

Kanoff and Niagara Pump Station Renovations

Final Report

Montara Water and Sanitary District
State Water Board CBI Project No. 313
Grant Agreement No. 06-123-550-0

December 2008



NUTE

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Montara Water and Sanitary District
 State Water Board Clean Beaches Initiative Grant Program
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KANOFF AND NIAGARA PUMP STATIONS
 MONTARA WATER AND SANITARY DISTRICT
 SAN MATEO COUNTY, CALIFORNIA

FINAL REPORT

December 31, 2008

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Project Setting and Existing Monitoring

The Kanoff Pump Station is located adjacent to Montara State Beach, between Highway One and the public beach. It is located at the intersection of Cabrillo Hwy. and First Street in the northwest corner of the community of Montara. The pump station is approximately 100 yards north of public parking, a restaurant, and abuts a beach access pedestrian path. It is adjacent to Montara State Beach, where the San Mateo County Environmental Health Department (SMCEH) conducts weekly monitoring for bacteria indicators in the ocean surf. The location of the pump station and this beach monitoring are indicated on Figure 1.

The Niagara Pump Station is near a 60-foot-high cliff above the Pacific Ocean. The Fitzgerald Marine Reserve includes the rocky coastline and tidepools at the base of this cliff. The pump station is situated at the western end of Niagara Street, located between four residences. The San Mateo County Environmental Health Department (SMCEH) conducts weekly monitoring at the Fitzgerald Marine Reserve beach located just south, down-current from this cliff. The location of the pump station and this beach monitoring are indicated on Figure 1.

The surface drainage from both pump stations flows toward public beaches, where the SMCEH has ambient monitoring stations that measure bacteria levels in the receiving waters.

Runoff from the Kanoff Pump Station site, including any sewage overflows, flows directly onto a public beach. For illustration, photographs of the March 17, 2005 sewage overflow onto Montara State Beach, adjacent to the Kanoff Pump Station, are included below as Figures 2 and 3. This overflow did not reach the ocean by surface runoff, and the raw, diluted sewage percolated into the sand and did not likely result in any water quality exceedances due to the filtering effect of the beach sand. Nevertheless, the overflow posed an obvious public health risk to users of the beach that day.

Since 2000, three sewage overflows have occurred at Kanoff Pump Station, with one spill reaching the ocean waters. The latest spill occurred on March 17, 2005, and Figures 2 and 3 show the footprint of this spill on the adjacent public beach. The Kanoff Pump Station is pictured in Figure 4 (pre-project) and Figure 5 (post-project, March 2008).

Runoff from the Niagara Pump Station site, including any sewage overflows, flows as sheet runoff toward a 60-foot-high cliff above the ocean. No overflows have been reported at this pump station since 2000.

Figures 6 and 7 show the Niagara Pump Station before and after the project completion in December 2007. Figure 8 shows the proximity of the station to the ocean cliff.

Pump Station Capacity

The renovation of the two pump stations had nothing to do with increasing capacity, but was focused solely on rehabilitation. The capacity of both pump stations is the same before and after project completion. Any pump station failures in the past were related to equipment age and condition. A capacity increase would lead to problems downstream of the pump station due to bottlenecks in the system en route to the Sewer Authority Mid-Coastside (SAM) wastewater treatment plant.

Pre-project the electrical motor control center was a hodgepodge assembly that periodically malfunctioned. The pumps and motors were past their useful life, rusted by the constant exposure to salt air. The engine generator malfunctioned due to exposure and age, and a temporary generator for backup power was in service at the time of renovation. This generator has been replaced. The pumps were operated on-off; there were no variable frequency drives (VFDs) to meter flow to the downstream sections of the sewer system. The downstream manhole was prone to overflows due to shock loading of the sewer, which is throttled due to development constraints by the Coastal Commission and the San Mateo County coastal permitting process.

The history of sanitary sewer overflows at the Kanoff Pump Station was related to aging and deterioration of equipment. No overflows were due to lack of capacity of the pump station. Increasing pumping capacity could have a detrimental effect on water quality by over-taxing the downstream sewers that lead to the SAM plant. The sewers between the subject pump stations and the treatment plant have been limited from increasing capacity due to coastal development restrictions and concerns about overloading the treatment plant.

Pump Station Renovations

The Kanoff pump station project included the removal of the existing below grade steel pump station structure and installation of a new concrete pump pit with two 30-horsepower submersible pumps. A third 30 horsepower submersible pump was installed in the existing concrete wet well ahead of the pump station. A valve pit was constructed to house the plug valves and check valves as necessary to tie into the double force mains which pump south along Highway 1 to the Montara Pump Station. The engine generator was replaced with a new 120 kilowatt engine generator within the existing building. New electrical equipment was installed.

