COUNTY OF ORANGE

RESOURCES & DEVELOPMENT MANAGEMENT DEPARTMENT

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October 12, 2004

State Water Resources Control Board
Division of Clean Water Programs
1001 I Street
PO Box 944212
Sacramento, CA 94244

Attention: Bruce Locken, Water Resources Control Engineer

Subject: Aliso Beach CBI Project – Transmittal of Draft Final Report – Contract 01-227-550-0

Dear Bruce,

Please find attached two (2) hard copies of the Draft Final Report for the J01P28 Interim Water Quality Improvement Package Plant project and one CD containing the pdf file of the report. These are submitted for your review and comments. Please call Max Andersen at 714-834-3173 if you have any questions.

Very truly yours,

S. Y. Nasser FOR

Sonia Y. Nasser, P.E.
Chief, Watershed and Coastal Resources
Engineering and Project Management

MA:

Attachments:

Draft Final Report

AGREEMENT: 01-227-550-0

ALISO BEACH CLEAN BEACHES INITIATIVE

J01P28 Interim Water Quality Improvement Package Plant Best Management Practices

COUNTY OF ORANGE RESOURCES AND DEVELOPMENT MANAGEMENT DEPARTMENT WATERSHED AND COASTAL RESOURCES

Prepared By: Max Andersen, PE September 2004

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J01P28 Interim Water Quality Improvement Package Plant Best Management Practices

INTRODUCTION

The J01P28 Interim Water Quality Improvement Package Plant Best Management Practices (J01P28 IWQPP BMP) is a Clean Beaches Initiative project. It was executed in response to a San Diego Regional Water Quality Control Board (SDRWQCB) 13225 Directive to clean up Aliso Creek.

Aliso Creek is listed as a Category I (Impaired) Priority Watershed (Aliso-San Onofre, #18070301) in the California Unified Assessment List and the lower portion of Aliso Creek is designated as impaired for bacterial contamination on the Clean Water Act Section 303 (d). In addition, the San Diego Regional Water Quality Control Board has identified Aliso Creek as a target watershed for priority water quality enhancement efforts. The beneficial uses associated with Aliso Beach are recreational.

GOALS AND SCOPE OF PROJECT

The goal of this project is to reduce bacteria in Aliso Creek to REC 1 acceptable levels. Bacteria to be monitored are Total Coliform, Fecal Coliform, and Enterococcus. The expected improvements are reduction in bacterial contamination in Aliso Creek and reduced beach postings at Aliso Beach.

The purpose of the project is to treat approximately 100,000 gallons to 150,000 gallons per day of contaminated dry-weather urban runoff from a 60-inch storm drain (Facility No. J01P28) to REC 1 standards and, thereby, improve the water quality in Aliso Creek and at Aliso Beach.

PROJECT DESCRIPTION AND TECHNIQUES

The Aliso Creek Watershed covers 30.4 square miles of Orange County and includes portions of the cities of Aliso Viejo, Dana Point, Laguna Niguel, Laguna Woods, Laguna Beach, and Lake Forest. Aliso Creek originates in the Santa Ana Mountains and terminates at the Pacific Ocean at Aliso Beach in South Laguna. Figure 1 below shows the Clear Creek Systems, Inc. installation before it is screened in to blend with the surroundings. Figure 2 below represents a map of the development in the watershed.

Springdale Storm Drain (Facility J01P28) is a tributary to Aliso Creek. The storm drain is designed for a 25 year frequency storm of approximately 1400 cubic feet per second. The storm drain also conveys runoff water from a fully developed area of approximately 2 square miles in the city of Aliso Viejo. The volume of urban runoff water varies from approximately 60,000 gallons per day to approximately 130,000 gallons per day. The development is a mix of urban

residential, commercial, light industry, and community association green areas such as ball fields. The storm drain pipe is a 60 inch reinforced concrete pipe and the storm drain outlet is a rectangular reinforced concrete energy dissipater basin with the dimensions 40 feet long, 30 feet wide and with an end wall that is 5 feet high. The basin is located adjacent to the creek. Figure 3 represents an aerial map of the Springdale Storm Drain tributary.

In 2002, the County of Orange contracted for the installation of a Clear Creek Systems, Inc. (CCS) package plant treatment system in order to implement Best Management Practices (BMP) at the Springdale Storm Drain. The CCS treatment systems includes three (3) - 200 gallons tanks multi media filter, two (2) - 500 gallons tanks organo clay filters and two (2) ultra violet light disinfection chambers. The UV chambers consist of two (2) steel cylinders with four (4) -160 Watt - UV lamps in each cylinder. The cylinders are shown in figure 5. The filters and UV disinfection units were installed by Clear Creek Systems, Inc (CCS).

The package plant treatment system has three main phase:

- Sediment and debris removal
- Oils, pesticides, and trace metals removal
- Disinfection

The larger debris and trash removal is performed at the inlet strainer that is located in the basin. Sediment removal is performed in the basin and in the multimedia filter. The oils, pesticides and trace metals are removed via adsorption onto the Organoclay media and the ultra violet light chambers removes bacteria and viruses. The system began operation July 31, 2003.

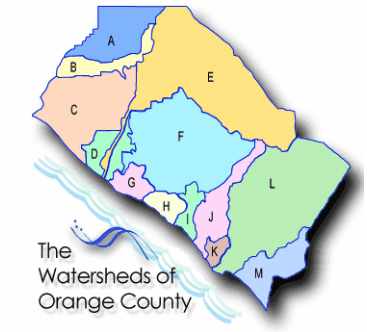
The package plant treatment system filters and disinfects approximately 100,000 gallons per day of urban runoff. The treated water is discharged at the storm drain outlet approximately 100 feet from the creek (the 100 feet distance is typical at dry weather flow conditions - at high storm flow conditions the creek reaches the storm drain outlet). See Figure 6. for the basin and discharge point.

The CCS equipment backwash function is pressure sensor controlled and will discharge the backwash water to the Moulton Niguel Water District (MNWD) sewer facility. Backwash of the filters is accomplished by using the available storm drain water. The permit for the discharge to the MNWD requires self monitoring and reporting on pesticides and heavy metals on a monthly sampling and testing program.

The County of Orange Resources and Development Management Department (RDMD) Environmental Resources (ER) samples for indicator bacteria and prepares the reporting and analysis. The reports are posted quarterly on the RDMD Website http://www.ocwatershed.com.

Figure 1. Completed Clear Creek Systems, Inc. (CCS) Package Treatment Plant Installation.

- At right are three (3) tanks - 30 inches in diameter and 60 inches high - containing the multi-media filter,
- In center are two (2) tanks - 48 inches in diameter and 72 inches high Organoclay filter,
- At left are the control panels and UV chambers.
- Immediately behind the CCS system is the storm drain outlet basin, and
- In front is a regional recreational bike trail



