BMP Retrofit Pilot Projects

Quarterly Status Report No. 9

BMP Retrofit Pilot Projects in District 7 and District 11

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INTRODUCTION

Background and Purpose

Periodic status reports and meetings are specified in the District 7 and District 11 Scoping Study as a means of updating NRDC, EPA, San Diego Baykeeper, and Santa Monica Baykeeper on the progress of the BMP Retrofit Pilot Program and discussing the program. The bi-weekly and quarterly status meetings have been scheduled on a regular basis to coincide with general project milestones and periods of significant activity. Approximate scheduled dates for the periodic status meetings are given in the *Scoping Study*. This report provides background documentation for the ninth status meeting to be held on June 14, 2000.

The scope of the status reports includes a general program-level overview of the activities that precede the status meetings. Status reports include information regarding the Pilot Program: (1) remaining construction, (2) OMM activities and sampling issues, (3) vector and biological issues, and (4) other issues pertaining to the pilot study. The program Master Schedule is contained in the *Scoping Study* for each District. An updated schedule is contained with this status report.

The preceding Status Meeting (No. 8) was held on March 15, 2000. The meeting minutes are included as Appendix A. The main issues discussed at Status Meeting No. 8 included the following:

- Non-stormwater Discharges/Source Control
- Design/Construction status for remaining sites in District 7
- Monitoring Issues
- Maintenance Indicator Document Revisions
- Vector Issues
- Environmental/Biological Issues
- Specific Device Issues
- OMM Activities
- Cost Workgroup/Cost Data Preparation
- Infiltration Opportunities Study in D11
- Pilot Program Schedule

The project calendar listing meetings and submittals scheduled for the next few months is included as Appendix J.

QUARTERLY STATUS REPORT SITE STATUS SUMMARY

Location	BMP Type	Site ID	OMM Consultant	District Review	Construction Phase	Instrumentation Phase	Monitoring Phase
DISTRICT 7							
I-605/SR-91	IB	73101	MW/Law				X
I-210 E. of Orcas	CDS	73102	MW/Law			X	
I-210 E. of Filmore	CDS	73103	MW/Law			X	
I-5/I-605	EDB	74101	BC				X
I-605/SR-91	EDB	74102	BC				X
Paxton Park & Ride	MF	74103	BC	X			
Metro MS	MCTT	74104	BC	X			
Alameda MS	OWS	74201	BC				X
Eastern MS	MF	74202	BC				X
Foothill MS	MF	74203	BC				X
Termination P&Ride	MF	74204	BC				X
Via Verde Park&Ride	MCTT	74206	BC				X
Lakewood Park&Ride	MCTT	74208	BC				X
Altadena MS	Bio Strip/IT	73211a,b	MW/Law				X
Foothill MS	DII	73216	MW/Law				X
LasFlores MS	DII	73217	MW/Law				X
Rosemead MS	DII	73218	MW/Law				X
I-605/SR-91	Bio Strip/Swale	73222a,b	MW/Law				X
Cerritos MS	BioSwale	73223	MW/Law				X
I-5/I-605	BioSwale	73224	MW/Law				X
I-605/ Del Amo	BioSwale	73225	MW/Law				X
DISTRICT 11							
I-5/SR-56	EDB	111101	KLI				X
I-15/SR-78	EDB	111102	KLI				X
I-5/La Costa (West)	IB	111103	KLI				X
I-5/La Costa (East)	WB	111104	KLI				X
I-5/Manchester (East)	EDB	111105	KLI				X
Kearney Mesa MS	MF(StormFilter)	112201	KLI				X
Escondido MS	MF	112202	KLI				X
La Costa Park & Ride	MF	112203	KLI				X
SR-78/I-5 Park&Ride	MF	112204	KLI				X
Melrose Ave/SR-78	Bio Swale	112205	KLI				X
I-5 Palomar Airport Rd	Bio Strip	112206	KLI				X
Carlsbad MS	Bio Strip/IT	112207a,b	KLI				X

NON-STORMWATER RUNOFF INSPECTIONS

Weekly inspections have been performed at the sites where non-stormwater runoff was previously noted. The following table summarizes when non-stormwater runoff were noted at the sites inspected. **Non-stormwater Weekly Inspections have been discontinued at all locations except those listed below. Should non-stormwater discharge be noted during routine inspections, weekly non-stormwater discharge inspections will resume.**

	District 11 Sites		
Week of	78/15 EDB	78/5 P&R MF	Carlsbad MS Bio Strip + Trench
April 3	Y	Y	Y
April 10	Y	N	Y
April 17	N	N	N
April 24	N	N	Y
May 1	N	N	Y
May 8	N	N	Y
May 15	N	N	N

Y – Non-stormwater runoff was observed

ACTIVITY DESCRIBED IN THIS QUARTERLY COVERS THE PERIOD FROM MARCH 1, 2000 – MAY 18, 2000

Applicable to all Monitored BMPs

The 2nd Year 1999-2000 OMM Report for each consultant is enclosed in Appendices B, C, and D, respectively.

District 7 BMP Pilot Sites

The following is a discussion of activities during the quarter for each BMP site.

I-605/SR-91 Interchange Infiltration Basin (Site ID 73101) MW/Law

Monitoring/Sampling Activities

3/2/00: Forecast predicted showers to produce < 0.10 inch of rainfall with a 60% probability of occurrence. Storm event produced 0.40 inch of rainfall. No teams were mobilized because the deployment criteria were not met

3/5/00: Forecast predicted rain to produce between 1 and 2 inches of rainfall with a 100% probability of occurrence. Storm event produced 1.01 inches of rainfall. A team was mobilized to make empirical observations of the infiltration basin.

3/7/00: Forecast predicted rain to produce between 1 and 2 inches of rainfall with an 80% probability of occurrence. Storm event produced 0.83 inches of rainfall. A team was mobilized to make empirical observations of the infiltration basin

3/30/00: Replaced desiccant cartridges.

4/14/00: Forecast predicted rain to produce up to 0.30 inch of rainfall with a 50% probability of occurrence. Storm event produced 0.00 inch of rainfall. No teams were mobilized because of the unlikelihood of rainfall producing enough runoff to cause water to pool in the infiltration basin.

4/16/00: Conducted pre-storm inspection of monitoring equipment.

4/17/00: Forecast predicted rain to produce up to 2 inches of rainfall with a 100% probability of occurrence. Storm event produced 2.14 inches of rainfall. A team was mobilized to make empirical observations of the infiltration basin.

4/21/00: Forecast predicted rain to produce up to 0.10 inch of rainfall with a 40% probability of occurrence. Storm event produced 0.00 inch of rainfall. No teams were mobilized because of the deployment criteria not being met.

4/25/00: Replaced monitoring station batteries.

5/15/00: Forecast predicted scattered showers and thunderstorms to produce up to 0.20 inch of rainfall with a 30% probability of occurrence. No teams were mobilized because of the deployment criteria not being met. Storm event produced 0.00 inch of rainfall.

I-605/SR-91 Interchange Infiltration Basin Monitoring Summary

Date	Rainfall Total	Deployment Criteria Met	Mobilized	Sampled		Empirical Observations
				Comp	Grab	
11/8/99	0.09	N	N	NA	NA	N
12/31/99	0.52	N	N	NA	NA	N
1/16/00	0.00	N	N	NA	NA	N
1/25/00	0.55	Y	Y	NA	NA	Y
1/30-31/00	0.25	N	N	NA	NA	N
2/10-11/00	0.26	N	N	NA	NA	N
2/12-14/00	1.14	Y	Y	NA	NA	Y
2/16/00	0.62	Y	Y	NA	NA	Y
2/20-21/00	2.14	Y	Y	NA	NA	Y
2/23/00	0.98	N	N	NA	NA	N
2/27/00	0.16	Y	Y	NA	NA	Y
3/3-4/00	0.40	N	N	NA	NA	N
3/5-6/00	1.01	Y	Y	NA	NA	Y
3/7-8/00	0.83	Y	Y	NA	NA	Y
4/14/00	0.00	Y	N*	NA	NA	N
4/17-18/00	1.58	Y	Y	NA	NA	Y
4/21/00	0.00	N	N	NA	NA	N
5/15/00	0.00	N	N	NA	NA	N

* Teams not mobilized because of the unlikelihood of rainfall producing enough runoff to cause water to pool in the infiltration basin

Operations and Maintenance

3/5/00: Approximately 3 inches of runoff collected within the infiltration basin. Some bypass was observed through the overflow structure because the intense rainfall created runoff with a flow level that exceeded the weir plate elevation.

3/7/00: Approximately 2 to 3 inches of runoff collected within the infiltration basin. Some bypass was observed through the overflow structure because the intense rainfall created runoff with a flow level that exceeded the weir plate elevation.

3/22/00: Conducted monthly inspection. Maintenance meeting MID thresholds was conducted during the week of 3/27/00.

3/30/00: Began pulling weeds greater than 12 inches tall, repairing erosion on the north side slope, compacting gopher holes, and removing trash and debris.

3/31/00: Completed activities that were started on 3/30/00.

4/17/00: Approximately 5.25 inches of runoff collected within the infiltration basin. Some bypass was evident through the overflow structure because the intense rainfall created runoff with a flow level that exceeded the weir plate elevation. Some trash discharged into the infiltration basin from both inlet pipes.

4/25/00: Conducted monthly site inspections.

4/26-27/00: Removed trash and debris from inlet areas, compacted gopher mounds, and repaired minor erosion problem on north side slope.

Vector Activities

None this period.

Issues / Solutions

None.

I-210/East Orcas Avenue Continuous Deflection Separators (Site ID 73102) MW/Law

Status

1/28/00: First day of construction was Jan. 28, 2000

3/21/00: While at Altadena Maintenance Station, it was observed that the flume approach sections for the CDS units had been blown of their pallets into the biofiltration strip. Winds upwards of 40 mph occurred in the area on 3/21/00. The approach sections were relocated onto the pavement beside the biofiltration strip.

4/21/00:
Installed BMP sign.

4/24/00: Final inspection was conducted. Contractor is completing Change Order work

Vector Activities

5/9/00: Breeding was observed at the sump of the CDS unit.

5/11/00: The sump of the CDS unit treated with Altosid liquid.

Issues / Solutions

The plans specify the use of Helical Coupling Bands to join the various sections of CMP Pipe. The Contractor installed Universal Coupling Bands, which do not provide a tight seal and therefore leak. The Contractor was directed to provide Helical Bands and was issued a Change Order to provide joint sealant to create a watertight seal.

I-210/East of Filmore Street Continuous Deflection Separators (Site ID 73103) MW/Law

Status

1/28/00: First day of construction was Jan. 28, 2000

3/21/00: While at Altadena Maintenance Station, it was observed that the flume approach sections for the CDS units had been blown of their pallets into the biofiltration strip. Winds upwards of 40 mph occurred in the area on 3/21/00. The approach sections were relocated onto the pavement beside the biofiltration strip.

4/20/00: Installed BMP sign.

4/24/00: Final inspection was conducted. Contractor is completing Change Order work

Issues / Solutions

Access to the site is from an existing gate at the end of a cul-de-sac on Filmore Street. However, the gate was removed during construction because there wasn't enough room between the gate and the Toe-of-Slope for the vehicles to enter the site. Following final inspection, the Contractor was issued a Change Order to provide a 3 meter wide Chain Link Gate. Estimated cost of this CCO is $1,100.

The plans specify the use of Helical Coupling Bands to join the various sections of CMP Pipe. The Contractor installed Universal Coupling Bands, which do not provide a tight seal and therefore leak. The Contractor was directed to provide Helical Bands and was issued a Change Order to provide joint sealant to create a watertight seal.

Design/Construction Schedule for CDS Units – PS&E Process

Activities	**Scheduled Dates**	**Actual Dates**	**Duration (calendar weeks)**
Obtain EA	06/01/99	06/04/99	
Begin Clearance	06/21/99	06/28/99	
Obtain District Clearances/To Santa Ana	07/26/99	09/14/99	4
End Santa Ana Review, Advertise, and Bid Opening	12/07/99	11/16/99	12
Award Contract	12/14/99	12/14/99	4
Begin Construction	02/01/00	01/28/00	4
Complete Construction	04/13/00	05/30/00	8
Fully Operational	05/04/00	06/15/00	2

District 7 CDS Sites Construction Cost Summary

Location	First Working Day	Scheduled Completion Date	Adjusted Completion Date	Bid Price[1]	Estimated CCOs	State Furnished Material	Total for CCOs and State Furnished Material	Estimated Total Final Cost[2]
I-210 East Orcas Ave.	1/28/99	3/31/00	5/4/00	$47,263	CCO No. 2 = $500 CMP Tee coupler and flange CCO No. 4 = $100 Provide Sealant on CMP Couplers CCO No. 5 = Cost Unknown, Use Anchor Assemblies (Alternative A) instead of Anchor Assemblies (Alternative B) CCO No. 6 = unknown cost, perform water test on CMP Couplers	$13,401 (CDS unit) $3,523 (flume approach) $529 (flume)	$18,053	$83,460

District 7 CDS Sites Construction Cost Summary (continued)

Location	First Working Day	Scheduled Completion Date	Adjusted Completion Date	Bid Price[1]	Estimated CCOs	State Furnished Material	Total for CCOs and State Furnished Material	Estimated Total Final Cost[2]
I-210/East of Filmore Ave.	1/28/99	3/31/00	5/4/00		CCO No. 1 = No Cost for relocation of chain link gate from east to west. CCO No. 2 =$500 CMP Tee coupler and flange CCO No. 3 = $1,100, 3 meter wide Chain Link Gate CCO No. 4 = $100 Provide Sealant on CMP Couplers CCO No. 5 = Cost Unknown, Use Anchor Assemblies (Alternative A) instead of Anchor Assemblies (Alternative B) CCO No. 6 = unknown cost, perform water test on CMP Couplers	$13,401 (CDS unit) $3,750 (flume approach) $593 (flume)	$19,444	
Total CDS Sites				**$47,263**	**$2,300**	**$35,197**	**$37,497**	**$84,760**

I-5/I-605 Extended Detention Basin (Site ID 74101) Brown and Caldwell

Monitoring/Sampling Activities

An underpredicted storm occurred on March 3. No teams were mobilized for this event. Another storm occurred on March 5. Since this event did not meet the 48-hour antecedent dry period criteria, no teams were mobilized for the March 5 event.

A storm occurred March 8, 2000 for which BC mobilized and successfully captured. Total onsite rainfall was 0.96 inches. Grab and composite samples were collected and empirical observations recorded.

Clean sample bottles were reinstalled during the routine weekly inspection, and the influent and effluent stations were put into storm readiness (March 20).

Successfully sampled storm of April 17 through April 18, 2000. The EDB received 2.57 inches of rainfall.

Operation and Maintenance

3/7/00:	Site inspection was conducted; no maintenance required.
3/20/00:	Site inspection was conducted; standing water in the effluent riser was removed
4/3/00:	Site inspection was conducted; no maintenance required; average grass height is approximately 16 inches in length with some varieties over 18 inches.
4/10/00:	Site inspection was conducted; no maintenance required.
4/24/00:	Site inspection was conducted; removed standing water from the effluent riser.
5/4/00:	Site inspection was conducted; no maintenance required

Vector Activities

The site was found breeding on April 20. The GLACVCD technician noted that both larvae and pupae were encountered and were most likely washed into the basin from the breeding areas within the basin's drainage. Since pupae were encountered, the site was abated with Golden Bear Oil on April 21.

Issues/Solutions

None this period.

I-5/I-605 Extended Detention Basin Monitoring Summary

Date	Rainfall Total	Deployment Criteria Met	Mobilized	Sampled		Empirical Observations
				Comp	Grab	
11/8/99	0.17	N	N	NA	NA	N
12/31/99	0.21	N	N	NA	NA	N
1/16/00	0.01	N	N	NA	NA	N
1/25/00	0.56	Y	Y	N	N	Y
1/30-31/00	0.35	N	N	NA	NA	N
2/10-11/00	0.51	N	N	NA	NA	N
2/12-14/00	0.98	N	N	NA	NA	N
2/16/00	0.65	N	N	NA	NA	N
2/20-21/00	2.29	Y	Y	Y	Y	Y
2/23/00	1.06	N	N	NA	NA	N
2/27/00	0.21	Y	Y	Y	Y	Y
3/8/00	0.96	Y	Y	Y	Y	Y
4/-18/00	2.57	Y	Y	Y	Y	Y

I-605/SR-91 Extended Detention Basin (Site ID 74102) Brown and Caldwell

Monitoring/Sampling Activities

An underpredicted storm occurred on March 3. No teams were mobilized for this event. Another storm occurred on March 5. Since this event did not meet the 48-hour antecedent dry period criteria, no teams were mobilized for the March 5 event.

BC mobilized and successfully captured the storm of March 8, 2000. Total onsite rainfall measured 0.82 inches. Empirical observations were recorded; grab and composite samples were collected.

During the routine weekly inspection, clean sample bottles were installed, and the influent and effluent stations were put into storm readiness (March 20).

Successfully sampled storm of April 17 through April 18, 2000. The EDB received 2.57 inches of rainfall.

Operation and Maintenance

3/7/00:	Site inspection was conducted; no maintenance required.
3/20/00:	Site inspection was conducted; no maintenance required.
4/3/00:	Site inspection was conducted; no maintenance required; average grass length is 16 inches.
4/10/00:	Site inspection was conducted; no maintenance required.
4/24/00:	Site inspection was conducted; no maintenance required.

Vector Activities

None this period.

Issues/Solutions

None this period.

I-605/SR 91 Extended Detention Basin Monitoring Summary

Date	Rainfall Total	Deployment Criteria Met	Mobilized	Sampled		Empirical Observations
				Comp	Grab	
11/8/99	0.08	N	N	NA	NA	N
12/31/99	0.41	N	N	NA	NA	N
1/16/00	0.00	N	N	NA	NA	N
1/25/00	0.48	Y	Y	N	N	Y
1/30-31/00	0.18	N	N	NA	NA	N
2/10-11/00	0.46	N	N	NA	NA	N
2/12-14/00	1.07	N	N	NA	NA	N
2/16/00	0.45	N	N	NA	NA	N
2/20-21/00	1.73	Y	Y	Y	Y	Y
2/23/00	0.19	N	N	NA	NA	N
2/27/00	0.04	Y	Y	Y	Y	Y
3/8/00	0.82	Y	Y	Y	Y	Y
4/17-18/00	2.57	Y	Y	Y	Y	Y

Paxton Maintenance Station Media Filter (Site ID 74103) Brown and Caldwell

Metro Maintenance Station Multi-Chamber Treatment Train (Site ID 74104) Brown and Caldwell

Status

Both Paxton and Metro plans and specifications are moving forward to District clearance. Review comments were received from D7OE and HQ Structural on the design packages during February and March, concluding on April 6, 2000. BC has had numerous discussions with Caltrans staff to clarify the comments and reach agreement on acceptable implementation of the comments. HQ structures has modified several of their original comments due to the type of structure involved. The two geotechnical consultants are expected to provide the requested calculations and responses to the comments on the geotechnical reports by the end of May, allowing a design package to be submitted to D7OE and HQ Structural for final review. HQ Structures has requested to review the full package again once comments are incorporated.

Schedule

Action	Duration	Milestone	Estimated Completion Date
Incorporate preliminary Structures and D7OE review comments		Submit entire PS&E package	03/08/00 (actual)
Structures and D7OE Review	4 weeks		
		Receive comments from Structures and D7OE	04/06/00 (actual)
Consultant revise PS&E	8 weeks		
			05/31/00
Structures final review	4 – 6 weeks		
		Receive comments from Caltrans	6/28/00
Consultant revise PS&E	1.5 weeks		
		Submit final to D7	7/10/00
D7 process and format PS&E	4 weeks		
		D7 submit to HQ	08/7/00
HQ review and processing; advertise contract	12 – 16 weeks		
		Advertise contract	11/13/00
Bid Period and evaluate bids	5 weeks		
		Notice to Proceed	12/18/00
Construction	16 weeks		
		Construction complete	04/9/01

Alameda Maintenance Station Oil Water Separator (Site ID 74201) Brown and Caldwell

Monitoring/Sampling Activities

An underpredicted storm occurred on March 3. No teams were mobilized for this event. Another storm occurred on March 5. Since this event did not meet the 48-hour antecedent dry period criteria, no teams were mobilized for the March 5 event.

The March 8, 2000 storm event was successfully captured. Total onsite rainfall was 0.68 inches. Grab samples were taken as well as empirical observations. Composites are not taken at this location.

The station was returned to storm readiness on March 22.

Successfully sampled storm of April 17 through April 18, 2000. The EDB received 1.44 inches of rainfall.

Operation and Maintenance

3/22/00:	Site inspection was conducted; no maintenance required.
4/3/00:	The weekly site inspection was conducted. No maintenance required. The inspection ports were loosened sufficiently for easy access (as requested by Greater Los Angeles Vector Control District personnel for inspection of the tank).
4/10/00:	Site inspection was conducted; no maintenance required.
4/24/00:	Site inspection was conducted. On April 27, miscellaneous trash and other debris was removed. Approximately 7 gallons of dry sediment was removed from the trench drain and placed in onsite drum. This is an accumulation since the last removal which occurred on December 3, 1999.
5/3/00:	Site inspection was conducted; no maintenance required.

Vector Activities

None this period.

Issues/Solutions

None this period.

Alameda Maintenance Station Oil/Water Separator Monitoring Summary

Date	Rainfall Total	Deployment Criteria Met	Mobilized	Sampled		Empirical Observations
				Comp	Grab	
11/8/99	0.38	N	N	NA	NA	N
12/31/99	0.11	N	N	NA	NA	N
1/16/00	0.00	N	N	NA	NA	N
1/25/00	0.51	Y	Y	NA*	N	Y
1/30-31/00	0.25	N	N	NA	NA	N
2/10-11/00	0.31	N	N	NA	NA	N
2/12-14/00	1.05	N	N	NA	NA	N
2/16/00	0.79	N	N	NA	NA	N
2/20-21/00	1.73	Y	Y	NA*	Y	Y
2/23/00	1.40	N	N	NA	NA	N
2/27/00	0.20	Y	Y	NA*	Y	Y
3/8/00	0.68	Y	Y	NA*	Y	Y
4/17-18/00	1.44	Y	Y	Y	Y	Y

* The Alameda site is an Oil/Water Separator and does not have a composite sampler (as do the other BMPs).

Eastern Region Maintenance Station (Site ID 74202) Brown and Caldwell

Monitoring/Sampling Activities

An underpredicted storm occurred on March 3. No teams were mobilized for this event. Another storm occurred on March 5. Since this event did not meet the 48-hour antecedent dry period criteria, no teams were mobilized for the March 5 event.

BC mobilized and successfully captured the storm of March 8, 2000. This storm produced a total onsite rainfall of 1.21 inches. Grab and composite samples were collected and empirical observations taken. The BMP filled to capacity and bypass occurred.

Clean sample bottles were reinstalled during the routine weekly inspection and the influent and effluent stations were put into storm readiness (March 17).

Successfully sampled storm of April 17 through April 18, 2000. The MF received 2.31 inches of rainfall.

Operation and Maintenance

4/3/003:	Site inspection was conducted; no maintenance required.
4/10/00:	Site inspection was conducted; no maintenance required.
4/24/00:	Site inspection was conducted; replaced the mosquito netting covering the sump on April 28.
5/4/00:	Site inspection was conducted; no maintenance required.

Vector Activities

None this period.

Issues/Solutions

The effluent pump will be carefully monitored during storm events to ensure that the pump and related circuitry operate correctly.

Eastern Region Maintenance Station Media Filter Monitoring Summary

Date	Rainfall Total	Deployment Criteria Met	Mobilized	Sampled		Empirical Observations
				Comp	Grab	
11/8/99	0.15	N	N	NA	NA	N
12/31/99	0.27	N	N	NA	NA	N
1/16/00	0.00	N	N	NA	NA	N
1/25/00	0.71	Y	Y	N	N	Y
1/30-31/00	0.20	N	N	NA	NA	N
2/10-11/00	0.49	N	N	NA	NA	N
2/12-14/00	1.51	N	N	NA	NA	N
2/16/00	0.72	N	N	NA	NA	N
2/20-21/00	2.35	Y	Y	Y	Y	Y
2/23/00	1.44	N	N	NA	NA	N
2/27/00	0.33	Y	Y	Y	Y	Y
3/8/00	1.21	Y	Y	Y	Y	Y
4/17-18/00	2.31	Y	Y	Y	Y	Y

Foothill Maintenance Station Media Filter – Sand (Site ID 74203)
Brown and Caldwell

Monitoring/Sampling Activities

An underpredicted storm occurred on March 3. No teams were mobilized for this event. Another storm occurred on March 5. Since this event did not meet the 48-hour antecedent dry period criteria, no teams were mobilized for the March 5 event.

BC mobilized and successfully captured the storm of March 8, 2000. Total onsite rainfall measured 0.80 inches. Grab and composite samples were taken; empirical observations were recorded. The BMP filled to capacity and bypass occurred.

Clean sample bottles were put in place during the routine weekly inspection and the influent and effluent stations were put into storm readiness (March 17).

Successfully sampled storm of April 17 through April 18, 2000. The MF received 2.92 inches of rainfall.

Operation and Maintenance

3/6/00:	Site inspection was conducted; no maintenance required.
3/17/00:	During the site inspection, standing water was observed in the sedimentation chamber. Accordingly, the stand pipe drain holes were cleaned out to improve the drain time.
4/3/00:	Site inspection was conducted; no maintenance required.
4/10/00:	Site inspection was conducted; no maintenance required.
4/24/00:	Site inspection was conducted; replaced the mosquito netting covering the sump on April 28: Removed wood chips and small tree branches and other debris that had blown into the BMP.
5/4/00:	Site inspection was conducted; no maintenance required.

Vector Activities

On March 17, the spreader trough in the media vault was found breeding. The site was abated with Altosid liquid on March 17.

Issues/Solutions

None this period.

Foothill Maintenance Station Media Filter Monitoring Summary

Date	Rainfall Total	Deployment Criteria Met	Mobilized	Sampled		Empirical Observations
				Comp	Grab	
11/8/99	0.1	N	N	NA	NA	N
12/31/99	0.28	N	N	NA	NA	N
1/16/00	0.00	N	N	NA	NA	N
1/25/00	0.68	Y	Y	N	N	Y
1/30-31/00	0.34	N	N	NA	NA	N
2/10-11/00	0.78	N	N	NA	NA	N
2/12-14/00	1.42	N	N	NA	NA	N
2/16/00	0.91	N	N	NA	NA	N
2/20-21/00	2.95	Y	Y	Y	Y	Y
2/23/00	1.59	N	N	NA	NA	N
2/27/00	0.49	Y	Y	Y	Y	Y
3/8/00	0.80	Y	Y	Y	Y	Y
4/17-18/00	2.92	Y	Y	Y	Y	Y

Termination Park and Ride Media Filter – Sand (Site ID 74204)
Brown and Caldwell

Monitoring/Sampling Activities

An underpredicted storm occurred on March 3. No teams were mobilized for this event. Another storm occurred on March 5. Since this event did not meet the 48-hour antecedent dry period criteria, no teams were mobilized for the March 5 event.

The storm that occurred on March 8, 2000 was successfully captured. Total onsite rainfall measured 0.94 inches. Grab and composite samples were collected and empirical observations were documented. The BMP filled to capacity and bypass occurred.

Concurrent with the routine weekly inspection, clean sample bottles were installed, and the influent and effluent stations were placed into storm readiness (March 20).

Successfully sampled storm of April 17 through April 18, 2000. The MF received 1.68 inches of rainfall.

Operation and Maintenance

3/6/00:	Site inspection was conducted; no maintenance required.
3/20/00:	During the site inspection, no indication of required maintenance was noted.
4/3/00:	A site inspection was conducted; no maintenance required.
4/10/00:	Site inspection was conducted; no maintenance required.
4/24/00	Site inspection was conducted; replaced the mosquito netting covering the sump on May 3.
5/3/00:	Site inspection was conducted; replaced mosquito netting over the sump; white paint graffitti on left gate post was noted.

Vector Activities

The sedimentation vault was found breeding on April 27. Abatement with Altosid liquid was performed on April 28.

Issues/Solutions

The effluent pump does not operate at night due to the increased power load caused by the Park and Ride light fixtures. BC is investigating a lower-amperage pump for replacement to correct the problem.

Termination Park and Ride Media Filter Monitoring Summary

Date	Rainfall Total	Deployment Criteria Met	Mobilized	Sampled		Empirical Observations
				Comp	Grab	
11/8/99	0.15	N	N	NA	NA	N
12/31/99	0.10	N	N	NA	NA	N
1/16/00	0.00	N	N	NA	NA	N
1/25/00	0.61	Y	Y	N	N	Y
1/30-31/00	1.13	N	N	NA	NA	N
2/10-11/00	0.21	N	N	NA	NA	N
2/12-14/00	0.95	N	N	NA	NA	N
2/16/00	0.66	N	N	NA	NA	N
2/20-21/00	2.16	Y	Y	Y	Y	Y
2/23/00	1.01	N	N	NA	NA	N
2/27/00	0.15	Y	Y	Y	Y	Y
3/8/00	0.94	Y	Y	Y	Y	Y
4/17-18/00	1.68	Y	Y	Y	Y	Y

Via Verde Park and Ride MCTT (Site ID 74206) Brown and Caldwell

Monitoring/Sampling Activities

An underpredicted storm occurred on March 3. No teams were mobilized for this event. Another storm occurred on March 5. Since this event did not meet the 48-hour antecedent dry period criteria, no teams were mobilized for the March 5 event.

The March 8, 2000 storm was successfully captured, which dropped a total rainfall of 0.75 inches onsite. Empirical observations were documented, and grab and composite samples were collected.

Clean sample bottles were installed during the routine weekly inspection and the influent and effluent stations were put into storm readiness (March 16).

Successfully sampled storm of April 17 through April 18, 2000. The MCTT received 1.42 inches of rainfall.

Operation and Maintenance

3/6/00:	Site inspection was conducted; no maintenance required.
3/16/00:	Site inspection was conducted; no maintenance required.
4/3/00:	Weekly site inspection was conducted; no maintenance required.
4/10/00:	Site inspection was conducted; no maintenance required.
4/24/00:	Site inspection was conducted; cleaned up trash and debris from the BMP; replaced the mosquito netting covering the sump on April 28.
5/3/00:	Site inspection was conducted; no maintenance required.

Vector Activities

The sedimentation vault was found breeding on March 10 and April 27. Abatement with Altosid liquid was performed on March 10 and April 28.

Issues/Solutions

None this period.

Via Verde Park and Ride Multi-Chamber Treatment Train Monitoring Summary

Date	Rainfall Total	Deployment Criteria Met	Mobilized	Sampled		Empirical Observations
				Comp	Grab	
11/8/99	0.14	N	N	NA	NA	N
12/31/99	0.35	N	N	NA	NA	N
1/16/00	0.00	N	N	NA	NA	N
1/25/00	0.88	Y	Y	N	N	Y
1/30-31/00	0.34	N	N	NA	NA	N
2/10-11/00	0.90	N	N	NA	NA	N
2/12-14/00	1.02	N	N	NA	NA	N
2/16/00	1.15	N	N	NA	NA	N
2/20-21/00	2.52	Y	Y	Y	Y	Y
2/23/00	1.47	N	N	NA	NA	N
2/27/00	0.40	Y	Y	Y	Y	Y
3/8/00	0.75	Y	Y	Y	Y	Y
4/17-18/00	1.42	Y	Y	Y	Y	Y

Lakewood Park and Ride MCTT (Site ID 74208) Brown and Caldwell

Monitoring/Sampling Activities

An underpredicted storm occurred on March 3. No teams were mobilized for this event. Another storm occurred on March 5. Since this event did not meet the 48-hour antecedent dry period criteria, no teams were mobilized for the March 5 event.

BC mobilized and successfully captured the storm of March 8, 2000, which produced a total onsite rainfall of 0.98 inches. Grab and composite samples were collected; empirical observations were recorded. The BMP filled to capacity and bypass occurred.

During the routine weekly inspection, clean sample bottles were installed, and the influent and effluent stations were put into storm readiness (March 20).

Successfully sampled storm of April 17 through April 18, 2000. The MCTT received 1.62 inches of rainfall.

Operation and Maintenance

4/6/00/4/20/00: Site inspection was conducted; no maintenance required.

4/3/00:	The weekly site inspection was conducted. No maintenance required at this time.
4/10/00:	Site inspection was conducted; no maintenance required.
4/24/00:	Site inspection was conducted; replaced the mosquito netting covering the sump on May 3.
5/3/00:	Site inspection was conducted; replaced mosquito netting on sump.

Vector Activities

The sedimentation vault was found breeding on March 14, 22, and 31; April 7, 20, and 27; and May 5 and 9. The site was treated with Altosid liquid on March 14, 22, and 31; April 7, 21 and 28; and May 5 and 10.

Issues/Solutions

The transfer pump in the sediment chamber does not operate correctly due to the pump's high power load. A lower amperage pump is being investigated to correct the problem.

Lakewood Park and Ride MCTT Monitoring Summary

Date	Rainfall Total	Deployment Criteria Met	Mobilized	Sampled		Empirical Observations
				Comp	Grab	
11/8/99	0.17	N	N	NA	NA	N
12/31/99	0.06	N	N	NA	NA	N
1/16/00	0.00	N	N	NA	NA	N
1/25/00	0.53	Y	Y	N	N	Y
1/30-31/00	0.32	N	N	NA	NA	N
2/10-11/00	0.34	N	N	NA	NA	N
2/12-14/00	0.46	N	N	NA	NA	N
2/16/00	0.55	N	N	NA	NA	N
2/20-21/00	1.89	Y	Y	Y	Y	Y
2/23/00	1.06	N	N	NA	NA	N
2/27/00	0.14	Y	Y	Y	Y	Y
3/8/00	0.98	Y	Y	Y	Y	Y
4/17-18/00	1.62	Y	Y	Y	Y	Y

Altadena Maintenance Station Bio Strip and Infiltration Trench (Site ID 73211 a, b) MW/Law

Monitoring/Sampling Activities

3/1/00 through 5/18/00: Data was downloaded from the monitoring equipment.

3/2/00: Forecast predicted showers to produce < 0.10 inch of rainfall with a 60% probability of occurrence. Storm event produced 0.43 inch of rainfall. No teams were mobilized because the deployment criteria were not met

3/5/00: Forecast predicted rain to produce between 1 and 2 inches of rainfall with a 100% probability of occurrence. Storm event produced 2.21 inches of rainfall. No teams were mobilized because the 48-hour antecedent dry period was not met.

3/7/00: Forecast predicted rain to produce between 1 and 2 inches of rainfall with a 80% probability of occurrence. Storm event produced 0.55 inches of rainfall. Teams were mobilized and composite samples were collected at both the influent and effluent locations and sent to the laboratory for analysis. Influent and effluent samples met minimum percent storm capture and minimum number of aliquots, and enough volume was collected to run the entire analytical suite. Empirical observations were made.

3/13/00: Installed loaner Troll 4000.

3/21/00: Calibrated the Troll 4000.

3/23/00: Replaced desiccant cartridges.

4/14/00: Forecast predicted rain to produce up to 0.30 inch of rainfall with a 50% probability of occurrence. Storm event produced 0.00 inch of rainfall. No teams were mobilized because of the unlikelihood of rainfall producing enough runoff to discharge through the biofiltration strip.

4/16/00: Conducted pre-storm inspection of monitoring equipment.

4/17/00: Forecast predicted rain to produce up to 2 inches of rainfall with a 100% probability of occurrence. A team was mobilized because the 48-hour antecedent dry period was met. Storm event produced approximately 3.50 inches of rainfall. At 12:34 a.m. on 4/18/00, a power outage occurred at the maintenance station terminating power to both sampling stations. Composite samples were collected at both the influent and effluent locations and represented the entire hydrograph during the first portion of the event, which ended on 4/17/00 at 8:30 p.m. The samples met the minimum percent storm capture of the associated hydrograph and minimum number of aliquots, and enough volume was collected to run the entire analytical suite. Therefore, the samples were sent to the laboratory for analysis. Empirical observations were made.

4/21/00: Forecast predicted rain to produce up to 0.10 inch of rainfall with a 40% probability of occurrence. Storm event produced 0.00 inch of rainfall. No teams were mobilized because of the deployment criteria not being met.

5/15/00: Forecast predicted scattered showers and thunderstorms to produce up to 0.20 inch of rainfall with a 30% probability of occurrence. No teams were mobilized because of the deployment criteria not being met. Storm event produced 0.00 inch of rainfall.

Altadena Maintenance Station Bio Strip and Infiltration Trench Monitoring Summary

Date	Rainfall Total	Antecedent Dry Period & Deployment Criteria Met	Mobilized	Sampled		Empirical Observations
				Comp	Grab	
11/8/99	0.19	N	N	NA	NA	N
12/31/99	0.25	N	N	NA	NA	N
1/16/00	0.04	N	N	NA	NA	N
1/25/00	0.45	Y	Y	Y	Y	Y
1/30-31/00	0.83	N	N	NA	NA	N
2/10-11/00	0.79	N	N	NA	NA	N
2/12-14/00	0.76	N	N	NA	NA	N
2/16/00	0.90	Y	Y	Y	N	Y
2/20-21/00	3.11	Y	Y	Y	N	Y
2/23/00	1.84	N	N	NA	NA	N
2/27/00	0.77	Y	Y	Y	Y	Y
3/3-4/00	0.43	N	N	NA	NA	N
3/5-6/00	2.21	N	N	NA	NA	Y
3/7-8/00	0.55	Y	Y	Y	NA	Y
4/14/00	0.00	Y	N*	NA	NA	N
4/17-18/00	3.50**	Y	Y	Y	NA	Y
4/21/00	0.00	N	N	NA	NA	N
5/15/00	0.00	N	N	NA	NA	N

* Teams not mobilized because of the unlikelihood of rainfall producing enough runoff to discharge through the biofiltration strip.

** Rainfall total estimated using NASA JPL rain gauge and onsite rain gauge.

Operations and Maintenance

3/7/00: Conducted post-storm inspections and drained spreader ditch.

3/8/00: Flow passed through the entire strip and discharged into the infiltration trench. No channelization or ponding was observed. During a short period of the storm, rainfall intensity was so great that it caused runoff from the maintenance yard to sheetflow directly into the collector ditch.

3/10/00: Conducted post-storm inspections and drained spreader ditch.

3/16/00: Conducted monthly inspections. Maintenance meeting MID thresholds was conducted during the week of 3/27/00. A detailed summary of vegetation coverage was provided in the 3/24/00 Biweekly Report.

3/23/00: Removed weeds greater than 12 inches tall, covered a small exposed section beneath the north wall of the Infiltration Trench with gravel, and removed trash and debris.

4/17/00: Flow passed through the entire strip and discharged into the infiltration trench. No channelization or ponding was observed. During periods of intense rainfall, runoff was so great that it sheetflowed directly from the maintenance yard to into the collector ditch. Discharge was observed through the overflow pipe of the infiltration trench.

4/20/00: Conducted monthly/post-storm inspection. Dewatered the strip's spreader ditch and began pulling weeds greater than 12 inches tall.

4/21/00: Completed pulling weeds greater than 12 inches tall.

Vector Activities

None this period.

Issues / Solutions

3/21/00: While at the site, it was observed that the flume approach sections for the CDS units had been blown of their pallets into the biofiltration strip. Winds upwards of 40 mph occurred in the area on 3/21/00. The approach sections were relocated onto the pavement beside the biofiltration strip by 3/25/00.

4/18/00: Power was re-established to the maintenance station between 12:34 and 7:00 a.m. on 4/18/00.

Foothill Maintenance Station Drain Inlet Insert (StreamGuard and Fossil Filter Inserts) (Site ID 73216 a, b) MW/Law

Monitoring/Sampling Activities

3/1/00 through 5/18/00: Data was downloaded from the monitoring equipment.

3/2/00: Forecast predicted showers to produce < 0.10 inch of rainfall with a 60% probability of occurrence. Storm event produced 0.37 inch of rainfall. No teams were mobilized because the deployment criteria were not met

3/5/00: Forecast predicted rain to produce between 1 and 2 inches of rainfall with a 100% probability of occurrence. Storm event produced 1.77 inches of rainfall. A team was mobilized to conduct during storm inspections in accordance with the MID. Sampling was not performed because the 48-hour antecedent dry period was not met.

3/7/00: Forecast predicted rain to produce between 1 and 2 inches of rainfall with a 80% probability of occurrence. Storm event produced 0.82 inches of rainfall. Teams were mobilized because the 48-hour antecedent dry period was met and because inspection during the storm is required per the MID. Composite samples were collected at both Fossil Filter and StreamGuard DII locations and sent to the laboratory for analysis. Both samples met minimum percent storm capture and minimum number of aliquots, and enough volume was collected to run the entire analytical suite. Empirical observations were made.

4/14/00: Forecast predicted rain to produce up to 0.30 inch of rainfall with a 50% probability of occurrence. Storm event produced 0.07 inch of rainfall. A team was mobilized because the 48-hour antecedent dry period was met and because inspection during the storm is required per the MID. Composite samples were collected at both Fossil Filter and StreamGuard DII locations. However, because the storm event did not meet the minimum size (0.10 inch), samples were not sent to the laboratory for analysis. Empirical observations were made.

4/16/00: Conducted pre-storm inspection of monitoring equipment.

4/17/00: Forecast predicted rain to produce up to 2 inches of rainfall with a 100% probability of occurrence. Teams were mobilized because the 48-hour antecedent dry period was met. Storm event produced 2.81 inches of rainfall. Composite samples were collected at both Fossil Filter and StreamGuard DII locations. The sample collected at the Fossil Filter location represented the entire storm event (i.e., through 9:25 a.m. on 4/18/00), met the minimum percent storm capture and minimum number of aliquots, and enough volume was collected to run the entire analytical suite. The sample collected at the StreamGuard location represented the entire hydrograph during the first portion of the event, which ended on 4/17/00 at 8:02 p.m. The portion of sample representing flow after 8:02 p.m. was discarded because flow measurements became erratic. The StreamGuard sample representing flow through 8:02 p.m. met the minimum percent storm capture of the associated hydrograph and minimum number of aliquots, and enough volume

was collected to run the entire analytical suite. Therefore, both Fossil Filter and StreamGuard samples were sent to the laboratory for analysis. Empirical observations were made.

4/19/00: Replaced flow meter at StreamGuard DII monitoring location, cleaned both samplers, and repaired rubber berm associated with the Fossil Filter DII monitoring vault.

4/21/00: Calibrated StreamGuard DII flow meter and readied monitoring equipment for storm event forecasted to occur in the evening. Forecast predicted rain to produce up to 0.10 inch of rainfall with a 40% probability of occurrence. No teams were mobilized because of the deployment criteria not being met. Storm event produced 0.07 inch of rainfall. Composite samples were collected at both Fossil Filter and StreamGuard DII locations. However, because the storm event did not meet the minimum size (0.10 inch), samples were not sent to the laboratory for analysis.

5/15/00: Forecast predicted scattered showers and thunderstorms to produce up to 0.20 inch of rainfall with a 30% probability of occurrence. Monitoring equipment was readied for the evening's event. No teams were mobilized because of the deployment criteria not being met. Storm event produced 0.00 inch of rainfall.

Foothill Maintenance Station Drain Inlet Insert (StreamGuard and Fossil Filter Inserts)
Monitoring Summary

Date	Rainfall Total	Antecedent Dry Period & Deployment Criteria Met	Mobilized	Sampled		Empirical Observations
				Comp	Grab	
11/8/99	0.10	N	N	NA	NA	N
12/31/99	0.28	N	N	NA	NA	N
1/16/00	0.00	N	N	NA	NA	N
1/25/00	0.65	Y	Y	Y	NA	Y
1/30-31/00	0.31	Y	Y	Y	NA	Y
2/10-11/00	0.79	N	N	NA	NA	N
2/12-14/00	1.34	N	N	NA	NA	N
2/16/00	0.92	Y	Y	Y	NA	Y
2/20-21/00	3.05	Y	Y	Y	NA	Y
2/23/00	1.60	N	N	NA	NA	N
2/27/00	0.48	Y	Y	Y	NA	Y
3/3-4/00	0.37	N	N	NA	NA	N
3/5-6/00	1.77	N	Y*	NA	NA	Y
3/7-8/00	0.82	Y	Y	Y	NA	Y
4/14/00	0.07	Y	Y	Y**	NA	Y
4/17-18/00	2.81	Y	Y	Y	NA	Y
4/21/00	0.07	N	N	NA	NA	N
5/15/00	0.00	N	N	NA	NA	N

* Deployment criteria met; team mobilized to conduct during-storm inspection.

** Samples were not analyzed because the minimum storm size (i.e., 0.10 inch) was not met.

Operations and Maintenance

3/5/00: Some debris accumulated in the Fossil Filter DII partially blocking the filter cartridge but did not cause flow bypass. DII was subsequently cleaned once during the storm event in accordance with the MID. Some trash and sediment accumulated in the StreamGuard DII. No bypass occurred and no maintenance was required.

3/7/00: Conducted pre-storm inspection of DIIs. Trash and debris were removed from the Fossil Filter DII in accordance with the MID. No maintenance was required at the StreamGuard DII.

3/8/00: Flow bypassed the Fossil Filter DII because of the cartridge's filtering capacity was exceeded. No bypass was observed at the StreamGuard DII. No maintenance was required of either DII during the storm.

3/10/00: Conducted post-storm inspection of DIIs. A small amount of organic material was removed from the Fossil Filter DII. No maintenance was required of the StreamGuard DII.

3/16/00: Conducted monthly inspections of DIIs. Some leaves and trash were removed from the Fossil Filter DII. No maintenance was required of the StreamGuard DII.

4/16/00: Conducted pre-storm inspection of DIIs. Trash and debris were removed from the Fossil Filter DII in accordance with the MID. No maintenance was required at the StreamGuard DII.

4/17/00: Some debris accumulated in the Fossil Filter DII partially blocking the filter cartridge causing flow bypass. DII was subsequently cleaned once during the storm event in accordance with the MID, however, bypass continued because of the flow rate exceeding the capacity of the filter cartridges. Flow bypass generally occurred when the flow rate exceeded 0.07 cfs. The flange that supports the Fossil Filter in the drain inlet bent because of the weight of the DII and water. Some leaves and sediment accumulated in the StreamGuard DII but maintenance was not required. Bypass was not observed in the StreamGuard DII.

4/19/00: Conducted post-storm inspection of Fossil Filter in accordance with MID.

5/8/00: Repaired the Fossil Filter DII by bending the mounting flange back to its original shape. Some organic material was removed from the DII.

5/15/00: Conducted pre-storm/monthly inspections of DIIs. Some organic material was removed from the Fossil Filter DII. No maintenance was required of the StreamGuard DII.

Vector Activities

None this period.

Issues / Solutions

None this period.

Las Flores Maintenance Station Drain Inlet Insert (StreamGuard and Fossil Filter Inserts) (Site ID 73217 a, b) MW/Law

Monitoring/Sampling Activities

3/1/00 through 5/18/00: Data was downloaded from the monitoring equipment.

3/2/00: Forecast predicted showers to produce < 0.10 inch of rainfall with a 60% probability of occurrence. Storm event produced 0.20 inch of rainfall. No teams were mobilized because the deployment criteria were not met

3/5/00: Forecast predicted rain to produce between 1 and 2 inches of rainfall with a 100% probability of occurrence. Storm event produced 1.06 inches of rainfall. A team was mobilized to conduct during storm inspections in accordance with the MID. Sampling was not performed because the 48-hour antecedent dry period was not met.

3/7/00: Forecast predicted rain to produce between 1 and 2 inches of rainfall with a 80% probability of occurrence. Storm event produced 0.91 inch of rainfall. A team was mobilized to conduct during storm inspections in accordance with the MID. Sampling was not performed because the 48-hour antecedent dry period was not met.

4/14/00: Forecast predicted rain to produce up to 0.30 inch of rainfall with a 50% probability of occurrence. Storm event produced 0.00 inch of rainfall. A team was mobilized because the 48-hour antecedent dry period was met and because inspection during the storm is required per the MID. No samples were collected.

4/16/00: Conducted pre-storm inspection of monitoring equipment.

4/17/00: Forecast predicted rain to produce up to 2 inches of rainfall with a 100% probability of occurrence. A team was mobilized because the 48-hour antecedent dry period was met. Storm event produced approximately 3.00 inches of rainfall (based on nearby Department of Forestry rain gauge). Composite samples were collected at both Fossil Filter and StreamGuard DII locations and sent to the laboratory for analysis. Both samples met minimum percent storm capture and minimum number of aliquots, and enough volume was collected to run the entire analytical suite. Empirical observations were made.

4/21/00: Readied monitoring equipment for storm event forecasted to occur in the evening. Forecast predicted rain to produce up to 0.10 inch of rainfall with a 40% probability of occurrence. No teams were mobilized because of the deployment criteria not being met. Storm event produced 0.00 inch of rainfall.

5/15/00: Forecast predicted scattered showers and thunderstorms to produce up to 0.20 inch of rainfall with a 30% probability of occurrence. Monitoring equipment was readied for the evening's event. No teams were mobilized because of the deployment criteria not being met. Storm event produced 0.02 inch of rainfall. No samples were collected.

Las Flores Maintenance Station Drain Inlet Insert (StreamGuard and Fossil Filter Inserts) Monitoring Summary

Date	Rainfall Total	Antecedent Dry Period & Deployment Criteria Met	Mobilized	Sampled		Empirical Observations
				Comp	Grab	
11/8/99	0.48	N	N	NA	NA	N
12/31/99	0.03	N	N	NA	NA	N
1/16/00	0.07	N	N	NA	NA	N
1/25/00	0.86	Y	Y	Y*	NA	Y
1/30-31/00	0.42	Y	Y	Y**	NA	Y
2/10-11/00	0.45	Y	Y	Y	NA	Y
2/12-14/00	1.67	N	N	NA	NA	N
2/16/00	0.48	N	Y***	NA	NA	Y
2/20-21/00	2.38	Y	Y	Y	NA	Y
2/23/00	1.80	N	N	NA	NA	N
2/27/00	0.50	Y	Y	Y	NA	Y
3/3-4/00	0.20	N	N	NA	NA	N
3/5-6/00	1.06	N	Y***	NA	NA	Y
3/7-8/00	0.91	N	Y***	NA	NA	Y
4/14/00	0.00	Y	Y	NA	NA	Y
4/17-18/00	2.63	Y	Y	Y	NA	Y
4/21/00	0.00	N	N	NA	NA	N
5/15/00	0.02	N	N	NA	NA	N

* Not enough sample collected from StreamGuard DII for analysis

** Not enough sample collected from Fossil Filter DII for analysis

*** Deployment criteria met; team mobilized to conduct during-storm inspection.

Operations and Maintenance

3/5/00: Sandbags were placed on the west side of the Fossil Filter DII by Caltrans staff. However, flow was still able to discharge into the DII. Trash accumulated in the Fossil Filter DII partially blocking the filter cartridge but did not cause flow

bypass. DII was subsequently cleaned once during the storm event in accordance with the MID. Some organic material accumulated in the StreamGuard DII. Approximately 18" of standing water in the StreamGuard caused the fabric slip away from the drain inlet grate, which allowed flow bypass.

3/7/00: Sandbags were placed on the west side of the Fossil Filter DII by Caltrans staff. However, flow was still able to discharge into the DII. Conducted during-storm inspections of the DIIs. Sediment was removed from the top of the Fossil Filter cartridge once during the storm in accordance with the MID. Trickle flow entered the Fossil Filter DII and no bypass was observed. The StreamGuard DII was re-secured in the drain inlet by compressing the fabric against the drain inlet wall and grate using wood shims. Trickle flow entered the StreamGuard DII and no bypass was observed.

3/13/00: Sandbags were placed on the west side of the Fossil Filter DII by Caltrans staff. Conducted post-storm inspection of DIIs. Organic material was removed from the Fossil Filter DII. No maintenance was required of the StreamGuard DII.

3/16/00: Conducted monthly inspections of DIIs. Sandbags were placed on the west side of the Fossil Filter DII by Caltrans staff. No maintenance was required of the either DII.

4/16/00: Conducted pre-storm inspection of DIIs. Leaves and sediment were removed from the Fossil Filter DII in accordance with the MID. No maintenance was required at the StreamGuard DII.

4/17/00: Some leaves accumulated in the Fossil Filter DII partially blocking the filter cartridge but did not cause flow bypass. DII was subsequently cleaned once during the storm event in accordance with the MID. Some leaves and sediment accumulated in the StreamGuard DII. No bypass occurred and no maintenance was required.

4/21/00: Conducted post-storm inspection of Fossil Filter DII in accordance with the MID. Sediment was removed from the Fossil Filter DII cartridges.

5/15/00: Conducted pre-storm/monthly inspections of DIIs. Some organic material and trash and debris were removed from the Fossil Filter DII. No maintenance was required of the StreamGuard DII.

Vector Activities

None this period.

Issues / Solutions

None this period.

Rosemead Maintenance Station Drain Inlet Insert (StreamGuard and Fossil Filter Inserts) (Site ID 73218 a, b) MW/Law

Monitoring/Sampling Activities

3/1/00 through 5/18/00: Data was downloaded from the monitoring equipment.

3/2/00: Forecast predicted showers to produce < 0.10 inch of rainfall with a 60% probability of occurrence. Storm event produced 0.53 inch of rainfall. No teams were mobilized because the deployment criteria were not met

3/5/00: Forecast predicted rain to produce between 1 and 2 inches of rainfall with a 100% probability of occurrence. Storm event produced 1.57 inches of rainfall. A team was mobilized to conduct during storm inspections in accordance with the MID. Sampling was not performed because the 48-hour antecedent dry period was not met.

3/7/00: Forecast predicted rain to produce between 1 and 2 inches of rainfall with a 80% probability of occurrence. Storm event produced 0.81 inches of rainfall. Teams were mobilized because the 48-hour antecedent dry period was met and because inspection during the storm is required per the MID. Composite samples were collected at both Fossil Filter and StreamGuard DII locations and sent to the laboratory for analysis. However, bottles containing both samples broke during transport to the laboratory. Consequently, laboratory analysis could not be conducted Empirical observations were made.

3/15/00: Repaired berm around the Fossil Filter monitoring vault.

4/14/00: Forecast predicted rain to produce up to 0.30 inch of rainfall with a 50% probability of occurrence. Storm event produced 0.00 inch of rainfall. A team was mobilized because the 48-hour antecedent dry period was met and because inspection during the storm is required per the MID. No samples were collected.

4/16/00: Conducted pre-storm inspection of monitoring equipment.

4/17/00: Forecast predicted rain to produce up to 2 inches of rainfall with a 100% probability of occurrence. A team was mobilized because the 48-hour antecedent dry period was met. Storm event produced approximately 2.07 inches of rainfall through 5:36 a.m. on 4/18/00. At 5:36 a.m. on 4/18/00, a power outage occurred at the maintenance station terminating power to both sampling stations. Composite samples were collected at both the Fossil Filter and StreamGuard DII locations and represented the entire hydrograph, which ended on 4/18/00 at 05:30 a.m. The samples met the minimum percent storm capture of the associated hydrograph and minimum number of aliquots, and enough volume was collected to run the entire analytical suite. Therefore, the samples were sent to the laboratory for analysis. Empirical observations were made.

4/19/00: Cleaned both samplers and repaired rubber berm associated with the Fossil Filter DII monitoring vault.

4/21/00: Readied monitoring equipment for storm event forecasted to occur in the evening. Forecast predicted rain to produce up to 0.10 inch of rainfall with a 40% probability of occurrence. No teams were mobilized because of the deployment criteria not being met. Storm event produced 0.00 inch of rainfall.

5/15/00: Forecast predicted scattered showers and thunderstorms to produce up to 0.20 inch of rainfall with a 30% probability of occurrence. Monitoring equipment was readied for the evening's event. No teams were mobilized because of the deployment criteria not being met. Storm event produced 0.00 inch of rainfall.

Rosemead Maintenance Station Drain Inlet Insert (StreamGuard and Fossil Filter Inserts) Monitoring Summary

Date	Rainfall Total	Antecedent Dry Period & Deployment Criteria Met	Mobilized	Sampled		Empirical Observations
				Comp	Grab	
11/8/99	0.12	N	N	NA	NA	N
12/31/99	0.34	N	N	NA	NA	N
1/16/00	0.01	N	N	NA	NA	N
1/25/00	0.72	Y	Y	Y	NA	Y
1/30-31/00	0.21	Y	Y	Y	NA	Y
2/10-11/00	0.46	N	N	NA	NA	N
2/12-14/00	1.05	N	N	NA	NA	N
2/16/00	0.90	N	Y*	NA	NA	Y
2/20-21/00	2.65	Y	Y	Y	NA	Y
2/23/00	1.89	N	N	NA	NA	N
2/27/00	0.46	Y	Y	Y	NA	Y
3/3-4/00	0.53	N	N	NA	NA	N
3/5-6/00	1.57	N	Y*	NA	NA	Y
3/7-8/00	0.81	Y	Y	N	NA	Y
4/14/00	0.00	Y	Y	NA	NA	Y
4/17-18/00	2.07**	Y	Y	Y	NA	Y
4/21/00	0.00	N	N	NA	NA	N
5/15/00	0.00	N	N	NA	NA	N

* Deployment criteria met; team mobilized to conduct during-storm inspection.

** Rainfall measured through 05:36 a.m. on 4/18/00.

Operations and Maintenance

3/5/00: Some sediment and trash accumulated in the Fossil Filter DII partially blocking the filter cartridge causing flow bypass. DII was subsequently cleaned once during the storm event in accordance with the MID. Bypass was not observed after the Fossil filter DII was cleaned. Some trash and sediment accumulated in the StreamGuard DII. No bypass occurred and no maintenance was required.

3/7/00: Conducted pre-storm inspection of DIIs. Organic material and paper were removed from the Fossil Filter DII in accordance with the MID. No maintenance was required at the StreamGuard DII.

3/8/00: Flow bypassed the Fossil Filter DII because of the cartridge's filtering capacity was exceeded. A small amount of organic material was removed from the Fossil Filter once during the storm in accordance with the MID. The StreamGuard slipped away from the curb side during the event. However, no bypass was observed at the StreamGuard DII.

3/10/00: Conducted post-storm inspection of DIIs. Trash and leaves were removed from the Fossil Filter DII. The StreamGuard DII was re-secured in the drain inlet.

3/16/00: Conducted monthly inspections of DIIs. Some leaves and trash were removed from the Fossil Filter DII. No maintenance was required of the StreamGuard DII.

4/16/00: Conducted pre-storm inspection of DIIs. Trash and debris were removed from the Fossil Filter DII in accordance with the MID. No maintenance was required at the StreamGuard DII.

4/17/00: Some debris accumulated in the Fossil Filter DII partially blocking the filter cartridge causing flow bypass. DII was subsequently cleaned once during the storm event in accordance with the MID, however, bypass continued because of the flow rate exceeding the capacity of the filter cartridges. Some organic matter accumulated in the Fossil Filter DII partially blocking the filter cartridge but did not cause flow bypass. Some debris accumulated in the StreamGuard DII but maintenance was not required. Bypass was observed in the StreamGuard DII through its overflow cutouts. Flooding was also observed (to a depth of approximately 4 inches) because the StreamGuard DII could not handle the flow rate. The southeast corner of the StreamGuard DII slipped in the drain inlet approximately 1.25 inches, however, bypass was not observed in the corner.

4/19/00: Conducted post-storm inspection of Fossil Filter DII in accordance with the MID. Sediment was removed from the Fossil Filter DII cartridges.

5/15/00: Conducted monthly inspections of DIIs. Some organic material and sediment were removed from the Fossil Filter DII. No maintenance was required of the StreamGuard DII.

Vector Activities

April 27: Breeding was noted at the monitoring vaults. The site was abated with Altosid liquid on April 28, 2000.

Issues / Solutions

4/18/00: Power was re-established to the maintenance station between 6:30 and 9:50 a.m. on 4/18/00.

I-605/SR-91 Interchange Bio Strip & Swale (Site ID 73222 a, b) MW/Law

Monitoring/Sampling Activities

Strip:

3/2/00: Forecast predicted showers to produce < 0.10 inch of rainfall with a 60% probability of occurrence. Storm event produced 0.40 inch of rainfall. No teams were mobilized because the deployment criteria were not met

3/5/00: Forecast predicted rain to produce between 1 and 2 inches of rainfall with a 100% probability of occurrence. Storm event produced 1.01 inches of rainfall. The minimum antecedent dry period was not met. However, a team was mobilized to make hydraulic residence time measurements at the I-605/SR-91 swale and was able to make empirical observations of the strip.

3/7/00: Forecast predicted rain to produce between 1 and 2 inches of rainfall with a 80% probability of occurrence. Storm event produced 0.83 inches of rainfall. Teams were mobilized and grab and composite samples were collected at both the influent and effluent locations and sent to the laboratory for analysis. Influent and effluent samples met minimum percent storm capture and minimum number of aliquots, and enough volume was collected to run the entire analytical suite. Empirical observations were made.

3/9/00: Re-calibrated effluent sampler's aliquot volume.

3/23/00: Prepared grab sample bottles for sample collection.

3/28/00: Cleaned flumes.

4/14/00: Forecast predicted rain to produce up to 0.30 inch of rainfall with a 50% probability of occurrence. Storm event produced 0.00 inch of rainfall. No teams were mobilized because of the unlikelihood of rainfall producing enough runoff to discharge through the biofiltration strip.

4/16/00: Conducted pre-storm inspection of monitoring equipment.

4/17/00: Forecast predicted rain to produce up to 2 inches of rainfall with a 100% probability of occurrence. Storm event produced 1.58 inches of rainfall. Teams were mobilized and grab and composite samples were collected at both the influent and effluent locations and sent to the laboratory for analysis. Influent and effluent samples met minimum percent storm capture and minimum number of aliquots, and enough volume was collected to run the entire analytical suite. Empirical observations were made.

4/21/00: Forecast predicted rain to produce up to 0.10 inch of rainfall with a 40% probability of occurrence. Storm event produced 0.00 inch of rainfall. No teams were mobilized because of the deployment criteria not being met.

4/25/00: Replaced monitoring station batteries.

4/26/00: Cleaned flumes.

5/15/00: Forecast predicted scattered showers and thunderstorms to produce up to 0.20 inch of rainfall with a 30% probability of occurrence. No teams were mobilized because of the deployment criteria not being met. Storm event produced 0.00 inch of rainfall.

I-605/SR-91 Interchange Bio Strip Monitoring Summary

Date	Rainfall Total	Antecedent Dry Period & Deployment Criteria Met	Mobilized	Sampled		Empirical Observations
				Comp	Grab	
11/8/99	0.09	N	N	NA	NA	N
12/31/99	0.52	N	N	NA	NA	N
1/16/00	0.00	N	N	NA	NA	N
1/25/00	0.55	Y	Y	N	N	Y
1/30-31/00	0.25	N	N	NA	NA	N
2/10-11/00	0.26	N	N	NA	NA	N
2/12-14/00	1.14	N	Y*	NA	NA	Y
2/16/00	0.62	N	N	NA	NA	N
2/20-21/00	2.14	Y	Y	N	Y	Y
2/23/00	0.98	N	N	NA	NA	N
2/27/00	0.16	Y	Y	N	N	Y
3/3-4/00	0.40	N	N	NA	NA	N
3/5-6/00	1.01	N	Y**	NA	NA	Y
3/7-8/00	0.83	Y	Y	Y	Y	Y
4/14/00	0.00	Y	N***	NA	NA	N
4/17-18/00	1.58	Y	Y	Y	Y	Y
4/21/00	0.00	N	N	NA	NA	N
5/15/00	0.00	N	N	NA	NA	N

* A team was mobilized to the Cerritos Maintenance Station swale to conduct hydraulic residence time measurements. Empirical observations of the strip were made while the team was in the area.

**A team was mobilized to the I-605/SR-91 swale to conduct hydraulic residence time measurements. Empirical observations of the strip were made while the team was in the area.

*** Teams not mobilized because of the unlikelihood of rainfall producing enough runoff to discharge through the biofiltration strip.

Swale:

3/2/00: Forecast predicted showers to produce < 0.10 inch of rainfall with a 60% probability of occurrence. Storm event produced 0.40 inch of rainfall. No teams were mobilized because the deployment criteria were not met

3/5/00: Forecast predicted rain to produce between 1 and 2 inches of rainfall with a 100% probability of occurrence. Storm event produced 1.01 inches of rainfall. The minimum antecedent dry period was not met. However, a team was mobilized to make hydraulic residence time measurements at the swale.

3/7/00: Forecast predicted rain to produce between 1 and 2 inches of rainfall with a 80% probability of occurrence. Storm event produced 0.83 inches of rainfall. Teams were mobilized and grab and composite samples were collected at both the influent and effluent locations and sent to the laboratory for analysis. Influent and effluent samples met minimum percent storm capture and minimum number of aliquots, and enough volume was collected to run the entire analytical suite. Empirical observations were made.

3/21/00: Internal battery died on influent sampler. Subsequently, battery was replaced and sampler re-calibrated.

3/23/00: Prepared grab sample bottles for sample collection.

3/30/00: Replaced desiccant at the influent monitoring station.

4/14/00: Forecast predicted rain to produce up to 0.30 inch of rainfall with a 50% probability of occurrence. Storm event produced 0.00 inch of rainfall. No teams were mobilized because of the unlikelihood of rainfall producing enough runoff to discharge through the biofiltration swale.

4/16/00: Conducted pre-storm inspection of monitoring equipment.

4/17/00: Forecast predicted rain to produce up to 2 inches of rainfall with a 100% probability of occurrence. Storm event produced 1.58 inches of rainfall. Teams were mobilized and composite samples were collected at both the influent and effluent locations and sent to the laboratory for analysis. Influent and effluent samples met minimum percent storm capture and minimum number of aliquots, and enough volume was collected to run the entire analytical suite. Empirical observations were made.

4/21/00: Forecast predicted rain to produce up to 0.10 inch of rainfall with a 40% probability of occurrence. Storm event produced 0.00 inch of rainfall. No teams were mobilized because of the deployment criteria not being met.

4/25/00: Replaced monitoring station batteries.

4/26/00: Cleaned flumes.

5/15/00: Forecast predicted scattered showers and thunderstorms to produce up to 0.20 inch of rainfall with a 30% probability of occurrence. No teams were mobilized

because of the deployment criteria not being met. Storm event produced 0.00 inch of rainfall.

I-605/SR-91 Interchange Bio Swale Monitoring Summary

Date	Rainfall Total	Antecedent Dry Period & Deployment Criteria Met	Mobilized	Sampled		Empirical Observations
				Comp	Grab	
11/8/99	0.09	N	N	NA	NA	N
12/31/99	0.52	N	N	NA	NA	N
1/16/00	0.00	N	N	NA	NA	N
1/25/00	0.55	Y	Y	N	N	Y
1/30-31/00	0.25	N	N	NA	NA	N
2/10-11/00	0.26	N	N	NA	NA	N
2/12-14/00	1.14	N	Y*	NA	NA	Y
2/16/00	0.62	N	N	NA	NA	N
2/20-21/00	2.14	Y	Y	N	Y	Y
2/23/00	0.98	N	N	NA	NA	N
2/27/00	0.16	Y	Y	N	N	Y
3/3-4/00	0.40	N	N	NA	NA	N
3/5-6/00	1.01	N	Y**	NA	NA	Y
3/7-8/00	0.83	Y	Y	Y	Y	Y
4/14/00	0.00	Y	N***	NA	NA	N
4/17-18/00	1.58	Y	Y	Y	NA	Y
4/21/00	0.00	N	N	NA	NA	N
5/15/00	0.00	N	N	NA	NA	N

*A team was mobilized to the Cerritos Maintenance Station swale to conduct hydraulic residence time measurements. Empirical observations of the swale were made while the team was in the area.

** A team was mobilized to the swale to conduct hydraulic residence timer measurements.

*** Teams not mobilized because of the unlikelihood of rainfall producing enough runoff to discharge through the biofiltration swale.

Operations and Maintenance

Strip:

3/5/00: Flow was perceptible as it passed through the strip. Trash and debris accumulated at the asphalt/strip interface. No channelization or ponding was observed within the strip.

3/7/00: Gopher traps set in fresh burrows and old burrows filled in with soil. One gopher caught.

3/8/00: Flow was perceptible as it passed through the strip. Trash and debris accumulated at the asphalt/strip interface. No channelization or ponding was observed within the strip.

3/20/00: Gopher traps set in fresh burrows and old burrows filled in with soil. One gopher caught.

3/22/00: Conducted monthly inspections. Maintenance meeting MID thresholds was conducted during the week of 3/27/00. A detailed summary of vegetation coverage was provided in the 3/24/00 Biweekly Report.

3/28/00: Began pulling weeds greater than 12 inches tall, compacting gopher holes, and removing trash and debris.

3/30/00: Completed activities that were started on 3/28/00.

4/4/00: Conducted gopher inspection and abatement. Two traps were set but no gophers caught.

4/10/00: Conducted gopher inspection and abatement.

4/11/00: Conducted gopher inspection and abatement.

4/17/00: Flow was perceptible as it passed through the strip. Trash and debris accumulated at the asphalt/strip interface. No channelization or ponding was observed within the strip.

4/19/00: Conducted gopher inspection. No traps set.

4/20/00: Pulled weeds greater than 12 inches tall and removed trash and debris in anticipation of monthly inspection findings.

4/21/00: Conducted gopher inspection. No traps set.

4/24/00: Conducted gopher inspection. No traps set.

4/25/00: Conducted monthly site inspections.

4/26-27/00: Removed trash and debris and compacted gopher mounds.

5/1/00: Conducted gopher inspection. One trap set but no gophers caught.

5/10/00: Gopher abatement discontinued based on direction given during biweekly status meeting.

Swale:

3/5/00: Flow was perceptible as it passed through the swale. Trash and debris accumulated in the energy dissipater and at the concrete spreader/biofilter interface. No channelization or ponding was observed within the swale. Hydraulic residence time measurements were conducted. The hydraulic residence time was estimated to be approximately 56 minutes (calculated from the time dye first entered the swale to the time it reached the end of the swale).

3/7/00: Gopher traps set in fresh burrows and old burrows filled in with soil.

3/8/00: Flow was perceptible as it passed through the swale. Trash and debris accumulated in the energy dissipater and at the concrete spreader/biofilter interface. No channelization or ponding was observed within the swale.

3/20/00: Gopher traps set in fresh burrows and old burrows filled in with soil.

3/22/00: Conducted monthly inspections. Maintenance meeting MID thresholds was conducted during the week of 3/27/00. A detailed summary of vegetation coverage was provided in the 3/24/00 Biweekly Report.

3/30/00: Removed weeds that were greater than 12 inches tall.

4/4/00: Conducted gopher inspection and abatement. Two traps were set but no gophers caught.

4/10/00: Conducted gopher inspection and abatement.

4/11/00: Conducted gopher inspection and abatement.

4/17/00: Flow was perceptible as it passed through the swale. Trash and debris accumulated in the energy dissipater and at the concrete spreader/biofilter interface. No channelization or ponding was observed within the swale.

4/19/00: Conducted gopher inspection and abatement. One trap set but no gophers caught.

4/20/00: Began pulling weeds greater than 12 inches tall in anticipation of monthly inspection findings.

4/21/00: Conducted gopher inspection. One trap set but no gophers caught.

4/24/00: Conducted gopher inspection. One trap set but no gophers caught.

4/25/00: Conducted monthly site inspections.

4/26-27/00: Finished pulling weeds greater than 12 inches tall and compacted gopher mounds.

5/1/00: Conducted gopher inspection and abatement. One trap set but no gophers caught.

5/10/00: Gopher abatement discontinued based on direction given during biweekly status meeting.

Vector Activities

None this period.

Issues / Solutions

None this period.

Cerritos Maintenance Station Bio Swale (Site ID 73223) MW/Law

Monitoring/Sampling Activities

3/1/00 through 5/18/00: Data was downloaded from the monitoring equipment.

3/2/00: Forecast predicted showers to produce < 0.10 inch of rainfall with a 60% probability of occurrence. Storm event produced 0.40 inch of rainfall. No teams were mobilized because the deployment criteria were not met

3/5/00: Forecast predicted rain to produce between 1 and 2 inches of rainfall with a 100% probability of occurrence. Storm event produced 1.01 inches of rainfall. The minimum antecedent dry period was not met. However, a team was mobilized to make hydraulic residence time measurements at the I-605/SR-91 swale and was able to make empirical observations of the swale.

3/7/00: Forecast predicted rain to produce between 1 and 2 inches of rainfall with a 80% probability of occurrence. Storm event produced 0.83 inches of rainfall. Teams were mobilized and composite samples were collected at both the influent and effluent locations and sent to the laboratory for analysis. Influent and effluent samples met minimum percent storm capture and minimum number of aliquots, and enough volume was collected to run the entire analytical suite. Empirical observations were made.

3/28/00: Replaced desiccant cartridges at the influent and effluent monitoring stations and cleaned the flumes.

4/14/00: Forecast predicted rain to produce up to 0.30 inch of rainfall with a 50% probability of occurrence. Storm event produced 0.00 inch of rainfall. No teams were mobilized because of the unlikelihood of rainfall producing enough runoff to discharge through the biofiltration swale.

4/16/00: Conducted pre-storm inspection of monitoring equipment.

4/17/00: Forecast predicted rain to produce up to 2 inches of rainfall with a 100% probability of occurrence. Storm event produced 1.58 inches of rainfall. Teams were mobilized and composite samples were collected at both the influent and effluent locations and sent to the laboratory for analysis. Influent and effluent samples met minimum percent storm capture and minimum number of aliquots, and enough volume was collected to run the entire analytical suite. Empirical observations were made.

4/21/00: Forecast predicted rain to produce up to 0.10 inch of rainfall with a 40% probability of occurrence. Storm event produced 0.00 inch of rainfall. No teams were mobilized because of the deployment criteria not being met.

4/26/00: Cleaned flumes.

5/15/00: Forecast predicted scattered showers and thunderstorms to produce up to 0.20 inch of rainfall with a 30% probability of occurrence. No teams were mobilized because of the deployment criteria not being met. Storm event produced 0.00 inch of rainfall.

Cerritos Maintenance Station Bio Swale Monitoring Summary

Date	Rainfall Total	Antecedent Dry Period & Deployment Criteria Met	Mobilized	Sampled		Empirical Observations
				Comp	Grab	
11/8/99	0.09	N	N	NA	NA	N
12/31/99	0.52	N	N	NA	NA	N
1/16/00	0.00	N	N	NA	NA	N
1/25/00	0.55	Y	Y	N	N	Y
1/30-31/00	0.25	N	N	NA	NA	N
2/10-11/00	0.26	N	N	NA	NA	N
2/12-14/00	1.14	N*	Y**	NA	NA	Y
2/16/00	0.62	N	N	NA	NA	N
2/20-21/00	2.14	Y	Y	Y	Y	Y
2/23/00	0.98	N	N	NA	NA	N
2/27/00	0.16	Y	Y	N	Y	Y
3/3-4/00	0.40	N	N	NA	NA	N
3/5-6/00	1.01	N	Y***	NA	NA	Y
3/7-8/00	0.83	Y	Y	Y	NA	Y
4/14/00	0.00	Y	N****	NA	NA	N
4/17-18/00	1.58	Y	Y	Y	NA	Y
4/21/00	0.00	N	N	NA	NA	N
5/15/00	0.00	N	N	NA	NA	N

*Criteria were not met for sampling.

**Hydraulic residence time measurements were taken.

***A team was mobilized to the I-605/SR-91 swale to conduct hydraulic residence time measurements. Empirical observations of the swale were made while the team was in the area.

****Teams not mobilized because of the unlikelihood of rainfall producing enough runoff to discharge through the biofiltration swale.

Operations and Maintenance

3/5/00: As flow progressed through the swale, it infiltrated through previously filled-in gopher holes at the downstream end of the swale causing the runoff to flow into the subsurface gopher hole laterals. Flow eventually eroded areas of the side slope where gopher holes had been previously filled in and where new gopher holes had been burrowed during the storm event, resulting in damage to the swale and flow bypass. Sediment, trash and debris accumulated in the energy dissipater and within the first third of the swale.

3/7/00: Gopher traps set in fresh burrows and old burrows filled in with soil.

3/8/00: As flow progressed through the swale, it infiltrated through previously filled-in gopher holes at the downstream end of the swale causing the runoff to flow into the subsurface gopher hole laterals. Flow eventually eroded areas of the side slope where gopher holes had been previously filled in and where new gopher holes had been burrowed during the storm event, resulting in damage to the swale and flow bypass. Sediment, trash and debris accumulated in the energy dissipater and within the first third of the swale.

3/20/00: Gopher traps set in fresh burrows and old burrows filled in with soil.

3/21/00: Repaired downstream end of swale slope by removing, replacing, and compacting a 6 to 8 foot section of the swale.

3/22/00: Conducted monthly inspections and removed trash and debris from the energy dissipater and the swale. Other maintenance meeting MID thresholds was conducted during the week of 3/27/00. A detailed summary of vegetation coverage was provided in the 3/24/00 Biweekly Report.

3/28/00: Repaired slumping on south bank of swale, removed weeds that were greater than 12 inches tall, and compacted gopher holes.

4/4/00: Conducted gopher inspection and abatement. One trap was set but no gophers caught.

4/10/00: Conducted gopher inspection and abatement.

4/11/00: Conducted gopher inspection and abatement.

4/17/00: As flow progressed through the swale, it infiltrated through previously filled-in gopher holes at the upstream end and mid-portion of the swale causing the runoff to flow into the subsurface gopher hole laterals. Flow eventually eroded areas of the side slope where gopher holes had been previously filled in, resulting in damage to the swale and flow bypass. As a temporary measure to promote flow to pass through the entire length of the swale, clay was used to repair the eroded areas. Sediment, trash and debris accumulated in the energy dissipater and within the first third of the swale.

4/19/00: Conducted gopher inspection and abatement. One trap set but no gophers caught.

4/20/00: Pulled weeds greater than 12 inches tall and removed trash and debris in anticipation of monthly inspection findings.

4/21/00: Conducted gopher inspection and abatement. One trap set and one gopher caught.

4/24/00: Conducted gopher inspection and abatement. One trap set and one gopher caught.

4/25/00: Conducted monthly site inspections.

4/26-27/00: Removed trash and debris and compacted gopher mounds.

5/1/00: Conducted gopher inspection and abatement. Two traps set but no gophers caught.

5/10/00: Gopher abatement discontinued based on direction given during biweekly status meeting.

Vector Activities

None this period.

Issues / Solutions

Gophers continue to burrow through the swale.

I-5/I-605 Bio Swale (Site ID 73224) MW/Law

Monitoring/Sampling Activities

3/1/00 through 5/18/00: Data was downloaded from the monitoring equipment.

3/2/00: Forecast predicted showers to produce < 0.10 inch of rainfall with a 60% probability of occurrence. Storm event produced 0.37 inch of rainfall. No teams were mobilized because the deployment criteria were not met

3/5/00: Forecast predicted rain to produce between 1 and 2 inches of rainfall with a 100% probability of occurrence. Storm event produced 1.30 inches of rainfall. The minimum antecedent dry period was not met. However, a team was mobilized to make hydraulic residence time measurements at the swale.

3/7/00: Forecast predicted rain to produce between 1 and 2 inches of rainfall with a 80% probability of occurrence. Storm event produced 0.93 inches of rainfall. Teams were mobilized and composite samples were collected at both the influent and effluent locations and sent to the laboratory for analysis. Influent and effluent samples met minimum percent storm capture and minimum number of aliquots, and enough volume was collected to run the entire analytical suite. Empirical observations were made.

3/28/00: Replaced desiccant cartridge at the effluent monitoring station.

4/14/00: Forecast predicted rain to produce up to 0.30 inch of rainfall with a 50% probability of occurrence. Storm event produced 0.00 inch of rainfall. No teams were mobilized because of the unlikelihood of rainfall producing enough runoff to discharge through the biofiltration swale.

4/16/00: Conducted pre-storm inspection of monitoring equipment.

4/17/00: Forecast predicted rain to produce up to 2 inches of rainfall with a 100% probability of occurrence. Storm event produced 2.52 inches of rainfall. Teams were mobilized and composite samples were collected at both the influent and effluent locations and sent to the laboratory for analysis. Influent and effluent samples met minimum percent storm capture and minimum number of aliquots, and enough volume was collected to run the entire analytical suite. Empirical observations were made.

4/21/00: Forecast predicted rain to produce up to 0.10 inch of rainfall with a 40% probability of occurrence. Storm event produced 0.00 inch of rainfall. No teams were mobilized because of the deployment criteria not being met.

4/25/00: Replaced monitoring station batteries.

4/26/00: Cleaned flumes.

5/15/00: Forecast predicted scattered showers and thunderstorms to produce up to 0.20 inch of rainfall with a 30% probability of occurrence. No teams were mobilized because of the deployment criteria not being met. Storm event produced 0.00 inch of rainfall.

I-5/I-605 Bio Swale Monitoring Summary

Date	Rainfall Total	Antecedent Dry Period & Deployment Criteria Met	Mobilized	Sampled		Empirical Observations
				Comp	Grab	
11/8/99	0.16	N	N	NA	NA	N
12/31/99	0.22	N	N	NA	NA	N
1/16/00	0.00	N	N	NA	NA	N
1/25/00	0.55	Y	Y	N	N	Y
1/30-31/00	0.30	N	N	NA	NA	N
2/10-11/00	0.45	N	N	NA	NA	N
2/12-14/00	1.01	N	N	NA	NA	N
2/16/00	0.58	N	N	NA	NA	N
2/20-21/00	2.29	Y	Y	Y	Y	Y
2/23/00	1.23	N	N	NA	NA	N
2/27/00	0.21	Y	Y	Y	Y	Y
3/3-4/00	0.37	N	N	NA	NA	N
3/5-6/00	1.30	N	Y*	NA	NA	Y
3/7-8/00	0.93	Y	Y	Y	NA	Y
4/14/00	0.00	Y	N**	NA	NA	N
4/17-18/00	2.52	Y	Y	Y	NA	Y
4/21/00	0.00	N	N	NA	NA	N
5/15/00	0.00	N	N	NA	NA	N

* A team was mobilized to the swale to conduct hydraulic residence timer measurements.

**Teams not mobilized because of the unlikelihood of rainfall producing enough runoff to discharge through the biofiltration swale.

Operations and Maintenance

3/5/00: Flow was perceptible as it passed through the swale. Trash and debris accumulated in the energy dissipater and at the concrete spreader/biofilter interface. No channelization or ponding was observed within the swale. Hydraulic residence time measurements were conducted. The hydraulic residence time was estimated to be approximately 8 minutes (calculated from the time dye first entered the swale to the time it reached the end of the swale).

3/7/00: Gopher traps set in fresh burrows and old burrows filled in with soil.

3/8/00: Flow was perceptible as it passed through the swale. Trash and debris accumulated in the energy dissipater and at the concrete spreader/biofilter interface. No channelization or ponding was observed within the swale.

3/20/00: Gopher traps set in fresh burrows and old burrows filled in with soil.

3/22/00: Conducted monthly inspections. Maintenance meeting MID thresholds was conducted during the week of 3/27/00. A detailed summary of vegetation coverage was provided in the 3/24/00 Biweekly Report.

3/28/00: Removed weeds and compacted gopher burrows.

4/4/00: Conducted gopher inspection and abatement. One trap was set but no gophers caught.

4/10/00: Conducted gopher inspection and abatement.

4/11/00: Conducted gopher inspection and abatement.

4/17/00: Flow was perceptible as it passed through the swale. At one location of the swale slope, a gopher hole allowed runoff to discharge onto the swale. Trash and debris accumulated in the energy dissipater and at the concrete spreader/biofilter interface. No channelization or ponding was observed within the swale.

4/19/00: Conducted gopher inspection and abatement. One trap set but no gophers caught.

4/21/00: Conducted gopher inspection. One trap set but no gophers caught.

4/24/00: Conducted gopher inspection. One trap set but no gophers caught.

4/25/00: Conducted monthly site inspections.

4/26-27/00: Pulled weeds greater than 12 inches tall, removed trash and debris, and compacted gopher mounds.

5/1/00: Conducted gopher inspection and abatement. One trap set but no gophers caught.

5/10/00: Gopher abatement discontinued based on direction given during biweekly status meeting.

Vector Activities

None this period.

Issues / Solutions

None this period.

I-605/Carson & Del Amo Bio Swale (Site ID 73225) MW/Law

Monitoring/Sampling Activities

3/2/00: Forecast predicted showers to produce < 0.10 inch of rainfall with a 60% probability of occurrence. Storm event produced 0.40 inch of rainfall. No teams were mobilized because the deployment criteria were not met

3/5/00: Forecast predicted rain to produce between 1 and 2 inches of rainfall with a 100% probability of occurrence. Storm event produced 1.01 inches of rainfall. No teams were mobilized because the minimum antecedent dry period was not met.

3/7/00: Forecast predicted rain to produce between 1 and 2 inches of rainfall with a 80% probability of occurrence. Storm event produced 0.83 inch of rainfall. Teams were mobilized and grab and composite samples were collected at both the influent and effluent locations and sent to the laboratory for analysis. Influent and effluent samples met minimum percent storm capture and minimum number of aliquots, and enough volume was collected to run the entire analytical suite. Empirical observations were made.

3/23/00: Prepared grab sample bottles for sample collection.

4/14/00: Forecast predicted rain to produce up to 0.30 inch of rainfall with a 50% probability of occurrence. Storm event produced 0.00 inch of rainfall. No teams were mobilized because of the unlikelihood of rainfall producing enough runoff to discharge through the biofiltration swale.

4/16/00: Conducted pre-storm inspection of monitoring equipment.

4/17/00: Forecast predicted rain to produce up to 2 inches of rainfall with a 100% probability of occurrence. Storm event produced 1.58 inches of rainfall. Teams were mobilized and grab and composite samples were collected at both the influent and effluent locations and sent to the laboratory for analysis. Influent and effluent samples met minimum percent storm capture and minimum number of aliquots, and enough volume was collected to run the entire analytical suite. Empirical observations were made.

4/21/00: Forecast predicted rain to produce up to 0.10 inch of rainfall with a 40% probability of occurrence. Storm event produced 0.00 inch of rainfall. No teams were mobilized because of the deployment criteria not being met.

4/25/00: Replaced monitoring station batteries.

4/26/00: Cleaned flumes.

5/15/00: Forecast predicted scattered showers and thunderstorms to produce up to 0.20 inch of rainfall with a 30% probability of occurrence. No teams were mobilized because of the deployment criteria not being met. Storm event produced 0.00 inch of rainfall.

I-605/Carson & Del Amo Bio Swale Monitoring Summary

Date	Rainfall Total	Antecedent Dry Period & Deployment Criteria Met	Mobilized	Sampled		Empirical Observations
				Comp	Grab	
11/8/99	0.09	N	N	NA	NA	N
12/31/99	0.52	N	N	NA	NA	N
1/16/00	0.00	N	N	NA	NA	N
1/25/00	0.55	Y	Y	N	N	Y
1/30-31/00	0.25	N	N	NA	NA	N
2/10-11/00	0.26	N	N	NA	NA	N
2/12-14/00	1.14	N	N	NA	NA	N
2/16/00	0.62	N	N	NA	NA	N
2/20-21/00	2.14	Y	Y*	N	Y	Y
2/23/00	0.98	N	N	NA	NA	N
2/27/00	0.16	Y	Y	N	N	Y
3/3-4/00	0.40	N	N	NA	NA	N
3/5-6/00	1.01	N	N	NA	NA	N
3/7-8/00	0.83	Y	Y	Y	NA	Y
4/14/00	0.00	Y	N**	NA	NA	N
4/17-18/00	1.58	Y	Y	Y	NA	Y
4/21/00	0.00	N	N	NA	NA	N
5/15/00	0.00	N	N	NA	NA	N

*Hydraulic residence time measurements were taken.

**Teams not mobilized because of the unlikelihood of rainfall producing enough runoff to discharge through the biofiltration swale.

Operations and Maintenance

3/8/00: Flow was perceptible as it passed through the swale. Trash and debris accumulated in the energy dissipater and at the concrete spreader/biofilter interface. No channelization or ponding was observed within the swale.

3/22/00: Conducted monthly inspections and removed trash and debris from the energy dissipater. Other maintenance meeting MID thresholds was conducted during the week of 3/27/00. A detailed summary of vegetation coverage was provided in the 3/24/00 Biweekly Report.

3/31/00: Removed weeds that were greater than 12 inches tall.

4/17/00: Flow was perceptible as it passed through the swale. Trash, debris, and organic material accumulated in the energy dissipater and at the concrete spreader/biofilter interface. No channelization or ponding was observed within the swale.

4/25/00: Conducted monthly site inspections.

4/26-27/00: Pulled weeds greater than 12 inches tall and removed trash and debris from the inlet area.

Vector Activities

None this period.

Issues / Solutions

None this period.

District 11 BMP Pilot Sites

Monitoring Activities Applicable to all sites

During the months of March and April, three storm events were monitored in District 11. Rainfall, percent capture, and sample aliquot numbers are provided in the tables below for each monitored storm event.

March 5, 2000 Storm Event					
Site	**Influent # of Aliquots**	**% Capt.**	**Effluent # of Aliquots**	**% Capt.**	**Rainfall**
I-5/SR-56 EDB	91	100	108	100	1.12"
I-15/SR-78 EDB	102	100	110	100	1.12"
Manchester EDB	57	100	81	100	1.19"
La Costa P&R SF	40	100	44	100	0.69"
I-5/SR-78 P&R SF	50	100	53	100	1.15"
Escondido MS SF	85	100	78	100	1.19"
Kearny Mesa MS MF	94	99.5	93	100	1.00"
Melrose Swale	17	100	0	NA	0.58"
Palomar Swale	79	100	62	100	0.65"
Carlsbad MS St/IT	34	92.5	12	100	0.41"
La Costa WB	52	100	40	100	0.63"
La Costa IB	N/A		N/A		0.52"

On the March 8, 2000 storm event, only samples from Kearny Mesa Maintenance Station and I-5/SR-78 Park and Ride were sent in for analysis.

March 8, 2000 Storm Event					
Site	**Influent # of Aliquots**	**% Capt.**	**Effluent # of Aliquots**	**% Capt.**	**Rainfall**
I-5/SR-56 EDB	1	100	0	NA	0.04"
I-15/SR-78 EDB	9	100	4	100	0.10"
Manchester EDB	2	100	4	100	0.10"
La Costa P&R SF	6	100	4	100	0.07"
I-5/SR-78 P&R SF	10	100	6	100	0.19"
Escondido MS SF	11	100	3	100	0.10"
Kearny Mesa MS MF	38	100	37	100	0.29"
Melrose Swale	2	100	0	NA	0.11"
Palomar Swale	3	100	0	NA	0.11"
Carlsbad MS St/IT	8	100	0	NA	0.08"
La Costa WB	4	100	4	100	0.05"
La Costa IB	N/A		N/A		0.07"

April 17-18, 2000 Storm Event					
Site	**Influent # of Aliquots**	**% Capt.**	**Effluent # of Aliquots**	**% Capt.**	**Rainfall**
I-5/SR-56 EDB	91	100	145	99.76	0.82"
I-15/SR-78 EDB	108	91	158	97	0.91"
Manchester EDB	69	100	62	100	0.81"
La Costa P&R SF	71	100	88	100	0.61"
I-5/SR-78 P&R SF	25	<100	30	100	0.49"
Escondido MS SF	134	95	155	100	0.88"
Kearny Mesa MS MF	47	100	62	100	0.52"
Melrose Swale	44	100	0	NA	0.52"
Palomar Swale	71	100	63	100	0.48"
Carlsbad MS St/IT	56	100	25	100	0.49"
La Costa WB	106	100	114	100	0.60"
La Costa IB	N/A		N/A		0.55"

Maintenance Activities Applicable to all sites

Site inspections were performed at all sites after the three monitored storm events and on April 3-4 and May 2-3.

I-5/SR-56 Extended Detention Basin (Site ID 111101) KLI

Monitoring/Sampling Activities

A Monitoring Summary Table for events to date is provided below.

Operations and Maintenance

No maintenance activities to note during this entire period.

Vector Activities

On March 6, the entire BMP (the first and second basins) was full of standing water about 1' deep. No mosquito breeding was noted. On March 14, the first basin had standing water about 2' deep and the second basin had standing water throughout with about 6" at the north end. No mosquito breeding was noted. On March 20, the first basin had about 50-60 square feet of standing water. This was found to be breeding mosquitoes. The second basin had standing water but no mosquito breeding was noted there. No treatment was deemed necessary. On March 27, the first basin had about 5-10 square feet of standing water. This was found to be breeding mosquitoes. The second basin had about 100 square feet of standing water but no mosquito breeding was noted there. On April 3, the site was dry.

Issues / Solutions

None for this entire period.

I-5/SR-56 EDB Monitoring Summary

Date	Rainfall Total	Deployment Criteria Met	Mobilized	Sampled		Empirical Observations
				Comp	Grab	
1/25/00	0.17	Y	Y	Y	N	Y
2/16/00	0.20	Y	Y	Y	Y	Y
2/20-21/00	1.64	Y	Y	Y	Y	Y
3/5-6/00	1.12	Y	Y	Y	N	Y
3/7-8/00	0.04	Y	Y	N	N	Y
4/17-18/00	0.82	Y	Y	Y	N	Y

SR-78/I-15 Extended Detention Basin (Site ID 111102) KLI

Monitoring/Sampling Activities

A Monitoring Summary table for events to date is provided below.

Operations and Maintenance

No maintenance activities to note during this entire period.

Vector Activities

On March 6, there was standing water about 2-4" deep at the inlet (about 200 sq. ft.) and the outlet (150 sq. ft.) and in the swale between the two. No mosquito breeding was noted. On March 14 and 20, the site was dry. On March 27, the site was dry. On April 3, there was standing water at the inlet leading over to the outflow. The water was about 1.5' wide and 2-3" deep. No mosquito breeding was noted.

Issues / Solutions

Non-stormwater discharge was noted during the month of April and District 11 was notified.

SR-78/I-15 EDB Monitoring Summary

Date	Rainfall Total	Deployment Criteria Met	Mobilized	Sampled		Empirical Observations
				Comp	Grab	
1/25/00	0.30	Y	Y	Y	Y	Y
2/16/00	0.38	Y	Y	Y	Y	Y
2/20-21/00	1.99	Y	Y	Y	Y	Y
3/5-6/00	1.12	Y	Y	Y	N	Y
3/7-8/00	0.10	Y	Y	N	N	Y
3/27/00	0.01	N	N	NA	NA	N
4/17-18/00	0.91	Y	Y	Y	N	Y

I-5/La Costa Avenue Infiltration Basin (Site ID 111103) KLI

Monitoring/Sampling Activities

Groundwater well samples were taken on April 24 after the April 17 event. A Monitoring Summary Table for events to date is provided below.