The pump station improvements included VFDs to meter flow to downstream sewers, a preventive measure for overflows at those downstream locations.

The Kanoff pump station improvements include a ventilation system that minimizes salt air exposure. The building used to have louver/grating systems that constantly exposed the equipment to corrosive salt air from the adjacent ocean beach. The new system

automatically opens only when the backup generator is in operation when there's a power outage. This improvement should lengthen the service life expectancy of the pump station components.

The Niagara pump station needed replacement of the pump, motor and other associated items to make sure it remains in good working condition to serve the properties on the Vallemar Bluffs and as a backup to the Vallemar Pump Station.

The motor control centers at both the Kanoff and Niagara pump stations were completely renovated and engineered to be compatible. They have stainless steel enclosures to protect the electrical components for an extended time period relative to the pre-project condition.

Pump Station Startup

There were no reported problems during startup of the Kanoff and Niagara pump stations. There have been no overflows or equipment malfunctions in the twelve months of operation since they became operational in December 2007.

Project Cost and CBI Funding

The final construction cost was \$1,409,265. The District originally sought to obtain about 25% of this cost in grant funding. With an initial construction cost estimate of \$1,000,000, the District applied for and obtained a \$250,000 from the State Water Board's Clean Beaches Initiative (CBI) Grant Program. The grant ended up covering 17.7% of the construction cost. The remaining 82.3% of the project construction cost and all the professional consulting and personnel costs were borne by ratepayers of the Montara Water and Sanitary District as the local share. This local share comprised 85% of the project cost, with the grant covering about 15% of the total project cost. Table 1, below, is a budget summary of the total project cost, including design, construction, and reporting.

Table 1 – Budget Summary

		PROP 40	MATCH	TOTAL
Personnel Services (includes benefits)				
<u>Class</u>	<u>Hours</u>	<u>Wage/Hour</u>		
General Manager	235	\$85.25	\$20,035	
District Clerk	29.5	\$65.25	\$1,925	
TOTAL			\$ 22,000	\$ 22,000
Professional and Consultant Services (Engineering Design, Construction Review, Grant Management, Environmental Permitting, Geologic Testing, Electrical Engineering)			\$ 239,372	\$ 239,372
Construction (contracted services)		<u>\$250,000</u>	<u>\$1,159,635</u>	<u>\$1,409,635</u>
<u>TOTAL</u>		<u>\$250,000</u>	<u>\$1,421,007</u>	<u>\$1,671,007</u>

Table of Items for Review

Table 2 – Items for Review

Item	DESCRIPTION	SUBMITTAL DATE
EXHIBIT A – SCOPE OF WORK		
1.0	QUALITY ASSURANCE PROJECT PLAN and MONITORING PLAN	
1.1	Quality Assurance Project Plan	November 2006
1.2	Monitoring Plan	November 2006
2.0	WORK TO BE PERFORMED BY GRANTEE	--
2.1	Project Design	Completed
2.1.2	As-Advertised Construction Documents	February 2007
2.1.4	Bid Summary, Proof of Advertising, and Construction Notice to Proceed	March 2007
2.2	Project Implementation	--
2.2.2	Photo documentation of construction at all phases	July 2007
3.0	REPORTING	
3.1	Annual Progress Summary	September 30, 2007 October 8, 2008
3.2	Draft Project Report	December 8, 2008
3.3	Final Project Report	December 31, 2008
EXHIBIT B – INVOICING, BUDGET DETAIL AND REPORTING PROVISIONS		
5.0	REPORTS	
5.1	Progress Reports by the twentieth (20 th) of the month following the end of the calendar quarter (March, June, September, and December)	September 2007 December 2007 March 2008 June 2008 September 2008
5.2	Grant Summary Form	July 2007
5.3	Natural Resource Projects Inventory Project Survey Form	December 2008
EXHIBIT C – SWRCB GENERAL CONDITIONS		
# 6	Copy of Final CEQA/NEPA Documentation Any activity in the scope of work subject to CEQA cannot begin prior to receipt of environmental clearance from the SWRCB.	October 2005
EXHIBIT D – GRANT PROGRAM TERMS & CONDITIONS		
#5	Monitoring and Reporting Plan	Approved March 2007

Monitoring Analysis – Number of Overflows

As expected the renovation of the two pump stations, especially the Kanoff Station, has resulted in the prevention of sanitary sewer overflows from these facilities. Tables 1 through 3 below list all the sanitary sewer overflows in the District pre-project (2000-2006) and post-project (2007-2008). The pump stations were operational on December 11, 2007. The certification of completion at Kanoff was delayed until March 2008 when the backup generator was fully installed, but the station has been operating for about one year as of the date of this report.