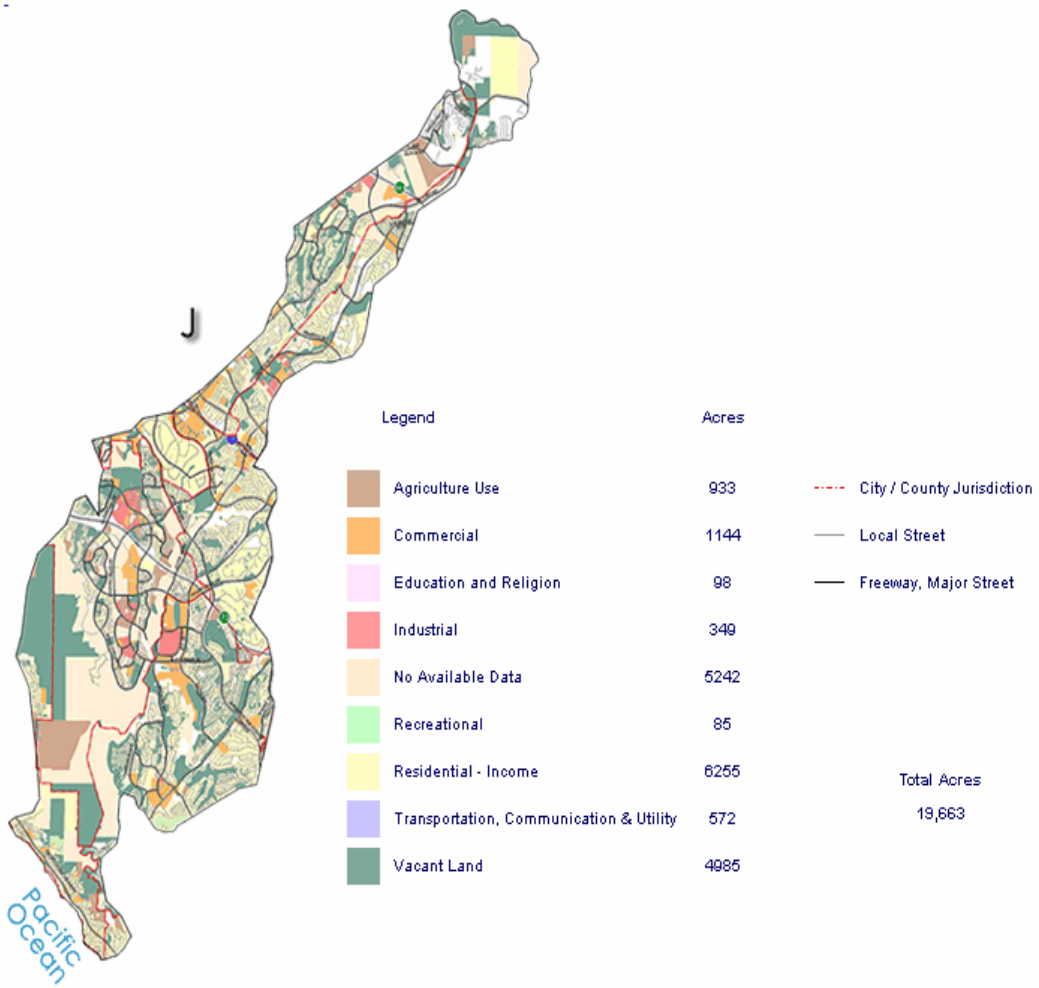


Figure 2. Aliso Creek Watershed

There are 13 watersheds in the County of Orange. Aliso Creek Watershed covers 30.4 square miles and is identified with the letter J. The watershed is near fully developed. Aliso Creek carries the Facility Number J01 and J01P28 identifies the storm drain called Springdale Storm Drain.

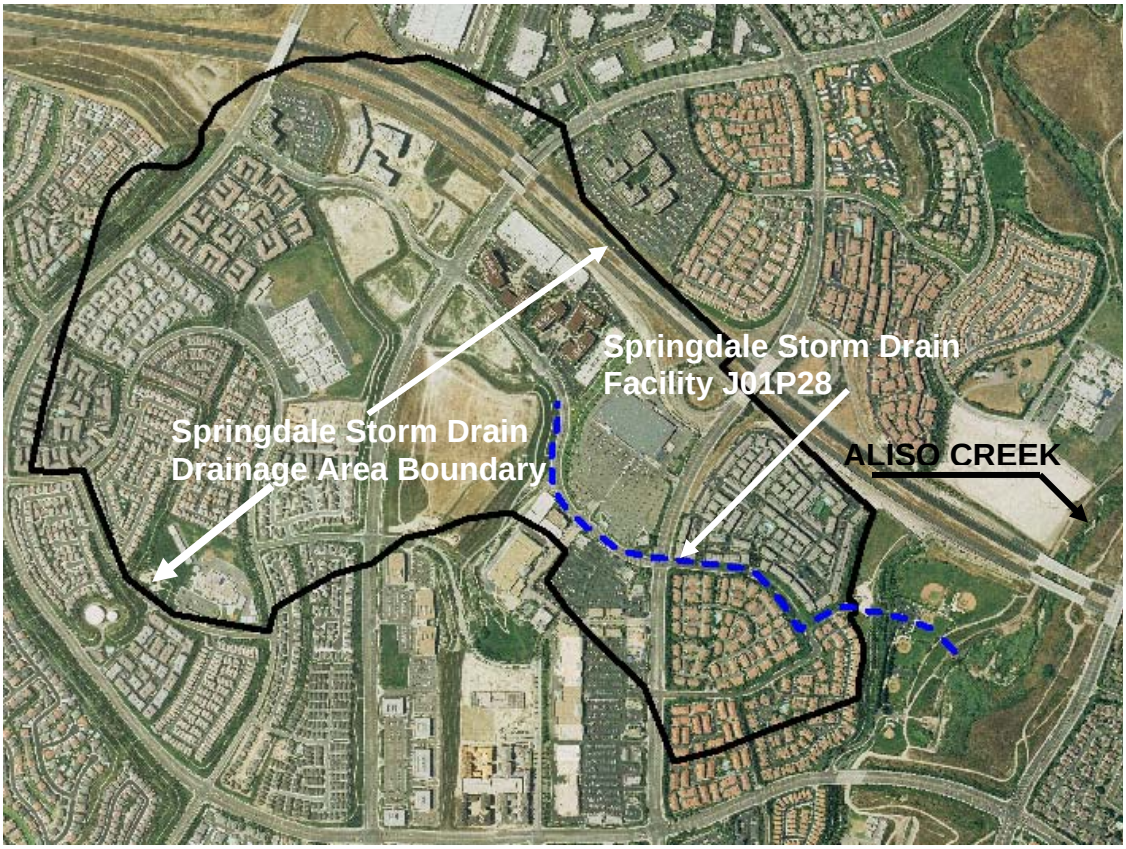


Figure 3. Springdale Storm Drain (J01P28) Drainage Area.

Figure 4 Before and After Photo.

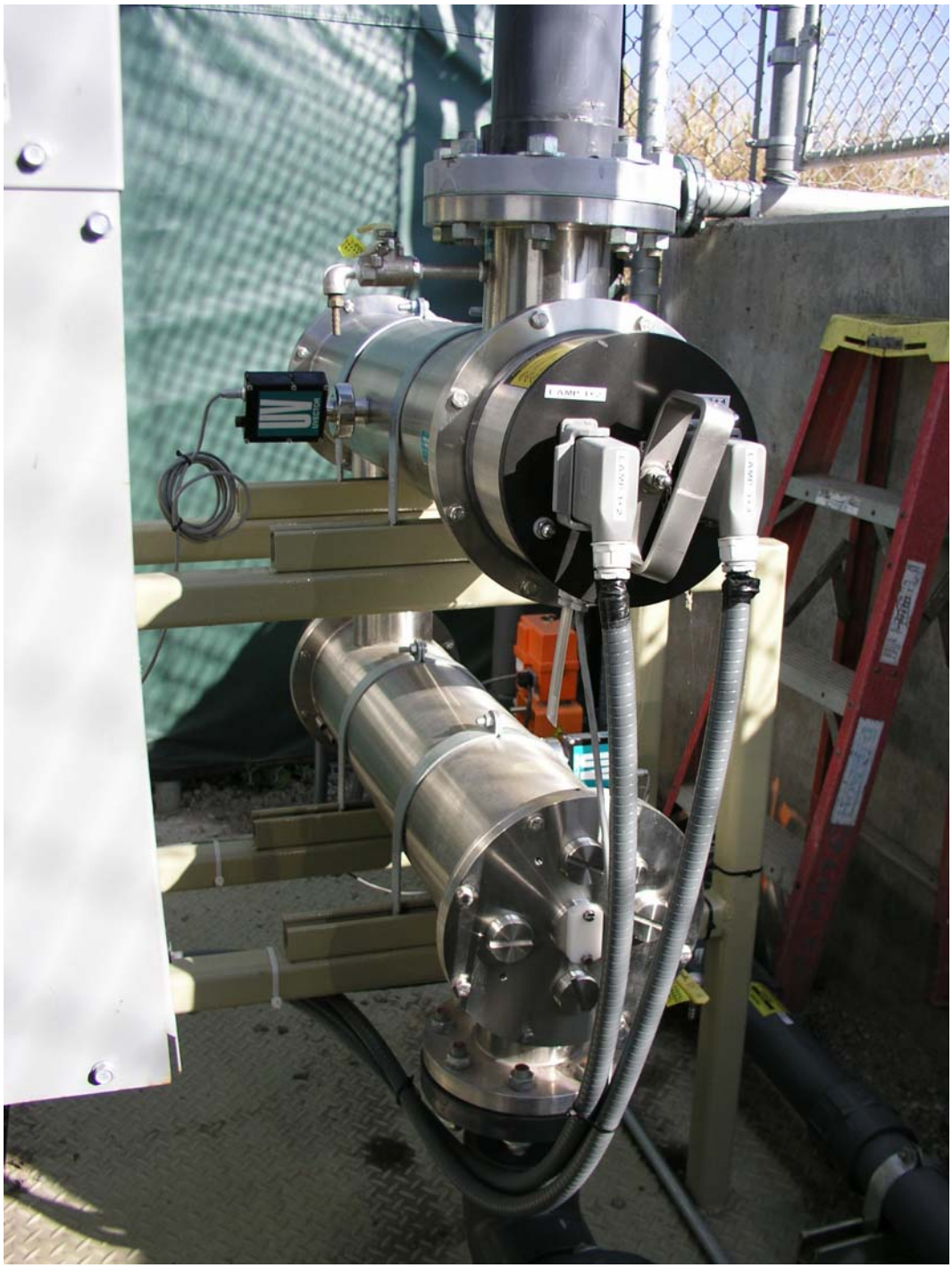


Figure 5. UV Cylinders.
Each of the stainless steel cylinders contain four (4) – ultra violet light lamps enclosed in protective quarts sleeves.