Well depth measurements were taken on March 15, March 28, April 11, April 24 and May 10. The groundwater log is provided in Appendix F.

Operations and Maintenance

A bird deterrent net at the infiltration basin was constructed on April 26 – 28 and finalized on May 16.

Woody wetland vegetation was removed from the perimeter of the infiltration basin on April 11.

Vector Activities

On March 6, there was about 2.5' of standing water in the basin, covering the surrounding asphalt path. No mosquito breeding was noted. On March 14, the standing water was about 2.4' deep in the basin. Cattails were starting to sprout. No mosquito breeding was noted. On March 20, there were about 2' of standing water in the basin and no mosquito breeding was noted. On March 27, standing water was about 1.5' deep. Emergent vegetation and algae were beginning to grow. The mosquito breeding was found in and around the emergent vegetation. On April 3, standing water filling the basin was about 1.46' deep. Mosquito larvae were noted around the perimeter of the pond in the floating algae. Raccoon prints were noted around the edge of the pond on both occasions. On April 10, April 18, April 24, and May 2, the site was found breeding. No abatement was performed.

Issues / Solutions

The solar panel was stolen on March 6 and was re-installed with locks and chains for security on March 10.

La Costa IB Monitoring Summary

Date	Rainfall Total	Deployment Criteria Met	Mobilized	Sampled		Empirical Observations
				Comp	Grab	
1/25/00	0.17	Y	Y	NA	NA	Y
2/16/00	0.16	Y	Y	NA	NA	Y
2/20-21/00	1.45	Y	Y	NA	NA	Y
3/5-6/00	0.65	Y	Y	NA	NA	Y
3/7-8/00	0.06	Y	Y	NA	NA	Y
4/17-18/00	0.55	Y	Y	NA	NA	Y

I-5/La Costa Wet Basin (Site ID 111104) KLI

Monitoring/Sampling Activities

Monthly 48-hour time weighted composite samples of the 6" inlet pipe from the trapezoidal channel to the wet basin were taken on March 28-30 and May 1-3. A Monitoring Summary Table for events to date is provided below.

Operations and Maintenance

The dam in the trapezoidal channel was re-built following the March 5 and the April 17-18 storm events. Mylar strips have been placed around the wet basin as a bird deterrent on March 21 per the MID.

Vector Activities

On March 6 and 14, there was standing water in the basin. Gambusia were plentiful. The cattails are encroaching into the open standing water areas. The cattails were noted to be increasing along the edges. No mosquito breeding was noted. The Wet Basin was found breeding on March 20, 2000. On March 27, breeding was observed. Gambusia were plentiful at the wet basin. Emergent vegetation was noted to be thickening weekly. On April 3, Gambusia were plentiful; mosquito larvae were found among the cattails. A dead rabbit was noted at the site. The site was found breeding mosquitoes on April 10, April 24, and May 2. No abatement was performed.

Issues / Solutions

None this entire period.

I-5 La Costa WB Monitoring Summary

Date	Rainfall Total	Deployment Criteria Met	Mobilized	Sampled		Empirical Observations
				Comp	Grab	
1/25/00	0.16	Y	Y	Y	Y	Y
2/16/00	0.16	Y	Y	Y	Y	Y
2/20-21/00	1.45	Y	Y	Y	Y	Y
3/5-6/00	0.63	Y	Y	Y	N	Y
3/7-8/00	0.05	Y	Y	N	N	Y
4/17-18/00	0.60	Y	Y	Y	N	Y

I-5/Manchester Avenue Extended Detention Basin (Site ID 111105) KLI

Monitoring/Sampling Activities

Sediment was cleaned out of inlet channel and pipe on March 2 and 21 to recover a buried flow sensor.

A Monitoring Summary table for events to date is provided below.

Operations and Maintenance

No maintenance activities to note during this entire period.

Vector Activities

On March 6, the site contained a good sized pond over 1' deep. No mosquito breeding was noted. On March 14, the site was dry. On March 20, standing water covered about 60% of the bottom of the BMP. Staff noted a mosquito egg raft in the standing water but no larvae or pupae. On March 27 and April 3, the site was dry.

Issues/Solutions

None this entire period.

I-5/Manchester EDB Monitoring Summary

Date	Rainfall Total	Deployment Criteria Met	Mobilized	Sampled		Empirical Observations
				Comp	Grab	
1/25/00	0.16	Y	Y	N	N	Y
2/16/00	0.22	Y	Y	Y	Y	Y
2/20-21/00	1.53	Y	Y	Y	Y	Y
3/5-6/00	1.19	Y	Y	Y	N	Y
3/7-8/00	0.10	Y	Y	N	N	Y
4/17-18/00	0.81	Y	Y	Y	N	Y

Kearny Mesa Maintenance Station StormFilter - Perlite/Zeolite (Site ID 112201) KLI

Monitoring/Sampling Activities

A Monitoring Summary table for events to date is provided below.

Operations and Maintenance

No maintenance activities to note during this entire period.

Vector Activities

On March 6, 14 and 20, the first chamber held about 2' of water. There was standing water in the spreader troughs of the second, third, and forth chambers. No mosquito breeding was noted. On March 27 and April 3, the first chamber held about two feet of water. The second, third, and fourth chambers had standing water in their spreading troughs. No mosquito breeding was noted on March 27. On April 3, staff noted a psychodid larva in the standing water in the spreader trough of the third chamber. The StormFilter was found breeding on April 10, 2000. No abatement was performed. The site was found breeding mosquitoes on April 24.

Issues / Solutions

None this entire period.

Kearny Mesa MS MF Monitoring Summary

Date	Rainfall Total	Deployment Criteria Met	Mobilized	Sampled		Empirical Observations
				Comp	Grab	
1/25/00	0.08	Y	Y	Y	N	Y
2/16/00	0.10	Y	Y	Y	Y	Y
2/20-21/00	2.32	Y	Y	Y	Y	Y
3/5-6/00	1.00	Y	Y	Y	N	Y
3/7-8/00	0.29	Y	Y	Y	N	Y
4/17-18/00	0.52	Y	Y	Y	N	Y

Escondido Maintenance Station Media Filter - Sand (Site ID 112202) KLI

Monitoring/Sampling Activities

A Monitoring Summary table for events to date is provided below.

Operations and Maintenance

No maintenance activities to note during this entire period.

Vector Activities

On March 6, the standing water in the first basin was about 1" below the spillway to the second basin. No mosquito breeding was noted. On March 14, the standing water in the first basin was about 4" below the spillway to the second basin. No mosquito breeding was noted. On March 20, the standing water in the first basin was about 11" deep. No mosquito breeding was noted. On March 27, the standing water in the first basin was about 7" deep. No mosquito breeding was noted. On April 3, the standing water in the first basin was about 1.0 - 1.5" deep. No mosquito breeding was noted.

Issues / Solutions

None this entire period.

Escondido MS Media Filter Monitoring Summary

Date	Rainfall Total	Deployment Criteria Met	Mobilized	Sampled		Empirical Observations
				Comp	Grab	
1/25/00	0.29	Y	Y	Y	Y	Y
2/16/00	0.50	Y	Y	Y	Y	Y
2/20-21/00	2.12	Y	Y	Y	Y	Y
3/5-6/00	1.19	Y	Y	Y	N	Y
3/7-8/00	0.19	Y	Y	N	N	Y
3/27/00	0.01	N	N	NA	NA	N
4/17-18/00	0.88	Y	Y	Y	N	Y

La Costa Park and Ride Media Filter - Sand (Site ID 112203) KLI

Monitoring/Sampling Activities

A Monitoring Summary table for events to date is provided below.

Operations and Maintenance

Weep holes to the drain plugs were cleared after the March 5 and April 17 storm events to allow the pre-sedimentation chamber to de-water. A bird deterrent net was installed on April 11.

Vector Activities

On March 6, no mosquito breeding noted. On March 14, there was less than 1/4" of standing water in areas of the first basin. There was also standing water in the spreader trough of the second basin. No mosquito breeding was noted. On March 20, there was standing water in the spreader trough of the second basin. No mosquito breeding was noted. On March 27, there was standing water in the spreader trough of the second basin. No mosquito breeding was noted. On April 3, the site was dry except for a minor amount of standing water in the spreader trough of the second basin. No mosquito breeding was noted. A dead rabbit was noted in the first basin.

Issues / Solutions

None this entire period.

La Costa P&R Sand Filter Monitoring Summary

Date	Rainfall Total	Deployment Criteria Met	Mobilized	Sampled		Empirical Observations
				Comp	Grab	
1/25/00	0.19	Y	Y	Y	Y	Y
2/16/00	0.16	Y	Y	Y	Y	Y
2/20-21/00	1.45	Y	Y	Y	Y	Y
3/5-6/00	0.69	Y	Y	Y	N	Y
3/7-8/00	0.07	Y	Y	N	N	Y
4/17-18/00	0.61	Y	Y	Y	N	Y

SR-78/I-5 Park and Ride Media Filter - Sand (Site ID 112204) KLI

Monitoring/Sampling Activities

Sediment was cleaned out of inlet pipe on March 2 to recover buried sampling equipment. A Monitoring Summary Table for events to date is provided below.

Operations and Maintenance

A bird deterrent net was installed on April 6 and then stolen on April 26. A new net was installed on May 1.

Vector Activities

On March 6, there was standing water about 2-3" deep covering the first basin and there was also standing water in the spreader trough of the second basin. No mosquito breeding was noted. On March 14, there was standing water about 1/4" deep in the southwest corner of the first basin. There was standing water in the spreader trough of the second basin. No mosquito breeding was noted. On March 20, March 27, and April 3, there was standing water in the spreader trough of the second basin. No mosquito breeding was noted.

Issues / Solutions

Non-stormwater discharge was noted during the month of April and District 11 was notified.

SR 78/I-5 P&R Sand Filter Monitoring Summary

Date	Rainfall Total	Deployment Criteria Met	Mobilized	Sampled		Empirical Observations
				Comp	Grab	
1/25/00	0.27	Y	Y	Y	Y	Y
2/16/00	0.14	Y	Y	Y	Y	Y
2/20-21/00	2.16	Y	Y	Y	Y	Y
3/5-6/00	1.15	Y	Y	N	N	Y
3/7-8/00	0.19	Y	Y	Y	N	Y
4/17-18/00	0.49	Y	Y	Y	N	Y

Melrose Ave/SR-78 Bio Swale (Site ID 112205) KLI

Monitoring/Sampling Activities

Site was operational for the April 17, 2000, event. During the April 17 event, the effluent had minor amounts of flow that totaled 0.69 cf, which was much too small to sample. A max stage of 0.041 ft was recorded on April 18 at 05:52 PST at the outlet. A Monitoring Summary Table for events to date is provided below.

Operations and Maintenance

The site was hand weeded on April 15.

The effluent blocked pipe at Melrose was cleared out by Caltrans maintenance in early March.

Vector Activities

On March 6, 14 and 20, there was no standing water. Active signs of gophers were noted. On March 27 and April 3, the site was dry and signs of active gophers were noted.

Issues / Solutions

None this period.

Melrose Ave./SR-78 Bio Swale Monitoring Summary

Date	Rainfall Total	Deployment Criteria Met	Mobilized	Sampled		Empirical Observations
				Comp	Grab	
1/25/00	0.22	Y	Y	N	N	Y
2/16/00	0.25	Y	Y	N	N	Y
2/20-21/00	2.29	Y	Y	N	N	Y
3/5-6/00	0.58	Y	Y	N	N	Y
3/7-8/00	0.11	Y	Y	N	N	Y
4/17-18/00	0.52	Y	Y	N	N	Y

I-5 Palomar Airport Biofiltration Swale (Site ID 112206) KLI

Monitoring/Sampling Activities

A Monitoring Summary table for events to date is provided below.

Operation and Maintenance

Gopher holes were collapsed and plugged on March 13.

During April site inspections, maintenance crews cleaned graffiti off the BMP sign at the Palomar Bio-swale.

Vector Activities

On March 6, there was about 2" of standing water covering half of the second grass section. No mosquito breeding was noted. Signs of active gophers were noted. On March 14, March 20, March 27, and April 3, the site was dry with signs of active gophers.

Issues / Solutions

None this entire period.

I-5/Palomar Biofiltration Swale Monitoring Summary

Date	Rainfall Total	Deployment Criteria Met	Mobilized	Sampled		Empirical Observations
				Comp	Grab	
1/25/00	0.17	Y	Y	N	N	Y
2/16/00	0.16	Y	Y	N	N	Y
2/20-21/00	0.62	Y	Y	Y	Y	Y
3/5-6/00	0.65	Y	Y	Y	Y	Y
3/7-8/00	0.11	Y	Y	N	N	Y
4/17-18/00	0.48	Y	Y	Y	N	Y

Carlsbad Maintenance Station Bio Strip Infiltration Trench (Site ID 112207) KLI

Monitoring/Sampling Activities

Groundwater well samples were taken after the April 17 event on April 20. A Monitoring Summary Table for events to date is provided below.

Operations and Maintenance

The biofiltration strips were hand weeded on April 15.

Vector Activities

On March 6, there was standing water about 1/4" deep in the bottom of about one half of the concrete-lined channel. No mosquito breeding was noted. On March 14, 20, and 27, the site was dry. On April 3, the site had minor amounts of standing water. No mosquito breeding was noted.

Issues / Solutions

Non-stormwater discharge was noted during this time period and District 11 was notified.

Carlsbad MS Bio Strip/Infiltration Trench Monitoring Summary

Date	Rainfall Total	Deployment Criteria Met	Mobilized	Sampled		Empirical Observations
				Comp	Grab	
1/25/00	0.29	Y	Y	N	N	Y
2/16/00	0.16	Y	Y	N	N	Y
2/20-21/00	0.58	Y	Y	Y	Y	Y
3/5-6/00	0.41	Y	Y	Y	Y	Y
3/7-8/00	0.11	Y	Y	N	N	Y
4/17-18/00	0.49	Y	Y	Y	N	Y

ESTIMATED BMP OPERATION SCHEDULE FOR REMAINING SITES UNDER CONSTRUCTION

Location	BMP Type	Monitoring Consultant	Estimated Date Site "On-line"[2]	Instrument Install[1]		Operational[3] (start empirical and maintain)	Ready for Water Quality Monitoring[4]
				Begin	Complete		
DISTRICT 7							
I-210 East of Orcas	CDS	MW/Law	5/04/00	Fall 2000	Fall 2000	Fall 2000	Fall 2000
I-210 East of Filmore	CDS	MW/Law	5/04/00	Fall 2000	Fall 2000	Fall 2000	Fall 2000
Paxton Park & Ride	MF	BC	4/9/01	4/9/01	4/22/01	4/22/01	4/22/01
Metro MS	MCTT	BC	4/9/01	4/9/01	4/22/01	4/22/01	4/22/01

1. Equipment installation schedule is dependent upon construction schedule.
2. Site on-line means BMP will receive stormwater runoff, not necessarily ready for monitoring or operations.
3. Site operational means BMP meets completion criteria and BMP is turned over to monitoring/maintenance teams to begin empirical observations and maintenance.

Ready for water quality monitoring means BMP has a full equipment installation and the equipment is ready to draw samples.

SUMMARY OF REQUIRED AND SUCCESSFULLY SAMPLED STORMS PER SITE

Location	BMP Type	Monitoring Consultant	Operational (yes/no)	Operational Date	Maximum Storms Required	Successfully Sampled Storms [1]	
						1998-1999	1999-2000 Preliminary
District 7							
I-605/SR-91	IB	MW/Law	Yes	4/9/99	4	N/A[5]	N/A[5]
I-210 East of Orcas	CDS	MW/Law	No	Fall 2000[2]	8	0	
I-210 East of Filmore	CDS	MW/Law	No	Fall 2000[2]	8	0	
I-5/I-605	EDB	BC	Yes	2/26/99	10	2	4
I-605/SR-91	EDB	BC	Yes	2/22/99	10	3	3[4]
Paxton P & R	MF	BC	No	4/22/01[2]	8	0	
Metro MS	MCTT	BC	No	4/22/01[2]	8	0	
Alameda MS	OWS	BC	Yes	5/17/99	8	0	4
Eastern MS	MF	BC	Yes	2/15/99	8	1	4
Foothill MS	MF	BC	Yes	3/8/99	8	2	4
Termination P & R	MF	BC	Yes	5/17/99	8	0	4
Via Verde P & R	MCTT	BC	Yes	5/17/99	8	0	4
Lakewood P & R	MCTT	BC	Yes	5/17/99	8	0	4
Altadena	Bio Strip	MW/Law	Yes	10/1/99	8	0	6[3]
	Infiltration Trench	MW/Law	Yes	10/1/99	8	N/A[5]	N/A[5]
Foothill MS	DII north- SG Insert	MW/Law	Yes	1/22/99	8	4	8
	DII south- FF Insert	MW/Law	Yes	1/22/99	8	3	8[3,6]
Las Flores MS	DII north-SG Insert	MW/Law	Yes	1/22/99	8	5	5
	DII south-FF Insert	MW/Law	Yes	1/22/99	8	2	5[3]
Rosemead MS	DII north-FF Insert	MW/Law	Yes	1/22/99	8	3	5[3]
	DII south-SG Insert	MW/Law	Yes	1/22/99	8	3	5
I-605/SR-91	Bio Strip	MW/Law	Yes	10/1/99	8	0	2
	Bio Swale	MW/Law	Yes	10/1/99	8	0	2
Cerritos MS	Bio Swale	MW/Law	Yes	10/1/99	8	0	4[8]
I-5/I-605	Boswell	MW/Law	Yes	10/1/99	8	0	4
I-605/ Del Amo	Boswell	MW/Law	Yes	10/1/99	8	0	2

[1] All 1998-1999 DII data in question. A criteria for acceptance has been established . 1998-1999 Data will be reviewed at the end of the year (2000).
[2] Subject to Schedule Update
[3] OMM Manual goal of 12 aliquot minimum sample not attained (January 2000 event)
[4] Less than 12 aliquots collected (at the influent at Altadena, at the effluent at the I-605/SR-91 EDB)
[5] N/A – Groundwater or Vadose Zone Samples
[6] OMM Manual goal of 12 aliquot minimum sample not attained (January 30, 2000 event)
[7] OMM Manual goal of 12 aliquot minimum sample not attained (February 16, 2000 event)
[8] OMM Manual goal of 12 aliquot minimum sample not attained (February 2000 event)
[9] OMM Manual goal of 12 aliquot minimum sample not attained (March 8, 2000 event)
[10] January 25 event at La Costa Wet Basin, % capture at the effluent, 31%

SUMMARY OF REQUIRED AND SUCCESSFULLY SAMPLED STORMS PER SITE

Location	BMP Type	Monitoring Consultant	Operational (yes/no)	Operational Date	Maximum Storms Required	Successfully Sampled Storms [1]	
						1998-1999	1999-2000 Preliminary
District 11							
I-5/SR-56	EDB	KLI	Yes	1/24/99	4	4	5[3]
I-15/SR-78	EDB	KLI	Yes	1/24/99	10	4	5
I-5/La Costa (West)	IB	KLI	Yes	1/24/99	4	N/A[5]	N/A[5]
I-5/La Costa (East)	WB	KLI	Yes	10/1/99	4	0	5[3,10]
I-5/Manchester (East)	EDB	KLI	Yes	10/1/99	4	0	5
Kearney Mesa MS	StormFilter (Perlite/Zeolite)	KLI	Yes	10/1/99	8	3	6[3]
Escondido MS	MF	KLI	Yes	2/16/99	8	3	5
La Costa P & R	MF	KLI	Yes	2/16/99	4	3	5[3,7]
SR-78/I-5 P& R	MF	KLI	Yes	2/26/99	8	2	5[7,9]
Melrose Ave/SR-78	Bio Swale	KLI	Yes	3/1/99	8	0	
I-5 Palomar Airport Rd	Bio Swale	KLI	Yes	10/1/99	8	0	3
Carlsbad MS	Bio Strip	KLI	Yes	10/1/99	4	0	3
	Infiltration Trench	KLI	Yes	10/1/99	4	N/A[5]	N/A[5]

[1] All 1998-1999 DII data in question. A criteria for acceptance has been established . 1998-1999 Data will be reviewed at the end of the year (2000).
[2] Subject to Schedule Update
[3] OMM Manual goal of 12 aliquot minimum sample not attained (January 25, 2000 event)
[4] Less than 12 aliquots collected (at the influent at Altadena, at the effluent at the I-605/SR-91 EDB)
[5] N/A – Groundwater or Vadose Zone Samples
[6] OMM Manual goal of 12 aliquot minimum sample not attained (January 30, 2000 event)
[7] OMM Manual goal of 12 aliquot minimum sample not attained (February 16, 2000 event)
[8] OMM Manual goal of 12 aliquot minimum sample not attained (February 27, 2000 event)
[9] OMM Manual goal of 12 aliquot minimum sample not attained (March 8, 2000 event)
[10] January 25 event at La Costa Wet Basin, % capture at the effluent, 31%

OMM PLAN ACTIVITIES

Volumes I and II

The documents have been finalized and adopted. No changes were made to the documents during the past quarter.

Maintenance Indicator Document

A revised MID dated March 21, 2000, was submitted to the Plaintiffs via email on March 21. Comments were received from NRDC and EPA. The comments primarily focused on the revisions that were entered for wet basin vegetation maintenance as a result of requests from the San Diego Vector Control Agency.

A meeting with CT, Plaintiffs, and SDVCD was held on May 11 to discuss the changes to the MID regarding vegetation management at the La Costa Wet Basin. As a result of the meeting, a Vegetation Management/Harvest plan has been developed for the Wet Basin. The Wet Basin Vegetation Management Plan will be provided under separate cover.

A revised Maintenance Indicator Document wil be provided under separate cover.

Database

The OMM Database is updated every 15th of the month and posted on the www.rbf.com/caltrans web site. Changes made to the database during this quarter include the following: (1) updates of OMM activities, (2) Analytical Data Jan 1999 to March 2000. Next update will be on June 15, 2000.

O&M Cost

O&M costs from the month of October 1999 to March 2000 are included in Appendix H of this document. Summary sheets are provided with costs sorted by BMP types as well as by Districts. The detailed cost breakdown for each BMP site is also included.

VECTOR ACTIVITIES

Summary of vector issues from March 1, 2000 to May 1, 2000.

DISTRICT 7

San Gabriel Valley Mosquito & Vector Control District

Monitoring

Breeding was observed at the following sites:

3/10/00 - Sedimentation vault of the MCTT at the Via Verde P&R (Site #74206).

3/17/00 - Spreader trough in media vault of the Media Filter at the Foothill MS (Site #74203).

4/27/00 - Sedimentation vault of the MCTT at the Via Verde P&R (Site #74206).

Monitoring vaults of the DIIs at the Rosemead MS (Site #73218 a,b).

Abatement

3/10/00 – Sedimentation vault of the MCTT at the Via Verde P&R (Site #74206) treated with Altosid liquid.

3/17/00 - Spreader trough of the media vault of the Media Filter at the Foothill MS (Site #74203) treated with Altosid liquid.

4/28/00 - Sedimentation vault of the MCTT at the Via Verde P&R (Site #74206) treated with Altosid liquid.

4/28/00 - Monitoring vaults of the DIIs at Rosemead MS (Site #73218 a,b) treated with Altosid liquid.

Greater Los Angeles County Vector Control District

Monitoring

Breeding was observed at the following sites:

3/14/00 - Sedimentation vault of the MCTT at the Lakewood P&R (Site #74208).

3/22/00 - Sedimentation vault of the MCTT at the Lakewood P&R (Site #74208).

3/31/00 - Sedimentation vault of the MCTT at the Lakewood P&R (Site #74208).

4/7/00 - Sedimentation vault of the MCTT at the Lakewood P&R (Site #74208).

4/20/00 - Sedimentation vault of the MCTT at the Lakewood P&R (Site #74208).

EDB at I-5/I-605 (Site #74101).

4/27/00 - Sedimentation vault of the MCTT at the Lakewood P&R (Site #74208).

Sedimentation vault of the Media Filter at Termination P&R (Site #74204).

5/5/00 - Sedimentation vault of the MCTT at the Lakewood P&R (Site #74208).

5/9/00 - Sedimentation vault of the MCTT at the Lakewood P&R (Site #74208).

5/9/00 - Sump of the CDS unit at I-210/East of Orcas (Site #73102).

Abatement

3/14/00 - Sedimentation vault of the MCTT at the Lakewood P&R (Site #74208) treated with Altosid liquid.

3/22/00 - Sedimentation vault of the MCTT at the Lakewood P&R (Site #74208) treated with Altosid liquid.

3/31/00 - Sedimentation vault of the MCTT at the Lakewood P&R (Site #74208) treated with Altosid liquid.

4/7/00 - Sedimentation vault of the MCTT at the Lakewood P&R (Site #74208) treated with Altosid liquid.

4/21/00 - Sedimentation vault of the MCTT at the Lakewood P&R (Site #74208) treated with Altosid liquid.

4/21/00 - EDB at I-5/I-605 (Site #74101) treated with Golden Bear Oil. The GLACVCD technician noted that both larvae and pupae were encountered and were most likely washed into the basin from breeding areas within the basin's drainage. Since pupae were encountered, the site was treated with Golden Bear Oil.

4/28/00 - Sedimentation vault of the MCTT at the Lakewood P&R (Site #74208) treated with Altosid liquid.

Media Filter at Termination P&R (Site #74204) treated with Altosid liquid.

5/5/00 - Sedimentation vault of the MCTT at the Lakewood P&R (Site #74208) treated with Altosid liquid.

5/10/00 - Sedimentation vault of the MCTT at the Lakewood P&R (Site #74208) treated with Altosid liquid.

5/11/00 - The sump of the CDS unit at I-210/East of Orcas (Site #73102) treated with Altosid liquid.

Los Angeles County West Vector Control District

Monitoring

No sites were found breeding during this period.

Abatement

No abatement carried out during this period.

DISTRICT 11

County of San Diego Vector Surveillance and Control

Monitoring

Breeding was observed at the following sites:

3/20/00:	The EDB at I-5/SR-56 (Site #111101).
	Wet Basin at La Costa (Site #111104).
3/27/00:	The EDB at I-5/SR-56 (Site #111101).
	IB at La Costa (Site #111103).
	Wet Basin at La Costa (Site #111104).
4/3/00:	The IB at La Costa (Site #111103).
	Wet Basin at La Costa (Site #111104).
4/10/00:	The IB at La Costa (Site #111103).
	Wet Basin at La Costa (Site #111104).
	StormFilter at Kearny Mesa MS (Site #112201).
4/18/00:	The IB at La Costa (Site #111103).
4/24/00:	The IB at La Costa (Site #111103).
	Wet Basin at La Costa (Site #111104).
	StormFilter at Kearny Mesa MS (Site #112201).
5/2/0:	The IB at La Costa (Site #111103).
	Wet Basin at La Costa (Site #111104).

Abatement

No abatement carried out during this period.

DEPARTMENT OF HEALTH SERVICES

Out-of-State Survey

A total of 338 surveys were sent, 85 within and 253 outside the state of California. As of 5/19/00, a total of 62 agencies (18%) have responded to the mailing. Of these, 16 out-of-state and 23 in-state provided some degree of feedback on BMP or BMP-like structures.

Based on the responses to the survey and/or telephone conversations, several out-of-state locations have been selected as sites of particular interest. These include agencies in Oregon, Virginia and New Jersey that have kept records of their work and have gained a breadth of knowledge and experience with potential and real problems associated with storm water related structures. The brief summaries below are of interest.

1. *City of Portland, Portland, Oregon.* The city of Portland has a variety of storm water management units including baffled catch basins, constructed wet basins, swales, and sedimentation manholes and sumps.
2. *City of Portsmouth, Portsmouth, VA.* Storm water control structures within this area include wet and dry basins, bioswales, and oil-water separators.
3. *New Jersey Department of Environmental Protection, NJ.* In response to our survey, the New Jersey DEP mailed DHS – VBDS their BMP manual for "Stromwater and nonpoint source pollution control". Although follow-up contacts have been unsuccessful thus far, the manual indicates that storm water BMP technology and implementation in New Jersey is extensive.

The full text DHS' Update on the Out-of-State BMP Survey can be found in Appendix I.

Vector Database

The DHS vector database reports have been updated for this quarter and will be posted on June 15, 2000.

Mosquito Production Study

DHS continued collecting production data from all BMP sites in Districts 7 and 11. To date, the following efforts have been made in undertaking the mosquito production study:

- Commencing in May, DHS began conducting weekly data collection and sampling of BMPs in Districts 7 and 11. Prior to this, samples were collected on a bi-weekly basis.
- Continued standardization of sampling techniques and monitoring frequency with the Vector Control Districts in Districts 7 and 11.

MCTT Monitoring and "Mosquito-Proofing"

In response to the Design Team's recommendations for the MCTT sites, DHS, in association with the Greater Los Angeles County Vector Control District, will assist Brown and Caldwell in attempting to mosquito proof the MCTT at the Lakewood P&R.

On 5/17/00 Brown and Caldwell submitted a memorandum (Appendix I) outlining specific modifications and cost estimates for "mosquito-proofing" the MCTT at Lakewood P&R. DHS will provide comment on this memorandum no later than 6/1/00.

Underground Vaults in BMPs

The concerns of local and state vector control agencies towards any proposed underground structures are similar to those raised in regard to existing underground storm drain and sewer networks. In urban environments these networks, in addition to above ground basins, sustain urban vector populations that would amplify urban cycles of various disease causing pathogens were they to occur. In addition to the diseases that may be transmitted, mosquito populations may become numerous enough in the summer months to be considered local pests and fall under the definition of vectors in the Health & Safety Code. Other potential disease vectors and pest species that may thrive in the underground habitats include chironomid midges, sand flies, cockroaches and rodents. In addition, abatement of vectors in the underground environment will pose a serious challenge to local vector control agencies in terms of logistics, technical expertise, and outlay of community monetary resources.

If any underground BMPs should be built, specific guidelines and safeguards must be put in place to direct the design, deployment and maintenance of these devices in a manner that limits their potential for vector production. For example, any underground BMPs, like those in the current Retrofit Pilot program, should be designed to hold storm water for no more than 72 hours. Vector production considerations would also require that both the inlet and outlet vents to be sealed, preferably with pressure sensitive flaps that would open under flow pressure. Such mechanisms would restrict the invasion of egg-laying mosquito females and impede the exit of emerging adults. Another major challenge facing any deployment of underground BMPs will be the development of maintenance protocols required to keep these devices operational.

DHS wishes to encourage further dialogue on this issue, but recommends that underground structures not be built. However if underground structure are to be constructed, DHS recommends that strict guidelines be formulated and followed to limit standing water.

The full text of the DHS memorandum on underground vaults is included in Appendix I

CDS Monitoring and "Mosquito Proofing"

On 4/27/00 representatives of DHS and GLACVCD met with Montgomery Watson, Law/Crandall and Caltrans to discuss vector monitoring protocols for the CDS units. Vector personnel concluded that dry-season monitoring would be best facilitated by leaving the sump

of the unit filled with water, rather than draining it at the conclusion of monitoring. This decision was made in light of the potential safety issues involved with entering semi-enclosed spaces. If water were removed from the sump, the vector technician would be forced to lean head-first into the sump (while hanging on to the edge with the free hand) in order to attempt to sample any water at the bottom of the sump. By leaving water in the sump, easy access to the water surface is assured, and confined space safety concerns are minimized. Possible modifications for "mosquito-proofing" the devices were also discussed. Montgomery Watson will address these potential modifications in a memo that will be submitted to the plaintiffs and vector control agencies for comment.

Other Notes:

DHS is still seeking internal engineering expertise to formulate specific design recommendations with regard to vector problems associated with the BMPs. These recommendations will be presented to the BMP design team as soon as possible.

ADULT MONITORING

UCR has supplied an overview of the findings for the adult mosquito and midge monitoring program (See Appendix I).

Sites Monitored by Vector Control District

Location	BMP Type	Monitor Consultant	Vector Control District	Activities
DISTRICT 7				
I-605/SR-91	IB	MW/Law	GLACVCD	None this period.
I-210 East of Orcas	CDS	MW/Law	GLACVCD	May 9: Breeding observed in sump of the CDS. May 11: Sump treated with Altosid liquid.
I-210 East of Filmore	CDS	MW/Law	GLACVCD	None reported.
I-5/I-605	EDB	BC	GLACVCD	April 20: Breeding noted. April 21: Site abated with Golden Bear Oil.
I-605/SR-91	EDB	BC	GLACVCD	None this period.
Paxton Park & Ride	MF	BC	GLACVCD	N/A
Metro MS	MCTT	BC	GLACVCD	N/A
Alameda MS	OWS	BC	GLACVCD	None this period.
Eastern MS	MF	BC	GLACVCD	None this period.
Foothill MS	MF	BC	SGVVCD	March 17: Spreader trough in media vault found breeding; treated with Altosid liquid.
Termination Park & Ride	MF	BC	GLACVCD	April 27: Breeding noted at sedimentation vault. April 28: Site abated with Altosid liquid.
Via Verde Park & Ride	MCTT	BC	SGVVCD	March 10: Breeding noted in sedimentation vault; treated with Altosid liquid. April 27: Breeding noted within the sedimentation vault. April 28: Site abated with Altosid liquid.
Lakewood Park & Ride	MCTT	BC	GLACVCD	March 14: Breeding observed in sedimentation vault; abated with Altosid liquid. March 22: Breeding observed in sedimentation vault; abated with Altosid liquid. March 31: Breeding observed in sedimentation vault; abated with Altosid liquid. April 7: Breeding observed in sedimentation vault; abated with Altosid liquid. April 20: Breeding observed in sedimentation vault. April 21: Site abated with Altosid liquid. April 27: Breeding noted within the sedimentation vault. April 28: Site abated with Altosid liquid. May 5: Breeding observed in sedimentation vault; abated with Altosid liquid. May 9: Breeding observed in sedimentation vault. May 10: Site abated with Altosid liquid.
Altadena	Bio Strip/IT	MW/Law	GLACVCD	None this period.
Foothill	DII	MW/Law	SGVVCD	None this period.
LasFlores	DII	MW/Law	LA Co West	None this period.

Location	BMP Type	Monitor Consultant	Vector Control District	Activities
Rosemead	DII	MW/Law	SGVVCD	April 27: Breeding noted within monitoring vault. April 28: Site abated with Altosid liquid.
I-605/SR-91	Bio Strip/Swale	MW/Law	GLACVCD	None this period.
Cerritos MS	BioSwale	MW/Law	GLACVCD	None this period.
I-5/I-605	BioSwale	MW/Law	GLACVCD	None this period.
I-605/ Del Amo	BioSwale	MW/Law	GLACVCD	None this period.
DISTRICT 11				
I-5/SR-56	EDB	KLI	SD Co VC	List basin found breeding on March 20. None in 2nd basin; no treatment performed March 27: Breeding noted; no abatement performed.
I-15/SR-78	EDB	KLI	SD Co VC	None this period.
I-5/La Costa (West)	IB	KLI	SD Co VC	Two mosquito larvae found on March 20. March 27: Breeding noted; no abatement performed. April 3: Breeding noted; no abatement performed. April 3, 10, and 18: Breeding noted; no abatement performed. April 24: Breeding noted; no abatement performed. May 2: Breeding noted; no abatement performed.
I-5/La Costa (East)	WB	KLI	SD Co VC	March 20: Breeding observed. Mosquito egg raft detected on March 20 inspection. March 27: Breeding noted; no abatement performed. April 3: Breeding noted; no abatement performed. April 3, 10: Breeding noted; no abatement performed. April 24: Breeding noted; no abatement performed. May 2: Breeding noted; no abatement performed.
I-5/Manchester (East)	EDB	KLI	SD Co VC	
Kearny Mesa MS	StormFilter (Perlite/Zeolite)	KLI	SD Co VC	April 10: Breeding noted; no abatement performed. April 24: Breeding noted; no abatement performed.
Escondido MS	MF	KLI	SD Co VC	
La Costa Park & Ride	MF	KLI	SD Co VC	
SR-78/I-5 Park & Ride	MF	KLI	SD Co VC	
Melrose Ave/SR-78	Bio Swale	KLI	SD Co VC	
I-5 Palomar Airport Road	Bio Swale	KLI	SD Co VC	
Carlsbad MS	Bio Strip/IT	KLI	SD Co VC	

ENVIRONMENTAL ISSUES

Dudek and Associates surveyed the BMPs in late February, March and early May 2000. The surveys consisted of reviewing the sites for potential endangered, threatened, or sensitive species issues. Conditions reviewed included presence of burrows, presence of water, presence of nesting birds or suitable habitat, and focused surveys for light-footed clapper rail and salt marsh skipper at selected coastal sites.

Bottas pocket gopher damage stayed consistent throughout the quarter. Sites affected by the damage was consistent with previous quarters. California ground squirrel damage appears to be increasing at some BMPs (see Appendix G) and may require treatment. No sensitive species issues have arisen as a result of the burrows.

Puddled or standing water was present consistently only at the La Costa infiltration basin. As previously stated, February survey was conducted during a rain event, therefore the presence of water was not noted. Despite the presence of water, no sensitive species were detected.

Nesting birds were not detected during the February and March surveys, however red-wing black birds are now nesting in the cattails at the La Costa Wet Basin. Nets have been erected at the La Costa and I-5/SR-78 Park-and-Ride Media Filters to prevent potential nesting by nearby snowy plover and least tern. Nesting in the BMPs by these species would be deleterious to them. An exclusion structure is almost complete at the La Costa Infiltration Basin. Surveys for light-footed clapper rail and salt marsh skipper were negative.

Discussions were initiated regarding the trapping of pocket gophers. As a result, it has been agreed that all trapping of gophers will be discontinued despite biologist concern that potential habitat may be created for protected species. It should be noted that mitigation/maintenance of the BMP facilities will continue according to the previously agreed to Maintenance Indicator Document (MID). Therefore, per the May 10, 2000, conference call, gopher trapping will be discontinued at all sites and the maintenance program will be revised to reflect this change, effective May 10, 2000.

WEATHER

Precipitation data for Los Angeles and San Diego were obtained from NOAA. Precipitation data since the beginning of the 1999-2000 season for 2 gages in Los Angeles and 2 gage in San Diego is provided below.

The data presented here is for reference only. The actual rainfall at individual BMP sites will vary from the values given in the table. The data presented above for Los Angeles is as of 4:00 p.m. for the preceding 24 hours on the date indicated. For San Diego, is as of 5:00 p.m. for the preceding 24 hours.

December 1999							
Los Angeles – Downtown/USC				**San Diego**			
Day	**Precip. (Inches)**	**Day**	**Precip. (Inches)**	**Day**	**Precip. (Inches)**	**Day**	**Precip. (Inches)**
1	0.00	16	0.00	1	0.00	16	0.00
2	0.00	17	0.00	2	0.00	17	0.00
3	0.00	18	0.00	3	0.00	18	0.00
4	0.00	19	0.00	4	0.00	19	0.00
5	0.00	20	0.00	5	0.00	20	0.00
6	0.00	21	0.00	6	0.00	21	0.00
7	0.00	22	0.00	7	0.00	22	0.00
8	0.00	23	0.00	8	0.00	23	0.00
9	0.00	24	0.00	9	0.00	24	0.00
10	0.03	25	0.00	10	0.03	25	0.00
11	0.00	26	0.00	11	0.00	26	0.00
12	0.00	27	0.00	12	0.00	27	0.00
13	0.00	28	0.00	13	0.00	28	0.00
14	0.00	29	0.00	14	0.00	29	0.00
15	0.00	30	0.00	15	0.00	30	0.00
		31	0.00			31	0.00

January 2000							
Los Angeles – Downtown/USC				**San Diego**			
Day	**Precip. (Inches)**	**Day**	**Precip. (Inches)**	**Day**	**Precip. (Inches)**	**Day**	**Precip. (Inches)**
1	0.12	16	0.00	1	0.28	16	0.03
2	0.00	17	0.02	2	0.04	17	Trace
3	0.00	18	0.01	3	0.00	18	0.00
4	0.00	19	0.00	4	0.00	19	0.00
5	0.00	20	0.00	5	0.00	20	0.00
6	0.00	21	0.00	6	0.00	21	0.00
7	0.00	22	0.00	7	0.00	22	0.00
8	0.00	23	0.02	8	0.00	23	0.00
9	0.00	24	0.00	9	0.00	24	0.00
10	0.00	25	0.42	10	0.00	25	Trace
11	0.00	26	0.14	11	0.00	26	0.03
12	0.00	27	0.00	12	0.00	27	0.00
13	0.00	28	0.00	13	0.00	28	0.00
14	0.00	29	0.00	14	0.00	29	0.00
15	0.00	30	0.03	15	0.00	30	Trace
		31	0.21			31	0.08

February 2000							
Los Angeles – Downtown/USC				**San Diego**			
Day	**Precip. (Inches)**	**Day**	**Precip. (Inches)**	**Day**	**Precip. (Inches)**	**Day**	**Precip. (Inches)**
1	0.00	16	0.58	1	0.00	16	0.07
2	0.00	17	0.08	2	0.00	17	0.14
3	0.00	18	0.00	3	0.00	18	0.00
4	0.00	19	0.00	4	0.00	19	0.00
5	0.00	20	0.29	5	0.02	20	0.33
6	0.00	21	1.63	6	0.00	21	1.19
7	0.00	22	0.00	7	0.00	22	0.58
8	0.00	23	1.09	8	Trace	23	0.08
9	0.00	24	0.00	9	0.00	24	0.63
10	0.41	25	0.00	10	0.03	25	0.00
11	0.12	26	0.00	11	0.09	26	0.00
12	0.62	27	0.24	12	0.39	27	Trace
13	0.26	28	0.00	13	0.06	28	Trace
14	0.44	29	0.00	14	0.06	29	0.00
15	0.00			15	0.00		

March 2000							
Los Angeles – Downtown/USC				**San Diego**			
Day	Precip. (Inches)	Day	Precip. (Inches)	Day	Precip. (Inches)	Day	Precip. (Inches)
1	0.00	16	0.00	1	0.04	16	0.00
2	0.00	17	0.00	2	0.00	17	0.00
3	0.01	18	0.00	3	0.01	18	0.00
4	0.27	19	0.00	4	Trace	19	0.00
5	1.78	20	0.00	5	0.65	20	0.10
6	0.04	21	0.00	6	0.08	21	0.00
7	0.00	22	0.00	7	0.05	22	0.00
8	0.71	23	0.00	8	0.06	23	0.00
9	0.01	24	0.00	9	0.00	24	0.00
10	0.00	25	0.00	10	0.00	25	0.00
11	0.00	26	0.00	11	0.00	26	0.00
12	0.00	27	0.00	12	0.00	27	Trace
13	0.00	28	0.00	13	0.00	28	0.00
14	0.00	29	0.00	14	0.00	29	0.00
15	0.00	30	0.00	15	0.00	30	0.00
		31	0.00			31	0.00

April 2000							
Los Angeles – Downtown/USC				**San Diego**			
Day	**Precip. (Inches)**	**Day**	**Precip. (Inches)**	**Day**	**Precip. (Inches)**	**Day**	**Precip. (Inches)**
1	0.00	16	0.00	1	0.00	16	0.00
2	0.00	17	1.03	2	0.00	17	0.02
3	0.00	18	0.46	3	0.00	18	0.46
4	0.00	19	0.00	4	0.00	19	0.01
5	0.00	20	0.00	5	0.00	20	0.00
6	0.00	21	0.00	6	0.00	21	Trace
7	0.00	22	0.00	7	0.00	22	0.01
8	0.00	23	0.00	8	0.00	23	0.00
9	0.00	24	0.00	9	0.00	24	0.00
10	0.00	25	0.00	10	0.00	25	0.00
11	0.00	26	0.00	11	0.00	26	0.00
12	0.00	27	0.00	12	0.00	27	0.00
13	0.00	28	0.00	13	0.00	28	0.00
14	0.00	29	0.00	14	0.00	29	0.00
15	0.00	30	0.00	15	0.04	30	0.00

May 2000							
Los Angeles – Downtown/USC				**San Diego**			
Day	Precip. (Inches)	Day	Precip. (Inches)	Day	Precip. (Inches)	Day	Precip. (Inches)
1	0.00	16	0.00	1	0.00	16	0.00
2	0.00	17	0.00	2	0.00	17	0.00
3	0.00	18	0.00	3	0.00	18	0.00
4	0.00	19	0.00	4	0.00	19	0.00
5	0.00	20	0.00	5	0.00	20	0.00
6	0.00	21	0.00	6	0.00	21	0.00
7	0.00	22	0.00	7	0.00	22	0.00
8	0.00	23	0.00	8	Trace	23	0.00
9	0.00	24	0.00	9	0.00	24	0.00
10	0.00	25	0.00	10	0.00	25	0.00
11	0.00	26	0.00	11	0.00	26	0.00
12	0.00	27	0.00	12	0.00	27	0.00
13	0.00	28	0.00	13	0.00	28	0.00
14	0.00	29	0.00	14	0.00	29	0.00
15	0.00	30	0.00	15	0.00	30	0.00
		31				31	

APPENDIX A

QUARTERLY STATUS 8 MEETING MINUTES

Robert Bein, William Frost & Associates
PROFESSIONAL ENGINEERS, PLANNERS & SURVEYORS

JN: 34123,34218

STORMWATER PLANNING AND RESEARCH SERVICES
CONTRACT NO. 43A0004A
Meeting Minutes

ISSUE VERSION: Final

MEETING NO.: 8
DATE: 3/15/00
TIME: 9:00 am
LOCATION:
RBF Irvine

SUBJECT: Quarterly Status Meeting No. 8

Prepared by: S. Taylor

Approved by: (Signature)

Date Prepared: 3/17/00

Attendee Names / Company

Sayra Ramos/CT District 11
Doug Failing/CT District 7
Steve Borroum/CT HQ
Brian Currier/CT HQ/UCD
Bob Wu/CT HQ
John Johnston/CSUS
William Evans/CT District 7
Richard Gordon/CT District 7
Pete Van Riper/CT District 7
Michael Samadian/CT HQ
Jeremy Johnstone/USEPA
Rick Graff/SDBK
Bruce Reznik/SDBK
Steve Fleischli/SMBayKeeper
Rich Horner/NRDC/SMBK
Everett DeLano/NRDC
Julie Hamilton/SDBK
Bill Whittenberg/RBF

Attendee Names / Company

Anna Lantin/RBF
Scott Taylor/RBF
Alan Batdorf/BC
Robert Finn/BC
Mark Williams/BC
Ed Othmer/MW/Law
Byron Berger/MW/Law
Marty Stevenson/KLI
Matt Zapala/KLI
Jeanne-Marie Lane/DHS
Mike Barrett/RBF/UT
Mike Devine/CSDVC
Wakoli Wekesa/DHS
Brock Ortega/RBF/Dudek
Ann Walker/RBF
Mark Moser/MW
Dean Messer/LWA
Trevor Smith/RBF

Copies To:

File

The following items presented summarize the substantive items discussed or issues resolved at the above meeting to the best of the writer's memory.

14725 Alton Parkway • P.O. Box 57057 • Irvine, CA 92619-7057 • 949-472-3505 • FAX 949 586 6531

ITEM	DESCRIPTION	STATUS	OPENED	DUE	ACTION FOR:
01	**Agenda Item 2, Opening Remarks:** Opening remarks from Plaintiffs – Plaintiffs inquired if comments on meeting minutes were addressed (from Q7). CT responded that the minutes were final with Plaintiff comments incorporated. Plaintiffs asked if Caltrans was updating the master schedule to show that the final reports would come out (for the Consent Decree) next year. Further discussion was deferred to later in the meeting.	FYI	3/15		
02	**Agenda Item 3, Non-Stormwater Discharge Reports:** District 7: Only one nonstormwater discharge, at I 605 Del Amo Bioswale. A rainbird was dripping water, the problem was corrected. Plaintiffs asked if vehicle washing is being done at designated wash racks per the separate agreement with the District. CT indicated that the agreement has been communicated to the supervisors at the Maintenance Stations. **The Plaintiffs asked for follow-up to make sure the agreement has been implemented. Caltrans agreed. Doug Failing suggested that continuing communication on this issue be incorporated into Richard Gordon's regular reviews.**	New	3/15	6/15	Caltrans D7
03	**Agenda Item 3, Con't:** District 11: No non-stormwater discharges in District 11. **Plaintiffs requested that the report should indicate that there is no evidence of non-stormwater discharge, rather stating that there is no discharge. CT agreed to change the wording in the report.**	New	3/15	3/30	Caltrans D7/D11
04	**Agenda Item 4, Design Activities in District 7:** The status of the CDS pilot construction was briefly reviewed. Questions were deferred since the MW-C representative was in the field with Plaintiff representatives. Plaintiffs asked when monitoring equipment would be in place at the sites. **Pilot team to respond at the next bi-weekly conference call.**	New	3/15	3/30	MW-C
05	**Agenda Item 4, Con't:** Metro MCTT/Paxton Sand Filter – The new construction schedule was shared with an additional geotechnical review, the schedule shows construction complete at the end of the year (12/20). District 7 will look at 'risk listing' of the projects. Risk listing may save up to 4-6 weeks, but it is unknown if this process can be used for this project. Plaintiffs indicated that it will require an additional monitoring season to satisfy the program. CT noted that they could still get the required 4 storms even if the pilots are not completed until January 2001. Plaintiffs agreed the decision would be weather dependent.	FYI	3/15		
06	**Agenda Item 5, Monitoring Discussion:** There has been intense monitoring activity in February. Mobilization Criteria: Missed at least one event that did not meet the threshold criteria. The minimum criteria for mobilization was lowered for the remainder of the 99/00 season from 50 % chance of 0.25 inch to 25% chance of 0.25 inch. This was accepted by the various parties in a bi-weekly call on 2/17/00, and the criteria was changed accordingly at that time. Discussed some of the issues surrounding the effort for, and problems of mobilization, and time required to mobilize. Plaintiffs noted that if there is an event and it is not monitored because it does not meet the threshold, then the next event, even if not spaced by 48 hrs, may be monitorable from an OMM rainfall criteria perspective. The Plaintiffs want to consider setting a maximum rainfall depth, or other suitable criteria that will initiate the 48 hr waiting	New	3/15	4/15	Caltrans

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ITEM	DESCRIPTION	STATUS	OPENED	DUE	ACTION FOR:
	period. Otherwise, the 48 hour minimum interevent time may not be needed. CT was open to this approach. **CT to confer with the consultant teams and get back to the Plaintiffs with a proposal to modify the 48 hr interevent criteria.** On a related note, CT indicated that they are doing a first flush study, the study results are about 1-year out, also corresponding with SCCWRP on their work in this area.				
07	**Agenda Item 5, Con't:** Sample Aliquots/use of previous events: A minimum of 12 aliquots is required per storm (OMM), an aliquot is a sample, taken each time the pump in the sampling unit is activated. The goal is 12 aliquots per storm and a 75 percent overall storm capture, so that the sample is representative of the event. The samplers are generally set to 78 samples (aliquots) for an event, and the spacing is longer or shorter between the samples depending on the length of the hydrograph. Due to infiltration and storm time, some effluent samples at some sites did not get the required number of aliquots. It was agreed to keep an asterisk by this data, and see, after the end of the monitoring season, if the data should be incorporated into the final efficiency calculations for the device. **It was agreed that CT will bring a proposal to the Plaintiffs discussing aliquots and percent of storm capture relative to inclusion of data that does not meet the current criteria (as stated in the OMM) in the final device efficiency calculations.**	New	3/15	6/15	Caltrans/Consultants
08	**Agenda Item 6, OMM Presentations: District** 7: BC Sites: BMPs operating well, some locations have gone into bypass mode during the three storms covered in this report. The January 25th event was not sampled, however, empirical observations were made. Sampling occurred on the other two events in February. Experienced bypass at all BMPs except the I-605/SR 91 EDB and Alameda MS OWS on February 20th event. Overall percent capture is near 100 %, the lowest is 66%. No events had less than12 aliquots. Minor problems were experienced: a battery failure, flow meter failure (I 605/SR 91 EDB, 2/20), storm lost at this location due to the equipment problems. There is also a problem at some sites with a high head loss on the influent side of the sampler, causing premature equipment wear. BC inspecting the equipment now to ensure it remains serviceable. It was further clarified that there were two bypass storm events at most sites in LA. Plaintiffs noted that the lack of effluent at biofilters is OK, since they are then performing at 100% effectiveness. A practice that is evolving at WSDOT is to manage roadside ditches according to water quality considerations, as long as they can still perform their conveyance function effectively, including among various techniques soil aeration to promote infiltration, followed by stabilizing with vegetation. CT noted that disturbing the soil could lead to erosion and discharge of sediment. Plaintiffs noted if stabilization is done after disturbance, erosion should not be a problem. CT believes that the jury is still out on the technical feasibility of bioswales, and noted that maintaining the vegetation will be an issue, specifically in dealing with potential fire hazard that biofilters may develop in dry summer conditions.	New	3/15	9/15	BC

ITEM	DESCRIPTION	STATUS	OPENED	DUE	ACTION FOR:
	BC OMM inspections: Replacing pumps at a number of sites because of current draw problems, and pumps failing to operate at certain times. Some media filters are building up sediment, resulting in longer detention on the filter. DHS is assessing options for MCTT vector monitoring. Hydroseed is doing well at all sites. **Via Verde sedimentation chamber is leaking, the cause will be found and fixed in the dry season.**				
09	**Agenda Item 6, Con't:** District 7: MW/LC sites: All percent storm captures were above 75% for the storms monitored during this period. The number of aliquots is greater than 12 with the exception of 6 samples. It was noted that we had yet to get a successful sample from the lysimeters. The Plaintiffs noted that it is a problematic form of monitoring, but has worked on some occasions in the past. In particular, the Plaintiffs asked if the vacuum is applied for an extended time, or only around the sampling time. When informed the latter is true, the Plaintiffs noted that other applications in their experience applied the vacuum continuously for an extended time before sampling; and they assumed that procedure was being used in this study, as it should be. We have met the four-storm goal for most Drain Inlet insert sites, except Las Flores and Rosemead (2 locations). It was stated that there is not much effluent out of the biofilters. The Plaintiffs noted a similar experience in monitoring a bioswale in the Pacific northwest. Additional discussion occurred relative to percent storm capture at biofilter devices. The analytical cost for sampling is about $6000 per year per site. The Fossil Filter must be cleaned during events, the crews are seeing bypass because the capacity of the filter is exceeded. The absorbent in the Fossil Filters does not need to be replaced per the guidance in the MID. The Plaintiffs asked why trash and debris accumulating more in the Fossil Filters than the Streamguard inserts. Law indicated that this was due to the number of trees and size of drainage area tributary to the Streamguard devices. Generally, the Fossil Filters are in watersheds that have more debris production. The Plaintiffs asked when bypass of the filters is occurring. Bypass occurs regularly at the sites for most storms for the Fossil Filter units. For Streamguard there have been observed bypass events also, and some ponded water in the inserts, and flooding at the inlet has occurred. The Vendor (Foss) indicates that these are not uncommon issues with the Streamguard. The maintenance threshold may need to be changed for the Streamguard to reduce bypass/flooding problems. Streamguard did fall into the drain during one event, at one location. It fell due to weight of water and debris (mostly leaves) in the filter bag. Shims were added to hold the bag in place, this 'fix' is beyond the normal installation practice. The flow in the bioswale is being distributed uniformly. Trash/debris is building up at the upstream energy dissipator for most bioswales. Gophers are a continuing problem, with implications for the type of material that is planted for the biofilters. The Plaintiffs suggested that it be noted in the record of experience that it is preferable for swales to be in cut rather than fill. The Plaintiffs noted that the burrowing owl should not be driving maintenance issues for the pilots with respect to the trapping of	New	3/15	4/15	Caltrans

ITEM	DESCRIPTION	STATUS	OPENED	DUE	ACTION FOR:
	gophers. **Caltrans agreed to take this idea under advisement, and will suggest some changes to Plaintiffs with respect to the current trapping protocol for gophers listed in the MID.** CT noted that we don't want to create a false environment for the pilot operation, but we must also be sensitive to the burrowing owl problem as well since their presence could limit maintenance of the device. It was clarified that trapping of gophers is an OM cost, not a pilot/monitoring cost. Traffic problems at the I 605/SR 91 infiltration basin were discussed. It was noted that flow bypass is occurring through the splitter/junction because the flow rate is too great. The weir plate can not be raised further because Cerritos Maintenance Station would flood from the resulting backwater. This is a retrofit problem due to limited head, and should be noted in the record of experience. MW to comment on this item in the next bi-weekly conference call. It was noted that at Rosemead MS, there is a lot of wind blow trash from adjacent railroad.				
010	**Agenda Item 6, Con't:** District 11 sites/KLI: Monitored five events during this quarter. Four sites with less than the 12 aliquots during first storm event, two sites with less than the required aliquots on second storm event. All sites got the required aliquots on February 20th. Successful residence time calculations were completed at the Palomar Airport Road swale. Sediment from the I-5/SR78 media filter site (possibly from the surrounding slopes) continues to be an issue. The Plaintiffs indicated that the slope planting should be checked to see if coverage is adequate. There was a problem with influent bypassing the swale at Palomar. Sandbags were installed and this stopped the problem. The Plaintiffs asked that the Consultants try to give the OMM information in a uniform way and manner. CT responded that the goal is to organize the data similarly, but time constraints are often a problem. The Plaintiffs indicated that it is not a big issue and they can live with some variety in the presentation. The Plaintiffs asked about the sampling on January 16, empirical observations were apparently made but no sampling occurred. Law indicated that the storm did not meet the established mobilization criteria. The Plaintiffs also inquired why the February 20th percent capture was apparently low at the I 605/SR 91 biofilter site. Law responded that the percent capture on the effluent was low (due to infiltration) and did not meet the OMM criteria. The Plaintiffs also asked why there was no deployment on February 10th, with 0.41 inch in LA, and why samples collected on January 4th exceeded holding times. Law responded that the deployment criteria were not met by the February 10th storm, except at one site. The January 4th event exceeded the holding time because the rain fell on the January 1st, a blackout date, the sample water was discarded. **The Plaintiffs asked that the date the sampling team mobilization criteria was changed be documented.** (see Item No. 6 above for date)	New	3/15	3/30	RBF
011	**Agenda Item 8, MID:** (Note, Agenda Item 7 deferred to later in meeting): The proposed changes to the	New	3/15	6/15	RBF/Caltrans

ITEM	DESCRIPTION	STATUS	OPENED	DUE	ACTION FOR:
	MID were briefly summarized: A more detailed maintenance protocol for the District 11 wet basin, and the changes requested by the Plaintiffs over the preceding quarter. It was also noted that the separate bound copy of the MID distributed at the meeting was the MID version to be reviewed by the group, as opposed to the version included in the Quarterly report. **It was agreed that CT would develop a maintenance item for pumping the MCTT dry during the summer season, and review this with the group.**				
012	**Agenda Item 9, Vector Report:** There is a continuing problem with mosquito inspection and breeding at the MCTTs. Minor problems at other sites. Adult monitoring report: Bill Walton will give his final presentation after adult monitoring is concluded in June of this year. The Plaintiffs asked why the adult monitoring study was extended. LWA responded that we wanted to capture a second wet season. The final report will be available in late summer. **The Plaintiffs asked that Bill Walton document why he chose the monitoring stations within CT right-of-way only. Requested BW to include mosquito flight adjacent to BMPs, i.e. right-of-way effects.** DHS reported that they are working with local agencies on monitoring consistency. DHS Sampling is continuing on a bi-weekly schedule, transitioning to weekly in late spring or summer. DHS has substantially completed their database, and it should be ready by April for review. Update on survey of other agencies/experience with BMPs: Sent out the survey at the beginning of January, 2000. Over 200 surveys were sent, about 20-30 percent were returned. DHS will make some telephone follow-up calls. DHS is trying to recruit an engineer to help develop recommendations relative to vector control at BMPs, and concurs that the MCTT is a problem device. Proper methodology and sampling techniques are a problem at the MCTT due to limited access. Protocols will evolve over the next several months, and there will most likely remain the necessity for abatement action at this device. Relative to the La Costa wet basin, the County priorities are to maintain access, and maintain vegetation density at a level that does not inhibit vector abatement.	New	3/15	9/15	LWA/Bill Walton
013	**Agenda Item 7, Comments from Manufacturers**: Plaintiffs asked why the whole data report wasn't given to Stormwater Management. KLI responded that there was general discussion that was not sent to them, but that analytical data was provided. The entire report was not forwarded to Stormwater Management so they would not have to cull through all of the other sites/data to find the StormFilter information. The Plaintiffs emphasized that once the entire team has reviewed the sampling data, it should be shared with the appropriate manufacturer. The Plaintiffs asked about the KLI response to Stormwater Management on TPH sampling. KLI	New	3/15	Open	Plaintiffs/Caltrans

ITEM	DESCRIPTION	STATUS	OPENED	DUE	ACTION FOR:
	responded that we are not evaluating TPH as a part of the program, since a grab procedure is required. Comments on Dr. Pitt's letter: A more detailed discussion of the responses to Dr. Pitt's letter will be conducted at the next bi-weekly conference call, since the lead person from BC was unavailable on a field trip with the Plaintiffs. The primary problem is vector sampling and the fact that water is retained year round in the MCTT. The Plaintiffs asked if a cover could be installed, and an opening in the cover provided (sealable) to do the sampling. DHS responded that several locations are needed to sample effectively, and a cover may be unworkable. It was agreed that pumping the MCTT dry for the summer is feasible and will be done. The Plaintiffs asked about the pickup of two drums of sediment at the Altadena Maintenance Station, and how long it took to accumulate the sediment. The sediment is from the spreader ditch, removed per the MID, accumulated over about the previous 9 months. The Plaintiffs asked if the MS is swept. CT responded that parts of the station are swept daily. The Plaintiffs believe the housekeeping practices can be improved to cut down on the amount of material through source control. The Plaintiffs noted that the devices [BMPs] we have installed are imperfect, and this is known, but the goal is to get source control to the point that the devices are unnecessary. CT will continue to pursue source control, and has elevated efforts in this regard, but there may not be a lot more that can be done without fundamental changes in the facilities themselves (i.e., reconstruct the yards). The Plaintiffs disagreed with this assessment and would like to follow up on the issue of doing a better job through source control. **CT District 7 was willing to work with the Plaintiffs on developing additional source control BMPs**.				
014	**Agenda Item 10, Environmental (Biological) Report:** In the January monthly report there is a recommendation that we deploy a net to restrict access to the infiltration basin in District 11 so that the waterfowl would not carry in San Diego fairy shrimp. The letter from the Fish and Wildlife Service was briefly reviewed, the Service had concerns about the type of monitoring being proposed for the Clapper Rail, the protocol was modified to forego tape playback type monitoring at their request. The Plaintiffs offered to go with CT to talk with the Service about endangered species issues. CT noted that the Service said they will only talk when we have a species of concern present. CT will continue to pursue a proactive dialogue with the Service. Caltrans invited the Plaintiffs to also dialogue with the Service.	FYI	3/15	Open	
015	**Agenda Item 11, Cost Workgroup:** A cost summary document was previously forwarded to the				

ITEM	DESCRIPTION	STATUS	OPENED	DUE	ACTION FOR:
	Plaintiffs. This document is a summary of data reflecting the cost for each BMP as it was constructed. This was developed so the cost workgroup would have something in hand as a starting point. The raw data is being collected, and it will be centralized at each District to facilitate review. Caltrans proposed to start the cost workgroup meeting ASAP, maybe during the week of March 27th. The Plaintiffs referred to two letters from them on this subject, dated February 28th and February 29th. One letter deals with the technical issues and problems. Caltrans is responding point by point to this letter. The response letter (on the technical points) will be transmitted by first of next week. The Plaintiffs noted that the data had a significant number of errors, and took several months to compile. CT responded that the data came from some contracts that had not been closed out, causing delay. CT agreed that the report contained errors, these will be corrected and an updated report forwarded to the Plaintiffs in mid-April. CT noted that the time built into the Stipulation amendment for the cost issue is probably not realistic. The Plaintiffs also noted that the stipulation requires that there be no pre-judgement of the study outcome, and putting together a final report, or part of the final report would fall into that category. **CT indicated that to date, only a report outline has been started, and that the outline will be provided to the Plaintiffs.**				
016	**Agenda Item 12, Infiltration Opportunities Study in District 11:** The Plaintiffs asked about the study plan for infiltration in District 11. RBF noted that a report should be to the Plaintiffs by early summer. The Plaintiffs talked about the need for a workplan for the study. **District 11 to call Jeremy Johnstone and Rich Horner to discuss the study further.**	New	3/15	6/15	District 11/RBF
017	**Miscellaneous Agenda Additions:** The Plaintiffs inquired about updating the overall Pilot Program Schedule, to bring it in agreement with the estimated completion date for the program. **CT responded that they would look at the existing schedule in the Scoping Study and respond on this issue.** An initial field report (as a result of the field visit by NRDC rep during the meeting) noted a flaw in the installation of the CDS unit at one of the sites. A construction report on this item will be provided at the next biweekly meeting. Caltrans noted that the Consultant contracts have very limited remaining authority, and that the contracts are up for renewal at the end of June. There may be a change in the Consultant teams as a result of new contracts being let.	New	3/15	4/15	Caltrans
018	**Next Meeting: June 14, 2000 at RBF at 9:30am. Next Bi-Weekly call, March 30th at 10 am.**	FYI			

APPENDIX B

2ND YEAR REPORT – D7 LAW CRANDALL SITES

CALTRANS
BMP RETROFIT PILOT PROGRAM

DISTRICT 7, LOS ANGELES

SECOND YEAR 1999-2000 REPORT

APPENDED

BEST MANAGEMENT PRACTICES

OPERATIONS, MAINTENANCE & MONITORING

August 2000

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1.0 STORMWATER DATA

This summary report encapsulates the 1999/2000 water quality monitoring data through April, 2000 at a portion of the District 7 sites involved in the Caltrans Best Management Practices (BMP) Retrofit Pilot Program (refer to Table 1-1 and Figure 1-1).

This report addresses District 7 BMP locations that were monitored under the responsibility of Law Crandall. Brown & Caldwell also shared the BMP Pilot Program monitoring responsibility in District 7, and it is suggested that the corresponding synopsis authored by this consultant be reviewed to gain full perspective of the District 7 BMP effort.

1.1 Objective

A primary objective of the Caltrans BMP Pilot Program is to evaluate the performance of BMPs. A comprehensive water quality monitoring study has been designed to meet these objectives by evaluating the BMPs' performance in the removal of contaminants from stormwater runoff and by understanding the level of effort required to maintain the BMPs at optimal effectiveness. Data collected from the 1999/2000 wet season through April, 2000 is contained in this report and is used to initially evaluate the BMP's performance. Data includes:

- Rainfall data from storm events during the study period;
- Water quality and quantity of runoff into and discharged from the BMPs;
- Empirical observations of water quality, traffic, rainfall, and antecedent conditions; and
- Documentation records of inspection and maintenance activities performed.

In addition to the data collected above, characterization results of sediment removed from the Altadena Biofiltration Strip (73211a) spreader ditch and annual core soil and surface sediment sampling results from the Infiltration Basin (73101) have been included.

1.2 Hydrology

The sections that follow describe BMP and site hydrological characteristics as observed during storm monitoring events and maintenance inspections during 1999/2000.

1.2.1 Precipitation During the Wet Season

Over the entire Los Angeles Basin, excluding mountain locations, the average annual precipitation ranges from less than 12 inches at the immediate coast to more than 20 inches at the foothills. The normal seasonal rainfall measured at downtown Los Angeles is 14.77 inches. On average, 92% of the seasonal precipitation falls between November 1st and April 30th. This percentage is roughly the same for all stations, regardless of

elevation or distance from the ocean (National Weather Service, *The Climate of Los Angeles California*). Between October 1999 and April 2000, approximately 10.5 inches of precipitation fell on downtown Los Angeles. On average, the months of October through January were drier than usual, February was wetter than usual, and March and April were slightly wetter than usual.

Figures 1-2a through 1-2f illustrate daily precipitation totals for the 1999/2000 wet season at the BMP sites.

1.2.2 Precipitation During Monitored Events

Precipitation during each storm event was characterized by total rainfall, duration of rainfall, maximum intensity, days since last rainfall, and the magnitude of the event immediately preceding the monitored storm event (antecedent rainfall). Precipitation characteristics for each monitored event are summarized in Table 1-2. Maximum rainfall intensity (maximum hourly intensity calculated as twelve times the maximum rainfall recorded in any five minute period) for monitored events is summarized in Table 1-2. Rainfall variability from BMP sites during monitored events is graphically represented in Figures 1-3a through 1-3d. Cumulative rainfall is summarized graphically for each monitored event at each BMP site in Figures 1-4 through 1-17.

Each sampled storm event was preceded by at least 48 hours, meeting the minimum antecedent dry period.

1.2.3 Stormwater Runoff During Monitored Events

Monitoring was designed to isolate rainfall events and the runoff created by those events. Table 1-3 provides a summary of the runoff measured at each station in conjunction with each storm event. Figures 1-4 through 1-15 graphically summarize the influent and effluent flow during each monitored event at each BMP in response to rainfall. These figures also show when individual aliquots were collected as part of each composite sample.

In general, the drainage areas at each of the BMP sites are relatively small and impervious. This resulted in quick response times of inlet flow in relation to the advent of rain and fluctuations in rainfall intensity. At BMPs where runoff is captured and infiltrated (i.e., infiltration basin and infiltration trench), ponded water infiltrated in less than 72 hours.

Influent and effluent flow monitoring was conducted during each monitored storm event at the biofiltration strip and swale sites. With the exception of the Altadena Maintenance Station Biofiltration Strip (73211a), flow did not discharge through the biofilters until mid- to late-February. Until this time, most of the runoff infiltrated through the biofilters. After soils within the biofilters were saturated, which typically required approximately 1.25 inches of precipitation within a two-week period, and with continuous rainfall of moderate intensity, runoff was observed discharging through the biofilters.

The volume of runoff entering the I-605/SR-91 Swale (73222b) and the I-5/I-605 Swale (73224) was greater than the volume of runoff discharging from the swales. However, because freeway embankments may have been contributing runoff into the Cerritos Maintenance Station Swale (73223) and the I-605 at Carson Swale (73225) through their side slopes, there were two events where the volume of runoff entering the swales was less than the volume of runoff discharging the swales. Also, during three events, the volume of runoff entering the Altadena Maintenance Station Strip (73211a) was less than the volume of runoff discharging from the strip. This is attributed to some runoff bypassing the influent flume and sheet flowing directly into the strip during intense periods of rainfall. The size of the tributary area at the I-605/SR-91 Strip (73222a) control location is comparable to the size of the tributary area entering the strip, hence the volume of runoff entering the strip is similar to that passing through the control location.

At the DII sites, flow through the BMPs was continuously monitored throughout the wet season. The total flow volume passing through the DIIs was used to calculate pollutant removal efficiencies. DII pollutant removal efficiency results are presented in Section 1.4 of this report. The DIIs were removed during the first week of June 2000.

At the I-605/SR-91 Infiltration Basin (73101), rainfall and water level within the BMP were measured during each monitored storm event. Figure 1-16 graphically summarizes the infiltration rate during each monitored event at the BMP in response to rainfall. For each monitored event, ponded water within the infiltration basin infiltrated within 72 hours.

At the Altadena Maintenance Station Infiltration Trench (73211b), rainfall, influent flow rate, and water level within the BMP was measured during each monitored storm event. Figure 1-17 graphically summarizes the infiltration rate during each monitored event at the BMP in response to rainfall. For each monitored event, ponded water within the infiltration trench infiltrated within 72 hours.

1.2.4 Hydraulic Residence Time Evaluation

In accordance with the OMM Plan, hydraulic residence time measurements were conducted at each biofiltration swale once during a storm event during the 1999/2000 wet season. The intent of the hydraulic residence time evaluation was to confirm that the hydraulic residence time for the 1-year, 24-hour storm event was achieved by each biofiltration swale. After conducting the measurements and evaluating the data, inherent limitations with the current approach were encountered; these limitations include:

- Changing rainfall intensity caused fluctuating flow rates resulting in unsteady flow (i.e., flow depth changes over time);
- Infiltration of runoff within the swale resulted in non-uniform flow (i.e., flow depth changes over distance);

- Precipitation directly onto unvegetated areas of the swale caused turbidity, impacting absorbance measurements; depending on the flow rate through the swale, the degree of turbidity was not constant, impacting absorbance measurements;
- Measurements were not taken during steady, 1-year, 24-hour flow rates and therefore, there was difficulty confirming that the design residence time criteria had been achieved.

The following paragraphs describe results of the 1999/2000 hydraulic residence time evaluations.

Hydraulic residence time evaluations were conducted when there was sufficient flow through the swale. Flow monitoring equipment was calibrated and initiated. A solution of Formulabs yellow/green dye was then poured into the inlet flume. Observations were noted as the dye flowed through the swale. Samples were collected in two-minute intervals once the dye was visually observed discharging from the swale. A total of 30 discrete samples were collected in individual cups and analyzed onsite using a HACH Model DR/700 Colorimeter.

Hydraulic residence time was measured as the point in time in which 50% of the dye's mass passes through the swale. Plug flow was assumed.

On February 12, 2000, a hydraulic residence time test was performed at the Cerritos Maintenance Station. The vegetation height in the swale was measured to be approximately 10 inches. Dye was poured into the inlet flume and reached the beginning of the swale at 02:56. Visual observations suggested that the dye reached the end of the swale approximately 5 minutes later at 03:01. Based on field observations (i.e., perceptibility of dye in the effluent), the fact that the absorbance measurements appeared to be impacted by turbidity, and a review of the actual absorbance measurements, judgment was made to use only the first 14 measurements. A peak absorbance of 550 units was recorded at 03:08 at the effluent (12 minutes after the dye had reached the beginning of the swale). Based on the procedure described above, the calculated hydraulic residence time is 16 minutes. The designed hydraulic residence time for Cerritos Maintenance Station Swale is 4.6 minutes. However, varying flow rates throughout the evaluation compromised the accuracy of the calculated hydraulic residence time. Figure 1-18a graphically shows the events of the hydraulic residence time evaluation.

On February 21, 2000, a hydraulic residence time test was performed at the I-605 at Carson Swale. The vegetation height in the swale was measured to be approximately 10 inches. Dye was poured into the inlet flume and reached the beginning of the swale at 12:00. Visual observations suggested that the dye reached the end of the swale approximately 31 minutes later at 12:31. Based on field observations (i.e., perceptibility of dye in the effluent), the fact that the absorbance measurements appeared to be impacted by turbidity, and a review of the actual absorbance measurements, judgment

was made to use only the first 14 measurements. A peak absorbance of 550 units was recorded at 12:36 at the effluent (36 minutes after the dye had reached the beginning of the swale). Based on the procedure described above, the calculated hydraulic residence time is 46 minutes. The designed hydraulic residence time for I-605 at Carson Swale is 9 minutes. However, varying flow rates throughout the evaluation compromised the accuracy of the calculated hydraulic residence time. Figure 1-18b graphically shows the events of the hydraulic residence time evaluation.

On March 5, 2000, a hydraulic residence time test was performed at the I-5/I-605 Swale. The vegetation height in the swale was measured to be approximately 8 to 10 inches. Dye was poured into the inlet flume and reached the beginning of the swale at 09:27. Visual observations suggested that the dye reached the end of the swale approximately 8 minutes later at 09:35. Based on field observations (i.e., perceptibility of dye in the effluent), the fact that the absorbance measurements appeared to be impacted by turbidity, and a review of the actual absorbance measurements, judgment was made to use only the first 7 measurements. A peak absorbance of 315 units was recorded at 09:37 at the effluent (10 minutes after the dye had reached the beginning of the swale). Based on the procedure described above, the calculated hydraulic residence time is 11 minutes. The designed hydraulic residence time for the I-5/I-605 Swale is 7 minutes. However, varying flow rates throughout the evaluation compromised the accuracy of the calculated hydraulic residence time. Figure 1-18c graphically shows the events of the hydraulic residence time evaluation.

On March 5, 2000, a hydraulic residence time test was performed at the I-605/SR-91 Swale. The vegetation height in the swale was measured to be approximately 10 to 12 inches. Dye was poured into the inlet flume and reached the beginning of the swale at 09:26. Visual observations suggested that the dye reached the end of the swale approximately 56 minutes later at 10:22. Based on field observations (i.e., perceptibility of dye in the effluent), the fact that the absorbance measurements appeared to be impacted by turbidity, and a review of the actual absorbance measurements, judgment was made to use only the first 11 measurements. A peak absorbance of 429 units was recorded at 10:28 at the effluent (62 minutes after the dye had reached the beginning of the swale). Based on the procedure described above, the calculated hydraulic residence time is 66 minutes. The designed hydraulic residence time for the I-605/SR-91 Swale is 9 minutes. However, varying flow rates throughout the evaluation compromised the accuracy of the calculated hydraulic residence time. Figure 1-18d graphically shows the events of the hydraulic residence time evaluation.

1.3 Analytical Results

The following sections provide an assessment of the overall quality of the data set, a summary of water quality data for each monitored event and solid sampling results.

1.3.1 Assessment of Quality Assurance/Quality Control Results

1.3.1.1 INTRODUCTION

Prior to determining BMP performance, laboratory reports were assessed and the data validated for overall precision, accuracy, representativeness, and completeness to establish data quality and usability. As part of this process, field and laboratory quality control (QC) data were assessed for compliance with the procedures and methods outlined in the Quality Assurance Project Plan (QAPP) presented in Appendix III of the OMM Plan. QC samples were collected during the 1999/2000 wet season. Prior to each event a QC schedule was developed to determine the type of QC samples to be collected at each site in a manner to satisfy the requirements outlined in the Operation, Maintenance, and Monitoring (OMM) Plan - Quality Assurance Project Plan. Given the constraints associated with the collection of stormwater samples, the QC schedule was designed to be flexible in case sufficient sample was not obtained from the designated QC station. Table 1-4a summarizes the QC samples collected during each monitored storm event.

The data quality indicators used to evaluate the overall usability of the data for meeting the project Data Quality Objectives (DQOs) are described in the following paragraphs.

Precision

Precision measures the reproducibility of individual measurements under a given set of conditions. Precision was evaluated for each analyte based on field and laboratory duplicates. Field duplicate analyses were used to measure both field and laboratory precision, and to make an overall judgement as to whether the contaminants detected in the environmental samples are representative of conditions at the BMP location in which the field duplicate was collected. Laboratory duplicates were used to demonstrate method precision at the time of the analyses. Overall, precision was evaluated in terms related to the mean concentration (relative percent difference). The relative percent difference (RPD) between the pair of samples was calculated using the following formula:

$$\%\text{RPD} = \frac{S - D}{S + \frac{D}{2}} \; x100$$

Where:

S = first sample value, and
D = duplicate sample value

Results for RPD calculations for both field duplicates and laboratory splits are presented in Tables 1-4b and 1-4c, respectively and further discussed in the Data Validation Results section.

Accuracy

Accuracy measures the bias in a measurement system by the degree of agreement between a measured value and an accepted reference or true value. The accuracy of the analytical determinations was evaluated using laboratory QC analyses such as laboratory control samples (LCS), matrix spikes (MS/MSD), and surrogate spikes (where applicable). Accuracy results for the LCS analyses were used to monitor the overall performance of all steps in the analysis, including sample preparation. Matrix spike accuracy data was used to provide information about the effect of each sample matrix on the preparation and analyses methodology. Surrogate spike recovery results (where applicable) were used to establish if the analytical method was performed properly. Accuracy is expressed as the percent recovery of a known concentration added and the measured concentration as shown in the following formula:

$$\%\text{Recovery} = \frac{S - U}{Cs} \; x100$$

Where:

S = Measured concentration of spiked aliquot, and
U = Measured concentration of unspiked aliquot, and
Cs = Concentration of spike added

Accuracy results are typically reported by the laboratory and are presented along with the associated analytical results in Appendix A. All of the accuracy results were within the established acceptance criteria (DQOs).

Representativeness

Representativeness expresses the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Sample representativeness was assessed in terms of percent storm captured, number of aliquots, and ultimately the evaluation of all associated blanks. Sample integrity was also evaluated with respect to adherence to the required preservation, storage, and holding times. A discussion of samples not meeting percent storm capture and/or minimum number of aliquots goals are discussed below. Blank results and adherence to holding times are discussed in the Data Validation Results section.

The OMM Plan defines a representative composite sample as being composed of a minimum of 12 aliquots, and representing at least 75 percent storm capture. All samples during the 1999/2000 wet season met the 75 percent minimum storm capture goal. The percent storm capture for samples for the 1999/2000 season was generally greater than 90 percent. Overall, the average percent storm capture for samples collected through April 2000 was 96 percent. All but six samples were composed of at least twelve aliquots (refer to Table 1-4d).

Completeness

Completeness is a measurement of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. Completeness was determined based on validation results and the number of valid data points (not rejected) relative to the total number of validated data. The overall completeness objective of 95 percent was met for all parameters. Percent completeness was calculated using the following formula:

$$\%\text{Completeness} = \frac{V}{T} \; x100$$

Where:

V = number of valid data points, and
T = total number of planned measurements

1.3.1.2 FIELD QA/QC

Blanks

Composite bottles and tubing were decontaminated in accordance with the procedures specified in the OMM Plan. All blanks were prepared in accordance with the project specifications as outlined in the OMM Plan - Quality Assurance Project Plan. Blank sample results were evaluated to determine whether contamination was introduced as a

result of sample equipment contribution (tubing blanks and composite bottle blanks) and analytical procedures (filter blanks and method blanks). Composite bottles (batches of 20) were not released for use unless blanks showed no contamination (i.e., blank results less than Reporting Limits). A review of this data showed that there were no contamination issues (i.e., all blank results were less than the Reporting Limits).

Field Duplicates

As shown in Table 1-4a, field duplicate samples were collected during four storm events for a total of four field duplicates composite samples and two field duplicates grab samples. These samples were submitted "blind" to the laboratory and analyzed for the full list of analytes associated with grab and composite samples. Precision data, as measured by the RPD, was calculated for all parameters reported above the reporting limit and are presented in Table 1-4b. As indicated in this table, RPD results are less than thirty five percent (<35%) in all samples except for:

- A Total Suspended Solids composite sample collected from the Las Flores Maintenance Station Fossil Filter™ on DII on January 25, 2000;
- A Fecal Coliform grab sample collected from the influent location of the Altadena Maintenance Station Biofiltration Strip on January 25, 2000;
- A Total Suspended Solids and Nitrate-N composite sample collected from the effluent location of the Cerritos Maintenance Station Biofiltration Strip on February 21, 2000;
- A Total Phosphorus composite sample collected from the Foothill Maintenance Station StreamGuard™ DII on February 27, 2000; and
- A Fecal Coliform grab sample collected from the influent location of the I-5/I-605 Biofiltration Swale on February 27, 2000.

RPD results for samples listed above are greater than 50 percent.

There are no review criteria for field duplicate analyses comparability. It is expected that the results may have more variability than laboratory replicates, which measures only laboratory performance. It is likely that the variance in the RPD observed in these samples is due to the heterogeneity of the samples.

1.3.1.3 LABORATORY QA/QC

To achieve the data quality needed to support project DQOs, all analyses for this investigation were performed using laboratory procedures in accordance with specified analytical protocols. To ensure comparability of the results and to maintain a high level of QC, a laboratory certified in the State of California under the Environmental Laboratory Accreditation Program (ELAP) performed the analyses.

The subsections below describe how each laboratory QC parameter was assessed for compliance with method-specific requirements. The results of this evaluation with respect to the data validation criteria are discussed in the Section 1.3.1.5.

Method Blanks

A method blank was included in every analytical batch of twenty samples or less to demonstrate that the laboratory materials and environment were not introducing contamination to the analysis. Sample concentrations associated with method blanks containing target analytes were evaluated with respect to blank concentrations during the data validation to determine the need for qualification.

Laboratory Control Samples (LCS)

One LCS was prepared with each analytical batch of 20 samples or less. The LCS consists of laboratory prepared blanks to which is added a known concentration of all of the target analytes. The LCS was carried through the entire sample preparation and analysis procedure with the sample unknowns. LCS recoveries were used to demonstrate that the method is operating within acceptable limits. LCS accuracy results were evaluated with respect to the acceptance criteria specified in the QAPP.

Laboratory Replicates

As shown in Table 1-4a, four composite samples and two grab samples were collected during storm events and were assigned for laboratory replicate analyses for the full list of analytes by the laboratory. These samples were split by the laboratory. Each aliquot of the sample was then analyzed and reported by the laboratory. Precision data as measured by the RPD was calculated for all parameters reported above the reporting limit and are presented in Table 1-4c. Precision data generated from laboratory splits were evaluated during the data validation with respect to the control limits specified in the QAPP. Laboratory duplicates with RPD limits outside the validation criteria and with both sample concentrations greater than 5x the RDL were flagged as estimated J for all samples analyzed within that batch.

Matrix Spike/Matrix Spike Duplicates (MS/MSD)

One set of matrix spike/matrix spike duplicate (MS/MSD) was prepared and analyzed for every analytical batch of 20 samples or less. As shown in Table 1-4a, MS/MSD analyses were performed on project samples collected during four storm events. In this process, three sample aliquots were measured out, and a known amount of the target analyte(s) was spiked into two of the aliquots at the same concentration. The three portions were then prepared and analyzed in the same manner. The analysis of the two spiked aliquots generated recovery data, which was used to measure the effects of interferences in the sample matrix and reflect the overall accuracy of the determination. Additionally, the calculated RPD between the two measurements were used to assess matrix-specific precision. The selection of spiking analytes was consistent with the published method.

Matrix spike accuracy and precision results were evaluated during the data validation with respect to the control limits specified in the QAPP.

Surrogates

Surrogate standards were added to all samples and QC samples tested by gas chromatography (GC). Surrogates are non-target compounds that are analytically similar to the analytes of interest. The surrogate compounds are spiked into the sample prior to the extraction or analysis. Surrogate recoveries were evaluated with respect to the acceptance criteria specified in the QAPP.

Holding Times

The holding time is the maximum amount of time that samples may be held before analysis and still be considered valid. Holding times for all samples were met during the 1999/2000 wet season.

Reporting Limits

Analytical methods and associated reporting limits (refer to Table 1-4e), specified in the OMM Plan, were adhered to.

1.3.1.4 DATA VALIDATION PROCESS

The following sections present the data validation effort performed to evaluate the usability of the sample data for meeting the project objectives.

Verification and Review

The verification and review process is based on overall accuracy, precision, and representativeness to establish data quality and usability. The approach used in the validation process involved the review of chain-of-custody forms; preparation, and use of checklists, which detail the required QC for each respective analytical method; verification and documentation of compliance with the applicable criteria; and, assignment of qualifiers to sample results associated with QC samples that do not meet the validation criteria.

The assessment below is intended to provide a synopsis of any significant problems identified during the data verification step that may lead to data qualification (i.e., assignment of qualifiers) during the later portion of the data validation process. The evaluation of whether or not qualification of the data is deemed necessary will follow basic guidelines from the United States Environmental Protection Agency (EPA) for evaluating inorganic and organic analysis (EPA February 1994a; EPA, 1994b).

Data Qualifiers

U	Indicates the compound or element was an analyte, but was not detected at or above the contract required detection limit (CRDL).
J	Indicates an estimated value.
R	Indicates that QC determined the data are not usable.
UJ	Indicates the compound or element was analyzed, but was not detected; the sample detection limit is an estimated value.

1.3.1.5 DATA VALIDATION RESULTS

Analytical results and associated data qualifiers are summarized in Tables 1-5a through 1-5d.

Stormwater Matrix

pH and Specific Conductance

pH and Specific Conductance analytical data were within acceptable QA/QC goals.

Hardness

Hardness analytical data was within acceptable QA/QC goals.

TSS

Total suspended solids analytical data was within acceptable QA/QC goals.

Nitrate-N

Nitrate-N analytical data was within acceptable QA/QC goals.

TKN

Total Kjeldahl Nitrogen (TKN) data was within acceptable QA/QC goals with the following exception:

- The RPD for a laboratory replicate sample collected at the influent location of the I-5/I-605 Biofiltration Swale on February 27, 2000 was 22 percent, slightly greater than the 20 percent goal. Consequently, a "J" qualifier has been applied to all TKN data for the February 27, 2000 storm event since they were all analyzed in the same batch.

It is likely that the variance in the RPD observed in this paired sample is due to the heterogeneity of the sample.

Total Phosphorous

Total phosphorus analytical data was within acceptable QA/QC goals.

Total/Dissolved Metals

Total and Dissolved Metals data were within acceptable QA/QC goals with the following exceptions:

- The RPD for a laboratory replicate of a dissolved copper sample collected at the influent location of the Altadena Biofiltration Strip on February 16, 2000 was 25 percent, slightly greater than the 20 percent goal. Consequently, a "J" qualifier has been applied to all dissolved copper data for the February 16, 2000 storm event since they were all analyzed in the same batch. It is likely that the variance in the RPD observed in this paired sample is due to the heterogeneity of the sample.

- The RPD for a laboratory replicate of a dissolved zinc sample collected at the influent location of the Altadena Biofiltration Strip on February 16, 2000 was 24 percent, slightly greater than the 20 percent goal. Consequently, a "J" qualifier has been applied to all dissolved zinc data for the February 16, 2000 storm event since they were all analyzed in the same batch. It is likely that the variance in the RPD observed in this paired sample is due to the heterogeneity of the sample.

TPH

Total Petroleum Hydrocarbon analytical data was within acceptable QA/QC goals.

Bacteria

Fecal Coliform data was within acceptable QA/QC goals with the following exceptions:

- The RPD for a laboratory replicate fecal coliform sample collected at the influent location of the Cerritos Maintenance Station Swale on February 21, 2000 was 59 percent. There are no review criteria for fecal coliform laboratory replicate analysis comparability. Therefore, the data has not been qualified. It is likely that the variance in the RPD observed in this paired sample is due to the heterogeneity of the sample.

- The RPD for a laboratory replicate fecal coliform sample collected at the control location of the I-605/SR-91 Biofiltration Strip on March 8, 2000 was 97 percent. There are no review criteria for fecal coliform laboratory replicate analysis comparability. Therefore, the data has not been qualified. It is likely that the

variance in the RPD observed in this paired sample is due to the heterogeneity of the sample.

Solid Matrices

Total Metals

Total Metals analytical data were within acceptable QA/QC goals.

TRPH

Total Recoverable Petroleum Hydrocarbon analytical data was within acceptable QA/QC goals with the following exceptions:

- The RPD for a matrix spike/matrix spike duplicate TRPH sample of StreamGuard™ absorbent material collected on June 1, 2000 from the DII sites was 51 percent, greater than the 30 percent goal. Consequently, a "J" qualifier has been applied to all TRPH data for StreamGuard absorbent material collected on June 1, 2000.

1.3.2 Water Quality Results

Analyses were conducted on stormwater samples by Pat-Chem Laboratories, a certified laboratory under the California Environmental Laboratory Accreditation Program (ELAP). The analyses were performed in accordance with methods and procedures outlined in the OMM Plan - Quality Assurance Project Plan and as specified by applicable EPA methods. The laboratory analyses performed on stormwater samples are listed in Table 1-4e. Analytical results are summarized in Table 1-5a.

1.3.3 Sediment Sampling Results

As part of the maintenance program, sediment is removed from the BMPs, tested, and properly disposed of. At the Altadena Maintenance Station Biofiltration Strip (73211a), material that had collected in the spreader ditch during the 1998/99 wet was removed and drummed on June 9, 1999. The material was composed of sediment, algae, and water. The material was black and silty in nature, with an organic decomposition odor. This material was tested and disposed.

On August 24, 1999 and periodically through December 7, 1999, material was removed from the spreader ditch (of the Altadena Maintenance Station Strip) and drummed. The material was composed of sediment, algae, and water. The material was black and silty in nature, with a decomposing organic odor. On December 7, 1999, the material was tested for disposal purpose and subsequently disposed.

Analytical results are summarized in Table 1-5b.

1.3.4 Soil Sampling Results

Core soil samples of the I-605/SR-91 Infiltration Basin (73101) were collected on June 20, 2000, following the end of the 1999/2000 wet season. Nine cores were collected from locations on an equilateral basin grid (superimposed over the basin). Each of the nine cores was collected using a hand-held, stainless steel soil probe. The probe was driven 1 meter [3.28 ft] below the ground surface and the core was recovered. Each core was then subdivided into three sections as follows:

Section 1 from the ground surface to 0.2 m [0.66 ft] below the ground surface.

Section 2 was from 0.3 m [0.98 ft] to 0.5 m [1.64 ft] below the ground surface.

Section 3 was from 0.6 m [1.97 ft] to 0.8 m [2.62 ft] below the ground surface.

Similar depth intervals of each core were combined to prepare three samples: one from the 0.0 m to 0.2m [0.66 ft] below ground surface interval, one from 0.3 m [0.98 ft] to 0.5 m [1.64 ft] below ground surface interval and one from the 0.6 m [1.97 ft] to 0.8 m [2.62 ft] below the ground surface. Samples were sent to Severn Trent Laboratories for total metals and TRPH analyses and also to LawCrandall's materials testing laboratory for grain size distribution testing.

Analytical results and grain size distribution test results are summarized in Table 1-5c. Results of the grain size distribution tests are also presented in Figures 1-19a through 1-19c.

1.3.5 Drain Inlet Insert Sampling Results

As part of the pollutant removal efficiency evaluation, DII media and the material within the DIIs was collected on June 1, 2000 and sent to Severn Trent Laboratories for analysis. The samples were analyzed for total metals and TRPH. Unused DII media had previously been analyzed to assess background concentrations of the DIIs. The following DII components and materials were tested:

StreamGuard™ DII	Fossil Filter™ DII
Geotextile fabric	Adsorbent material
Absorbent material	Debris/litter/sediment
Debris/litter/sediment	

Results of the analyses are summarized in Table 1-5d.

1.3.6 Vadose Zone Sampling

One pressure-vacuum lysimeter is installed in the I-605/SR-91 Infiltration Basin (73101) and one is installed in the Altadena Maintenance Station Infiltration Trench (73211b). On at least four occasions, vacuums were applied to both lysimeters in an attempt to obtain pore fluid samples. During one storm event at the Altadena Maintenance Station Infiltration Trench, a few drops of liquid were obtained from the infiltration trench one time but otherwise no fluids have been observed. Vacuums were applied to both lysimeters at different times during and after rain events and for varying lengths of times (5 minutes to 14 hours).