Table 3 – Overflows in Montara Sanitary District, 2000-2006

Date	Volume of Overflow (gallons)	Location of Overflow	To Ocean
2/13/2000	Unknown	Montara Pump Station	Yes
5/7/2000	116,000	Montara Pump Station	Yes
6/24/2000	300	Nevada @ N. Lake St.	Yes
12/1/2001	Unknown	Montara Pump Station	Yes
12/2/2001	Unknown	Montara Pump Station	Yes
2/26/2002	100,000	Kanoff Pump Station	Beach
2/15/2003	15,000	Kanoff Pump Station	Yes
12/29/2003	?	Montara Pump/Storm Water Retention Station	Yes
3/17/2005	<10,000	Kanoff Pump Station	Beach

Table 4 – Overflows in Montara Sanitary District, 2007-2008

Date	Volume of Overflow (gallons)	Cause	Location of Overflow	To Ocean
1/19/2008	15	Pressure Difference at Lateral	Cabrillo & 7th	No
4/28/2008	20	Roots	13th & Farallone	No
5/5/2008	324.3	Plastic Bags	Carlos & Stetson	No
9/28/2008	2	Grease	121 Bernal	No
10/5/2008	100	Rags	560 Kanoff	No
10/7/2008	80	Roots	391 6th	No

Table 5 – Summary Table: Number of Overflows Pre- and Post-Project

	Kanoff Pump Station		Niagara Pump Station	
	Pre-Project 2000-2006	Post-Project 2007-2008	Pre-Project 2000-2006	Post-Project 2007-2008
No. Of Overflows	3	0	0	0

Monitoring Analysis – Beach Monitoring

Beach Postings and Closures

There were no beach closures posted at Montara State Beach or Fitzgerald Marine Reserve during the post-project monitoring period.

Bacteriological Monitoring

As a secondary indicator, bacteriological monitoring conducted by San Mateo County Environmental Health Department (SMCEH) was reviewed to determine whether water quality at the beaches has generally improved before and after the pump station projects. Because any adverse effects due to the pump stations is episodic, these ambient data based on weekly grab samples are not really expected to respond to changes in pump station reliability.

The results tabulated in Appendix A show that beach water quality in the vicinity of the pump stations did not measurably change before and after project completion, as expected. The results of the comparison area summarized below.

The following water quality standards from the California Ocean Plan apply.

Single sample standards:

<i>Total Coliforms</i>	<i>10,000 organisms/100ml</i>
<i>Fecal Coliforms (E. coli)</i>	<i>400 organisms/100ml</i>
<i>Enterococci</i>	<i>104 organisms/100ml</i>
<i>Fecal:Total Coliform Ratio > 1000 Total Coliforms if ratio > 0.1</i>	

30-day Log Mean standards:

<i>Enterococci</i>	<i>35 organisms/100ml</i>
<i>Total Coliforms</i>	<i>1,000 organisms/100ml</i>
<i>Fecal Coliforms</i>	<i>200 organisms/100ml</i>

Data were compared between the wet season months (January-March) and dry season months (May-October) of consecutive years 2007 and 2008 to detect any change in water quality before and after project completion.

Montara State Beach

At Montara State Beach, adjacent to the Kanoff Pump Station, no water quality standards were exceeded in the year before and year after the pump station improvements. The bacterial levels in wet and dry seasons, before and after the project, were extremely low reflecting excellent water quality from a bacterial standpoint.

Comparing the two wet seasons, the median of bacteria levels was the same pre- and post-project. The 90th percentile value of the fecal and total coliform data was slightly higher in 2008 compared to 2007, driven by higher values detected in the January 28, 2008 sampling event.

Montara State Beach bacteria levels were about the same in the dry seasons of 2007 (pre-project) and 2008 (post-project). The only difference was that the total coliform 90th percentile value came down from 19 MPN/100ml to 10 MPN/100ml, which are very low values reflecting excellent water quality.

The differences in bacteria levels at Montara State Beach between both the wet and dry seasons of 2007 and 2008 are so small that they are considered insignificant.

James Fitzgerald Marine Reserve

At James Fitzgerald Marine Reserve, downstream from both the Niagara and Kanoff pump stations (see Figure 1), the water quality is not as good as at Montara State Beach, and several exceedances of the water quality standard were noted.

In the wet season of 2007, before the pump station improvement projects, the highest number of water quality exceedances were noted. There were six (6) separate exceedances of bacterial standards, including one exceedance of the single sample fecal coliform standard, two exceedances of the 1,000 MPN/100ml total coliform sample (applicable because fecal:total ratio exceeded 0.1 at the time), two exceedances of the enterococci single sample standard and three exceedances of the enterococci log mean standard.