Figure 6. Energy dissipater end wall and Discharge Point for Treatment System Effluent

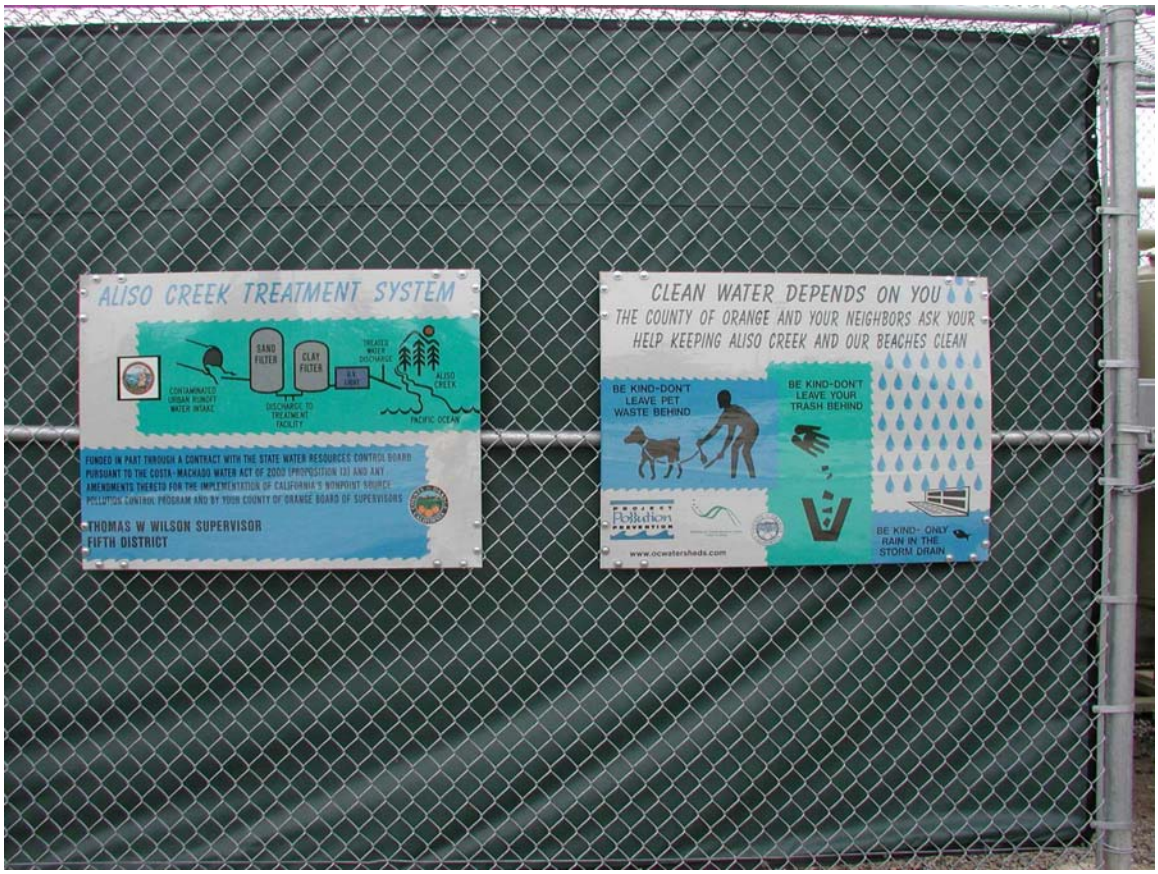


Figure 7. Information Signs

The informational signs are included as an educational effort and provide a funding disclaimer and a simple message about how to keep the environment cleaner.

SCHEDULED SUBMITTALS

DOCUMENTS SUBMITTED WITH REPORT NO. 1:

- Quarterly Progress Report
- Construction Agreement with disclaimer language
- Contract Summary Form
- Permits
- Plans and Special Provisions, AIT for August 6, 2002, Subcontract for construction

DOCUMENTS SUBMITTED WITH REPORT NO. 2

- Progress Payment Report No. 12
- Electrical Engineer's Certification
- Contract Change Order No. 1
- Contract Change Order No. 2
- Contract Change Order No. 3
- Notice of Completion
- Moulton Niguel Water District Special Wastewater Discharge Permit MNWD – N4 – 001
- Quality Assurance Plan
- Notice of Completion
- As-builts
- Operations and Maintenance Manual
- Monitoring Plan
- Monitoring Data from 7/31/03 to 9/03/03

DOCUMENTS SUBMITTED WITH REPORT NO. 3

- Results of Monitoring July to October 2003

DOCUMENTS SUBMITTED WITH REPORT NO. 4

- Results of Monitoring October to December 2003

ENVIRONMENTAL DOCUMENTATION AND PERMITS

The Revised Mitigated Negative Declaration (RMND No. 01-145) was adopted by the County of Orange Board of Supervisors on May 21, 2002 as adequate for the construction of the project and the Notice of Determination was filed on May 21, 2002

Fish and Game /Streambed Alteration Agreement 5-2002-0121 was received May 30, 2002.

Clean Water Act Section 401 Certification was received on June 13, 2002

MNWD permit for Nuisance water Special Waste Water Discharge Permit issued on March 24, 2003.

Electrical building permit was obtained on April 14, 2003.

MONITORING

The monitoring plan for the J01P28 project is consistent with the sampling plan that was forwarded to the Region 9 Regional Board on April 2, 2001 (in response to the Water Code Section 13225 Directive). That plan identified those drains with equivalent diameters greater than 39 inches that discharge to Aliso Creek or its tributaries (Sulphur Creek, English Canyon Creek, and Wood Canyon Creek) for sampling and bacteriological monitoring. The sites are sampled five times in each thirty day period. Sampling is conducted Monday through Friday unless rainfall occurs. If rainfall is predicted for a scheduled sampling day, that sampling is rescheduled.

South Orange County Wastewater Authority samples the surf zone at Aliso Beach. The results are listed on the OCHA website http://www.ocbeachinfo.com/downloads/reports/2003oceanreport.pdf and summarized in text format on the Historical data. Review of the data for the results at Sample Station C1, S8 and S9 is included in Figure No. 7. Sample station C1 is at the mouth of Aliso Creek, S8 is located ½ mile south of the mouth of the Aliso Creek and S9 is located ¼ mile south of Aliso Creek. As expected the water quality appears to improve in the surf zone with the distance from the mouth of the Aliso Creek as shown in Chart No. 5.

MONITORING DATA

The monitoring data is included in Appendix A.

TABLE No. 1 Through TABLE No. 3, identify the results of the sampling at the J01P28 and Aliso Creek confluence, upstream (U/S), downstream (D/S) and at the J01P28 sample location. The sample data includes the time period from beginning of July 2003 to end of June 2004. The corresponding graphs are included as Chart No. 1 through Chart No. 3.

TABLE No. 5, includes the data for the performance analysis of the Best Management Practices System at Springdale Storm Drain and includes the results from April 6, 2004 to June 29, 2004 for the sampling at five (5) locations related to the confluence between Springdale Storm Drain tributary (J01P28) and Aliso Creek (J01).

- influent to J01P28 CCS unit,
- effluent of J01P28 CCS unit,
- in J01P28 15 feet upstream of the confluence with Aliso Creek (J01),
- in Aliso Creek 25 feet upstream of the confluence with J01P28, and
- in Aliso Creek 25 feet downstream of the confluence with J01P28.

The report to the Region 9 Water Quality Control Board for April 04 to July 04 included an analysis of the data and stated that there is no significant increase in pollution of the creek at the confluence with J01P28 and that the CCS, Inc. treatment system is capable of reducing the concentration of fecal coliform geomean by 99%. The table values are included in TABLE No. 4. The substantial reduction in bacti concentration between influent and effluent indicates that the treatment system has succeeded in reducing the contribution of pollutants to Aliso Creek.

The Clear Creek System (CCS) at J01P28 is deactivated during the storm season. The permit to discharge the backwash water to the Moulton Niguel Water District sewer system does not include discharge of storm water. The Environmental Resources Section analyzed the performance of the CCS, Inc package treatment plant upon the reactivation of the system in April 04 and after the storm drain outlet basin had been cleaned out. Sampling for indicator bacteria recommenced on the J01P28 discharge before it enters the system (influent), immediately after it is processed (effluent), and approximately 15 feet before it reaches Aliso Creek. Sampling at Aliso Creek also continued 25 feet upstream and downstream of its confluence with J01P28 as part of the Directive monitoring program. This data was used to evaluate the effectiveness of the Clear Creek System and is included in TABLE 4.