Based on review of the sampling procedures, site lithology, and performance of the lysimeters, the most likely causes preventing the lysimeters from collecting samples are that the silica flour encasing the lysimeter may have dried out and/or that water is not available to be collected. Per plaintiff request and Caltrans agreement, future attempts to collect vadose zone samples will be performed by applying vacuum to the lysimeters for a 24-hour period following a storm event if vacuums can be maintained.

1.4 Preliminary BMP Performance Evaluations

A preliminary evaluation of BMP performance was conducted to provide initial estimates of BMP efficiency (Tables 1-6a through 1-6c).

1.4.1 Biofiltration Strips and Swales

BMP efficiencies presented in Tables 1-6a and 1-6b were calculated based upon Event Mean Concentrations (EMCs) and load estimates measured at the influent and effluent monitoring sites for each biofiltration BMP. Average wet season efficiencies based on loads were also calculated and followed the Scoping Study methodology. For purposes of these preliminary calculations, the value of the reporting limit was used in cases where an analyte was reported as undetected. The following equations were used:

$$\text{Efficiency (\%)} = \frac{\text{EMC in} - \text{EMC out}}{\text{EMC in}} \times 100$$

and

$$\text{Efficiency (\%)} = \frac{\text{Load in} - \text{Load out}}{\text{Load in}} \times 100$$

Negative values indicate increases in concentration. Figures 1-20a through 1-20f are scatter plots graphically showing BMP pollutant removal efficiencies.

1.4.2 Drain Inlet Inserts

Preliminary BMP efficiencies were estimated for three StreamGuard™ DIIs and three Fossil Filter™ DIIs, which were installed at the Foothill, Las Flores, and Rosemead Maintenance Stations on 27 September 1999 and removed on 1 June 2000. Table 1-6c summarizes results and Worksheets 1 through 12 present the mass balance calculations.

To estimate the removal of contaminants by a DII, the procedure below was used. This procedure was taken from the *Criteria for Determination of Additional Drain Inlet Insert Monitoring Requirements and Use of 1998-1999 Monitoring Results.* For purposes of these preliminary calculations, the value of the reporting limit was used in cases where an analyte was reported as undetected.

1. For each of the five pollutants measured in the inlet media (total solids, total copper, total lead, total zinc, and TRPH), calculate percent efficiency representing the time interval since the last time the insert medium was changed, using the equation:

$$\text{Efficiency (\%)} = \frac{\text{Estimated Influent Pollutant Mass} - \text{Effluent Pollutant Mass}}{\text{Estimated Influent Pollutant Mass}} \times 100$$

2. Estimate the influent pollutant mass for the time interval according to:

Estimated Influent Pollutant Mass = Insert Medium Pollutant Mass + Total Effluent Pollutant Mass for the time interval

3. Calculate total effluent pollutant mass in two ways, and compute efficiency with each method for comparison:

   I. Storm-by-storm method:
      A. Estimate the effluent mass for each storm event in the time interval according to:

   Estimated Event Effluent Pollutant Mass = Effluent EMC x Event Runoff Volume

      B. For storm events that were successfully monitored, use the measured data.

      C. For any storm event during the time interval that met the deployment criteria but was not successfully monitored, estimate the EMC for that event as the mean of all EMCs measured for that case in all storm events during the time interval. How the mean EMC is determined depends on whether the data tend more to be normally or log-normally distributed. If the concentrations tend more to be normally distributed, use the arithmetic mean of the effluent EMCs. If they tend more to be log-normally

distributed, calculate the mean effluent EMC by log-transforming individual storm EMCs, averaging, and then transforming back.

D. Add the effluent pollutant masses from all storm events in the time interval.

II. Aggregated storm method:

A. Estimate the total effluent mass for all storm events in the time interval according to:

Estimated Total Effluent Pollutant Mass = Mean EMC x Total Runoff Volume

B. How the mean EMC is determined depends on whether the data tend more to be normally or log-normally distributed. If the concentrations tend more to be normally distributed, use the arithmetic mean of the effluent EMCs measured for that case in all storm events during the time interval. If they tend more to be log-normally distributed, calculate the mean effluent EMC by log-transforming individual storm EMCs, averaging, and then transforming back.

4. Compute mean efficiencies <u>for each pollutant and each wet season</u> by averaging results computed according to Steps 1-3 for all time intervals in that wet season.

1.4.3 Normality Test

Data sets were first tested for normality using the Shapiro-Wilk test. The Shapiro-Wilk (W) test is an effective method for evaluating whether the underlying distribution being tested is normally distributed. Data normality is a prerequisite to the computation of certain statistical tests (e.g., t-test). This test, which is a complex analysis of variance, was used to test a variable for departures from normality of the data. It requires a random sample of between 3 and 5,000 data points. Most authors agree that this is the most reliable quantification of non-normality for small to medium sized sample data set. In the Shapiro-Wilk Test, the following hypotheses are tested:

H_0 : The population has a normal distribution.
H_1 : The population does not have a normal distribution.

The null hypothesis (H_o) of the test is that the sample data set is taken from a normal distribution, thus a significance level of < 0.05 rejects this supposition of normality. Parametric methods with variables for which W is significant should not be used. Results of this test are not clear evidence of normality or non-normality, but just one piece of evidence that can be helpful. The Shapiro-Wilk test statistic, W, is calculated using the formula below.

$$W = \frac{1}{d}\left[\sum_{i=1}^{k} a_i (x_{[n-i+1]} - x_{[i]})\right]^2 \qquad d = \sum_{i=1}^{n} (x-\bar{x})^2$$

$$\text{if } n \text{ is even} \quad k = \frac{n}{2} \qquad\qquad \text{if } n \text{ is odd} \quad k = \frac{n-1}{2}$$

Where:

$\bar{x}$ = arithmetic mean
x_i = sample data
n = the number of sample data
a_i = the coefficient for the Shapiro-Wilk Test for normality (Gilbert, Table A6). Where the value of a_i is obtained knowing n.

The P value or critical level is the probability of rejecting the H_o when it is true. The null hypothesis is most often the hypothesis of "no difference". The term "significance level" (alpha) is used to refer to a pre-chosen probability and the term "P value" is used to indicate a probability that is calculated using the given data.

If the P value is less than the chosen significance level then you reject the null hypothesis (i.e., accept that your sample data gives reasonable evidence of a population difference for the observed parameters). It does NOT imply a "meaningful" or "important" difference.

The choice of significance level at which you reject the H_o is arbitrary. Traditionally the 5%, 1%, and 0.1% ($P < 0.05$, 0.01, and 0.001) regions are used. These numbers tend to give a false sense of security when in reality there are many factors that can contribute to the arbitrary nature of these levels. Ideally, random samples could be defined and the most appropriate test and one definitive conclusion could be made. However, because this cannot be done, optimization of research is done to minimize sources of uncertainty. A significance level or P-value of 0.05 (95% confidence interval) was used when performing the Shapiro-Wilk test.

Table 1-7 summarizes normality test results. Note that 1998-1999 data was not checked for normality because in all cases, fewer than three samples were collected and represented discharge from the DIIs.

1.4.4 1998-1999 Drain Inlet Insert Acceptance Criterion

The criterion for accepting and using the 1998-1999 results involved comparison of the calculated efficiencies for the various contaminants measured then and in 1999 2000. This criterion was applied after gaps between the DIIs and drain inlets were filled and the monitoring vaults bermed. If the 1998-1999 estimated efficiencies were generally lower

than the 1999-2000 values by a set margin (criterion for rejection of 1998-1999 results), then the 1998-1999 was rejected.

Before application of the subsequent criteria, at least eight successfully monitored rainfall events over two wet seasons (1998-1999 and 1999-2000) was required for each case. A "case" is a combination of a site (Foothill, Las Flores, or Rosemead Maintenance Station) and a DII (Stream Guard™ or Fossil Filter™). For Fossil Filter™ DII cases, only those events successfully monitored after installation of stainless steel filters counted toward the eight events. Therefore, the minimum numbers of events in 1999-2000 were:

	Fossil Filter	Stream Guard
Foothill Maintenance Station	5	4
Las Flores Maintenance Station	6	3
Rosemead Maintenance Station	5	5

1. In each wet season each case was required to have a median percent storm capture ≥60% and no more than one case could have median percent storm capture <70.

2. In each wet season the median percent storm capture of ≥80% was required for all cases, and the mean percent storm capture of ≥75%was required for all cases.

3. The monitoring events from 1998-1999 (after installation of stainless steel filters for Fossil Filter™ cases) could count toward the minimum eight events for each case, and their results could be used to express treatment efficiencies, if the mean percent efficiencies for 1998-1999 were not more than 20% lower than the 1999-2000 mean percent efficiencies (computed as 0.2 x 1999-2000 % efficiency) for at least four of the five pollutants measured.

For any case failing to meet this criterion, a minimum of eight storm events could be monitored in 1999-2000; if the minimum was not reached in 1999-2000, monitoring will continue in the 2000-2001 wet season until the minimum number is reached. The 1998-1999 results will not be used to express treatment efficiencies for cases failing to meet the criterion.

Table 1-8 summarizes the comparison of the 1998-1999 results with the 1999-2000 results and defines whether the 1998-1999 results may be used to express treatment efficiencies.

Table 1-1: District 7 Sites

Site ID.	BMP Location	BMP Type
73101	I-605/SR-91	Infiltration Basin
73211a	Altadena Maintenance Station	Biofiltration Strip
73211b	Altadena Maintenance Station	Infiltration Trench
73216	Foothill Maintenance Station - North	StreamGuard™ Drain Inlet Insert
73216	Foothill Maintenance Station - South	Fossil Filter™ Drain Inlet Insert
73217	Las Flores Maintenance Station - North	StreamGuard™ Drain Inlet Insert
73217	Las Flores Maintenance Station - South	Fossil Filter™ Drain Inlet Insert
73218	Rosemead Maintenance Station - North	Fossil Filter™ Drain Inlet Insert
73218	Rosemead Maintenance Station - South	StreamGuard™ Drain Inlet Insert
73222a	I-605/SR-91	Biofiltration Strip
73222b	I-605/SR-91	Biofiltration Swale
73223	Cerritos Maintenance Station	Biofiltration Swale
73224	I-5/I-605	Biofiltration Swale
73225	I-605 at Carson	Biofiltration Swale

Table 1-2: Rainfall Statistics for Each Monitored Event

Site/Event	Start Rain Date	Start Rain Time	End Rain Date	End Rain Time	Duration Rain (hours: minutes)	Total Rain (inches)	Max Intensity (inches/hour)	Antecedent Rain (days)	Antecedent Rain (inches)
Event 1									
Altadena MS Strip/IT	1/25/00	2:15	1/25/00	20:42	18:27:00	0.65	0.24	24.4	0.20
Foothill MS Dils	1/25/00	3:19	1/25/00	13:56	10:37:00	0.60	0.24	24.5	0.28
Las Flores MS Dils	1/25/00	0:37	1/25/00	19:25	18:48:00	0.86	0.24	78.0	0.48
Rosemead MS Dils	1/25/00	2:16	1/25/00	20:45	18:29:00	0.72	0.36	24.6	0.32
Event 2									
Foothill MS Dils	1/30/00	19:21	1/31/00	1:26	6:05:00	0.31	0.24	5.3	0.60
Las Flores MS Dils	1/30/00	14:06	1/31/00	0:48	10:42:00	0.42	0.24	4.9	0.85
Rosemead MS Dils	1/30/00	16:32	1/30/00	23:31	6:59:00	0.21	0.12	4.8	0.72
Event 3									
Las Flores MS Dils	2/10/00	4:29	2/10/00	18:37	14:08:00	0.45	0.36	10.2	0.42
Event 4									
Altadena MS Strip/IT	2/16/00	4:08	2/16/00	20:19	16:11:00	0.92	0.36	2.6	0.17
Foothill MS Dils	2/16/00	4:08	2/16/00	20:19	16:11:00	0.92	0.36	2.6	0.17
Event 5									
Altadena MS Strip/IT	2/20/00	6:16	2/21/00	19:59	37:43:00	3.11	0.96	3.4	0.92
Foothill MS Dils	2/20/00	6:31	2/21/00	15:58	33:27:00	3.05	0.96	3.4	0.92
Las Flores MS Dils	2/20/00	6:01	2/21/00	12:38	30:37:00	2.38	3.24	3.5	0.45
Rosemead MS Dils	2/20/00	6:07	2/21/00	14:16	32:09:00	2.64	1.44	3.4	0.90
I-605/SR-91 Strip	2/20/00	5:49	2/21/00	17:19	35:30:00	2.14	0.96	3.3	0.62
I-605/SR-91 Swale	2/20/00	5:49	2/21/00	17:19	35:30:00	2.14	0.96	3.3	0.62
Cerritos Swale	2/20/00	5:49	2/21/00	17:19	35:30:00	2.14	0.96	3.3	0.62
I-5/I-605 Swale	2/20/00	5:57	2/21/00	16:35	34:38:00	2.29	1.32	3.5	0.58
I-605 at Carson Swale	2/20/00	5:49	2/21/00	17:19	35:30:00	2.14	0.96	3.3	0.62
Event 6									
Altadena MS Strip/IT	2/27/00	12:02	2/27/00	17:34	5:32:00	0.77	0.72	3.8	1.84
Foothill MS Dils	2/27/00	12:23	2/27/00	17:43	5:20:00	0.48	0.60	3.8	1.59
Las Flores MS Dils	2/27/00	9:28	2/27/00	15:41	6:13:00	0.50	0.36	3.9	1.62
Rosemead MS Dils	2/27/00	12:13	2/27/00	17:20	5:07:00	0.46	0.60	3.9	1.69
Cerritos Swale	2/27/00	13:04	2/27/00	14:08	1:04:00	0.16	0.36	4.0	0.98
I-605/I-5 Swale	2/27/00	12:41	2/27/00	14:21	1:40:00	0.21	0.24	3.6	1.09
Event 7									
Altadena MS Strip/IT	3/8/00	0:36	3/8/00	9:28	8:52:00	0.55	0.36	2.5	2.18
Foothill MS Dils	3/8/00	2:17	3/8/00	11:23	9:06:00	0.79	0.48	2.6	1.77
I-605/SR-91 Swale	3/8/00	2:12	3/8/00	10:58	8:46:00	0.83	0.48	2.7	0.92
I-605/SR-91 Strip	3/8/00	2:12	3/8/00	10:58	8:46:00	0.83	0.48	2.7	0.92
Cerritos Swale	3/8/00	2:12	3/8/00	10:58	8:46:00	0.83	0.48	2.7	0.92
I-5/I-605 Swale	3/8/00	3:06	3/8/00	10:33	7:27:00	0.93	0.72	2.7	1.19
I-605 at Carson Swale	3/8/00	2:12	3/8/00	10:58	8:46:00	0.83	0.48	2.7	0.92
Event 8									
Altadena MS Strip/IT	4/17/00	10:17	4/17/00	17:41	7:24:00	2.01	0.60	40.1	0.55
Foothill MS Dils	4/17/00	10:40	4/18/00	10:56	24:16:00	2.90	1.44	40.0	0.79
Las Flores MS Dils	4/17/00	8:05	4/18/00	7:36	23:31:00	2.63	3.48	40.0	0.99
Rosemead MS Dils	4/17/00	10:32	4/18/00	4:14	17:42:00	2.10	1.56	40.1	0.81
I-605/SR-91 Strip	4/17/00	10:33	4/18/00	3:59	17:26:00	1.58	1.44	40.0	0.83
I-605/SR-91 Swale	4/17/00	10:33	4/18/00	3:59	17:26:00	1.58	1.44	40.0	0.83
Cerritos Swale	4/17/00	10:33	4/18/00	3:59	17:26:00	1.58	1.44	40.0	0.83
I-5/I-605 Swale	4/17/00	10:26	4/18/00	9:21	22:55:00	2.52	2.64	40.0	0.93
I-605 at Carson Swale	4/17/00	10:33	4/18/00	3:59	17:26:00	1.58	1.44	40.0	0.83

Table 1-3: Flow Data for Each Monitored Event[1]

Site/Event	Start Flow Date	Start Flow Time	End Flow Date	End Flow Time	Duration Flow (hours: minutes)	Total Flow (cubic feet)	Vol. To Samp (cf)	No. of Sample Aliquots Collected	Peak Flow (cfs)	% Capture	Peak Capture
Event 1											
Altadena Strip Inf	1/25/00	0:54	1/25/00	10:41	9:47:00	2584	159	7	0.234	86	Y
Altadena Strip Eff	1/25/00	3:30	1/25/00	9:45	6:15:00	1819	48	18	0.203	95	Y
Foothill FF Dll	1/25/00	4:01	1/25/00	21:30	17:29:00	1034	151	3	0.086	88	Y
Foothill SG Dll	1/25/00	2:05	1/25/00	14:39	12:34:00	262	28	14	0.021	100	Y
Las Flores FF Dll	1/25/00	0:36	1/25/00	19:59	19:23:00	926	41	11	0.067	97	Y
Rosemead FF Dll	1/25/00	2:10	1/25/00	21:44	19:34:00	456	24	9	0.041	94	Y
Rosemead SG Dll	1/25/00	2:06	1/25/00	23:07	21:01:00	2332	115	16	0.340	100	Y
Event 2											
Foothill FF Dll	1/30/00	19:34	1/30/00	23:54	4:20:00	351	20	9	0.057	98	Y
Foothill SG Dll	1/30/00	19:24	1/31/00	5:33	10:09:00	379	2	70	0.053	89	Y
Las Flores SG Dll	1/30/00	18:23	1/31/00	0:09	5:46:00	47	2	12	0.010	100	Y
Rosemead FF Dll	1/30/00	16:40	1/31/00	0:45	8:05:00	94	3	15	0.020	95	Y
Rosemead SG Dll	1/30/00	14:22	1/31/00	1:44	11:22:00	651	15	20	0.070	92	Y
Event 3											
Las Flores FF Dll	2/10/00	4:31	2/10/00	22:28	17:57:00	858	6	55	0.294	77	Y
Las Flores SG Dll	2/10/00	4:32	2/10/00	18:49	14:17:00	48	1	23	0.040	96	Y
Event 4											
Altadena Strip Inf	2/16/00	3:26	2/16/00	21:41	18:15:00	5337	40	104	0.628	78	Y
Altadena Strip Eff	2/16/00	3:17	2/16/00	21:05	17:48:00	6086	22	126	0.631	91	Y
Foothill FF Dll	2/16/00	4:29	2/16/00	21:39	17:10:00	1634	37	44	0.120	100	Y
Foothill SG Dll	2/16/00	4:50	2/16/00	20:38	15:48:00	268	4	138	0.027	100	Y
Event 5											
Altadena Strip Inf	2/20/00	6:20	2/21/00	21:34	39:14:00	12658	239	42	0.466	79	Y
Altadena Strip Eff	2/20/00	6:42	2/21/00	21:50	39:08:00	12104	239	44	0.782	90	Y
Foothill FF Dll	2/20/00	6:38	2/21/00	22:40	40:02:00	5722	303	18	0.665	95	Y
Foothill SG Dll	2/20/00	7:05	2/21/00	17:55	34:50:00	1512	49	32	0.082	81	Y
Las Flores FF Dll	2/20/00	5:59	2/21/00	13:35	31:36:00	3034	83	36	2.045	98	Y
Las Flores SG Dll	2/20/00	5:55	2/21/00	13:07	31:12:00	567	22	23	0.354	89	Y
Rosemead FF Dll	2/20/00	6:13	2/21/00	19:13	37:00:00	2664	48	46	0.266	81	Y
Rosemead SG Dll	2/20/00	6:13	2/21/00	21:29	39:16:00	3379	115	28	0.256	95	Y
Cerritos Swale Inf	2/20/00	6:02	2/21/00	18:12	36:10:00	4092	55	64	0.402	87	Y
Cerritos Swale Eff	2/20/00	12:03	2/21/00	19:40	31:37:00	3094	27	90	0.141	92	Y
I-5/I-605 Swale Inf	2/20/00	10:00	2/21/00	17:38	31:38:00	4095	62	65	0.705	98	Y
I-5/I-605 Swale Eff	2/20/00	6:46	2/21/00	17:32	34:46:00	2279	31	62	0.578	87	Y

[1] Only sites where flow was measured and composite samples were collected are included in this table.

Table 1-3: Flow Data for Each Monitored Event (continued)[1]

Site/Event	Start Flow Date	Start Flow Time	End Flow Date	End Flow Time	Duration Flow (hours: minutes)	Total Flow (cubic feet)	Vol. To Samp (cf)	No. of Sample Aliquots Collected	Peak Flow (cfs)	% Capture	Peak Capture
Event 6											
Altadena Strip Inf	2/27/00	10:42	2/27/00	15:41	4:59:00	2169	38	51	0.442	100	Y
Altadena Strip Eff	2/27/00	12:12	2/27/00	15:28	3:16:00	2249	48	32	0.652	100	Y
Foothill FF Dil	2/27/00	12:27	2/27/00	18:25	5:58:00	683	8	96	0.256	100	Y
Foothill SG Dil	2/27/00	11:50	2/28/00	12:20	24:30:00	984	12	81	0.056	99	Y
Las Flores FF Dil	2/27/00	9:46	2/27/00	16:20	6:34:00	512	14	33	0.106	90	Y
Las Flores SG Dil	2/27/00	10:30	2/27/00	15:45	5:15:00	90	3	13	0.025	100	Y
Rosemead FF Dil	2/27/00	12:13	2/27/00	17:39	5:26:00	300	8	38	0.112	100	Y
Rosemead SG Dil	2/27/00	12:18	2/27/00	18:33	6:15:00	1692	40	37	0.530	87	Y
Cerritos Swale Inf	2/27/00	13:25	2/27/00	14:54	1:29:00	152	16	9	0.077	95	Y
Cerritos Swale Eff	2/27/00	13:49	2/27/00	15:40	1:51:00	200	11	18	0.059	99	Y
I-5/I-605 Swale Inf	2/27/00	12:58	2/27/00	15:03	2:05:00	257	6	43	0.104	100	Y
I-5/I-605 Swale Eff	2/27/00	14:00	2/27/00	14:44	0:44:00	42	3	16	0.052	100	Y
Event 7											
Altadena Strip Inf	3/8/00	0:52	3/8/00	12:39	11:47:00	2203	95	24	0.235	100	Y
Altadena Strip Eff	3/8/00	2:22	3/8/00	12:53	10:31:00	1976	95	20	0.228	96	Y
Foothill FF Dil	3/8/00	2:47	3/8/00	14:36	11:49:00	1608	17	75	0.185	100	Y
Foothill SG Dil	3/8/00	2:46	3/8/00	12:00	9:14:00	463	12	65	0.038	99	Y
I-605/SR-91 Strip Control	3/8/00	2:55	3/8/00	12:06	9:11:00	576	6	89	0.094	93	Y
I-605/SR-91 Strip Eff	3/8/00	3:26	3/8/00	13:01	9:35:00	219	2	46	0.059	87	Y
I-605/SR-91 Swale Inf	3/8/00	2:45	3/8/00	12:06	9:21:00	452	3	150	0.083	100	Y
I-605/SR-91 Swale Eff	3/8/00	8:59	3/8/00	10:30	1:31:00	69	2	32	0.047	93	Y
Cerritos Swale Inf	3/8/00	2:59	3/8/00	11:39	8:40:00	2022	16	126	0.376	100	Y
Cerritos Swale Eff	3/8/00	2:18	3/8/00	12:23	10:05:00	2643	14	146	0.477	100	Y
I-5/I-605 Swale Inf	3/8/00	3:14	3/8/00	12:23	9:09:00	1373	8	141	0.295	100	Y
I-5/I-605 Swale Eff	3/8/00	3:43	3/8/00	11:31	7:48:00	988	3	142	0.263	100	Y
I-605 at Carson Inf	3/8/00	2:58	3/8/00	11:31	8:33:00	413	9	45	0.068	98	Y
I-605 at Carson Eff	3/8/00	4:09	3/8/00	12:49	8:40:00	456	4	97	0.075	85	Y

[1] Only sites where flow was measured and composite samples were collected are included in this table.

Table 1-3: Flow Data for Each Monitored Event (concluded)[1]

Site/Event	Start Flow Date	Start Flow Time	End Flow Date	End Flow Time	Duration Flow (hours: minutes)	Total Flow (cubic feet)	Vol. To Samp (cf)	No. of Sample Aliquots Collected	Peak Flow (cfs)	% Capture	Peak Capture
Event 8											
Altadena Strip Inf	4/17/00	10:20	4/17/00	18:19	7:59:00	6131	160	38	0.4	99	Y
Altadena Strip Eff	4/17/00	10:16	4/17/00	19:03	8:47:00	8220	111	73	0.8	99	Y
Foothill FF Dll	4/17/00	10:44	4/18/00	9:57	23:13:00	5315	23	231	1.1	100	Y
Foothill SG Dll	4/17/00	10:43	4/17/00	18:02	7:19:00	344	20	33	0.1	99	Y
Las Flores FF Dll	4/17/00	9:09	4/18/00	9:00	23:51:00	4800	28	165	1.7	96	Y
Las Flores SG Dll	4/17/00	9:11	4/18/00	2:44	17:33:00	485	7	69	0.2	100	Y
Rosemead FF Dll	4/17/00	10:38	4/18/00	4:40	18:02:00	1593	24	66	0.4	99	Y
Rosemead SG Dll	4/17/00	10:35	4/18/00	4:40	18:05:00	7226	114	76	1.0	82	Y
I-605/SR-91 Strip Control	4/17/00	11:25	4/18/00	4:56	17:31:00	958	11	85	0.3	98	Y
I-605/SR-91 Strip Eff	4/17/00	13:03	4/18/00	4:35	15:32:00	134	3	12	0.1	90	Y
I-605/SR-91 Swale Inf	4/17/00	10:57	4/18/00	9:34	22:37:00	674	5	129	0.2	96	Y
I-605/SR-91 Swale Eff	4/17/00	10:46	4/18/00	3:23	16:37:00	300	3	26	0.2	89	Y
Cerritos Swale Inf	4/17/00	12:00	4/18/00	5:24	17:24:00	3122	40	72	0.8	92	Y
Cerritos Swale Eff	4/17/00	10:36	4/18/00	4:37	18:01:00	562	27	21	0.5	100	Y
I-5/I-605 Swale Inf	4/17/00	13:30	4/18/00	7:33	18:03:00	3118	14	151	1.1	98	Y
I-5/I-605 Swale Eff	4/17/00	12:14	4/18/00	9:50	21:36:00	2605	6	168	1.1	100	Y
I-605 at Carson Inf	4/17/00	12:23	4/18/00	4:33	16:10:00	967	17	54	0.2	95	Y
I-605 at Carson Eff	4/17/00	13:22	4/18/00	11:13	21:51:00	797	7	110	0.1	97	Y

[1] Only sites where flow was measured and composite samples were collected are included in this table.

Table 1-4a Summary of QA/QC Samples

Site	1/25/2000	2/16/2000	2/20-21/00	2/27/00	3/8/00
Altadena Maintenance Station Biofiltration Strip - Influent	Field Duplicate (grab)	Laboratory Replicate (composite)			
Altadena Maintenance Station Biofiltration Strip - Effluent		MS/MSD (composite)			
Foothill Maintenance Station StreamGuard™ DII		Field Duplicate (composite)		Field Duplicate (composite)	
Foothill Maintenance Station Fossil Filter™ DII				Laboratory Replicate (composite)	MS/MSD (composite)
Las Flores Maintenance Station Fossil Filter™ DII	Field Duplicate (composite)		Laboratory Replicate (composite)/ MS/MSD (composite)		
I-605/SR-91 Biofiltration Strip - Influent					Laboratory Replicate (grab)/ MS/MSD (grab)
Cerritos Maintenance Station Biofiltration Swale - Influent			Laboratory Replicate (grab)		
Cerritos Maintenance Station Biofiltration Swale - Effluent			Field Duplicate (composite)		
I-5/I-605 Biofiltration Swale – Influent			MS/MSD (grab)	Laboratory Replicate (composite)/ MS/MSD (composite)/ Field Duplicate (grab)	
I-5/I-605 Biofiltration Swale - Effluent				MS/MSD (grab)	
I-605 at Carson Biofiltration Swale - Effluent					Laboratory Replicate (composite)
Sample from Analytical Batch	MS/MSD (grab)/ MS/MSD (composite)				

Table 1-4b Field Duplicate RPD Results

1/25/00 Las Flores Maintenance Station - Fossil Filter DII (Composite Samples)

	Original	Duplicate	RPD
pH	6.8	7.1	4%
Conductivity	18	17	6%
Hardness	20	19	5%
TSS	13	46	112%
Nitrate as N	1.37	1.43	4%
TKN	2.5	2.5	0%
Total Phosphorus	<0.002	<0.002	0%
Total Cu	1.7	1.8	6%
Total Pb	<1	<1	0%
Total Zn	10.8	11.8	9%
Dissolved Cu	1.2	1.4	15%
Dissolved Pb	1	1	0%
Dissolved Zn	9.1	11.5	23%
TPH-Diesel	<250	<250	0%
TPH-Heavy Oil	<200	<200	0%
TPH-Gasoline	<50	<50	0%

1/25/00 Altadena Maintenance Station – Influent (Grab Samples)

	Original	Duplicate	RPD
TPH-Diesel	<250	<250	0%
TPH-Heavy Oil	310	365	16%
TPH-Gasoline	<50	<50	0%
Fecal Coliform	80	30	91%

2/16/00 Foothill Maintenance Station – StreamGuard DII (Composite Samples)

	Original	Duplicate	RPD
pH	6.9	6.9	0%
Conductivity	19	19	0%
Hardness	12	12	0%
TSS	13	10	26%
Nitrate as N	0.4	0.41	2%
TKN	1.59	1.97	21%
Total Phosphorus	<0.002	0.06	187%
Total Cu	4.4	4.3	2%
Total Pb	1.7	1.6	6%
Total Zn	50	53	6%
Dissolved Cu	4.3	4	7%
Dissolved Pb	1.5	1.6	6%
Dissolved Zn	48	48	0%
TPH-Diesel	<250	<250	0%
TPH-Heavy Oil	<200	<200	0%
TPH-Gasoline	<50	<50	0%

Table 1-4b Field Duplicate RPD Results (continued)

2/21/00 Cerritos Maintenance Station Swale - Effluent (Composite Samples)

	Original	Duplicate	RPD
pH	7.4	7.5	1%
Conductivity	127	144	13%
Hardness	50	46	8%
TSS	62	30	70%
Nitrate as N	0.31	0.13	82%
TKN	1.56	1.42	9%
Total Phosphorus	0.18	0.13	32%
Total Cu	3.3	3.3	0%
Total Pb	5.7	5.9	3%
Total Zn	17.2	21.3	21%
Dissolved Cu	4.1	2.9	34%
Dissolved Pb	4.9	5	2%
Dissolved Zn	17.6	15.8	11%

2/27/00 Foothill Maintenance Station – StreamGuard DII (Composite Samples)

	Original	Duplicate	RPD
pH	7	6.9	1%
Conductivity	36	37	3%
Hardness	11	11	0%
TSS	5	6	18%
Nitrate as N	0.4	0.41	2%
TKN	2.15	1.97	9%
Total Phosphorus	0.05	0.1	67%
Total Cu	4.2	4.9	15%
Total Pb	<1	1.2	18%
Total Zn	50	64	25%
Dissolved Cu	4.3	4.1	5%
Dissolved Pb	<1	<1	0%
Dissolved Zn	49	50	2%
TPH-Diesel	<250	<250	0%
TPH-Heavy Oil	<200	<200	0%
TPH-Gasoline	<50	<50	0%

2/27/00 I-5/I-605 – Influent (Grab Samples)

	Original	Duplicate	RPD
TPH-Diesel	<250	<250	0%
TPH-Heavy Oil	319	308	4%
TPH-Gasoline	<50	<50	0%
Fecal Coliform	30	240	156%

Table 1-4c Laboratory Replicate RPD Results

2/16/00 Altadena Maintenance Station – Influent (Composite Samples)

	Field	Duplicate	RPD
pH	7	7	0%
Conductivity	21	23	9%
Hardness	15	15	0%
TSS	117	122	4%
Nitrate as N	0.23	0.2	14%
TKN	1.45	1.48	2%
Total Phosphorus	0.032	0.03	6%
Total Cu	11.4	11.5	1%
Total Pb	18.9	17.2	9%
Total Zn	124	107	15%
Dissolved Cu	9.4	7.3	25%
Dissolved Pb	14.1	11.5	20%
Dissolved Zn	116	91	24%

2/21/00 Las Flores Maintenance Station - Fossil Filter DII (Composite Samples)

	Original	Duplicate	RPD
pH	7.3	7.3	0%
Conductivity	36	36.5	1%
Hardness	22	20	10%
TSS	38	40	5%
Nitrate as N	0.35	0.35	0%
TKN	1.08	1.03	5%
Total Phosphorus	0.06	0.06	0%
Total Cu	1.3	1.2	8%
Total Pb	1.3	1.9	38%
Total Zn	14	12.9	8%
Dissolved Cu	1.3	1.3	0%
Dissolved Pb	1.1	1.1	0%
Dissolved Zn	8.4	8	5%
TPH-Diesel	<250	<250	0%
TPH-Heavy Oil	<200	<200	0%
TPH-Gasoline	<50	<50	0%

2/21/00 Cerritos Maintenance Station Swale – Influent (Grab Samples)

	Original	Duplicate	RPD
TPH-Diesel	<250	<250	0%
TPH-Heavy Oil	<200	<200	0%
TPH-Gasoline	<50	<50	0%
Fecal Coliform	24000	13000	59%

Table 1-4c Laboratory Replicate RPD Results (continued)

2/27/00 I-5/I-605 – Influent
(Composite Samples)

	Original	Duplicate	RPD
pH	6.5	6.5	0%
Conductivity	75	75	0%
Hardness	23	23	0%
TSS	21	21	0%
Nitrate as N	0.63	0.6	5%
TKN	2.32	2.89	22%
Total Phosphorus	0.08	0.08	0%
Total Cu	18.8	17	10%
Total Pb	21.7	18.4	16%
Total Zn	90	81	11%
Dissolved Cu	12.2	12.6	3%
Dissolved Pb	5.7	5.3	7%
Dissolved Zn	61	61	0%

2/27/00 Foothill Maintenance Station- Fossil Filter DII
(Composite Samples)

	Original	Duplicate	RPD
TPH-Diesel	<250	<250	0%
TPH-Heavy Oil	<200	<200	0%
TPH-Gasoline	<50	<50	0%

3/8/00 I-605 at Carson – Effluent
(Composite Samples)

	Original	Duplicate	RPD
pH	7.6	7.5	1%
Conductivity	111	107	4%
Hardness	49	49	0%
TSS	5	11	75%
Nitrate as N	0.69	0.73	6%
TKN	2.6	2.83	8%
Total Phosphorus	0.35	0.39	11%
Total Cu	9.4	9.8	4%
Total Pb	38	38	0%
Total Zn	29.3	29.3	0%
Dissolved Cu	8.5	8.1	5%
Dissolved Pb	24	25	4%
Dissolved Zn	23.7	25.2	6%

3/8/00 I-605/SR-91 Strip – Control
(Grab Samples)

	Original	Duplicate	RPD
TPH-Diesel	<250	<250	0%
TPH-Heavy Oil	311	280	10%
TPH-Gasoline	<50	<50	0%
Fecal Coliform	800	2300	97%

Table 1-4d Samples Comprised of Less Than Twelve Aliquots

Location	Date	No. of Aliquots	% Storm Capture	Comments	Figure Reference
Altadena Maintenance Station Biofiltration Strip – Influent	1/25/2000	7	86	Sample is from first monitored event of the season. Sample aliquots are well distributed across the hydrograph. Recommend accepting sample without qualification.	1-4a
Foothill Maintenance Station – Fossil Filter™ DII	1/25/2000	3	88	Sample is from first monitored event of the season. Sample results will be used as part of a mass-balance approach in calculating pollutant removal efficiency. Recommend accepting sample without qualification.	1-13a
Las Flores Maintenance Station – Fossil Filter™ DII	1/25/2000	11	97	Sample is from first monitored event of the season. Number of sample aliquots just below minimum required. Sample aliquots are well distributed across the hydrograph. Recommend accepting sample without qualification.	1-14a
Rosemead Maintenance Station – Fossil Filter™ DII	1/25/2000	9	94	Sample is from first monitored event of the season. Number of sample aliquots near minimum required. Sample aliquots are well distributed across the hydrograph. Recommend accepting sample without qualification.	1-15a
Foothill Maintenance Station – Fossil Filter™ DII	1/30/2000	9	98	Number of sample aliquots near minimum required. Sample aliquots are well distributed across the hydrograph. Recommend accepting sample without qualification.	1-13b
Cerritos Maintenance Station Biofiltration Swale – Influent	2/27/2000	9	95	Number of sample aliquots near minimum required. Sample aliquots are well distributed across the hydrograph. Paired sample met minimum % storm capture and minimum number of aliquots. Recommend accepting sample without qualification.	1-7b

Table 1-4e Analytical Methods and Reporting Limits

Analyte	Sample Type	Analytical Method	Reporting Limits
Stormwater Matrix			
Conventionals			
pH	Composite	EPA 150.1	0.1 pH
Specific Conductance	Composite	EPA 120.1	1.0
Hardness	Composite	EPA 130.2	2 mg/L
TSS	Composite	EPA 160.2	1 mg/L
Nutrients			
Nitrate-N	Composite	EPA 300	0.01 mg/L
TKN	Composite	EPA 351.3	0.1 mg/L
Total Phosphorus	Composite	EPA 365.1	0.002 mg/L
Total/Dissolved Metal			
Copper	Composite	EPA 200.8	1 ug/L
Lead	Composite	EPA 200.8	1 ug/L
Zinc	Composite	EPA 200.8	1 ug/L
Organics			
TPH-diesel	Grab/Composite[1]	EPA 8015M	250 ug/L
TPH-oil	Grab/Composite[1]	EPA 8015M	200 ug/L
TPH-gasoline	Grab/Composite[1]	EPA 8015M	50 ug/L
Bacteria			
Fecal Coliform	Grab	SM 9221	2 MPN/100
Sediment, Soil and Solid[2] Matrices			
Organics			
Total Recoverable Petroleum Hydrocarbons (TRPH)	Composite	EPA 418.1(IR)/ 1664HEM	10 mg/kg
Total Metals			
Copper	Composite	EPA 6020	2.5 mg/kg
Lead	Composite	EPA 6020	0.3 mg/kg
Zinc	Composite	EPA 6020	2.0 mg/kg
Grain Size Distribution[3] (Method of Tests for Sieve Analysis of Fine and Coarse Aggregates)	Composite	Caltrans Test 202	---

Table 1-4e Analytical Methods and Reporting Limits (concluded)

Analyte	Sample Type	Analytical Method	Reporting Limits
Sediment Matrix (Disposal)			
Organics			
Total Recoverable Petroleum Hydrocarbons (TRPH)	Composite	EPA 418.1	10 mg/kg
Volatile Organic Compounds	Composite	EPA 8260B	SW-846[7] requirements
Total Metals			
California Code of Regulations (CCR), Title 22 Metals[4]	Composite	EPA 6020/ 7471	SW-846[7] requirements
California Code of Regulations (CCR), Title 22 Waste Extraction Test (WET) Metals[5]	Composite	STLC Extraction	SW-846[7] requirements
Toxicity Characteristic Leaching Procedure (TCLP) Metals[6]	Composite	TCLP 1311	SW-846[7] requirements

1 Composite samples of effluent from DIIs were analyzed for TPH (diesel, oil, and gasoline).

2 Solid matrices for DIIs include StreamGuard™ fabric and absorbent, and Fossil Filter™ adsorbent

3 Grain size distribution test is for Infiltration Basin soil and sediment only.

4 California Code of Regulations (CCR), Title 22 Metals (Sb, As, Ba, Be, Cd, Cr (total), Co, Cu, Hg, Pb, Mo, Ni, Se, Ag, Tl, V, and Zn). Initial waste characterization results may lead to a shorter list of metals for subsequent sediment disposal.

5 Any sample for total metals that are below the Total Threshold Limit Concentration [TTLC] but exceed the ten times Soluble Threshold Limit Concentration (STLC) will be further analyzed using the WET procedure. WET extracts will be analyzed only for metals which exceed the ten times STLC criteria. Sediments associated with total metal results that exceed TTLC values are automatically considered hazardous and therefore do not need to undergo the WET procedure.

6 If any of the WET-soluble concentrations are equal to or greater than the TCLP regulatory thresholds, then analysis of the waste by TCLP may be required.

7 "Test Methods for Evaluating Solid Waste, Physical /Chemical Methods". SW-846, Update III. (SW-846).

Table 1-5a: BMP Retrofit Pilot Study, Stormwater Laboratory Data – District 7

Sample Date	BMP Location	BMP Type	Site ID	Sampling Location	% Storm Capture	pH	Specific Conductance (umhos/cm)	Hardness (mg/L)	TSS (mg/L)	Total (ug/L) Cu	Total (ug/L) Pb	Total (ug/L) Zn	Dissolved (ug/L) Cu	Dissolved (ug/L) Pb	Dissolved (ug/L) Zn	Nitrate-Nitrogen (mg/L)	TKN (mg/L)	Total P (mg/L)	Fecal Coliform MPN/100mL	TPH - Diesel (ug/L)	TPH - Gasoline (ug/L)	TPH - Oil (ug/L)
Storm Water Matrix																						
January 25, 2000	Altadena Maintenance Station	Biofiltration Strip	073211a	Influen	86	6.7	10	15	50	1.3	2.0	13.1	1U	1U	5.1	0.27	1.8	0.002U	80	250U	50U	310
January 25, 2000	Altadena Maintenance Station	Biofiltration Strip	073211a	Effluent	95	6.7	20	20	17	1U	1U	4.2	1U	1U	3.2	0.41	2.2	0.51	140	250U	50U	200U
January 25, 2000	Foothill Maintenance Station	Drain Inlet Insert - Fossil Filter	073216	Effluent	88	6.5	12	18	24	1.5	1U	14.8	1.1	1U	13.8	1.2	0.9	0.002U	---	250U	50U	200U
January 25, 2000	Foothill Maintenance Station	Drain Inlet Insert - StreamGuard	073216	Effluent	100	7.2	9	10	13	1.7	1U	13.5	1.4	1U	10.5	0.41	1.8	0.002U	---	250U	50U	200U
January 25, 2000	Las Flores Maintenance Station	Drain Inlet Insert - Fossil Filter	073217	Effluent	97	6.8	18	20	13	1.7	1U	10.8	1.2	1U	9.1	1.37	2.5	0.002U	---	250U	50U	200U
January 25, 2000	Rosemead Maintenance Station	Drain Inlet Insert - StreamGuard	073218	Effluent	100	7.3	11	18	44	3.0	2.4	27.6	1.3	1U	18.7	0.68	18.2	0.002U	---	250U	50U	200U
January 25, 2000	Rosemead Maintenance Station	Drain Inlet Insert - Fossil Filter	073218	Effluent	94	7.1	17	26	39	2.4	2.3	34.2	1.9	1U	26.7	1.02	1.4	0.002U	---	250U	50U	200U
January 31, 2000	Foothill Maintenance Station	Drain Inlet Insert - Fossil Filter	073216	Effluent	98	6.5	50	22	8	1.5	1U	13.4	1.3	1U	11.7	0.70	2.4	0.128	---	250U	50U	200U
January 31, 2000	Foothill Maintenance Station	Drain Inlet Insert - StreamGuard	073216	Effluent	89	6.8	40	18	6	1.3	1U	18.2	1.3	1U	12.3	0.67	3.7	0.096	---	250U	50U	200U
January 31, 2000	Las Flores Maintenance Station	Drain Inlet Insert - StreamGuard	073217	Effluent	100	7.5	270	70	11	1.6	1U	11.4	1.4	1U	9.7	6.3	1.3	0.138	---	250U	50U	200U
January 30, 2000	Rosemead Maintenance Station	Drain Inlet Insert - Fossil Filter	073218	Effluent	95	7.1	91	36	19	1.8	1U	19.8	1.5	1U	18.0	1.52	2.1	0.075	---	250U	50U	200U
January 31, 2000	Rosemead Maintenance Station	Drain Inlet Insert - StreamGuard	073218	Effluent	92	6.3	115	35	18	3.7	1U	24.6	3.3	1U	23.7	1.99	4.7	0.198	---	250U	50U	200U
February 10, 2000	Las Flores Maintenance Station	Drain Inlet Insert - Fossil Filter	073217	Effluent	77	7.2	99	27	128	22.2	16.4	107	21.1	13.9	98	1.13	3.25	0.07	---	250U	50U	200U
February 10, 2000	Las Flores Maintenance Station	Drain Inlet Insert - StreamGuard	073217	Effluent	96	7.9	199	54	92	33.4	12.3	453	15.2	8.3	247	0.44	3.38	0.07	---	250U	50U	200U
February 16, 2000	Altadena Maintenance Station	Biofiltration Strip	073211a	Influent	78	7.0	21	15	117	11.4	18.9	124	9.4J	14.1	116J	0.23	1.45	0.032	---	---	---	---
February 16, 2000	Altadena Maintenance Station	Biofiltration Strip	073211a	Effluent	91	7.4	47	21	24	3.1	2.9	16.9	2.7J	2.7	15.8J	0.35	1.22	0.31	---	---	---	---
February 16, 2000	Foothill Maintenance Station	Drain Inlet Inser - Fossil Filter	073216	Effluent	100	7.2	32	12	32	7.7	9.4	69	7.3J	8.2	67J	0.41	1.73	0.002U	---	250U	50U	200U
February 16, 2000	Foothill Maintenance Station	Drain Inlet Inser - StreamGuard	073216	Effluent	100	6.9	19	12	13	4.4	1.7	50	4.3J	1.5	48J	0.40	1.59	0.002U	---	250U	50U	200U
February 21, 2000	Altadena Maintenance Station	Biofiltration Strip	073211a	Influent	79	7.5	22	15	79	1.1	1.3	13	1U	1U	9.1	0.22	1.43	0.05	---	---	---	---
February 21, 2000	Altadena Maintenance Station	Biofiltration Strip	073211a	Effluent	90	7.6	24	16	15	1U	1U	9.1	1U	1U	5.6	0.12	0.9	0.18	---	---	---	---
February 20, 2000	I-605/SR-91	Biofiltration Strip	073222a	Control	---	---	---	---	---	---	---	---	---	---	---	---	---	---	500	250U	50U	200U
February 20, 2000	I-605/SR-91	Biofiltration Strip	073222a	Effluent	---	---	---	---	---	---	---	---	---	---	---	---	---	---	170	250U	50U	200U
February 20, 2000	I-605/SR-91	Biofiltration Swale	073222b	Influent	---	---	---	---	---	---	---	---	---	---	---	---	---	---	240	250U	50U	200U
February 20, 2000	I-605/SR-91	Biofiltration Swale	073222b	Effluent	---	---	---	---	---	---	---	---	---	---	---	---	---	---	500	250U	50U	200U
February 21, 2000	Cerritos Maintenance Station	Biofiltration Swale	073223	Influent	87	7.5	4	41	71	5.1	8.9	34.3	4.1	7.1	30.1	0.45	1.80	0.07	24000	250U	50U	200U
February 21, 2000	Cerritos Maintenance Station	Biofiltration Swale	073223	Effluent	92	7.4	127	50	62	3.3	5.7	17.2	4.1	4.9	17.6	0.31	1.56	0.18	>160000	250U	50U	200U
February 22, 2000	I-5/I-605	Biofiltration Swale	073224	Influent	98	7.2	65	21	94	4.6	8.3	50.9	3.1	6.4	26.6	0.27	1.28	0.07	140	250U	50U	200U
February 21, 2000	I-5/I-605	Biofiltration Swale	073224	Effluent	87	7.5	50	23	10	1.5	2.0	6.2	1.3	1.7	6.2	0.68	1.05	0.17	50	250U	50U	200U
February 20, 2000	I-605 @ Carson	Biofiltration Swale	073225	Influent	---	---	---	---	---	---	---	---	---	---	---	---	---	---	5000	250U	50U	200U
February 20, 2000	I-605 @ Carson	Biofiltration Swale	073225	Effluent	---	---	---	---	---	---	---	---	---	---	---	---	---	---	500	250U	50U	200U
February 21, 2000	Foothill Maintenance Station	Drain Inlet Insert - Fossil Filter	073216	Effluent	95	7.3	19	13	22	1.2	2.0	9.4	1.2	2.0	9.4	0.18	1.09	0.07	---	250U	50U	200U
February 21, 2000	Foothill Maintenance Station	Drain Inlet Insert - StreamGuard	073216	Effluent	81	7.5	23	23	20	1.2	1U	13	1.0	1U	13	0.03	1.08	0.06	---	250U	50U	200U
February 21, 2000	Las Flores Maintenance Station	Drain Inlet Insert - Fossil Filter	073217	Effluent	98	7.3	36	22	38	1.3	1.3	14.0	1.3	1.1	8.4	0.35	1.08	0.06	---	250U	50U	200U
February 21, 2000	Las Flores Maintenance Station	Drain Inlet Insert - StreamGuard	073217	Effluent	89	7.8	181	62	167	11.1	1.7	18.7	10.3	1.3	16.6	1.63	0.81	0.08	---	250U	50U	200U
February 21, 2000	Rosemead Maintenance Station	Drain Inlet Insert - StreamGuard	073218	Effluent	95	7.7	393	136	28	4.8	1.9	13.0	4.7	1.5	12.5	0.44	1.06	0.10	---	250U	50U	200U
February 21, 2000	Rosemead Maintenance Station	Drain Inlet Insert - Fossil Filter	073218	Effluent	81	7.4	41	17	8	2.8	1.2	19.5	2.6	1U	18.2	0.60	1.78	0.10	---	250U	50U	200U

"---" - Not Analyzed

Table 1-5a: BMP Retrofit Pilot Study, Stormwater Laboratory Data - District 7 (concluded)

Sample Date	BMP Location	BMP Type	Site ID	Sampling Location	% Storm Capture	pH	Specific Conductance (umhos/cm)	Hardness (mg/L)	TSS (mg/L)	Total (ug/L) Cu	Total (ug/L) Pb	Total (ug/L) Zn	Dissolved (ug/L) Cu	Dissolved (ug/L) Pb	Dissolved (ug/L) Zn	Nitrate-Nitrogen (mg/L)	TKN (mg/L)	Total P (mg/L)	Fecal Coliform (MPN/100mL)	TPH - Diesel (ug/L)	TPH - Gasoline (ug/L)	TPH - Oil (ug/L)
Storm Water Matrix																						
February 27, 2000	Altadena Maintenance Station	Biofiltration Strip	073211a	Influent	100	6.5	32	11	45	13.7	18.5	102	4.6	1.3	28	0.73	2.64J	0.08	800	250U	50U	222
February 27, 2000	Altadena Maintenance Station	Biofiltration Strip	073211a	Effluent	100	6.6	28	10	16	3.0	3.4	20.2	1.7	1.0	12	0.56	1.69J	0.21	300	250U	50U	200U
February 27, 2000	Cerritos Maintenance Station	Biofiltration Swale	073223	Influent	95	7.2	29	80	29	24.3	15.4	96	7.8	4.8	58	0.73	2.64J	0.12	5000	250U	50U	457
February 27, 2000	Cerritos Maintenance Station	Biofiltration Swale	073223	Effluent	99	7.3	98	79	62	20.5	15.0	61	5.6	3.8	35	0.77	2.13J	0.27	1600	250U	50U	320
February 27, 2000	I-5/I-605	Biofiltration Swale	073224	Influent	100	6.5	75	23	21	18.8	21.7	90	2.2	5.7	61	0.63	2.32J	0.08	30	250U	50U	319
February 27, 2000	I-5/I-605	Biofiltration Swale	073224	Effluent	100	6.8	78	24	14	10.4	9.6	28.1	9.3	5.1	23.3	0.88	1.95J	0.27	220	250U	50U	292
February 28, 2000	Foothill Maintenance Station	Drain Inlet Insert - Fossil Filter	073216	Effluent	100	6.9	36	11	20	5.8	4.7	60	4.1	1U	42	0.53	2.08J	0.07	---	250U	50U	200U
February 28, 2000	Foothill Maintenance Station	Drain Inlet Insert - StreamGuard	073216	Effluent	99	7.0	36	11	5	4.2	1U	50	4.3	1U	49	0.40	2.15J	0.05	---	250U	50U	200U
February 27, 2000	Las Flores Maintenance Station	Drain Inlet Insert - Fossil Filter	073217	Effluent	90	6.5	49	14	13	6.1	2.3	31	5.1	1U	20.8	0.31	3.23J	0.08	---	250U	50U	200U
February 27, 2000	Las Flores Maintenance Station	Drain Inlet Insert - StreamGuard	073217	Effluent	100	6.5	50	14	24	12.8	2.5	32	4.6	1U	17.3	0.33	1.71J	0.10	---	250U	50U	200U
February 27, 2000	Rosemead Maintenance Station	Drain Inlet Insert - StreamGuard	073218	Effluent	87	6.5	33	9	27	11.6	12.2	106	5.5	1.3	58	0.58	1.95J	0.06	---	250U	50U	200U
February 27, 2000	Rosemead Maintenance Station	Drain Inlet Insert - Fossil Filter	073218	Effluent	100	6.8	49	17	13	10.4	6.5	218	7.1	2.9	115	0.70	1.86J	0.13	---	250U	50U	200U
March 8, 2000	Altadena Maintenance Station	Biofiltration Strip	073211a	Influent	100	7.1	41	20	52	7.2	12.0	57	2.6	1.2	29	0.34	1.83	0.04	---	---	---	---
March 8, 2000	Altadena Maintenance Station	Biofiltration Strip	073211a	Effluent	96	7.4	33	15	28	2.5	2.0	14.8	2.1	1U	13.8	0.02	1.66	0.18	---	---	---	---
March 8, 2000	I-605/SR-91	Biofiltration Strip	073222a	Control	93	7.5	71	48	54	24.8	81	96	11.2	20.7	45	0.41	1.78	0.12	800	250U	50U	311
March 8, 2000	I-605/SR-91	Biofiltration Strip	073222a	Effluent	87	7.6	161	64	1U	8.1	4.6	19.5	8.4	2.6	12.8	0.30	1.03	2.73	140	250U	50U	200U
March 8, 2000	I-605/SR-91	Biofiltration Swale	073222b	Influent	100	7.5	80	41	38	19.4	40.1	121	10.8	15.9	72.8	0.29	1.85	0.28	5000	250U	50U	488
March 8, 2000	I-605/SR-91	Biofiltration Swale	073222b	Effluent	93	7.9	279	54	26	13.8	9.9	31.2	11.5	4.9	20.5	0.39	2.65	2.68	900	250U	50U	355
March 8, 2000	Cerritos Maintenance Station	Biofiltration Swale	073223	Influent	100	7.6	86	32	103	35.6	100	275	11.1	19.0	52.3	0.39	1.79	0.11	---	---	---	---
March 8, 2000	Cerritos Maintenance Station	Biofiltration Swale	073223	Effluent	100	7.6	10[illegible]	41	56	19.5	49.8	84.6	11.7	20.3	48.6	0.47	4.76	0.15	---	---	---	---
March 8, 2000	I-5/I-605	Biofiltration Swale	073224	Influent	100	7.4	82	26	54	25.2	74.2	371	13.4	26.2	69	0.51	1.81	0.09	---	---	---	---
March 8, 2000	I-5/I-605	Biofiltration Swale	073224	Effluent	100	7.4	68	26	18	14.[illegible]	33.1	48.5	9.5	18.1	33.2	0.47	1.85	0.20	---	---	---	---
March 8, 2000	I-605 @ Carson	Biofiltration Swale	073225	Influent	98	7.6	85	39	67	27.8	175	110	9.4	18.1	24.1	0.45	3.23	0.13	11000	250U	50U	890
March 8, 2000	I-605 @ Carson	Biofiltration Swale	073225	Effluent	85	7.6	11[illegible]	49	5	9.4	38	29.3	8.5	24	23.7	0.69	2.60	0.35	8000	250U	50U	355
March 8, 2000	Foothill Maintenance Station	Drain Inlet Insert - Fossil Filter	073218	Effluent	100	7.6	24	25	31	6.7	12.0	74	3.1	2.6	41	0.23	1.48	0.07	---	250U	50U	210
March 8, 2000	Foothill Maintenance Station	Drain Inlet Insert - StreamGuard	073216	Effluent	99	6.8	34	21	10	4.3	2	66	3.6	1U	59	0.37	2.6	0.04	---	250U	50U	200U
April 18, 2000	Altadena Maintenance Station	Biofiltration Strip	073211	Influent	99	6.7	19	8	57	9.5	9.7	74	4.8	1.3	43.1	0.20	0.11	0.08	---	---	---	---
April 18, 2000	Altadena Maintenance Station	Biofiltration Strip	073211	Effluent	99	6.9	28	10	11	5.4	3.5	37.3	4.8	1.2	29.2	0.23	0.11	0.22	---	---	---	---
April 18, 2000	I-605/SR-91	Biofiltration Strip	073222a	Influent	98	7.5	81	29	61	36.3	79	226	20.4	14.8	75	0.62	2.49	0.21	300	250U	50U	2083
April 18, 2000	I-605/SR-91	Biofiltration Strip	073222a	Effluent	90	6.9	179	40	19	17	8.7	61.7	14.7	2.4	50.7	1.15	4.23	0.79	9000	250U	50U	1222
April 18, 2000	I-605/SR-91	Biofiltration Swale	073222b	Influent	96	7.5	85	30	45	30.7	40.2	322	19	12.2	141	0.82	0.13	0.2	---	---	---	---
April 18, 2000	I-605/SR-91	Biofiltration Swale	073222b	Effluent	89	7.4	193	30	37	20.3	15.5	68.9	16	4.8	45.4	0.83	0.13	1.03	---	---	---	---
April 18, 2000	Cerritos Maintenance Station	Biofiltration Swale	073223	Influent	92	7.5	104	41	117	58.4	133	478	22.4	20	105	0.62	0.11	0.17	---	---	---	---
April 18, 2000	Cerritos Maintenance Station	Biofiltration Swale	073223	Effluent	100	7.7	84	30	50	27.4	47.6	104	17.4	15.5	50.3	0.58	0.08	0.34	---	---	---	---
April 18, 2000	I-5/I-605	Biofiltration Swale	073224	Influent	98	7.4	75	25	27	26.3	48.4	243	17.1	13.9	109	0.48	0.12	0.11	---	---	---	---
April 18, 2000	I-5/I-605	Biofiltration Swale	073224	Effluent	100	7.1	59	19	19	19.5	31.3	80.9	15	10.3	55.6	0.47	0.13	0.29	---	---	---	---
April 18, 2000	I-605 @ Carson	Biofiltration Swale	073225	Influent	95	7.4	88	35	67	31.2	173	152	18.9	46.1	69.5	0.67	2.41	0.15	8000	250U	50J	6663
April 18, 2000	I-605 @ Carson	Biofiltration Swale	073225	Effluent	97	7	120	39	31	23	74.6	75.1	17.2	16.8	427	0.91	2.76	0.53	2400	250U	50J	7838
April 18, 2000	Foothill Maintenance Station	Drain Inlet Insert - Fossil Filter	073216	Effluent	100	6.8	26	8	27	8.[illegible]	10	62.8	4.7	1.6	57.1	0.34	1.6	0.08	---	250U	50J	200U
April 18, 2000	Foothill Maintenance Station	Drain Inlet Insert - StreamGuard	073216	Effluent	99	6.8	17	4	13	5.8	2.8	63.5	4.9	1U	54.5	0.22	1.38	0.05	---	250U	50J	200U
April 18, 2000	Las Flores Maintenance Station	Drain Inlet Insert - Fossil Filter	073217	Effluent	96	6.6	151	53	30	17.4	3.5	107	14.2	1.3	103	0.66	2.29	0.08	---	250U	50J	1118
April 18, 2000	Las Flores Maintenance Station	Drain Inlet Insert - StreamGuard	073217	Effluent	100	6.4	68	21	36	9.7	3.7	34.5	7.1	1	27.9	0.60	1.56	0.15	---	250U	50J	200U
April 18, 2000	Rosemead Maintenance Station	Drain Inlet Insert - StreamGuard	073218	Effluent	82	6.9	73	27	45	19.3	12.5	328	16.5	3.7	319	2.22	2.1	0.14	---	250U	50J	200U
April 18, 2000	Rosemead Maintenance Station	Drain Inlet Insert - Fossil Filter	073218	Effluent	99	7.3	53	20	38	29.7	16.8	436	21.5	5	356	0.86	1.9	0.1	---	250U	50J	200U

"---" - Not Analyzed

U Indicates the compound or element was an analyte, but was not detected at or above the Reporting Limit

Table 1-5b: BMP Retrofit Pilot Study, Sediment Sampling Laboratory Data - District 7

Sample Date	BMP Location	Site ID	BMP Type	Total (mg/kg)																
				Ag	As	Ba	Be	Cd	Cu	Co	Cr	Pb	Zn	Mo	Ni	Sb	Se	Tl	V	Hg
Solids Matrix (Sediment)																				
June 8, 1999	Biofiltration Strip Spreader Ditch - Drum 1	073211A	Biofiltration Strip	0.066	1.8	69.3	0.11	0.38	59.5	3.4	12.6	114[a]	134	1.3	12.9	0.60	0.12	0.048	16.1	0.037
December 12, 1999	Biofiltration Strip Spreader Ditch - Drum 1	073211A	Biofiltration Strip	0.1	2.1	94.0	0.14	1.1	34.5	4.8	12.9	102[c]	294	2.1	9.5	1.50	0.20U	0.10U	16.0	0.04U
December 12, 1999	Biofiltration Strip Spreader Ditch - Drum 2	073211A	Biofiltration Strip	0.14	2.9	109.0	0.17	1.2	49.4	5.6	16.4	144[c]	337	2.3	13.1	1.70	0.20U	0.10U	21.3	0.05

Sample Date	BMP Location	Site ID	BMP Type	STLC		VOCs (ug/kg)[b]			
				Pb (mg/L)	TRPH (mg/kg)	Acetone	Methylene Chloride	Toluene	2-Butanone (MEK)
Solids Matrix (Sediment)									
June 8, 1999	Biofiltration Strip Spreader Ditch - Drum 1	073211A	Biofiltration Strip	6.1	2350	79	15	140	15
December 12, 1999	Biofiltration Strip Spreader Ditch - Drum 1	073211A	Biofiltration Strip	---	1490	---	---	3900	---
December 12, 1999	Biofiltration Strip Spreader Ditch - Drum 2	073211A	Biofiltration Strip	---	1460	---	---	3300	---

"---" - Not Analyzed

[a] 10X STLC < Concentration < TTLC, thus requiring WET procedure.

[b] Parameters with results > Reporting Limit

[c] Because results were similar from sample collected on June 3, 1999, WET procedure was not required.

Table 1-5c: BMP Retrofit Pilot Study, Soil Sampling Laboratory Data - District 7

					Total (mg/kg)					Grain Size Distribution (% Passing)					
Sample Date	BMP Location	Site ID	BMP Type	Sampling Location	Cu	Pb	Zn	TRPH (mg/kg)	Mass (grams)	No. 4	No. 10	No. 20	No. 40	No. 100	No. 200
Solids Matrix (Soil)															
June 20, 2000	I-605/SR-91 Interchange	073101	Infiltration Basin	I-605/SR-91 Baseline Soil; 0.0-0.2 meter depth	22.8	39.4	54.4	10U	986.5	100	99.4	98.3	95.1	74.1	53.3
June 20, 2000	I-605/SR-91 Interchange	073101	Infiltration Basin	I-605/SR-91 Baseline Soil; 0.3-0.5 meter depth	16.1	3.4	35.8	10U	1082	100	100	99.4	94.7	58	28.7
June 20, 2000	I-605/SR-91 Interchange	073101	Infiltration Basin	I-605/SR-91 Baseline Soil; 0.6-0.8 meter depth	16.1	3.5	36.6	10U	940	100	100	99.3	94.5	54.5	25

Table 1-5d: BMP Retrofit Pilot Study, Drain Inlet Insert Solid Matrix Sampling Laboratory Data - District 7

Sample Date	Location	Site ID	BMP Type	Sampling Location	Total (mg/kg) Cu	Pb	Zn	TRPH (mg/kg)
Solids Matrix (StreamGuard Fabric)								
June 1, 2000	Foothill Maintenance Station	073216	Drain Inlet Insert - StreamGuard	Used - StreamGuard Fabric	74.5	150	917	3020
June 1, 2000	Las Flores Maintenance Station	073217	Drain Inlet Insert - StreamGuard	Used - StreamGuard Fabric	34.3	38.3	210	2180
June 1, 2000	Rosemead Maintenance Station	073218	Drain Inlet Insert - StreamGuard	Used - StreamGuard Fabric	42.5	95.4	934	2300
Solids Matrix (StreamGuard Absorbent)								
June 1, 2000	Foothill Maintenance Station	073216	Drain Inlet Insert - StreamGuard	Used - StreamGuard Absorbent	16.9	29.5	105	33700J
June 1, 2000	Las Flores Maintenance Station	073217	Drain Inlet Insert - StreamGuard	Used - StreamGuard Absorbent	10.9	8.2	46.7	28100J
June 1, 2000	Rosemead Maintenance Station	073218	Drain Inlet Insert - StreamGuard	Used - StreamGuard Absorbent	15.5	25.9	121	26400J
Solids Matrix (StreamGuard Sediment)								
June 1, 2000	Foothill Maintenance Station	073216	Drain Inlet Insert - StreamGuard	Used - StreamGuard Sediment	29.9	52.9	301	2870
June 1, 2000	Las Flores Maintenance Station	073217	Drain Inlet Insert - StreamGuard	Used - StreamGuard Sediment	24.5	9.9	98.7	8860
June 1, 2000	Rosemead Maintenance Station	073218	Drain Inlet Insert - StreamGuard	Used - StreamGuard Sediment	51	127	574	2320
Solids Matrix (Fossil Filter Adsorbent)								
June 1, 2000	Foothill Maintenance Station	073216	Drain Inlet Insert - Fossil Filter	Used - Fossil Filter Adsorbent	35.3	119	338	5180
June 1, 2000	Las Flores Maintenance Station	073217	Drain Inlet Insert - Fossil Filter	Used - Fossil Filter Adsorbent	18.9	21.7	120	3270
June 1, 2000	Rosemead Maintenance Station	073218	Drain Inlet Insert - Fossil Filter	Used - Fossil Filter Adsorbent	61.5	135	705	1460
Solids Matrix (Fossil Filter Sediment)								
June 1, 2000	Foothill Maintenance Station	073216	Drain Inlet Insert - Fossil Filter	Used - Fossil Filter Sediment	57	104	356	4550
June 1, 2000	Las Flores Maintenance Station	073217	Drain Inlet Insert - Fossil Filter	Used - Fossil Filter Sediment	22.2	7	69	333U
June 1, 2000	Rosemead Maintenance Station	073218	Drain Inlet Insert - Fossil Filter	Used - Fossil Filter Sediment	43.7	70.2	856	2950

Table 1-6a: BMP Pollutant Removal Efficiencies (Biofiltration Strips)

Altadena MS Strip — 25 January, 2000

	EMCs Influent	EMCs Effluent	Efficiency (%)	% Diff. in Load
TSS (mg/L)	50	17	66	76
Total Cu (ug/L)	3	1U	>23	>46
Total Pb (ug/L)	2	1U	>50	>65
Total Zn (ug/L)	13.1	4.2	68	77
Dissolved Cu (ug/L)	1U	1U	na	na
Dissolved Pb (ug/L)	1U	1U	na	na
Dissolved Zn (ug/L)	5.1	3.2	37	56
Nitrate-Nitrogen (mg/L)	0.27	0.41	-52	-7
TKN (mg/L)	1.8	2.2	-22	14
Total P (mg/L)	0.302U	0.51	-25400	-17851
Storm Volume (cubic feet)	2584	1819		

Altadena MS Strip — 16 February, 2000

	EMCs Influent	EMCs Effluent	Efficiency (%)	% Diff. in Load
TSS (mg/L)	117	24	79	77
Total Cu (ug/L)	11.4	3.1	73	69
Total Pb (ug/L)	18.9	2.9	85	83
Total Zn (ug/L)	124	16.9	86	84
Dissolved Cu (ug/L)	9.4	2.7	71	67
Dissolved Pb (ug/L)	14.1	2.7	81	78
Dissolved Zn (ug/L)	116	15.8	86	84
Nitrate-Nitrogen (mg/L)	0.23	0.35	-52	-74
TKN (mg/L)	1.45	1.22	16	4
Total P (mg/L)	0.032	0.31	-859	-1005
Storm Volume (cubic feet)	5337	6086		

Altadena MS Strip — 21 February, 2000

	EMCs Influent	EMCs Effluent	Efficiency (%)	% Diff. in Load
TSS (mg/L)	79	15	81	82
Total Cu (ug/L)	1.1	1U	>9	>13
Total Pb (ug/L)	1.3	1U	>23	>26
Total Zn (ug/L)	13	9.1	30	33
Dissolved Cu (ug/L)	1U	1U	na	na
Dissolved Pb (ug/L)	1U	1U	na	na
Dissolved Zn (ug/L)	9.1	5.6	38	41
Nitrate-Nitrogen (mg/L)	0.22	0.12	45	48
TKN (mg/L)	1.43	0.9	37	40
Total P (mg/L)	0.05	0.18	-260	-244
Storm Volume (cubic feet)	12658	12104		

Altadena MS Strip — 27 February, 2000

	EMCs Influent	EMCs Effluent	Efficiency (%)	% Diff. in Load
TSS (mg/L)	45	16	64	63
Total Cu (ug/L)	13.7	3	78	77
Total Pb (ug/L)	18.5	3.4	82	81
Total Zn (ug/L)	102	20.2	80	79
Dissolved Cu (ug/L)	4.6	1.7	63	62
Dissolved Pb (ug/L)	1.3	1	23	20
Dissolved Zn (ug/L)	28	12	57	56
Nitrate-Nitrogen (mg/L)	0.73	0.56	23	20
TKN (mg/L)	2.64	1.69	36	34
Total P (mg/L)	0.08	0.21	-163	-172
Storm Volume (cubic feet)	2169	2249		

Altadena MS Strip — 8 March, 2000

	EMCs Influent	EMCs Effluent	Efficiency (%)	% Diff in Load
TSS (mg/L)	52	28	46	52
Total Cu (ug/L)	7.2	2.5	65	69
Total Pb (ug/L)	12	2	83	85
Total Zn (ug/L)	57	14.8	74	77
Dissolved Cu (ug/L)	2.6	2.1	19	28
Dissolved Pb (ug/L)	1.2	1U	>16	>25
Dissolved Zn (ug/L)	29	13	55	60
Nitrate-Nitrogen (mg/L)	0.34	0.02	94	95
TKN (mg/L)	1.63	1.66	-2	9
Total P (mg/L)	0.04	0.18	-350	-304
Storm Volume (cubic feet)	2203	1976		

Altadena MS Strip — 18 April, 2000

	EMCs Influent	EMCs Effluent	Efficiency (%)	% Diff. in Load
TSS (mg/L)	57	11	11	74
Total Cu (ug/L)	9.5	5.4	43	24
Total Pb (ug/L)	9.7	3.5	64	52
Total Zn (ug/L)	74	37.3	50	32
Dissolved Cu (ug/L)	4.8	4.8	0	-34
Dissolved Pb (ug/L)	1.3	1.2	8	-24
Dissolved Zn (ug/L)	43.1	29.2	32	9
Nitrate-Nitrogen (mg/L)	0.20	0.23	-15	-54
TKN (mg/L)	0.11	0.11	0	-34
Total P (mg/L)	0.08	0.22	-175	-269
Storm Volume (cubic feet)	6131	8220		

Altadena MS Strip — *1999 - 2000 Wet Season Statistics*

Parameter	Minimum Load Removal (%)	Maximum Load Removal (%)	Average Season Removal (%)
TSS	52	82	67
T-Cu	13	77	65
T-Pb	26	85	79
T-Zn	32	84	71
D-Cu	-34	67	37
D-Pb	-24	78	47
D-Zn	9	84	62
N-N	-74	95	-41
TKN	-34	40	3
T-P	-17851	-172	-301

Influent (cf) 59663
Effluent (cf) 70776

I-605/SR-91 Strip — 8 March, 2000

	EMCs Influent	EMCs Effluent	Efficiency (%)	% Diff. in Load
TSS (mg/L)	54	1U	>98	>99
Total Cu (ug/L)	24.8	8.1	67	83
Total Pb (ug/L)	81	4.6	94	93
Total Zn (ug/L)	96	19.5	80	92
Dissolved Cu (ug/L)	11.2	6.4	43	73
Dissolved Pb (ug/L)	20.7	2.6	87	95
Dissolved Zn (ug/L)	45	12.8	72	80
Nitrate-Nitrogen (mg/L)	0.41	0.3	27	72
TKN (mg/L)	1.78	1.03	42	78
Total P (mg/L)	0.12	2.73	-2175	-755
Storm Volume (cubic feet)	576	219		

I-605/SR-91 Strip — 18 April, 2000

	EMCs Influent	EMCs Effluent	Efficiency (%)	% Diff. in Load
TSS (mg/L)	61	19	69	96
Total Cu (ug/L)	36.9	17	54	94
Total Pb (ug/L)	79	8.7	89	98
Total Zn (ug/L)	226	61.7	73	96
Dissolved Cu (ug/L)	20.4	14.7	28	90
Dissolved Pb (ug/L)	14.8	2.4	84	98
Dissolved Zn (ug/L)	79	50.7	36	91
Nitrate-Nitrogen (mg/L)	0.62	1.15	-85	74
TKN (mg/L)	2.49	4.23	-70	76
Total P (mg/L)	0.21	0.79	-276	47
Storm Volume (cubic feet)	958	134		

I-605/SR-91 Strip — *1999 - 2000 Wet Season Statistics*

Parameter	Minimum Load Removal (%)	Maximum Load Removal (%)	Average Season Removal (%)
TSS	96	99	93
T-Cu	88	94	95
T-Pb	98	98	99
T-Zn	92	96	97
D-Cu	78	90	92
D-Pb	95	98	98
D-Zn	89	91	93
N-N	72	74	81
TKN	76	78	83
T-P	-765	47	-37

Influent (cf) 14088
Effluent (cf) 1538

Note 1: Altadena MS influent and effluent monitored throughout wet season.
Note 2: I-605/SR-91 control and effluent non-monitored wet season flow volume estimated using Scoping Study procedure.
Note 3: Where EMC was non-detect then Reporting Limit was used.
Note 4: U Indicates the compound or element was an analyte, but was not detected at or above the Reporting Limit.

Table 1-6b: BMP Pollutant Removal Efficiencies (Biofiltration Swales)

I-605/SR-91 Swale — 8 March, 2000

	EMCs Influent	EMCs Effluent	Efficiency (%)	% Diff. in Load
TSS (mg/L)	38	26	32	90
Total Cu (ug/L)	19.4	13.8	29	89
Total Pb (ug/L)	40.1	9.9	75	96
Total Zn (ug/L)	121	31.2	74	96
Dissolved Cu (ug/L)	10.8	11.5	-6	84
Dissolved Pb (ug/L)	15.9	4.9	69	95
Dissolved Zn (ug/L)	72.9	20.5	72	96
Nitrate-Nitrogen (mg/L)	0.29	0.39	-34	79
TKN (mg/L)	1.85	2.65	-43	78
Total P (mg/L)	0.28	2.68	-857	-46
Storm Volume (cubic feet)	452	69		

I-605/SR-91 Swale — 18 April, 2000

	EMCs Influent	EMCs Effluent	Efficiency (%)	% Diff. in Load
TSS (mg/L)	45	37	18	63
Total Cu (ug/L)	30.7	20.3	34	71
Total Pb (ug/L)	40.2	15.5	61	83
Total Zn (ug/L)	322	68.9	79	90
Dissolved Cu (ug/L)	19	16	16	63
Dissolved Pb (ug/L)	12.2	4.8	61	82
Dissolved Zn (ug/L)	141	45.4	68	86
Nitrate-Nitrogen (mg/L)	0.82	0.83	-1	55
TKN (mg/L)	0.13	0.13	0	55
Total P (mg/L)	0.2	1.03	-415	-129
Storm Volume (cubic feet)	674	300		

I-605/SR-91 Swale — *1999 - 2000 Wet Season Statistics*

Parameter	Minimum Load Removal (%)	Maximum Load Removal (%)	Average Season Removal (%)
TSS	63	90	82
T-Cu	71	89	84
T-Pb	83	96	93
T-Zn	90	96	95
D-Cu	63	84	79
D-Pb	82	95	92
D-Zn	86	96	93
N-N	55	79	76
TKN	55	78	54
T-P	-129	-46	-97

Influent (cf) 6985
Effluent (cf) 1608

Cerritos MS Swale — 21 February, 2000

	EMCs Influent	EMCs Effluent	Efficiency (%)	% Diff. in Load
TSS (mg/L)	71	62	13	34
Total Cu (ug/L)	5.1	3.3	35	51
Total Pb (ug/L)	8.9	5.7	36	52
Total Zn (ug/L)	34.3	17.2	50	62
Dissolved Cu (ug/L)	4.1	4.1	0	24
Dissolved Pb (ug/L)	7.1	4.9	31	48
Dissolved Zn (ug/L)	30.1	17.6	42	56
Nitrate-Nitrogen (mg/L)	0.45	0.31	31	48
TKN (mg/L)	1.6	1.56	3	26
Total P (mg/L)	0.07	0.18	-157	-94
Storm Volume (cubic feet)	4092	3094		

Cerritos MS Swale — 27 February, 2000

	EMCs Influent	EMCs Effluent	Efficiency (%)	% Diff. in Load
TSS (mg/L)	29	62	-114	-181
Total Cu (ug/L)	24.3	20.5	16	-11
Total Pb (ug/L)	15.4	15	3	-28
Total Zn (ug/L)	96	61	36	16
Dissolved Cu (ug/L)	17.8	15.6	12	-15
Dissolved Pb (ug/L)	4.8	3.8	21	-4
Dissolved Zn (ug/L)	58	35	40	21
Nitrate-Nitrogen (mg/L)	0.73	0.77	-5	-39
TKN (mg/L)	2.64	3.13	-19	-56
Total P (mg/L)	0.12	0.27	-125	-196
Storm Volume (cubic feet)	152	200		

Cerritos MS Swale — 8 March, 2000

	EMCs Influent	EMCs Effluent	Efficiency (%)	% Diff in Load
TSS (mg/L)	103	56	46	29
Total Cu (ug/L)	35.6	19.5	45	28
Total Pb (ug/L)	100	49.8	50	35
Total Zn (ug/L)	275	84.6	69	60
Dissolved Cu (ug/L)	11.1	11.7	-5	-38
Dissolved Pb (ug/L)	19	20.3	-7	-40
Dissolved Zn (ug/L)	52.3	48.6	7	-21
Nitrate-Nitrogen (mg/L)	0.39	0.47	-21	-58
TKN (mg/L)	1.79	4.76	-166	-248
Total P (mg/L)	0.11	0.15	-36	-78
Storm Volume (cubic feet)	2022	2643		

Cerritos MS Swale — 18 April, 2000

	EMCs Influent	EMCs Effluent	Efficiency (%)	% Diff. in Load
TSS (mg/L)	117	50	57	92
Total Cu (ug/L)	58.4	27.4	53	92
Total Pb (ug/L)	133	47.6	64	94
Total Zn (ug/L)	478	104	78	96
Dissolved Cu (ug/L)	22.4	17.4	22	86
Dissolved Pb (ug/L)	20	15.5	23	86
Dissolved Zn (ug/L)	105	50.3	52	91
Nitrate-Nitrogen (mg/L)	0.62	0.58	6	83
TKN (mg/L)	0.11	0.08	27	87
Total P (mg/L)	0.17	0.34	-100	64
Storm Volume (cubic feet)	3122	562		

Cerritos MS Swale — *1999 - 2000 Wet Season Statistics*

Parameter	Minimum Load Removal (%)	Maximum Load Removal (%)	Average Season Removal (%)
TSS	-181	92	51
T-Cu	-11	92	59
T-Pb	-28	94	71
T-Zn	16	96	81
D-Cu	-38	86	37
D-Pb	-40	86	35
D-Zn	-21	91	55
N-N	-58	83	29
TKN	-248	87	-69
T-P	-196	64	-45

Influent (cf) 19923
Effluent (cf) 14488

I-5/I-605 — 21 February, 2000

	EMCs Influent	EMCs Effluent	Efficiency (%)	% Diff. in Load
TSS (mg/L)	94	10	89	94
Total Cu (ug/L)	4.6	1.5	67	82
Total Pb (ug/L)	8.3	2	76	87
Total Zn (ug/L)	50.9	6.2	88	93
Dissolved Cu (ug/L)	3.1	1.3	58	77
Dissolved Pb (ug/L)	6.4	1.7	73	85
Dissolved Zn (ug/L)	26.6	6.2	77	87
Nitrate-Nitrogen (mg/L)	0.27	0.68	-152	-40
TKN (mg/L)	1.28	1.05	18	54
Total P (mg/L)	0.07	0.17	-143	-35
Storm Volume (cubic feet)	4095	2279		

I-5/I-605 — 27 February, 2000

	EMCs Influent	EMCs Effluent	Efficiency (%)	% Diff. in Load
TSS (mg/L)	21	14	33	89
Total Cu (ug/L)	18.8	10.4	45	91
Total Pb (ug/L)	21.7	9.6	56	93
Total Zn (ug/L)	90	28.1	69	95
Dissolved Cu (ug/L)	12.2	9.3	24	88
Dissolved Pb (ug/L)	5.7	5.1	11	85
Dissolved Zn (ug/L)	61	23.3	62	94
Nitrate-Nitrogen (mg/L)	0.63	0.68	-8	82
TKN (mg/L)	2.32	1.95	16	86
Total P (mg/L)	0.08	0.27	-238	45
Storm Volume (cubic feet)	257	42		

I-5/I-605 — 8 March, 2000

	EMCs Influent	EMCs Effluent	Efficiency (%)	% Diff. in Load
TSS (mg/L)	54	18	67	76
Total Cu (ug/L)	25.2	14.1	44	60
Total Pb (ug/L)	74.2	33.1	55	68
Total Zn (ug/L)	371	48.5	87	91
Dissolved Cu (ug/L)	13.4	9.5	29	49
Dissolved Pb (ug/L)	26.2	18.1	31	50
Dissolved Zn (ug/L)	69	33.2	52	65
Nitrate-Nitrogen (mg/L)	0.51	0.47	8	34
TKN (mg/L)	1.81	1.85	-2	26
Total P (mg/L)	0.09	0.2	-122	-60
Storm Volume (cubic feet)	1373	988		

I-5/I-605 — 18 April, 2000

	EMCs Influent	EMCs Effluent	Efficiency (%)	% Diff. in Load
TSS (mg/L)	27	19	30	41
Total Cu (ug/L)	26.6	19.6	26	38
Total Pb (ug/L)	48.4	31.3	35	46
Total Zn (ug/L)	243	80.9	67	72
Dissolved Cu (ug/L)	17.1	15	12	27
Dissolved Pb (ug/L)	13.9	10.3	26	38
Dissolved Zn (ug/L)	109	55.6	49	57
Nitrate-Nitrogen (mg/L)	0.48	0.47	2	18
TKN (mg/L)	0.12	0.13	-8	9
Total P (mg/L)	0.11	0.29	-164	-120
Storm Volume (cubic feet)	3118	2605		

I-5/I-605 — *1999 - 2000 Wet Season Statistics*

Parameter	Minimum Load Removal (%)	Maximum Load Removal (%)	Average Season Removal (%)
TSS	41	94	87
T-Cu	38	91	70
T-Pb	46	93	74
T-Zn	72	95	90
D-Cu	27	88	62
D-Pb	38	85	68
D-Zn	57	94	79
N-N	-40	82	49
TKN	9	86	65
T-P	-120	45	-12

Influent (cf) 22225
Effluent (cf) 9368

I-605 at Carson — 8 March, 2000

	EMCs Influent	EMCs Effluent	Efficiency (%)	% Diff. in Load
TSS (mg/L)	67	5	93	92
Total Cu (ug/L)	27.8	9.4	66	63
Total Pb (ug/L)	175	38	78	76
Total Zn (ug/L)	110	29.3	73	71
Dissolved Cu (ug/L)	9.4	8.5	10	6
Dissolved Pb (ug/L)	18.1	24	-33	-46
Dissolved Zn (ug/L)	24.4	23.7	3	-7
Nitrate-Nitrogen (mg/L)	0.45	0.69	-53	-69
TKN (mg/L)	3.23	2.6	20	11
Total P (mg/L)	0.13	0.35	-169	-197
Storm Volume (cubic feet)	413	456		

I-605 at Carson — 18 April, 2000

	EMCs Influent	EMCs Effluent	Efficiency (%)	% Diff. in Load
TSS (mg/L)	67	31	54	62
Total Cu (ug/L)	31.2	23	26	39
Total Pb (ug/L)	173	74.6	57	64
Total Zn (ug/L)	152	75.1	51	59
Dissolved Cu (ug/L)	18.9	17.2	9	25
Dissolved Pb (ug/L)	46.1	16.8	64	70
Dissolved Zn (ug/L)	69.5	42.7	39	49
Nitrate-Nitrogen (mg/L)	0.67	0.91	-36	-12
TKN (mg/L)	2.41	2.76	-15	6
Total P (mg/L)	0.13	0.33	-253	-191
Storm Volume (cubic feet)	967	797		

I-605 at Carson — *1999 - 2000 Wet Season Statistics*

Parameter	Minimum Load Removal (%)	Maximum Load Removal (%)	Average Season Removal (%)
TSS	62	92	89
T-Cu	39	63	85
T-Pb	64	76	92
T-Zn	59	71	89
D-Cu	0	25	77
D-Pb	-46	70	86
D-Zn	-7	49	84
N-N	-69	-12	65
TKN	6	11	77
T-P	-197	-191	21

Influent (cf) 22025
Effluent (cf) 5459

Note 1: Cerritos MS influent and I-5/I-605 effluent monitored throughout wet season.
Note 2: I-605/SR-91 influent and effluent, Cerritos MS effluent, I-5/I-605 influent, and I-605 at Carson influent and effluent non-monitored wet season flow volumes estimated using Scoping Study procedure.
Note 3: Where EMC was non-detect then Reporting Limit was used.
Note 4: U Indicates the compound or element was an analyte, but was not detected at or above the Reporting Limit.

Table 1-6c: BMP Pollutant Removal Efficiencies (Drain Inlet Inserts)

Foothill MS StreamGuard DII
1999 - 2000 Wet Season Statistics

Parameter	% Diff. In Load Storm-by-Storm Method	% Diff. in Load Aggregate Method
Sediment	62	63
T-Cu	23	22
T-Pb	55	55
T-Zn	22	23
Hydrocarbons	21	21

Effluent (cf) 8462

Las Flores MS StreamGuard DII
1999 - 2000 Wet Season Statistics

Parameter	% Diff. In Load Storm-by-Storm Method	% Diff. in Load Aggregate Method
Sediment	52	57
T-Cu	17	16
T-Pb	31	32
T-Zn	21	21
Hydrocarbons	66	66

Effluent (cf) 2831

Rosemead MS StreamGuard DII
1999 - 2000 Wet Season Statistics

Parameter	% Diff. In Load Storm-by-Storm Method	% Diff. in Load Aggregate Method
Sediment	4	4
T-Cu	1	7
T-Pb	5	3
T-Zn	2	3
Hydrocarbons	3	1

Effluent (cf) 39422

Foothill MS Fossil Filter DII
1999 - 2000 Wet Season Statistics

Parameter	% Diff. In Load Storm-by-Storm Method	% Diff. in Load Aggregate Method
Sediment	25	27
T-Cu	9	11
T-Pb	19	24
T-Zn	8	10
Hydrocarbons	10	10

Effluent (cf) 27257

Las Flores MS Fossil Filter DII
1999 - 2000 Wet Season Statistics

Parameter	% Diff. In Load Storm-by-Storm Method	% Diff. in Load Aggregate Method
Sediment	38	41
T-Cu	6	8
T-Pb	10	11
T-Zn	4	6
Hydrocarbons	6	7

Effluent (cf) 20609

Rosemead MS Fossil Filter DII
1999 - 2000 Wet Season Statistics

Parameter	% Diff. In Load Storm-by-Storm Method	% Diff. in Load Aggregate Method
Sediment	76	76
T-Cu	29	40
T-Pb	56	66
T-Zn	33	46
Hydrocarbons	26	26

Effluent (cf) 9805

Note 1: Dissolved solids fraction and gross solids fraction of effluent not accounted for in mass balance.
Note 2: Efficiencies include sediment/debris entrapped by the DII. Extensive maintenance was conducted before, during, and after storm events to clear sediment and debris from the DII. Sediment and debis removed from the DII was temporarily stored onsite and then analyzed at the same time as DII.
Note 3 :Flow measured continuously while DII was installed.
Note 4: Where EMC was non-detect then Reporting Limit was used.