In 2008 wet season, there was only one exceedance of the enterococci single sample standard on January 28, 2008, during a series of storms that caused sanitary sewer overflows around the San Francisco Bay Area. The sampling on this day also drove the 90th percentile coliform values higher than seen in 2007, but the lower median values of fecal and total coliform of 2008 speak to better overall water quality. The lower number of exceedances at this beach in 2008 compared to 2007 is probably due to lower number of large storms in 2008 compared to 2007. As noted in the 2002 303(d) list report by the Regional Water Board, the water quality at this beach is strongly influenced by the numerous horse boarding facilities in the area along San Vicente Creek. With little or no rainfall after February of 2008, there was a dry March and therefore lower number of water quality exceedances.

The dry season data from the successive summers of 2007 and 2008 at James Fitzgerald Marine Reserve beach were virtually identical. One exceedance of the fecal coliform single sample standard was recorded in 2007 (August 20) and an exceedance of both the fecal and total single sample standard was documented on one day in 2008 (July 8). The enterococci data were hard to distinguish, with the same median value in both summers. The median of the fecal coliform data from 2007 and 2008 were identical at a low 31 MPN/100ml. The median of the 2007 total coliform data was 98 MPN/100ml compared to the 2008 total coliform data at 52 MPN/100ml, suggesting a slight decline in coliform density between the years, which would be a corresponding slight improvement.

Conclusion

In conclusion, a comparison of the bacterial data pre-project and post-project show no discernible differences related to pump station improvements. If anything, there appears to be a slight improvement in water quality between 2007 and 2008 from a bacteriological point of view, but in the wet season at James Fitzgerald beach, that trend is probably due to lower rainfall in the winter of 2008. In the dry season it was difficult to show any change in overall water quality.

As expected, the pump station improvements did not result in any clear signal in the bacterial water quality data from the nearby beaches. The purpose of the project was to prevent sanitary sewer overflows due to pump station failures. In the cases of Kanoff and Niagara pump stations, the historic water quality problems were related to a few episodic events attributable to failing equipment and not to any chronic loss of untreated wastewaters nor any capacity issues in high wet weather flows. It is therefore no surprise that the ambient water quality monitoring did not detect a signal from the routine upgrading of the pumping facilities.

No overflows have occurred since the improvements, meeting the goal of the project. In preventive maintenance projects such as the Kanoff and Niagara pump station renovations, water quality monitoring is not a good indicator of success. It is hoped that ambient water quality monitoring would not ever detect problems related to aging pump station facilities; when it does, problems have progressed far beyond a threshold that is needed to protect public health on California's public beaches. Preventive work on sanitary sewer systems such as this project needs to occur long before a point is reached where ambient beach monitoring detects a bacteriological signal.

Contact Information

For more information about the pump station renovations, monitoring information, or the contents of this report, please feel free to contact the persons below:

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Figure 1: Map of County Bacteria Monitoring and Pump Station Locations