Results from the CCS effluent were compared to results from the CCS influent to determine if the treatment system was successful in reducing bacteria levels during the quarter. The fecal coliform geomean of the effluent, 317 CFU/100mL, was found to be statistically significantly lower (ANOVA $\alpha = 0.05$) than the fecal coliform geomean of the influent, 77,414 CFU/100mL, with a 99.6% reduction.


Treasure Island Sign
Aliso Beach - North
ALISO CREEK
C1
S9
Aliso Beach - Middle
Aliso Beach Projection of Outfall
S8
Aliso Beach - South
Camel Point
Table Rock
STATION
Laguna Lido
9th Street/1000 Step Beach
CALIFORNIA
SOUTH ORANGE COUNTY WASTEWATER AUTHORITY SAMPLING STATIONS AT ALISO BEACH AND SOUTH LAGUNA
ORANGE COUNTY, CALIFORNIA
Three Arch Bay
ORANGE COUNTY
AREA ENLARGED
ALISO CREEK COUNTY BEACH

Figure 8.

The fecal coliform levels of the CCS effluent immediately after treatment were compared to fecal coliform levels of the effluent 15 feet before it meets Aliso Creek. The fecal coliform geomean of the effluent 15 feet before Aliso Creek, 2,575 CFU/100mL, was found to be statistically significantly higher (ANOVA α = 0.05) than the effluent immediately after treatment, 317 *CFU/100mL.* The water enters a ponded area after it is released from the CCS (See Figure 6), then flows for approximately 30 feet in a natural ditch into Aliso Creek. There are no inputs to the channel between the treatment plant and its confluence with Aliso Creek. This area is shaded. Regrowth may be a possible factor in the increase in bacteria levels between the two points. Table 4 also includes a schematic of the flow

Comparisons were conducted of fecal coliform levels in Aliso Creek upstream and downstream of its confluence with J01P28 to determine if there was an impact from J01P28. There was no significant difference (ANOVA α = 0.05) found between the quarterly geomean of levels upstream, 765 CFU/100mL, and the quarterly geomean of levels downstream, 1300 CFU/100mL. Thus there was no significant impact from the J01P28 input during the quarter, for the first spring quarter (April-June) in the four years of Directive monitoring.

The County continues to operate and maintain the Clear Creek system and evaluate its performance. Due to over-discharge from the backwash system to Moulton Niguel Water District (MNWD), the CCS was reconfigured to return the discharge to the retention basin during an automatic backwash. This has resulted in elevated bacteria levels in the influent to the CCS (fecal coliform geomean of 77,414 CFU/100mL). The system is manually backwashed weekly to MNWD.

The retention basin upstream of the CCS was cleaned out during the quarter. The organo clay media in two of the five filtration tanks of the CCS were replaced at the end of July 2004. These practices should reduce the frequency of automatic backwashing and reduce the levels of bacteria in the influent.

The surf zone monitoring is included in the historical data that is located on the HCA website:
http://www.ocbeachinfo.com/downloads/reports/2003oceanreport.pdf The data show that in year 2003 Aliso Beach had 5 AB411 period postings over 9 days for a total of 0.5 Beach Mile Days (BMD). The total available AB411 beach mile days for Aliso Beach were 428 BMDs. These postings represents one tenth of a percent. The small number of postings can be contributed to several efforts by the Cities and the County in cleaning up the watershed and is not entirely due to the installation and operation of the CCS system at J01P28.

The water at the mouth of the Aliso Creek has a higher concentration of bacti than the surf zone water at Aliso Beach Middle and/or Aliso Beach South as evidenced in Chart No. 5 (Page A-11) but it was not possible to relate the

monitoring results at the confluence to the monitoring results at the mouth of Aliso Creek.

EFFECTIVENESS IN REACHING GOALS:

The CCS, Inc. treatment system has the ability to treat the influent to REC 1 standards. However, bacterial regrowth in the effluent water occurs so rapidly that the treated water at the confluence with Aliso Creek that it would not be possible for the CCS, Inc. package plant treatment system alone to reduce the bacteria in Aliso Creek to REC 1 standards.

Two information signs were added to the CCS system enclosure in an effort to help educate the public and to help reduce vandalism. It appears to have been positively received by the public. County staff has only received encouraging comments from people passing the treatment system.

PROJECT DIFFICULTIES

Sole Source Contracting:

- The Coastal Commission staff report special condition stated Clear Creek Systems, Inc. or equivalent.
- Solution: Design consultant was directed to identify manufacturers of equivalent treatment systems and delivery times. When none other was available in the relatively short time frame, the Board of Supervisors approved the sole source contract.

Contractor Bonding Requirements:

- County of Orange requires sufficient bonds to allow bonding company to complete the project including warranties in the event the construction contractor defaults. The cost of bonding was not included in the contractor's proposal.
- Solution: Contractor was given additional time to negotiate the cost of bonds

Obtaining UL Certification on UV Control Cabinet:

- The UV disinfection equipment did not have UL certification. The electrical permit required specifically UL certification.
- Solution: The Contractor was given additional time to field certify the equipment by UL and subsequently when field certification was not possible, an electrical engineer certified in the state of California as contracted to prepare a certification that the equipment was installed in accordance with the California Electrical Code.

Protecting against Vandalism:

- The equipment had sustained minor damage, when several large rocks had been thrown over the construction security fencing prior to completion of installation.
- Solution: A contract change order was approved to completely enclose the equipment with an 8 feet high security chain link fence including an over head chain link fence.

Defending Project against Water Rights Claims:

- During the environment document preparation phase, a water rights claim was filed against the project:
- Solution: The County of Orange hired a special counsel to defend against the claim and on March 6, 2002 the State Water Resources Control Board found that that use of the urban runoff water in a storm drain does not require a water rights permit unless the water is diverted from a natural water course.

Complying With the MNWD Permit Requirements:

- The equipment performs automatic backwashing of the multimedia filter and discharge the backwash to the Moulton Niguel Water District (MNWD). Backwashing limitation were repeatedly exceeded.
- Solution: Work to comply with the MNWD permit is ongoing.

Equipment Failures:

- The CCS unit has experienced a high number of down times.
- Solution: The contractor has performed additional maintenance when notified and has replace parts on warranty as needed.
  The storm drain outlet basin was cleaned out a the end of March 04 after the end of the storm season and prior to restart of the start up of the equipment.

Regrowth In Habitat Downstream Of Discharge Point:

- The treated water experiences a rapid regrowth of the bacteria concentration after being released to the habitat.
- Solution: Work on this problem is ongoing. Additional permits are applied for in order to perform clean-up work in the habitat and the storm drain outlet basin.

Clean Up Of Basin:

- Organic matter from the dense surrounding vegetation continues to accumulate in the storm outlet basin. Clean up of the basin is difficult because of limited access.
- Solution: A permit to expand the equipment access pad has been applied for through Department of Fish and Game.

CONCLUSIONS AND RECOMMENDATION

The Clear Creek Systems, Inc. system (CCS) is operating successfully and is reducing the contribution of contaminants to Aliso Creek. Changing the backwash procedure and allowing an increase in discharge of backwash volume to the Moulton Niguel Water District could improve the performance of the CCS system. The bacterial regrowth in the habitat is a larger problem and beyond the intended performance of the CCS system. It is difficult to determine if the CCS system installation at the Springdale Storm Drain has contributed to the reduction in postings at the Aliso Beach.

Based upon the one year operation of the CCS system, it is recommended that the operation be continued.