Table 1-7: Normality Test Summary

Data		Shapiro-Wilk			
		W Statistic	P value	Evidence of Normality	Transform Data (Y/N)
StreamGuard™ DII - TSS	Foothill MS	0.919881	0.4685	No evidence of non-normality	N
	Las Flores MS	0.870645	0.2690	No evidence of non-normality	N
	Rosemead MS	0.885162	0.3334	No evidence of non-normality	N
StreamGuard™ DII - Total Cu	Foothill MS	0.860444	0.1528	No evidence of non-normality	N
	Las Flores MS	0.858136	0.2216	No evidence of non-normality	N
	Rosemead MS	0.840028	0.1650	No evidence of non-normality	N
StreamGuard™ DII - Total Pb	Foothill MS	0.778776	0.0251	Unlikely	Y
	Las Flores MS	0.749605	0.0295	Unlikely	Y
	Rosemead MS	0.757448	0.0348	Unlikely	Y
StreamGuard™ DII - Total Zn	Foothill MS	0.832884	0.0852	Test not quite signifiant but do not assume normality	Y
	Las Flores MS	0.599346	0.0006	Unlikely	Y
	Rosemead MS	0.74373	0.0260	Unlikely	Y
StreamGuard™ DII - TPH	Foothill MS	1	>0.9999	All data are ND	N
	Las Flores MS	1	>0.9999	All data are ND	N
	Rosemead MS	1	>0.9999	All data are ND	N
Fossil Filter™ DII - TSS	Foothill MS	0.911642	0.4074	No evidence of non-normality	Y; other Fossil Filter™ DII data tend to be non-normal
	Las Flores MS	0.738489	0.0232	Unlikely	Y
	Rosemead MS	0.864069	0.2432	No evidence of non-normality	Y; other Fossil Filter™ DII data tend to be non-normal
Fossil Filter™ DII - Total Cu	Foothill MS	0.817005	0.0601	Test not quite signifiant but do not assume normality	Y
	Las Flores MS	0.861016	0.2319	No evidence of non-normality	Y; other Fossil Filter™ DII data tend to be non-normal
	Rosemead MS	0.744039	0.0262	Unlikely	Y
Fossil Filter™ DII - Total Pb	Foothill MS	0.863626	0.1631	No evidence of non-normality	Y; other Fossil Filter™ DII data tend to be non-normal
	Las Flores MS	0.685327	0.0067	Unlikely	Y
	Rosemead MS	0.781192	0.0564	Test not quite signifiant but do not assume normality	Y
Fossil Filter™ DII Total Zn	Foothill MS	0.825137	0.0719	Test not quite signifiant but do not assume normality	Y
	Las Flores MS	0.776256	0.0513	Test not quite signifiant but do not assume normality	Y
	Rosemead MS	0.788299	0.0648	Test not quite signifiant but do not assume normality	Y
Fossil Filter™ DII - TPH	Foothill MS	0.452971	<0.0001	Unlikely	Y
	Las Flores MS	0.552182	0.0001	Unlikely	Y
	Rosemead MS	1	>0.9999	All data are ND	Y

Table 1-8: Acceptance Criterion Results

DII Location and Type	Period of Use	Median % Storm Capture	No. of Required Storms	No. of Storms Monitored	Efficiency (%)					Accept/Reject 1998-1999 Data
					Solids	Copper	Lead	Zinc	Hydrocarbons	
Foothill MS StreamGuard DII	December 1998 - January 29, 1999	56			15	2	7	0	7	Reject: At least two 1998-1999 pollutant efficiencies were less than 20% of 1999-2000 efficiencies
	March 24, 1999 - April 8, 1999	58			5	1	4	1	8	
	April 8, 1999 - April 12, 1999	61			35	2	5	2	7	
	1998-1999 Summary	**60**			**18**	**2**	**5**	**3**	**7**	
	1999-2000 Summary [1]	**99**	**4**	**7**	**63**	**22**	**55**	**23**	**21**	
	80% of 1999-2000 Efficiency				**50.4**	**17.6**	**44**	**18.4**	**16.8**	
	1999-2000 Summary Without Litter Removal[1]				**3**	**9**	**32**	**11**	**13**	
	1998-1999 Mean % Efficiency More Than 20% Lower Than 1999-2000 Mean % Efficiency				**YES**	**YES**	**YES**	**YES**	**YES**	
Las Flores MS StreamGuard DII	December 1998 - March 24, 1999	75			27	4	6	5	7	Reject: At least two 1998-1999 pollutant efficiencies were less than 20% of 1999-2000 efficiencies
	March 24, 1999 - June 11, 1999	74			35	4	11	11	34	
	1998-1999 Summary	**74**			**31**	**4**	**9**	**8**	**21**	
	1999-2000 Summary [1]	**100**	**3**	**5**	**57**	**16**	**32**	**21**	**66**	
	80% of 1999-2000 Efficiency				**45.6**	**12.8**	**25.6**	**16.8**	**52.8**	
	1999-2000 Summary Without Litter Removal[1]				**2**	**3**	**15**	**6**	**31**	
	1998-1999 Mean % Efficiency More Than 20% Lower Than 1999-2000 Mean % Efficiency				**YES**	**YES**	**YES**	**YES**	**YES**	
Rosemead MS StreamGuard DII	March 24, 1999 - June 8, 1999	99			4	2	2	1	5	Reject: At least two 1998-1999 pollutant efficiencies were less than 20% of 1999-2000 efficiencies
	1998-1999 Summary	**99**			**4**	**2**	**2**	**1**	**5**	
	1999-2000 Summary [1]	**92**	**5**	**5**	**4**	**1**	**7**	**3**	**3**	
	80% of 1999-2000 Efficiency				**3.2**	**0.8**	**5.6**	**2.4**	**2.4**	
	1999-2000 Summary Without Litter Removal[1]				**0**	**1**	**3**	**2**	**2**	
	1998-1999 Mean % Efficiency More Than 20% Lower Than 1999-2000 Mean % Efficiency				**NO**	**NO**	**YES**	**YES**	**NO**	
Foothill MS Fossil Filter DII	December 1998 - January 29, 1999	93			30	2	4	3	10	Reject: At least two 1998-1999 pollutant efficiencies were less than 20% of 1999-2000 efficiencies
	March 24, 1999 - April 8, 1999	88			19	1	2	1	37	
	April 8, 1999 - April 12, 1999	99			35	2	3	2	11	
	1998-1999 Summary	**95**			**28**	**2**	**3**	**2**	**19**	
	1999-2000 Summary [1]	**100**	**5**	**7**	**27**	**11**	**24**	**10**	**10**	
	80% of 1999-2000 Efficiency				**21.6**	**8.8**	**19.2**	**8**	**8**	
	1999-2000 Summary Without Litter Removal[1]				**19**	**7**	**19**	**7**	**7**	
	1998-1999 Mean % Efficiency More Than 20% Lower Than 1999-2000 Mean % Efficiency				**NO**	**YES**	**YES**	**YES**	**NO**	
Las Flores MS Fossil Filter DII	March 24, 1999 - June 11, 1999	90			64	26	32	23	59	Reject: Minimum number of storms not achieved
	1998-1999 Summary	**90**			**64**	**26**	**32**	**23**	**59**	
	1999-2000 Summary [1]	**96**	**6**	**5**	**41**	**8**	**11**	**6**	**7**	
	80% of 1999-2000 Efficiency				**32.8**	**6.4**	**8.8**	**4.8**	**5.6**	
	1999-2000 Summary Without Litter Removal[1]				**25**	**4**	**9**	**4**	**7**	
	1998-1999 Mean % Efficiency More Than 20% Lower Than 1999-2000 Mean % Efficiency				**NO**	**NO**	**NO**	**NO**	**NO**	
Rosemead MS Fossil Filter DII	December 1998 - January 29, 1999	62			31	15	17	12	7	Reject: At least two 1998-1999 pollutant efficiencies were less than 20% of 1999-2000 efficiencies
	March 24, 1999 - June 8, 1999	80			56	17	22	17	49	
	1998-1999 Summary	**80**			**44**	**16**	**20**	**15**	**28**	
	1999-2000 Summary [1]	**95**	**5**	**5**	**76**	**40**	**66**	**46**	**26**	
	80% of 1999-2000 Efficiency				**60.8**	**32**	**52.8**	**36.8**	**20.8**	
	1999-2000 Summary Without Litter Removal[1]				**39**	**19**	**46**	**17**	**5**	
	1998-1999 Mean % Efficiency More Than 20% Lower Than 1999-2000 Mean % Efficiency				**YES**	**YES**	**YES**	**YES**	**NO**	

[1] Based on Aggregate Method

Median % Storm Capture for All 1998-1999 Cases (Goal >= 80%)	**83**	**Mean % Storm Capture for All 1998-1999 Cases (Goal >= 75%)**	**77**
Median % Storm Capture for All 1999-2000 Cases (Goal >= 80%)	**98**	**Mean % Storm Capture for All 1999-2000 Cases (Goal >= 75%)**	**95**

Figure 1-1: Map of Study Area, Caltrans District 7 Los Angeles

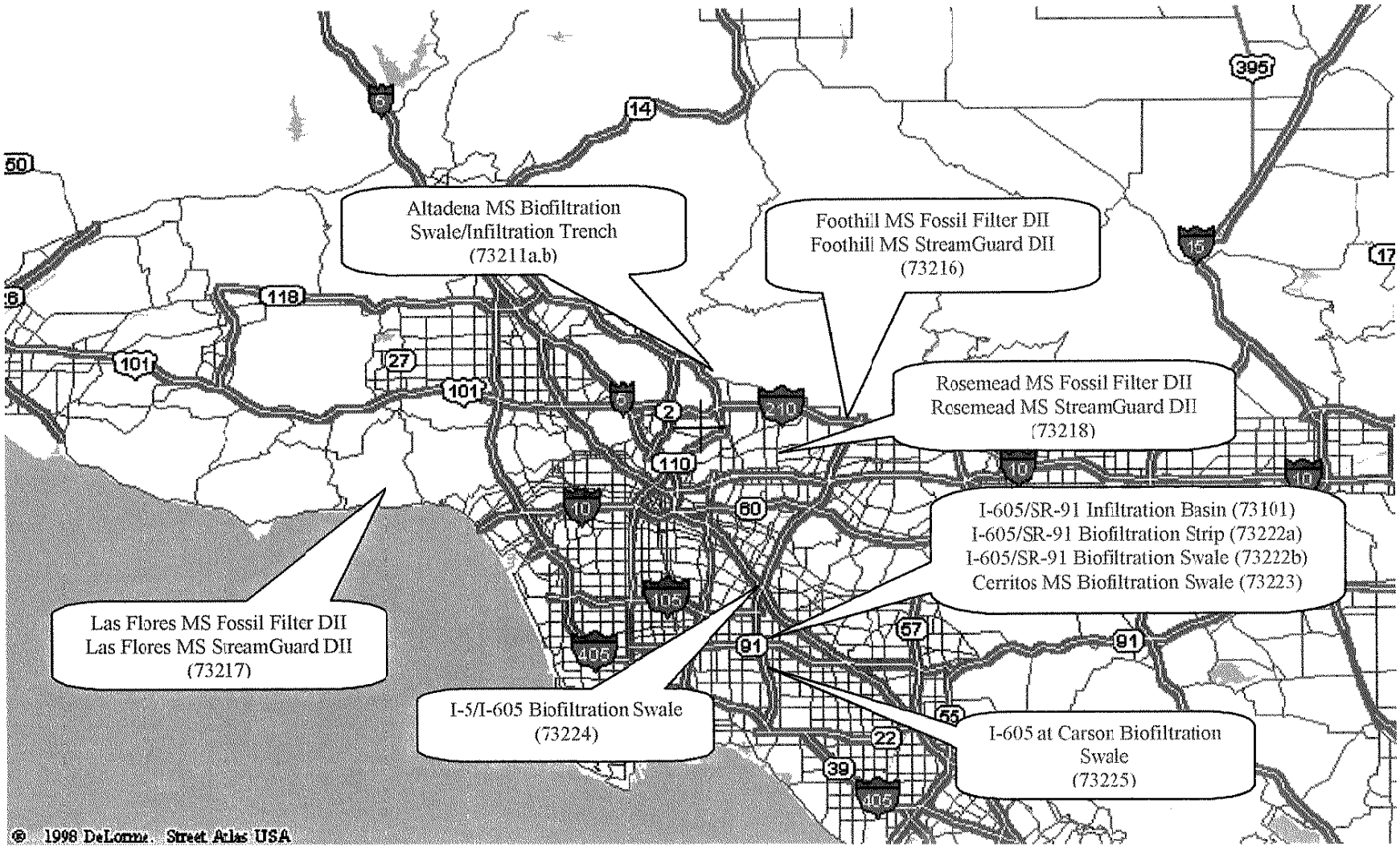
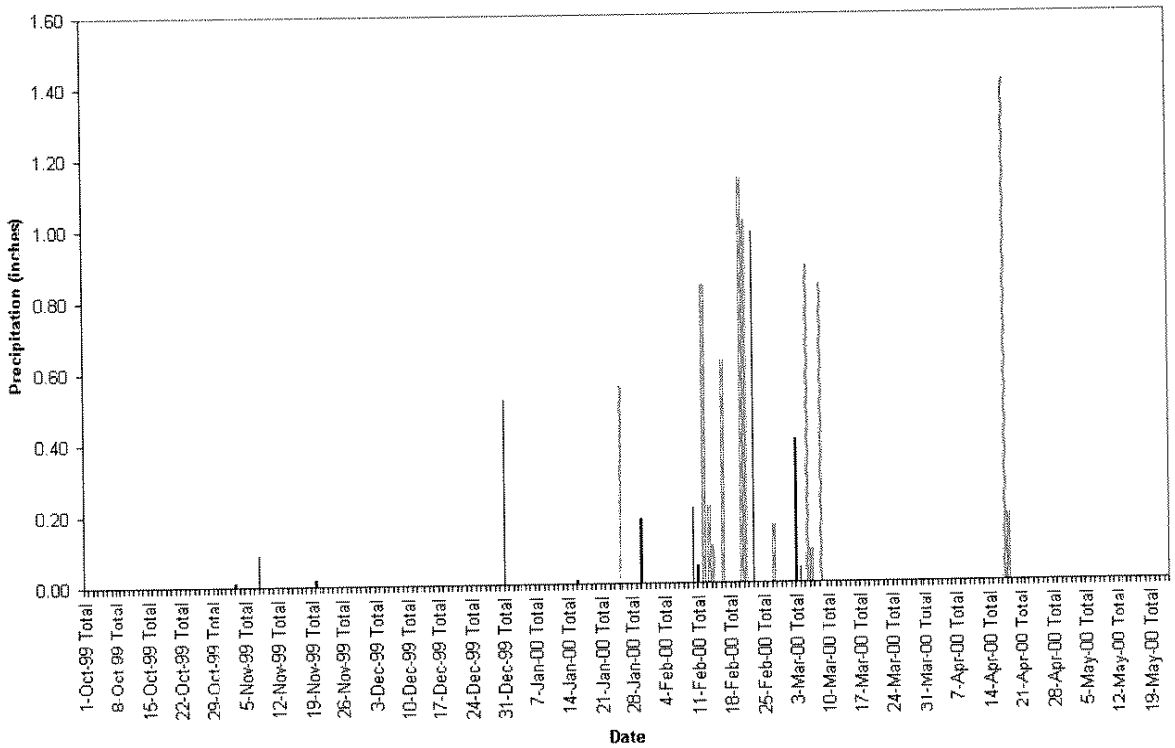


Figure 1-2a: Daily Precipitation Totals for Altadena Maintenance Station[1]

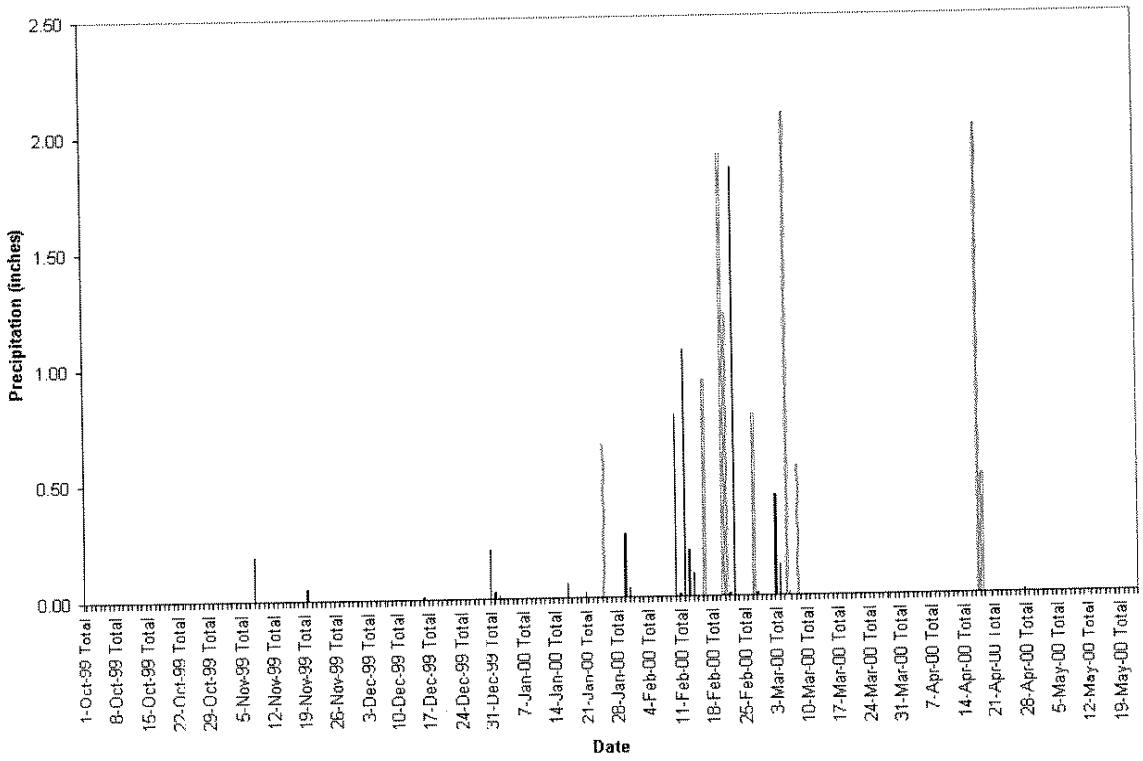


(1) Totals obtained from onsite rain gauge

Thick gray lines indicate events for which monitoring was conducted.

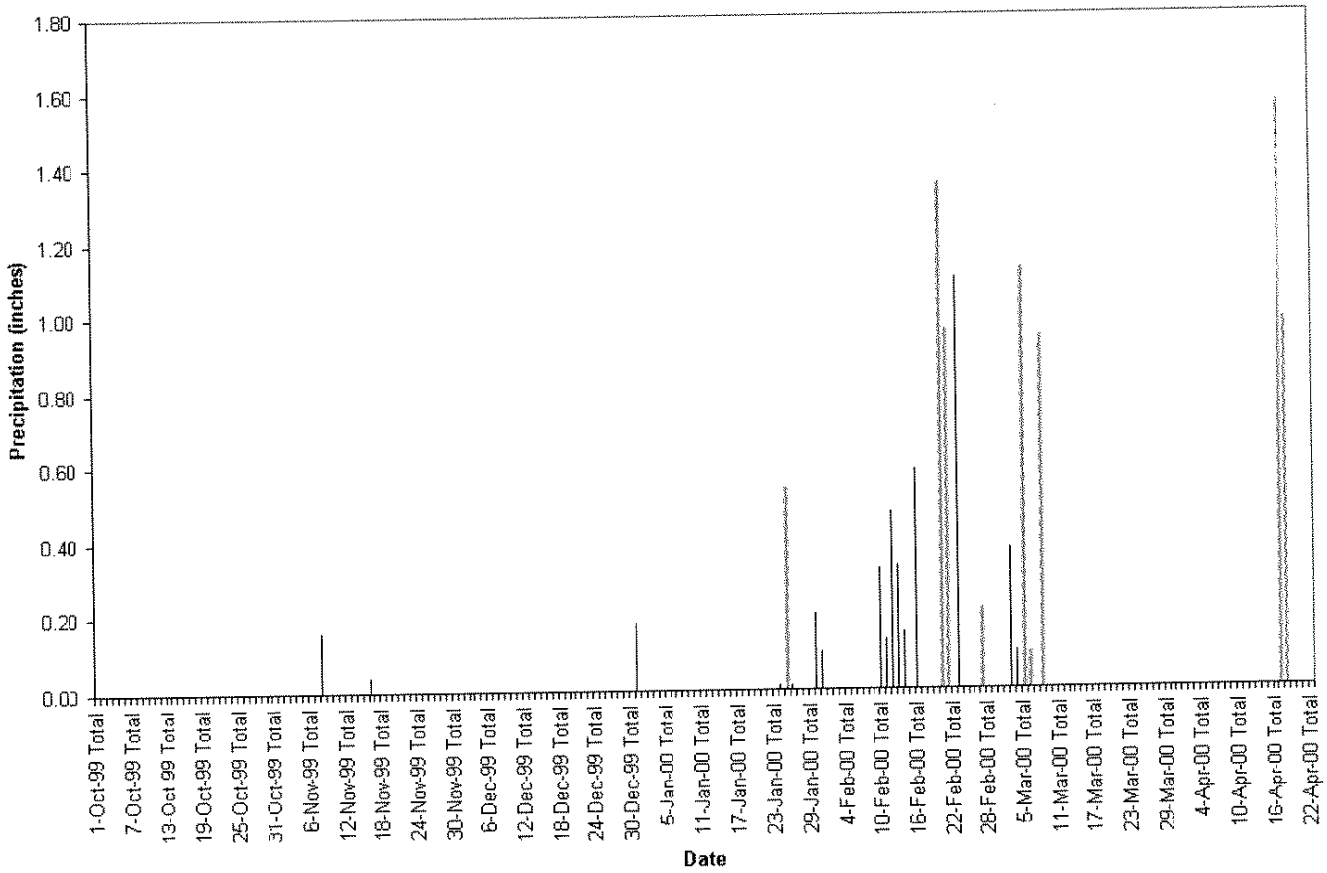
Thin black lines indicate events for which neither samples nor empirical observations were taken.

Figure 1-2b: Daily Precipitation Totals for I-605/SR-91, I-605 at Carson, and Cerritos Maintenance Station[1]



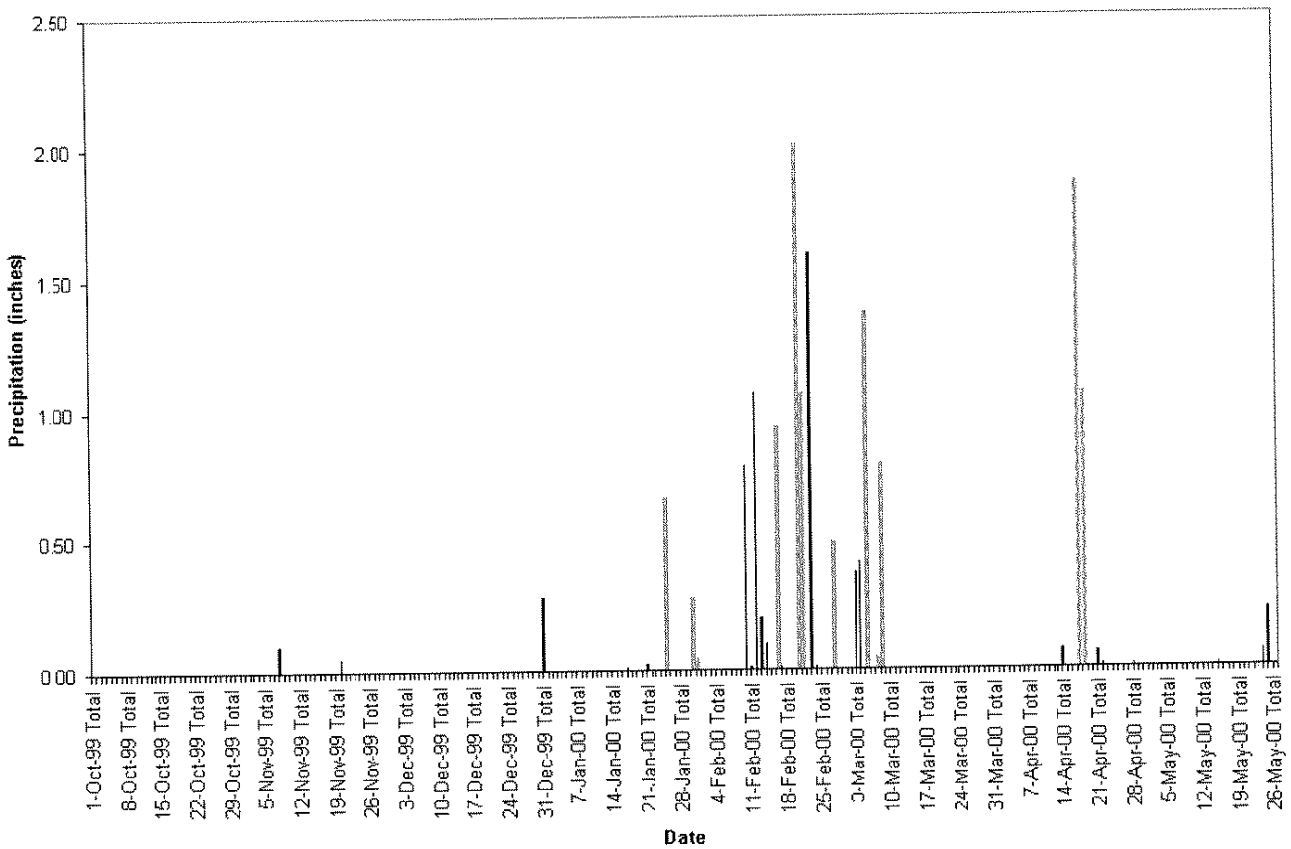
(1) Totals obtained from onsite rain gauge
Thick gray lines indicate events for which monitoring was conducted.
Thin black lines indicate events for which neither samples nor empirical observations were taken.

Figure 1-2c: Daily Precipitation Totals for I-5/I-605(1)



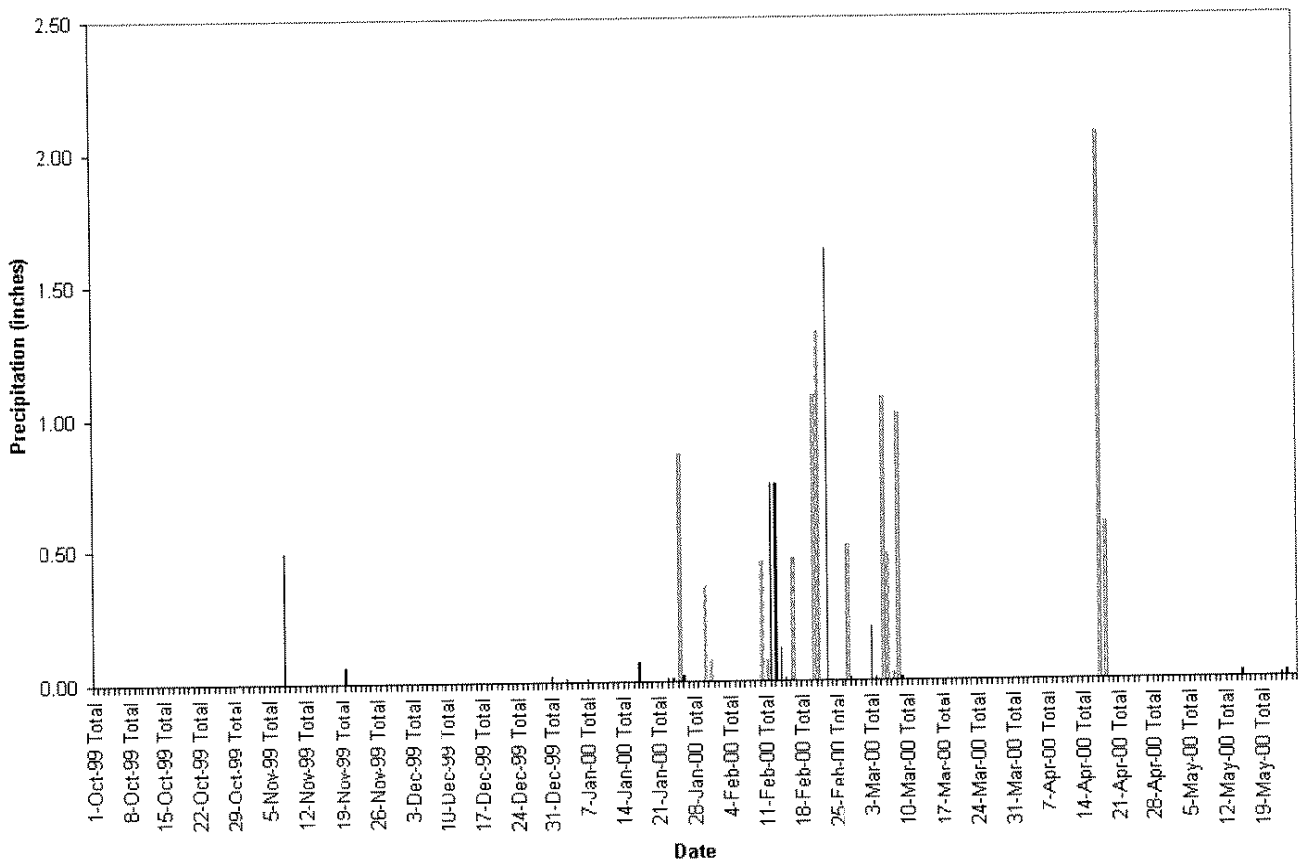
(1) Totals obtained from onsite rain gauge
Thick gray lines indicate events for which monitoring was conducted.
Thin black lines indicate events for which neither samples nor empirical observations were taken.

Figure 1-2d: Daily Precipitation Totals for Foothill Maintenance Station[1]



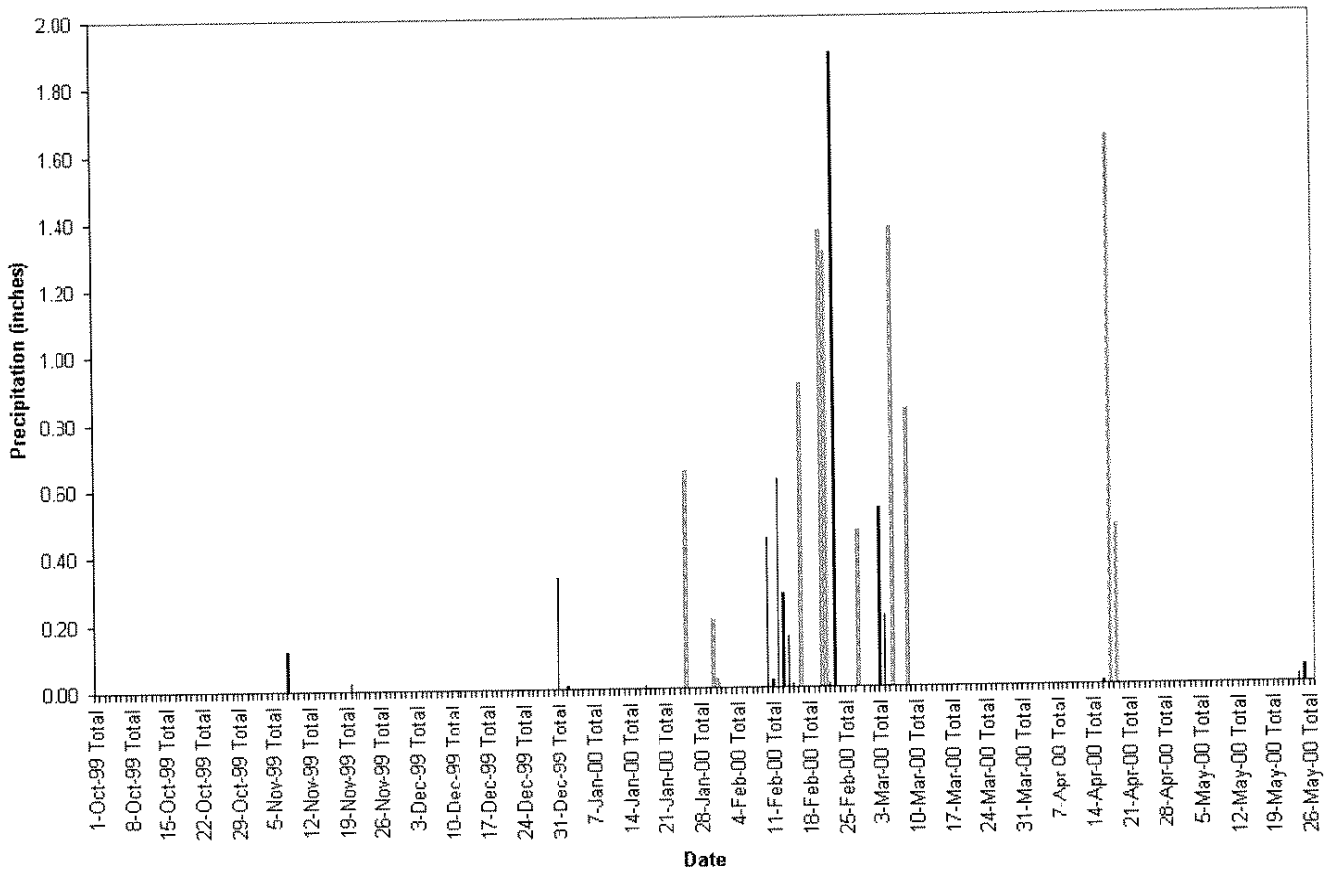
(1) Totals obtained from onsite rain gauge
Thick gray lines indicate events for which monitoring was conducted.
Thin black lines indicate events for which neither samples nor empirical observations were taken.

Figure 1-2e: Daily Precipitation Totals for Las Flores Maintenance Station[1]



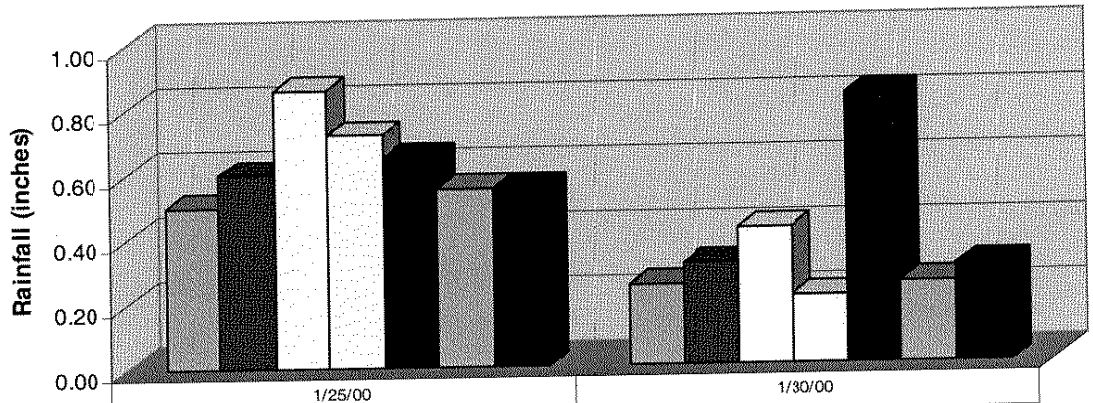
(1) Totals obtained from onsite rain gauge
Thick gray lines indicate events for which monitoring was conducted.
Thin black lines indicate events for which neither samples nor empirical observations were taken.

Figure 1-2f: Daily Precipitation Totals for Rosemead Maintenance Station(1)



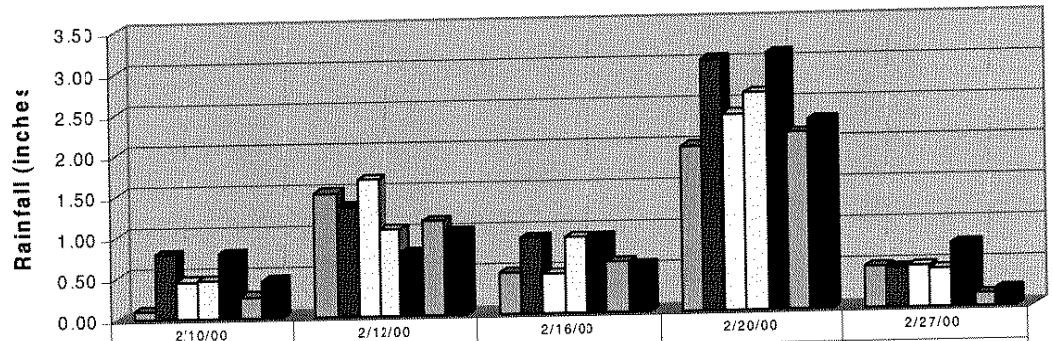
(1) Totals obtained from onsite rain gauge
Thick gray lines indicate events for which monitoring was conducted.
Thin black lines indicate events for which neither samples nor empirical observations were taken.

Figure 1-3a: Monitored Event Rainfall Totals - January 2000



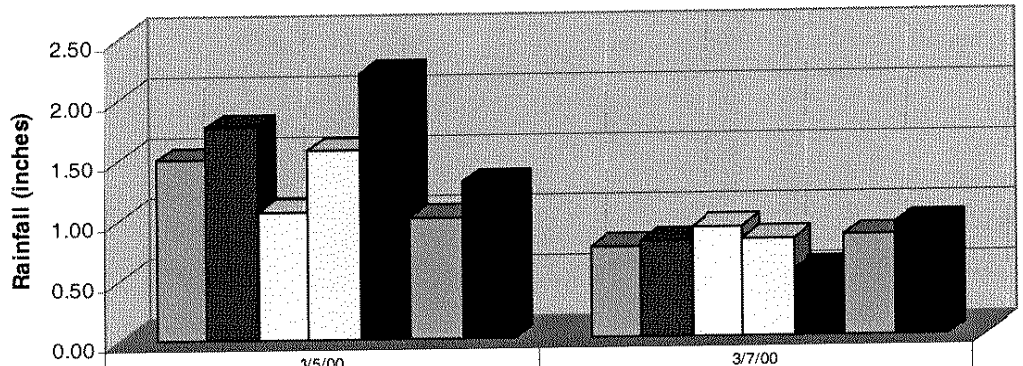
	1/25/00	1/30/00
Predicted Rainfall	0.50	0.25
Foothill Maintenance Station (DIIs)	0.60	0.31
Las Flores Maintenance Station (CIIs)	0.86	0.42
Rosemead Maintenance Station (DIIs)	0.72	0.21
Altadena Maintenance Station (Strp/IT)	0.65	0.83
Cerritos Maintenance Station (Swale), I-605/SR-91 (Swale, Strip, and IB), I-605 @ Carson (Swale)	0.55	0.25
I-5/I-605 (Swale)	0.55	0.30

Figure 1-3b: Monitored Event Rainfall Totals - February 2000



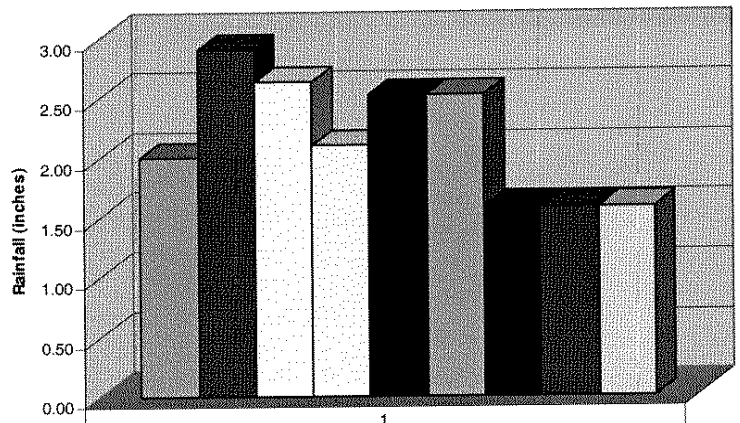
	2/10/00	2/12/00	2/16/00	2/20/00	2/27/00
Predicted Rainfall	0.10	1.50	0.50	2.00	0.50
Foothill Maintenance Station (DIIs)	0.79	1.34	0.92	3.05	0.48
Las Flores Maintenance Station (DIIs)	0.45	1.67	0.48	2.38	0.50
Rosemead Maintenance Station (DIIs)	0.46	1.05	0.92	2.64	0.46
Altadena Maintenance Station (Strip/IT)	0.79	0.76	0.92	3.11	0.77
Cerritos Maintenance Station (Swale), I-605/SR-91 (Swale, Strip, and IB), I-605 @ Carson (Swale)	0.26	1.14	0.62	2.14	0.16
I-5/I-605 (Swale)	0.45	1.01	0.58	2.29	0.21

Figure 1-3c: Monitored Event Rainfall Totals - March 2000



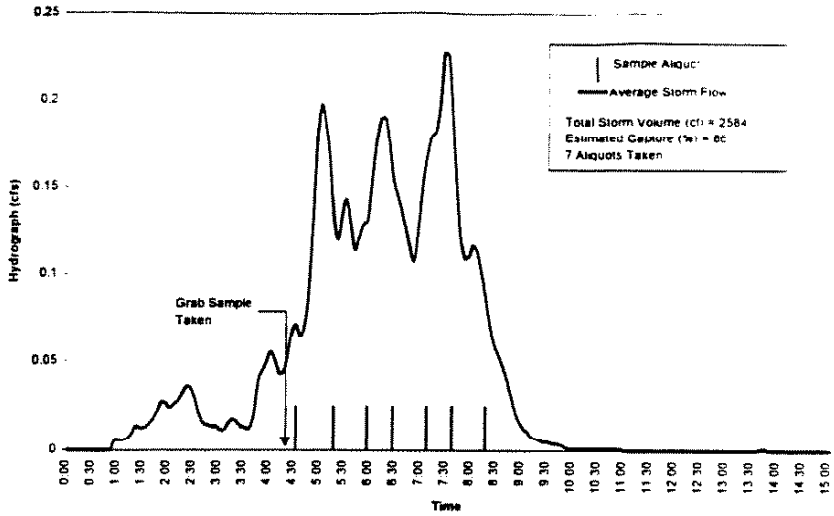
	3/5/00	3/7/00
Predicted Rainfall	1.50	0.75
Foothill Maintenance Station (DIIs)	1.77	0.79
Las Flores Maintenance Station (DIIs)	1.06	0.91
Rosemead Maintenance Station (DIIs)	1.57	0.81
Altadena Maintenance Station (Strip/IT)	2.21	0.55
Cerritos Maintenance Station (Swale), I-605/SR-91 (Swale, Strip, and IB), I-605 @ Carson (Swale)	1.01	0.83
I-5/I-605 (Swale)	1.30	0.93

Figure 1-3d: Monitored Event Rainfall Totals - April 2000

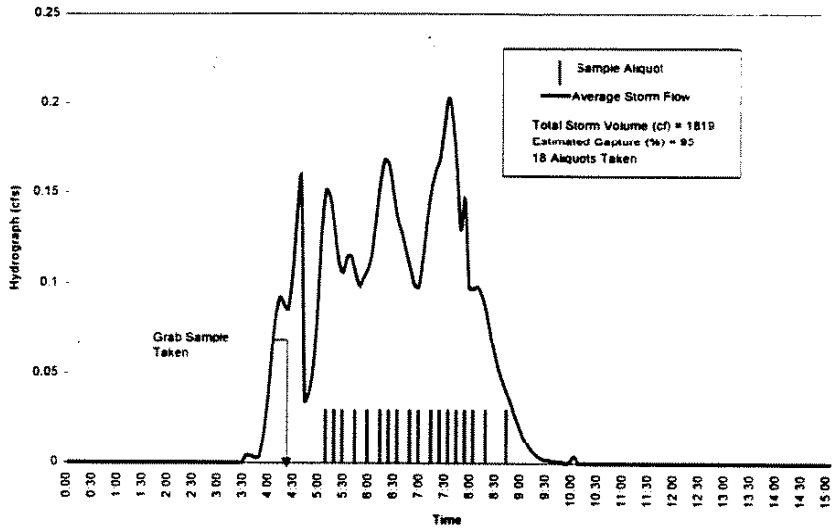


	1
Predicted Rainfall	2.00
Foothill Maintenance Station (Dils)	2.9
Las Flores Maintenance Station (Dils)	2.63
Rosemead Maintenance Station (Dils)	2.1
Altadena Maintenance Station (Strip/IT)	2.52
I-5/I-605 (Swale)	2.52
Carritos Maintenance Station (Swale), I-605/SR-91 (Swale, Strip, and IB), I-605 @ Carson (Swale)	1.58
I-605/SR-91 (Swale, Strip, and IB)	1.58
I-605 @ Carson (Swale)	1.58

Influent



Effluent



Cumulative Rainfall

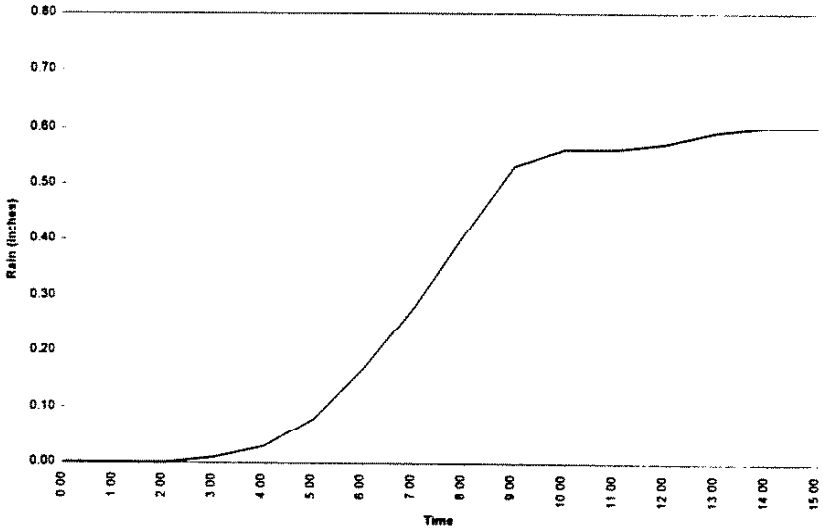
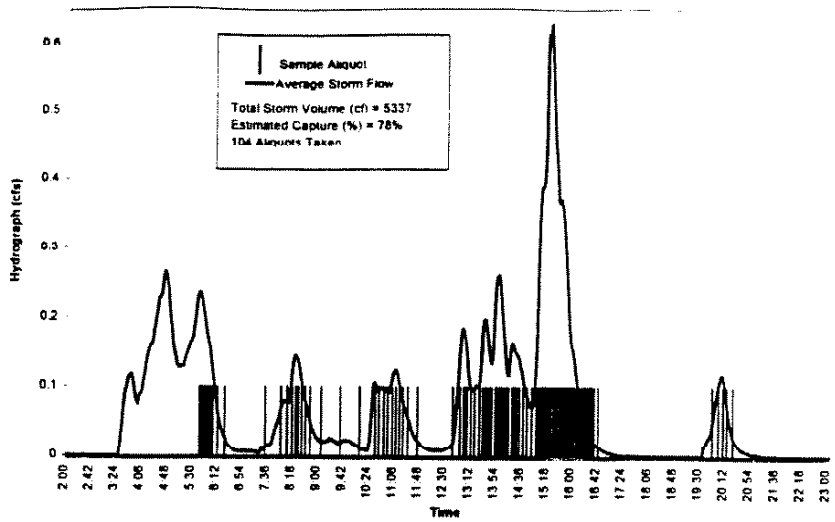
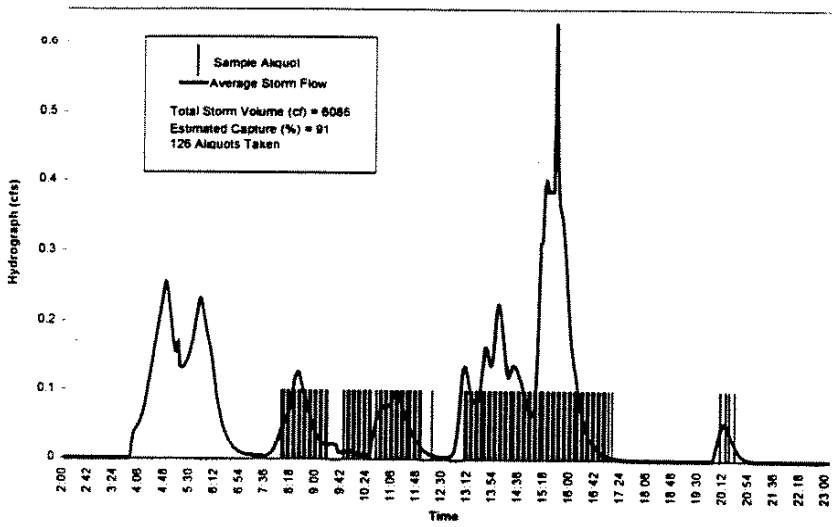


Figure 1-4a: Influent and Effluent Hydrograph, and Cumulative Rainfall at the Altadena MS Biofiltration Strip for Event 1 on January 25, 2000

Influent



Effluent



Cumulative Rainfall

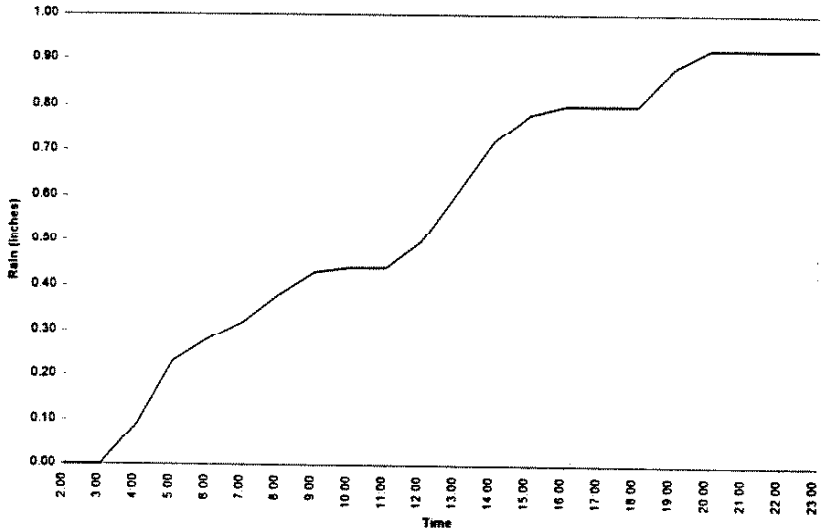
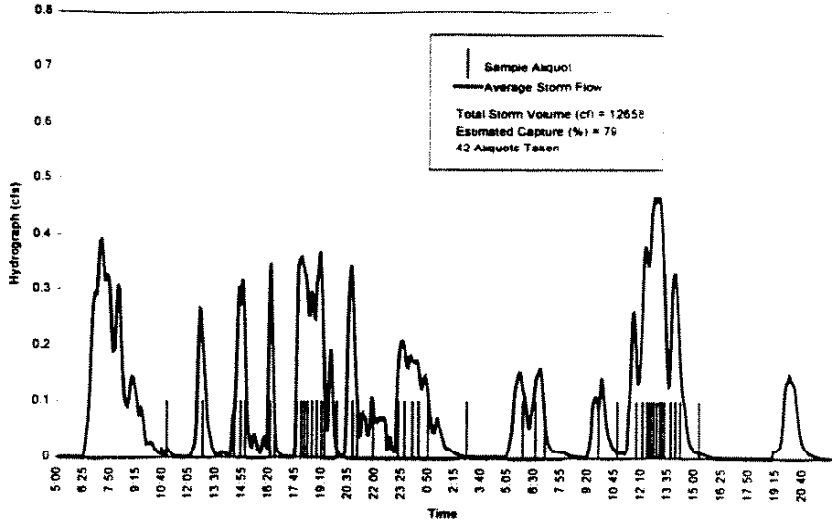
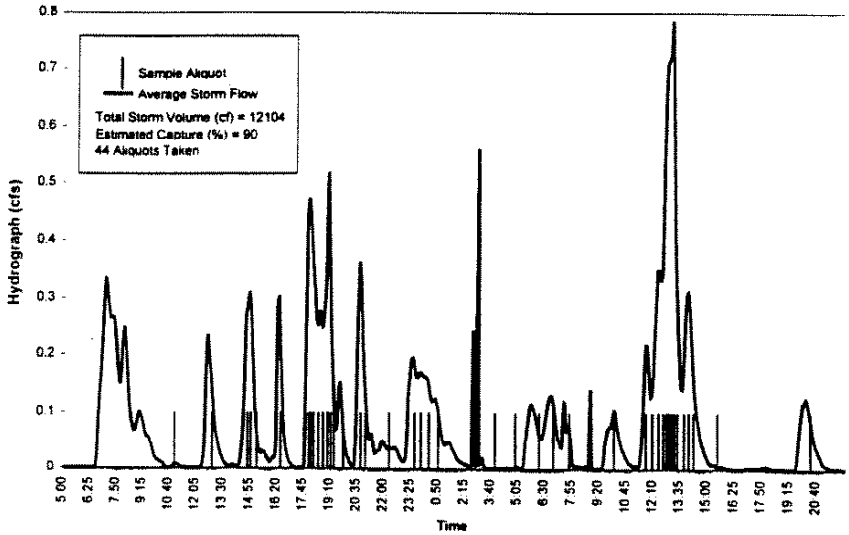


Figure 1-4b: Influent and Effluent Hydrograph, and Cumulative Rainfall at the Altadena MS Biofiltration Strip for Event 4 on February 16, 2000

Influent



Effluent



Cumulative Rainfall

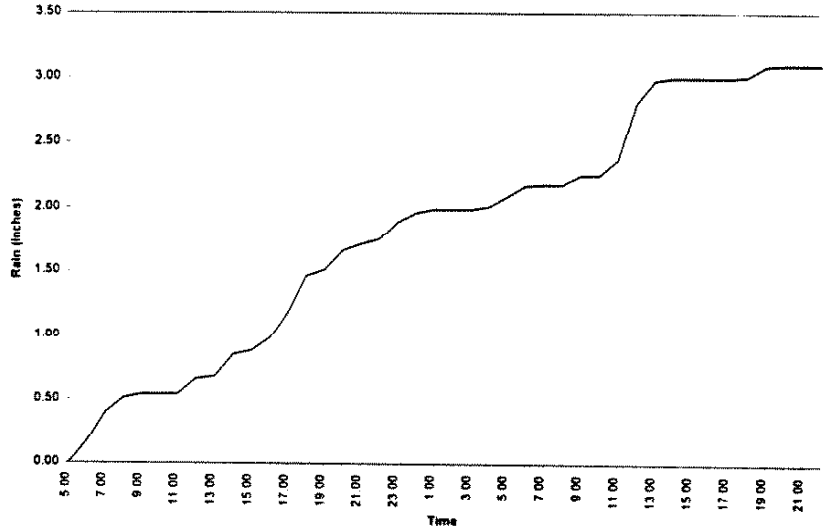
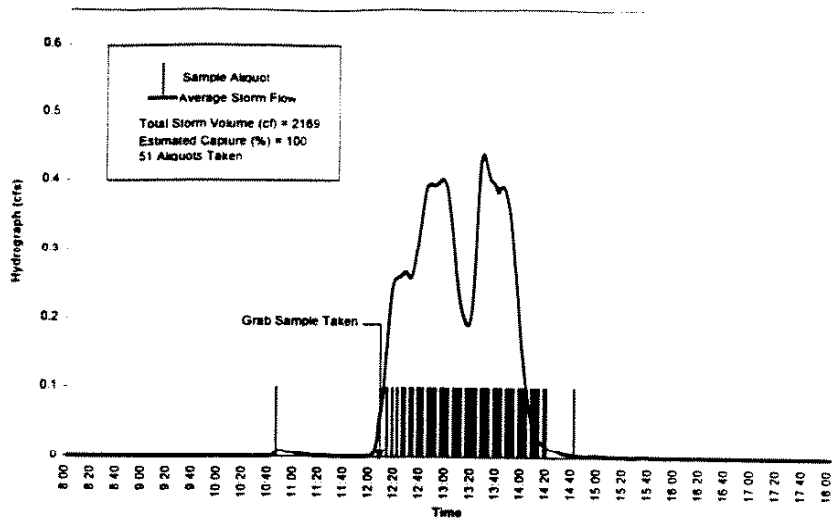
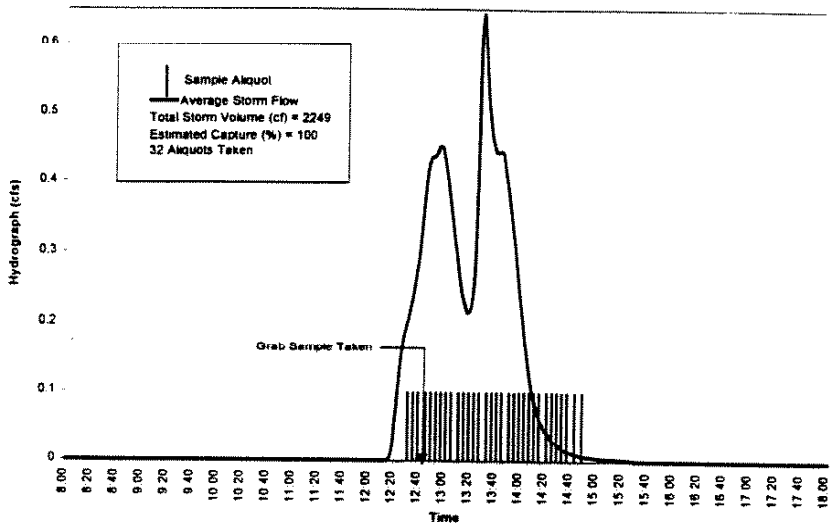


Figure 1-4c: Influent and Effluent Hydrograph, and Cumulative Rainfall at the Altadena MS Biofiltration Strip for Event 5 on February 20-21, 2000.

Influent



Effluent



Cumulative Rainfall

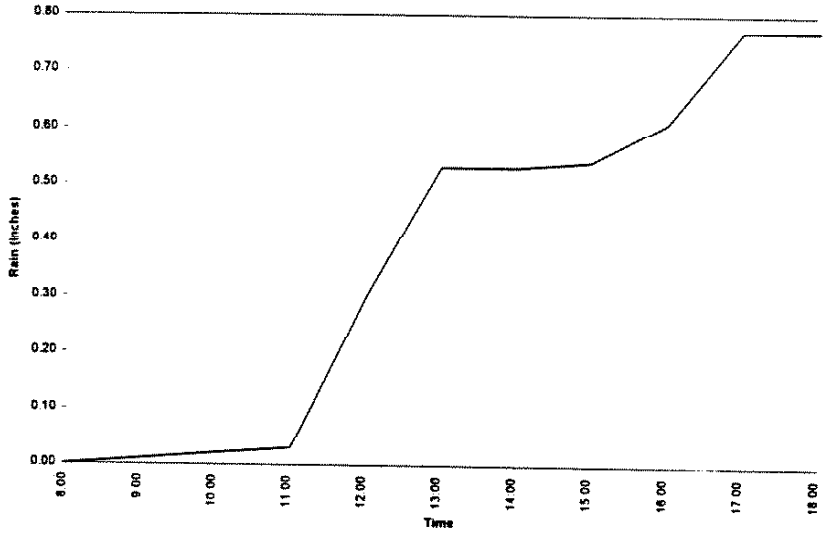
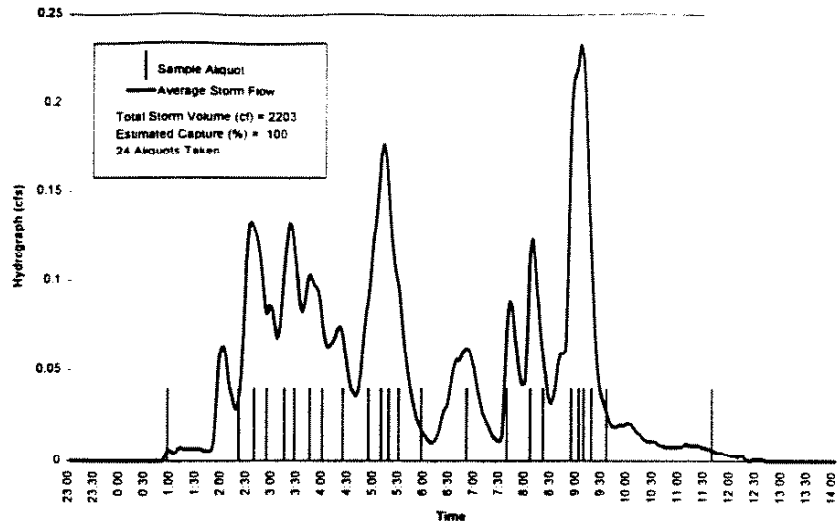
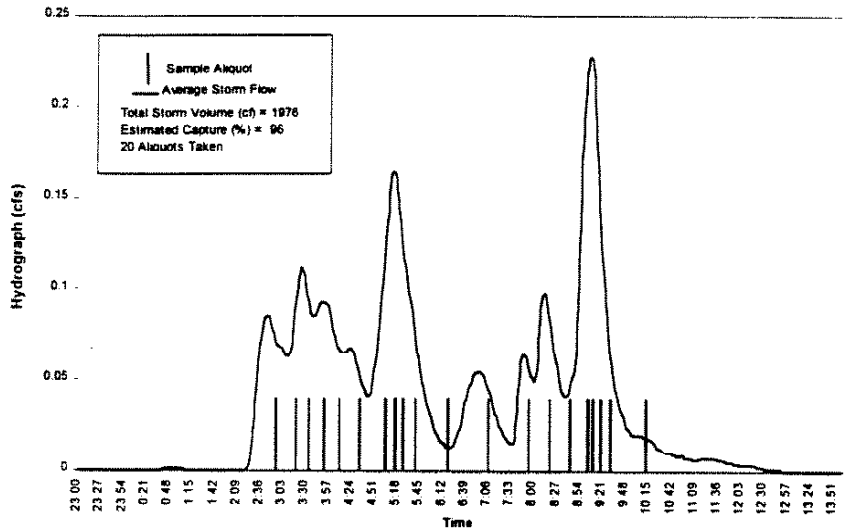


Figure 1-4d: Influent and Effluent Hydrograph, and Cumulative Rainfall at the Altadena MS Biofiltration Strip for Event 6 on February 27, 2000

Influent



Effluent



Cumulative Rainfall

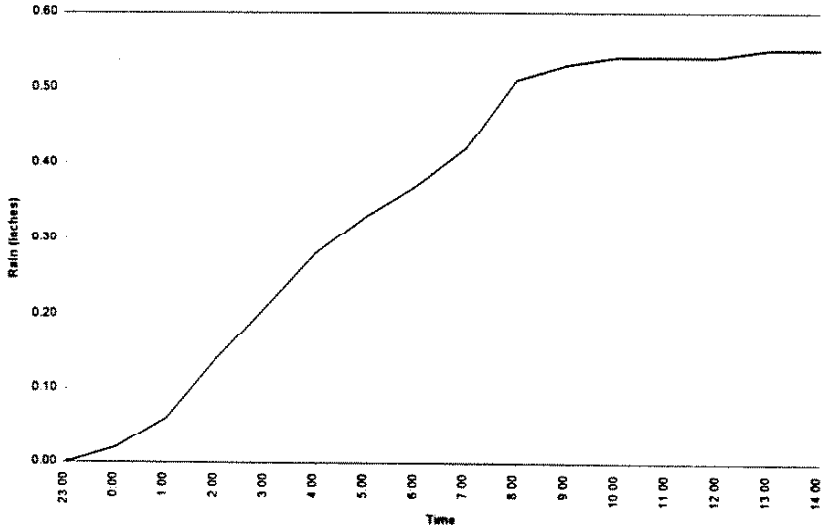
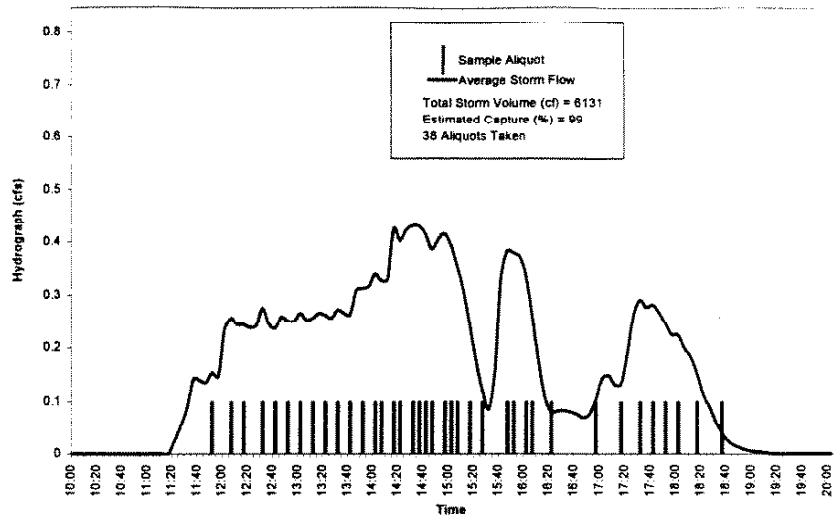
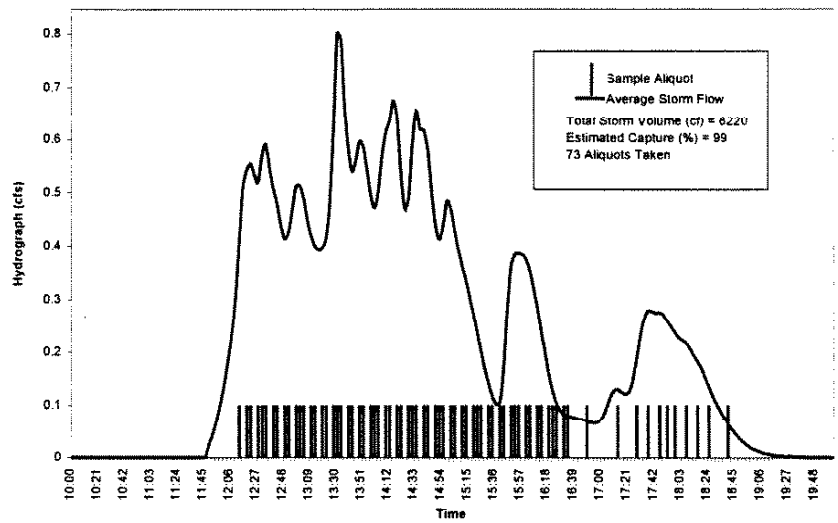


Figure 1-4e: Influent and Effluent Hydrograph, and Cumulative Rainfall at the Altadena MS Biofiltration Strip for Event 7 on March 8, 2000

Influent



Effluent



Cumulative Rainfall

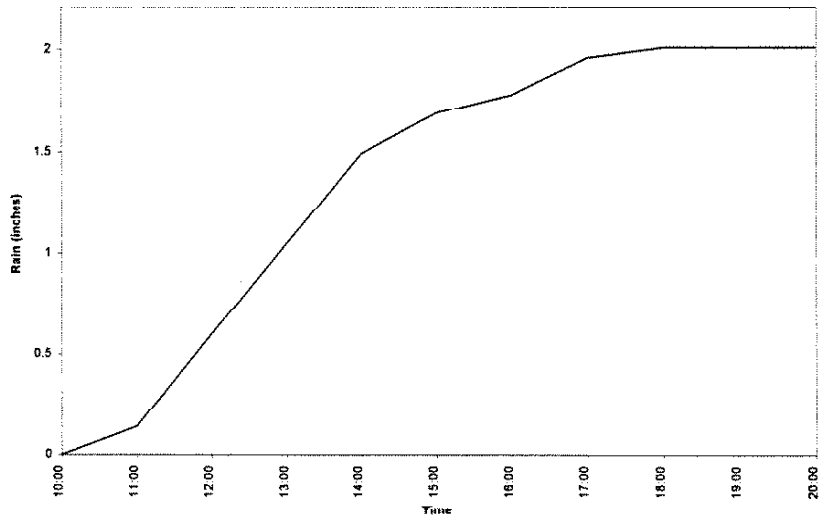
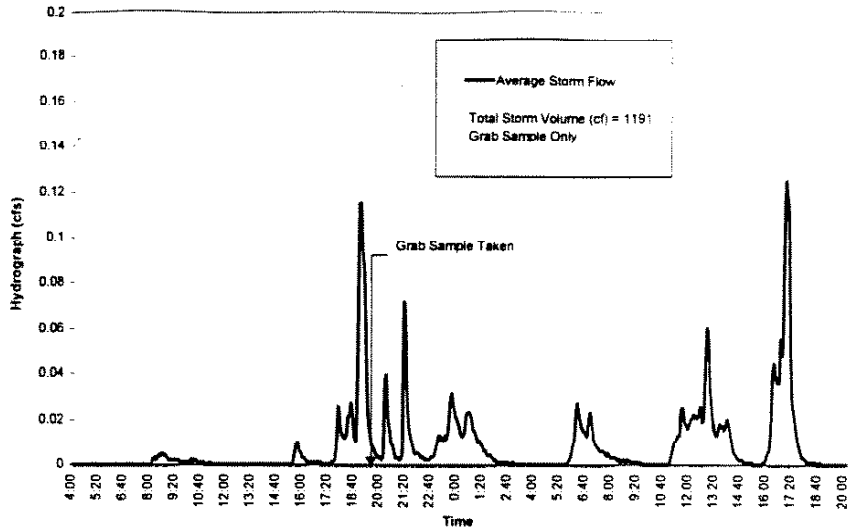
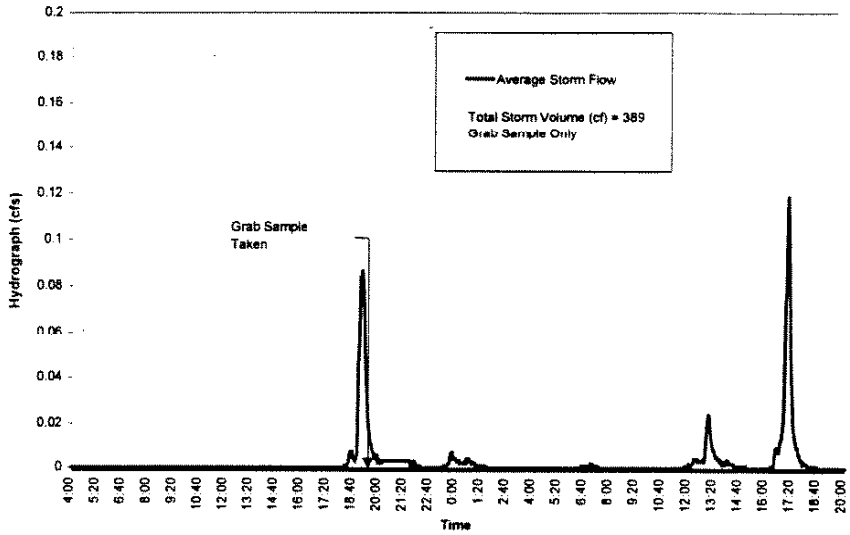


Figure 1-4f: Influent and Effluent Hydrograph, and Cumulative Rainfall at the Altadena MS Biofiltration Strip for Event 8 on April 17-18, 2000

Control



Effluent



Cumulative Rainfall

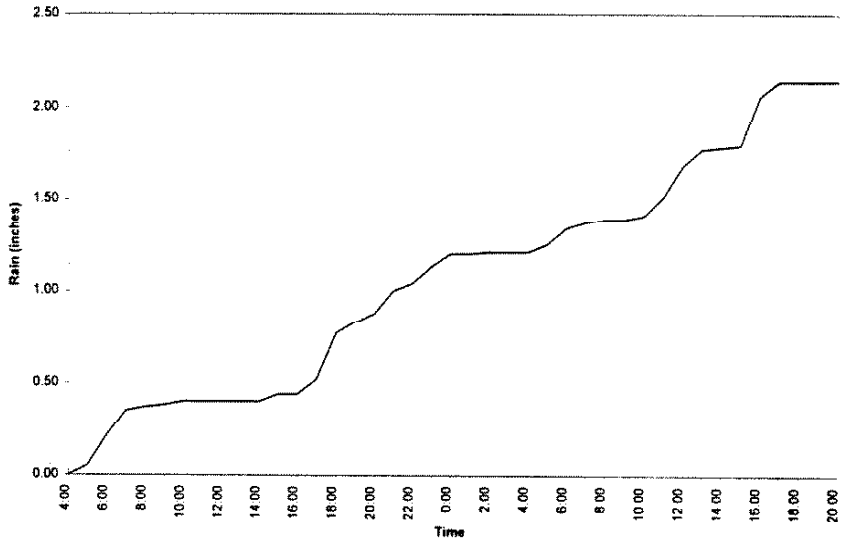
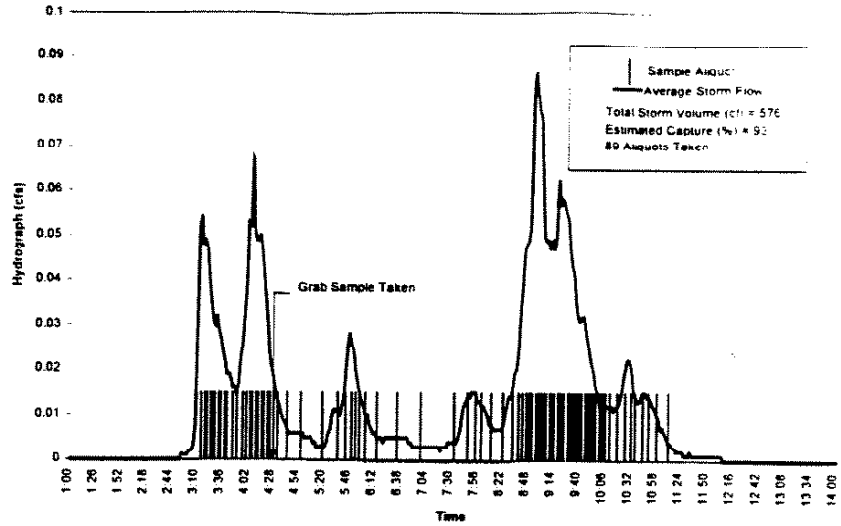
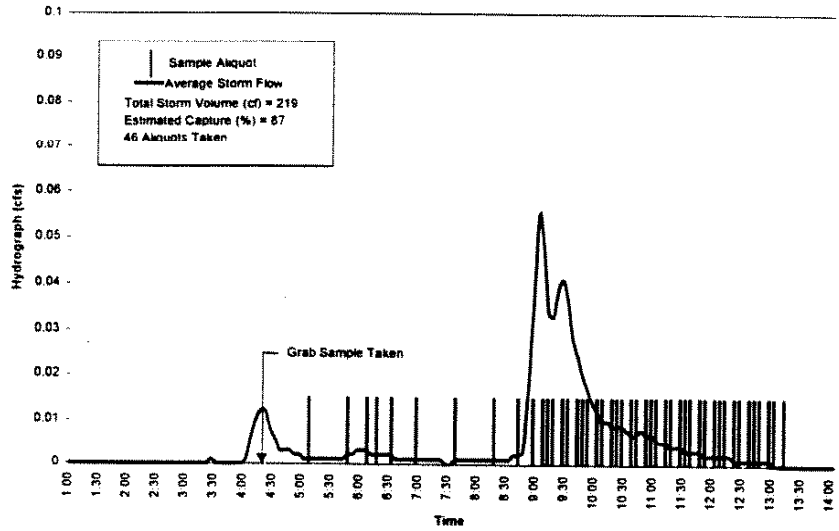


Figure 1-5a: Control and Effluent Hydrograph, and Cumulative Rainfall at the I-605/SR-91 Biofiltration Strip for Event 5 on February 20-21, 2000 (Grab Sample Only)

Control



Effluent



Cumulative Rainfall

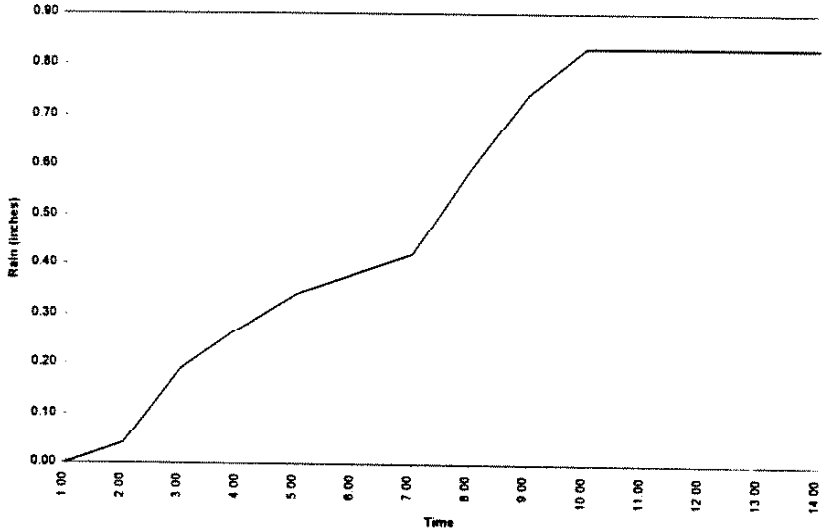
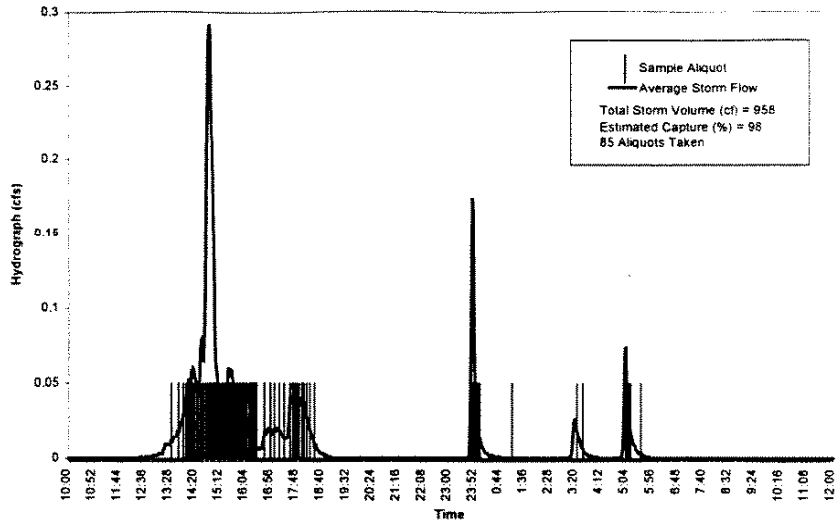
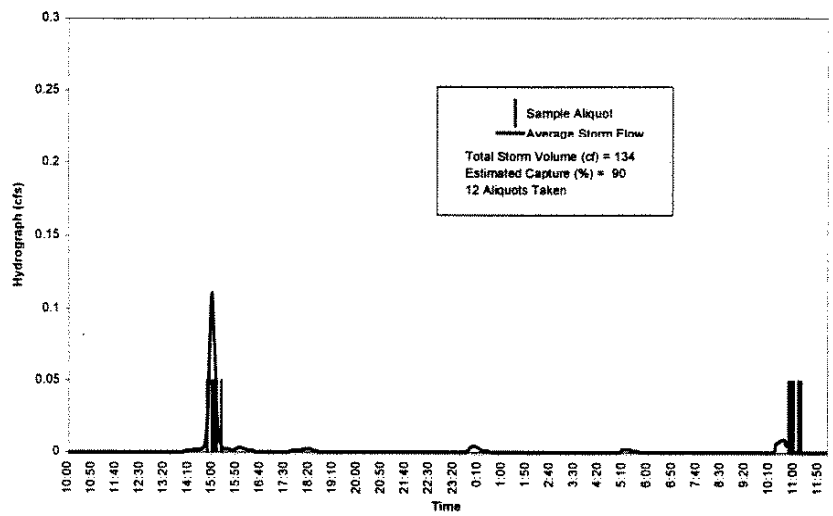


Figure 1-5b: Control and Effluent Hydrograph, and Cumulative Rainfall at the I-605/SR-91 Biofiltration Strip for Event 7 on March 8, 2000

Influent



Effluent



Cumulative Rainfall

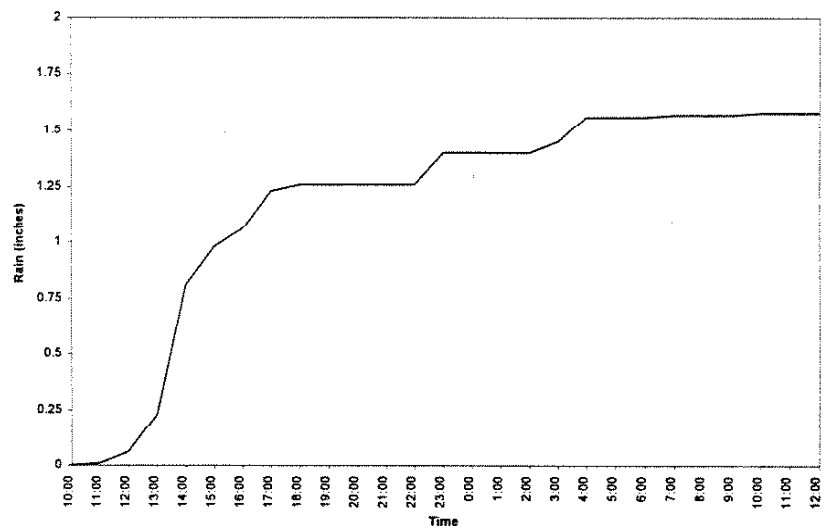
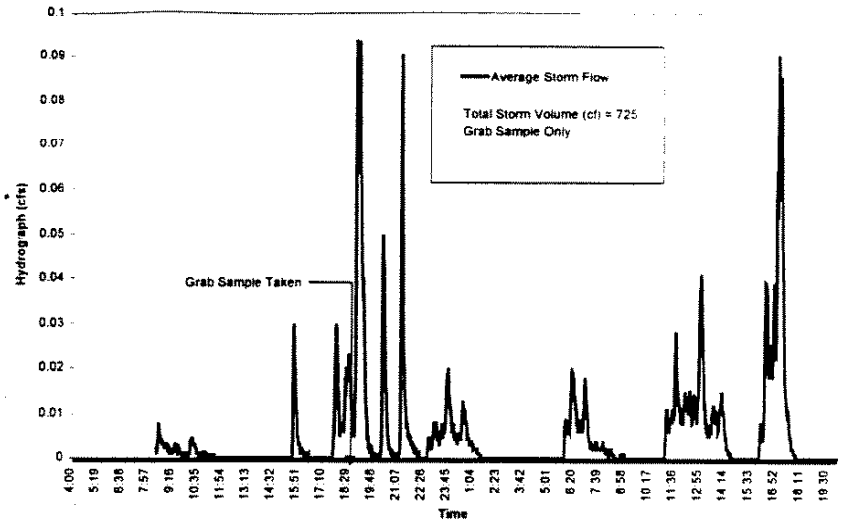
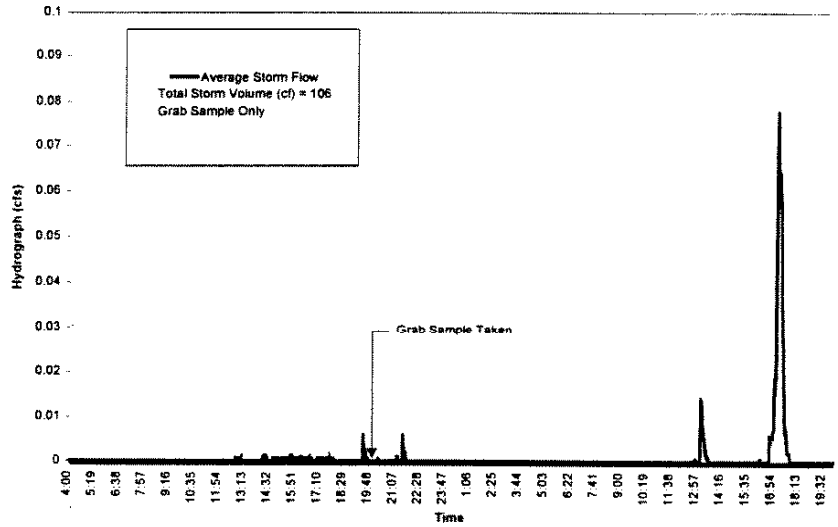


Figure 1-5c: Influent and Effluent Hydrograph, and Cumulative Rainfall at the I-605/SR-91 Biofiltration Strip for Event 8 on April 17-18, 2000

Influent



Effluent



Cumulative Rainfall

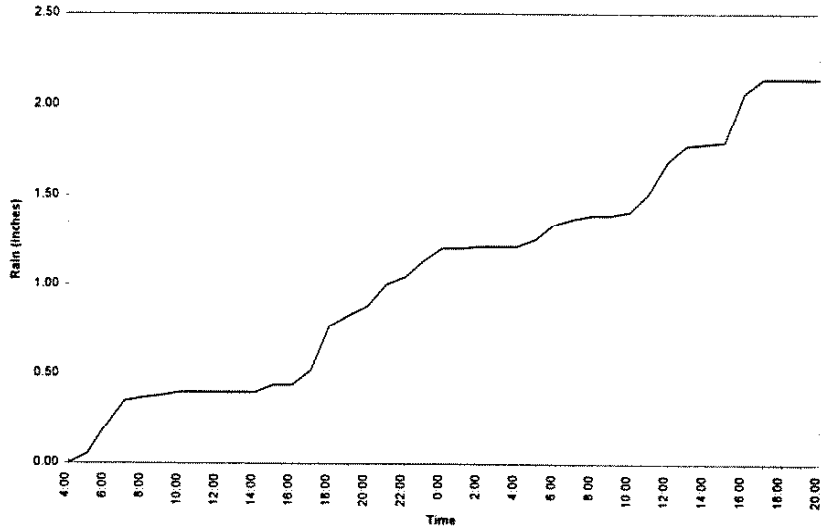
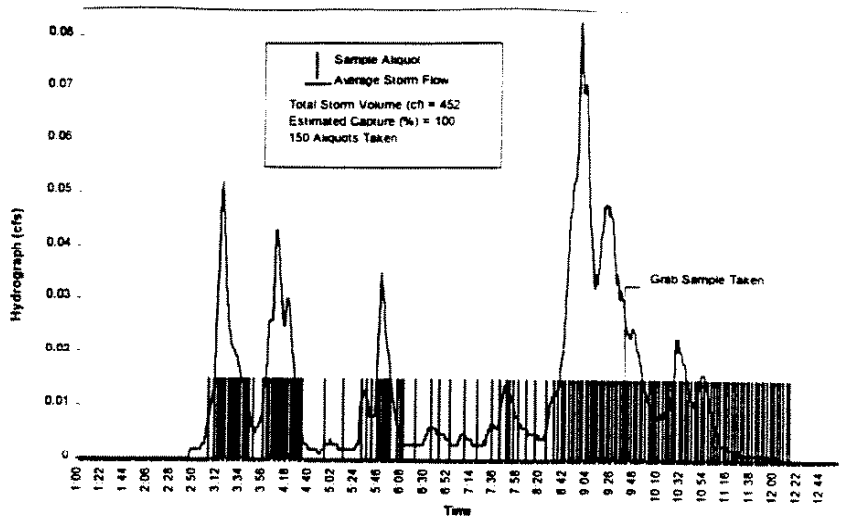
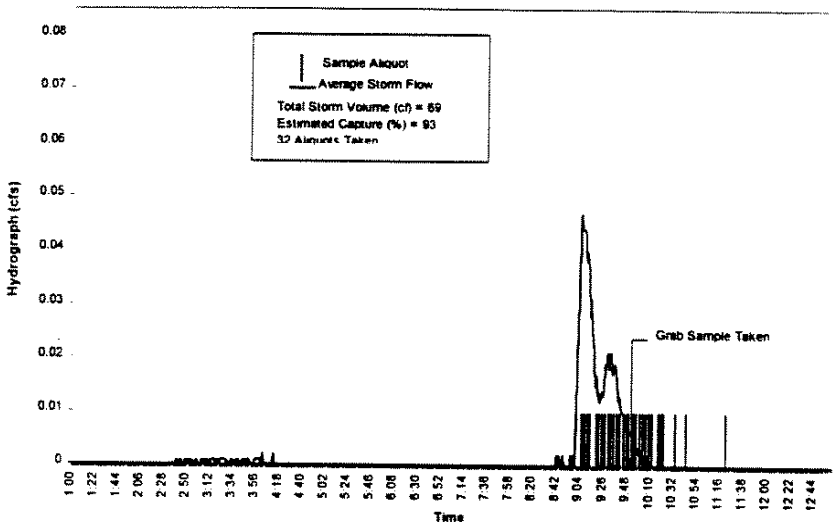


Figure 1-6a: Influent and Effluent Hydrograph, and Cumulative Rainfall at the I-605/SR-91 Swale for Event 5 on February 20-21, 2000 (Grab Sample Only)

Influent



Effluent



Cumulative Rainfall

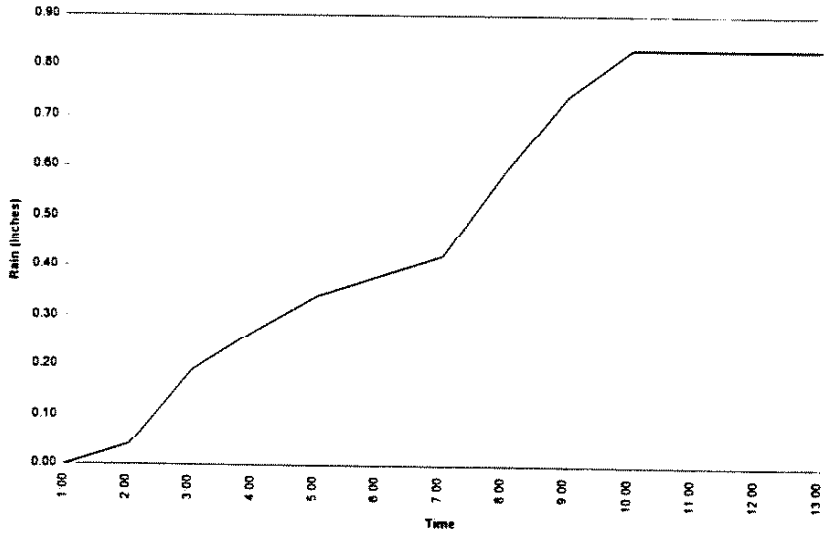
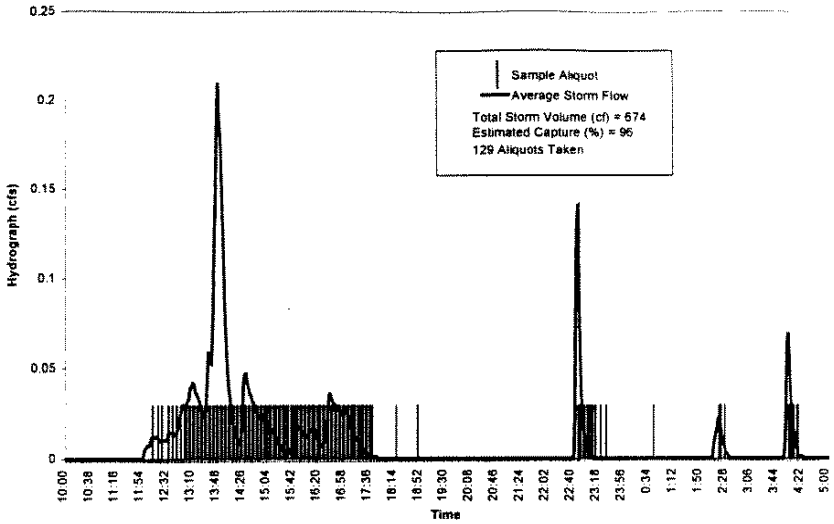
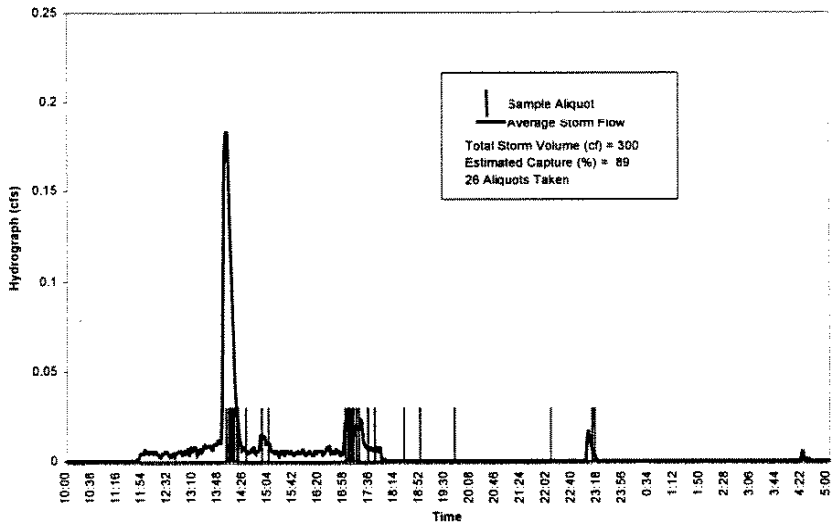


Figure 1-6b: Influent and Effluent Hydrograph, and Cumulative Rainfall at the I-605/SR-91 Swale for Event 7 on March 8, 2000

Influent



Effluent



Cumulative Rainfall

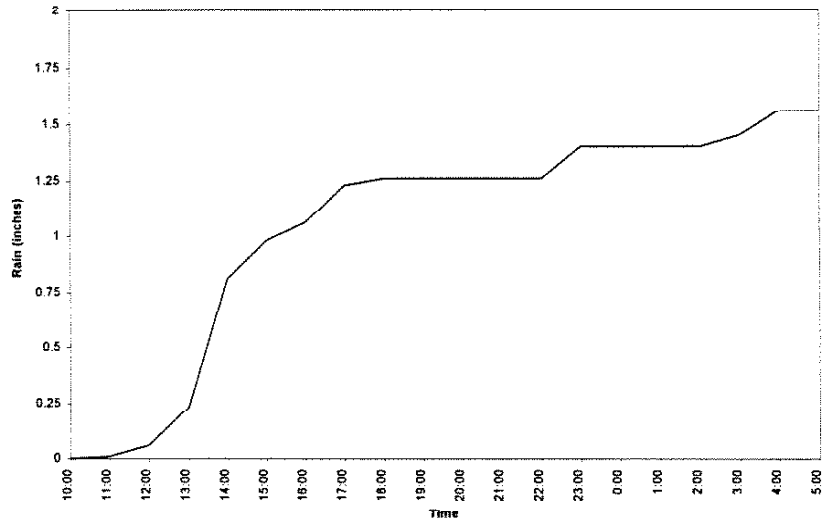
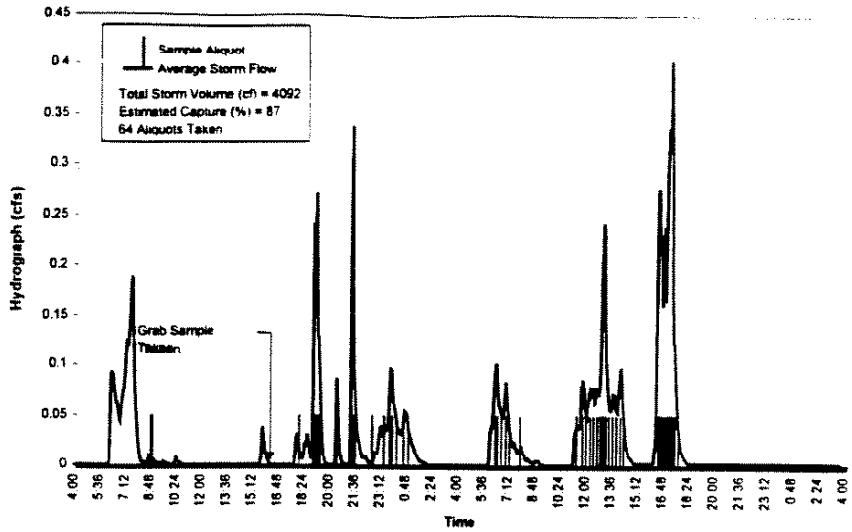
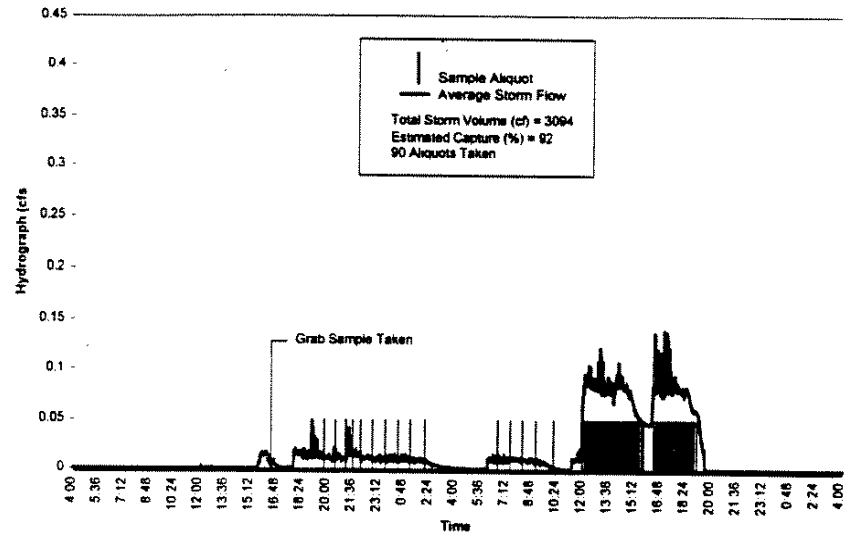


Figure 1-6c: Influent and Effluent Hydrograph, and Cumulative Rainfall at the I-605/SR-91 Swale for Event 8 on April 17-18, 2000

Influent



Effluent



Cumulative Rainfall

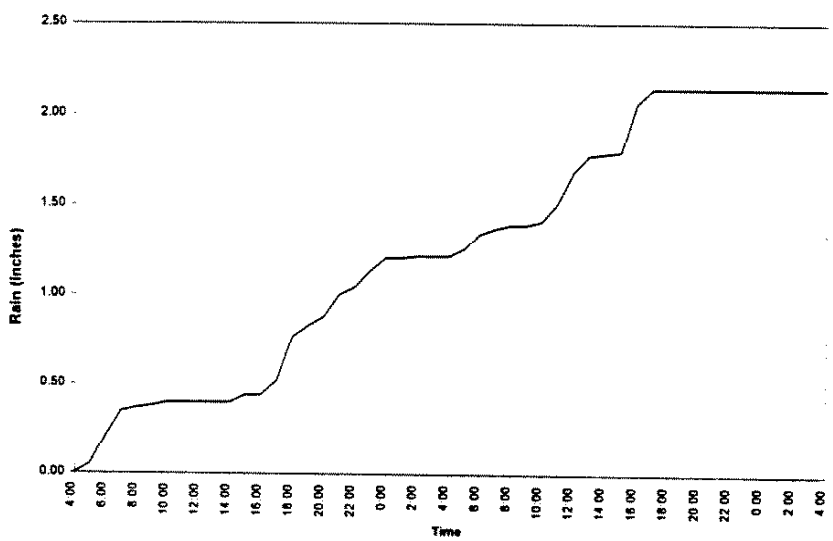
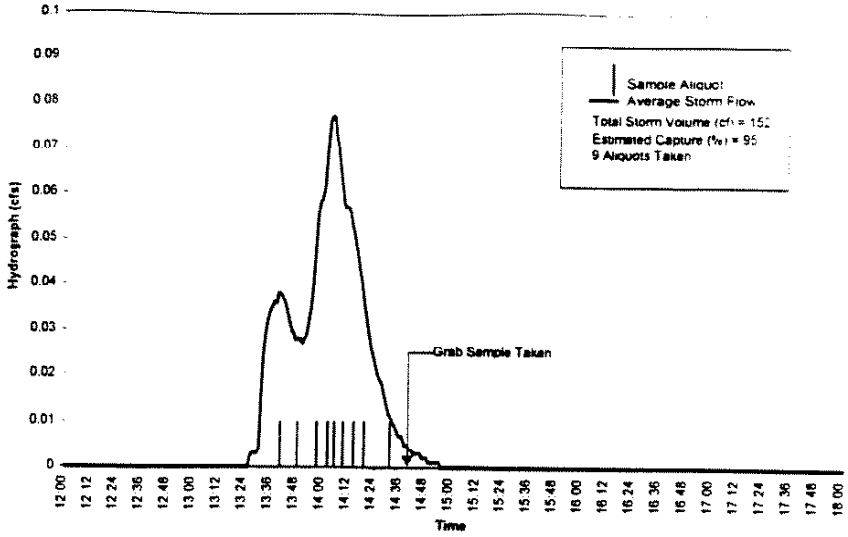
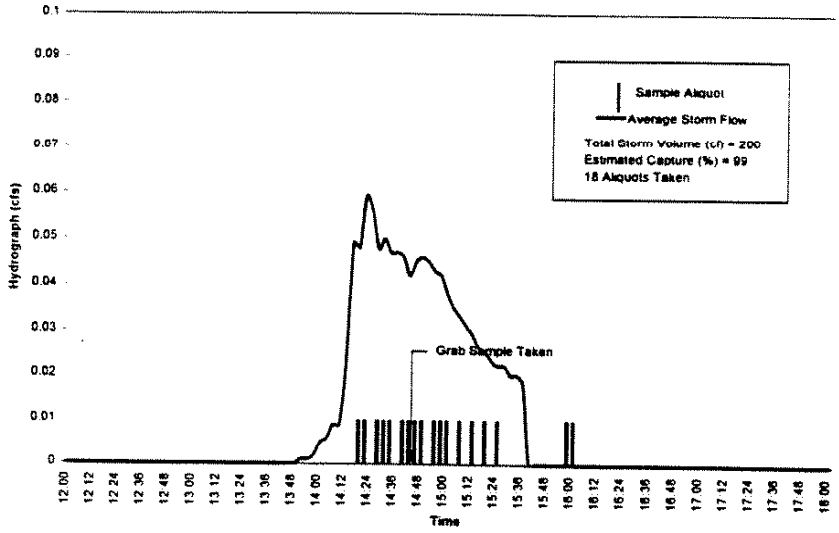