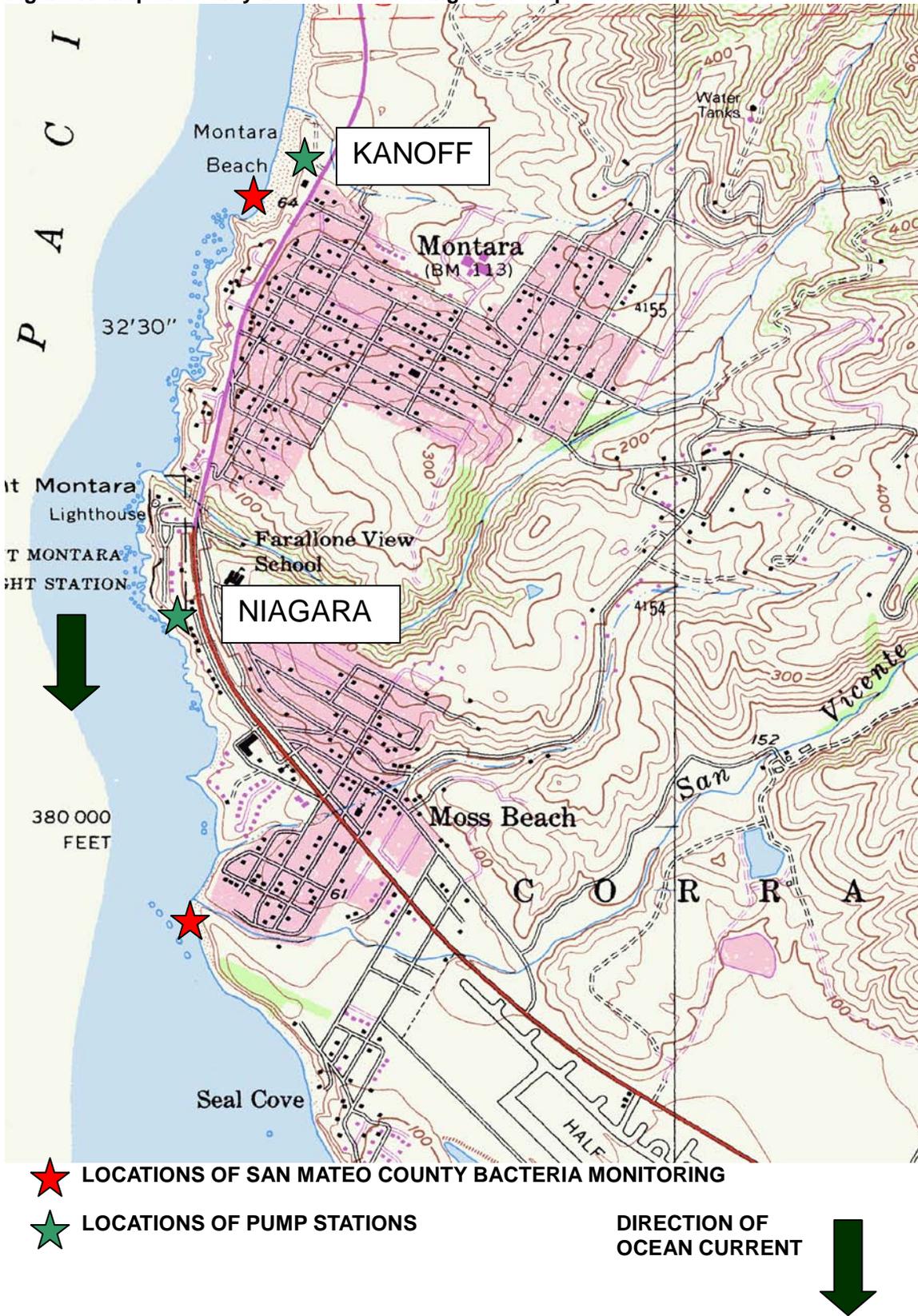


Figure 2: View Facing South of March 17, 2005 Overflow from Kanoff Pump Station to Montara State Beach



Figure 3: View of March 17, 2005 Overflow from Kanoff Pump Station to Beach



Figure 4: Kanoff Pump Station (Pre-Project)



Figure 5: Kanoff Pump Station (Post-Project)



Figure 6: Niagara Pump Station (Pre-Project)



Figure 7: Niagara Pump Station (Post-Project)



Figure 8: Niagara Pump Station Vicinity, Facing West



APPENDIX A – Beach Monitoring Data Analysis

SAN MATEO COUNTY ENVIRONMENTAL HEALTH DEPT.

MONTARA STATE BEACH
JAMES FITZGERALD MARINE RESERVE BEACH

2007-2008

**MONTARA STATE BEACH MONITORING - WET SEASON
PRE-PROJECT DATA - JAN-MAR 2007**

Date	Fecal Coliform		Total Coliform		Fecal:Total Ratio	Enterococci		
	Single Sample	30-day Log Mean	Single Sample	30-day Log Mean		Single Sample	30-day Log Mean	
1/2/2007	<	10		10	1.00	<	10	
1/8/2007	<	10		52	0.19	<	10	
1/22/2007	<	10	<	10	1.00	<	10	
1/29/2007	<	10	<	10	1.00	<	10	
1/29/2007	<	10	10.0	10	13.9	1.00	10.0	
2/5/2007	<	10	10.0	10	13.9	1.00	10.0	
2/13/2007	<	10	10.0	10	10.0	1.00	10.0	
2/20/2007	<	10	10.0	10	10.0	1.00	10.0	
2/26/2007		10	10.0	52	13.9	0.19	10.0	
3/5/2007		10	10.0	20	16.0	0.50	10.0	
3/12/2007	<	10	10.0	10	16.0	1.00	10.0	
3/19/2007	<	10	10.0	10	16.0	1.00	10.0	
3/26/2007	<	10	10.0	10	16.0	1.00	10.0	
3/26/2007	<	10	10.0	10	11.5	1.00	10.0	
No. of Samples		14	10	14	10		14	10
Median		10		10			10	
90th Percentile		10		42.4			10	
WQ Std.		400	200	10000*	1000		104	35
				*1000 if Fecal:Total >0.1				
No. of Exceedances		0	0	0	0		0	0
Exceedance Frequency		0.0%	0.0%	0.0%	0.0%		0.0%	0.0%