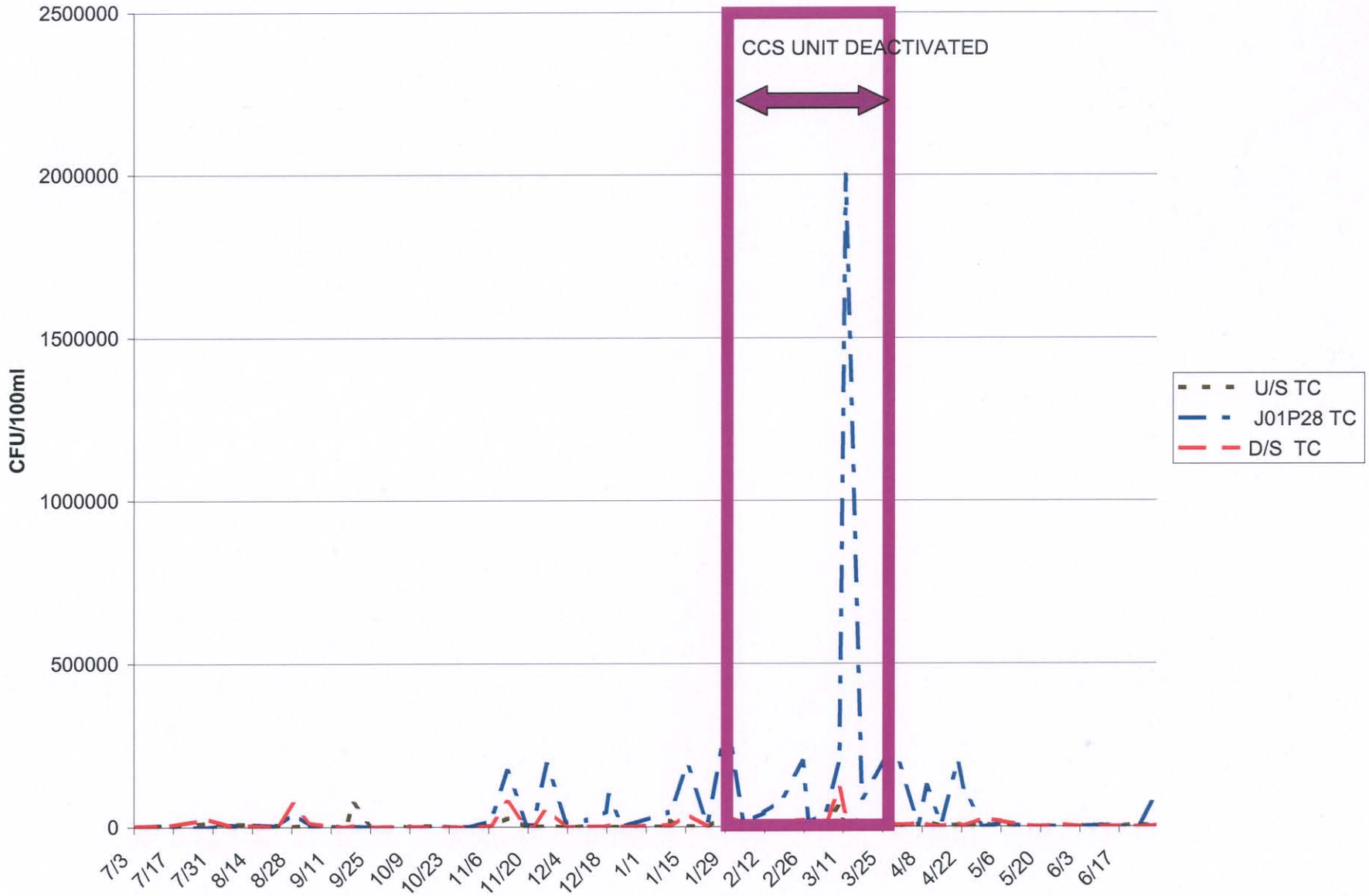
Maintenance and Operations Divisions staff also recommends that an effort be made to clean up the habitat by removing dead and decomposing vegetation, that trash removal be scheduled after end of each storm season, that overhead screening of the outlet structure discharge basin be installed to help lower water temperature and limit the amount of organic matter in the storm drain outlet basin. These suggestions will be implemented pending available budget and manpower.

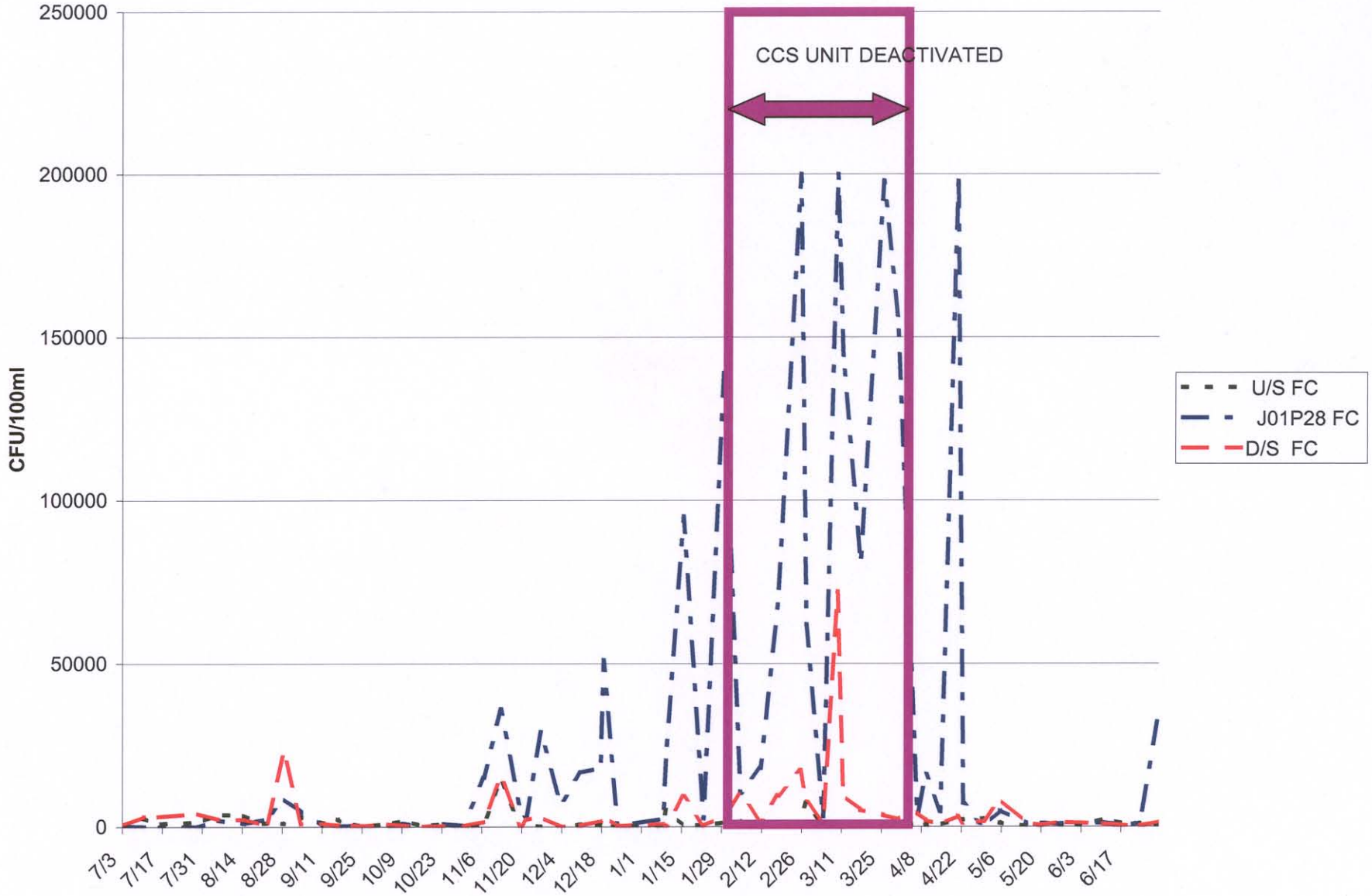
Date	Total Coliform in Aliso Creek U/S of Confluence with J01P28 CFU/100 ml	Total Coliform in J01P28 at Confluence with Aliso Creek CFU/100 ml	Total Coliform in Aliso Creek D/S of Confluence with J01P28 CFU/100 ml	Date	Total Coliform in Aliso Creek U/S of Confluence with J01P28 CFU/100 ml	Total Coliform in J01P28 at Confluence with Aliso Creek CFU/100 ml	Total Coliform in Aliso Creek D/S of Confluence with J01P28 CFU/100 ml
7/3/03	380	690	3230	1/8/04	560	45000	7100
7/10/03	4750	0	5000	1/9/04	17700	48000	400
7/15/03	4550	0	5200	1/15/04	1360	192000	39000
7/29/03	11000	0	25000	1/22/04	550	8950	1730
8/5/03	9000	6650	5000	1/29/04	29800	327000	33000
8/14/03	7600	7450	5000	2/4/04	4200	14400	10600
8/21/03	4100	4200	3700	2/11/04	610	43000	5500
8/22/03	6300	3400	2500	2/17/04	1290	80000	15800
8/28/03	2300	44000	72000	2/25/04	1770	200000	21000
9/3/03	4300	5400	12900	2/27/04	9250	13400	13200
9/11/03	1700	330	1170	3/4/04	2600	41000	3200
9/16/03	3700	300	720	3/9/04	63000	200000	121000
9/18/03	77000	2700	4700	3/11/04	3000	2000000	45000
9/25/03	460	780	620	3/17/04	870	89000	6800
10/2/03	1060	20	1420	3/25/04	1710	200000	9500
10/9/03	2400	1330	1800	3/30/04	1430	200000	5900
10/16/03	3100	10	1290	4/6/04	6500	9200	9000
10/23/03	1040	1190	530	4/9/04	13900	126000	6100
10/30/03	1300	1660	225	4/14/04	1500	9100	1400
11/6/03	4600	20000	5600	4/20/04	4300	200000	11600
11/12/03	27000	173000	77000	4/22/04	2900	120000	1630
11/19/03	750	7500	0	4/29/04	3900	110	26000
11/21/03	1900	6950	2750	5/5/04	7200	10200	17600
11/26/03	390	193000	55000	5/14/04	1360	1400	3300
12/3/03	230	15400	290	5/19/04	1590	1350	1510
12/10/03	2000	21000	2250	5/26/04	440	1600	4500
12/17/03	1110	48000	2300	5/28/04	1540	1390	5600
12/18/03	100	98000	5700	6/2/04	1430	1280	1390
12/23/03	250	1380	1160	6/10/04	3800	4300	2500
				6/18/04	1160	660	1230
				6/23/04	6300	1720	640
				6/29/04	980	87000	2800