Figure 1-7a: Influent and Effluent Hydrograph, and Cumulative Rainfall at the Cerritos MS Swale for Event 5 on February 20-21, 2000

Influent



Effluent



Cumulative Rainfall

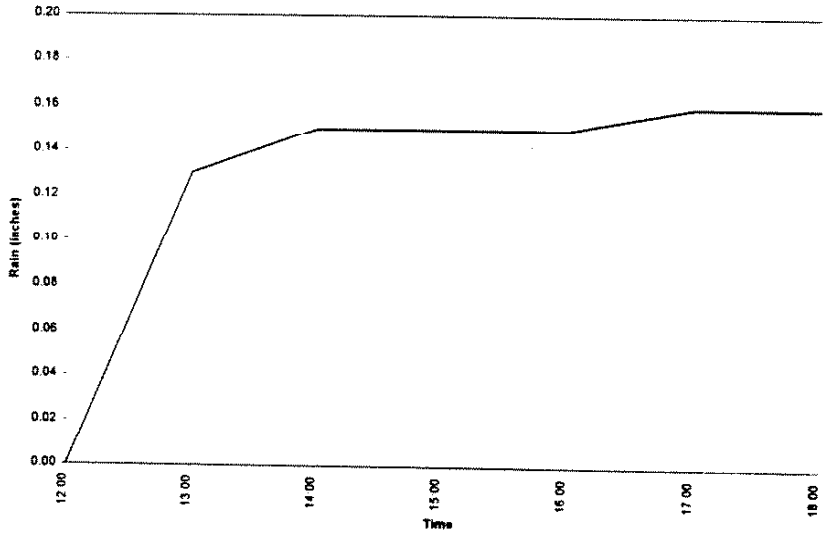
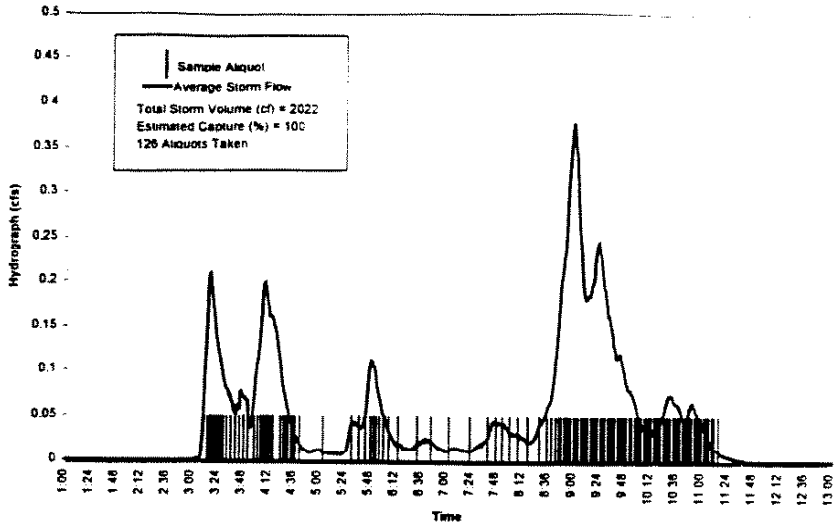
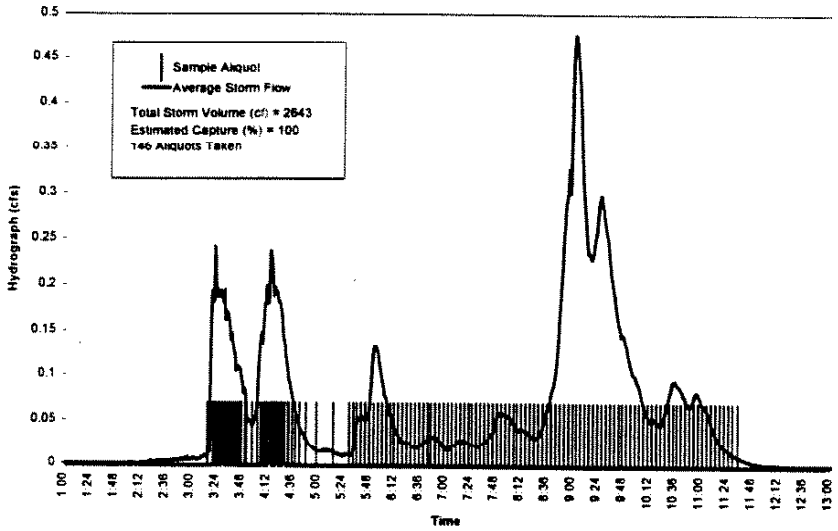


Figure 1-7b: Influent and Effluent Hydrograph, and Cumulative Rainfall at the Cerritos MS Swale for Event 6 on February 27, 2000

Influent



Effluent



Cumulative Rainfall

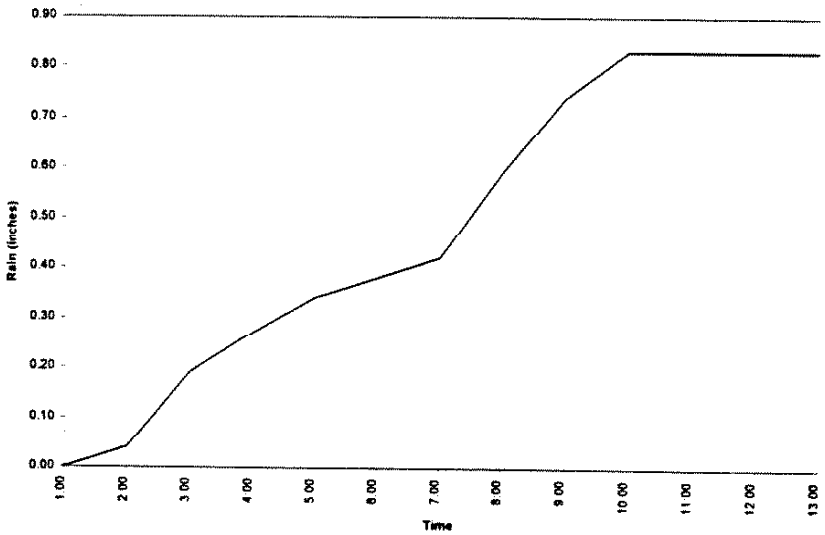
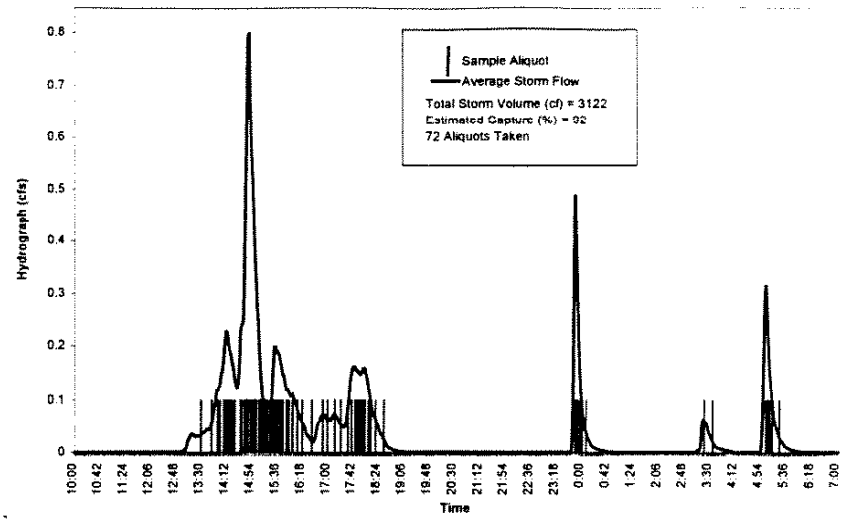
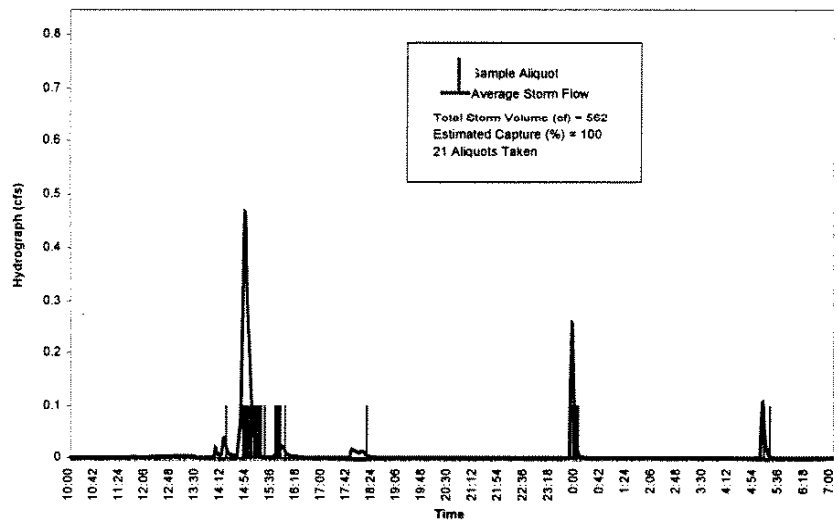


Figure 1-7c: Influent and Effluent Hydrograph, and Cumulative Rainfall at the Cerritos MS Swale for Event 7 on March 8, 2000

Influent



Effluent



Cumulative Rainfall

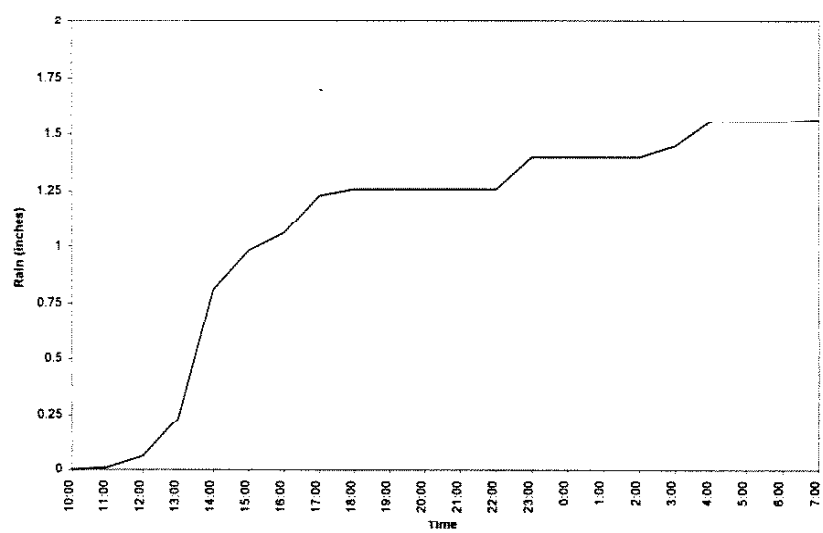
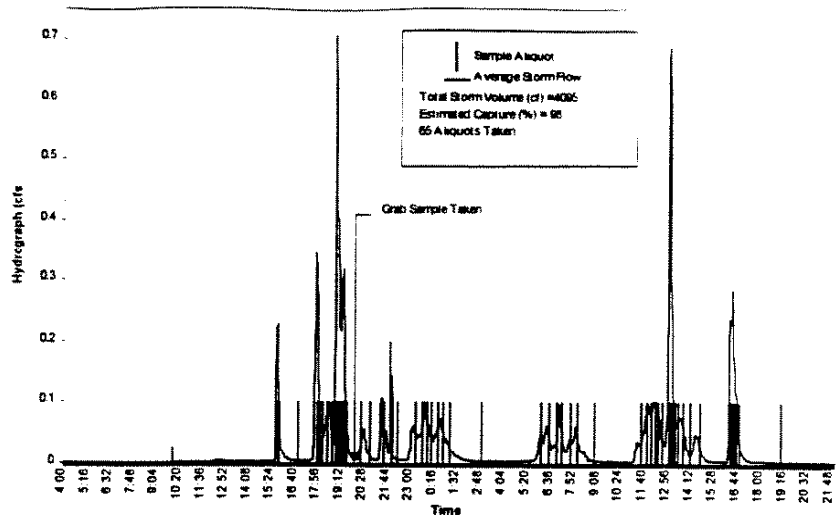
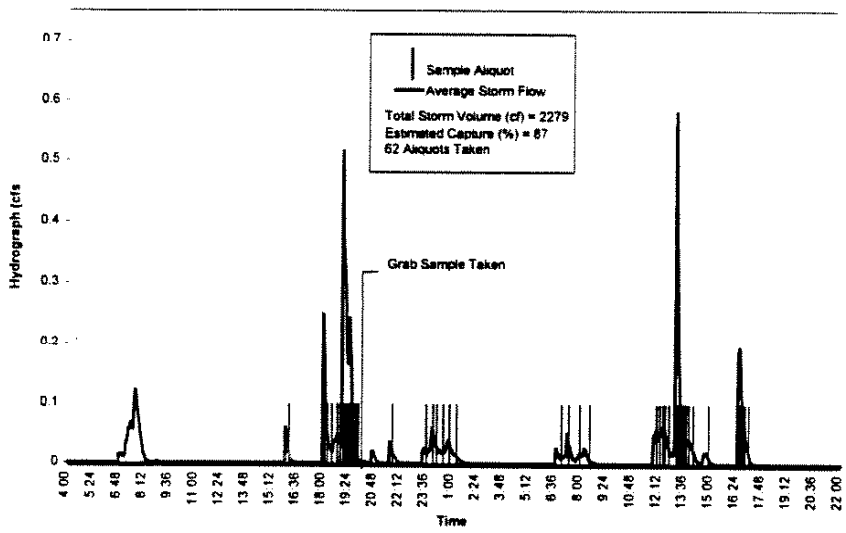


Figure 1-7d: Influent and Effluent Hydrograph, and Cumulative Rainfall at the Cerritos MS Swale for Event 8 on April 17-18, 2000

Influent



Effluent



Cumulative Rainfall

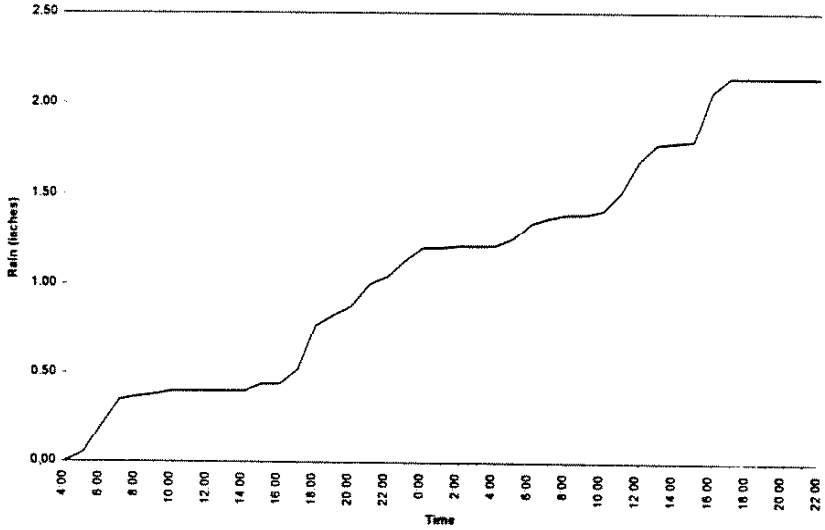
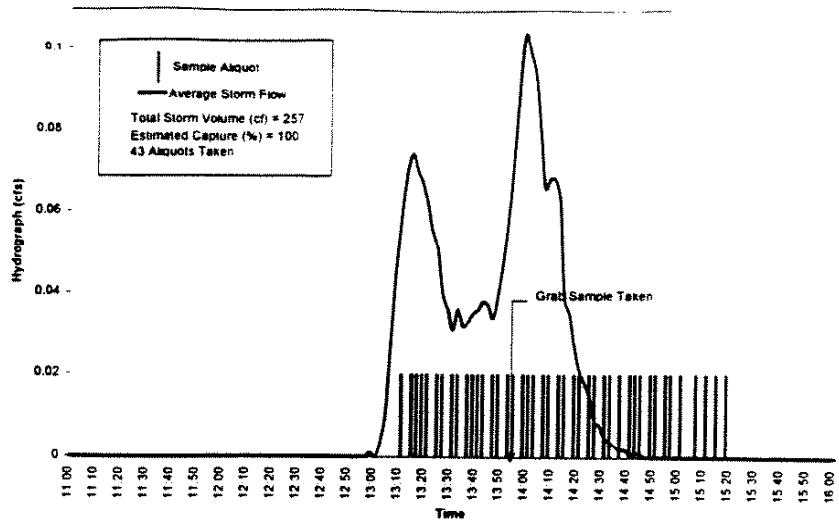
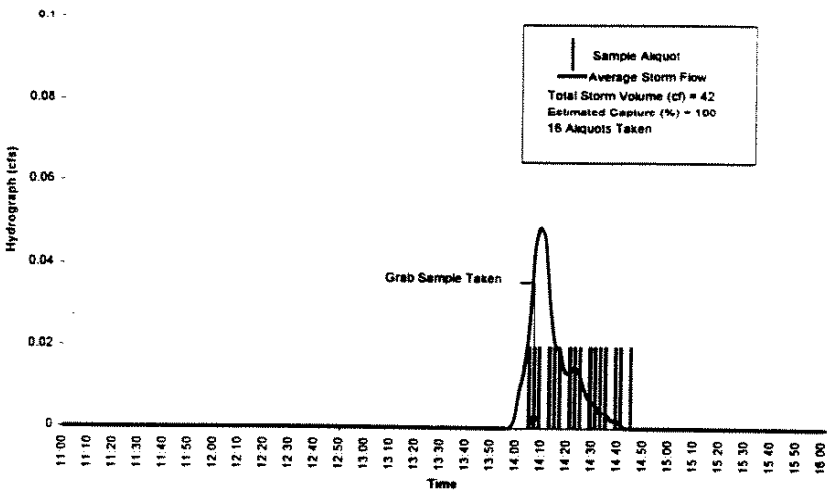


Figure 1-8a: Influent and Effluent Hydrograph, and Cumulative Rainfall at the I-5/I-605 Swale for Event 5 on February 20-21, 2000

Influent



Effluent



Cumulative Rainfall

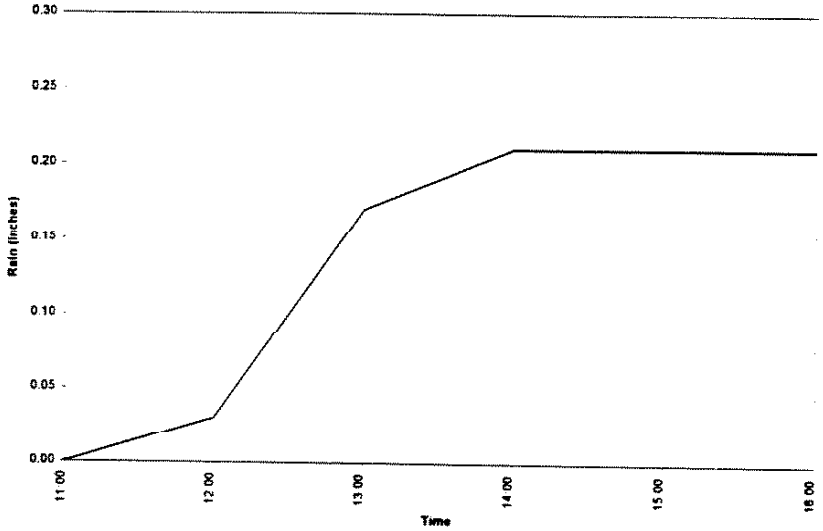
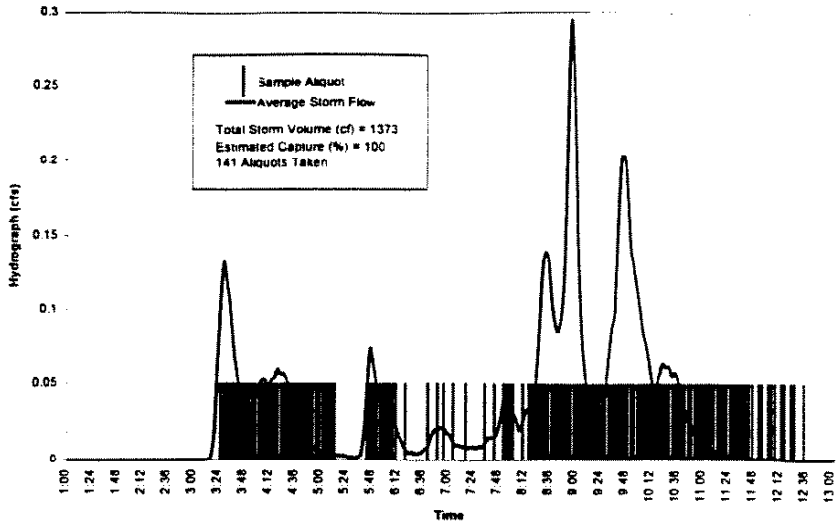
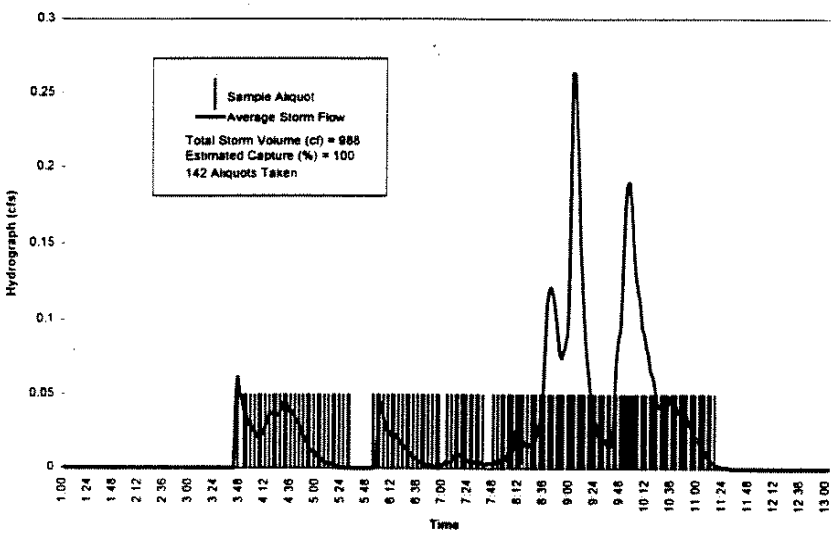


Figure 1-8b: Influent and Effluent Hydrograph, and Cumulative Rainfall at the I-5/I-605 Swale for Event 6 on February 27, 2000

Influent



Effluent



Cumulative Rainfall

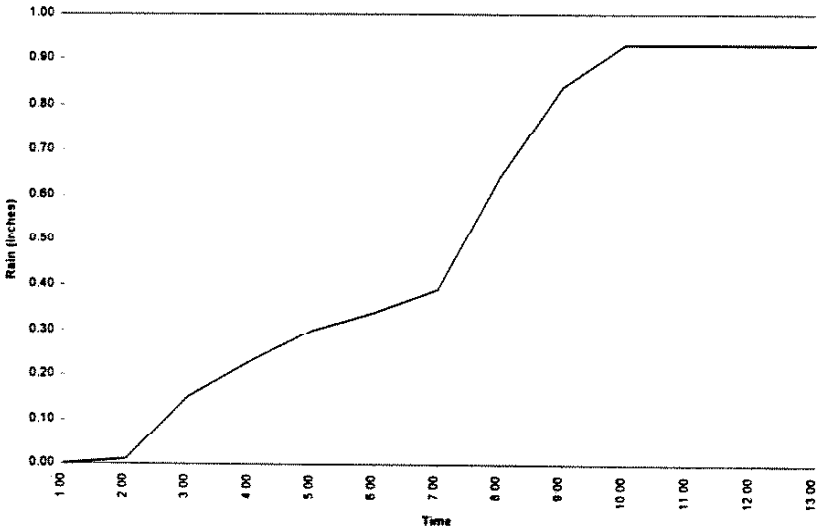
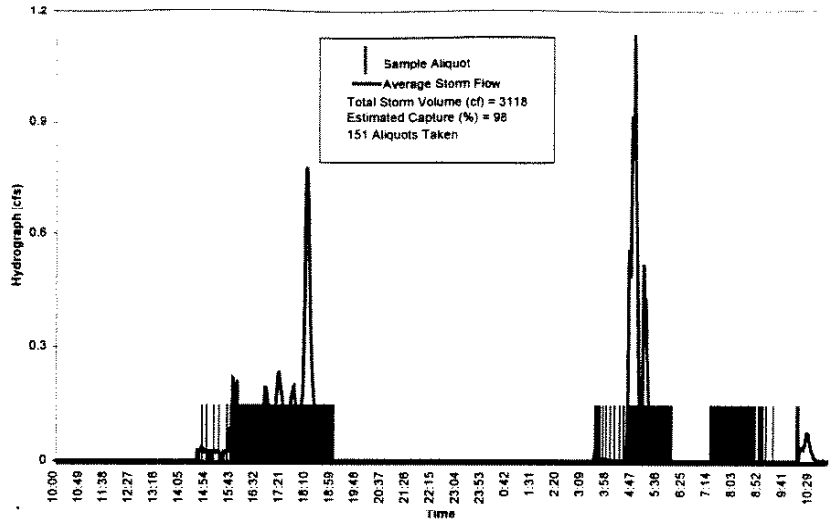
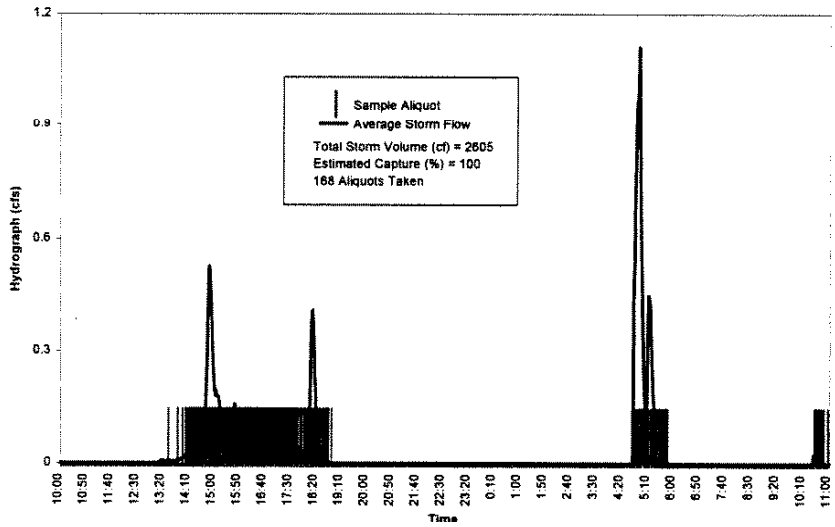


Figure 1-8c: Influent and Effluent Hydrograph, and Cumulative Rainfall at the I-5/I-605 Swale for Event 7 on March 8, 2000

Influent



Effluent



Cumulative Rainfall

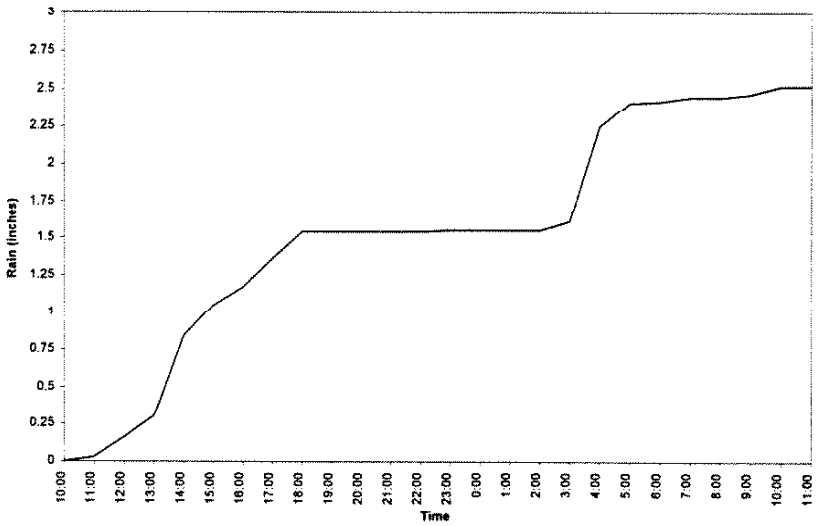
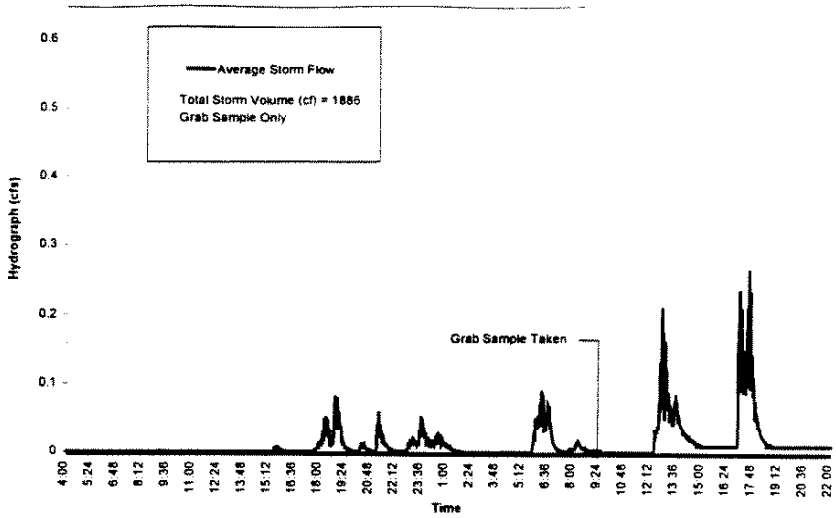
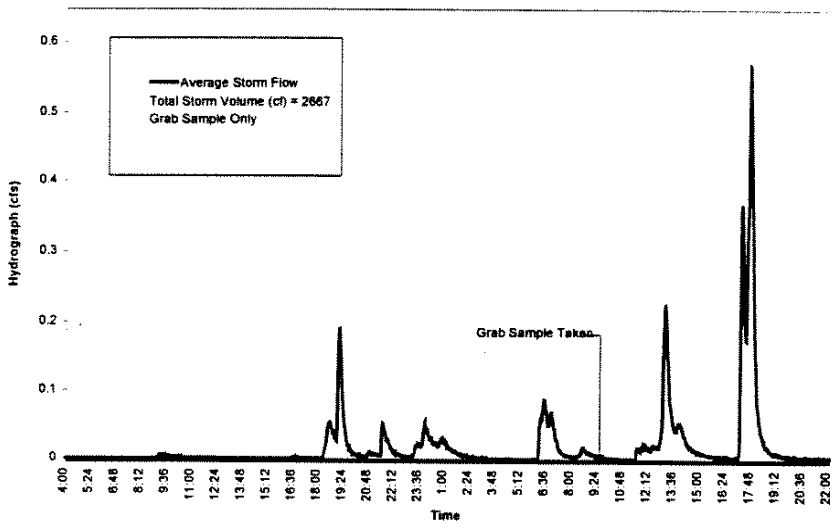


Figure 1-8d: Influent and Effluent Hydrograph, and Cumulative Rainfall at the I-5/I-605 Swale for Event 8 on April 17-18, 2000

Influent



Effluent



Cumulative Rainfall

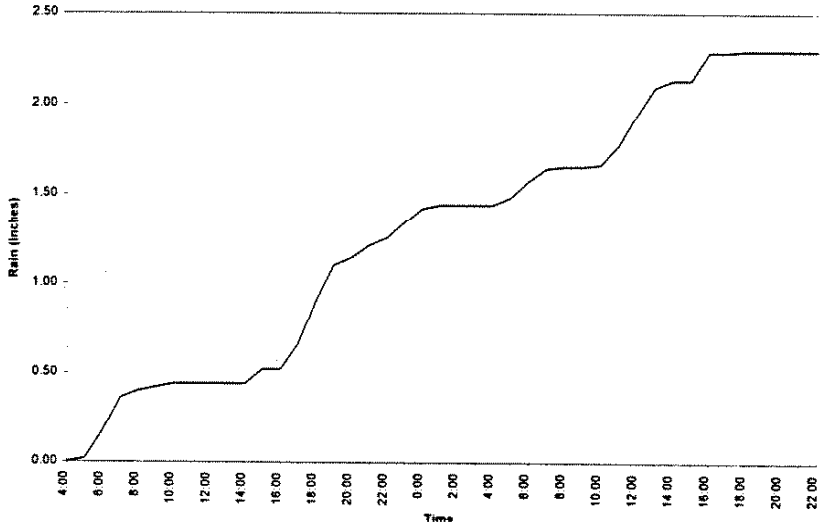
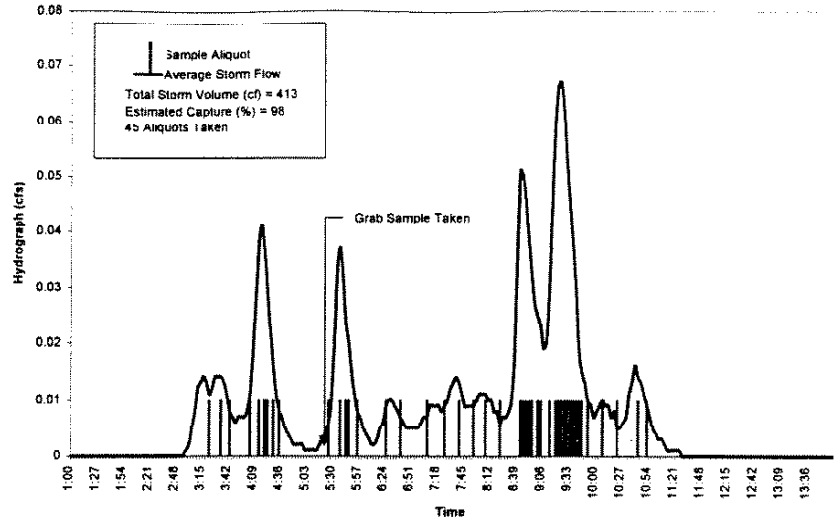
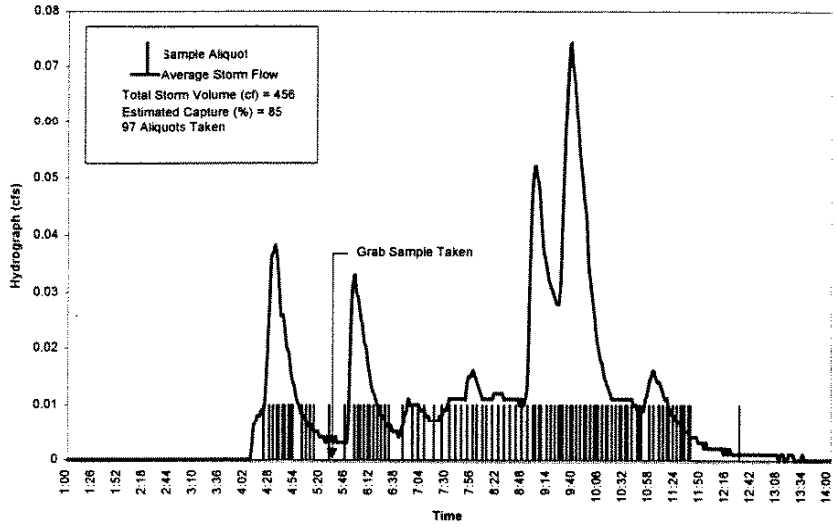


Figure 1-9a: Influent and Effluent Hydrograph, and Cumulative Rainfall at the I-605 @ Carson Swale for Event 5 on February 20-21, 2000 (Grab sample Only)

Influent



Effluent



Cumulative Rainfall

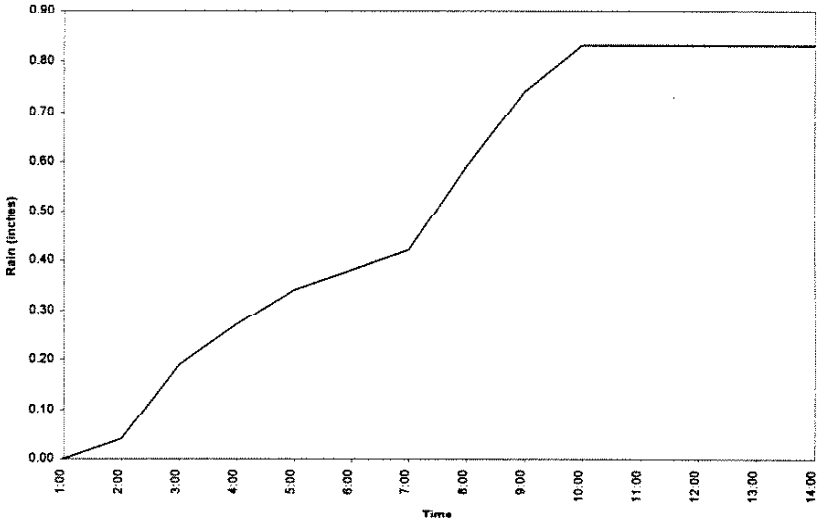
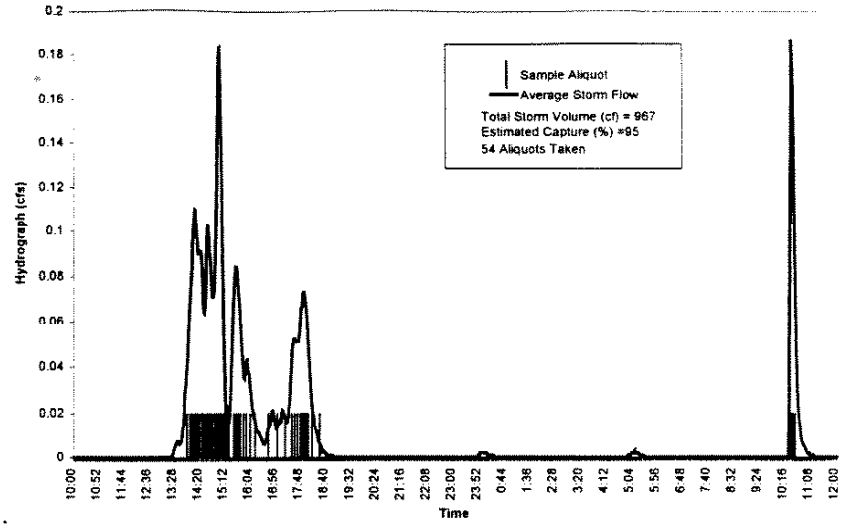
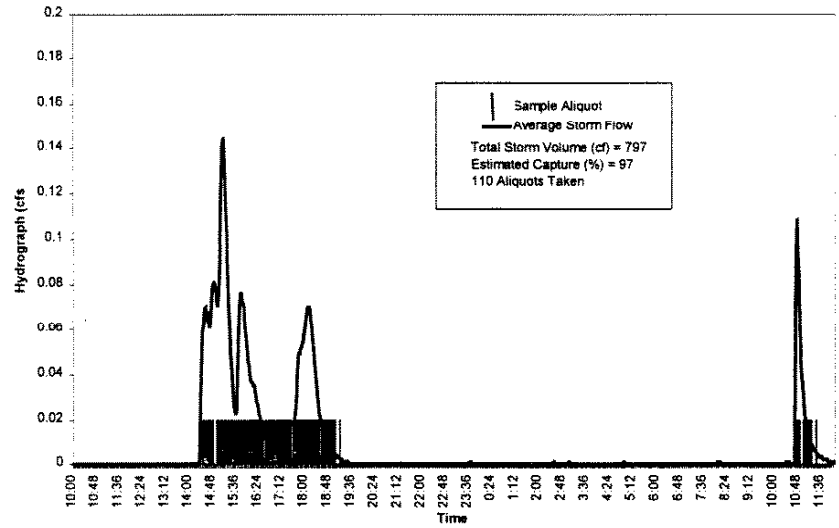


Figure 1-9b: Influent and Effluent Hydrograph, and Cumulative Rainfall at the I-605 @ Carson Swale for Event 7 on March 8, 2000

Influent



Effluent



Cumulative Rainfall

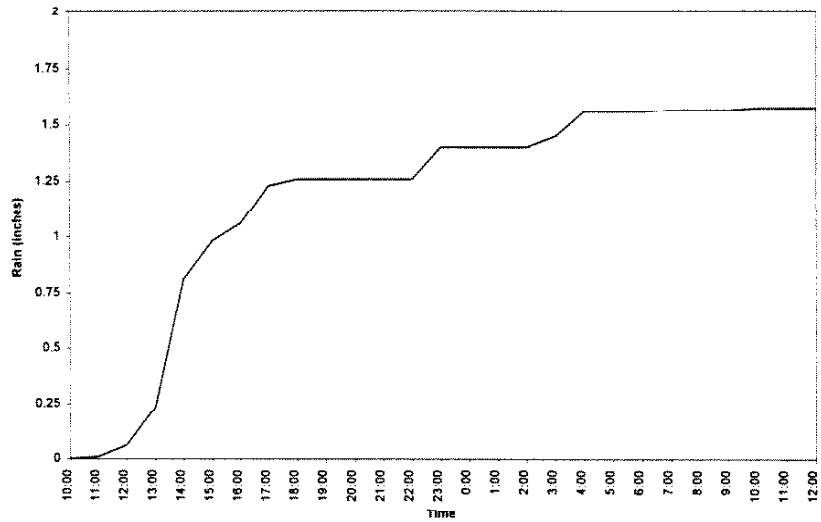
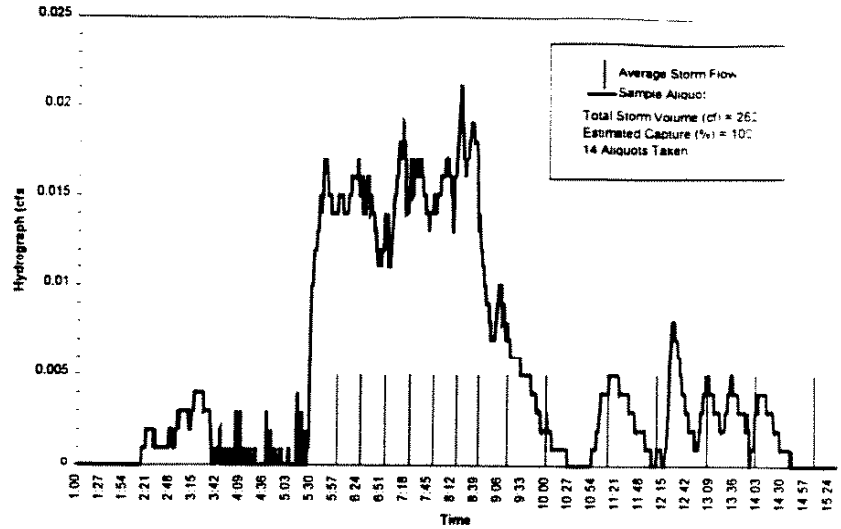
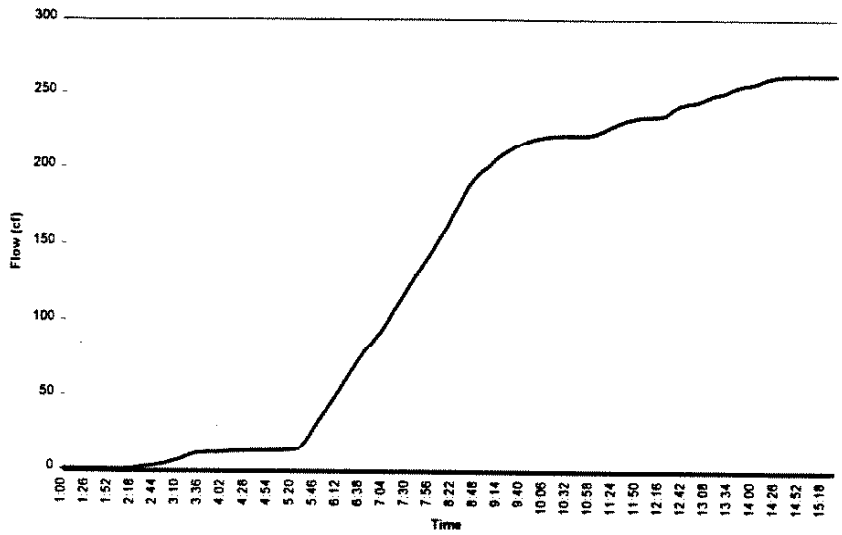


Figure 1-9c: Influent and Effluent Hydrograph, and Cumulative Rainfall at the I-605 @ Carson Swale for Event 8 on April 17-18, 2000

Effluent



Cumulative Flow



Cumulative Rainfall

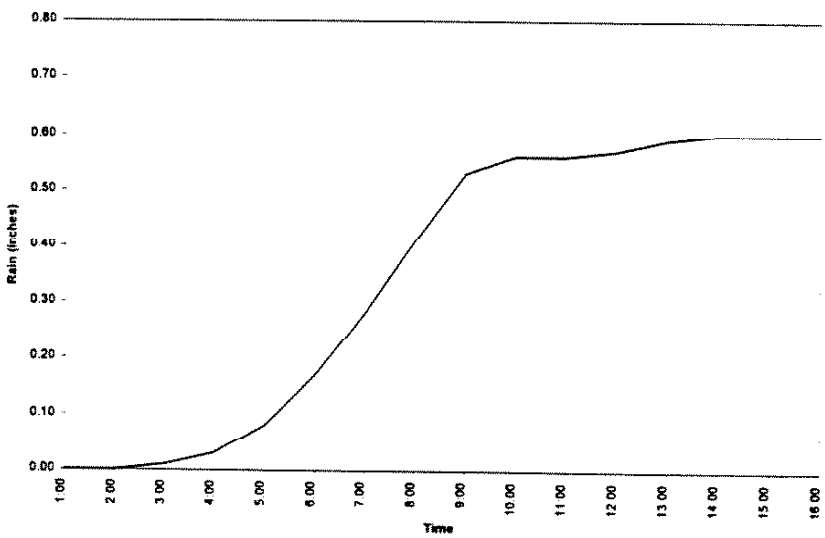
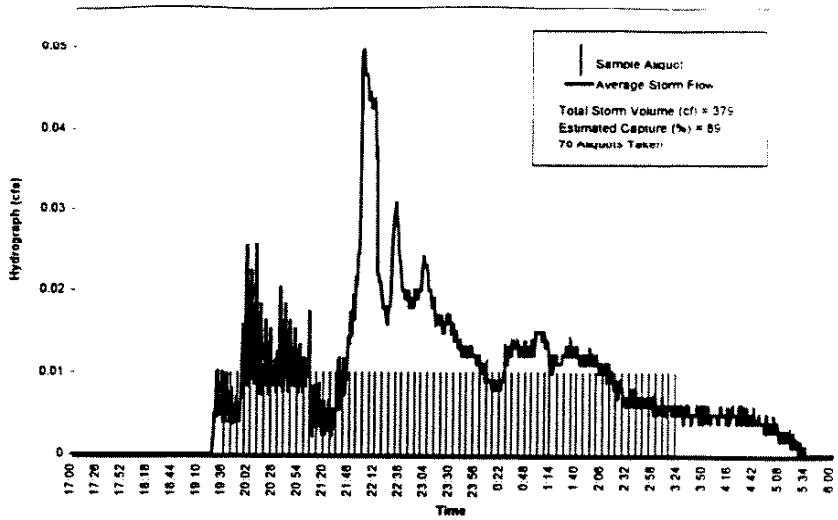
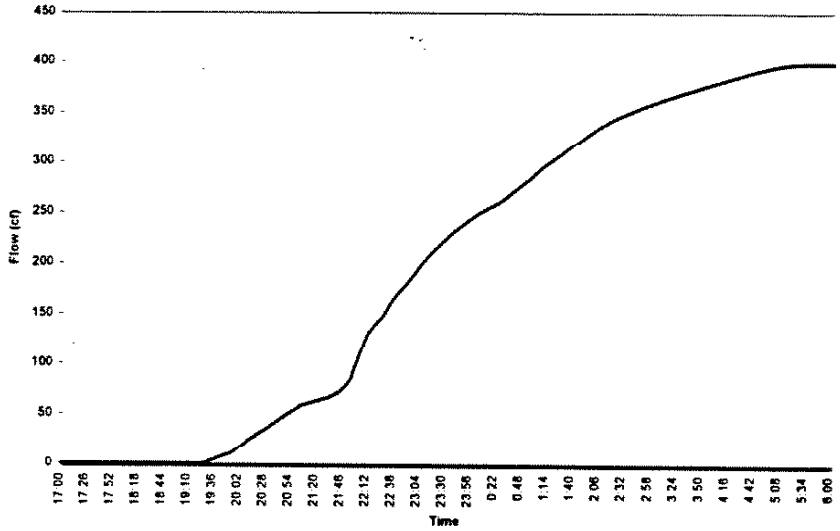


Figure 1-10a: Effluent Hydrograph, Cumulative Flow and Cumulative Rainfall at the Foothill MS StreamGuard DII for Event 1 on January 25, 2000

Effluent



Cumulative Flow



Cumulative Rainfall

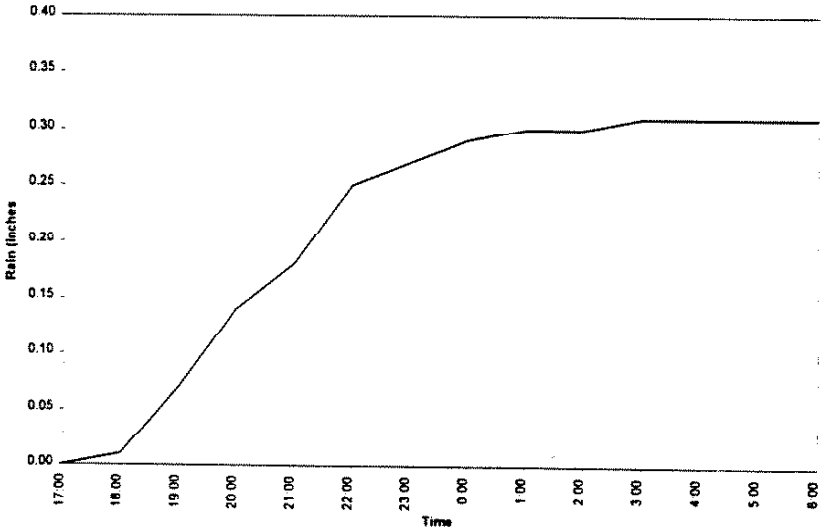
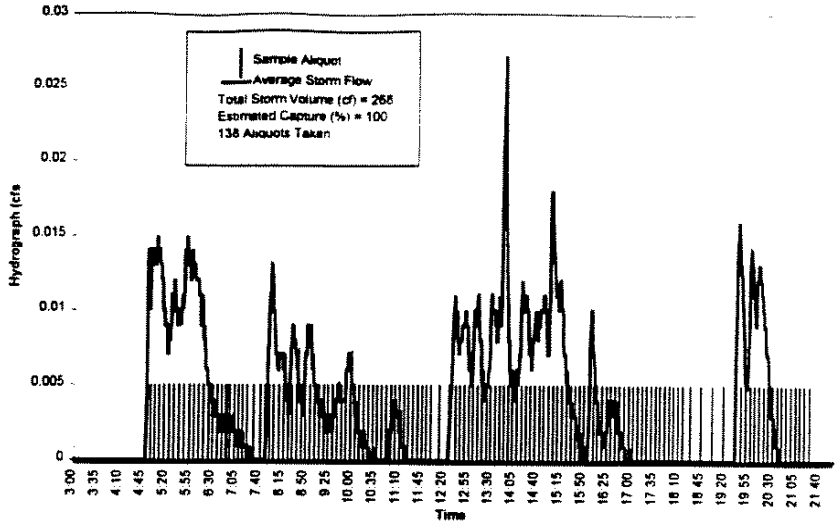
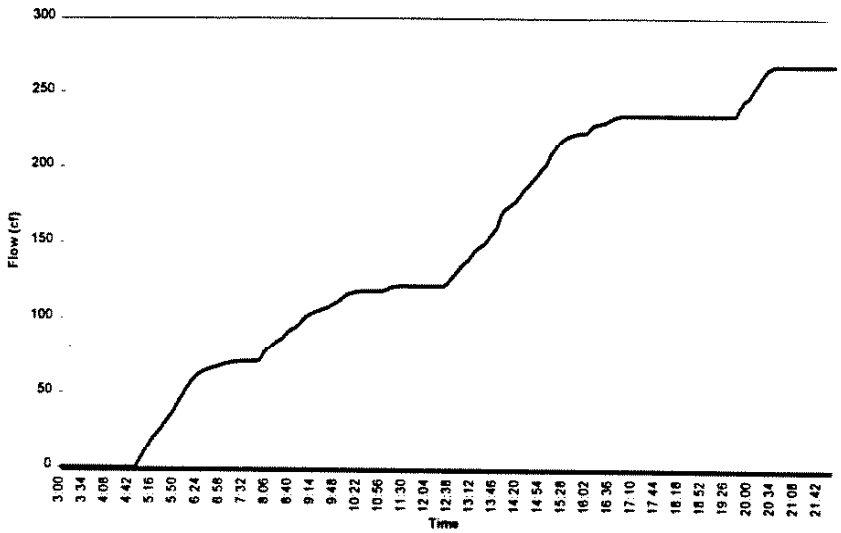


Figure 1-10b: Effluent Hydrograph, Cumulative Flow and Cumulative Rainfall at the Foothill MS StreamGuard DII for Event 2 on January 30, 2000

Effluent



Cumulative Flow



Cumulative Rainfall

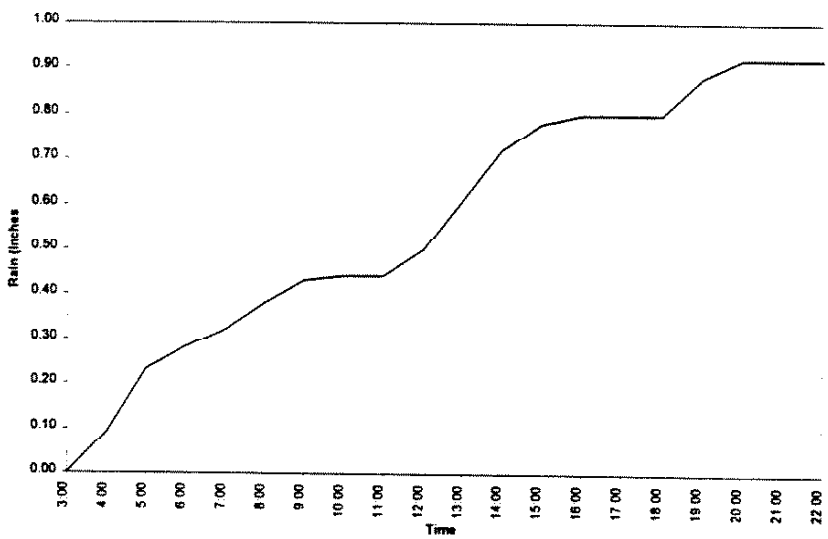
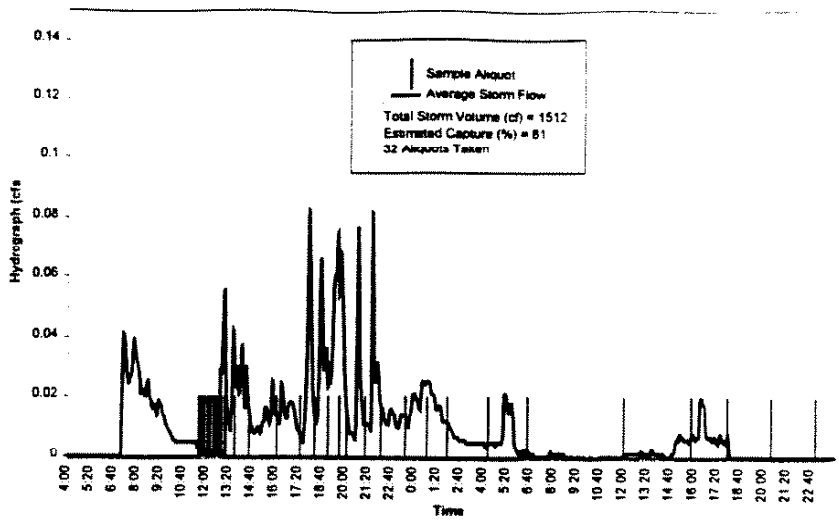
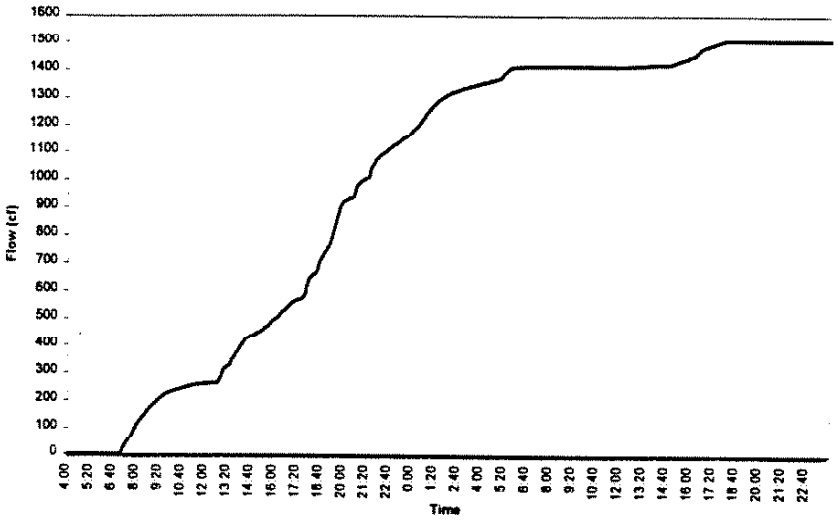


Figure 1-10c: Effluent Hydrograph, Cumulative Flow and Cumulative Rainfall at the Foothill MS StreamGuard DII for Event 4 on February 16, 2000

Effluent



Cumulative Flow



Cumulative Rainfall

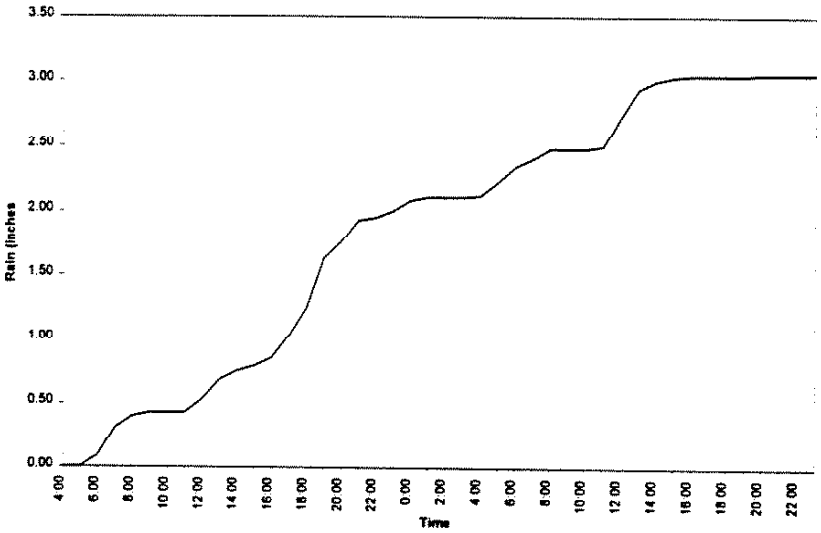
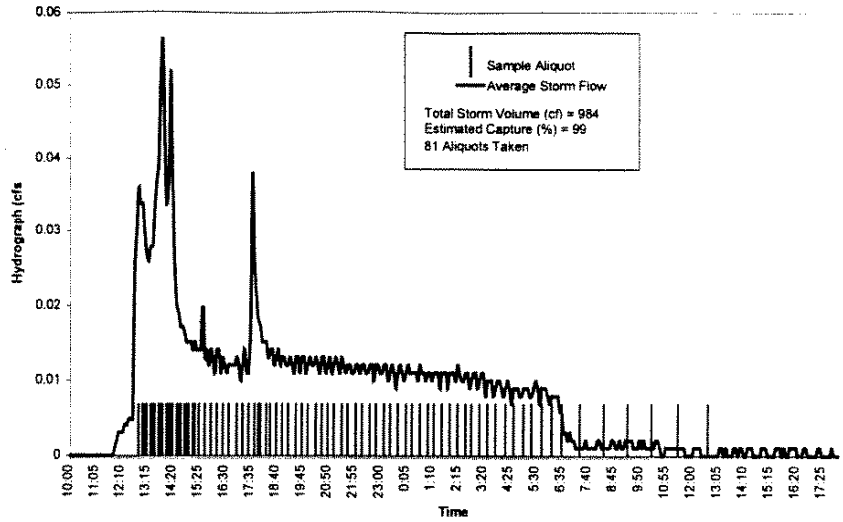
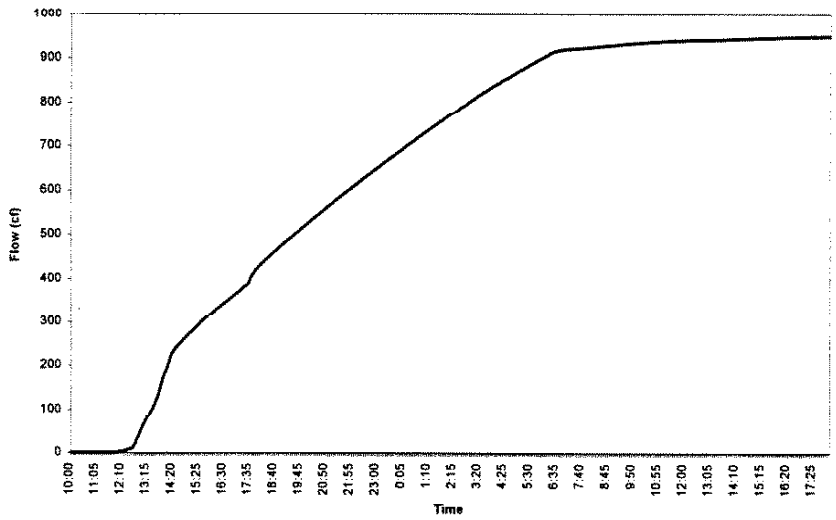


Figure 1-10d: Effluent Hydrograph, Cumulative Flow and Cumulative Rainfall at the Foothill MS StreamGuard DII for Event 5 on February 20-21, 2000

Effluent



Cumulative Flow



Cumulative Rainfall

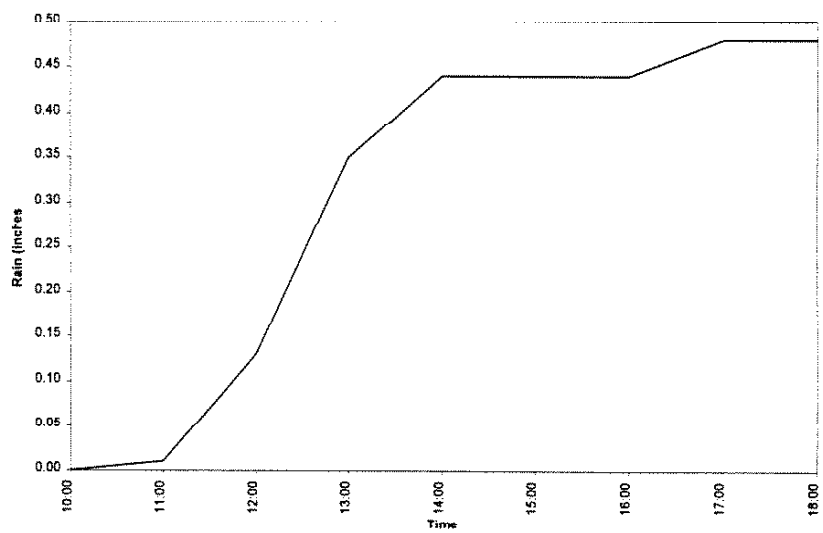
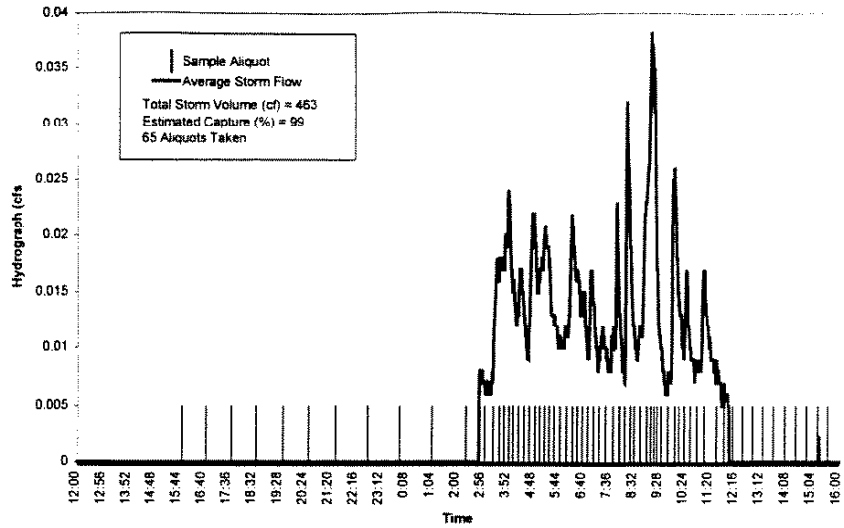
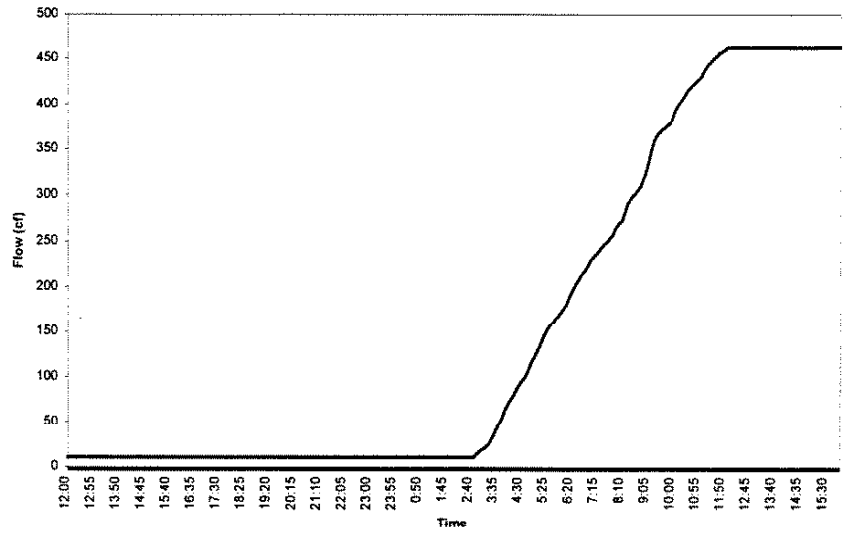


Figure 1-10e: Effluent Hydrograph, Cumulative Flow and Cumulative Rainfall at the Foothill MS StreamGuard DII for Event 6 on February 27, 2000

Effluent



Cumulative Flow



Cumulative Rainfall

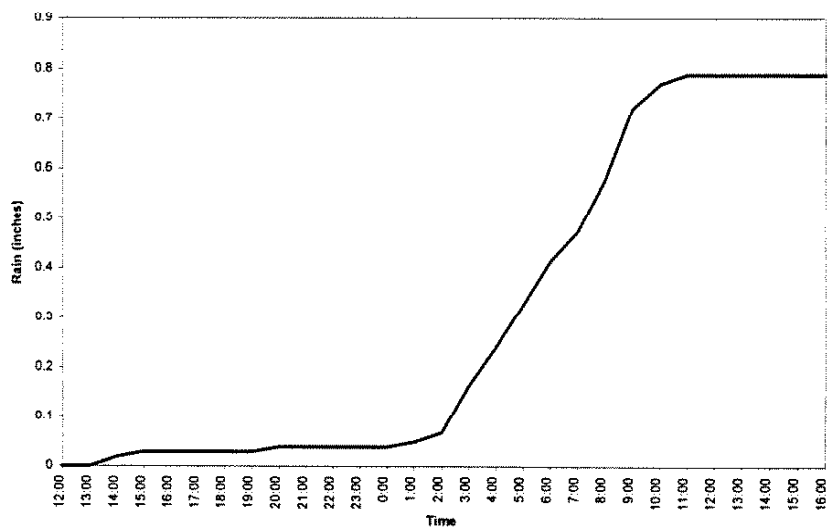
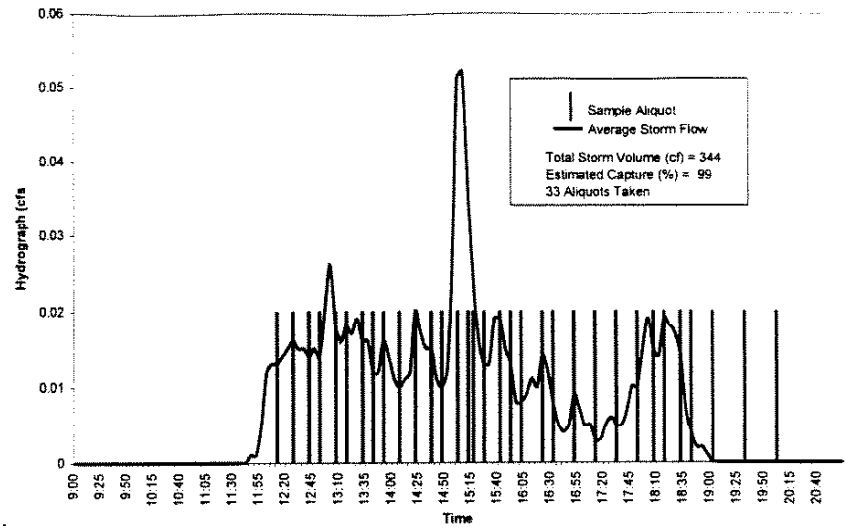
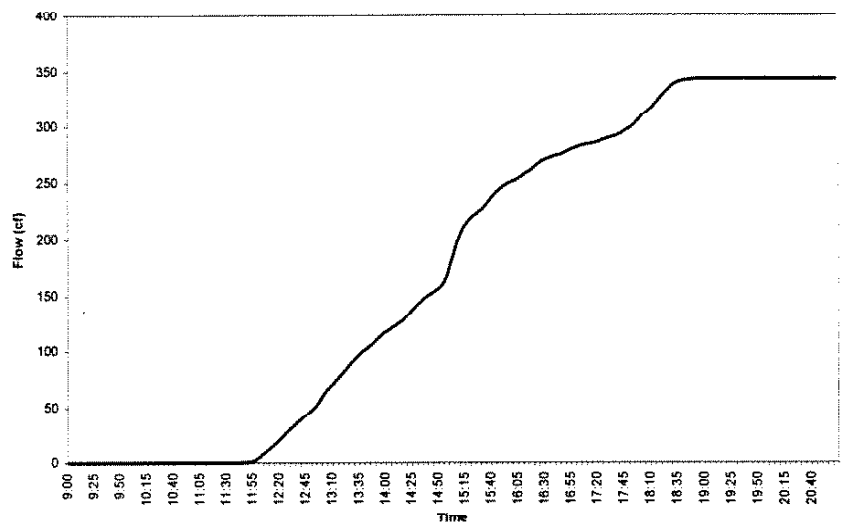


Figure 1-10f: Effluent Hydrograph, Cumulative Flow and Cumulative Rainfall at the Foothill MS StreamGuard DII for Event 7 on March 8, 2000

Effluent



Cumulative Flow



Cumulative Rainfall

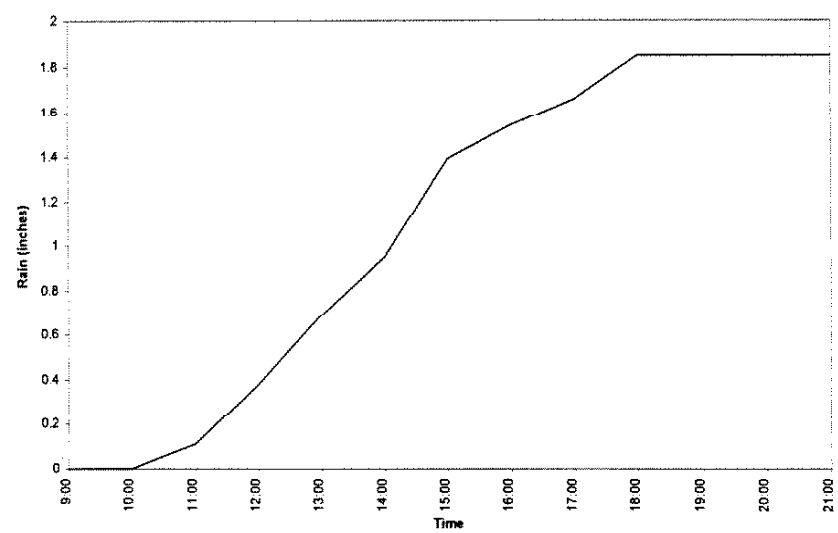
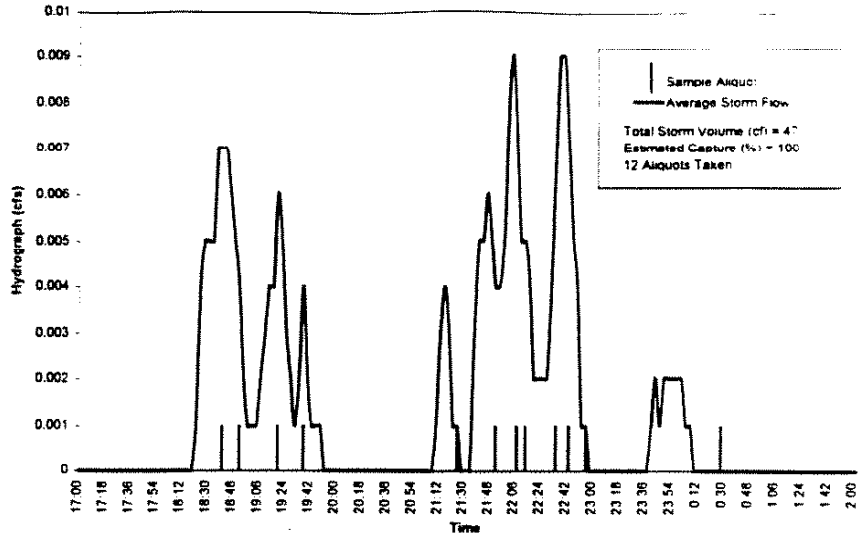
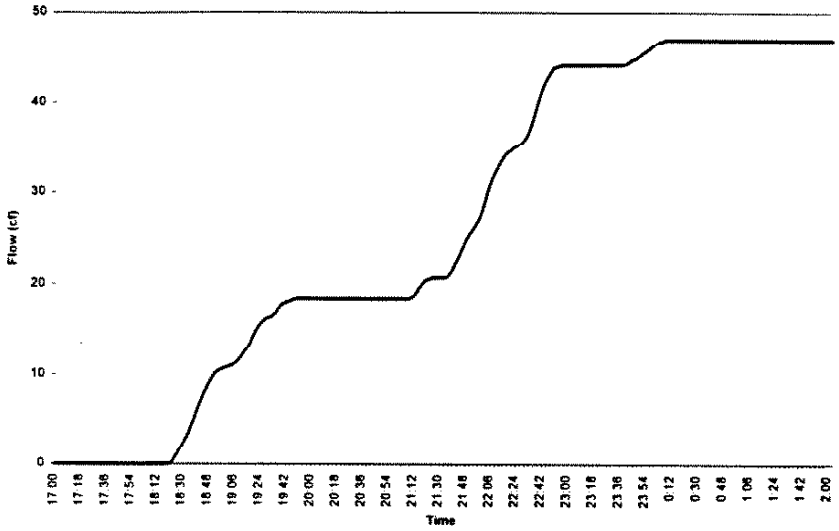


Figure 1-10g: Effluent Hydrograph, Cumulative Flow, and Cumulative Rainfall at the Foothill MS StreamGuard DII for Event 8 on April 17, 2000

Effluent



Cumulative Flow



Cumulative Rainfall

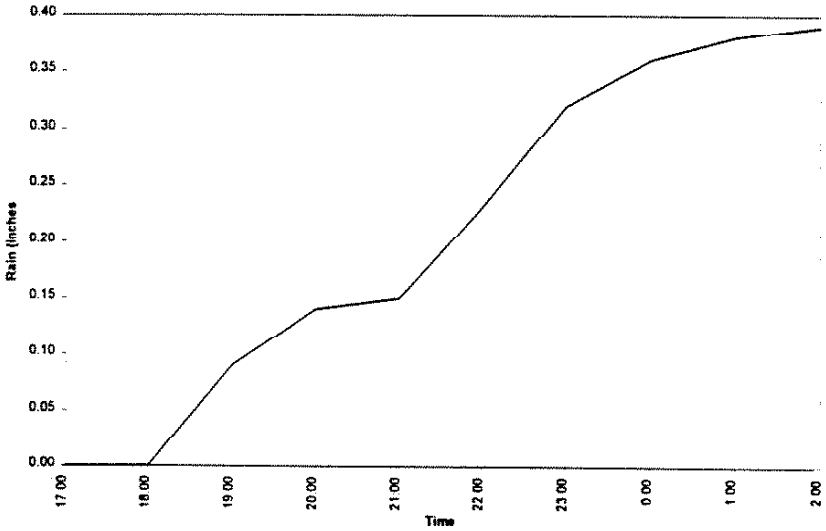
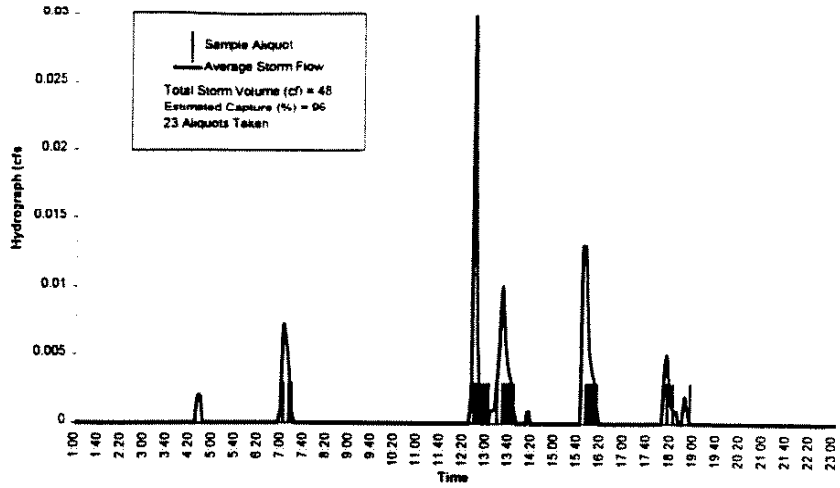
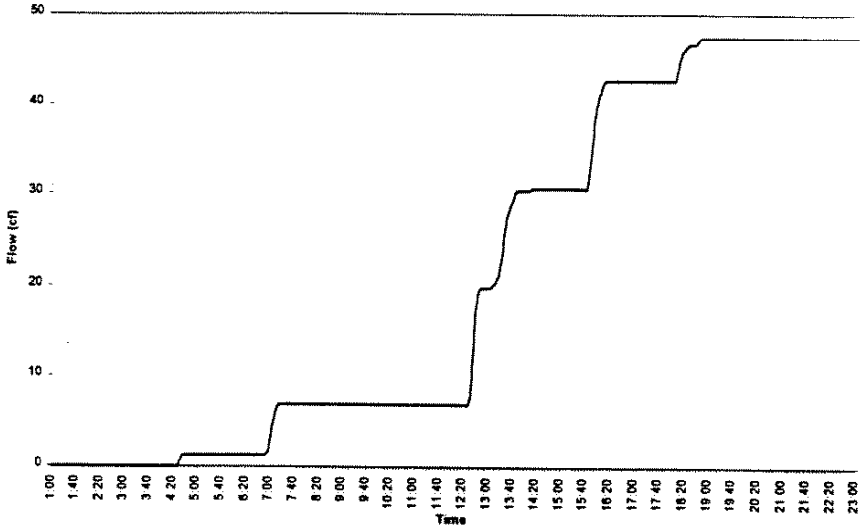


Figure 1-11a: Effluent Hydrograph, Cumulative Flow, and Cumulative Rainfall at the Las Flores MS StreamGuard DII for Event 2 on January 30, 2000

Effluent



Cumulative Flow



Cumulative Rainfall

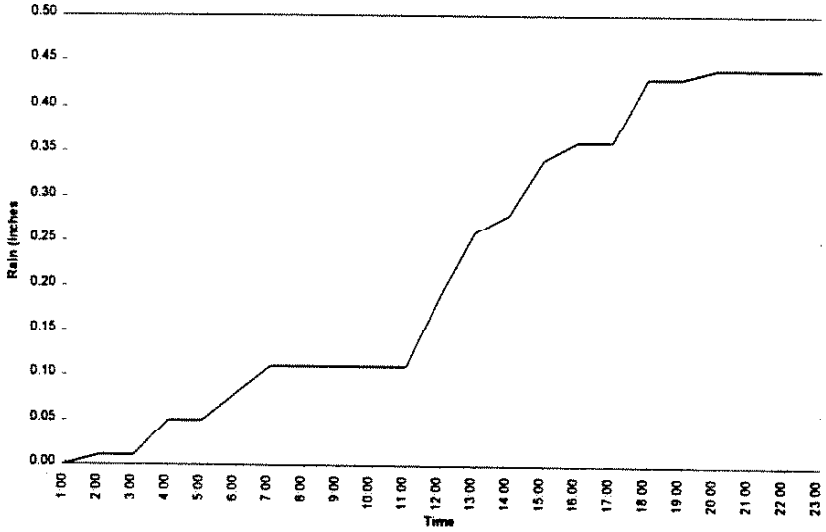
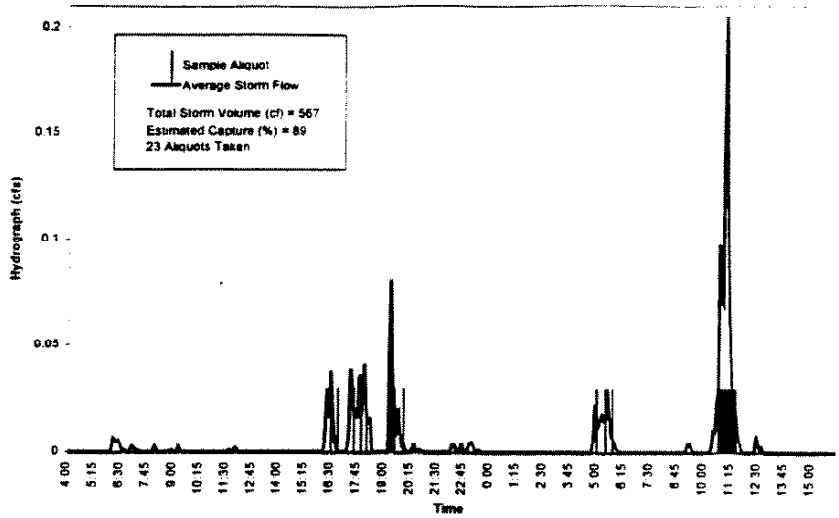
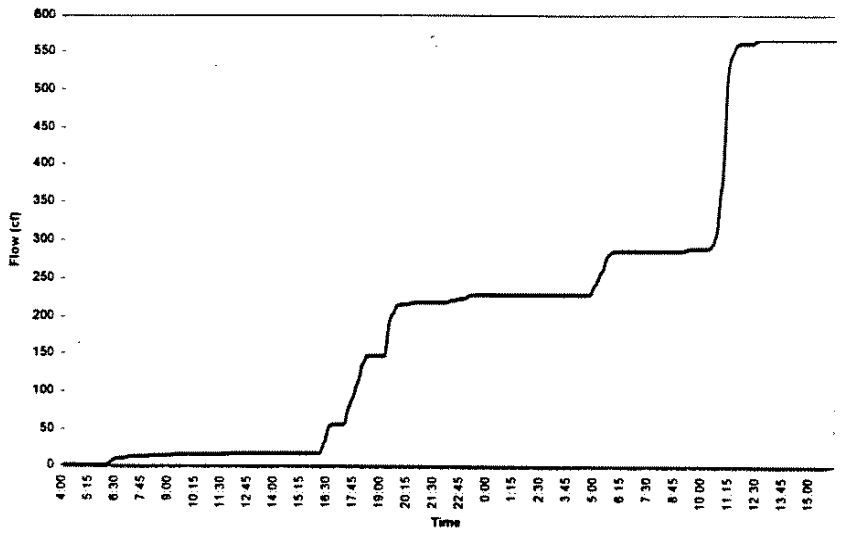


Figure 1-11b: Effluent Hydrograph, Cumulative Flow, and Cumulative Rainfall at the Las Flores MS StreamGuard DII for Event 3 on February 10, 2000

Effluent



Cumulative Flow



Cumulative Rainfall

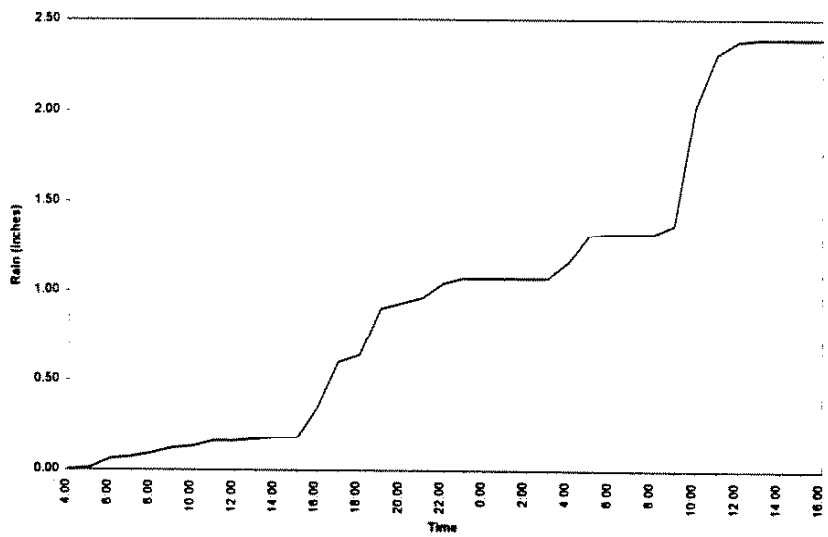
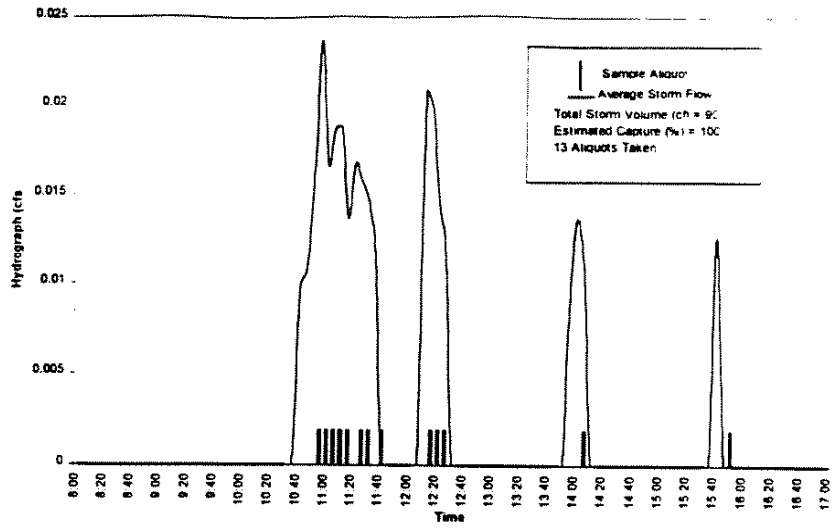
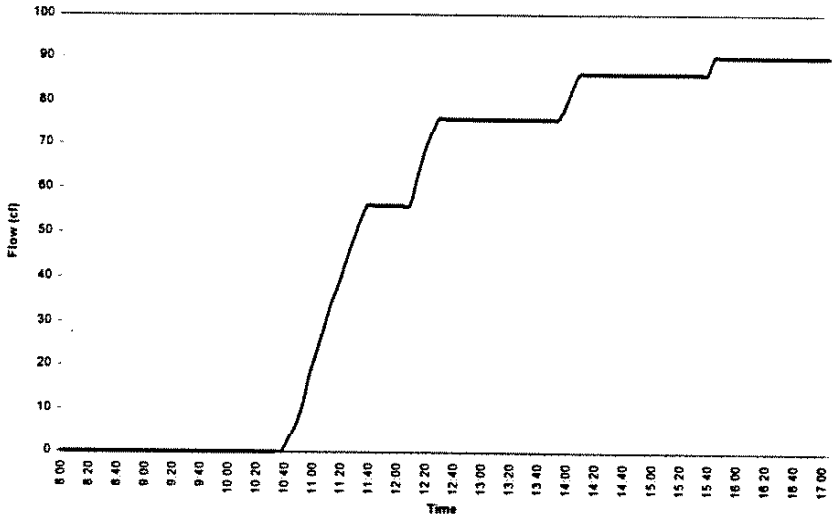


Figure 1-11c: Effluent Hydrograph, Cumulative Flow, and Cumulative Rainfall at the Las Flores MS StreamGuard DII for Event 5 on February 20-21, 2000

Effluent



Cumulative Flow



Cumulative Rainfall

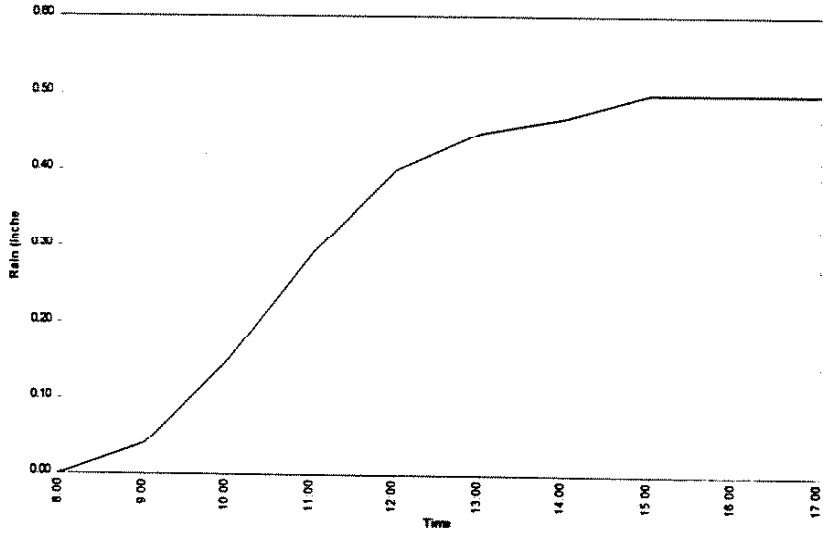
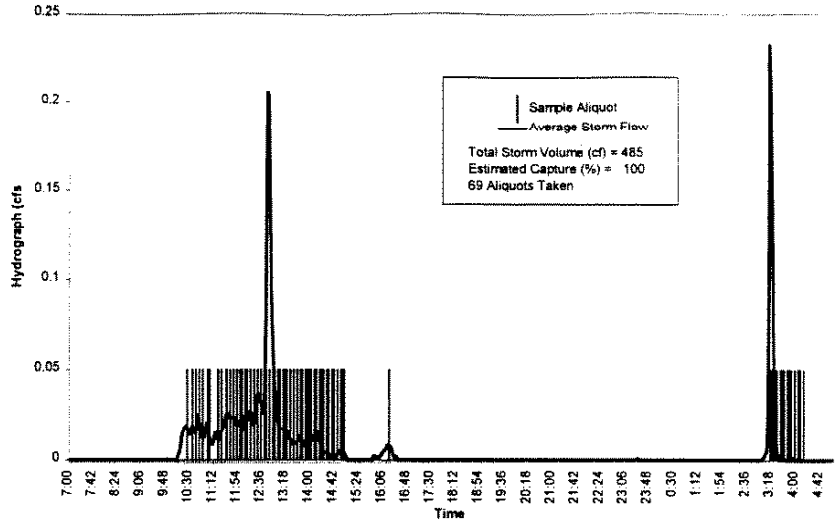
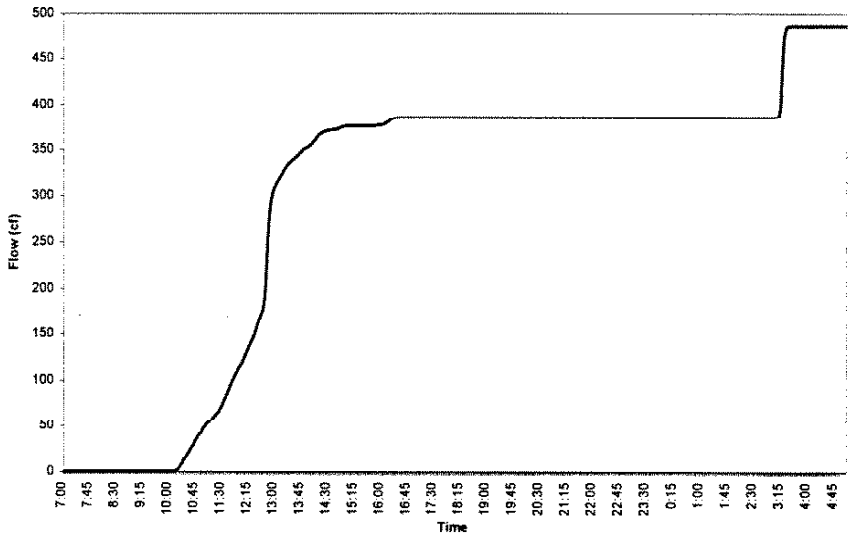