MONTARA STATE BEACH MONITORING - WET SEASON

POST-PROJECT DATA - JAN-MAR 2008

Date	Fecal Coliform		Total Coliform		Fecal:Total Ratio	Enterococci				
	Single Sample	30-day Log Mean	Single Sample	30-day Log Mean		Single Sample	30-day Log Mean			
1/2/2008	<	10		10	1.00	<	10			
1/7/2008	<	10		10	1.00		10			
1/15/2008		10		20	0.50	<	10			
1/22/2008	<	10	<	10	1.00	<	10			
1/28/2008		41	13.3	1720	32.2	0.02	64	14.5		
2/4/2008		10	13.3	52	44.7	0.19	10	14.5		
2/11/2008	<	10	13.3	73	66.6	0.14	<	10	14.5	
2/19/2008		20	15.2	20	66.6	1.00	<	10	14.5	
2/25/2008	<	10	15.2	<	10	66.6	1.00	<	10	14.5
3/3/2008	<	10	11.5	<	10	23.8	1.00	<	10	10.0
3/10/2008	<	10	11.5	<	10	17.1	1.00	<	10	10.0
3/17/2008	<	10	11.5	<	10	11.5	1.00	<	10	10.0
3/24/2008	<	10	10.0	<	10	10.0	1.00	<	10	10.0
3/31/2008	<	10	10.0	<	10	10.0	1.00	<	10	10.0
No. of Samples		14	10	14	10		14	10		
Median		10		10			10			
90th Percentile		17		66.7			10			
WQ Std.		400	200	10000*	1000		104	35		
				*1000 if Fecal:Total >0.1						
No. of Exceedances		0	0	0	0		0	0		
Exceedance Frequency		0.0%	0.0%	0.0%	0.0%		0.0%	0.0%		

MONTARA STATE BEACH MONITORING - DRY SEASON

PRE-PROJECT DATA - MAY-OCT 2007

Date	Fecal Coliform		Total Coliform		Fecal:Total Ratio	Enterococci			
	Single Sample	30-day Log Mean	Single Sample	30-day Log Mean		Single Sample	30-day Log Mean		
5/7/2007	<	10		20	0.50	<	10		
5/14/2007	<	10	<	10	1.00	<	10		
5/21/2007	<	10	<	10	1.00	<	10		
5/29/2007		10	10.0	10	11.9	1.00	10	10.0	
6/4/2007	<	10	10.0	10	10.0	1.00	<	10	10.0
6/12/2007		10	10.0	10	10.0	1.00	<	10	10.0
6/18/2007	<	10	10.0	10	10.0	1.00	<	10	10.0
6/26/2007	<	10	10.0	10	10.0	1.00	<	10	10.0
7/2/2007	<	10	10.0	10	10.0	1.00	<	10	10.0
7/10/2007	<	10	10.0	10	10.0	1.00	<	10	10.0
7/16/2007	<	10	10.0	10	10.0	1.00	<	10	10.0
7/30/2007	<	10	10.0	10	10.0	1.00	<	10	10.0
8/9/2007	<	10	10.0	10	10.0	1.00	<	10	10.0
8/13/2007	<	10	10.0	10	10.0	1.00	<	10	10.0
8/20/2007	<	10	10.0	10	10.0	1.00	<	10	10.0
8/27/2007	<	10	10.0	10	10.0	1.00	<	10	10.0
9/4/2007	<	10	10.0	20	11.9	0.50	<	10	10.0
9/10/2007	<	10	10.0	10	11.9	1.00	<	10	10.0
9/24/2007	<	10	10.0	31	15.8	0.32	<	10	10.0
10/1/2007	<	10	10.0	10	15.8	1.00	<	10	10.0
10/9/2007		10	10.0	10	13.3	1.00	<	10	10.0
10/15/2007		10	10.0	10	13.3	1.00	<	10	10.0

No. of Samples	22	19	22	19		22	19
Median	10		10			10	
90th Percentile	10		19			10	
WQ Std.	400	200	10000*	1000		104	35
			*1000 if Fecal:Total >0.1				
No. of Exceedances	0	0	0	0		0	0
Exceedance Frequency	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%