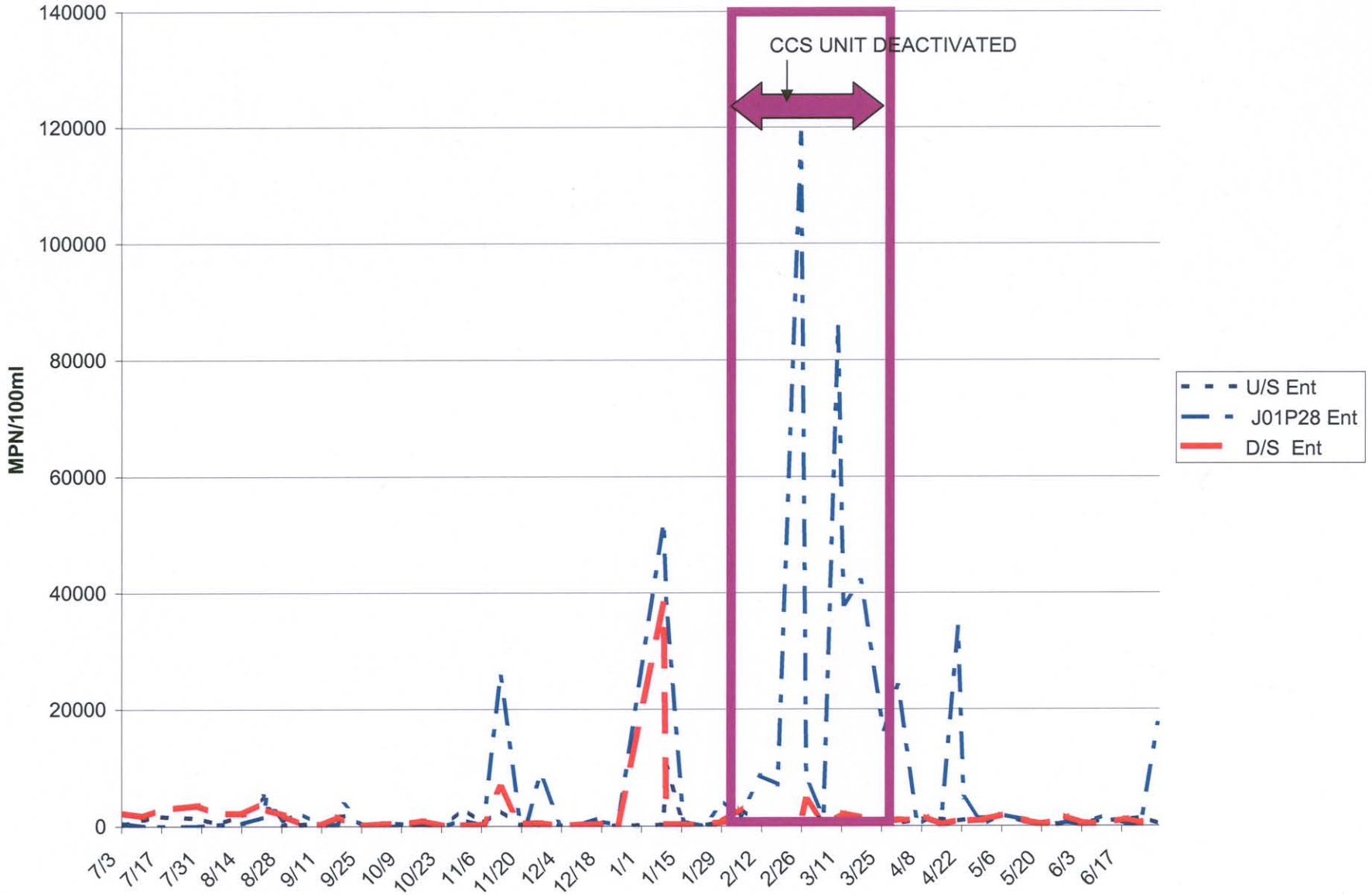
TABLE No. 2 MONITORING DATA FOR FECAL COLIFORM AT THE CONFLUENCE Agreement 01-227-550

Date	Fecal Coliform in Aliso Creek U/S of Confluence with J01P28 CFU/100 ml	Fecal Coliform in J01P28 at Confluence with Aliso Creek CFU/100 ml	Fecal Coliform in Aliso Creek D/S of Confluence with J01P28 CFU/100 ml	Date	Fecal Coliform in Aliso Creek U/S of Confluence with J01P28 CFU/100 ml	Fecal Coliform in J01P28 at Confluence with Aliso Creek CFU/100 ml	Fecal Coliform in Aliso Creek D/S of Confluence with J01P28 CFU/100 ml
7/3/03	190	220	680	1/8/04	80	2500	880
7/10/03	2700	0	3200	1/9/04	5100	23000	220
7/15/03	900	0	3150	1/15/04	380	95000	9350
7/29/03	1400	0	4100	1/22/04	490	2600	370
8/5/03	3800	2050	2300	1/29/04	1300	139000	3020
8/14/03	3550	950	2300	2/4/04	1630	10400	10100
8/21/03	1060	2300	860	2/11/04	280	18000	1790
8/22/03	1190	2700	780	2/17/04	950	68000	9600
8/28/03	990	8700	23000	2/25/04	1410	200000	17300
9/3/03	3200	4600	980	2/27/04	7200	62000	7800
9/11/03	1080	180	960	3/4/04	460	2800	1330
9/16/03	2400	160	540	3/9/04	1020	200000	72000
9/18/03	1030	330	690	3/11/04	1180	143000	9700
9/25/03	230	430	270	3/17/04	520	81000	5100
10/2/03	740	10	880	3/25/04	430	198000	3600
10/9/03	1800	1080	440	3/30/04	180	156000	2300
10/16/03	320	10	140	4/6/04	1090	3400	4300
10/23/03	810	920	310	4/9/04	470	16200	1900
10/30/03	305	390	310	4/14/04	590	4600	820
11/6/03	460	15000	1550	4/20/04	2000	200000	3200
11/12/03	14400	36000	15400	4/22/04	2100	7200	880
11/19/03	180	4900	0	4/29/04	2400	10	1750
11/21/03	490	2900	2200	5/5/04	1140	5000	8400
11/26/03	80	29000	3100	5/14/04	150	1050	1200
12/3/03	90	7100	110	5/19/04	620	1040	560
12/10/03	720	16600	420	5/26/04	210	940	1390
12/17/03	610	18000	1800	5/28/04	860	1010	1270
12/18/03	10	51000	3200	6/2/04	450	980	1200
12/23/03	90	280	300	6/10/04	2200	1240	990
				6/18/04	770	470	410
				6/23/04	1000	1080	300
				6/29/04	310	32000	1380