Figure 1-11d: Effluent Hydrograph, Cumulative Flow, and Cumulative Rainfall at the Las Flores MS StreamGuard DII for Event 6 on February 27, 2000

Effluent



Cumulative Flow



Cumulative Rainfall

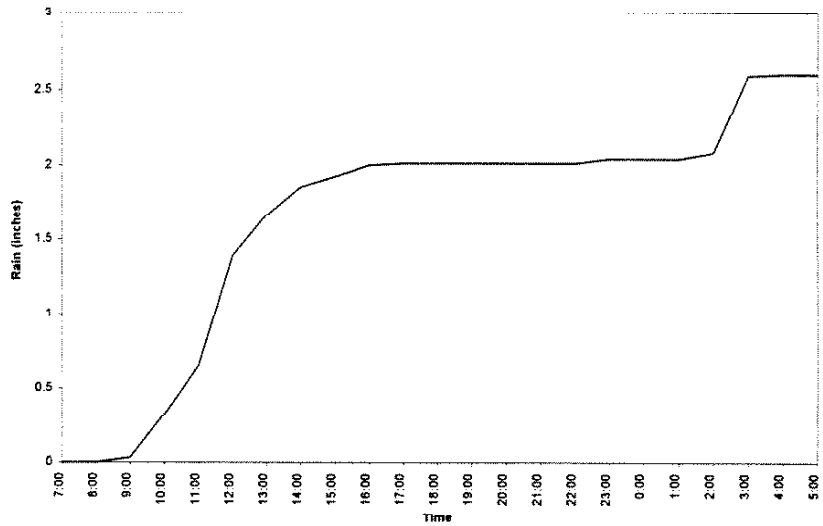
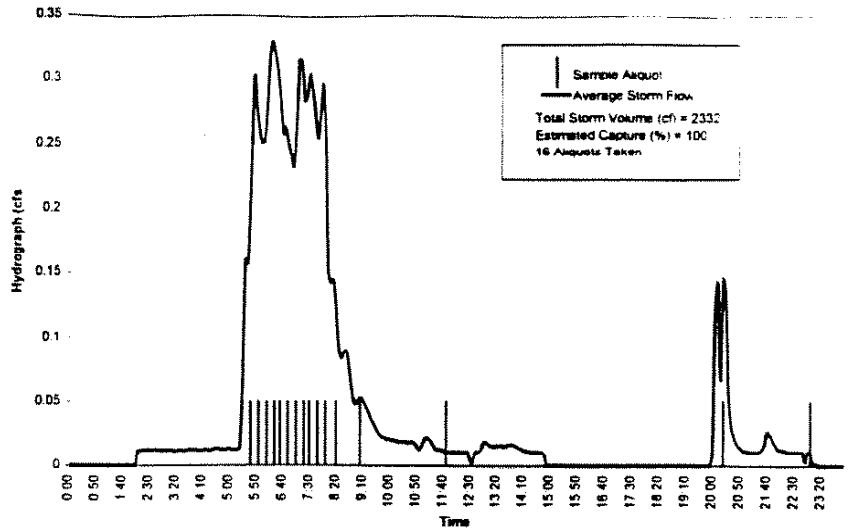
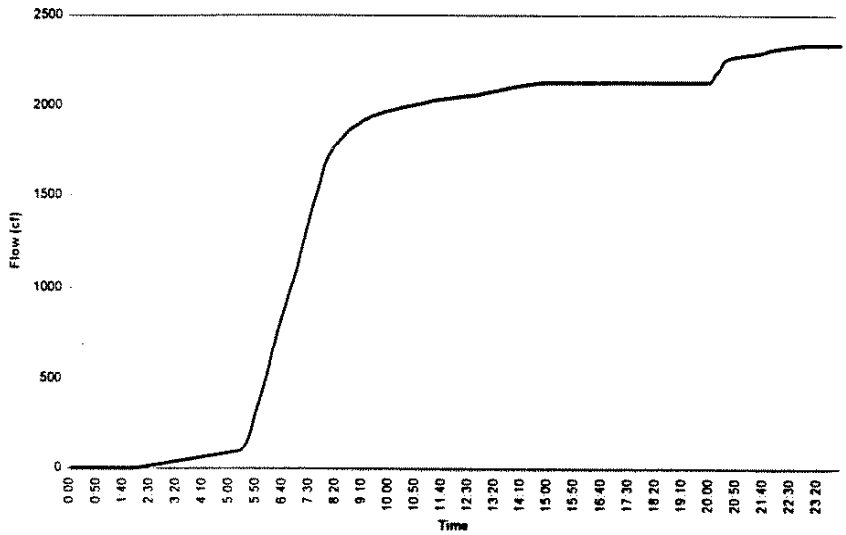


Figure 1-11e: Effluent Hydrograph, Cumulative Flow, and Cumulative Rainfall at the Las Flores MS StreamGuard DII for Event 8 on April 17-18, 2000

Effluent



Cumulative Flow



Cumulative Rainfall

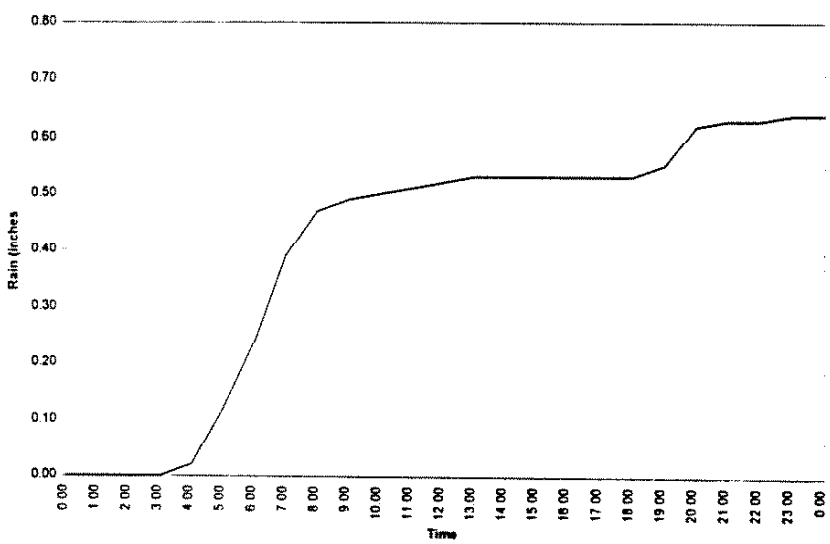
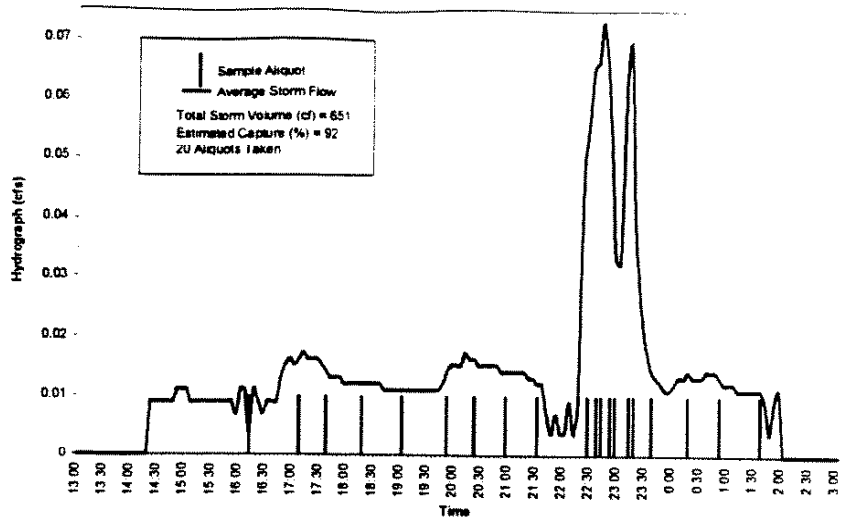
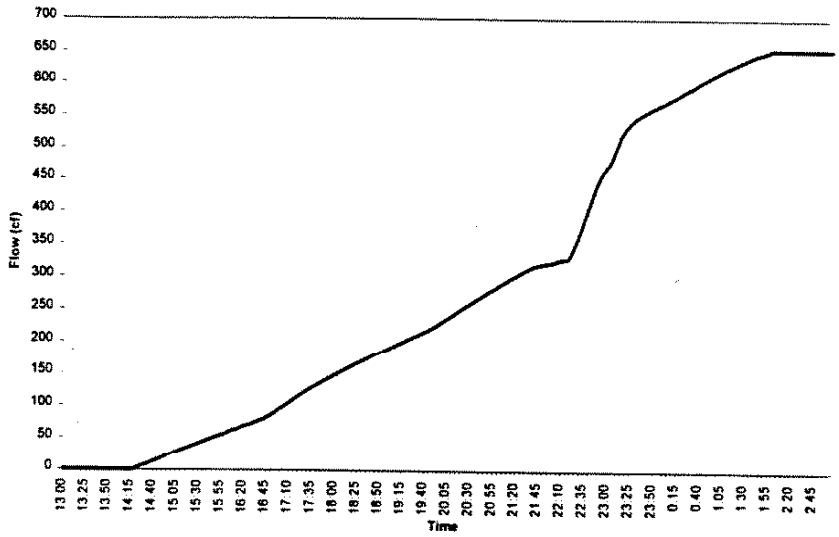


Figure 1-12a: Effluent Hydrograph, Cumulative Flow, and Cumulative Rainfall at the Rosemead MS StreamGuard DII for Event 1 on January 25, 2000

Effluent



Cumulative Flow



Cumulative Rainfall

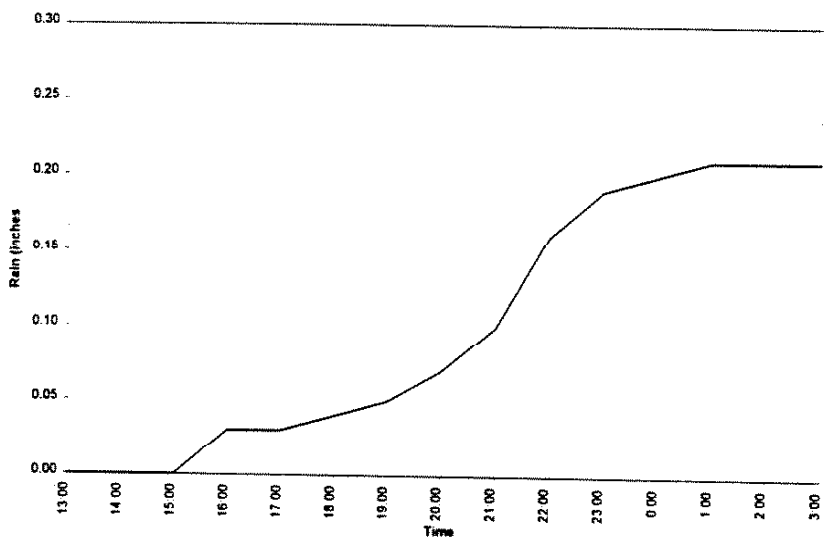
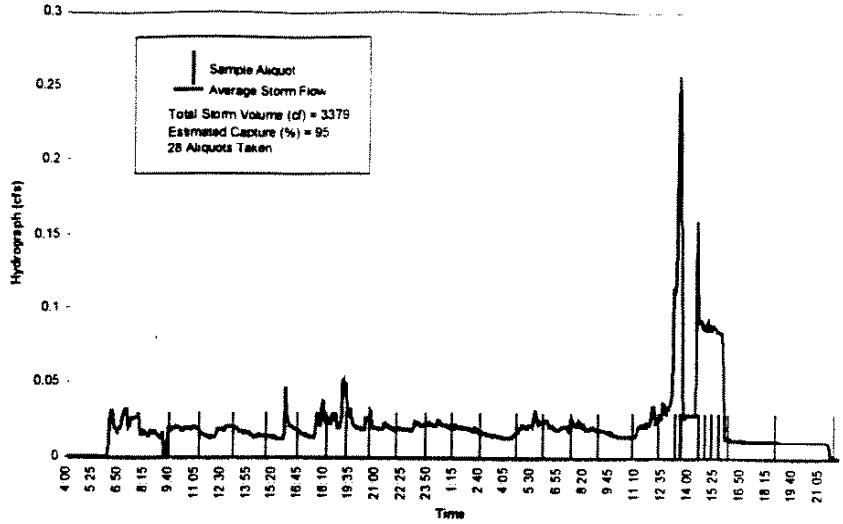
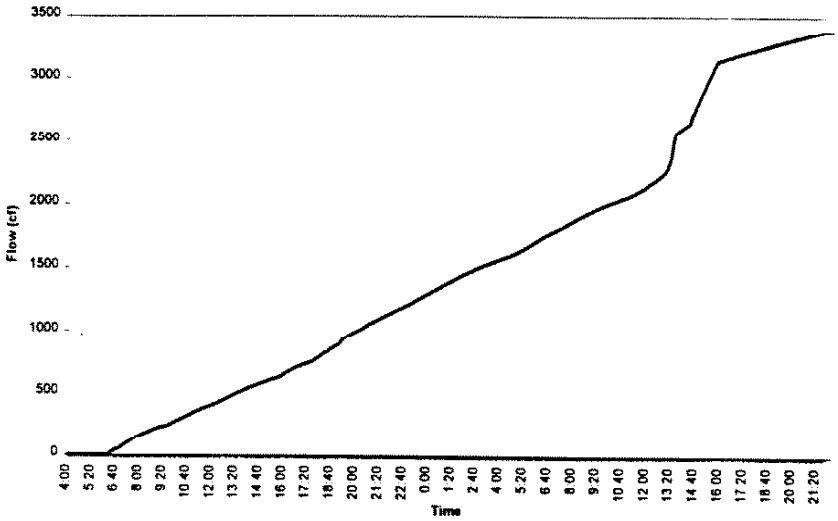


Figure 1-12b: Effluent Hydrograph, Cumulative Flow, and Cumulative Rainfall at the Rosemead MS StreamGuard DII for Event 2 on January 30, 2000

Effluent



Cumulative Flow



Cumulative Rainfall

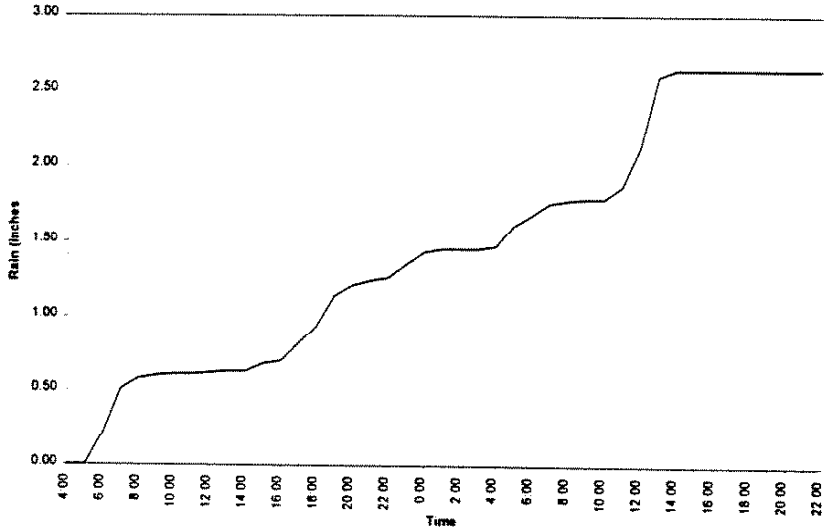
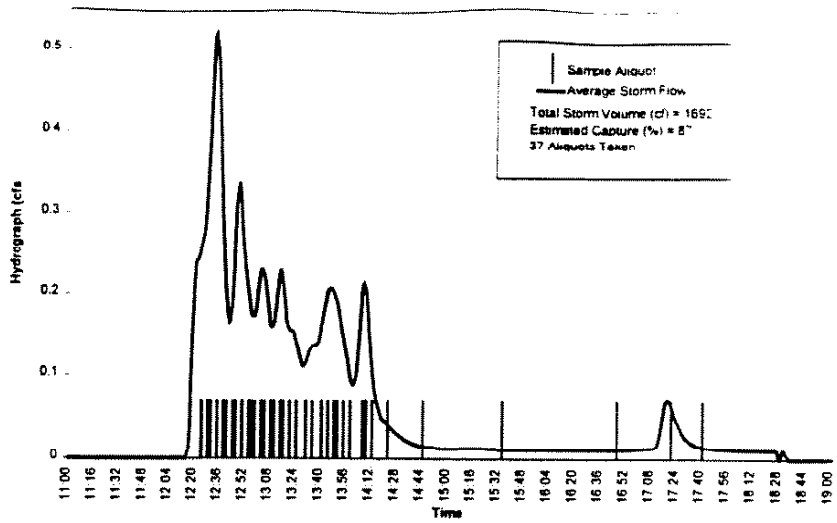
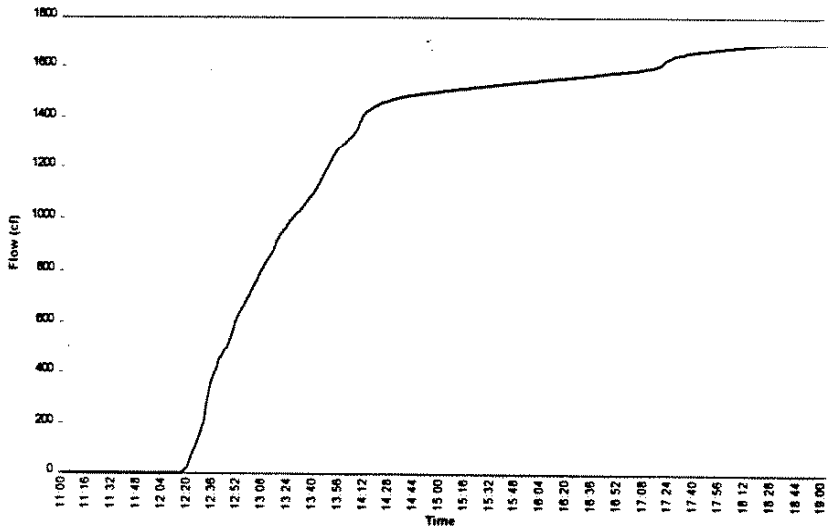


Figure 1-12c: Effluent Hydrograph, Cumulative Flow, and Cumulative Rainfall at the Rosemead MS StreamGuard DII for Event 5 on February 20-21, 2000

Effluent



Cumulative Flow



Cumulative Rainfall

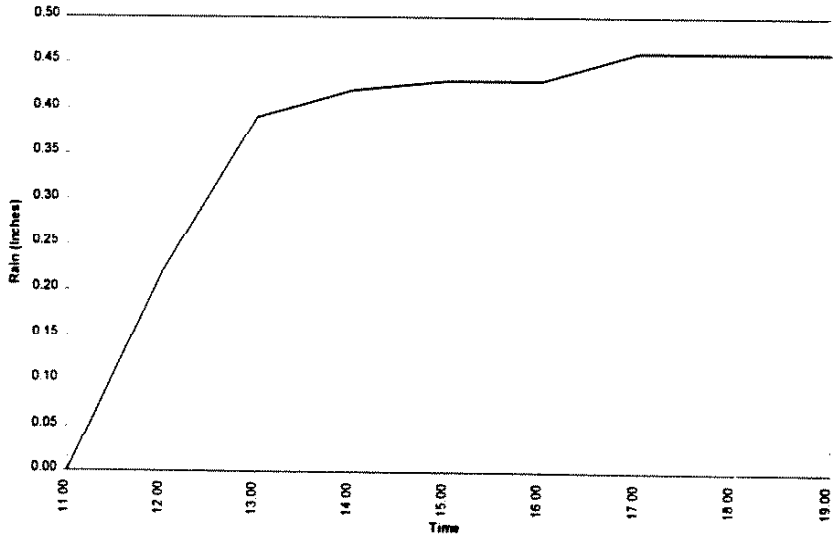
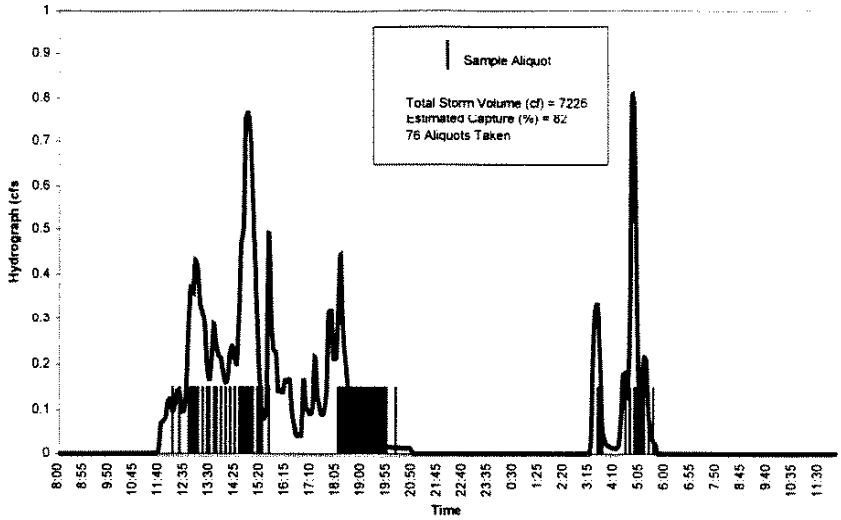
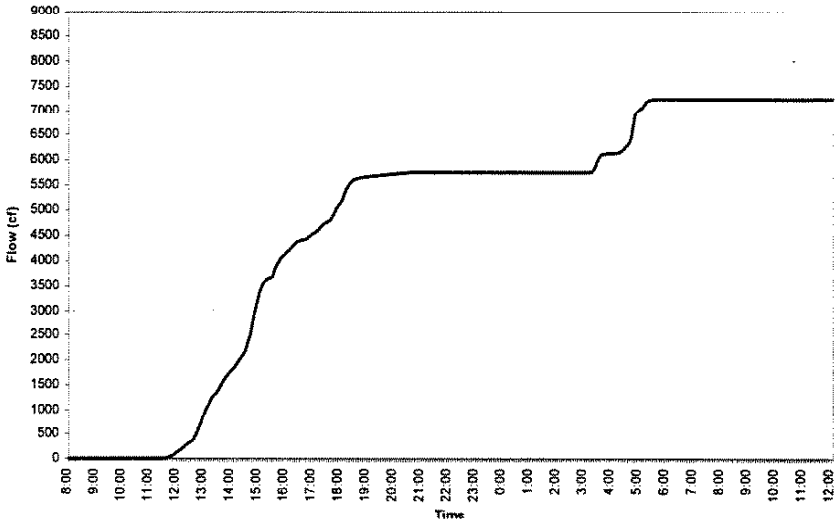


Figure 1-12d: Effluent Hydrograph, Cumulative Flow, and Cumulative Rainfall at the Rosemead MS StreamGuard DII for Event 6 on February 27, 2000

Effluent



Cumulative Flow



Cumulative Rainfall

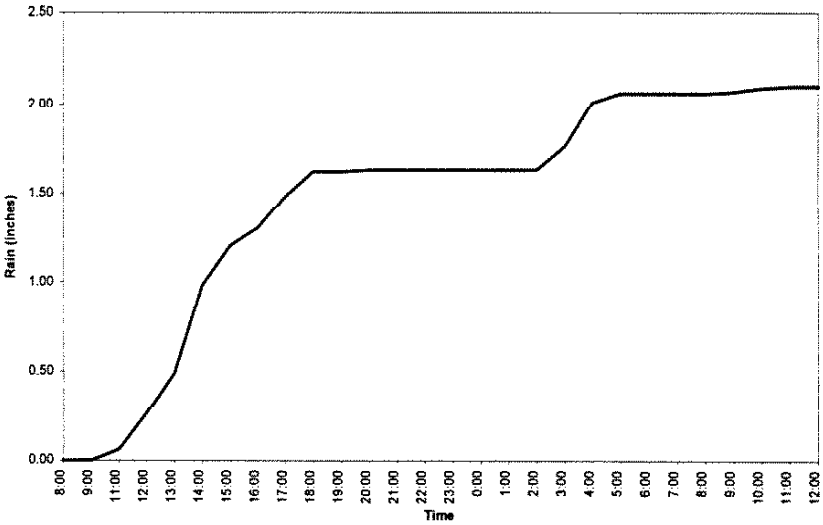
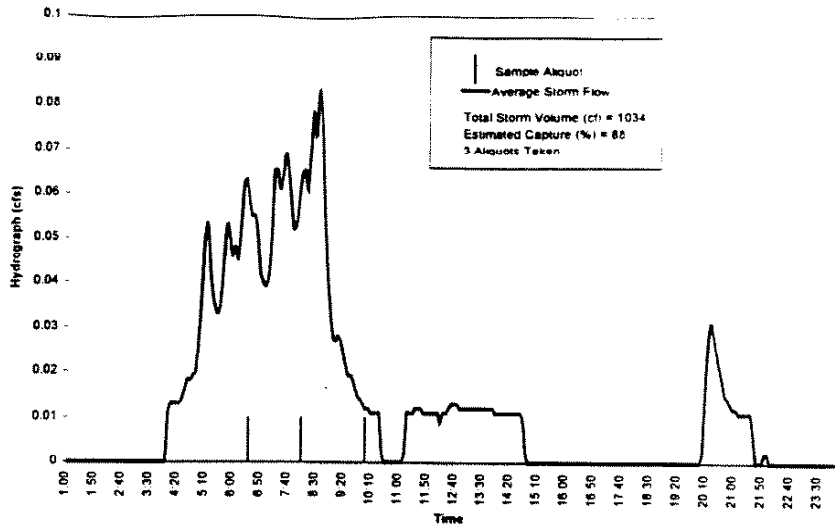
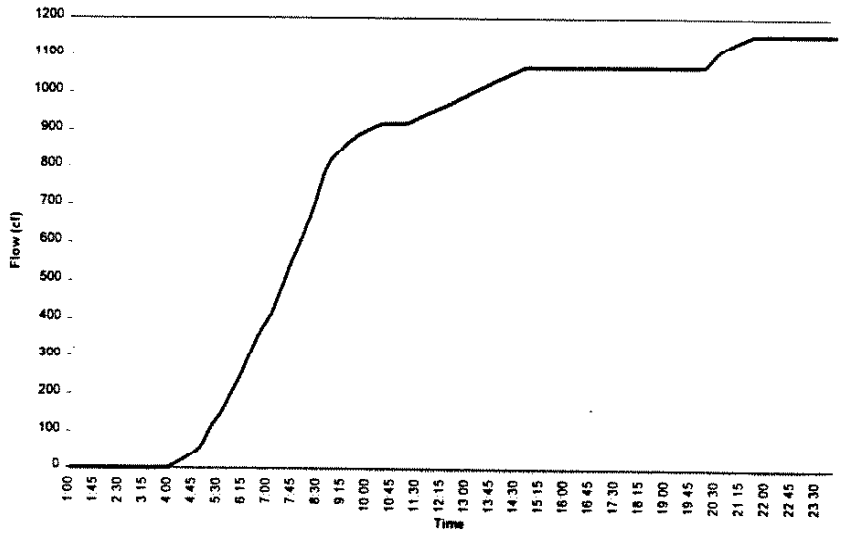


Figure 1-12e: Effluent Hydrograph, Cumulative Flow, and Cumulative Rainfall at the Rosemead MS StreamGuard DII for Event 8 on April 17-18, 2000

Effluent



Cumulative Flow



Cumulative Rainfall

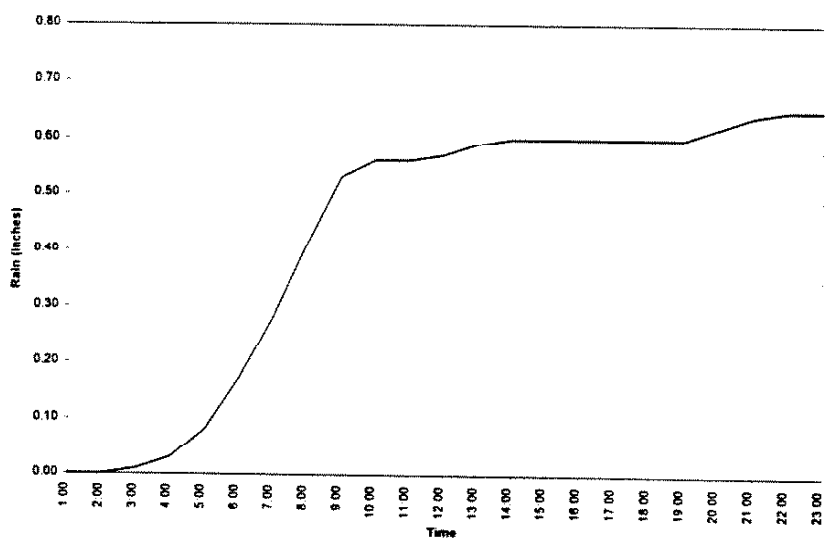
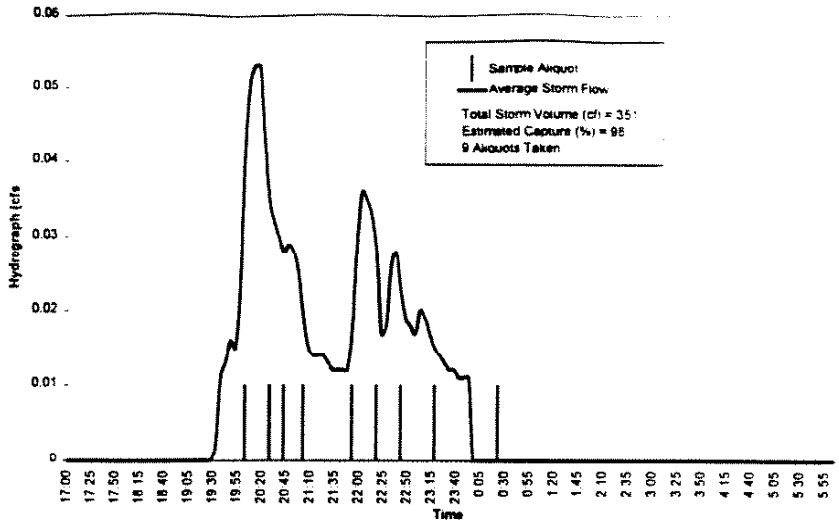
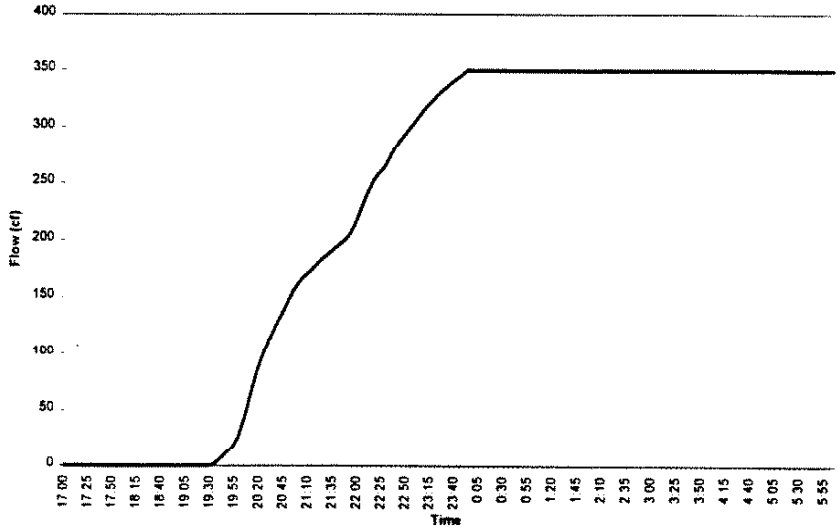


Figure 1-13a: Effluent Hydrograph, Cumulative Flow and Cumulative Rainfall at the Foothill MS Fossil Filter DII for Event 1 on January 25, 2000

Effluent



Cumulative Flow



Cumulative Rainfall

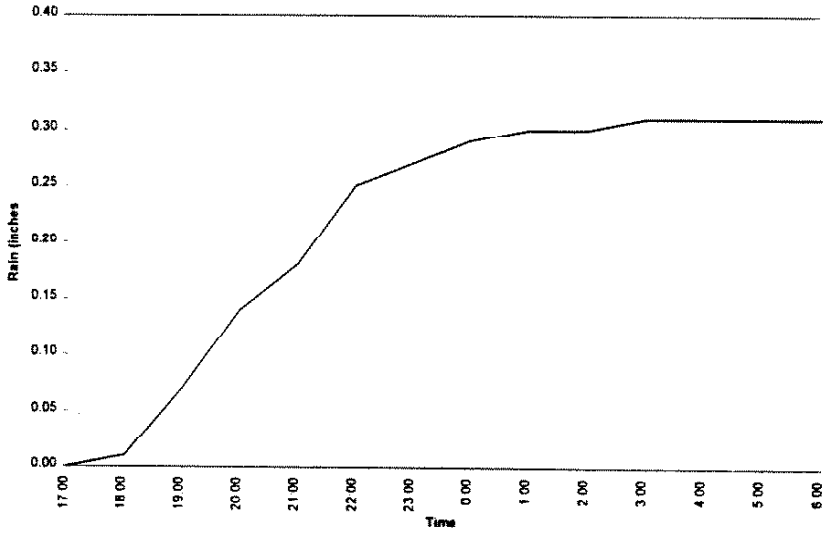
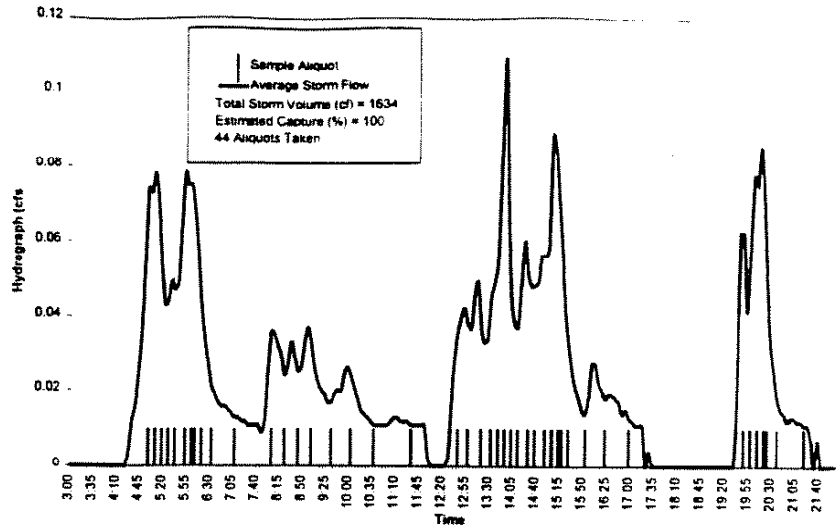
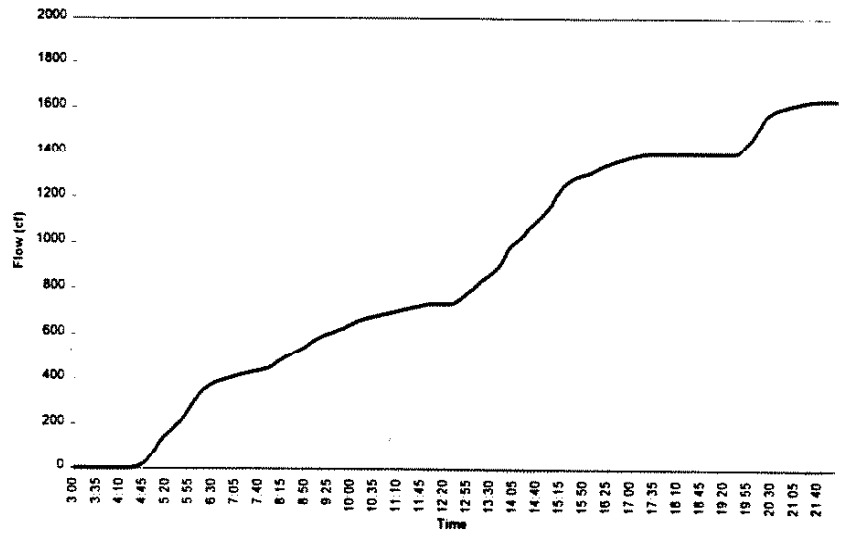


Figure 1-13b: Effluent Hydrograph, Cumulative Flow and Cumulative Rainfall at the Foothill MS Fossil Filter DII for Event 2 on January 30, 2000

Effluent



Cumulative Flow



Cumulative Rainfall

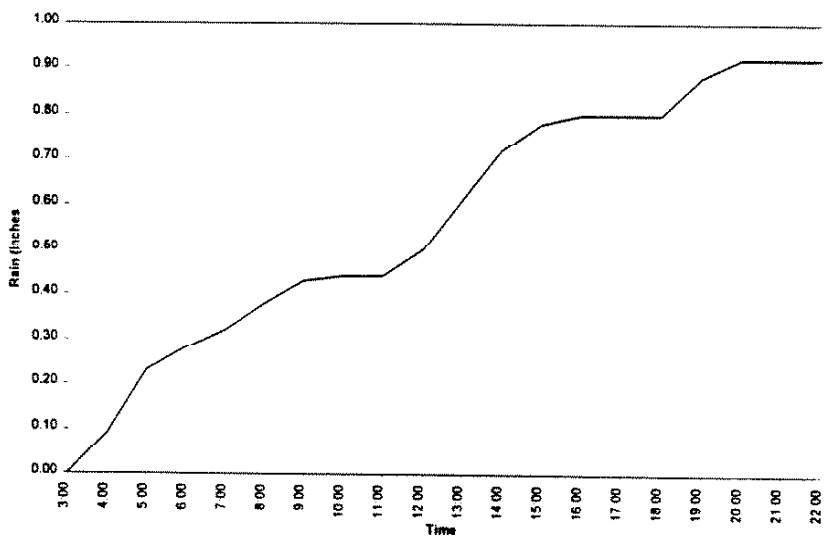
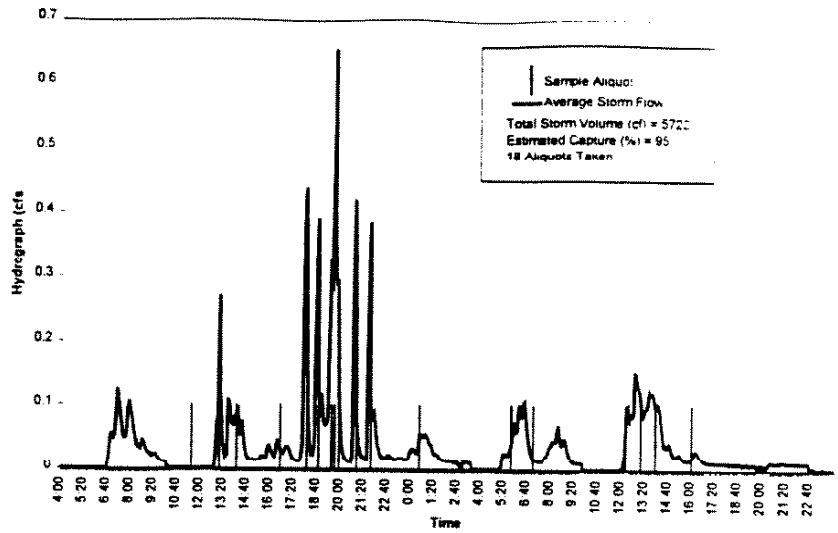
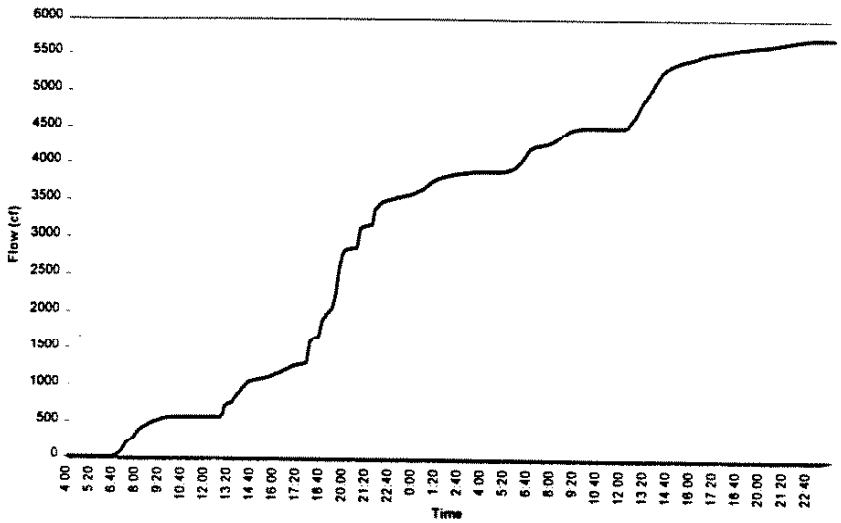


Figure 1-13c: Effluent Hydrograph, Cumulative Flow and Cumulative Rainfall at the Foothill MS Fossil Filter DII for Event 4 on February 16, 2000

Effluent



Cumulative Flow



Cumulative Rainfall

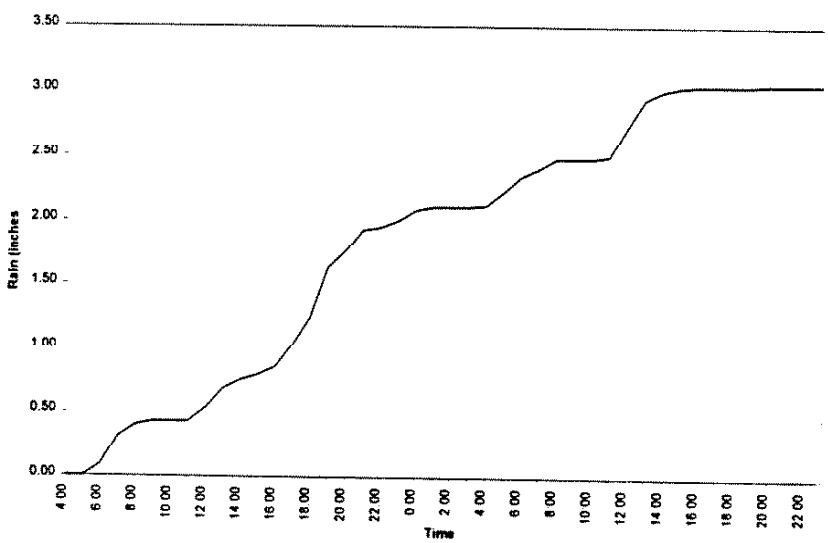
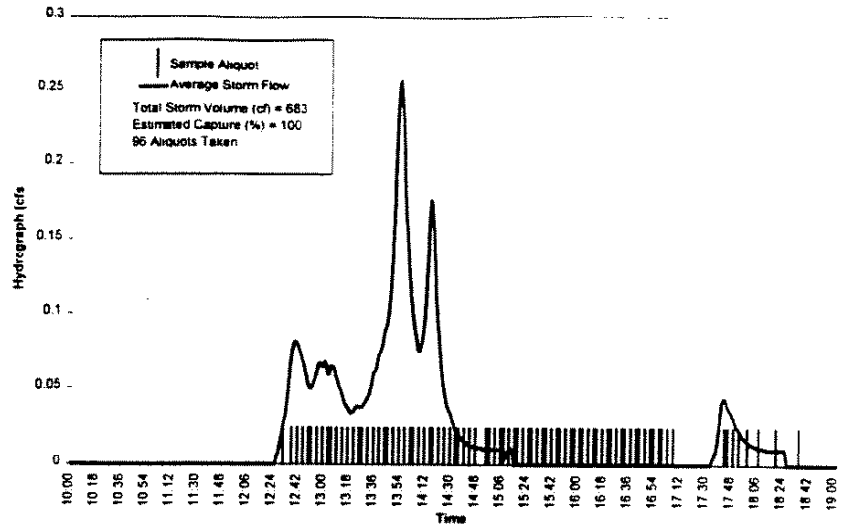
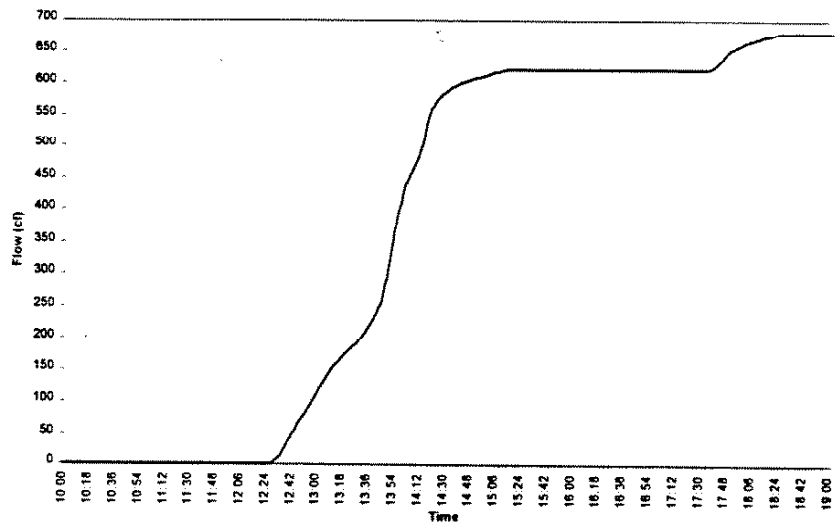


Figure 1-13d: Effluent Hydrograph, Cumulative Flow and Cumulative Rainfall at the Foothill MS Fossil Filter DII for Event 5 on February 20-21, 2000

Effluent



Cumulative Flow



Cumulative Rainfall

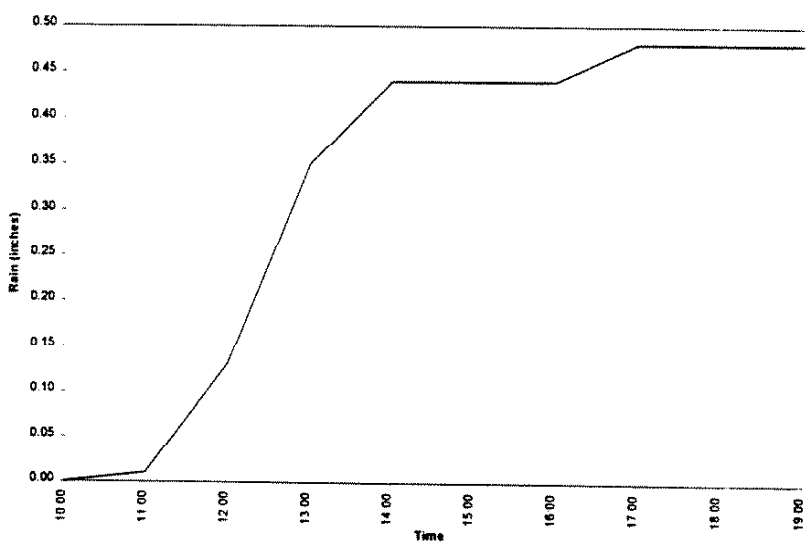
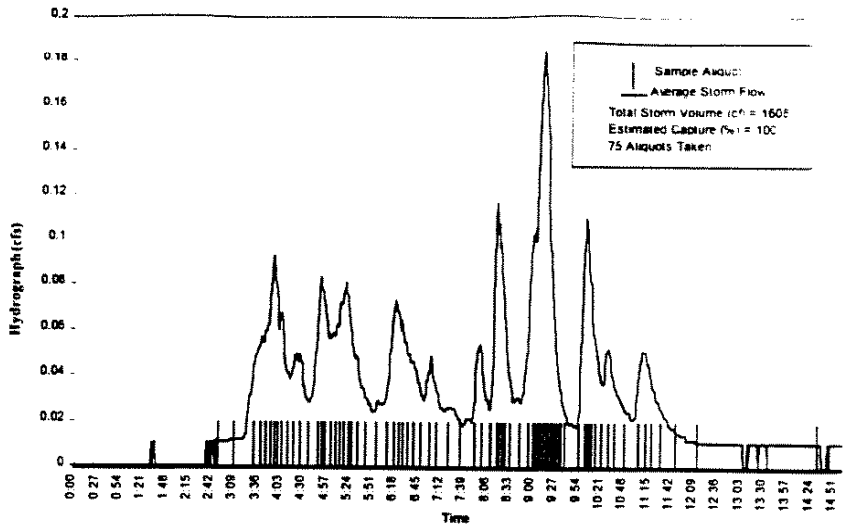
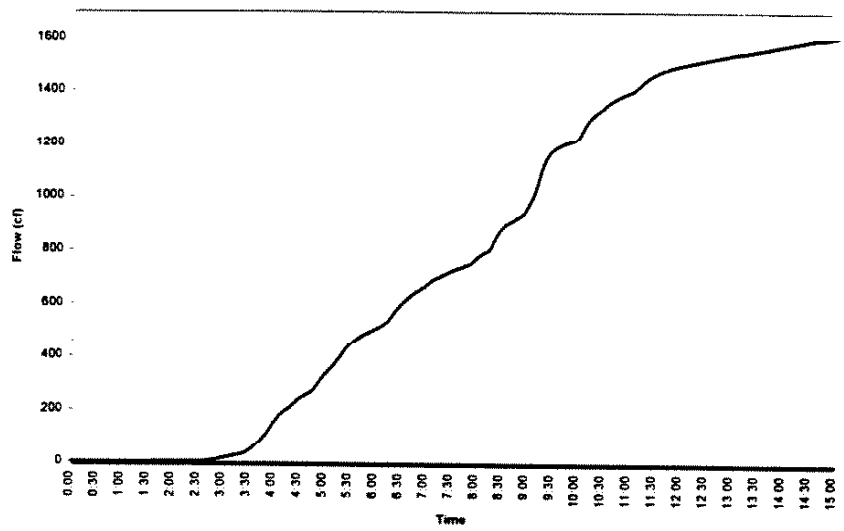


Figure 1-13e: Effluent Hydrograph, Cumulative Flow and Cumulative Rainfall at the Foothill MS Fossil Filter DII for Event 6 on February 27, 2000

Effluent



Cumulative Flow



Cumulative Rainfall

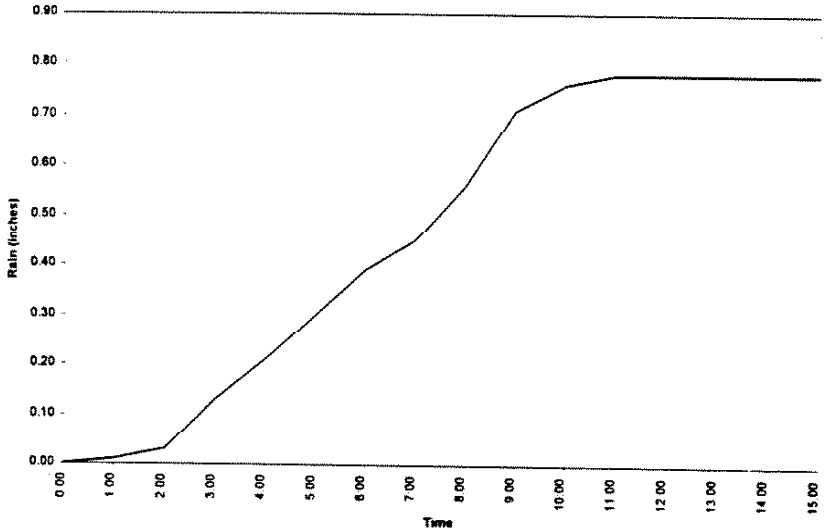
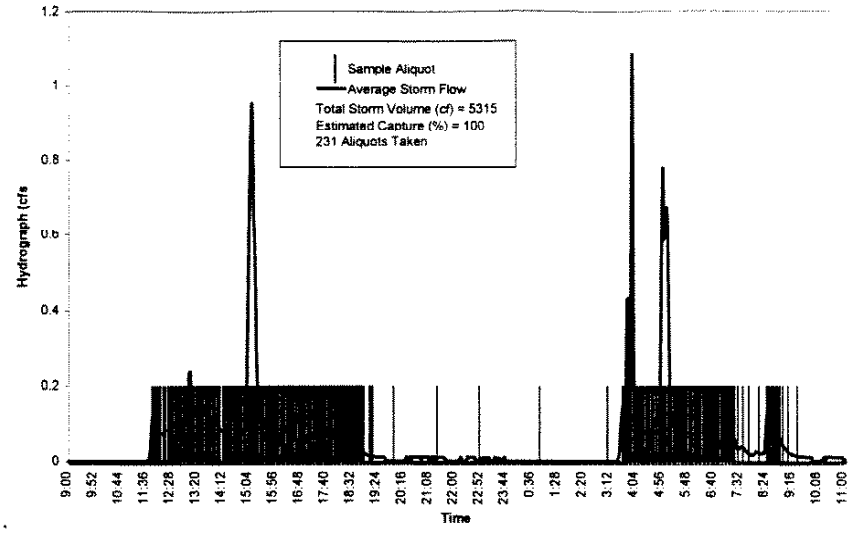
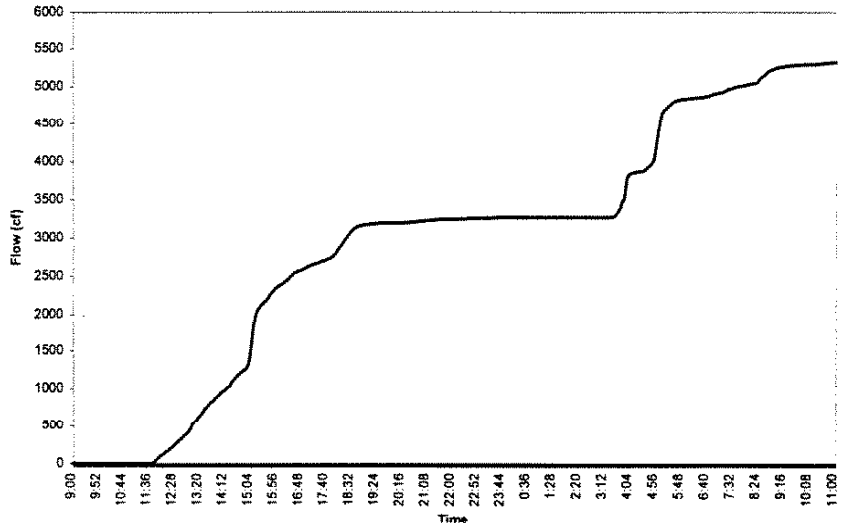


Figure 1-13f: Effluent Hydrograph, Cumulative Flow and Cumulative Rainfall at the Foothill MS Fossil Filter DII for Event 7 on March 8, 2000

Effluent



Cumulative Flow



Cumulative Rainfall

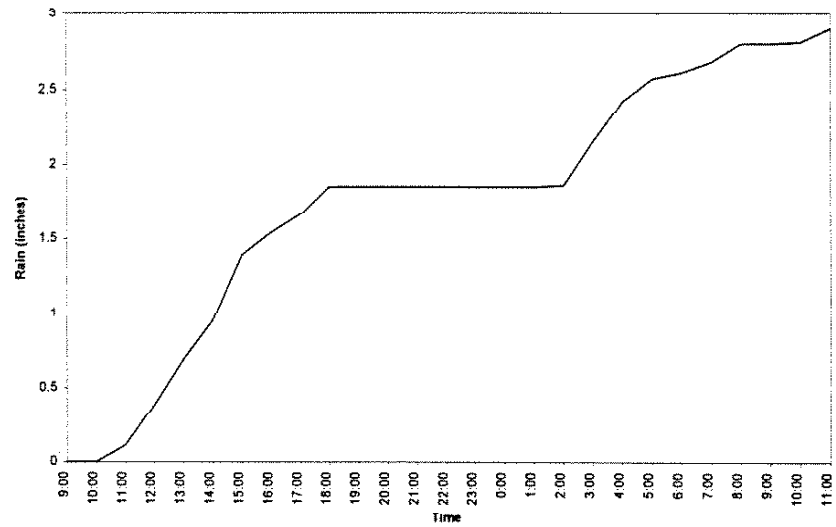
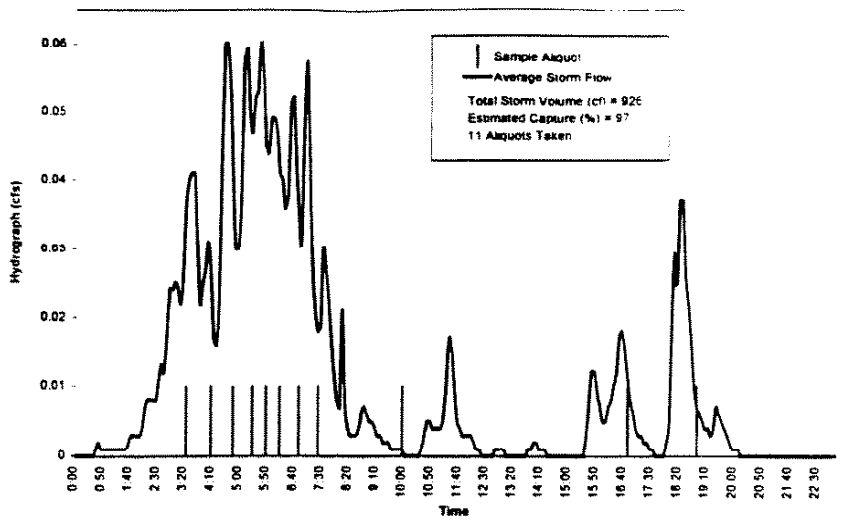
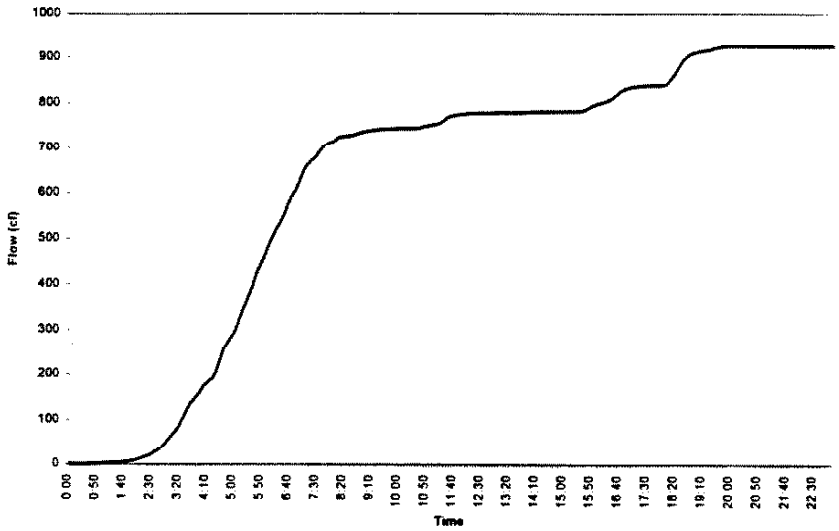


Figure 1-13g: Effluent Hydrograph, Cumulative Flow, and Cumulative Rainfall at the Foothill MS Fossil Filter DII for Event 8 on April 17-18, 2000

Effluent



Cumulative Flow



Cumulative Rainfall

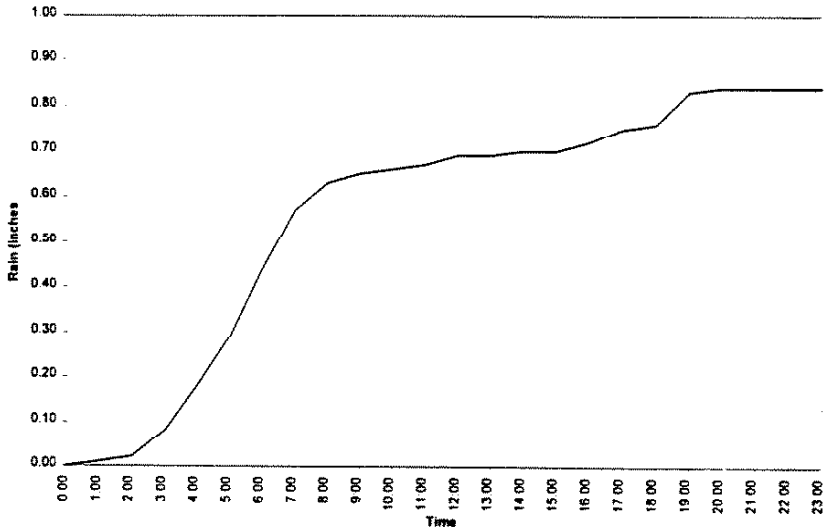
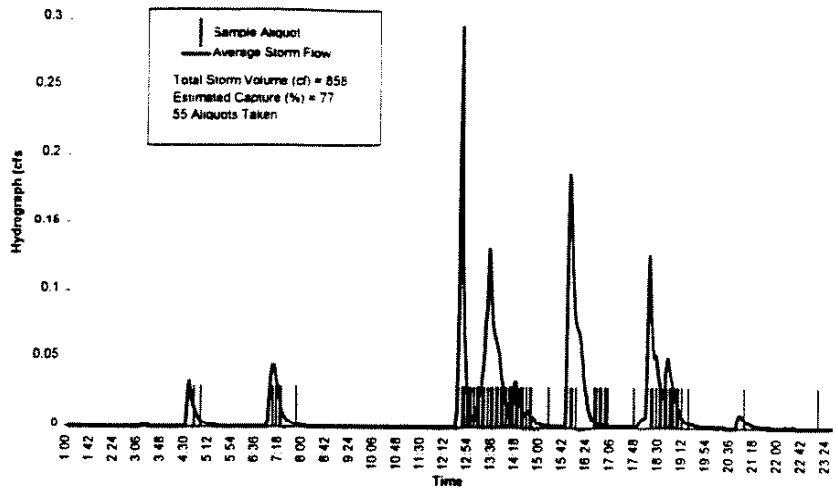
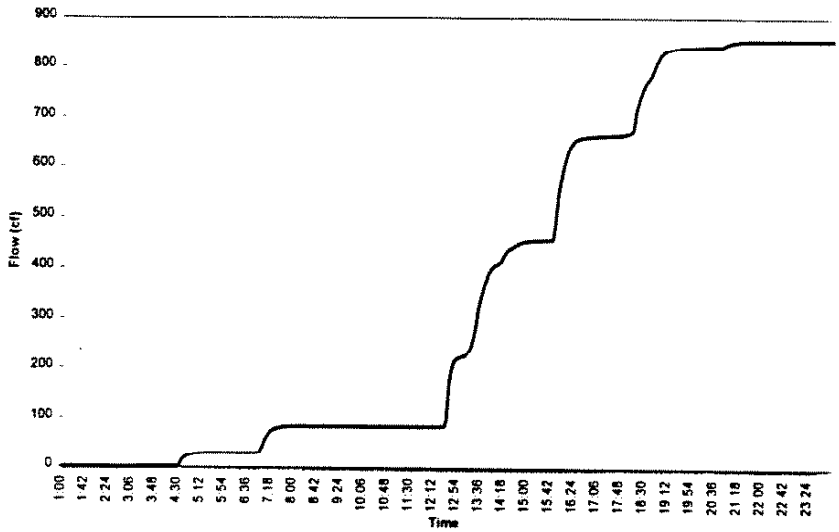


Figure 1-14a: Effluent Hydrograph, Cumulative Flow, and Cumulative Rainfall at the Las Flores MS Fossil Filter DII for Event 1 on January 25, 2000

Effluent



Cumulative Flow



Cumulative Rainfall

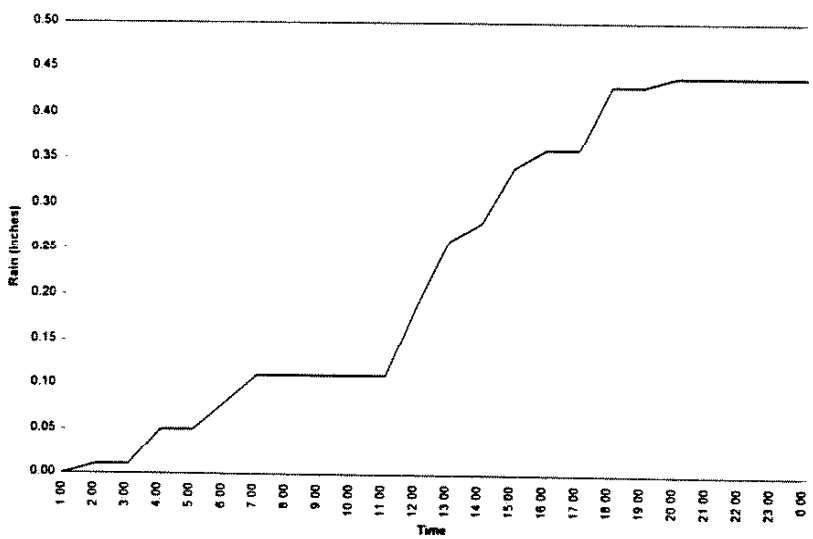
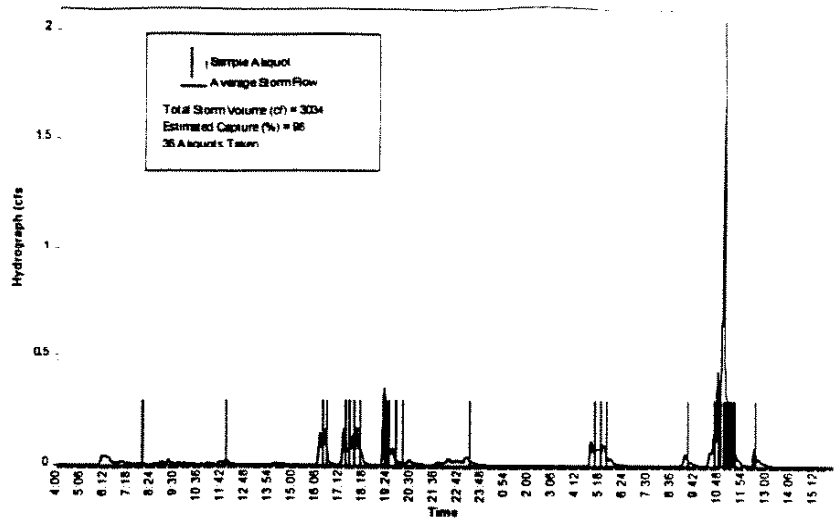
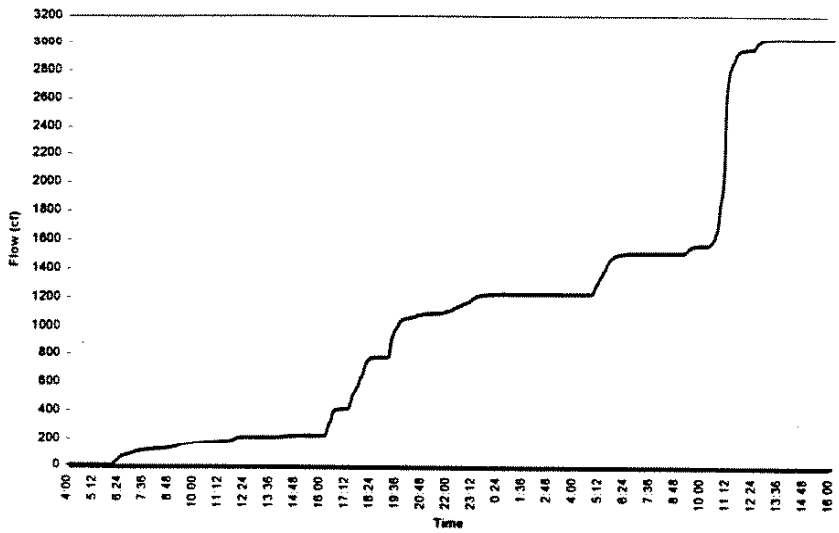


Figure 1-14b: Effluent Hydrograph, Cumulative Flow, and Cumulative Rainfall at the Las Flores MS Fossil Filter DII for Event 3 on February 10, 2000

Effluent



Cumulative Flow



Cumulative Rainfall

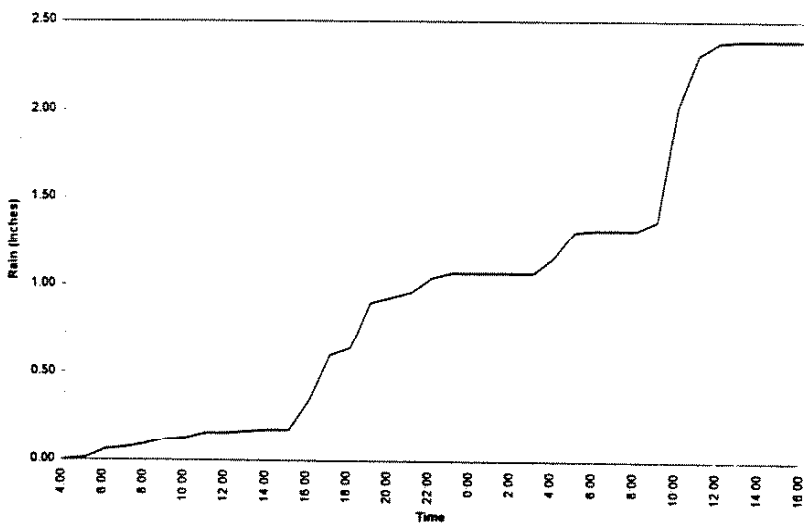
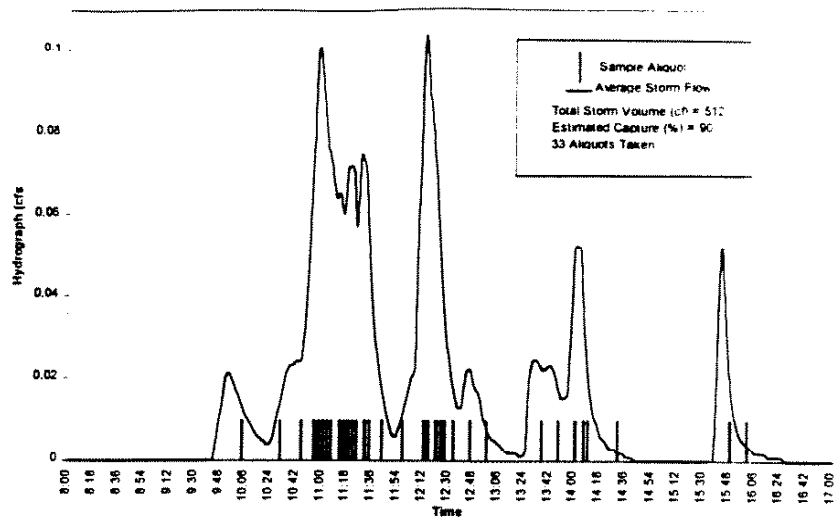
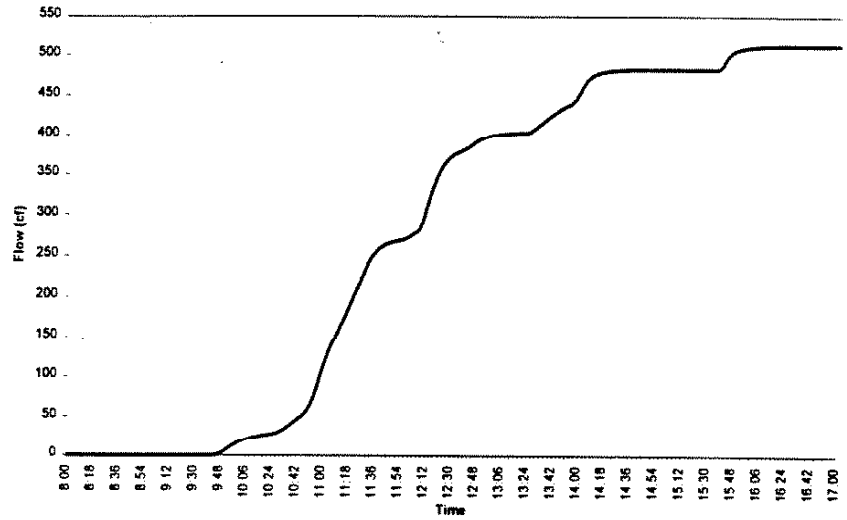


Figure 1-14c: Effluent Hydrograph, Cumulative Flow, and Cumulative Rainfall at the Las Flores MS Fossil Filter DII for Event 5 on February 20-21, 2000

Effluent



Cumulative Flow



Cumulative Rainfall

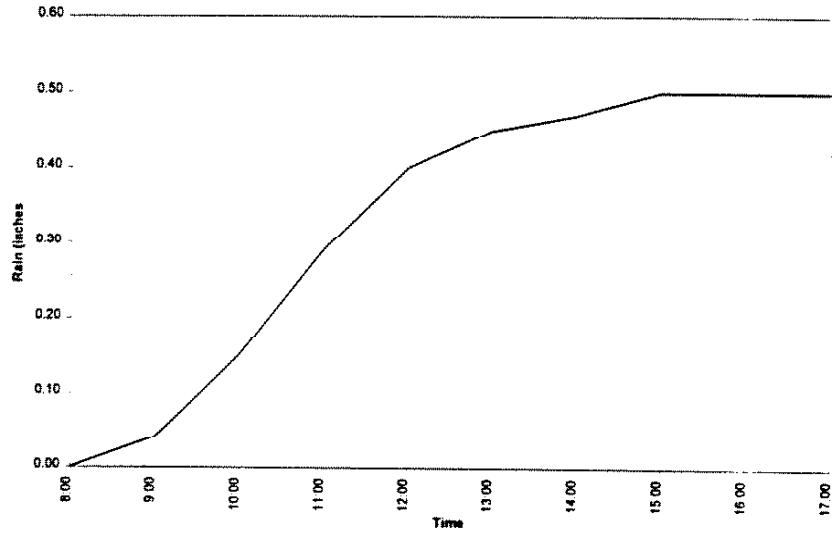
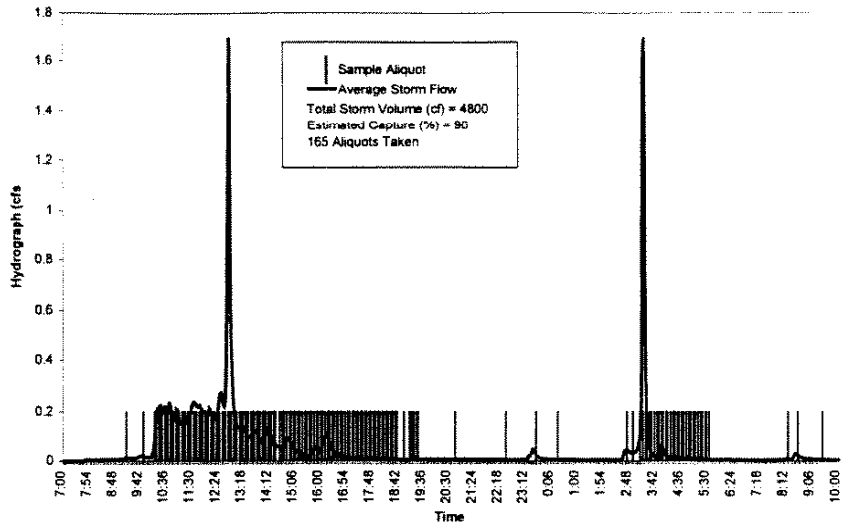
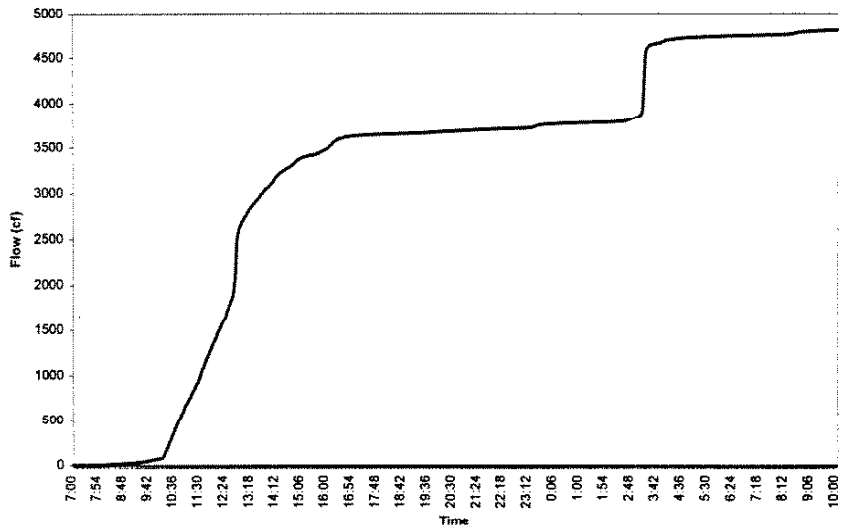


Figure 1-14d: Effluent Hydrograph, Cumulative Flow, and Cumulative Rainfall at the Las Flores MS Fossil Filter DII for Event 6 on February 27, 2000

Effluent



Cumulative Flow



Cumulative Rainfall

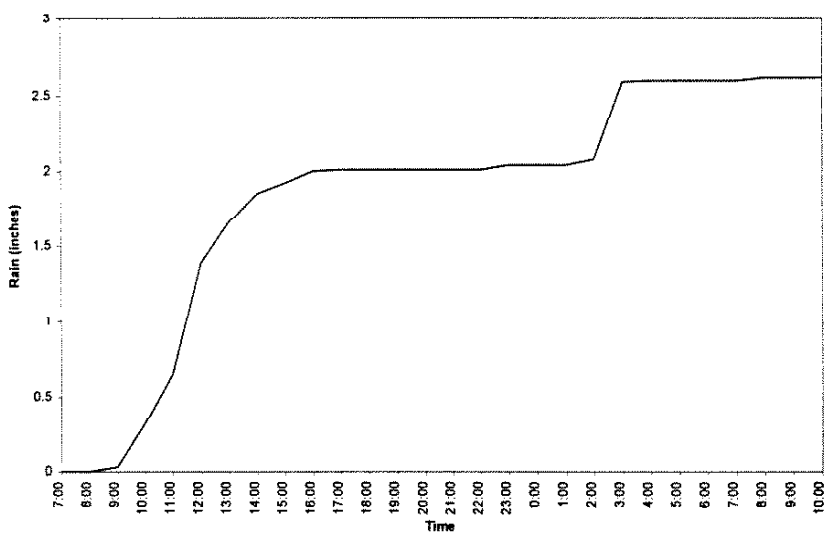
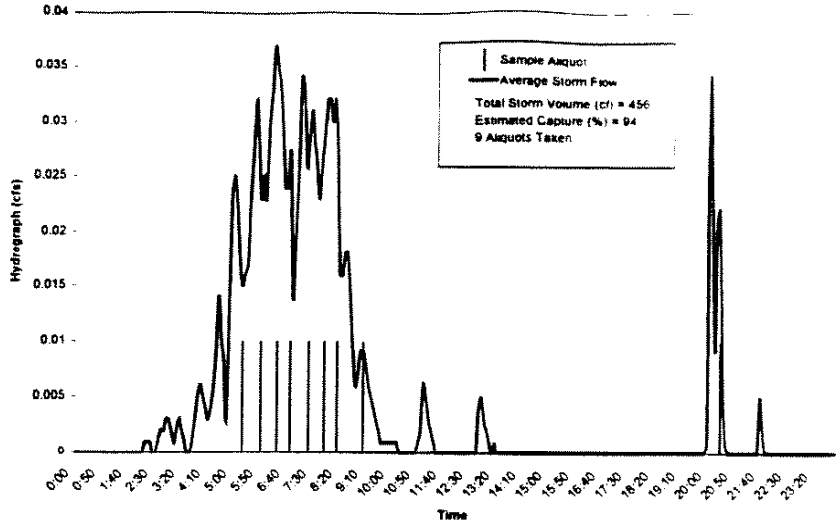
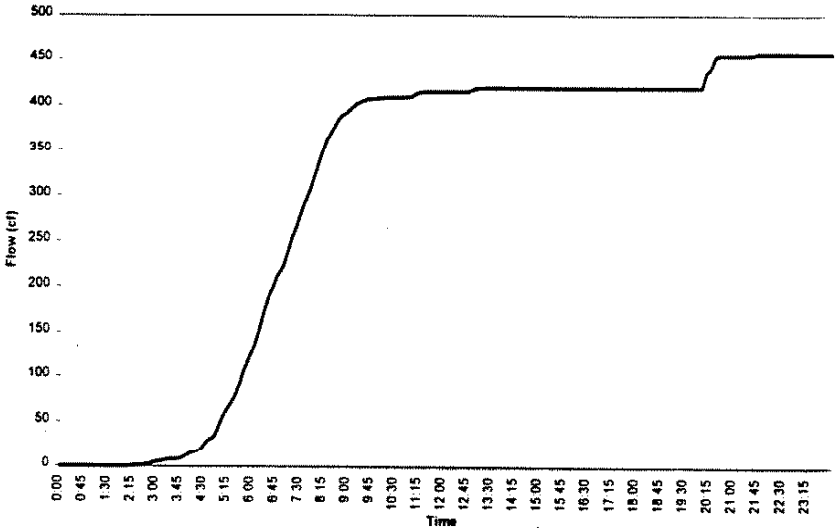


Figure 1-14e: Effluent Hydrograph, Cumulative Flow, and Cumulative Rainfall at the Las Flores MS Fossil Filter DII for Event 8 on April 17-18, 2000

Effluent



Cumulative Flow



Cumulative Rainfall

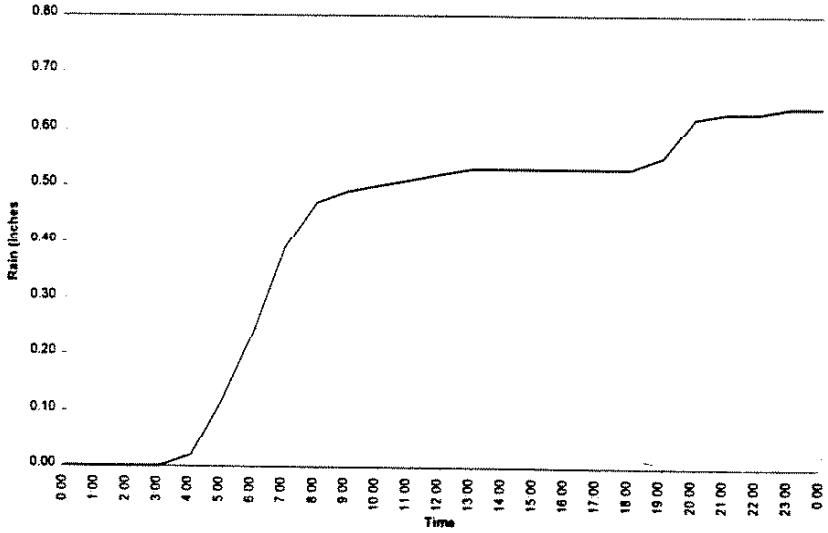
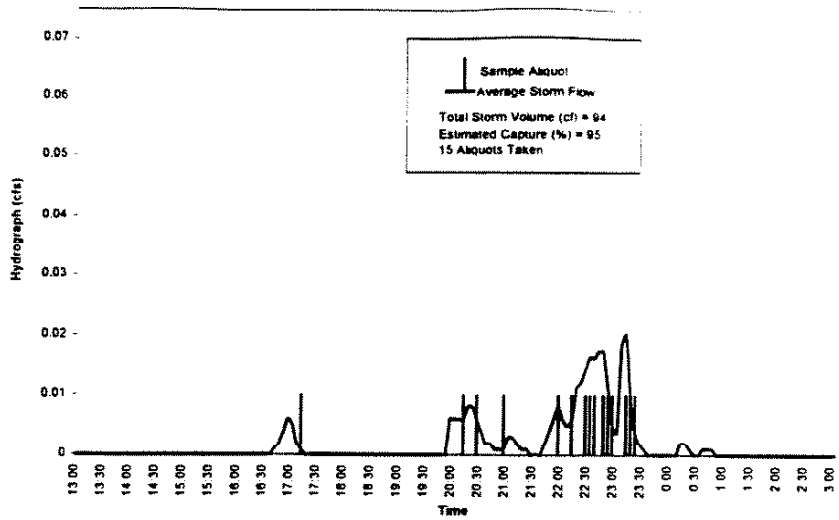
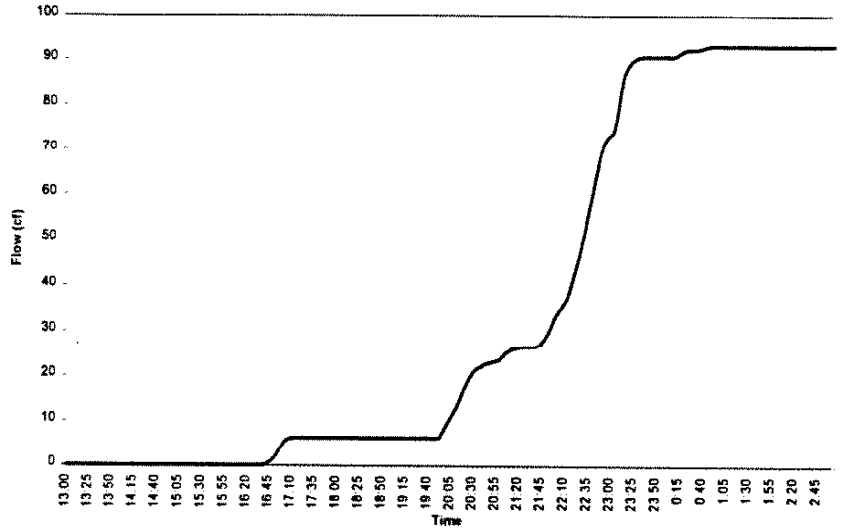


Figure 1-15a: Effluent Hydrograph, Cumulative Flow, and Cumulative Rainfall at the Rosemead MS Fossil Filter DII for Event 1 on January 25, 2000

Effluent



Cumulative Flow



Cumulative Rainfall

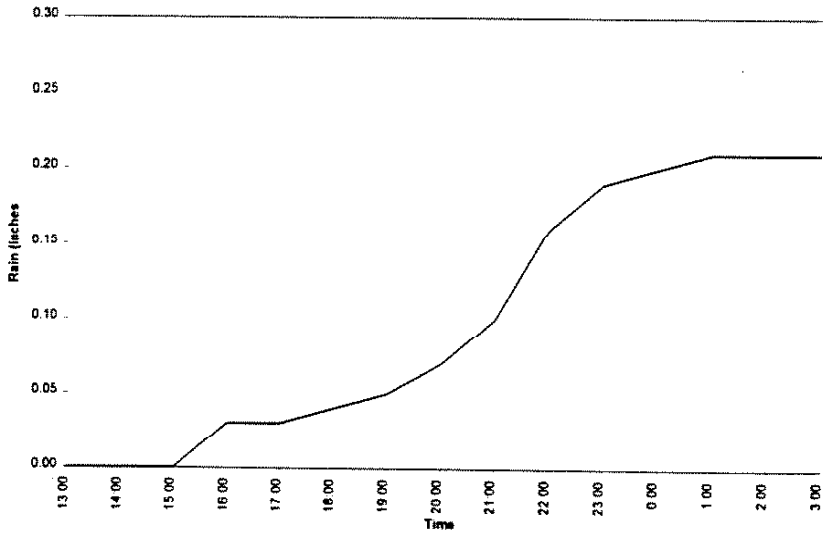
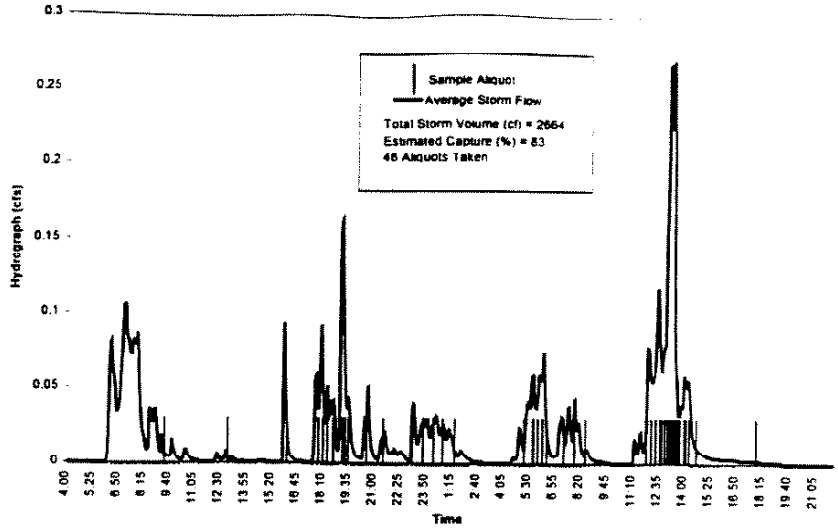
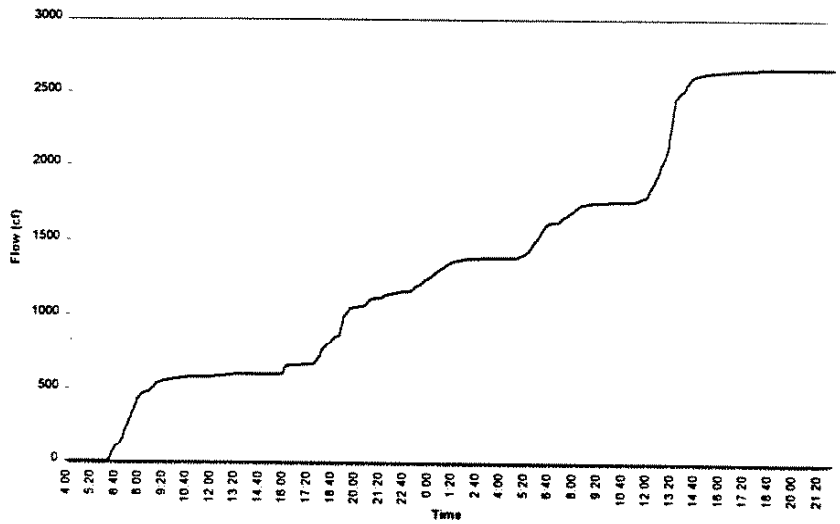


Figure 1-15b: Effluent Hydrograph, Cumulative Flow, and Cumulative Rainfall at the Rosemead MS Fossil Filter DII for Event 2 on January 30, 2000

Effluent



Cumulative Flow



Cumulative Rainfall

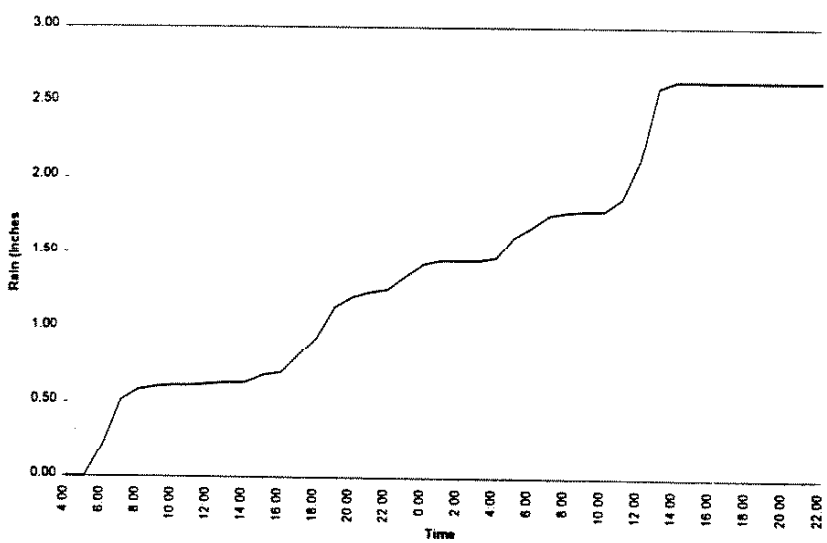
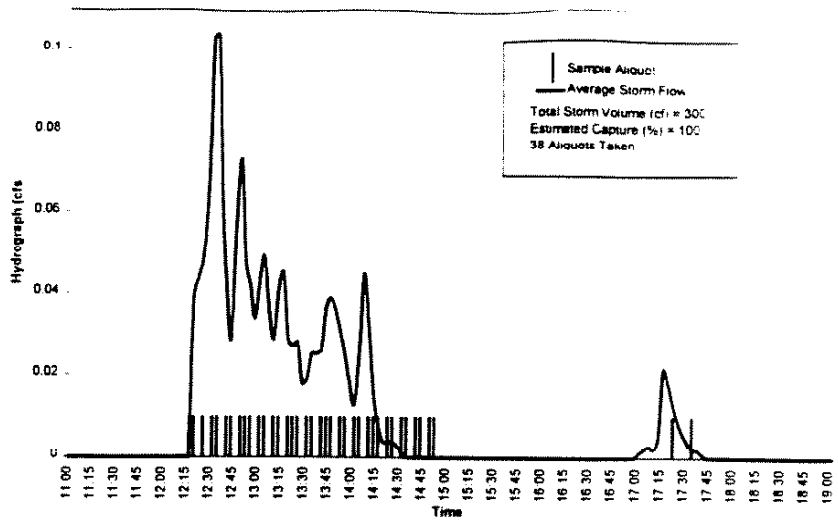
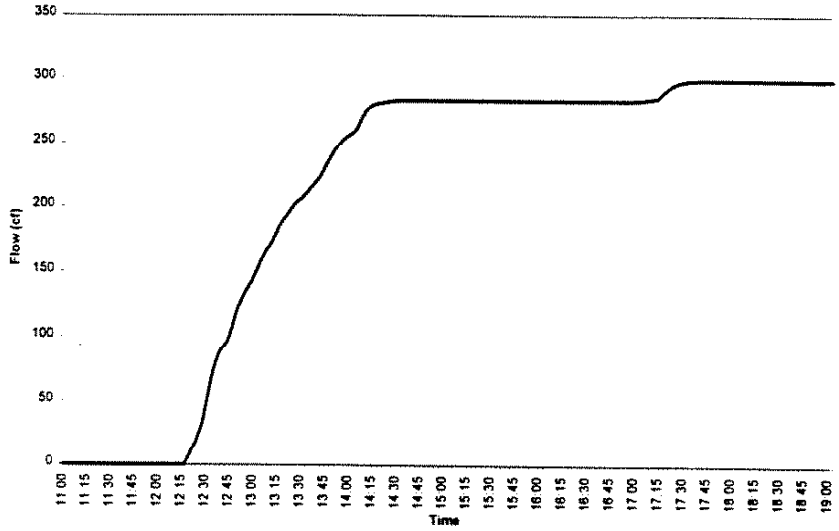


Figure 1-15c: Effluent Hydrograph, Cumulative Flow, and Cumulative Rainfall at the Rosemead MS Fossil Filter DII for Event 5 on February 20-21, 2000

Effluent



Cumulative Flow



Cumulative Rainfall

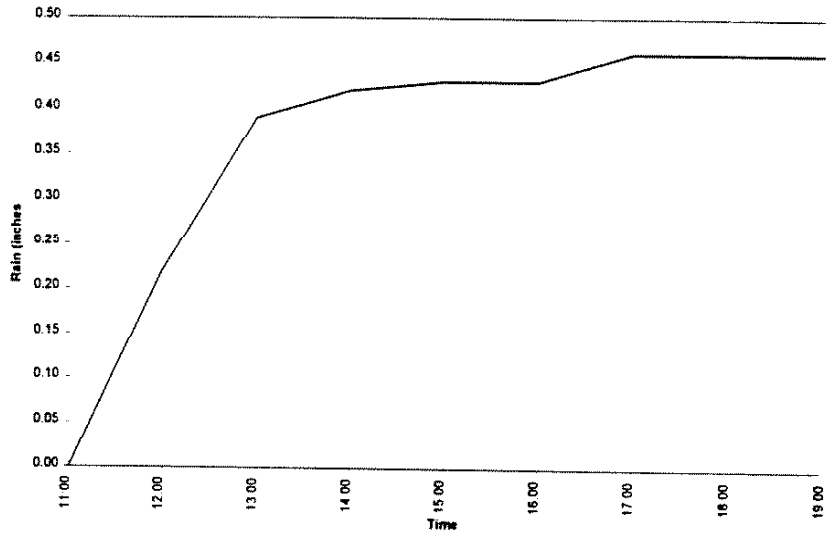
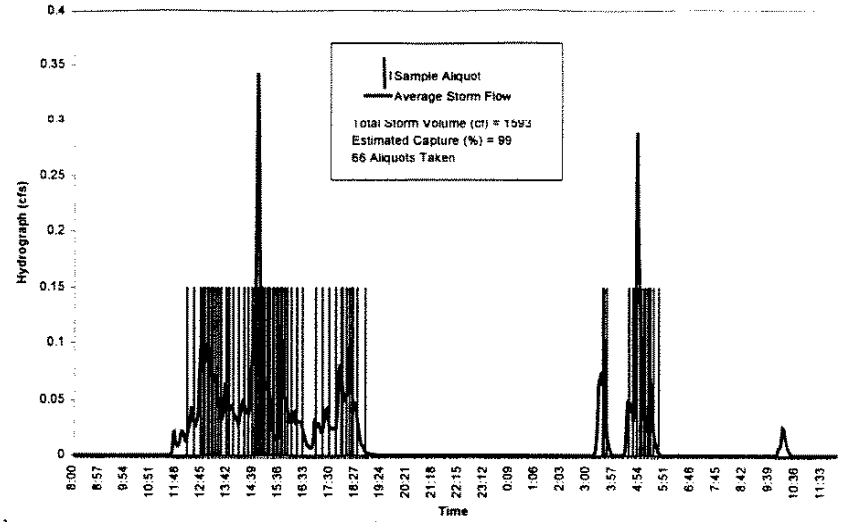
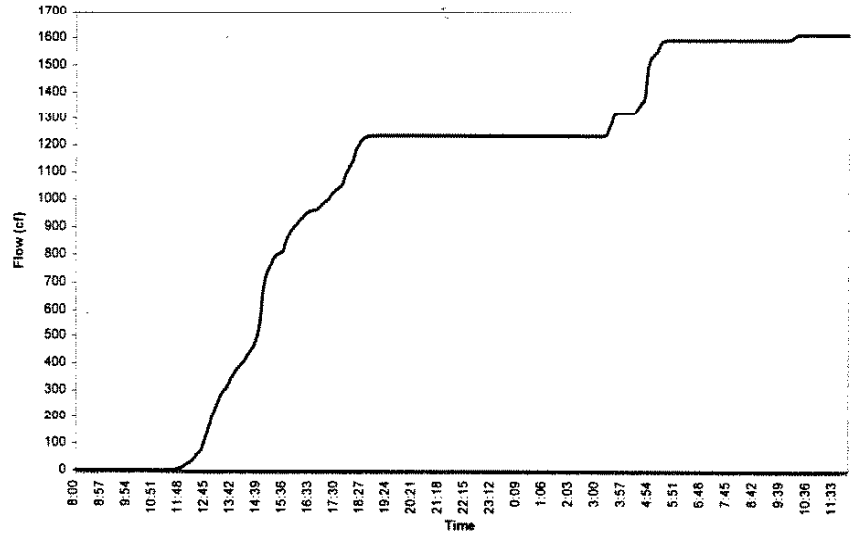


Figure 1-15d: Effluent Hydrograph, Cumulative Flow, and Cumulative Rainfall at the Rosemead MS Fossil Filter DII for Event 6 on February 27, 2000

Effluent



Cumulative Flow



Cumulative Rainfall

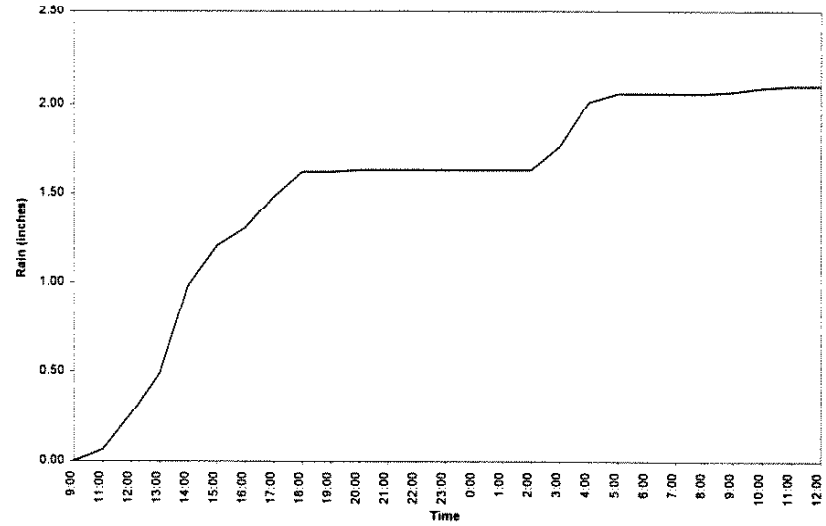
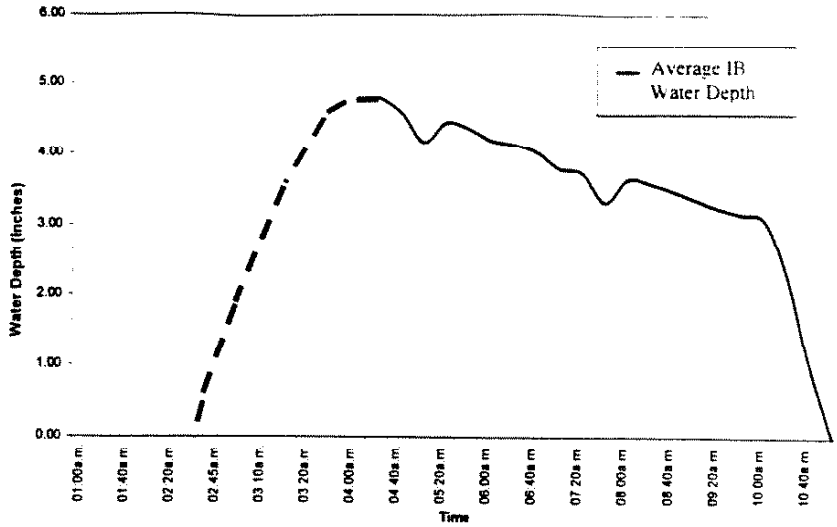


Figure 1-15e: Effluent Hydrograph, Cumulative Flow, and Cumulative Rainfall-at the Rosemead MS Fossil Filter DII for Event 8 on April 17-18, 2000

IB Water Depth



Cumulative Rainfall

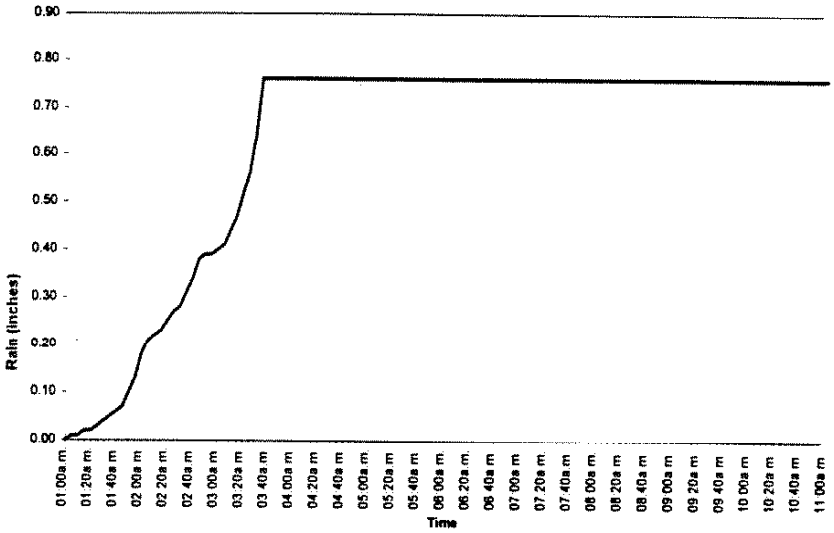
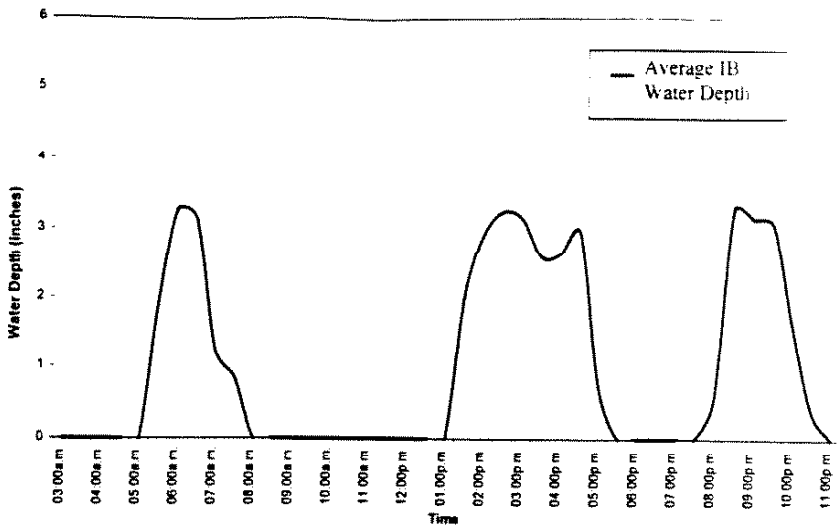


Figure 1-16a: Infiltration Basin Water Depth and Cumulative Rainfall at the I-605/SR-91 Infiltration Basin on February 12, 2000. Note: Data logger at IB turned on at 04:00 on 2/12/2000, dashed line represents estimated water depth in IB.