MONTARA STATE BEACH MONITORING - DRY SEASON

POST-PROJECT DATA - MAY-OCT 2008

Date	Fecal Coliform		Total Coliform		Fecal:Total Ratio	Enterococci		
	Single Sample	30-day Log Mean	Single Sample	30-day Log Mean		Single Sample	30-day Log Mean	
5/5/2008	<	10	<	10	1.00	<	10	
5/13/2008	<	10	<	10	1.00	<	10	
5/19/2008	<	10	<	10	1.00	<	10	
5/29/2008	<	10	10.0	10	10.0	1.00	10	10.0
6/2/2008	<	10	10.0	10	10.0	1.00	10	10.0
6/10/2008	<	10	10.0	10	10.0	1.00	10	10.0
6/16/2008	<	10	10.0	10	10.0	1.00	10	10.0
6/25/2008	<	10	10.0	10	10.0	1.00	10	10.0
6/30/2008	<	10	10.0	10	10.0	1.00	10	10.0
7/8/2008	<	10	10.0	10	10.0	1.00	10	10.0
7/14/2008	<	10	10.0	10	10.0	1.00	10	10.0
7/21/2008	<	10	10.0	10	10.0	1.00	10	10.0
7/28/2008	<	10	10.0	10	10.0	1.00	10	10.0
8/4/2008	<	10	10.0	10	10.0	1.00	10	10.0
8/11/2008		10	10.0	10	10.0	1.00	10	10.0
8/18/2008	<	10	10.0	10	10.0	1.00	10	10.0
8/25/2008		10	10.0	10	10.0	1.00	10	10.0
9/2/2008	<	10	10.0	10	10.0	1.00	10	10.0
9/8/2008		10	10.0	52	15.1	0.19	10	10.0
9/15/2008	<	10	10.0	10	15.1	1.00	10	10.0
9/25/2008	<	10	10.0	10	15.1	1.00	10	10.0
9/29/2008	<	10	10.0	10	15.1	1.00	10	10.0

No. of Samples	22	19	22	19		22	19
Median	10		10			10	
90th Percentile	10		10			10	
WQ Std.	400	200	10000*	1000		104	35
			*1000 if Fecal:Total >0.1				
No. of Exceedances	0	0	0	0		0	0
Exceedance Frequency	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%

**JAMES FITZGERALD MARINE RESERVE BEACH MONITORING - WET SEASON
PRE-PROJECT DATA - JAN-MAR 2007**

Date	Fecal Coliform		Total Coliform		Fecal:Total Ratio	Enterococci		
	Single Sample	30-day Log Mean	Single Sample	30-day Log Mean		Single Sample	30-day Log Mean	
1/2/2007	10		20		0.50	<	10	
1/8/2007	432		1250		0.35		124	
1/17/2007	10		31		0.32	<	10	
1/22/2007	199		402		0.50	<	10	
1/29/2007	85	59.3	121	130.4	0.70		10	16.5
2/12/2007	31	74.3	146	194.1	0.21		20	19.0
2/20/2007	85	53.7	404	154.8	0.21		42	15.3
2/26/2007	10	53.7	171	217.8	0.06		53	21.4
3/5/2007	212	54.4	1376	278.6	0.15		222	39.7
3/12/2007	74	52.9	97	266.6	0.76		10	39.7
3/19/2007	86	64.8	228	291.4	0.38		42	46.1
3/27/2007	97	66.6	169	244.8	0.57		10	34.6

No. of Samples	12	8	12	8		12	8
Median	85		170			15	
90th Percentile	210.7		1165.4			116.9	
WQ Std.	400	200	10000*	1000		104	35
			*1000 if Fecal:Total >0.1				
No. of Exceedances	1	0	2	0		2	3
Exceedance Frequency	8.3%	0.0%	16.7%	0.0%		16.7%	37.5%

**JAMES FITZGERALD MARINE RESERVE BEACH MONITORING - WET SEASON
POST-PROJECT DATA - JAN-MAR 2008**

Date	Fecal Coliform		Total Coliform		Fecal:Total Ratio	Enterococci		
	Single Sample	30-day Log Mean	Single Sample	30-day Log Mean		Single Sample	30-day Log Mean	
1/2/2008	10		10		1.00	<	10	
1/7/2008	62		96		0.65		10	
1/14/2008	389		644		0.60		31	
1/22/2008	63		450		0.14	<	10	
1/28/2008	73	64.4	3255	246.3	0.02		207	23.0
2/6/2008 <	10	64.4	122	406.1	0.08	<	10	23.0
2/11/2008	10	44.7	110	417.3	0.09		10	23.0
2/25/2008	373	44.3	368	373.1	1.01	<	10	18.3
3/3/2008	31	38.5	31	218.5	1.00	<	10	18.3
3/5/2008	173	45.7	2187	201.8	0.08		10	10.0
3/10/2008 <	10	45.7	10	122.4	1.00		31	12.5
3/17/2008	41	60.6	74	113.0	0.55	<	10	12.5
3/24/2008	63	42.5	350	111.9	0.18	<	10	12.5
No. of Samples	13	9	13	9			13	9
Median	62		122				10	
90th Percentile	333		1878.4				31	
WQ Std.	400	200	10000*	1000			104	35
			*1000 if Fecal:Total >0.1					
No. of Exceedances	0	0	0	0			1	0
Exceedance Frequency	0.0%	0.0%	0.0%	0.0%			7.7%	0.0%