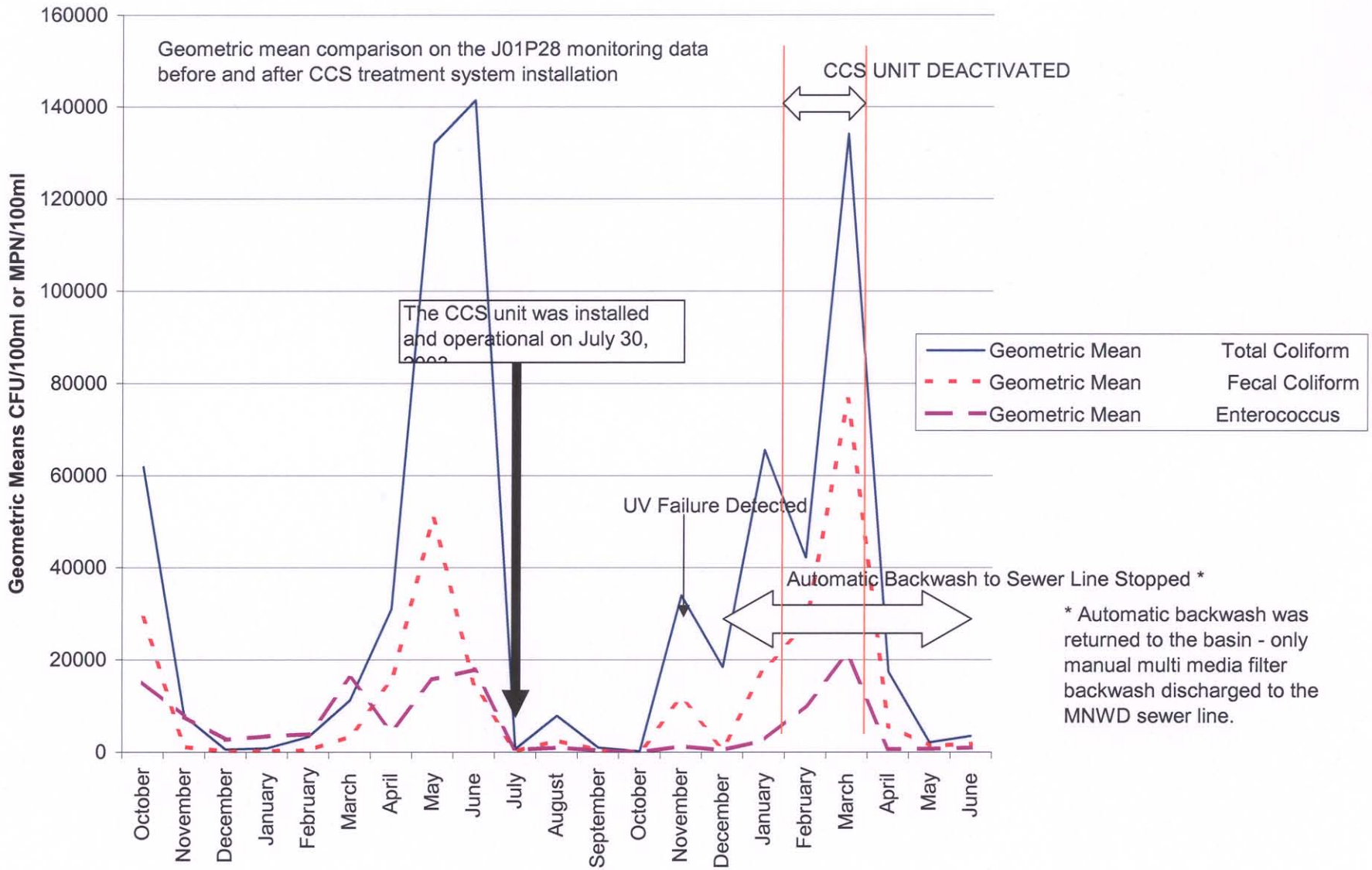
Date	Enterococcus in Aliso Creek U/S of Confluence with J01P28 MPN/100ml	Enterococcus in J01P28 U/S of Confluence with Aliso Creek MPN/100ml	Enterococcus in Aliso Creek D/S of Confluence with J01P28 MPN/100ml	Date	Enterococcus in Aliso Creek U/S of Confluence with J01P28 MPN/100ml	Enterococcus in J01P28 U/S of Confluence with Aliso Creek MPN/100ml	Enterococcus in Aliso Creek D/S of Confluence with J01P28 MPN/100ml
7/3/03	280	540	2285	1/8/04	250	52000	38000
7/10/03	1100	0	1700	1/9/04	10400	38000	340
7/15/03	1700	0	2850	1/15/04	320	770	320
7/29/03	1400	0	3600	1/22/04	140	20	230
8/5/03	450	290	2200	1/29/04	680	4200	805
8/14/03	1830	530	2200	2/4/04	3100	1760	3000
8/21/03	5200	1610	4200	2/11/04	280	8600	490
8/22/03	3400	4800	2900	2/17/04	180	7100	270
8/28/03	230	1000	1900	2/25/04	970	119000	710
9/3/03	330	2300	380	2/27/04	4400	8200	4400
9/11/03	410	30	340	3/4/04	760	1640	660
9/16/03	1490	410	1700	3/9/04	730	86000	1250
9/18/03	1820	3800	950	3/11/04	2070	38000	2160
9/25/03	170	130	190	3/17/04	260	42000	1420
10/2/03	530	10	430	3/25/04	1150	16400	900
10/9/03	380	10	410	3/30/04	400	24000	1070
10/16/03	390	10	920	4/6/04	1110	30	970
10/23/03	10	10	90	4/9/04	1260	1220	1460
10/30/03	3050	1110	210	4/14/04	1130	160	260
11/6/03	570	100	290	4/20/04	840	34000	970
11/12/03	2700	26000	6650	4/22/04	1060	4800	790
11/19/03	310	300	0	4/29/04	1410	130	1050
11/21/03	230	400	490	5/5/04	1940	1900	1820
11/26/03	140	8900	570	5/14/04	530	960	840
12/3/03	130	150	110	5/19/04	270	500	350
12/10/03	280	250	280	5/26/04	370	360	890
12/17/03	230	1580	410	5/28/04	410	620	1580
12/18/03	90	700	230	6/2/04	620	300	500
12/23/03	100	270	100	6/10/04	890	1690	480
				6/18/04	1010	340	1180
				6/23/04	1380	340	470
				6/29/04	390	17400	1730


CCS UNIT DEACTIVATED
CFU/100ml
2500000
2000000
1500000
1000000
500000
0
7/3
7/17
7/31
8/14
8/28
9/11
9/25
10/9
10/23
11/6
11/20
12/4
12/18
1/1
1/15
1/29
2/12
2/26
3/11
3/25
4/8
4/22
5/6
5/20
6/3
6/17
U/S TC
J01P28 TC
D/S TC


CCS UNIT DEACTIVATED
CFU/100ml
250000
200000
150000
100000
50000
0
7/3
7/17
7/31
8/14
8/28
9/11
9/25
10/9
10/23
11/6
11/20
12/4
12/18
1/1
1/15
1/29
2/12
2/26
3/11
3/25
4/8
4/22
5/6
5/20
6/3
6/17
U/S FC
J01P28 FC
D/S FC


CCS UNIT DEACTIVATED
MPN/100ml
140000
120000
100000
80000
60000
40000
20000
0
7/3
7/17
7/31
8/14
8/28
9/11
9/25
10/9
10/23
11/6
11/20
12/4
12/18
1/1
1/15
1/29
2/12
2/26
3/11
3/25
4/8
4/22
5/6
5/20
6/3
6/17
U/S Ent
J01P28 Ent
D/S Ent

Year	Month	Geometric Mean Total Coliform	Geometric Mean Fecal Coliform	Geometric Mean Enterococcus
2003	October	61851	29066	15155
2003	November	7841	1184	7708
2003	December	586	239	2734
2003	January	855	257	3443
2003	February	3298	354	3916
2003	March	11186	3453	16005
2003	April	30989	15408	4689
2003	May	132127	50843	15739
2003	June	141477	14619	17879
2003	July	690	220	540
2003	August	7918	2538	1035
2003	September	1024	425	426
2003	October	221	131	26
2003	November	33972	11735	1348
2003	December	18383	785	407
2004	January	65588	18158	2638
2004	February	42132	27520	10095
2004	March	134189	76495	21114
2004	April	17410	5759	706
2004	May	2121	1390	727
2004	June	3524	1816	1004


Geometric mean comparison on the J01P28 monitoring data before and after CCS treatment system installation
CCS UNIT DEACTIVATED
The CCS unit was installed and operational on July 30,
UV Failure Detected
Automatic Backwash to Sewer Line Stopped *
* Automatic backwash was returned to the basin - only manual multi media filter backwash discharged to the MNWD sewer line.
Geometric Mean Total Coliform
Geometric Mean Fecal Coliform
Geometric Mean Enterococcus
Geometric Means CFU/100ml or MPN/100ml
160000
140000
120000
100000
80000
60000
40000
20000
0
October
November
December
January
February
March
April
May
June
July
August
September
October
November
December
January
February
March
April
May
June