IB
Water
Depth



Cumulative
Rainfall

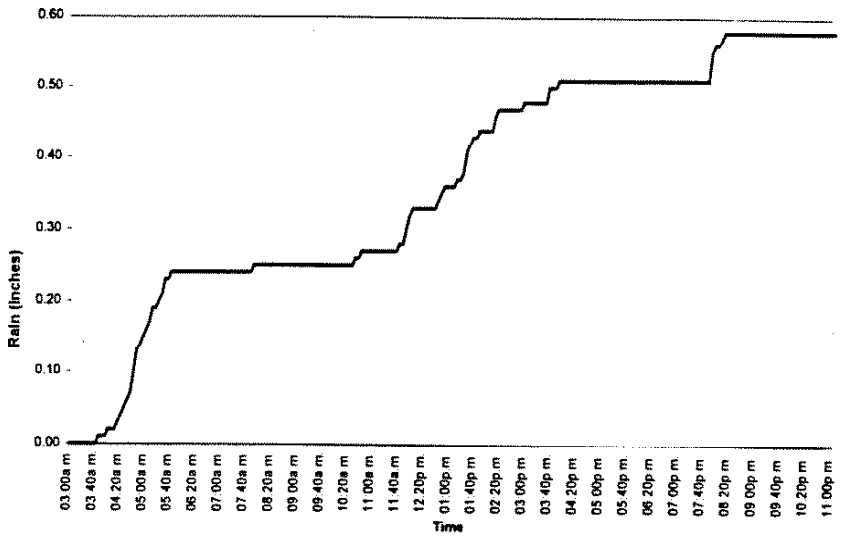
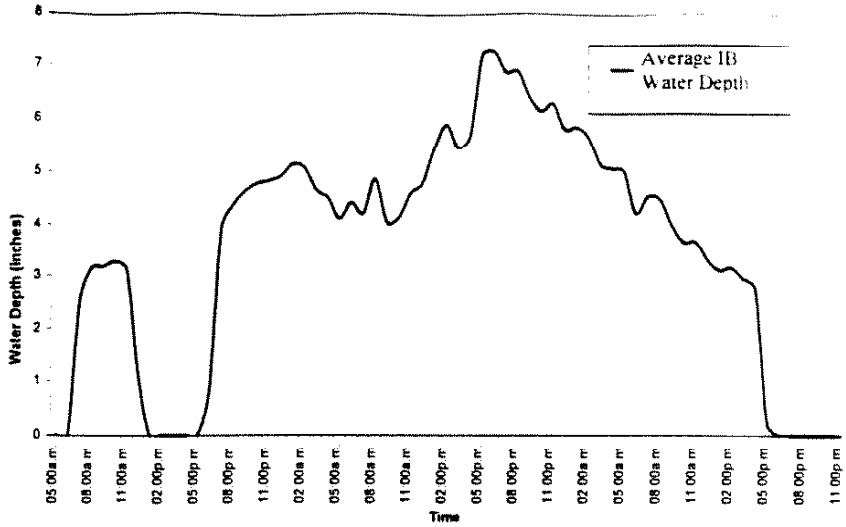


Figure 1-16b: Infiltration Basin Water Depth and Cumulative Rainfall at the I-605/SR-91 Infiltration Basin on February 16, 2000.

IB Water Depth



Cumulative Rainfall

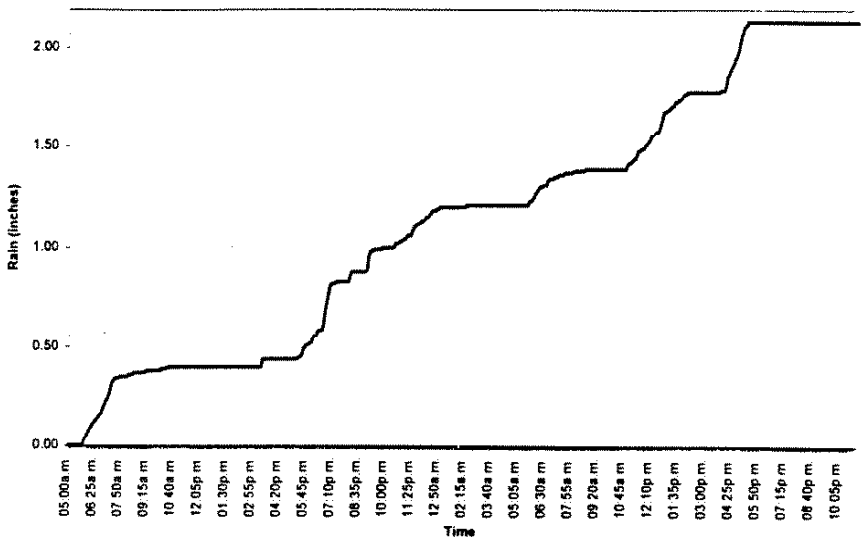
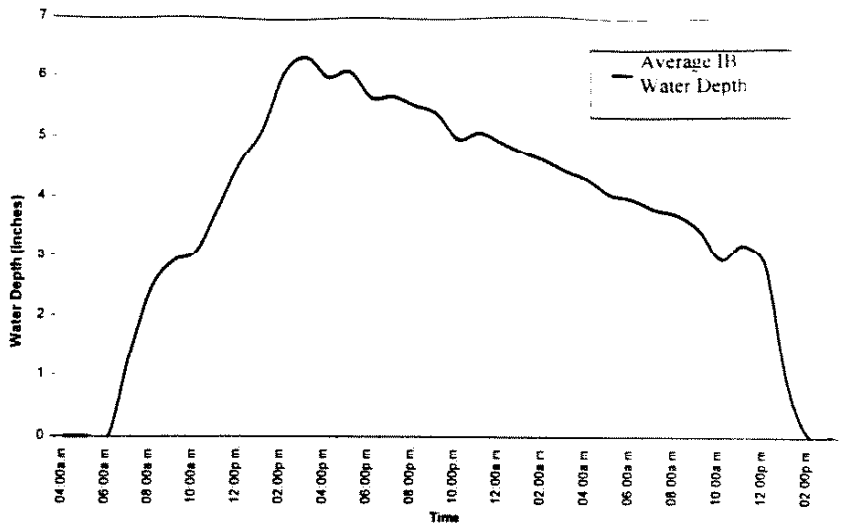


Figure 1-16c: Infiltration Basin Water Depth and Cumulative Rainfall at the I-605/SR-91 Infiltration Basin during February 20 to February 21, 2000

IB Water Depth



Cumulative Rainfall

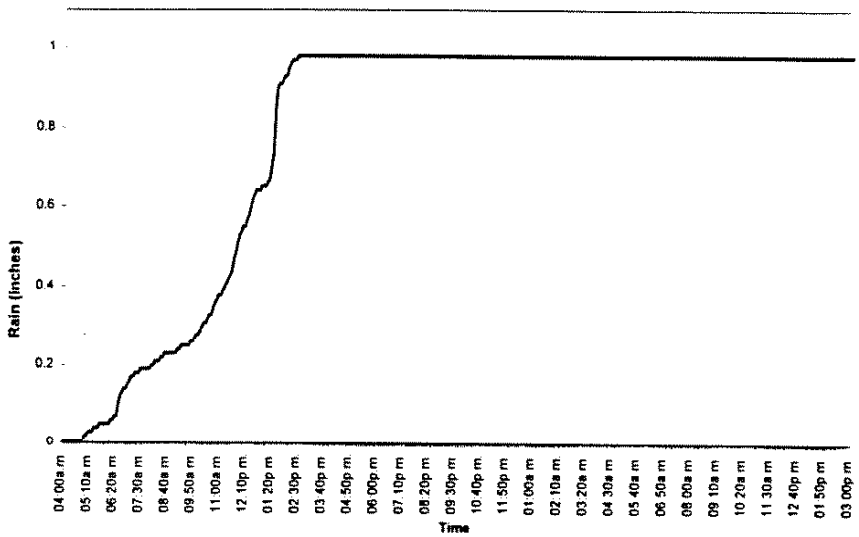
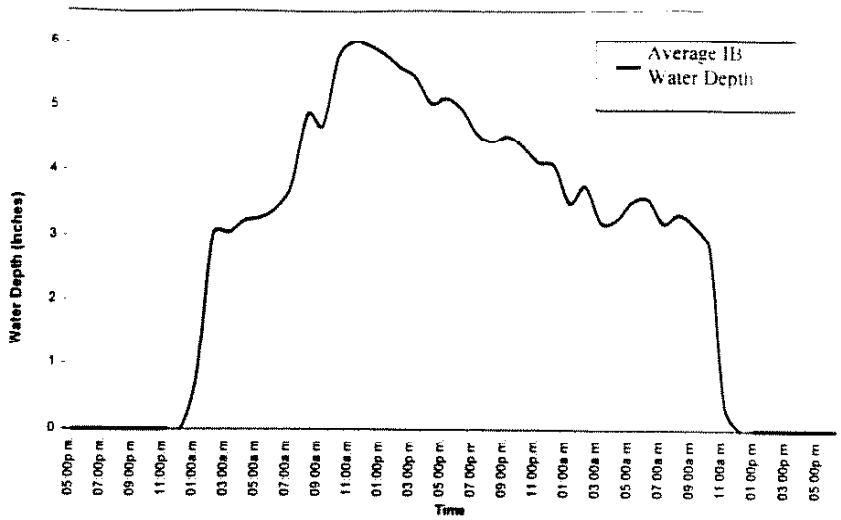


Figure 1-16d: Infiltration Basin Water Depth and Cumulative Rainfall at the I-605/SR-91 Infiltration Basin during February 23 to 24, 2000

IB Water Depth



Cumulative Rainfall

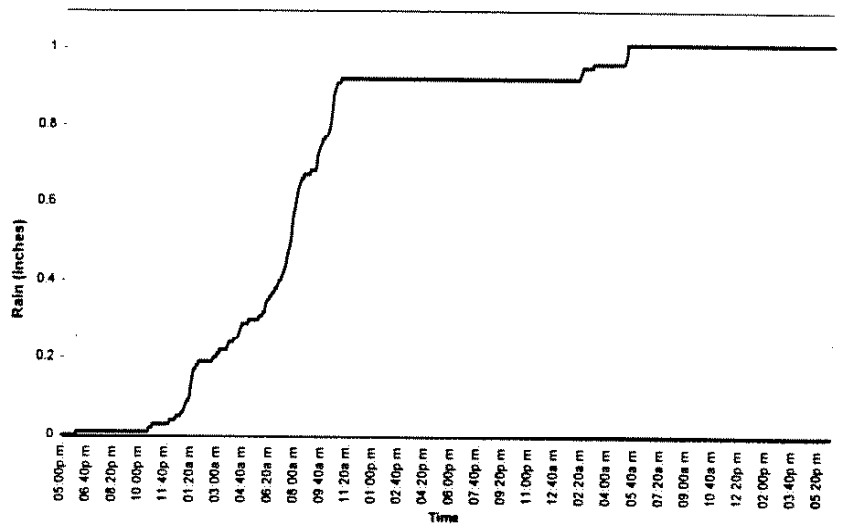
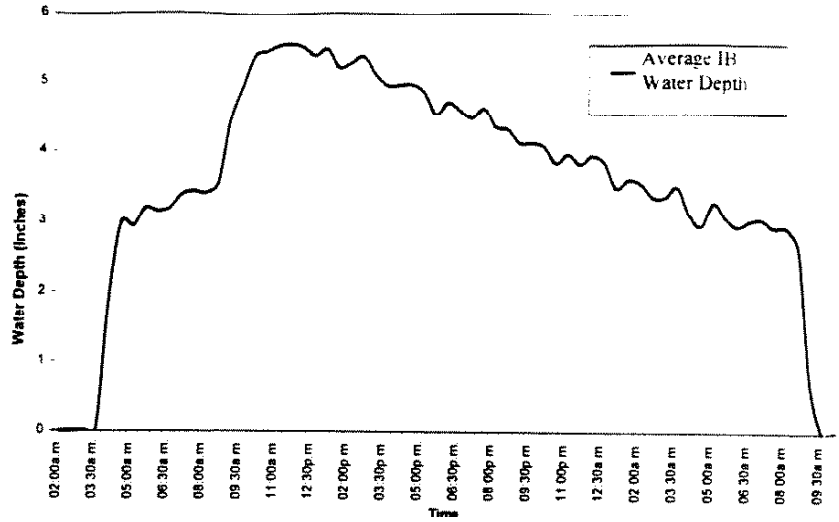


Figure 1-16e: Infiltration Basin Water Depth and Cumulative Rainfall at the I-605/SR-91 Infiltration Basin during March 5 to March 6, 2000

IB
Water
Depth



Cumulative
Rainfall

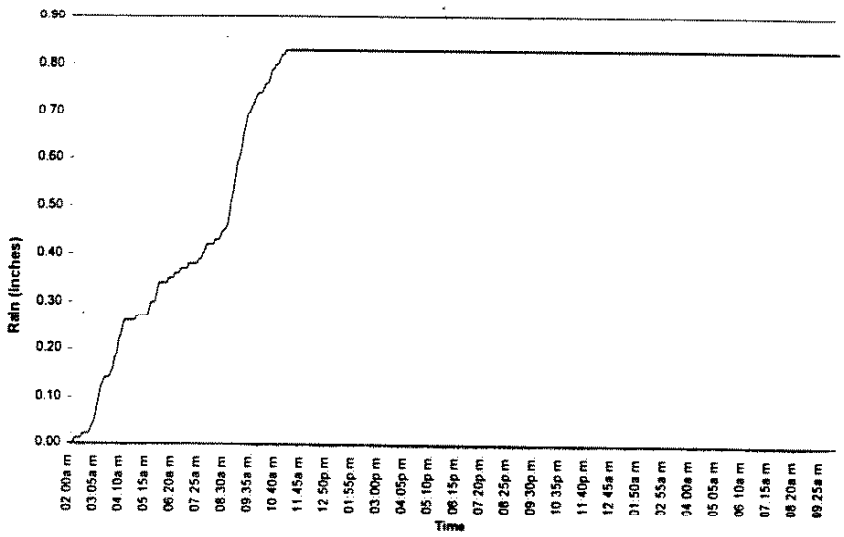
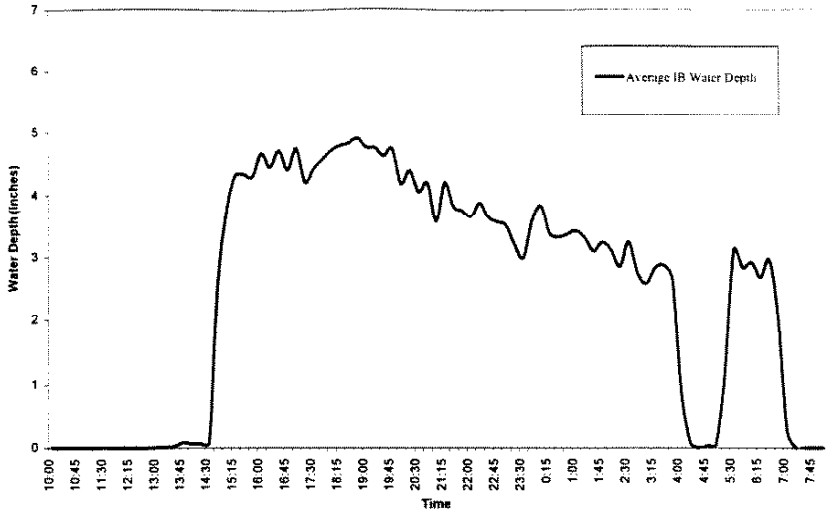


Figure 1-16f: Infiltration Basin Water Depth and Cumulative Rainfall at the I-605/SR-91 Infiltration Basin during March 8 to March 9, 2000

Basin Water Depth



Cumulative Rainfall

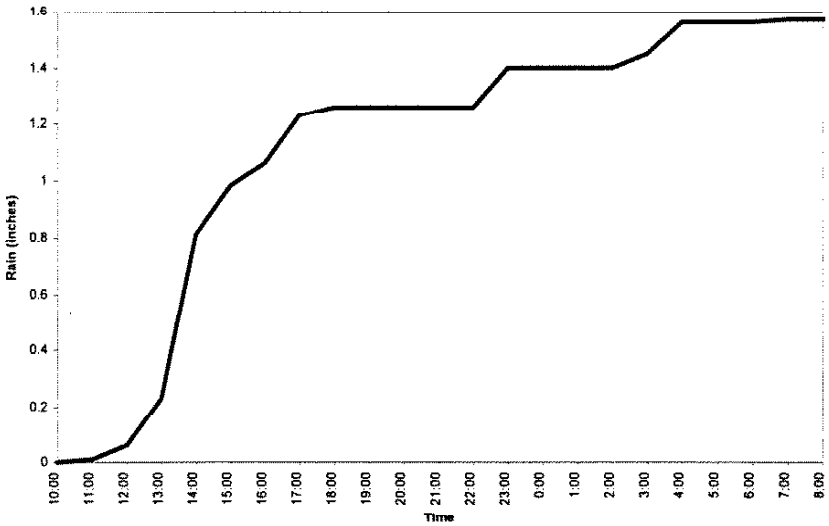
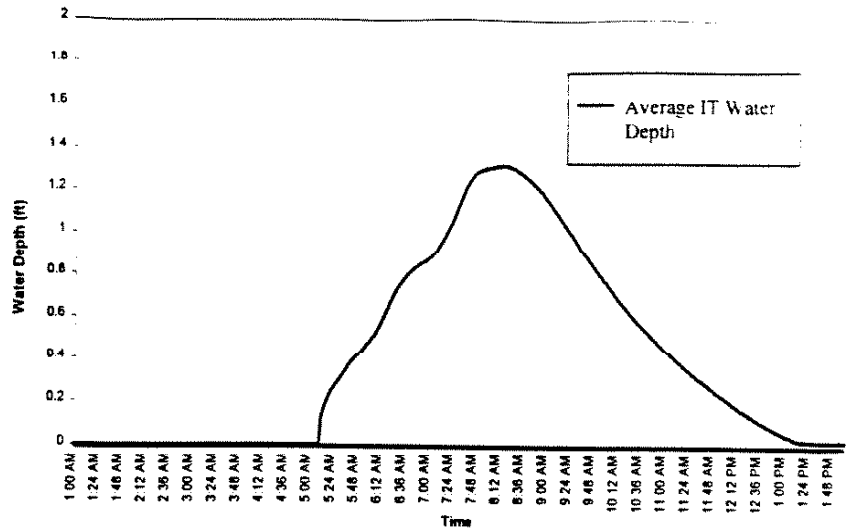
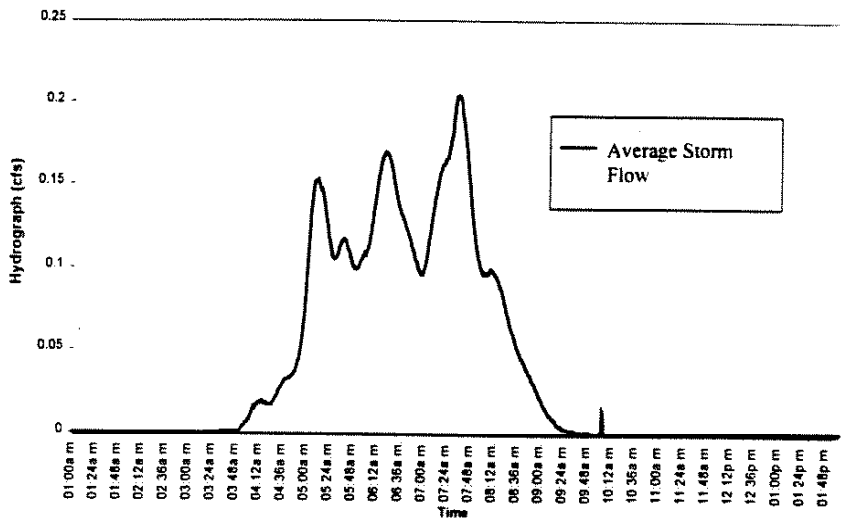


Figure 1-16g: Infiltration Basin Water Depth and Cumulative Rainfall at the I-605/SR-91 Infiltration Basin during April 17 to April 18, 2000.

Water Depth in IT



Influent



Cumulative Rainfall

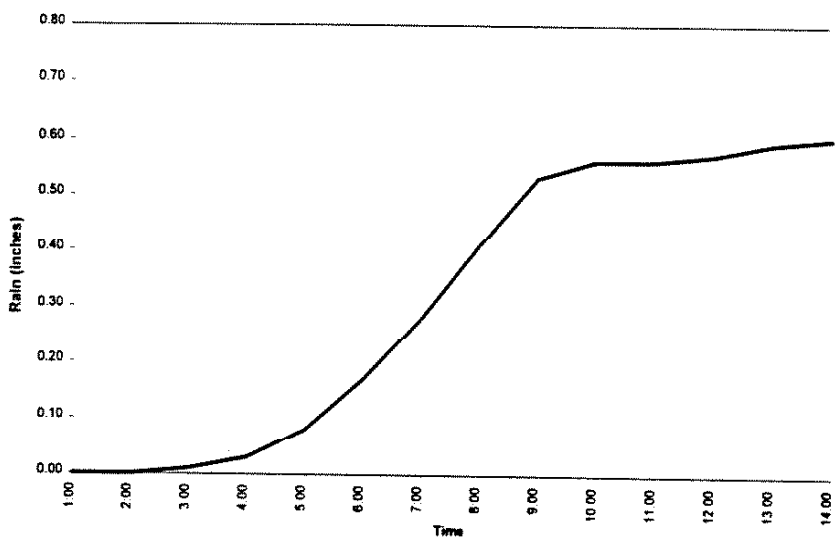
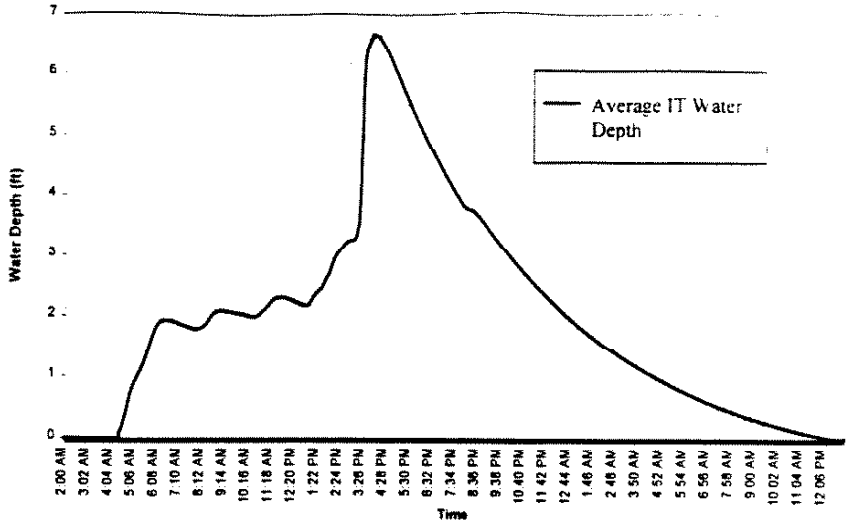
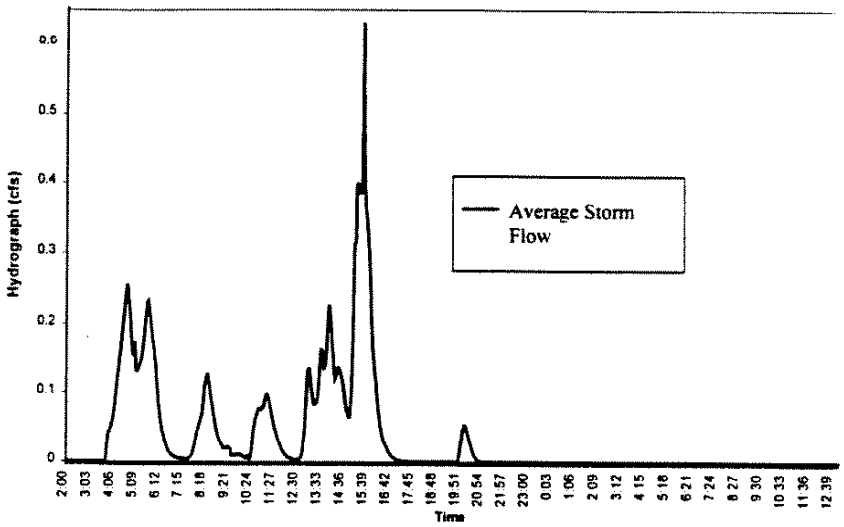


Figure 1-17a: Water Depth in IT, Influent Hydrograph, and Cumulative Rainfall at the Altadena MS on January 25, 2000

Water Depth in IT



Influent



Cumulative Rainfall

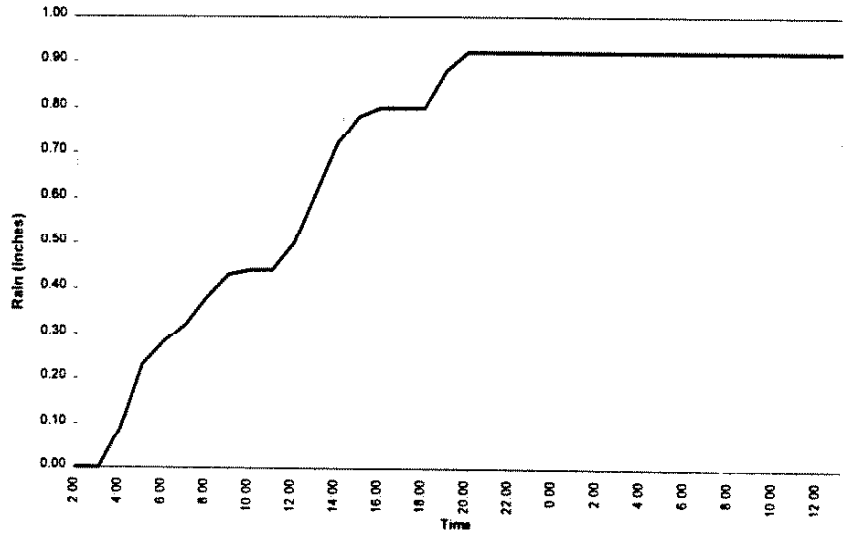
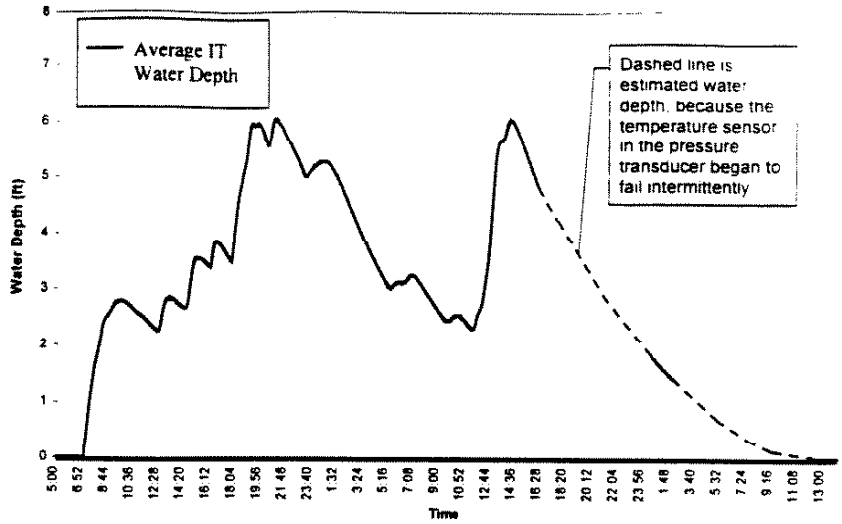
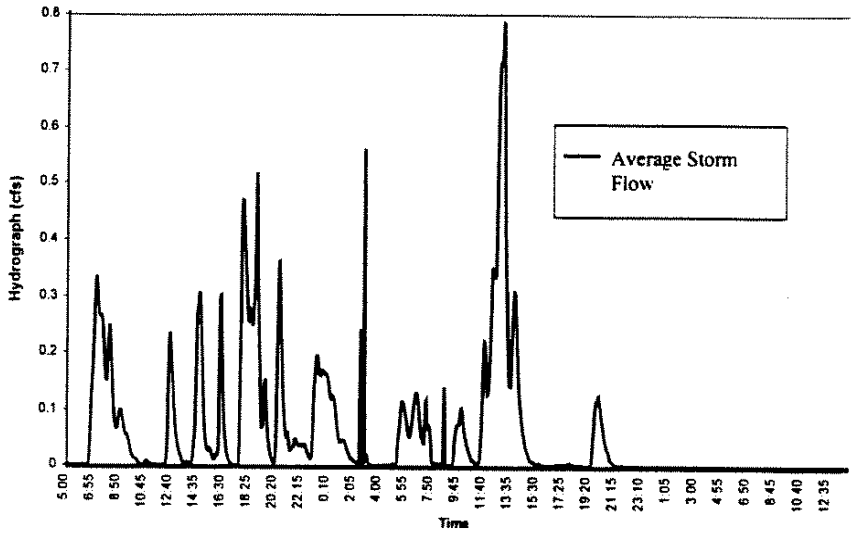


Figure 1-17b: Water Depth in IT, Influent Hydrograph, and Cumulative Rainfall at the Altadena MS during February 16 and February 17, 2000

Water Depth in IT



Influent



Cumulative Rainfall

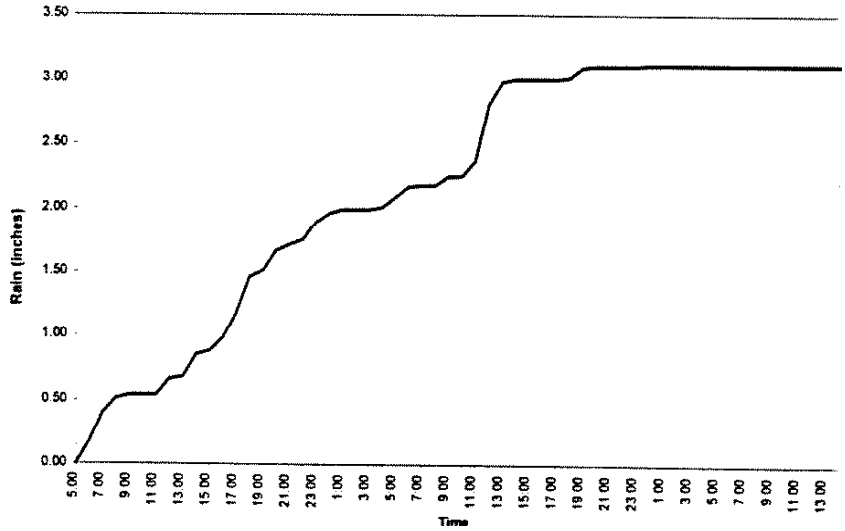
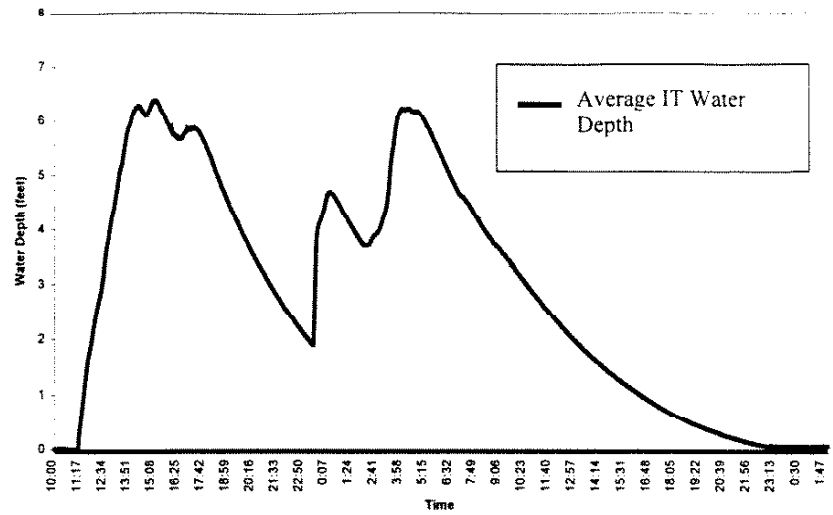
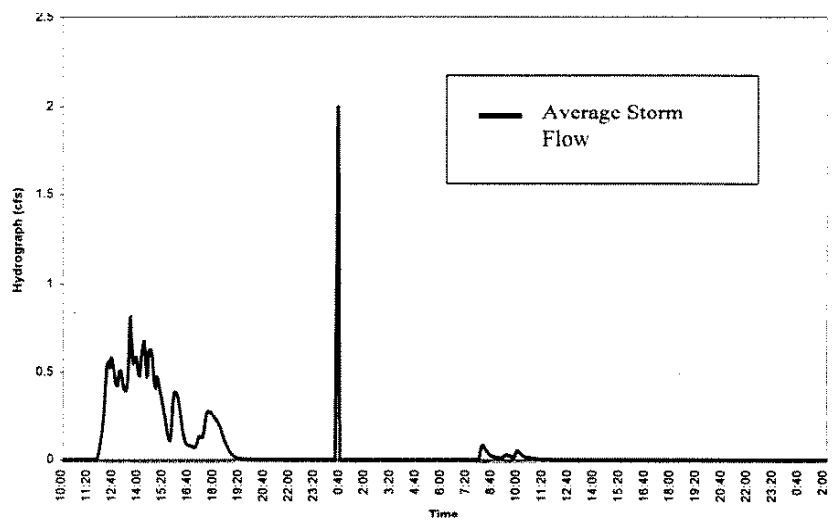


Figure 1-17c: Water Depth in IT, Influent Hydrograph, and Cumulative Rainfall at the Altadena MS during February 20 to February 22, 2000.

Water Depth in IT



Influent



Cumulative Rainfall

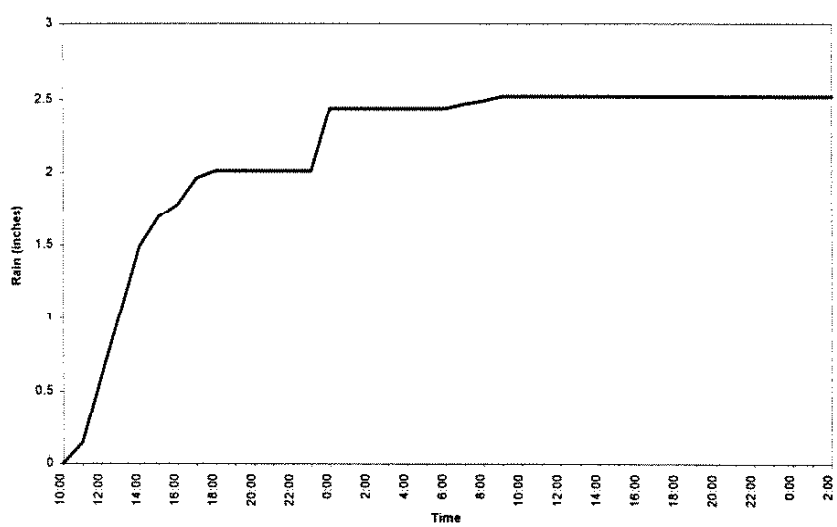
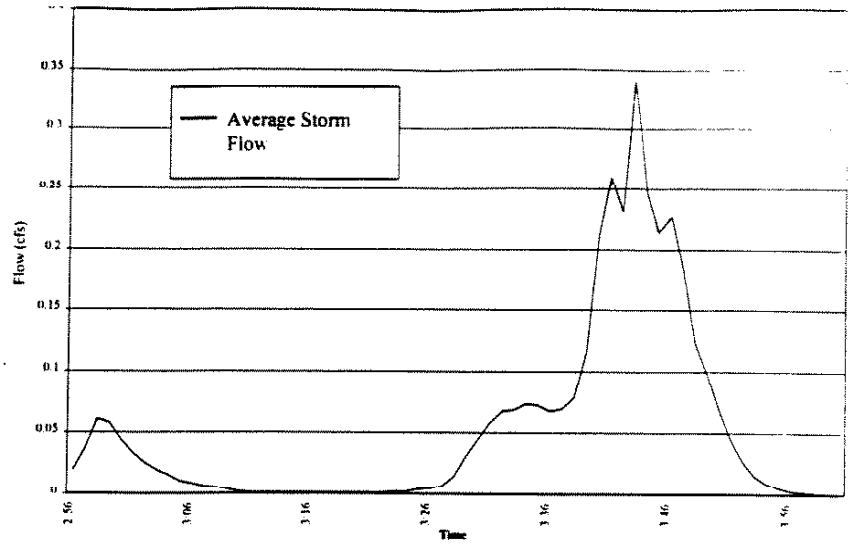
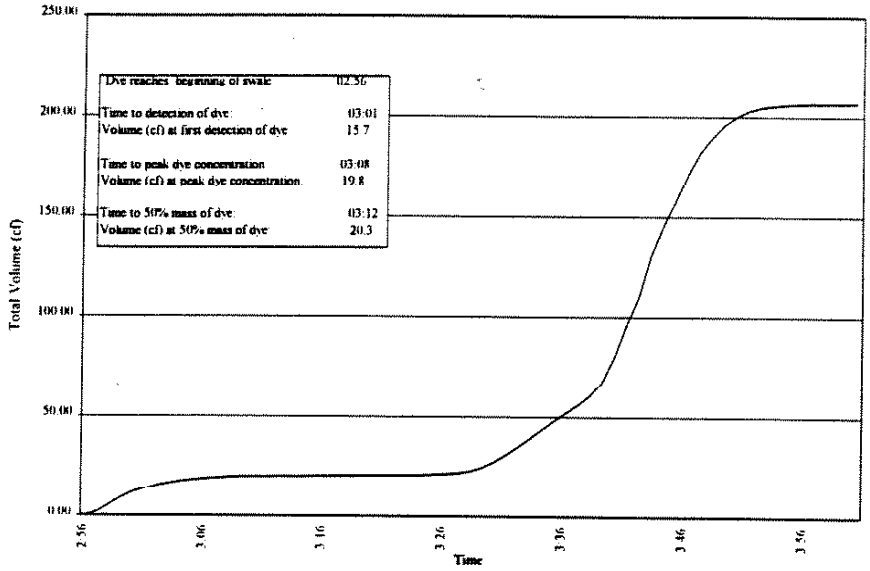


Figure 1-17d: Water Depth in IT, Influent Hydrograph, and Cumulative Rainfall at the Altadena MS for Event 8 on April 17-18, 2000.

Effluent Flow



Cumulative Flow



Absorbance

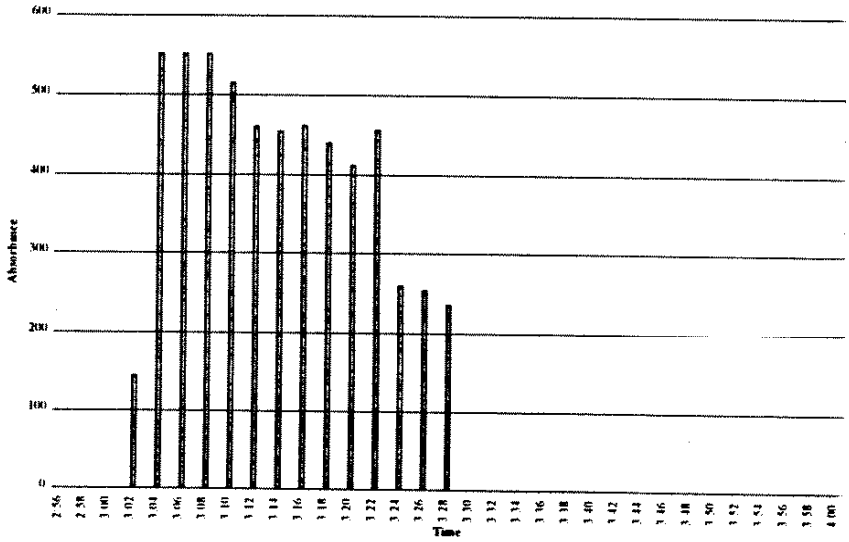
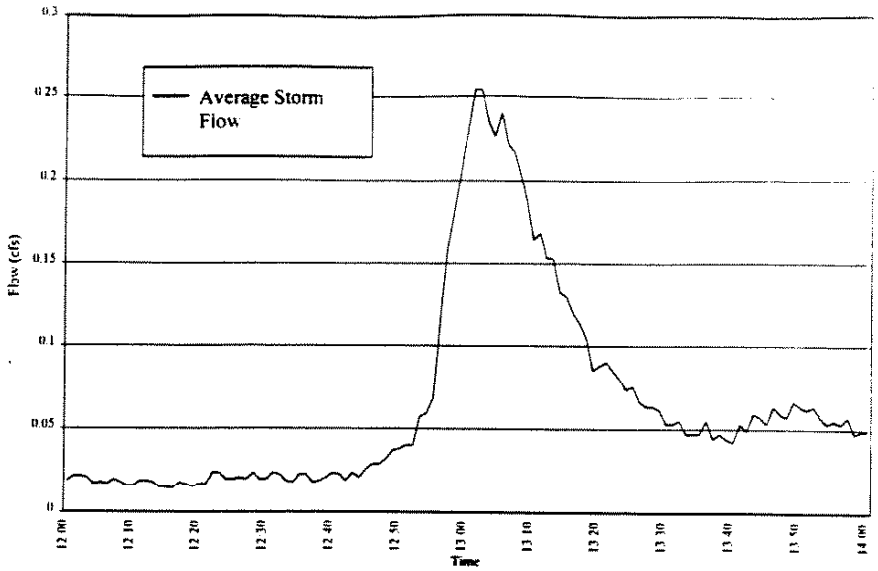
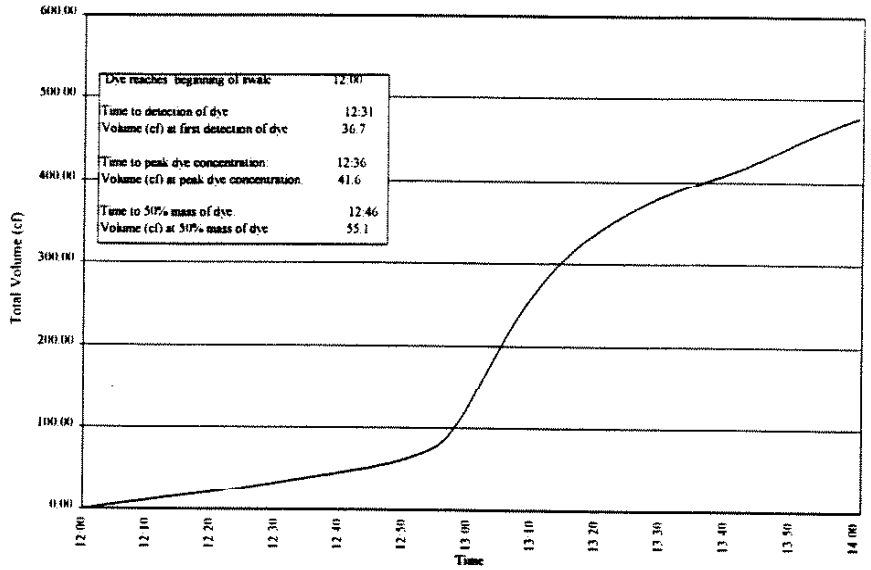


Figure 1-18a: Hydraulic Residence Time Characteristics (Effluent Flow, Cumulative Flow and Absorbance) at the Cerritos MS Swale on February 12, 2000

Effluent Flow



Cumulative Flow



Absorbance

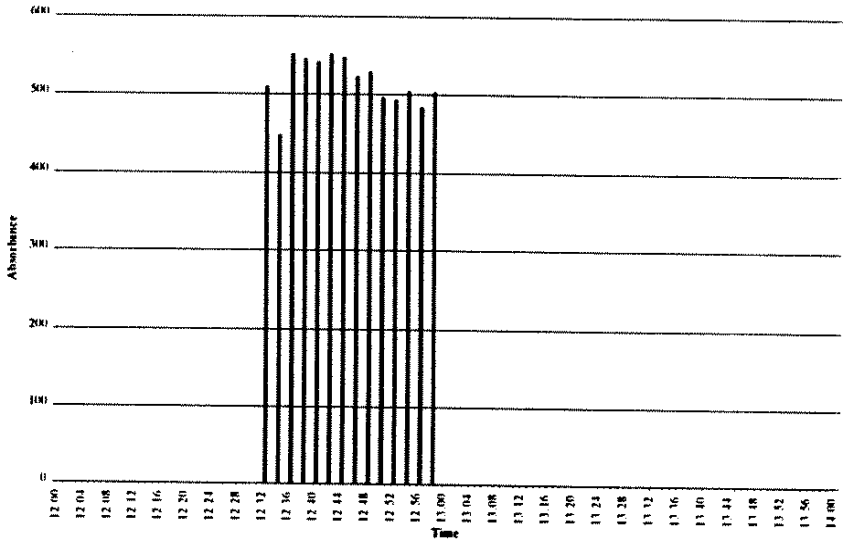
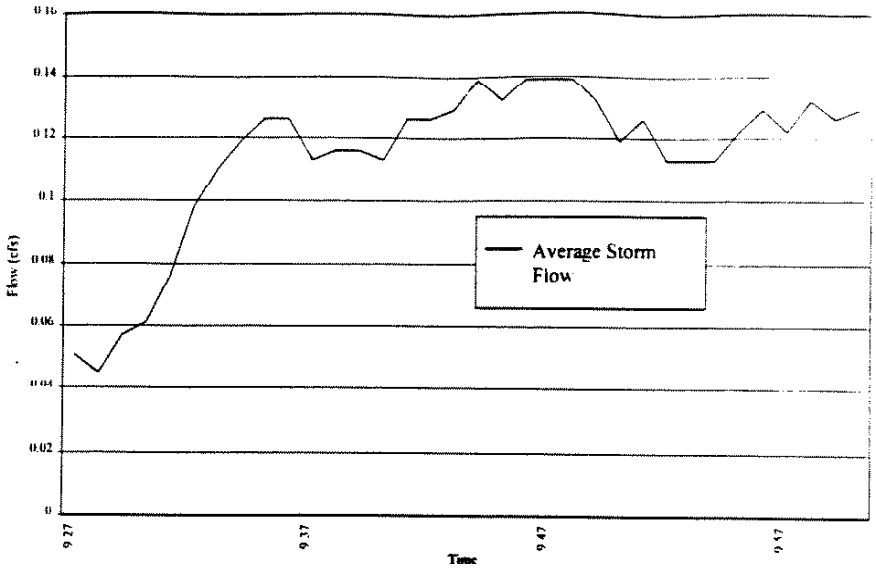
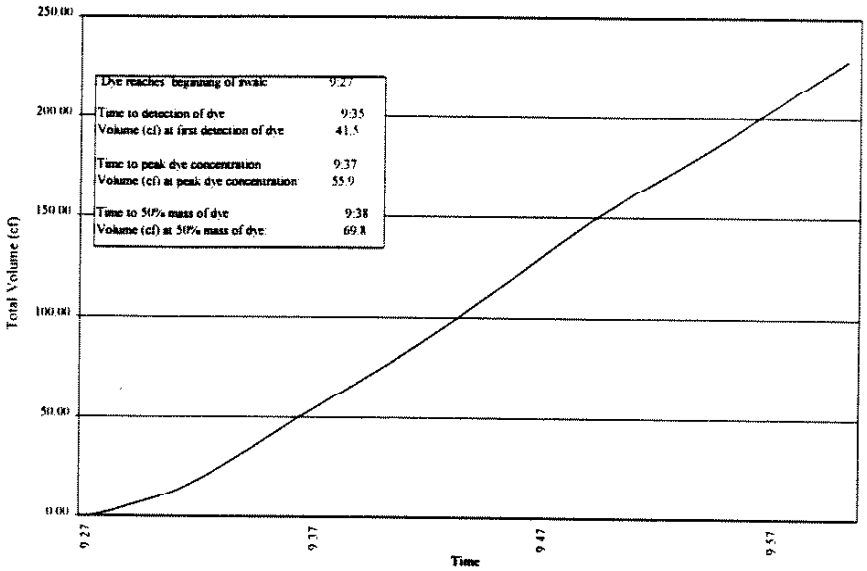


Figure 1-18b: Hydraulic Residence Time Characteristics (Effluent Flow, Cumulative Flow and Absorbance) at the I-605 @ Carson Swale on February 21, 2000

Effluent Flow



Cumulative Flow



Absorbance

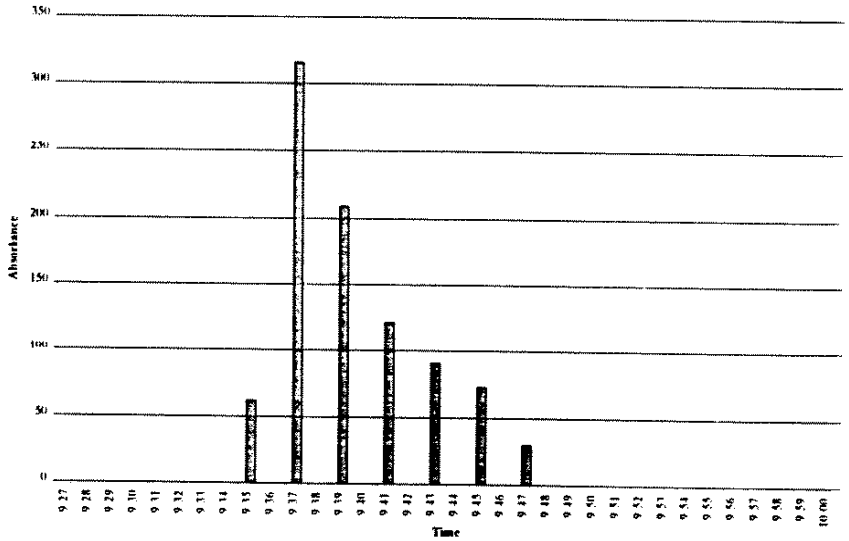
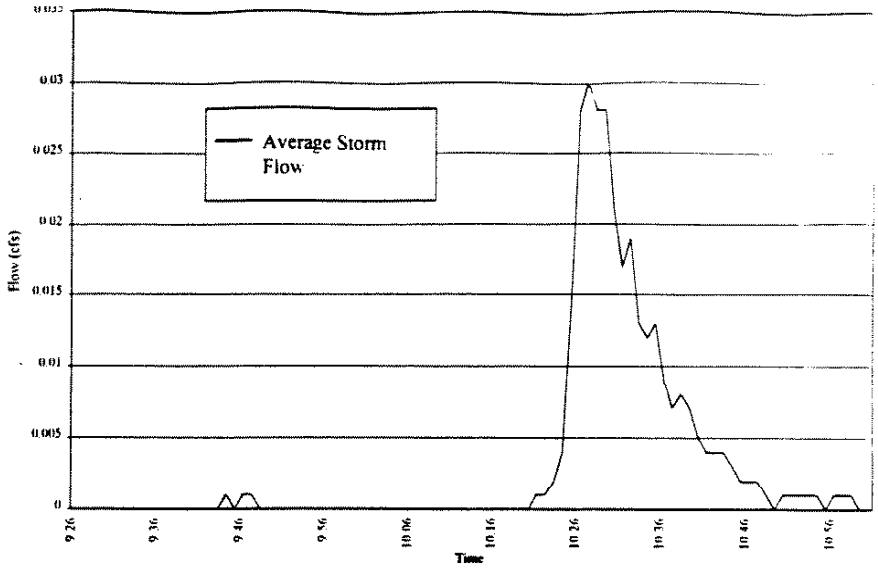
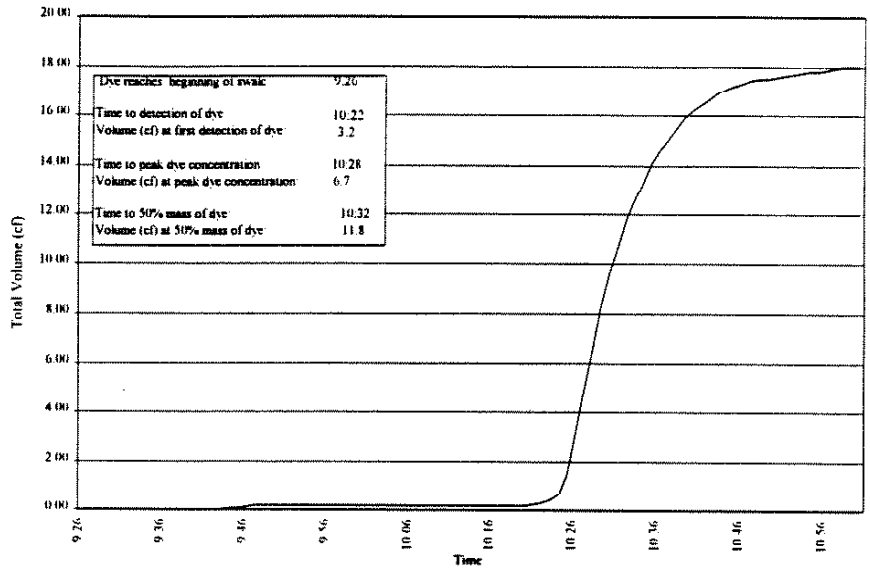


Figure 1-18c: Hydraulic Residence Time Characteristics (Effluent Flow, Cumulative Flow and Absorbance) at the I-5/I-605 Swale on March 5, 2000

Effluent Flow



Cumulative Flow



Absorbance

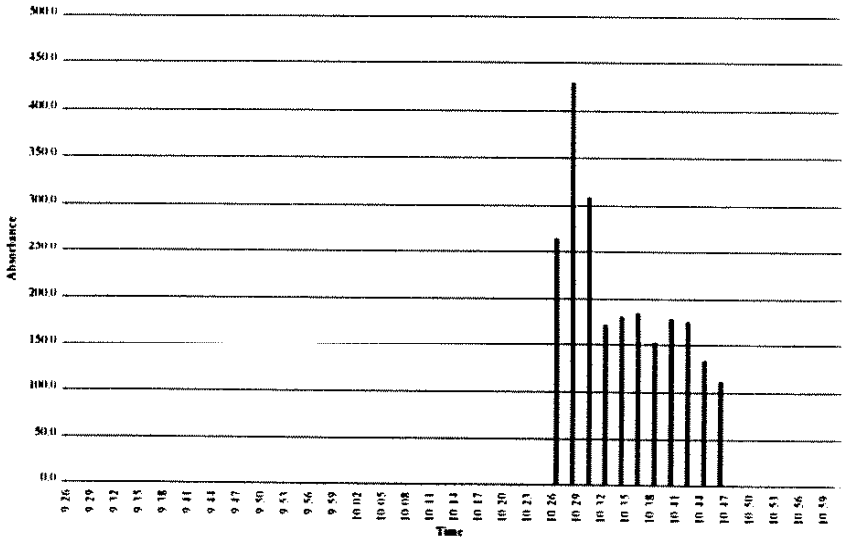
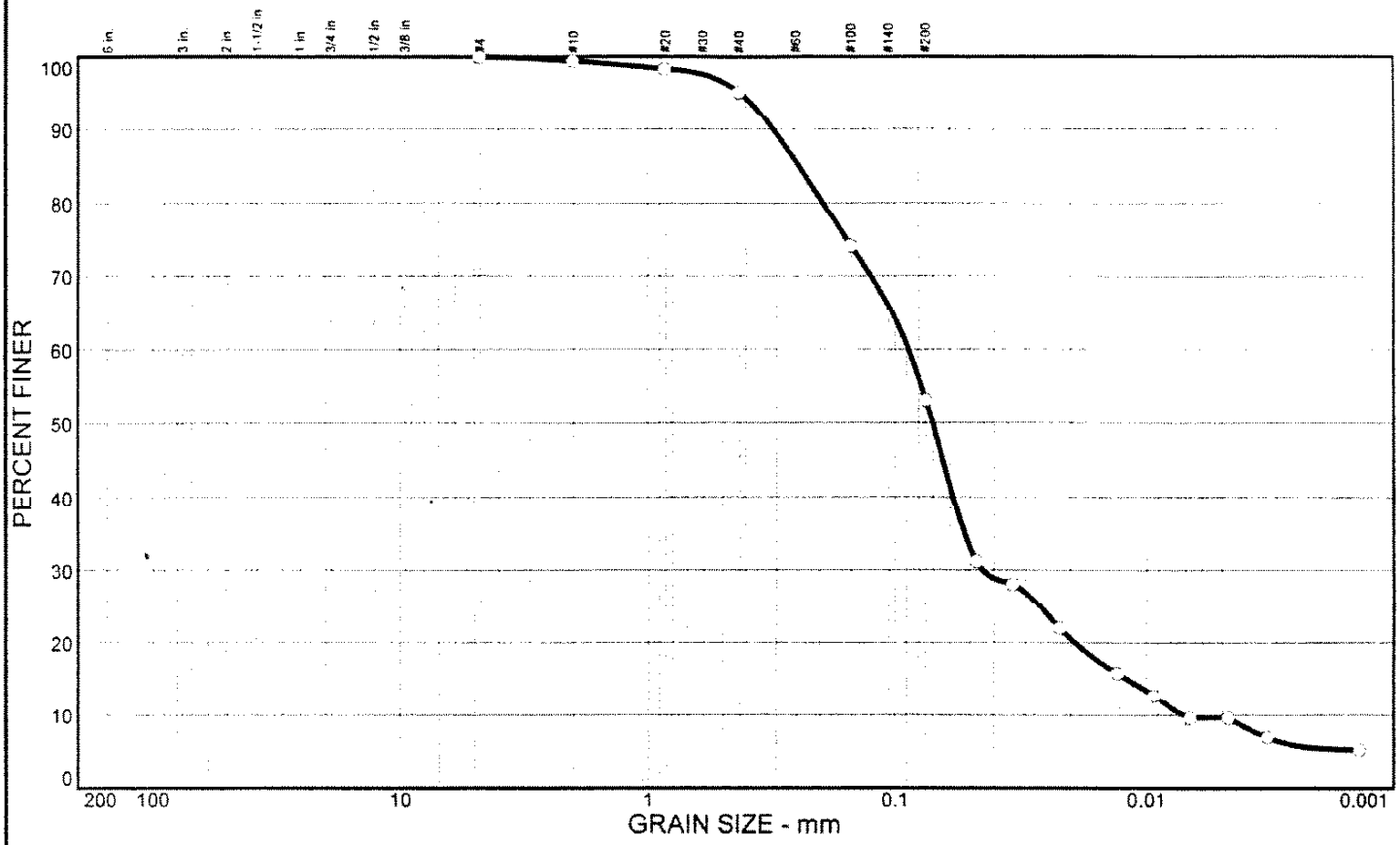


Figure 1-18d: Hydraulic Residence Time Characteristics (Effluent Flow, Cumulative Flow and Absorbance) at I-605/SR-91 Swale on March 5, 2000

PARTICLE SIZE DISTRIBUTION TEST REPORT



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
		46.7	43.7	9.6	ML			

SIEVE inches size	PERCENT FINER		

	GRAIN SIZE		
D_{60}	0.0879		
D_{30}	0.0444		
D_{10}	0.0072		
	COEFFICIENTS		
C_c	3.13		
C_u	12.26		

SIEVE number size	PERCENT FINER		
#4	100.0		
#10	99.4		
#20	98.3		
#40	95.1		
#100	74.1		
#200	53.3		

SOIL DESCRIPTION

Sandy Silt

REMARKS:

sampled at 1330 on 6-20-00

Source:

Sample No.: 073101-layer1-17200 Elev./Depth: 0 -0.2 m

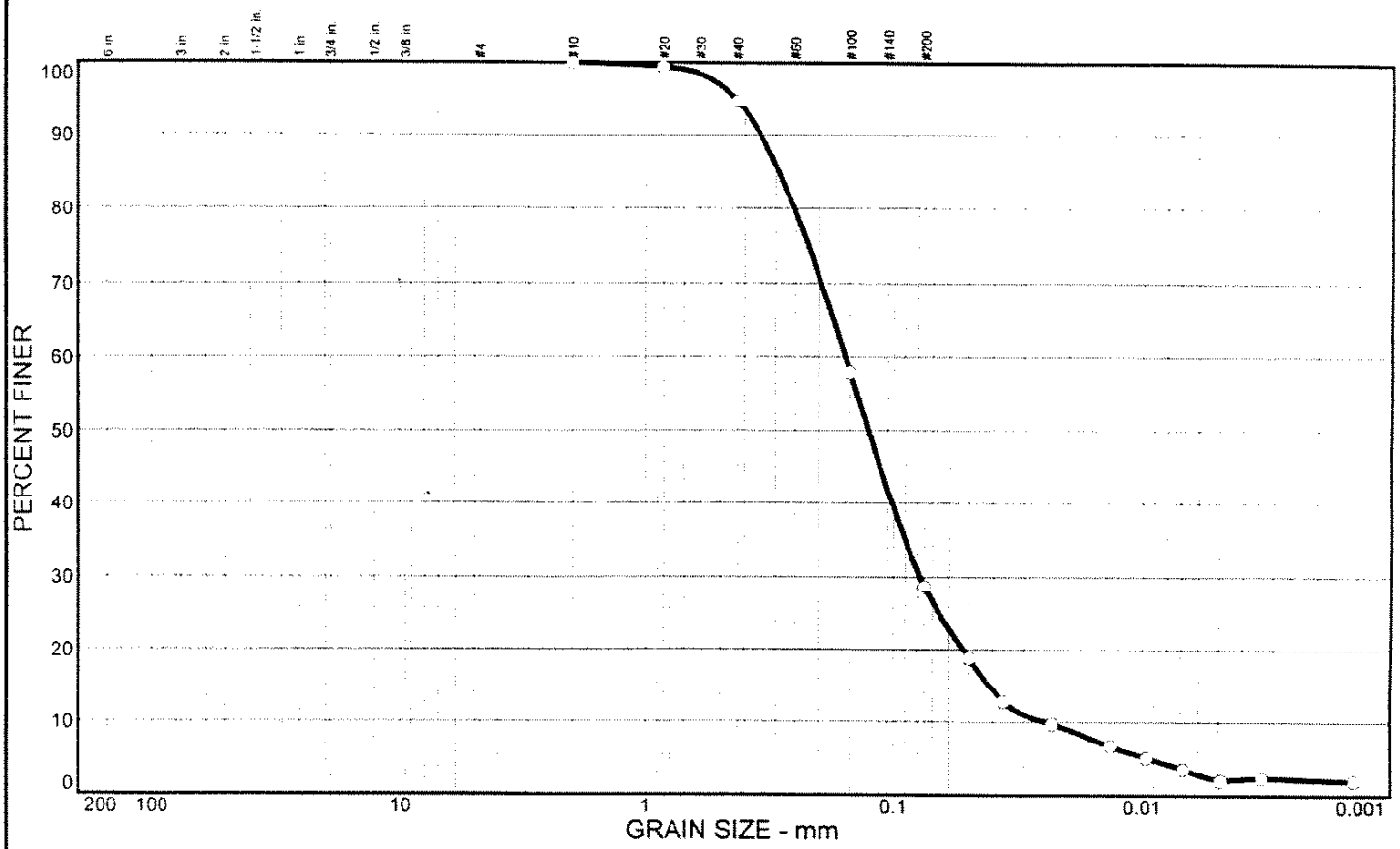
FIGURE 1-19a

Client: Caltrans

Project: Caltrans District 7 IB

Project No.: 70300-8-0212-02-901

PARTICLE SIZE DISTRIBUTION TEST REPORT



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
		71.3	26.6	2.1	SM			

SIEVE inches size	PERCENT FINER		

	GRAIN SIZE		
D_{60}	0.157		
D_{30}	0.0781		
D_{10}	0.0247		
	COEFFICIENTS		
C_C	1.58		
C_U	6.35		

SIEVE number size	PERCENT FINER		
#10	100.0		
#20	99.4		
#40	94.7		
#100	58.0		
#200	28.7		

SOIL DESCRIPTION

Silty Sand

REMARKS:

sampled at 1500 on 6-20-00

Source:

Sample No.: 073101-layer2-17200 Elev./Depth: 0.3-0.5 m

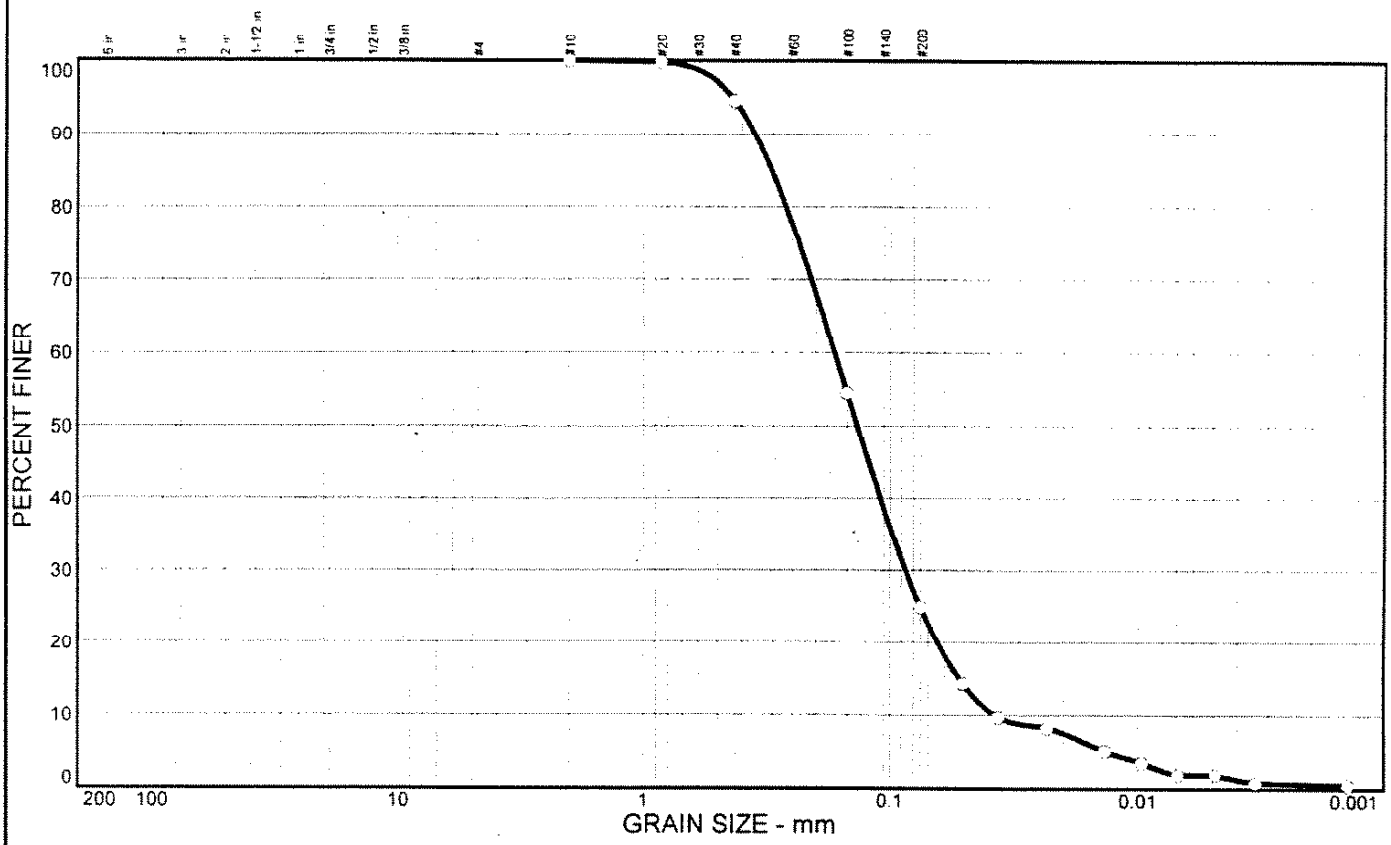
FIGURE 1-19b

Client: Caltrans

Project: Caltrans District 7 IB

Project No.: 70300-8-0212-02-901

PARTICLE SIZE DISTRIBUTION TEST REPORT



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
		75.0	23.1	1.9	SM			

SIEVE inches size	PERCENT FINER
GRAIN SIZE	
D_{60}	0.169
D_{30}	0.0860
D_{10}	0.0377
COEFFICIENTS	
C_c	1.16
C_u	4.47

SIEVE number size	PERCENT FINER
#10	100.0
#20	99.8
#40	94.5
#100	54.5
#200	25.0

SOIL DESCRIPTION

Silty Sand

REMARKS:

sampled at 1505 on 6-20-00

Source:

Sample No.: 073101-layer3-17200

Elev./Depth: 0.6-0.8 m

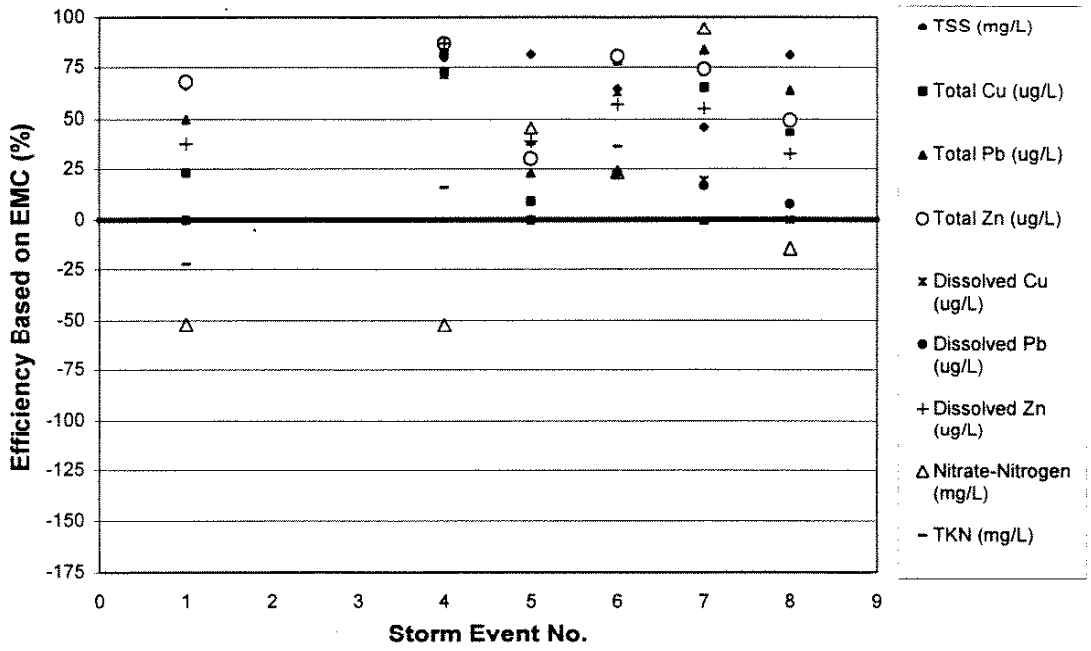
FIGURE 1-19c

Client: Caltrans

Project: Caltrans District 7 IB

Project No.: 70300-8-0212-02-901

Figure 1-20a: BMP Pollutant Removal Efficiency at the Altadena Maintenance Station Biofiltration Strip



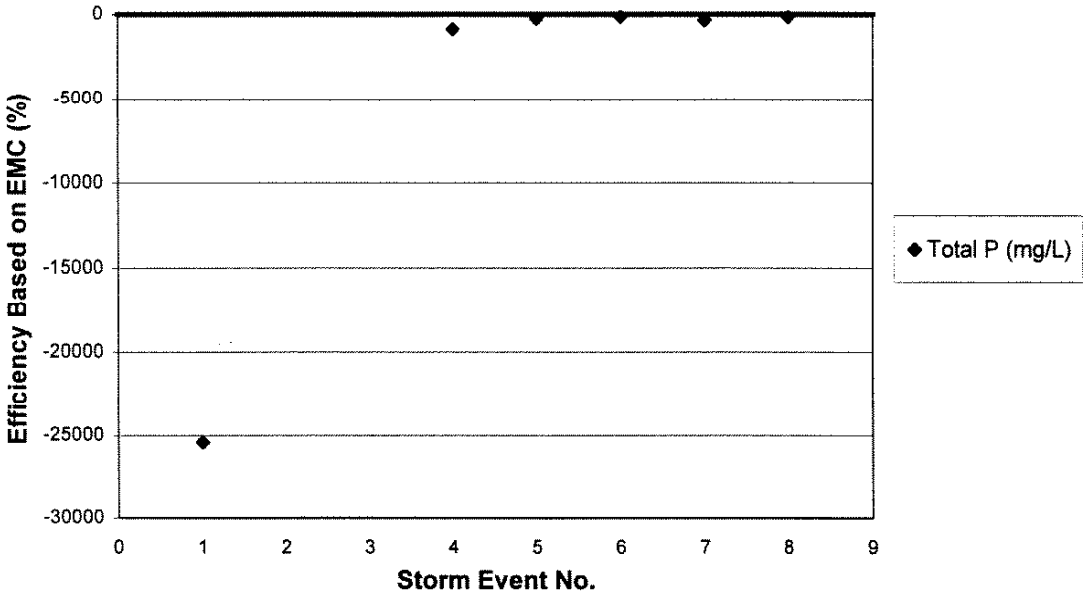
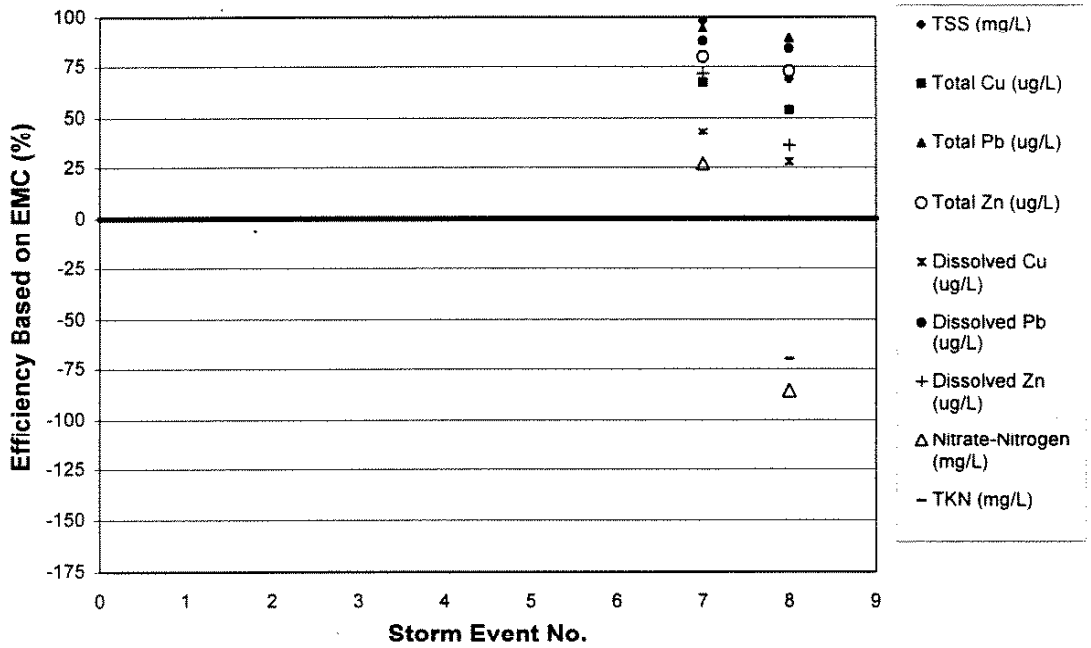


Figure 1-20b: BMP Pollutant Removal Efficiency at the I-605/SR-91 Biofiltration Strip



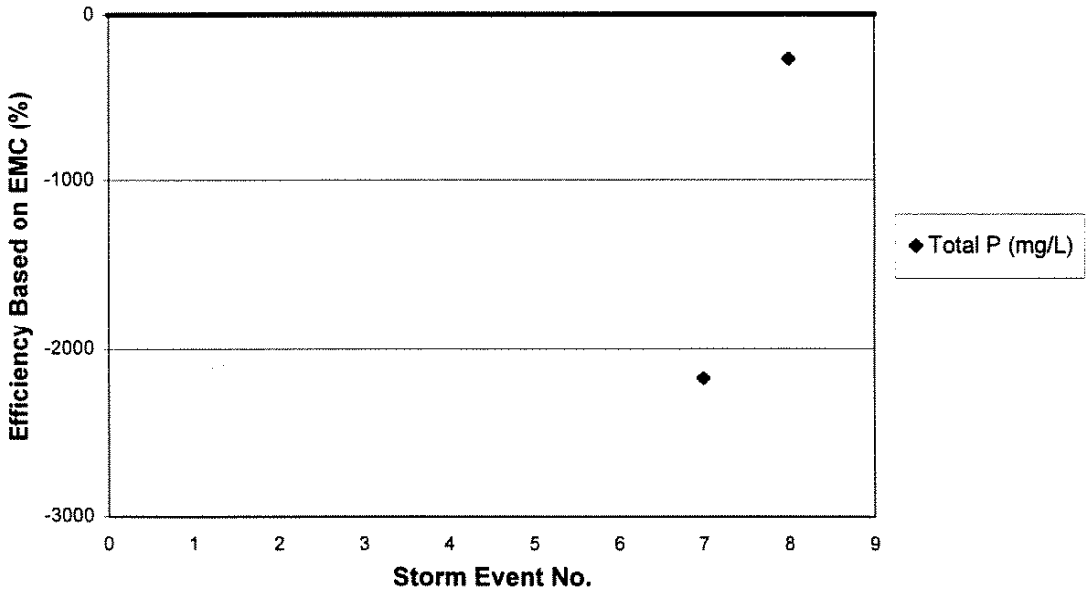


Figure 1-20c: BMP Pollutant Removal Efficiency at the I-605/SR-91 Biofiltration Swale

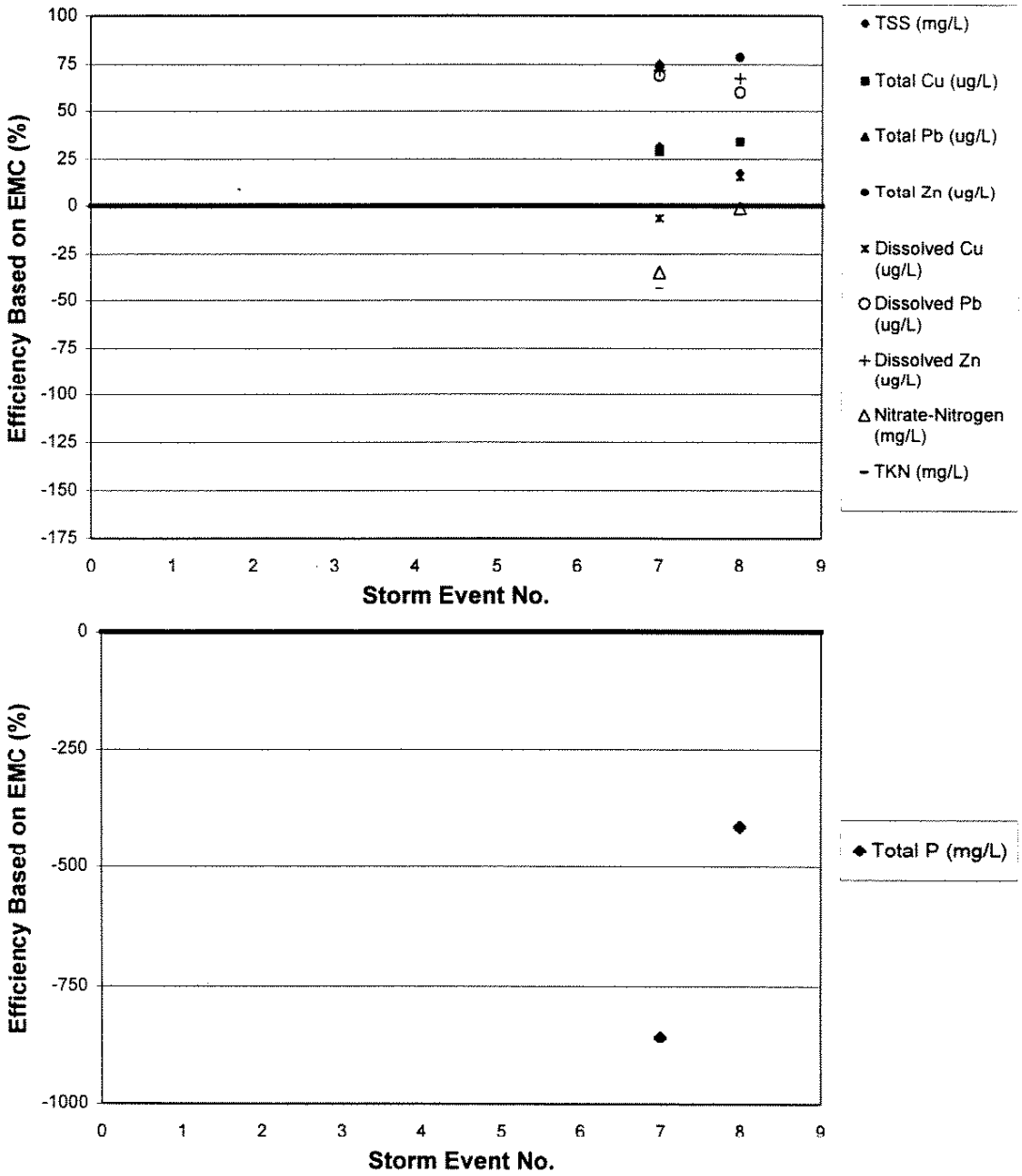
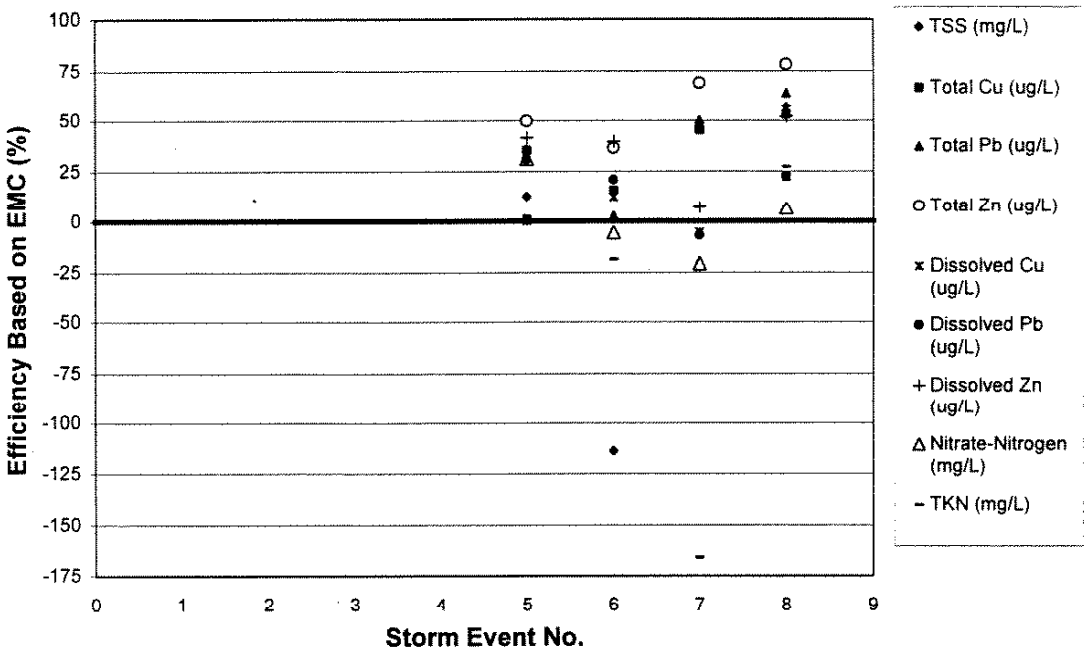


Figure 1-20d: BMP Pollutant Removal Efficiency at the Cerritos Maintenance Station Biofiltration Swale