**JAMES FITZGERALD MARINE RESERVE BEACH MONITORING - DRY SEASON
PRE-PROJECT DATA - MAY-OCT 2007**

Date	Fecal Coliform		Total Coliform		Fecal:Total Ratio	Enterococci			
	Single Sample	30-day Log Mean	Single Sample	30-day Log Mean		Single Sample	30-day Log Mean		
5/1/2007		109		1850	0.06		31		
5/7/2007	<	10		30	0.33	<	10		
5/15/2007		63		121	0.52		10		
5/21/2007	<	10	28.8 <	10	90.5	1.00	<	10	13.3
5/29/2007		216	34.2	292	57.1	0.74	<	10	10.0
6/4/2007	<	10	34.2	30	57.1	0.33	<	10	10.0
6/11/2007		20	25.6	74	50.5	0.27		10	10.0
6/18/2007		20	30.5	31	67.0	0.65	<	10	10.0
6/25/2007		52	21.4	98	51.0	0.53	<	10	10.0
7/2/2007		74	35.2	158	77.2	0.47	<	10	10.0
7/9/2007		31	39.3	173	95.5	0.18		10	10.0
7/16/2007	<	10	33.0 <	10	71.9	1.00	<	10	10.0
7/30/2007		201	46.3	495	107.9	0.41		31	13.3
8/9/2007		132	53.6	171	110.0	0.77		42	19.0
8/13/2007	<	10	40.4	20	64.1	0.50	<	10	19.0
8/20/2007		568	110.8	717	186.7	0.79		31	25.2
8/22/2007		10	52.3	20	83.7	0.50	<	10	19.0
8/28/2007		109	49.9	135	78.9	0.81	<	10	13.3
9/4/2007		20	59.3	97	117.1	0.21	<	10	13.3
9/10/2007		20	25.7	52	60.7	0.38	<	10	10.0
9/17/2007	<	10	25.7	41	72.7	0.24	<	10	10.0
9/24/2007		98	25.0	135	72.7	0.73	<	10	10.0
10/1/2007		52	31.8	148	80.8	0.35	<	10	10.0
10/9/2007		20	31.8	74	88.2	0.27	<	10	10.0
10/15/2007		354	77.5	529	167.2	0.67		31	13.3
10/22/2007		10	43.8	20	103.8	0.50	<	10	13.3
10/30/2007		86	49.7	122	98.9	0.70	<	10	13.3
No. of Samples		27	24	27	24			27	24
Median		31		98				10	
90th Percentile		207		508.6				31	
WQ Std.		400	200	10000*	1000			104	35
				*1000 if Fecal:Total >0.1					
No. of Exceedances		1	0	0	0			0	0
Exceedance Frequency		3.7%	0.0%	0.0%	0.0%			0.0%	0.0%

**JAMES FITZGERALD MARINE RESERVE BEACH MONITORING - DRY SEASON
PRE-PROJECT DATA - MAY-OCT 2008**

Date	Fecal Coliform		Total Coliform		Fecal:Total Ratio	Enterococci		
	Single Sample	30-day Log Mean	Single Sample	30-day Log Mean		Single Sample	30-day Log Mean	
5/5/2008	<	10	<	10	1.00	<	10	
5/13/2008	<	10	<	10	1.00	<	10	
5/19/2008		31		52	0.60	<	10	
5/19/2008		74		2595	60.6	<	10	10.0
5/29/2008		31		41	86.2	<	10	10.0
6/2/2008		30		41	122.7	<	10	10.0
6/9/2008	<	10		10	81.3	<	10	10.0
6/16/2008		30		30	26.6	<	10	10.0
6/23/2008		10		52	28.3	<	10	10.0
6/30/2008		52		84	33.8	<	10	10.0
7/7/2008		63		63	53.6	<	10	10.0
7/8/2008		3654	>	24192	285.6			10.0
7/14/2008		63		73	310.9	<	10	10.0
7/21/2008		52		85	311.8	<	10	10.0
7/28/2008		120		314	465.9	<	10	10.0
8/4/2008		63		262	150.3	<	10	10.0
8/11/2008		122		201	193.6	<	10	10.0
8/18/2008		31		52	171.2	<	10	10.0
8/25/2008		86		148	141.9	<	10	10.0
9/2/2008		10		98	111.0	<	10	10.0
9/8/2008	<	10	<	10	52.4	<	10	10.0
9/15/2008	<	10	<	10	34.7	<	10	10.0
9/22/2008	<	10		20	21.0	<	10	10.0
9/29/2008		10		10	11.9	<	10	10.0
10/14/2008	<	10		20	14.1		30	13.2
No. of Samples		25	22	25	22		24	22
Median		31		52			10	
90th Percentile		106.4		293.2			10	
WQ Std.		400	200	10000*	1000		104	35
				*1000 if Fecal:Total >0.1				
No. of Exceedances		1	0	1	0		0	0
Exceedance Frequency		4.0%	0.0%	4.0%	0.0%		0.0%	0.0%