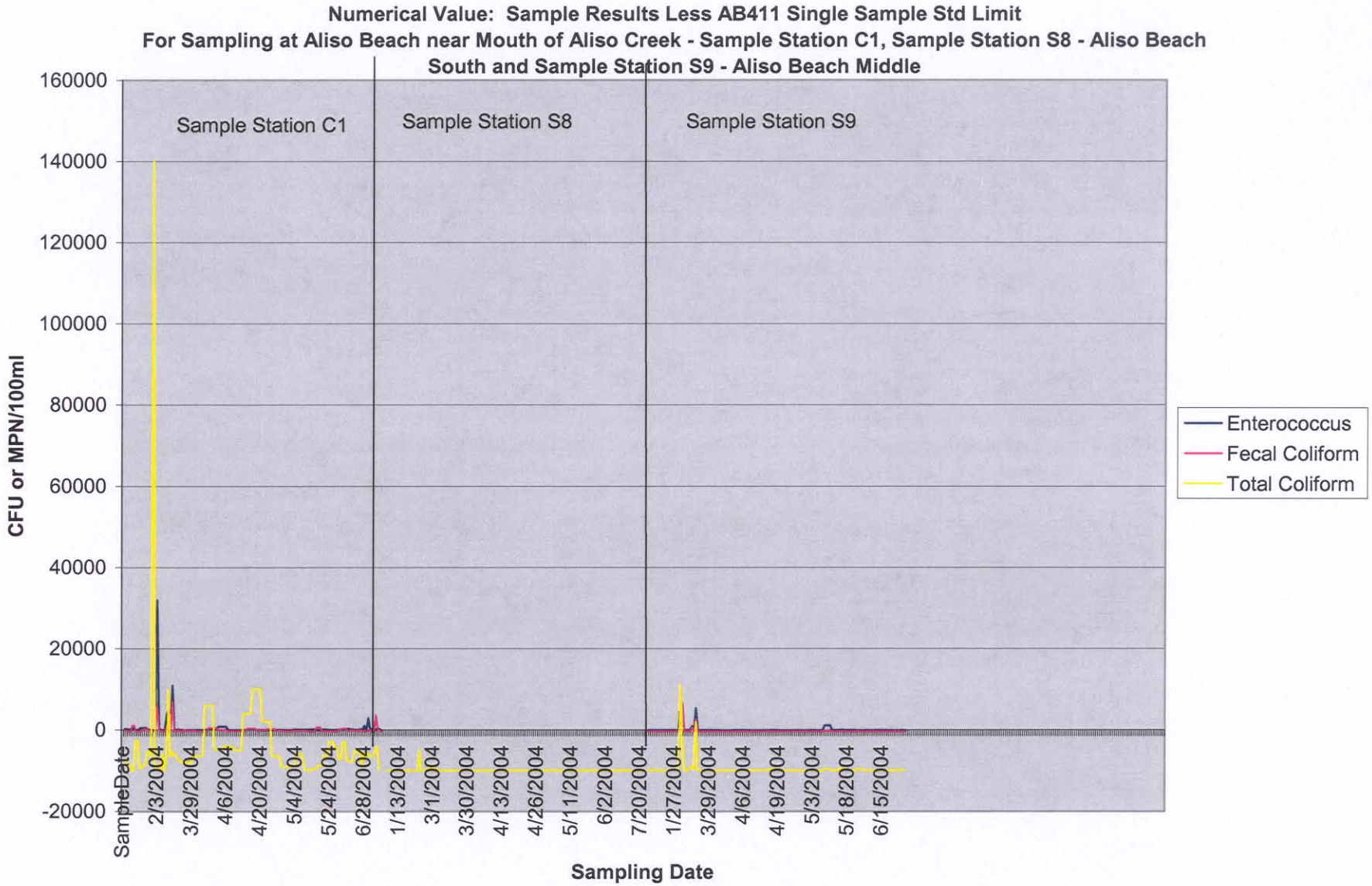

Numerical Value: Sample Results Less AB411 Single Sample Std Limit
For Sampling at Aliso Beach near Mouth of Aliso Creek - Sample Station C1, Sample Station S8 - Aliso Beach South and Sample Station S9 - Aliso Beach Middle
Sample Station C1
Sample Station S8
Sample Station S9
160000
140000
120000
100000
80000
60000
40000
20000
0
-20000
CFU or MPN/100ml
SampleDate
2/3/2004
3/29/2004
4/6/2004
4/20/2004
5/4/2004
5/24/2004
6/28/2004
1/13/2004
3/1/2004
3/30/2004
4/13/2004
4/26/2004
5/11/2004
6/2/2004
7/20/2004
1/27/2004
3/29/2004
4/6/2004
4/19/2004
5/3/2004
5/18/2004
6/15/2004
Sampling Date
Enterococcus
Fecal Coliform
Total Coliform

TABLE No. 5-1

Log Values of data in Table 5

Date	Time	Inlet FC	Outlet FC	Conf FC	U/S FC	D/S FC	Date	log Inlet	log Outlet	log Conf	log U/S	log D/S
04/06/04				3400	1090	4300	04/06/04			3.53	3.04	3.63
4/9/2004	7:40	>200,000	240	16,200	470	1,900	4/9/2004	5.30	2.38	4.21	2.67	3.28
4/14/2004	9:25	129,000	1,040	4,600	590	820	4/14/2004	5.11	3.02	3.66	2.77	2.91
4/20/2004	10:25	>200,000	3,500	>200,000	2,000	3,200	4/20/2004	5.30	3.54	5.30	3.30	3.51
4/22/2004	8:00	21,000	700	72,000	2,100	880	4/22/2004	4.32	2.85	4.86	3.32	2.94
4/29/2004	8:45	129,000	30	10	2,400	1,750	4/29/2004	5.11	1.48	1.00	3.38	3.24
5/5/2004	8:35	>200,000	20	5,000	1,140	8,400	5/5/2004	5.30	1.30	3.70	3.06	3.92
5/14/2004	9:42	129,000	20	1,050	150	1,200	5/14/2004	5.11	1.30	3.02	2.18	3.08
5/19/2004	8:50	75,000	10	1,040	620	560	5/19/2004	4.88	1.00	3.02	2.79	2.75
5/26/2004	9:05	168,000	760	940	210	1,390	5/26/2004	5.23	2.88	2.97	2.32	3.14
5/28/2004	8:20	14,000	690	1,010	860	1,270	5/28/2004	4.15	2.84	3.00	2.93	3.10
6/2/2004	10:15	102,000	150	980	450	1,200	6/2/2004	5.01	2.18	2.99	2.65	3.08
6/10/2004	10:04	33,000	1,520	1,240	2,200	990	6/10/2004	4.52	3.18	3.09	3.34	3.00
6/18/2004	10:20	101,000	900	470	770	410	6/18/2004	5.00	2.95	2.67	2.89	2.61
6/23/2004	10:40	14,400	1,270	1,080	1,000	300	6/23/2004	4.16	3.10	3.03	3.00	2.48
6/29/2004	10:00	69,000	3,300	32,000	310	1,380	6/29/2004	4.84	3.52	4.51	2.49	3.14

TABLE No. 5-2 Source Data Table 5

Supporting Statistical Calculations

Date	log Inlet	log Outlet
4/9/2004	5.30	2.38
4/14/2004	5.11	3.02
4/20/2004	5.30	3.54
4/22/2004	4.32	2.85
4/29/2004	5.11	1.48
5/5/2004	5.30	1.30
5/14/2004	5.11	1.30
5/19/2004	4.88	1.00
5/26/2004	5.23	2.88
5/28/2004	4.15	2.84
6/2/2004	5.01	2.18
6/10/2004	4.52	3.18
6/18/2004	5.00	2.95
6/23/2004	4.16	3.10
6/29/2004	4.84	3.52

Date	log Outlet	log Conf
4/9/2004	2.38	4.21
4/14/2004	3.02	3.66
4/20/2004	3.54	5.30
4/22/2004	2.85	4.86
4/29/2004	1.48	1.00
5/5/2004	1.30	3.70
5/14/2004	1.30	3.02
5/19/2004	1.00	3.02
5/26/2004	2.88	2.97
5/28/2004	2.84	3.00
6/2/2004	2.18	2.99
6/10/2004	3.18	3.09
6/18/2004	2.95	2.67
6/23/2004	3.10	3.03
6/29/2004	3.52	4.51

Anova: Single Factor In vs. Out

Yes

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*	
Column 1	15	73.33222	4.888815	0.167444	**77413**
Column 2	15	37.51975	2.501317	0.721436	**317**

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	42.75111	1	42.75111	96.19091	1.48E-10	4.195982
Within Groups	12.44433	28	0.44444			
Total	55.19544	29				

Anova: Single Factor

Yes

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*	
Column 1	15	37.51975	2.501317	0.721436	**317**
Column 2	15	51.0406	3.402706	1.077641	**2528**

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	6.093777	1	6.093777	6.774338	0.014622	4.195982
Within Groups	25.18708	28	0.899538			
Total	31.28085	29				

TABLE No. 5-2 Source Data Table 5

Supporting Statistical Calculations

Date	log U/S	log D/S
04/06/04	3.04	3.63
4/9/2004	2.67	3.28
4/14/2004	2.77	2.91
4/20/2004	3.30	3.51
4/22/2004	3.32	2.94
4/29/2004	3.38	3.24
5/5/2004	3.06	3.92
5/14/2004	2.18	3.08
5/19/2004	2.79	2.75
5/26/2004	2.32	3.14
5/28/2004	2.93	3.10
6/2/2004	2.65	3.08
6/10/2004	3.34	3.00
6/18/2004	2.89	2.61
6/23/2004	3.00	2.48
6/29/2004	2.49	3.14

Anova: Single Factor

No

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*	
Column 1	16	46.13943	2.883714	0.132135	**765**
Column 2	16	49.82177	3.113861	0.13338	**1300**

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.423739	1	0.423739	3.191822	0.084118	4.170886
Within Groups	3.982735	30	0.132758			
Total	4.406475	31				