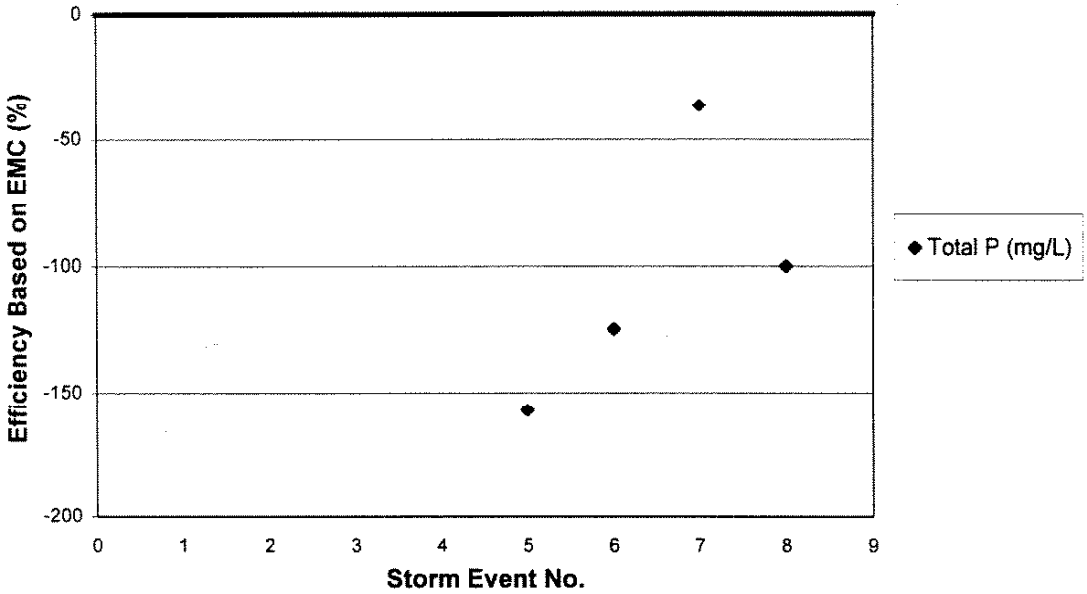
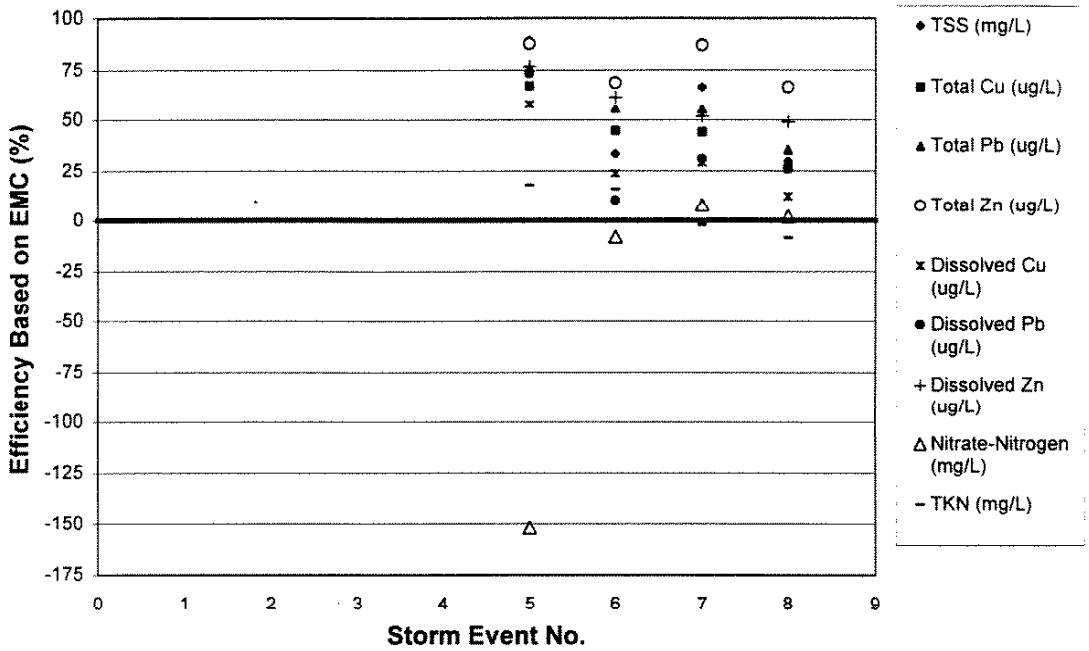


Figure 1-20e: BMP Pollutant Removal Efficiency at the I-5/I-605 Biofiltration Swale



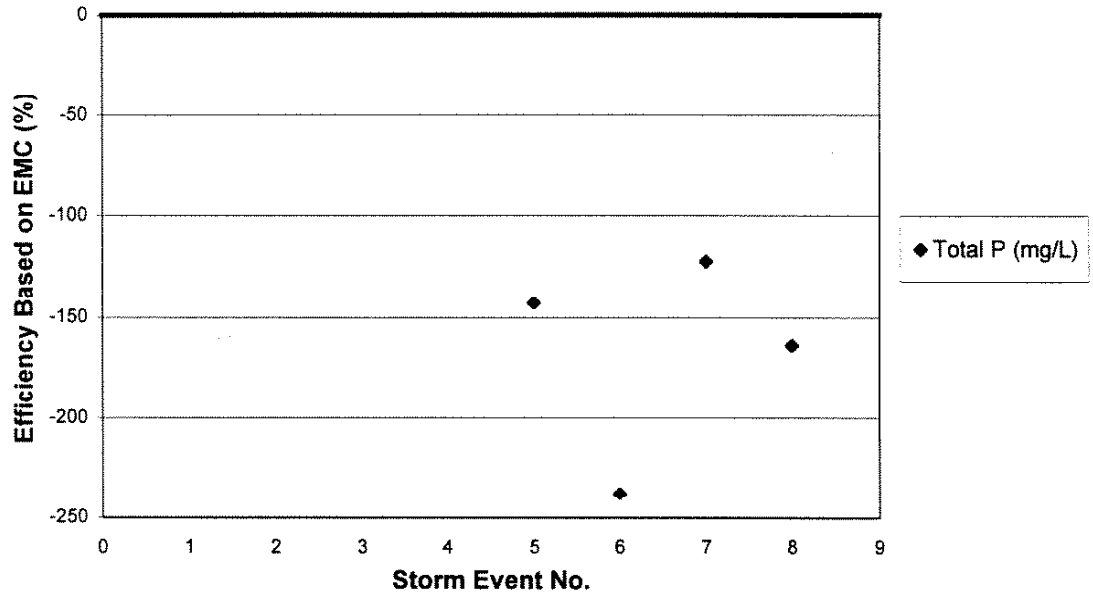
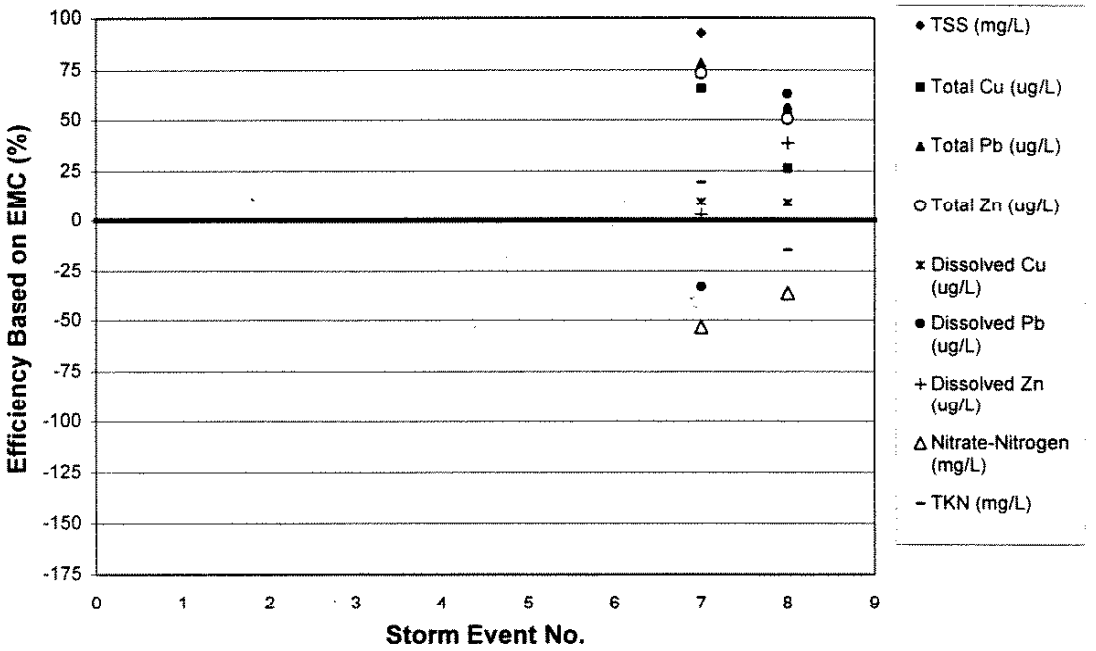
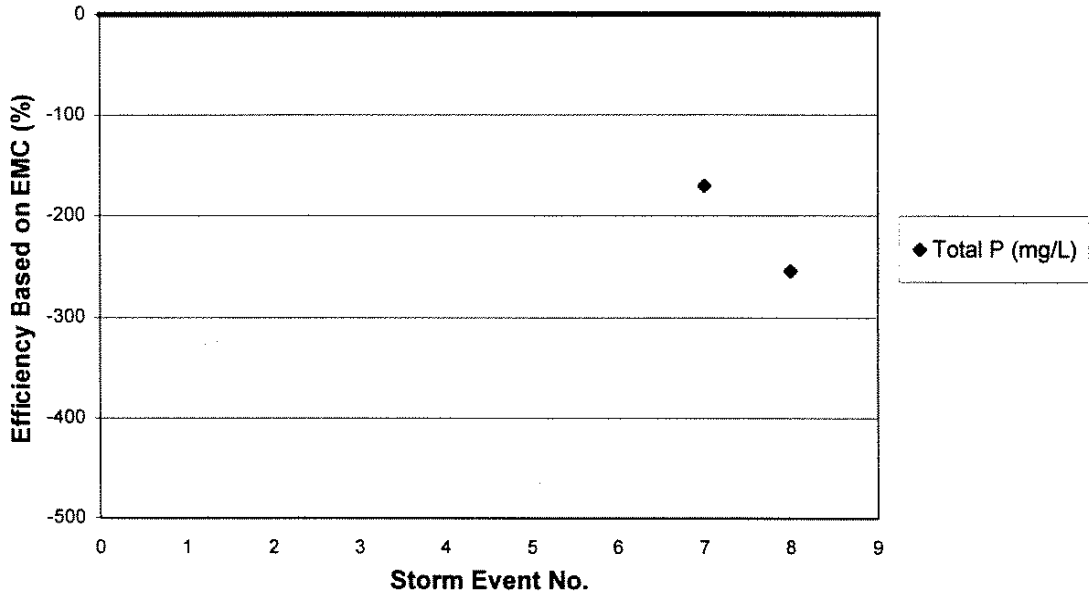


Figure 1-20f: BMP Pollutant Removal Efficiency at the I-605 at Carson Biofiltration Swale





Worksheet 1
Foothill Maintenance Station StreamGuard DII % Removal Efficiency Calculations (Storm-by-Storm Method)

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Copper	Used StreamGuard Geotextile Fabric	74.5	960	---	---	0.000157
Copper	Used StreamGuard Absorbent Material	18.9	504.5	---	---	0.000019
Copper	Used StreamGuard Debris/litter/sediment	29.9	4536	---	---	0.000298
Copper	*Used Media Subtotal*					*0.000474*
Copper	Unused StreamGuard Geotextile Fabric	0.22	943.9	---	---	0.000000
Copper	Unused StreamGuard Absorbent Material	0.24	443.15	---	---	0.000000
Copper	*Unused Media Subtotal*					*0.000001*
Copper	Effluent Water from 25 January 2000 storm event			1.7	262	0.000028
Copper	Effluent Water from 30 January 2000 storm event	---	---	1.3	379	0.000031
Copper	Effluent Water from 16 February 2000 storm event	---	---	4.4	268	0.000073
Copper	Effluent Water from 21 February 2000 storm event	---	---	1.2	1512	0.000113
Copper	Effluent Water from 27 February 2000 storm event	---	---	4.2	984	0.000257
Copper	Effluent Water from 8 March 2000 storm event	---	---	4.3	463	0.000124
Copper	Effluent Water from 17 April 2000 storm event	---	---	5.8	344	0.000124
Copper	Estimated effluent from unsampled storm events	---	---	3.3	4250	0.000866
Copper	*Effluent Subtotal*					*0.001517*
Copper	Estimated Influent Load					0.002091
Copper	Efficiency (%)					23%
Copper	Efficiency w/o Litter Removal (%)					10%

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Lead	Used StreamGuard Geotextile Fabric	150	960	---	---	0.000317
Lead	Used StreamGuard Absorbent Material	29.5	504.5	---	---	0.000033
Lead	Used StreamGuard Debris/litter/sediment	52.9	4536	---	---	0.000526
Lead	*Used Media Subtotal*					*0.000877*
Lead	Unused StreamGuard Geotextile Fabric	0.1	943.9	---	---	0.000000
Lead	Unused StreamGuard Absorbent Material	0.1	443.15	---	---	0.000000
Lead	*Unused Media Subtotal*					*0.000000*
Lead	Effluent Water from 25 January 2000 storm event	---	---	1	262	0.000016
Lead	Effluent Water from 30 January 2000 storm event	---	---	1	379	0.000024
Lead	Effluent Water from 10 February 2000 storm event	---	---	1.7	268	0.000028
Lead	Effluent Water from 21 February 2000 storm event	---	---	1	1512	0.000094
Lead	Effluent Water from 27 February 2000 storm event	---	---	1	984	0.000061
Lead	Effluent Water from 8 March 2000 storm event	---	---	2	463	0.000058
Lead	Effluent Water from 17 April 2000 storm event	---	---	2.8	344	0.000060
Lead	Estimated effluent from unsampled storm events	---	---	1.4	4250	0.000365
Lead	*Effluent Subtotal*					*0.000707*
Lead	Estimated Influent Load					0.001584
Lead	Efficiency (%)					55%
Lead	Efficiency w/o Litter Removal (%)					33%

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Zinc	Used StreamGuard Geotextile Fabric	917	960	---	---	0.001937
Zinc	Used StreamGuard Absorbent Material	105	504.5	---	---	0.000117
Zinc	Used StreamGuard Debris/litter/sediment	301	4536	---	---	0.003004
Zinc	*Used Media Subtotal*					*0.005057*
Zinc	Unused StreamGuard Geotextile Fabric	3.8	943.9	---	---	0.000008
Zinc	Unused StreamGuard Absorbent Material	0.6	443.15	---	---	0.000001
Zinc	*Unused Media Subtotal*					*0.000008*
Zinc	Effluent Water from 25 January 2000 storm event	---	---	13.5	262	0.000220
Zinc	Effluent Water from 30 January 2000 storm event	---	---	18.2	379	0.000430
Zinc	Effluent Water from 16 February 2000 storm event	---	---	50	268	0.000835
Zinc	Effluent Water from 21 February 2000 storm event	---	---	13	1512	0.001225
Zinc	Effluent Water from 27 February 2000 storm event	---	---	50	984	0.003065
Zinc	Effluent Water from 8 March 2000 storm event	---	---	66	463	0.001904
Zinc	Effluent Water from 17 April 2000 storm event	---	---	63.5	344	0.001361
Zinc	Estimated effluent from unsampled storm events	---	---	*31.9*	4250	0.008441
Zinc	*Effluent Subtotal*					*0.017478*
Zinc	Estimated Influent Load					0.022528
Zinc	Efficiency (%)					22%
Zinc	Efficiency w/o Litter Removal (%)					10%

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Petroleum Hydrocarbons	Used StreamGuard Geotextile Fabric	3020	960	---	---	0.006378
Petroleum Hydrocarbons	Used StreamGuard Absorbent Material	33706	504.5	---	---	0.037404
Petroleum Hydrocarbons	Used StreamGuard Debris/litter/sediment	2870	4536	---	---	0.028640
Petroleum Hydrocarbons	*Used Media Subtotal*					*0.072422*
Petroleum Hydrocarbons	Unused StreamGuard Geotextile Fabric	684	943.9	---	---	0.001420
Petroleum Hydrocarbons	Unused StreamGuard Absorbent Material	1870	443.15	---	---	0.001824
Petroleum Hydrocarbons	*Unused Media Subtotal*					*0.003341*
Petroleum Hydrocarbons	Effluent Water from 25 January 2000 storm event	---	---	500	262	0.008161
Petroleum Hydrocarbons	Effluent Water from 30 January 2000 storm event	---	---	500	379	0.011805
Petroleum Hydrocarbons	Effluent Water from 16 February 2000 storm event	---	---	500	268	0.008348
Petroleum Hydrocarbons	Effluent Water from 21 February 2000 storm event	---	---	500	1512	0.047097
Petroleum Hydrocarbons	Effluent Water from 27 February 2000 storm event	---	---	500	984	0.030650
Petroleum Hydrocarbons	Effluent Water from 8 March 2000 storm event	---	---	500	463	0.014422
Petroleum Hydrocarbons	Effluent Water from 17 April 2000 storm event	---	---	500	344	0.010715
Petroleum Hydrocarbons	Estimated effluent from unsampled storm events	---	---	500	4250	0.132381
Petroleum Hydrocarbons	*Effluent Subtotal*					*0.263578*
Petroleum Hydrocarbons	Estimated Influent Load					0.332660
Petroleum Hydrocarbons	Efficiency (%)					21%
Petroleum Hydrocarbons	Efficiency w/o Litter Removal (%)					13%

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (mg/L)	Runoff Volume (ft^3)	Load (lbs)
Sediment[1]	Used StreamGuard Geotextile Fabric	---	960	---	---	2.116416
Sediment[1]	Used StreamGuard Absorbent Material	---	504.5	---	---	1.112221
Sediment	Used StreamGuard Debris/litter/sediment	---	4536	---	---	10.000066
Sediment	*Used Media Subtotal*					*13.228702*
Sediment	Unused StreamGuard Geotextile Fabric	---	943.9	---	---	2.080622
Sediment	Unused StreamGuard Absorbent Material	---	443.15	---	---	0.976968
Sediment	*Unused Media Subtotal*					*3.057590*
Sediment	Effluent Water from 25 January 2000 storm event	---	---	13	262	0.212183
Sediment	Effluent Water from 30 January 2000 storm event	---	---	6	379	0.141663
Sediment	Effluent Water from 16 February 2000 storm event	---	---	13	268	0.217043
Sediment	Effluent Water from 21 February 2000 storm event	---	---	20	1512	1.883860
Sediment	Effluent Water from 27 February 2000 storm event	---	---	5	984	0.306501
Sediment	Effluent Water from 8 March 2000 storm event	---	---	10	463	0.288435
Sediment	Effluent Water from 17 April 2000 storm event	---	---	13	344	0.278592
Sediment	Estimated effluent from unsampled storm events	---	---	11	4250	3.025852
Sediment	*Effluent Subtotal*					*6.354130*
Sediment	Estimated Influent Load					16.524942
Sediment	Efficiency (%)					62%
Sediment	Efficiency w/o Litter Removal (%)					3%

[1] Mass of unused DII element subtracted from mass of used DII element.

Note 1: Dissolved solids fraction and gross solids fraction of effluent not accounted for in mass balance.

Note 2: Efficiencies include sediment/debris entrapped by the DII. Extensive maintenance was conducted before, during, and after storm events to clear sediment and debris from the DII. Sediment and debris removed from the DII was temporarily stored onsite and then analyzed at the same time as DII.

Note 3: Where the individual storm EMCs showed evidence of normality, the unsampled effluent concentration was estimated by averaging individual storm EMCs.

Note 4: Where the individual storm EMCs showed evidence of non-normality, the unsampled effluent concentration was estimated by log-transforming individual storm EMCs, averaging, and then transforming back. These EMCs are italicized.

Note 5: Flow measured continuously while DII was installed.

Note 6: Reporting Limit was used where results were "<" Reporting Limit.

Calculated by: Byron Berger

Checked by: Ed Othmer

Worksheet 2
Foothill Maintenance Station Fossil Filter DII % Removal Efficiency Calculations (Storm-by-Storm Method)

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Copper	Used Fossil Filter Adsorbent	35.3	5897	---	---	0.000458
Copper	Used Fossil Filter Debris/litter/sediment	57	2268	---	---	0.000284
Copper	*Used Media Subtotal*					*0.000742*
Copper	*Unused Fossil Filter Adsorbent*	*0.2*	*1900*	---	---	*0.000001*
Copper	Effluent Water from 25 January 2000 storm event	---	---	1.5	1034	0.000097
Copper	Effluent Water from 30 January 2000 storm event	---	---	1.5	351	0.000033
Copper	Effluent Water from 16 February 2000 storm event	---	---	7.7	1634	0.000784
Copper	Effluent Water from 21 February 2000 storm event	---	---	1.2	5722	0.000428
Copper	Effluent Water from 27 February 2000 storm event	---	---	5.8	683	0.000247
Copper	Effluent Water from 8 March 2000 storm event	---	---	6.7	1608	0.000671
Copper	Effluent Water from 17 April 2000 storm event	---	---	8.1	5315	0.002682
Copper	Estimated effluent from unsampled storm events	---	---	3.5	10910	0.002385
Copper	*Effluent Subtotal*					*0.007325*
Copper	Estimated Influent Load					0.008067
Copper	**Efficiency (%)**					**9%**
Copper	**Efficiency w/o Litter Removal (%)**					**8%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Lead	Used Fossil Filter Adsorbent	119	5897	---	---	0.001544
Lead	Used Fossil Filter Debris/litter/sediment	104	2268	---	---	0.000519
Lead	*Used Media Subtotal*					*0.002063*
Lead	*Unused Fossil Filter Adsorbent*	*1.2*	*1900*	---	---	*0.000005*
Lead	Effluent Water from 25 January 2000 storm event	---	---	1	1034	0.000064
Lead	Effluent Water from 30 January 2000 storm event	---	---	1	351	0.000022
Lead	Effluent Water from 16 February 2000 storm event	---	---	9.4	1634	0.000957
Lead	Effluent Water from 21 February 2000 storm event	---	---	2	5722	0.000713
Lead	Effluent Water from 27 February 2000 storm event	---	---	4.7	683	0.000200
Lead	Effluent Water from 8 March 2000 storm event	---	---	12	1608	0.001202
Lead	Effluent Water from 17 April 2000 storm event	---	---	10	5315	0.003311
Lead	Estimated effluent from unsampled storm events	---	---	*3.8*	10910	0.002555
Lead	*Effluent Subtotal*					*0.009924*
Lead	Estimated Influent Load					0.011082
Lead	**Efficiency (%)**					**19%**
Lead	**Efficiency w/o Litter Removal (%)**					**15%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Zinc	Used Fossil Filter Adsorbent	338	5897	---	---	0.004385
Zinc	Used Fossil Filter Debris/litter/sediment	356	2268	---	---	0.001776
Zinc	*Used Media Subtotal*					*0.006161*
Zinc	*Unused Fossil Filter Adsorbent*	*1.2*	*1900*	---	---	*0.000005*
Zinc	Effluent Water from 25 January 2000 storm event	---	---	14.8	1034	0.000953
Zinc	Effluent Water from 30 January 2000 storm event	---	---	13.4	351	0.000293
Zinc	Effluent Water from 16 February 2000 storm event	---	---	69	1634	0.007024
Zinc	Effluent Water from 21 February 2000 storm event	---	---	9.4	5722	0.003351
Zinc	Effluent Water from 27 February 2000 storm event	---	---	60	683	0.002553
Zinc	Effluent Water from 8 March 2000 storm event	---	---	74	1608	0.007413
Zinc	Effluent Water from 17 April 2000 storm event	---	---	82.8	5315	0.027416
Zinc	Estimated effluent from unsampled storm events	---	---	*33.5*	10910	0.022764
Zinc	*Effluent Subtotal*					*0.071767*
Zinc	Estimated Influent Load					0.077923
Zinc	**Efficiency (%)**					**8%**
Zinc	**Efficiency w/o Litter Removal (%)**					**6%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Petroleum Hydrocarbons	Used Fossil Filter Adsorbent	5180	5897	---	---	0.067202
Petroleum Hydrocarbons	Used Fossil Filter Debris/litter/sediment	4550	2268	---	---	0.022703
Petroleum Hydrocarbons	*Used Media Subtotal*					*0.089905*
Petroleum Hydrocarbons	*Unused Fossil Filter Adsorbent*	*26.6*	*1900*	---	---	*0.000111*
Petroleum Hydrocarbons	Effluent Water from 25 January 2000 storm event	---	---	500	1034	0.032208
Petroleum Hydrocarbons	Effluent Water from 30 January 2000 storm event	---	---	500	351	0.010933
Petroleum Hydrocarbons	Effluent Water from 16 February 2000 storm event	---	---	500	1634	0.050897
Petroleum Hydrocarbons	Effluent Water from 21 February 2000 storm event	---	---	500	5722	0.178232
Petroleum Hydrocarbons	Effluent Water from 27 February 2000 storm event	---	---	500	683	0.021274
Petroleum Hydrocarbons	Effluent Water from 8 March 2000 storm event	---	---	510	1608	0.051088
Petroleum Hydrocarbons	Effluent Water from 17 April 2000 storm event	---	---	500	5315	0.165554
Petroleum Hydrocarbons	Estimated effluent from unsampled storm events	---	---	*501.4*	10910	0.340793
Petroleum Hydrocarbons	*Effluent Subtotal*					*0.850979*
Petroleum Hydrocarbons	Estimated Influent Load					0.940772
Petroleum Hydrocarbons	**Efficiency (%)**					**10%**
Petroleum Hydrocarbons	**Efficiency w/o Litter Removal (%)**					**7%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (mg/L)	Runoff Volume (ft^3)	Load (lbs)
Sediment[1]	Used Fossil Filter Adsorbent	---	5897	---	---	13.000526
Sediment	Used Fossil Filter Debris/litter/sediment	---	2268	---	---	5.000033
Sediment	*Used Media Subtotal*					*18.000559*
Sediment	*Unused Fossil Filter Adsorbent*	---	*1900*	---	---	4.188740
Sediment	Effluent Water from 25 January 2000 storm event	---	---	24	1034	1.545961
Sediment	Effluent Water from 30 January 2000 storm event	---	---	8	351	0.174930
Sediment	Effluent Water from 16 February 2000 storm event	---	---	32	1634	3.257363
Sediment	Effluent Water from 21 February 2000 storm event	---	---	22	5722	7.842191
Sediment	Effluent Water from 27 February 2000 storm event	---	---	20	683	0.850976
Sediment	Effluent Water from 8 March 2000 storm event	---	---	31	1608	3.105379
Sediment	Effluent Water from 17 April 2000 storm event	---	---	27	5315	8.939925
Sediment	Estimated effluent from unsampled storm events	---	---	*21.7*	10910	14.745762
Sediment	*Effluent Subtotal*					*40.462508*
Sediment	Estimated Influent Load					54.274327
Sediment	**Efficiency (%)**					**25%**
Sediment	**Efficiency w/o Litter Removal (%)**					**18%**

[1] Mass of unused DII element subtracted from mass of used DII element.

Note 1: Dissolved solids fraction and gross solids fraction of effluent not accounted for in mass balance.

Note 2: Each Fossil Filter DII used approximately 1900 grams of adsorbent material.

Note 3: Efficiencies include sediment/debris entrapped by the DII. Extensive maintenance was conducted before, during, and after storm events to clear sediment and debris from the DII. Sediment and debris removed from the DII was temporarily stored onsite and then analyzed at the same time as DII.

Note 4: Where the individual storm EMCs showed evidence of normality, the unsampled effluent concentration was estimated by averaging individual storm EMCs.

Note 5: Where the individual storm EMCs showed evidence of non-normality, the unsampled effluent concentration was estimated by log-transforming individual storm EMCs, averaging, and then transforming back. These EMCs are italicized.

Note 6: Flow measured continuously while DII was installed.

Note 7: Reporting Limit was used where results were "<" Reporting Limit.

Calculated by: Byron Berger

Checked by: Ed Ottmer

Worksheet 3
Las Flores Maintenance Station StreamGuard DII % Removal Efficiency Calculations (Storm-by-Storm Method)

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Copper	Used StreamGuard Geotextile Fabric	34.3	890	---	---	0.000067
Copper	Used StreamGuard Absorbent Material	10.9	617	---	---	0.000015
Copper	Used StreamGuard Debris/litter/sediment	24.5	6804	---	---	0.000367
Copper	*Used Media Subtotal*					*0.000449*
Copper	Unused StreamGuard Geotextile Fabric	0.22	943.9	---	---	0.000000
Copper	Unused StreamGuard Absorbent Material	0.24	443.15	---	---	0.000000
Copper	*Unused Media Subtotal*					*0.000001*
Copper	Effluent Water from 30 January 2000 storm event	---	---	1.6	47	0.000005
Copper	Effluent Water from 10 February 2000 storm event	---	---	33.4	48	0.000100
Copper	Effluent Water from 21 February 2000 storm event	---	---	11.1	567	0.000392
Copper	Effluent Water from 27 February 2000 storm event	---	---	12.8	90	0.000072
Copper	Effluent Water from 17 April 2000 storm event	---	---	9.7	485	0.000293
Copper	Estimated effluent from unsampled storm events	---	---	13.7	1594	0.001362
Copper	*Effluent Subtotal*					*0.002224*
Copper	Estimated Influent Load					0.002672
Copper	**Efficiency (%)**					**17%**
Copper	**Efficiency w/o Litter Removal (%)**					**4%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Lead	Used StreamGuard Geotextile Fabric	38.3	890	---	---	0.000075
Lead	Used StreamGuard Absorbent Material	8.2	617	---	---	0.000011
Lead	Used StreamGuard Debris/litter/sediment	9.9	6804	---	---	0.000148
Lead	*Used Media Subtotal*					*0.000234*
Lead	Unused StreamGuard Geotextile Fabric	0.1	943.9	---	---	0.000000
Lead	Unused StreamGuard Absorbent Material	0.1	443.15	---	---	0.000000
Lead	*Unused Media Subtotal*					*0.000000*
Lead	Effluent Water from 30 January 2000 storm event	---	---	1	47	0.000003
Lead	Effluent Water from 10 February 2000 storm event	---	---	12.3	48	0.000037
Lead	Effluent Water from 21 February 2000 storm event	---	---	1.7	567	0.000060
Lead	Effluent Water from 27 February 2000 storm event	---	---	2.5	90	0.000014
Lead	Effluent Water from 17 April 2000 storm event	---	---	3.7	485	0.000112
Lead	Estimated effluent from unsampled storm events	---	---	2.9	1594	0.000285
Lead	*Effluent Subtotal*					*0.000510*
Lead	Estimated Influent Load					0.000744
Lead	**Efficiency (%)**					**31%**
Lead	**Efficiency w/o Litter Removal (%)**					**14%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Zinc	Used StreamGuard Geotextile Fabric	210	890	---	---	0.000411
Zinc	Used StreamGuard Absorbent Material	46.7	617	---	---	0.000063
Zinc	Used StreamGuard Debris/litter/sediment	98.7	6804	---	---	0.001477
Zinc	*Used Media Subtotal*					*0.001952*
Zinc	Unused StreamGuard Geotextile Fabric	3.8	943.9	---	---	0.000008
Zinc	Unused StreamGuard Absorbent Material	0.6	443.15	---	---	0.000001
Zinc	*Unused Media Subtotal*					*0.000008*
Zinc	Effluent Water from 30 January 2000 storm event	---	---	11.4	47	0.000033
Zinc	Effluent Water from 10 February 2000 storm event	---	---	453	48	0.001355
Zinc	Effluent Water from 21 February 2000 storm event	---	---	18.7	567	0.000661
Zinc	Effluent Water from 27 February 2000 storm event	---	---	32	90	0.000179
Zinc	Effluent Water from 17 April 2000 storm event	---	---	34.5	485	0.001042
Zinc	Estimated effluent from unsampled storm events	---	---	*40.3*	1594	0.004004
Zinc	*Effluent Subtotal*					*0.007275*
Zinc	Estimated Influent Load					0.009218
Zinc	**Efficiency (%)**					**21%**
Zinc	**Efficiency w/o Litter Removal (%)**					**6%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Petroleum Hydrocarbons	Used StreamGuard Geotextile Fabric	2180	890	---	---	0.004268
Petroleum Hydrocarbons	Used StreamGuard Absorbent Material	28100	617	---	---	0.038143
Petroleum Hydrocarbons	Used StreamGuard Debris/litter/sediment	8660	6804	---	---	0.132624
Petroleum Hydrocarbons	*Used Media Subtotal*					*0.175035*
Petroleum Hydrocarbons	Unused StreamGuard Geotextile Fabric	684	943.9	---	---	0.001420
Petroleum Hydrocarbons	Unused StreamGuard Absorbent Material	1970	443.15	---	---	0.001921
Petroleum Hydrocarbons	*Unused Media Subtotal*					*0.003341*
Petroleum Hydrocarbons	Effluent Water from 30 January 2000 storm event	---	---	500	47	0.001464
Petroleum Hydrocarbons	Effluent Water from 10 February 2000 storm event	---	---	500	48	0.001495
Petroleum Hydrocarbons	Effluent Water from 21 February 2000 storm event	---	---	500	567	0.017661
Petroleum Hydrocarbons	Effluent Water from 27 February 2000 storm event	---	---	500	90	0.002803
Petroleum Hydrocarbons	Effluent Water from 17 April 2000 storm event	---	---	500	485	0.015107
Petroleum Hydrocarbons	Estimated effluent from unsampled storm events	---	---	500	1594	0.049651
Petroleum Hydrocarbons	*Effluent Subtotal*					*0.088181*
Petroleum Hydrocarbons	Estimated Influent Load					0.259875
Petroleum Hydrocarbons	**Efficiency (%)**					**66%**
Petroleum Hydrocarbons	**Efficiency w/o Litter Removal (%)**					**31%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (mg/L)	Runoff Volume (ft^3)	Load (lbs)
Sediment[1)]	Used StreamGuard Geotextile Fabric	---	890	---	---	1.962094
Sediment[1)]	Used StreamGuard Absorbent Material	---	617	---	---	1.360238
Sediment	Used StreamGuard Debris/litter/sediment	---	6804	---	---	15.000098
Sediment	*Used Media Subtotal*					*18.322431*
Sediment	Unused StreamGuard Geotextile Fabric	---	943.9	---	---	2.080922
Sediment	Unused StreamGuard Absorbent Material	---	443.15	---	---	0.976968
Sediment	*Unused Media Subtotal*					*3.057890*
Sediment	Effluent Water from 30 January 2000 storm event	---	---	11	47	0.032208
Sediment	Effluent Water from 10 February 2000 storm event	---	---	92	48	0.275103
Sediment	Effluent Water from 21 February 2000 storm event	---	---	167	567	5.898837
Sediment	Effluent Water from 27 February 2000 storm event	---	---	24	90	0.134561
Sediment	Effluent Water from 17 April 2000 storm event	---	---	36	485	1.087705
Sediment	Estimated effluent from unsampled storm events	---	---	66	1594	6.553889
Sediment	*Effluent Subtotal*					*13.982303*
Sediment	Estimated Influent Load					28.246844
Sediment	**Efficiency (%)**					**52%**
Sediment	**Efficiency w/o Litter Removal (%)**					**2%**

[1)] Mass of unused DII element subtracted from mass of used DII element.

Note 1: Dissolved solids fraction and gross solids fraction of effluent not accounted for in mass balance.

Note 2: Efficiencies include sediment/debris entrapped by the DII. Extensive maintenance was conducted before, during, and after storm events to clear sediment and debris from the DII. Sediment and debis removed from the DII was temporarily stored onsite and then analyzed at the same time as DII.

Note 3: Where the individual storm EMCs showed evidence of normality, the unsampled effluent concentration was estimated by averaging individual storm EMCs.

Note 4: Where the individual storm EMCs showed evidence of non-normality, the unsampled effluent concentration was estimated by log-transforming individual storm EMCs, averaging, and then transforming back. These EMCs are italicized.

Note 5: Flow measured continuously while DII was installed.

Note 6: Reporting Limit was used where results were "<" Reporting Limit.

Calculated by: Byron Berger

Checked by: Ed Othmer

Worksheet 4
Las Flores Maintenance Station Fossil Filter DII % Removal Efficiency Calculations (Storm-by-Storm Method)

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Copper	Used Fossil Filter Adsorbent	18.9	7711	---	---	0.000321
Copper	Used Fossil Filter Debris/litter/sediment	22.2	6350	---	---	0.000310
Copper	*Used Media Subtotal*					*0.000631*
Copper	*Unused Fossil Filter Adsorbent*	*0.2*	*1900*	---	---	*0.000001*
Copper	Effluent Water from 25 January 2000 storm event	---	---	1.7	926	0.000098
Copper	Effluent Water from 10 February 2000 storm event	---	---	22.2	858	0.001187
Copper	Effluent Water from 21 February 2000 storm event	---	---	1.3	3034	0.000246
Copper	Effluent Water from 27 February 2000 storm event	---	---	6.1	512	0.000195
Copper	Effluent Water from 17 April 2000 storm event	---	---	17.4	4800	0.005203
Copper	Estimated effluent from unsampled storm events	---	---	5.5	10479	0.003615
Copper	*Effluent Subtotal*					*0.010543*
Copper	Estimated Influent Load					0.011173
Copper	**Efficiency (%)**					**6%**
Copper	**Efficiency w/o Litter Removal (%)**					**3%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Lead	Used Fossil Filter Adsorbent	21.7	7711	---	---	0.000368
Lead	Used Fossil Filter Debris/litter/sediment	7	6350	---	---	0.000098
Lead	*Used Media Subtotal*					*0.000466*
Lead	*Unused Fossil Filter Adsorbent*	*1.2*	*1900*	---	---	*0.000005*
Lead	Effluent Water from 25 January 2000 storm event	---	---	1	926	0.000058
Lead	Effluent Water from 10 February 2000 storm event	---	---	16.4	858	0.000877
Lead	Effluent Water from 21 February 2000 storm event	---	---	1.3	3034	0.000246
Lead	Effluent Water from 27 February 2000 storm event	---	---	2.3	512	0.000073
Lead	Effluent Water from 17 April 2000 storm event	---	---	3.5	4800	0.001047
Lead	Estimated effluent from unsampled storm events	---	---	*2.8*	10479	0.001827
Lead	*Effluent Subtotal*					*0.004127*
Lead	Estimated Influent Load					0.004588
Lead	**Efficiency (%)**					**10%**
Lead	**Efficiency w/o Litter Removal (%)**					**8%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Zinc	Used Fossil Filter Adsorbent	120	7711	---	---	0.002036
Zinc	Used Fossil Filter Debris/litter/sediment	69	6350	---	---	0.000964
Zinc	*Used Media Subtotal*					*0.003000*
Zinc	*Unused Fossil Filter Adsorbent*	*1.2*	*1900*	---	---	*0.000005*
Zinc	Effluent Water from 25 January 2000 storm event	---	---	10.8	926	0.000623
Zinc	Effluent Water from 10 February 2000 storm event	---	---	107	858	0.005719
Zinc	Effluent Water from 21 February 2000 storm event	---	---	14	3034	0.002646
Zinc	Effluent Water from 27 February 2000 storm event	---	---	31	512	0.000989
Zinc	Effluent Water from 17 April 2000 storm event	---	---	107	4800	0.031996
Zinc	Estimated effluent from unsampled storm events	---	---	35.2	10479	0.022947
Zinc	*Effluent Subtotal*					*0.064920*
Zinc	Estimated Influent Load					0.067914
Zinc	**Efficiency (%)**					**4%**
Zinc	**Efficiency w/o Litter Removal (%)**					**3%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Petroleum Hydrocarbons	Used Fossil Filter Adsorbent	3270	7711	---	---	0.055473
Petroleum Hydrocarbons	Used Fossil Filter Debris/litter/sediment	333	6350	---	---	0.004652
Petroleum Hydrocarbons	*Used Media Subtotal*					*0.060125*
Petroleum Hydrocarbons	*Unused Fossil Filter Adsorbent*	*26.6*	*1900*	---	---	*0.000111*
Petroleum Hydrocarbons	Effluent Water from 25 January 2000 storm event	---	---	500	926	0.028843
Petroleum Hydrocarbons	Effluent Water from 10 February 2000 storm event	---	---	500	858	0.026725
Petroleum Hydrocarbons	Effluent Water from 21 February 2000 storm event	---	---	500	3034	0.094504
Petroleum Hydrocarbons	Effluent Water from 27 February 2000 storm event			500	512	0.015948
Petroleum Hydrocarbons	Effluent Water from 17 April 2000 storm event	---	---	1416	4800	0.423420
Petroleum Hydrocarbons	Estimated effluent from unsampled storm events	---	---	*615.7*	10479	0.401953
Petroleum Hydrocarbons	*Effluent Subtotal*					*0.991394*
Petroleum Hydrocarbons	Estimated Influent Load					1.051408
Petroleum Hydrocarbons	**Efficiency (%)**					**6%**
Petroleum Hydrocarbons	**Efficiency w/o Litter Removal (%)**					**5%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (mg/L)	Runoff Volume (ft^3)	Load (lbs)
Sediment[1]	Used Fossil Filter Adsorbent	---	7711	---	---	16.999671
Sediment	Used Fossil Filter Debris/litter/sediment	---	6350	---	---	13.999210
Sediment	*Used Media Subtotal*					*30.998881*
Sediment	*Unused Fossil Filter Adsorbent*	---	*1900*	---	---	4.188740
Sediment	Effluent Water from 25 January 2000 storm event	---	---	13	926	0.749931
Sediment	Effluent Water from 10 February 2000 storm event	---	---	128	858	6.841701
Sediment	Effluent Water from 21 February 2000 storm event	---	---	38	3034	7.182341
Sediment	Effluent Water from 27 February 2000 storm event	---	---	13	512	0.414649
Sediment	Effluent Water from 17 April 2000 storm event	---	---	30	4800	8.970762
Sediment	Estimated effluent from unsampled storm events	---	---	*30*	10479	19.642058
Sediment	*Effluent Subtotal*					*43.801443*
Sediment	Estimated Influent Load					70.611583
Sediment	**Efficiency (%)**					**38%**
Sediment	**Efficiency w/o Litter Removal (%)**					**23%**

[1] Mass of unused DII element subtracted from mass of used DII element.

Note 1: Dissolved solids fraction and gross solids fraction of effluent not accounted for in mass balance.

Note 2: Each Fossil Filter DII used approximately 1900 grams of adsorbent material.

Note 3: Efficiencies include sediment/debris entrapped by the DII. Extensive maintenance was conducted before, during, and after storm events to clear sediment and debris from the DII. Sediment and debis removed from the DII was temporarily stored onsite and then analyzed at the same time as DII.

Note 4: Where the individual storm EMCs showed evidence of normality, the unsampled effluent concentration was estimated by averaging individual storm EMCs.

Note 5: Where the individual storm EMCs showed evidence of non-normality, the unsampled effluent concentration was estimated by log-transforming individual storm EMCs, averaging, and then transforming back. These EMCs are italicized.

Note 6: Flow measured continuously while DII was installed.

Note 7: Reporting Limit was used where results were "<" Reporting Limit.

Calculated by: Byron Berger

Checked by: Ed Othmer

Worksheet 5
Rosemead Maintenance Station StreamGuard DII % Removal Efficiency Calculations (Storm-by-Storm Method)

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Copper	Used StreamGuard Geotextile Fabric	42.5	1056	---	---	0.000099
Copper	Used StreamGuard Absorbent Material	15.5	437	---	---	0.000015
Copper	Used StreamGuard Debris/litter/sediment	51	1515	---	---	0.000170
Copper	*Used Media Subtotal*					*0.000284*
Copper	Unused StreamGuard Geotextile Fabric	0.22	943.9	---	---	0.000000
Copper	Unused StreamGuard Absorbent Material	0.24	443.15	---	---	0.000000
Copper	*Unused Media Subtotal*					*0.000000*
Copper	Effluent Water from 25 January 2000 storm event	---	---	3	2332	0.000436
Copper	Effluent Water from 30 January 2000 storm event	---	---	3.7	651	0.000150
Copper	Effluent Water from 21 February 2000 storm event	---	---	4.6	3379	0.001010
Copper	Effluent Water from 27 February 2000 storm event	---	---	11.6	1692	0.001223
Copper	Effluent Water from 17 April 2000 storm event	---	---	19.3	7226	0.008688
Copper	Estimated effluent from unsampled storm events	---	---	8.5	24142	0.012754
Copper	*Effluent Subtotal*					*0.024261*
Copper	Estimated Influent Load					0.024544
Copper	**Efficiency (%)**					**1%**
Copper	**Efficiency w/o Litter Removal (%)**					**0%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Lead	Used StreamGuard Geotextile Fabric	95.4	1056	---	---	0.000222
Lead	Used StreamGuard Absorbent Material	25.9	437	---	---	0.000025
Lead	Used StreamGuard Debris/litter/sediment	127	1515	---	---	0.000423
Lead	*Used Media Subtotal*					*0.000670*
Lead	Unused StreamGuard Geotextile Fabric	0.1	943.9	---	---	0.000000
Lead	Unused StreamGuard Absorbent Material	0.1	443.15	---	---	0.000000
Lead	*Unused Media Subtotal*					*0.000000*
Lead	Effluent Water from 25 January 2000 storm event	---	---	2.4	2332	0.000349
Lead	Effluent Water from 30 January 2000 storm event	---	---	1	651	0.000041
Lead	Effluent Water from 21 February 2000 storm event	---	---	1.9	3379	0.000400
Lead	Effluent Water from 27 February 2000 storm event	---	---	12.2	1692	0.001286
Lead	Effluent Water from 17 April 2000 storm event	---	---	12.5	7226	0.005627
Lead	Estimated effluent from unsampled storm events	---	---	3.7	24142	0.005568
Lead	*Effluent Subtotal*					*0.013270*
Lead	Estimated Influent Load					0.013939
Lead	**Efficiency (%)**					**5%**
Lead	**Efficiency w/o Litter Removal (%)**					**2%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Zinc	Used StreamGuard Geotextile Fabric	934	1056	---	---	0.002170
Zinc	Used StreamGuard Absorbent Material	121	437	---	---	0.000116
Zinc	Used StreamGuard Debris/litter/sediment	574	1515	---	---	0.001913
Zinc	*Used Media Subtotal*					*0.004199*
Zinc	Unused StreamGuard Geotextile Fabric	3.8	943.9	---	---	0.000008
Zinc	Unused StreamGuard Absorbent Material	0.6	443.15	---	---	0.000001
Zinc	*Unused Media Subtotal*					*0.000008*
Zinc	Effluent Water from 25 January 2000 storm event	---	---	27.6	2332	0.004010
Zinc	Effluent Water from 30 January 2000 storm event	---	---	24.6	651	0.000998
Zinc	Effluent Water from 21 February 2000 storm event	---	---	13	3379	0.002737
Zinc	Effluent Water from 27 February 2000 storm event	---	---	106	1692	0.011173
Zinc	Effluent Water from 17 April 2000 storm event	---	---	328	7226	0.147652
Zinc	Estimated effluent from unsampled storm events	---	---	*49.8*	24142	0.074926
Zinc	*Effluent Subtotal*					*0.241495*
Zinc	Estimated Influent Load					0.245686
Zinc	**Efficiency (%)**					**2%**
Zinc	**Efficiency w/o Litter Removal (%)**					**1%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Petroleum Hydrocarbons	Used StreamGuard Geotextile Fabric	2300	1056	---	---	0.005343
Petroleum Hydrocarbons	Used StreamGuard Absorbent Material	26400	437	---	---	0.025381
Petroleum Hydrocarbons	Used StreamGuard Debris/litter/sediment	2320	1515	---	---	0.007733
Petroleum Hydrocarbons	*Used Media Subtotal*					*0.038457*
Petroleum Hydrocarbons	Unused StreamGuard Geotextile Fabric	684	943.9	---	---	0.001420
Petroleum Hydrocarbons	Unused StreamGuard Absorbent Material	1970	443.15	---	---	0.001921
Petroleum Hydrocarbons	*Unused Media Subtotal*					*0.003341*
Petroleum Hydrocarbons	Effluent Water from 25 January 2000 storm event	---	---	500	2332	0.072638
Petroleum Hydrocarbons	Effluent Water from 30 January 2000 storm event	---	---	500	651	0.020278
Petroleum Hydrocarbons	Effluent Water from 21 February 2000 storm event	---	---	500	3379	0.105251
Petroleum Hydrocarbons	Effluent Water from 27 February 2000 storm event	---	---	500	1692	0.052703
Petroleum Hydrocarbons	Effluent Water from 17 April 2000 storm event	---	---	500	7226	0.225079
Petroleum Hydrocarbons	Estimated effluent from unsampled storm events			500	24142	0.751987
Petroleum Hydrocarbons	*Effluent Subtotal*					*1.227935*
Petroleum Hydrocarbons	Estimated Influent Load					1.263051
Petroleum Hydrocarbons	**Efficiency (%)**					**3%**
Petroleum Hydrocarbons	**Efficiency w/o Litter Removal (%)**					**2%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (mg/L)	Runoff Volume (ft^3)	Load (lbs)
Sediment[1]	Used StreamGuard Geotextile Fabric	---	1056	---	---	2.328058
Sediment[1]	Used StreamGuard Absorbent Material	---	437	---	---	0.963410
Sediment	Used StreamGuard Debris/litter/sediment	---	1515	---	---	3.339969
Sediment	*Used Media Subtotal*					*6.631437*
Sediment	Unused StreamGuard Geotextile Fabric	---	943.9	---	---	2.080922
Sediment	Unused StreamGuard Absorbent Material	---	443.15	---	---	0.976968
Sediment	*Unused Media Subtotal*					*3.057890*
Sediment	Effluent Water from 25 January 2000 storm event	---	---	44	2332	6.392166
Sediment	Effluent Water from 30 January 2000 storm event	---	---	18	651	0.729996
Sediment	Effluent Water from 21 February 2000 storm event	---	---	28	3379	5.894040
Sediment	Effluent Water from 27 February 2000 storm event	---	---	27	1692	2.845974
Sediment	Effluent Water from 17 April 2000 storm event	---	---	45	7226	20.257102
Sediment	Estimated effluent from unsampled storm events	---	---	32	24142	48.726732
Sediment	*Effluent Subtotal*					*84.848011*
Sediment	Estimated Influent Load					88.421557
Sediment	**Efficiency (%)**					**4%**
Sediment	**Efficiency w/o Litter Removal (%)**					**0%**

[1] Mass of unused DII element subtracted from mass of used DII element.

Note 1: Dissolved solids fraction and gross solids fraction of effluent not accounted for in mass balance.

Note 2: Efficiencies include sediment/debris entrapped by the DII. Extensive maintenance was conducted before, during, and after storm events to clear sediment and debris from the DII. Sediment and debris removed from the DII was temporarily stored onsite and then analyzed at the same time as DII.

Note 3: Where the individual storm EMCs showed evidence of normality, the unsampled effluent concentration was estimated by averaging individual storm EMCs.

Note 4: Where the individual storm EMCs showed evidence of non-normality, the unsampled effluent concentration was estimated by log-transforming individual storm EMCs, averaging, and then transforming back. These EMCs are italicized.

Note 5: Flow measured continuously while DII was installed.

Note 6: Reporting Limit was used where results were "<" Reporting Limit.

Calculated by: Byron Berger

Checked by: Ed Othmer

Worksheet 6
Rosemead Maintenance Station Fossil Filter DII % Removal Efficiency Calculations (Storm-by-Storm Method)

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Copper	Used Fossil Filter Adsorbent	61.5	5443	---	---	0.000736
Copper	Used Fossil Filter Debris/litter/sediment	43.7	14061	---	---	0.001352
Copper	*Used Media Subtotal*					*0.002088*
Copper	*Unused Fossil Filter Adsorbent*	*0.2*	*1900*	---	---	*0.000001*
Copper	Effluent Water from 25 January 2000 storm event	---	---	2.4	456	0.000068
Copper	Effluent Water from 30 January 2000 storm event	---	---	1.8	94	0.000011
Copper	Effluent Water from 21 February 2000 storm event	---	---	2.8	2664	0.000465
Copper	Effluent Water from 27 February 2000 storm event	---	---	10.4	300	0.000194
Copper	Effluent Water from 17 April 2000 storm event	---	---	29.7	1593	0.002947
Copper	Estimated effluent from unsampled storm events	---	---	5.2	4698	0.001517
Copper	*Effluent Subtotal*					*0.005202*
Copper	Estimated Influent Load					0.007289
Copper	**Efficiency (%)**					**29%**
Copper	**Efficiency w/o Litter Removal (%)**					**12%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Lead	Used Fossil Filter Adsorbent	135	5443	---	---	0.001617
Lead	Used Fossil Filter Debris/litter/sediment	70.2	14061	---	---	0.002172
Lead	*Used Media Subtotal*					*0.003788*
Lead	*Unused Fossil Filter Adsorbent*	*1.2*	*1900*	---	---	*0.000005*
Lead	Effluent Water from 25 January 2000 storm event	---	---	2.3	456	0.000065
Lead	Effluent Water from 30 January 2000 storm event	---	---	1	94	0.000006
Lead	Effluent Water from 21 February 2000 storm event	---	---	1.2	2664	0.000199
Lead	Effluent Water from 27 February 2000 storm event	---	---	6.5	300	0.000121
Lead	Effluent Water from 17 April 2000 storm event	---	---	16.8	1593	0.001667
Lead	Estimated effluent from unsampled storm events	---	---	3.1	4698	0.000917
Lead	*Effluent Subtotal*					*0.002976*
Lead	Estimated Influent Load					0.006759
Lead	**Efficiency (%)**					**56%**
Lead	**Efficiency w/o Litter Removal (%)**					**35%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Zinc	Used Fossil Filter Adsorbent	705	5443	---	---	0.008442
Zinc	Used Fossil Filter Debris/litter/sediment	856	14061	---	---	0.026480
Zinc	*Used Media Subtotal*					*0.034922*
Zinc	*Unused Fossil Filter Adsorbent*	*1.2*	*1900*	---	---	*0.000005*
Zinc	Effluent Water from 25 January 2000 storm event	---	---	34.2	456	0.000972
Zinc	Effluent Water from 30 January 2000 storm event	---	---	19.8	94	0.000116
Zinc	Effluent Water from 21 February 2000 storm event	---	---	19.5	2664	0.003236
Zinc	Effluent Water from 27 February 2000 storm event	---	---	218	300	0.004074
Zinc	Effluent Water from 17 April 2000 storm event	---	---	436	1593	0.043268
Zinc	Estimated effluent from unsampled storm events	---	---	*66.0*	4698	0.019325
Zinc	*Effluent Subtotal*					*0.070991*
Zinc	Estimated Influent Load					0.105908
Zinc	**Efficiency (%)**					**33%**
Zinc	**Efficiency w/o Litter Removal (%)**					**11%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Petroleum Hydrocarbons	Used Fossil Filter Adsorbent	1480	5443	---	---	0.017483
Petroleum Hydrocarbons	Used Fossil Filter Debris/litter/sediment	2950	14061	---	---	0.091256
Petroleum Hydrocarbons	*Used Media Subtotal*					*0.108739*
Petroleum Hydrocarbons	*Unused Fossil Filter Adsorbent*	*26.6*	*1900*	---	---	*0.000111*
Petroleum Hydrocarbons	Effluent Water from 25 January 2000 storm event	---	---	500	456	0.014204
Petroleum Hydrocarbons	Effluent Water from 30 January 2000 storm event	---	---	500	94	0.002928
Petroleum Hydrocarbons	Effluent Water from 21 February 2000 storm event	---	---	500	2664	0.082980
Petroleum Hydrocarbons	Effluent Water from 27 February 2000 storm event	---	---	500	300	0.009345
Petroleum Hydrocarbons	Effluent Water from 17 April 2000 storm event	---	---	500	1593	0.049620
Petroleum Hydrocarbons	Estimated effluent from unsampled storm events	---	---	*500*	4698	0.146336
Petroleum Hydrocarbons	*Effluent Subtotal*					*0.305411*
Petroleum Hydrocarbons	Estimated Influent Load					0.414038
Petroleum Hydrocarbons	**Efficiency (%)**					**26%**
Petroleum Hydrocarbons	**Efficiency w/o Litter Removal (%)**					**5%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (mg/L)	Runoff Volume (ft^3)	Load (lbs)
Sediment[1]	Used Fossil Filter Adsorbent	---	5443	---	---	11.999638
Sediment	Used Fossil Filter Debris/litter/sediment	---	14061	---	---	30.998881
Sediment	*Used Media Subtotal*					*42.998518*
Sediment	*Unused Fossil Filter Adsorbent*	---	*1900*	---	---	4.188740
Sediment	Effluent Water from 25 January 2000 storm event	---	---	39	456	1.107889
Sediment	Effluent Water from 30 January 2000 storm event	---	---	19	94	0.111262
Sediment	Effluent Water from 21 February 2000 storm event	---	---	8	2664	1.327673
Sediment	Effluent Water from 27 February 2000 storm event	---	---	13	300	0.242956
Sediment	Effluent Water from 17 April 2000 storm event	---	---	38	1593	3.771084
Sediment	Estimated effluent from unsampled storm events	---	---	*20*	4698	5.750517
Sediment	*Effluent Subtotal*					*12.311384*
Sediment	Estimated Influent Load					51.121162
Sediment	**Efficiency (%)**					**76%**
Sediment	**Efficiency w/o Litter Removal (%)**					**39%**

[1] Mass of unused DII element subtracted from mass of used DII element.

Note 1: Dissolved solids fraction and gross solids fraction of effluent not accounted for in mass balance.

Note 2: Each Fossil Filter DII used approximately 1900 grams of adsorbent material.

Note 3: Efficiencies include sediment/debris entrapped by the DII. Extensive maintenance was conducted before, during, and after storm events to clear sediment and debris from the DII. Sediment and debis removed from the DII was temporarily stored onsite and then analyzed at the same time as DII.

Note 4: Where the individual storm EMCs showed evidence of normality, the unsampled effluent concentration was estimated by averaging individual storm EMCs.

Note 5: Where the individual storm EMCs showed evidence of non-normality, the unsampled effluent concentration was estimated by log-transforming individual storm EMCs, averaging, and then transforming back. These EMCs are italicized.

Note 6: Flow measured continuously while DII was installed.

Note 7: Reporting Limit was used where results were "<" Reporting Limit.

Calculated by: Byron Berger

Checked by: Ed Othmer

Worksheet 7
Foothill Maintenance Station StreamGuard DII % Removal Efficiency Calculations (Aggregate Method)

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Copper	Used StreamGuard Geotextile Fabric	74.5	960	---	---	0.000157
Copper	Used StreamGuard Absorbent Material	16.9	504.5	---	---	0.000019
Copper	Used StreamGuard Debris/litter/sediment	29.9	4536	---	---	0.000298
Copper	*Used Media Subtotal*					*0.000474*
Copper	Unused StreamGuard Geotextile Fabric	0.22	943.9	---	---	0.000000
Copper	Unused StreamGuard Absorbent Material	0.24	443.15	---	---	0.000000
Copper	*Unused Media Subtotal*					*0.000001*
Copper	Effluent Water from 25 January 2000 storm event	---	---	1.7	262	
Copper	Effluent Water from 30 January 2000 storm event	---	---	1.3	379	
Copper	Effluent Water from 16 February 2000 storm event	---	---	4.4	268	
Copper	Effluent Water from 21 February 2000 storm event	---	---	1.2	1512	
Copper	Effluent Water from 27 February 2000 storm event	---	---	4.2	984	
Copper	Effluent Water from 8 March 2000 storm event	---	---	4.3	463	
Copper	Effluent Water from 17 April 2000 storm event	---	---	5.8	344	
Copper	Estimated flow volume from unsampled storm events	---	---	---	4250	
Copper	*Effluent Subtotal (Mean EMC x Total Runoff Volume)*			3.3	8462	0.001726
Copper	Estimated Influent Load					0.002198
Copper	Efficiency (%)					22%
Copper	Efficiency w/o Litter Removal (%)					9%

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Lead	Used StreamGuard Geotextile Fabric	150	960	---	---	0.000317
Lead	Used StreamGuard Absorbent Material	29.5	504.5	---	---	0.000033
Lead	Used StreamGuard Debris/litter/sediment	52.9	4536	---	---	0.000528
Lead	*Used Media Subtotal*					*0.000877*
Lead	Unused StreamGuard Geotextile Fabric	0.1	943.9	---	---	0.000000
Lead	Unused StreamGuard Absorbent Material	0.1	443.15	---	---	0.000000
Lead	*Unused Media Subtotal*					*0.000000*
Lead	Effluent Water from 25 January 2000 storm event	---	---	1	262	
Lead	Effluent Water from 30 January 2000 storm event	---	---	1	379	
Lead	Effluent Water from 10 February 2000 storm event	---	---	1.7	268	
Lead	Effluent Water from 21 February 2000 storm event	---	---	1	1512	
Lead	Effluent Water from 27 February 2000 storm event	---	---	1	984	
Lead	Effluent Water from 8 March 2000 storm event	---	---	2	463	
Lead	Effluent Water from 17 April 2000 storm event	---	---	2.8	344	
Lead	Estimated effluent from unsampled storm events	---	---	---	4250	
Lead	*Effluent Subtotal (Mean EMC x Total Runoff Volume)*			*1.4*	8462	0.000727
Lead	Estimated Influent Load					0.001604
Lead	Efficiency (%)					55%
Lead	Efficiency w/o Litter Removal (%)					32%

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Zinc	Used StreamGuard Geotextile Fabric	917	960	---	---	0.001937
Zinc	Used StreamGuard Absorbent Material	105	504.5	---	---	0.000117
Zinc	Used StreamGuard Debris/litter/sediment	301	4536	---	---	0.003004
Zinc	*Used Media Subtotal*					*0.005057*
Zinc	Unused StreamGuard Geotextile Fabric	3.8	943.9	---	---	0.000006
Zinc	Unused StreamGuard Absorbent Material	0.6	443.15	---	---	0.000001
Zinc	*Unused Media Subtotal*					*0.000008*
Zinc	Effluent Water from 25 January 2000 storm event	---	---	13.5	262	
Zinc	Effluent Water from 30 January 2000 storm event	---	---	16.2	379	
Zinc	Effluent Water from 16 February 2000 storm event	---	---	50	268	
Zinc	Effluent Water from 21 February 2000 storm event	---	---	13	1512	
Zinc	Effluent Water from 27 February 2000 storm event	---	---	50	984	
Zinc	Effluent Water from 8 March 2000 storm event	---	---	66	463	
Zinc	Effluent Water from 17 April 2000 storm event	---	---	63.5	344	
Zinc	Estimated effluent from unsampled storm events	---	---	---	4250	
Zinc	*Effluent Subtotal (Mean EMC x Total Runoff Volume)*			*31.9*	8462	0.016806
Zinc	Estimated Influent Load					0.021854
Zinc	Efficiency (%)					23%
Zinc	Efficiency w/o Litter Removal (%)					11%

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Petroleum Hydrocarbons	Used StreamGuard Geotextile Fabric	3020	960	---	---	0.006378
Petroleum Hydrocarbons	Used StreamGuard Absorbent Material	33700	504.5	---	---	0.037404
Petroleum Hydrocarbons	Used StreamGuard Debris/litter/sediment	2870	4536	---	---	0.028640
Petroleum Hydrocarbons	*Used Media Subtotal*					*0.072422*
Petroleum Hydrocarbons	Unused StreamGuard Geotextile Fabric	684	943.9	---	---	0.001420
Petroleum Hydrocarbons	Unused StreamGuard Absorbent Material	1070	443.15			0.001021
Petroleum Hydrocarbons	*Unused Media Subtotal*					*0.003341*
Petroleum Hydrocarbons	Effluent Water from 25 January 2000 storm event	---	---	500	262	
Petroleum Hydrocarbons	Effluent Water from 30 January 2000 storm event	---	---	500	379	
Petroleum Hydrocarbons	Effluent Water from 16 February 2000 storm event	---	---	500	268	
Petroleum Hydrocarbons	Effluent Water from 21 February 2000 storm event	---	---	500	1512	
Petroleum Hydrocarbons	Effluent Water from 27 February 2000 storm event	---	---	500	984	
Petroleum Hydrocarbons	Effluent Water from 8 March 2000 storm event	---	---	500	463	
Petroleum Hydrocarbons	Effluent Water from 17 April 2000 storm event	---	---	300	344	
Petroleum Hydrocarbons	Estimated effluent from unsampled storm events	---	---	---	4250	
Petroleum Hydrocarbons	*Effluent Subtotal (Mean EMC x Total Runoff Volume)*			500.0	8462	0.263578
Petroleum Hydrocarbons	Estimated Influent Load					0.332660
Petroleum Hydrocarbons	Efficiency (%)					21%
Petroleum Hydrocarbons	Efficiency w/o Litter Removal (%)					13%

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (mg/L)	Runoff Volume (ft^3)	Load (lbs)
Sediment[1]	Used StreamGuard Geotextile Fabric	---	960	---	---	2.116416
Sediment[1]	Used StreamGuard Absorbent Material	---	504.5	---	---	1.112221
Sediment	Used StreamGuard Debris/litter/sediment	---	4536	---	---	10.000066
Sediment	*Used Media Subtotal*					*13.228702*
Sediment	Unused StreamGuard Geotextile Fabric		943.9			2.080023
Sediment	Unused StreamGuard Absorbent Material	---	443.15	---	---	0.976868
Sediment	*Unused Media Subtotal*					*3.057890*
Sediment	Effluent Water from 25 January 2000 storm event	---	---	13	262	
Sediment	Effluent Water from 30 January 2000 storm event	---	---	6	379	
Sediment	Effluent Water from 16 February 2000 storm event	---	---	13	268	
Sediment	Effluent Water from 21 February 2000 storm event	---	---	20	1512	
Sediment	Effluent Water from 27 February 2000 storm event	---	---	5	984	
Sediment	Effluent Water from 8 March 2000 storm event	---	---	10	463	
Sediment	Effluent Water from 17 April 2000 storm event	---	---	13	344	
Sediment	Estimated effluent from unsampled storm events	---	---	---	4250	
Sediment	*Effluent Subtotal (Mean EMC x Total Runoff Volume)*			11.4	8462	6.024650
Sediment	Estimated Influent Load					16.195462
Sediment	Efficiency (%)					63%
Sediment	Efficiency w/o Litter Removal (%)					3%

[1] Mass of unused DII element subtracted from mass of used DII element.

Note 1: Dissolved solids fraction and gross solids fraction of effluent not accounted for in mass balance.

Note 2: Efficiencies include sediment/debris entrapped by the DII. Extensive maintenance was conducted before, during, and after storm events to clear sediment and debris from the DII. Sediment and debris removed from the DII was temporarily stored onsite and then analyzed at the same time as DII.

Note 3: Where the individual storm EMCs showed evidence of normality, the mean EMC effluent concentration was estimated by averaging individual storm EMCs.

Note 4: Where the individual storm EMCs showed evidence of non-normality, the mean EMC effluent concentration was estimated by log-transforming individual storm EMCs, averaging, and then transforming back. These EMCs are italicized.

Note 5: Flow measured continuously while DII was installed.

Note 6: Reporting Limit was used where results were "<" Reporting Limit.

Calculated by: Byron Berger

Checked by: Ed Ohmer

Worksheet 8
Foothill Maintenance Station Fossil Filter DII % Removal Efficiency Calculations (Aggregate Method)

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Copper	Used Fossil Filter Adsorbent	35.3	5897	---	---	0.000458
Copper	Used Fossil Filter Debris/litter/sediment	57	2268	---	---	0.000284
Copper	*Used Media Subtotal*					*0.000742*
Copper	*Unused Fossil Filter Adsorbent*	*0.2*	*1900*	---	---	*0.000001*
Copper	Effluent Water from 25 January 2000 storm event	---	---	1.5	1034	
Copper	Effluent Water from 30 January 2000 storm event	---	---	1.5	351	
Copper	Effluent Water from 16 February 2000 storm event	---	---	7.7	1634	
Copper	Effluent Water from 21 February 2000 storm event	---	---	1.2	5722	
Copper	Effluent Water from 27 February 2000 storm event	---	---	5.8	683	
Copper	Effluent Water from 8 March 2000 storm event	---	---	6.7	1608	
Copper	Effluent Water from 17 April 2000 storm event	---	---	8.1	5315	
Copper	Estimated effluent from unsampled storm events	---	---	---	10910	
Copper	*Effluent Subtotal (Mean EMC x Total Runoff Volume)*			*3.5*	27257	0.005958
Copper	Estimated Influent Load					0.006699
Copper	**Efficiency (%)**					**11%**
Copper	**Efficiency w/o Litter Removal (%)**					**7%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Lead	Used Fossil Filter Adsorbent	119	5897	---	---	0.001544
Lead	Used Fossil Filter Debris/litter/sediment	104	2268	---	---	0.000519
Lead	*Used Media Subtotal*					*0.002063*
Lead	*Unused Fossil Filter Adsorbent*	*1.2*	*1900*	---	---	*0.000005*
Lead	Effluent Water from 25 January 2000 storm event	---	---	1	1034	
Lead	Effluent Water from 30 January 2000 storm event	---	---	1	351	
Lead	Effluent Water from 16 February 2000 storm event	---	---	9.4	1634	
Lead	Effluent Water from 21 February 2000 storm event	---	---	2	5722	
Lead	Effluent Water from 27 February 2000 storm event	---	---	4.7	683	
Lead	Effluent Water from 8 March 2000 storm event	---	---	12	1608	
Lead	Effluent Water from 17 April 2000 storm event	---	---	10	5315	
Lead	Estimated effluent from unsampled storm events	---	---	---	10910	
Lead	*Effluent Subtotal (Mean EMC x Total Runoff Volume)*			*3.8*	27257	0.006383
Lead	Estimated Influent Load					0.008440
Lead	**Efficiency (%)**					**24%**
Lead	**Efficiency w/o Litter Removal (%)**					**19%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Zinc	Used Fossil Filter Adsorbent	338	5897	---	---	0.004385
Zinc	Used Fossil Filter Debris/litter/sediment	356	2268	---	---	0.001776
Zinc	*Used Media Subtotal*					*0.006161*
Zinc	*Unused Fossil Filter Adsorbent*	*1.2*	*1900*	---	---	*0.000005*
Zinc	Effluent Water from 25 January 2000 storm event	---	---	14.8	1034	
Zinc	Effluent Water from 30 January 2000 storm event	---	---	13.4	351	
Zinc	Effluent Water from 16 February 2000 storm event	---	---	69	1634	
Zinc	Effluent Water from 21 February 2000 storm event	---	---	9.4	5722	
Zinc	Effluent Water from 27 February 2000 storm event	---	---	60	683	
Zinc	Effluent Water from 8 March 2000 storm event	---	---	74	1608	
Zinc	Effluent Water from 17 April 2000 storm event	---	---	82.8	5315	
Zinc	Estimated effluent from unsampled storm events	---	---	---	10910	
Zinc	*Effluent Subtotal (Mean EMC x Total Runoff Volume)*			*33.5*	27257	0.056874
Zinc	Estimated Influent Load					0.063030
Zinc	**Efficiency (%)**					**10%**
Zinc	**Efficiency w/o Litter Removal (%)**					**7%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Petroleum Hydrocarbons	Used Fossil Filter Adsorbent	5180	5897	---	---	0.067202
Petroleum Hydrocarbons	Used Fossil Filter Debris/litter/sediment	4550	2268	---	---	0.022703
Petroleum Hydrocarbons	*Used Media Subtotal*					*0.089905*
Petroleum Hydrocarbons	*Unused Fossil Filter Adsorbent*	*28.8*	*1900*	---	---	*0.000111*
Petroleum Hydrocarbons	Effluent Water from 25 January 2000 storm event	---	---	500	1034	
Petroleum Hydrocarbons	Effluent Water from 30 January 2000 storm event	---	---	500	351	
Petroleum Hydrocarbons	Effluent Water from 16 February 2000 storm event	---	---	500	1634	
Petroleum Hydrocarbons	Effluent Water from 21 February 2000 storm event	---	---	500	5722	
Petroleum Hydrocarbons	Effluent Water from 27 February 2000 storm event	---	---	500	683	
Petroleum Hydrocarbons	Effluent Water from 8 March 2000 storm event	---	---	510	1608	
Petroleum Hydrocarbons	Effluent Water from 17 April 2000 storm event	---	---	500	5315	
Petroleum Hydrocarbons	Estimated effluent from unsampled storm events	---	---	---	10910	
Petroleum Hydrocarbons	*Effluent Subtotal (Mean EMC x Total Runoff Volume)*			*501.4*	27257	0.851419
Petroleum Hydrocarbons	Estimated Influent Load					0.941213
Petroleum Hydrocarbons	**Efficiency (%)**					**10%**
Petroleum Hydrocarbons	**Efficiency w/o Litter Removal (%)**					**7%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (mg/L)	Runoff Volume (ft^3)	Load (lbs)
Sediment[1]	Used Fossil Filter Adsorbent	---	5897	---	---	13.000526
Sediment	Used Fossil Filter Debris/litter/sediment	---	2268	---	---	5.000033
Sediment	*Used Media Subtotal*					*18.000559*
Sediment	*Unused Fossil Filter Adsorbent*	---	*1900*	---	---	4.188740
Sediment	Effluent Water from 25 January 2000 storm event	---	---	24	1034	
Sediment	Effluent Water from 30 January 2000 storm event	---	---	8	351	
Sediment	Effluent Water from 16 February 2000 storm event	---	---	32	1634	
Sediment	Effluent Water from 21 February 2000 storm event	---	---	22	5722	
Sediment	Effluent Water from 27 February 2000 storm event	---	---	20	683	
Sediment	Effluent Water from 8 March 2000 storm event	---	---	31	1608	
Sediment	Effluent Water from 17 April 2000 storm event	---	---	27	5315	
Sediment	Estimated effluent from unsampled storm events	---	---	---	10910	
Sediment	*Effluent Subtotal (Mean EMC x Total Runoff Volume)*			*21.7*	27257	36.840077
Sediment	Estimated Influent Load					50.651896
Sediment	**Efficiency (%)**					**27%**
Sediment	**Efficiency w/o Litter Removal (%)**					**19%**

[1] Mass of unused DII element subtracted from mass of used DII element.

Note 1: Dissolved solids fraction and gross solids fraction of effluent not accounted for in mass balance.

Note 2: Each Fossil Filter DII used approximately 1900 grams of adsorbent material.

Note 3: Efficiencies include sediment/debris entrapped by the DII. Extensive maintenance was conducted before, during, and after storm events to clear sediment and debris from the DII. Sediment and debis removed from the DII was temporarily stored onsite and then analyzed at the same time as DII.

Note 4: Where the individual storm EMCs showed evidence of normality, the mean EMC effluent concentration was estimated by averaging individual storm EMCs.

Note 5: Where the individual storm EMCs showed evidence of non-normality, the mean EMC effluent concentration was estimated by log-transforming individual storm EMCs, averaging, and then transforming back. These EMCs are italicized.

Note 6: Flow measured continuously while DII was installed.

Note 7: Reporting Limit was used where results were "<" Reporting Limit.

Calculated by: Byron Berger

Checked by: Ed Othmer

Worksheet 9
Las Flores Maintenance Station StreamGuard DII % Removal Efficiency Calculations (Aggregate Method)

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Copper	Used StreamGuard Geotextile Fabric	34.3	890	---	---	0.000067
Copper	Used StreamGuard Absorbent Material	10.9	617	---	---	0.000015
Copper	Used StreamGuard Debris/litter/sediment	24.5	6804	---	---	0.000367
Copper	*Used Media Subtotal*					*0.000449*
Copper	Unused StreamGuard Geotextile Fabric	0.22	943.9	---	---	0.000000
Copper	Unused StreamGuard Absorbent Material	0.24	443.15	---	---	0.000000
Copper	*Unused Media Subtotal*					*0.000000*
Copper	Effluent Water from 30 January 2000 storm event	---	---	1.6	47	
Copper	Effluent Water from 10 February 2000 storm event	---	---	33.4	48	
Copper	Effluent Water from 21 February 2000 storm event	---	---	11.1	567	
Copper	Effluent Water from 27 February 2000 storm event	---	---	12.8	90	
Copper	Effluent Water from 17 April 2000 storm event	---	---	9.7	485	
Copper	Estimated effluent from unsampled storm events	---	---	---	1594	
Copper	*Effluent Subtotal (Mean EMC x Total Runoff Volume)*			13.7	2831	0.002420
Copper	Estimated Influent Load					0.002868
Copper	**Efficiency (%)**					**16%**
Copper	**Efficiency w/o Litter Removal (%)**					**3%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Lead	Used StreamGuard Geotextile Fabric	38.3	890	---	---	0.000075
Lead	Used StreamGuard Absorbent Material	8.2	617	---	---	0.000011
Lead	Used StreamGuard Debris/litter/sediment	9.9	6804	---	---	0.000148
Lead	*Used Media Subtotal*					*0.000234*
Lead	Unused StreamGuard Geotextile Fabric	0.1	943.9	---	---	0.000000
Lead	Unused StreamGuard Absorbent Material	0.1	443.15	---	---	0.000000
Lead	*Unused Media Subtotal*					*0.000000*
Lead	Effluent Water from 30 January 2000 storm event	---	---	1	47	
Lead	Effluent Water from 10 February 2000 storm event	---	---	12.3	48	
Lead	Effluent Water from 21 February 2000 storm event	---	---	1.7	567	
Lead	Effluent Water from 27 February 2000 storm event	---	---	2.5	90	
Lead	Effluent Water from 17 April 2000 storm event	---	---	3.7	485	
Lead	Estimated effluent from unsampled storm events	---	---	---	1594	
Lead	*Effluent Subtotal (Mean EMC x Total Runoff Volume)*			2.6	2831	0.000506
Lead	Estimated Influent Load					0.000739
Lead	**Efficiency (%)**					**32%**
Lead	**Efficiency w/o Litter Removal (%)**					**15%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Zinc	Used StreamGuard Geotextile Fabric	210	890	---	---	0.000411
Zinc	Used StreamGuard Absorbent Material	46.7	617	---	---	0.000063
Zinc	Used StreamGuard Debris/litter/sediment	96.7	6804	---	---	0.001477
Zinc	*Used Media Subtotal*					*0.001952*
Zinc	Unused StreamGuard Geotextile Fabric	3.8	943.9	---	---	0.000008
Zinc	Unused StreamGuard Absorbent Material	0.6	443.15	---	---	0.000001
Zinc	*Unused Media Subtotal*					*0.000008*
Zinc	Effluent Water from 30 January 2000 storm event	---	---	11.4	47	
Zinc	Effluent Water from 10 February 2000 storm event	---	---	453	48	
Zinc	Effluent Water from 21 February 2000 storm event	---	---	18.7	567	
Zinc	Effluent Water from 27 February 2000 storm event	---	---	32	90	
Zinc	Effluent Water from 17 April 2000 storm event	---	---	34.5	485	
Zinc	Estimated effluent from unsampled storm events	---	---	---	1594	
Zinc	*Effluent Subtotal (Mean EMC x Total Runoff Volume)*			*40.3*	2831	0.007112
Zinc	Estimated Influent Load					0.009055
Zinc	**Efficiency (%)**					**21%**
Zinc	**Efficiency w/o Litter Removal (%)**					**6%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Petroleum Hydrocarbons	Used StreamGuard Geotextile Fabric	2180	890	---	---	0.004268
Petroleum Hydrocarbons	Used StreamGuard Absorbent Material	28100	617	---	---	0.038143
Petroleum Hydrocarbons	Used StreamGuard Debris/litter/sediment	8860	6804	---	---	0.132624
Petroleum Hydrocarbons	*Used Media Subtotal*					*0.175035*
Petroleum Hydrocarbons	Unused StreamGuard Geotextile Fabric	684	943.9	---	---	0.001420
Petroleum Hydrocarbons	Unused StreamGuard Absorbent Material	1070	443.15	---	---	0.001921
Petroleum Hydrocarbons	*Unused Media Subtotal*					*0.003341*
Petroleum Hydrocarbons	Effluent Water from 30 January 2000 storm event	---	---	500	47	
Petroleum Hydrocarbons	Effluent Water from 10 February 2000 storm event	---	---	500	48	
Petroleum Hydrocarbons	Effluent Water from 21 February 2000 storm event	---	---	500	567	
Petroleum Hydrocarbons	Effluent Water from 27 February 2000 storm event	---	---	500	90	
Petroleum Hydrocarbons	Effluent Water from 17 April 2000 storm event	---	---	500	485	
Petroleum Hydrocarbons	Estimated effluent from unsampled storm events	---	---	---	1594	
Petroleum Hydrocarbons	*Effluent Subtotal (Mean EMC x Total Runoff Volume)*			500.0	2831	0.088181
Petroleum Hydrocarbons	Estimated Influent Load					0.259875
Petroleum Hydrocarbons	**Efficiency (%)**					**66%**
Petroleum Hydrocarbons	**Efficiency w/o Litter Removal (%)**					**31%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (mg/L)	Runoff Volume (ft^3)	Load (lbs)
Sediment[1]	Used StreamGuard Geotextile Fabric	---	890	---	---	1.962094
Sediment[1]	Used StreamGuard Absorbent Material	---	617	---	---	1.360238
Sediment	Used StreamGuard Debris/litter/sediment	---	6804	---	---	15.000098
Sediment	*Used Media Subtotal*					*18.322431*
Sediment	Unused StreamGuard Geotextile Fabric	---	943.9	---	---	2.080922
Sediment	Unused StreamGuard Absorbent Material	---	443.15	---	---	0.976968
Sediment	*Unused Media Subtotal*					*3.057890*
Sediment	Effluent Water from 30 January 2000 storm event	---	---	11	47	
Sediment	Effluent Water from 10 February 2000 storm event	---	---	92	48	
Sediment	Effluent Water from 21 February 2000 storm event	---	---	167	567	
Sediment	Effluent Water from 27 February 2000 storm event	---	---	24	90	
Sediment	Effluent Water from 17 April 2000 storm event	---	---	36	485	
Sediment	Estimated effluent from unsampled storm events	---	---	---	1594	
Sediment	*Effluent Subtotal (Mean EMC x Total Runoff Volume)*			66.0	2831	11.639938
Sediment	Estimated Influent Load					26.904478
Sediment	**Efficiency (%)**					**57%**
Sediment	**Efficiency w/o Litter Removal (%)**					**2%**

[1] Mass of unused DII element subtracted from mass of used DII element.

Note 1:	Dissolved solids fraction and gross solids fraction of effluent not accounted for in mass balance.
Note 2:	Efficiencies include sediment/debris entrapped by the DII. Extensive maintenence was conducted before, during, and after storm events to clear sediment and debris from the DII. Sediment and debis removed from the DII was temporarily stored onsite and then analyzed at the same time as DII.
Note 3:	Where the individual storm EMCs showed evidence of normality, the mean EMC effluent concentration was estimated by averaging individual storm EMCs.
Note 4:	Where the individual storm EMCs showed evidence of non-normality, the mean EMC effluent concentration was estimated by log-transforming individual storm EMCs, averaging, and then transforming back. These EMCs are italicized.
Note 5:	Flow measured continuously while DII was installed.
Note 6:	Reporting Limit was used where results were "<" Reporting Limit.
Calculated by:	Byron Berger
Checked by:	Ed Othmer

Worksheet 10
Las Flores Maintenance Station Fossil Filter DII % Removal Efficiency Calculations (Aggregate Method)

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Copper	Used Fossil Filter Adsorbent	18.9	7711	---	---	0.000321
Copper	Used Fossil Filter Debris/litter/sediment	22.2	6350	---	---	0.000310
Copper	*Used Media Subtotal*					*0.000631*
Copper	*Unused Fossil Filter Adsorbent*	*0.2*	*1900*	---	---	*0.000001*
Copper	Effluent Water from 25 January 2000 storm event	---	---	1.7	926	
Copper	Effluent Water from 10 February 2000 storm event	---	---	22.2	858	
Copper	Effluent Water from 21 February 2000 storm event	---	---	1.3	3034	
Copper	Effluent Water from 27 February 2000 storm event	---	---	6.1	512	
Copper	Effluent Water from 17 April 2000 storm event	---	---	17.4	4800	
Copper	Estimated effluent from unsampled storm events	---	---	---	10479	
Copper	*Effluent Subtotal (Mean EMC x Total Runoff Volume)*			*5.5*	20609	0.007110
Copper	Estimated Influent Load					0.007740
Copper	**Efficiency (%)**					**8%**
Copper	**Efficiency w/o Litter Removal (%)**					**4%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Lead	Used Fossil Filter Adsorbent	21.7	7711	---	---	0.000368
Lead	Used Fossil Filter Debris/litter/sediment	7	6350	---	---	0.000098
Lead	*Used Media Subtotal*					*0.000466*
Lead	*Unused Fossil Filter Adsorbent*	*1.2*	*1900*	---	---	*0.000005*
Lead	Effluent Water from 25 January 2000 storm event	---	---	1	926	
Lead	Effluent Water from 10 February 2000 storm event	---	---	16.4	858	
Lead	Effluent Water from 21 February 2000 storm event	---	---	1.3	3034	
Lead	Effluent Water from 27 February 2000 storm event	---	---	2.3	512	
Lead	Effluent Water from 17 April 2000 storm event	---	---	3.5	4800	
Lead	Estimated effluent from unsampled storm events	---	---	---	10479	
Lead	*Effluent Subtotal (Mean EMC x Total Runoff Volume)*			*2.8*	20609	0.003593
Lead	Estimated Influent Load					0.004064
Lead	**Efficiency (%)**					**11%**
Lead	**Efficiency w/o Litter Removal (%)**					**9%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Zinc	Used Fossil Filter Adsorbent	120	7711	---	---	0.002036
Zinc	Used Fossil Filter Debris/litter/sediment	69	6350	---	---	0.000964
Zinc	*Used Media Subtotal*					*0.003000*
Zinc	*Unused Fossil Filter Adsorbent*	*1.2*	*1900*	---	---	*0.000005*
Zinc	Effluent Water from 25 January 2000 storm event	---	---	10.8	926	
Zinc	Effluent Water from 10 February 2000 storm event	---	---	107	858	
Zinc	Effluent Water from 21 February 2000 storm event	---	---	14	3034	
Zinc	Effluent Water from 27 February 2000 storm event	---	---	31	512	
Zinc	Effluent Water from 17 April 2000 storm event	---	---	107	4800	
Zinc	Estimated effluent from unsampled storm events	---	---	---	10479	
Zinc	*Effluent Subtotal (Mean EMC x Total Runoff Volume)*			*35.2*	20609	0.045129
Zinc	Estimated Influent Load					0.048124
Zinc	**Efficiency (%)**					**6%**
Zinc	**Efficiency w/o Litter Removal (%)**					**4%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Petroleum Hydrocarbons	Used Fossil Filter Adsorbent	3270	7711	---	---	0.055473
Petroleum Hydrocarbons	Used Fossil Filter Debris/litter/sediment	333	6350	---	---	0.004652
Petroleum Hydrocarbons	*Used Media Subtotal*					*0.060125*
Petroleum Hydrocarbons	*Unused Fossil Filter Adsorbent*	*26.6*	*1900*	---	---	*0.000111*
Petroleum Hydrocarbons	Effluent Water from 25 January 2000 storm event	---	---	500	926	
Petroleum Hydrocarbons	Effluent Water from 10 February 2000 storm event	---	---	500	858	
Petroleum Hydrocarbons	Effluent Water from 21 February 2000 storm event	---	---	500	3034	
Petroleum Hydrocarbons	Effluent Water from 27 February 2000 storm event	---	---	500	512	
Petroleum Hydrocarbons	Effluent Water from 17 April 2000 storm event	---	---	1416	4800	
Petroleum Hydrocarbons	Estimated effluent from unsampled storm events	---	---	---	10479	
Petroleum Hydrocarbons	*Effluent Subtotal (Mean EMC x Total Runoff Volume)*			*615.7*	20609	0.790519
Petroleum Hydrocarbons	Estimated Influent Load					0.850533
Petroleum Hydrocarbons	**Efficiency (%)**					**7%**
Petroleum Hydrocarbons	**Efficiency w/o Litter Removal (%)**					**7%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (mg/L)	Runoff Volume (ft^3)	Load (lbs)
Sediment[1]	Used Fossil Filter Adsorbent	---	7711	---	---	16.999671
Sediment	Used Fossil Filter Debris/litter/sediment		6350			13.999210
Sediment	*Used Media Subtotal*					*30.998881*
Sediment	*Unused Fossil Filter Adsorbent*	---	*1900*	---	---	4.188740
Sediment	Effluent Water from 25 January 2000 storm event	---	---	13	926	
Sediment	Effluent Water from 10 February 2000 storm event	---	---	128	858	
Sediment	Effluent Water from 21 February 2000 storm event	---	---	38	3034	
Sediment	Effluent Water from 27 February 2000 storm event	---	---	13	512	
Sediment	Effluent Water from 17 April 2000 storm event	---	---	30	4800	
Sediment	Estimated effluent from unsampled storm events	---	---	---	10479	
Sediment	*Effluent Subtotal (Mean EMC x Total Runoff Volume)*			*30.1*	20609	38.629944
Sediment	Estimated Influent Load					65.440085
Sediment	**Efficiency (%)**					**41%**
Sediment	**Efficiency w/o Litter Removal (%)**					**25%**

[1] Mass of unused DII element subtracted from mass of used DII element.

Note 1: Dissolved solids fraction and gross solids fraction of effluent not accounted for in mass balance.

Note 2: Each Fossil Filter DII used approximately 1900 grams of adsorbent material.

Note 3: Efficiencies include sediment/debris entrapped by the DII. Extensive maintenance was conducted before, during, and after storm events to clear sediment and debris from the DII. Sediment and debis removed from the DII was temporarily stored onsite and then analyzed at the same time as DII.

Note 4: Where the individual storm EMCs showed evidence of normality, the mean EMC effluent concentration was estimated by averaging individual storm EMCs.

Note 5: Where the individual storm EMCs showed evidence of non-normality, the mean EMC effluent concentration was estimated by log-transforming individual storm EMCs, averaging, and then transforming back. These EMCs are italicized.

Note 6: Flow measured continuously while DII was installed.

Note 7: Reporting Limit was used where results were "<" Reporting Limit.

Calculated by: Byron Berger

Checked by: Ed Othmer

Worksheet 11
Rosemead Maintenance Station StreamGuard DII % Removal Efficiency Calculations (Aggregate Method)

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Copper	Used StreamGuard Geotextile Fabric	42.5	1056	---	---	0.000099
Copper	Used StreamGuard Absorbent Material	15.5	437	---	---	0.000015
Copper	Used StreamGuard Debris/litter/sediment	51	1515	---	---	0.000170
Copper	*Used Media Subtotal*					*0.000284*
Copper	Unused StreamGuard Geotextile Fabric	0.22	943.9	---	---	0.000000
Copper	Unused StreamGuard Absorbent Material	0.24	443.15	---	---	0.000000
Copper	*Unused Media Subtotal*					*0.000001*
Copper	Effluent Water from 25 January 2000 storm event	---	---	3	2332	
Copper	Effluent Water from 30 January 2000 storm event	---	---	3.7	651	
Copper	Effluent Water from 21 February 2000 storm event	---	---	4.6	3379	
Copper	Effluent Water from 27 February 2000 storm event	---	---	11.6	1692	
Copper	Effluent Water from 17 April 2000 storm event	---	---	19.3	7226	
Copper	Estimated effluent from unsampled storm events	---	---	---	24142	
Copper	*Effluent Subtotal (Mean EMC x Total Runoff Volume)*			8.5	39422	0.020826
Copper	Estimated Influent Load					0.021109
Copper	**Efficiency (%)**					**1%**
Copper	**Efficiency w/o Litter Removal (%)**					**1%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Lead	Used StreamGuard Geotextile Fabric	95.4	1056	---	---	0.000222
Lead	Used StreamGuard Absorbent Material	25.9	437	---	---	0.000025
Lead	Used StreamGuard Debris/litter/sediment	127	1515	---	---	0.000423
Lead	*Used Media Subtotal*					*0.000670*
Lead	Unused StreamGuard Geotextile Fabric	0.1	943.9	---	---	0.000000
Lead	Unused StreamGuard Absorbent Material	0.1	443.15	---	---	0.000000
Lead	*Unused Media Subtotal*					*0.000000*
Lead	Effluent Water from 25 January 2000 storm event	---	---	2.4	2332	
Lead	Effluent Water from 30 January 2000 storm event	---	---	1	651	
Lead	Effluent Water from 21 February 2000 storm event	---	---	1.9	3379	
Lead	Effluent Water from 27 February 2000 storm event	---	---	12.2	1692	
Lead	Effluent Water from 17 April 2000 storm event	---	---	12.5	7226	
Lead	Estimated effluent from unsampled storm events	---	---	---	24142	
Lead	*Effluent Subtotal (Mean EMC x Total Runoff Volume)*			2.7	39422	0.006092
Lead	Estimated Influent Load					0.009761
Lead	**Efficiency (%)**					**7%**
Lead	**Efficiency w/o Litter Removal (%)**					**3%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Zinc	Used StreamGuard Geotextile Fabric	934	1056	---	---	0.002170
Zinc	Used StreamGuard Absorbent Material	121	437	---	---	0.000116
Zinc	Used StreamGuard Debris/litter/sediment	574	1515	---	---	0.001913
Zinc	*Used Media Subtotal*					*0.004199*
Zinc	Unused StreamGuard Geotextile Fabric	3.8	943.9	---	---	0.000008
Zinc	Unused StreamGuard Absorbent Material	0.6	443.15	---	---	0.000001
Zinc	*Unused Media Subtotal*					*0.000008*
Zinc	Effluent Water from 25 January 2000 storm event	---	---	27.6	2332	
Zinc	Effluent Water from 30 January 2000 storm event	---	---	24.6	651	
Zinc	Effluent Water from 21 February 2000 storm event	---	---	13	3379	
Zinc	Effluent Water from 27 February 2000 storm event	---	---	106	1692	
Zinc	Effluent Water from 17 April 2000 storm event	---	---	326	7226	
Zinc	Estimated effluent from unsampled storm events	---	---	---	24142	
Zinc	*Effluent Subtotal (Mean EMC x Total Runoff Volume)*			49.8	39422	0.122349
Zinc	Estimated Influent Load					0.126539
Zinc	**Efficiency (%)**					**3%**
Zinc	**Efficiency w/o Litter Removal (%)**					**2%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Petroleum Hydrocarbons	Used StreamGuard Geotextile Fabric	2300	1056	---	---	0.005343
Petroleum Hydrocarbons	Used StreamGuard Absorbent Material	26400	437	---	---	0.025361
Petroleum Hydrocarbons	Used StreamGuard Debris/litter/sediment	2320	1515	---	---	0.007733
Petroleum Hydrocarbons	*Used Media Subtotal*					*0.038457*
Petroleum Hydrocarbons	Unused StreamGuard Geotextile Fabric	684	943.9	---	---	0.001420
Petroleum Hydrocarbons	Unused StreamGuard Absorbent Material	1070	443.15			0.001021
Petroleum Hydrocarbons	*Unused Media Subtotal*					*0.002441*
Petroleum Hydrocarbons	Effluent Water from 25 January 2000 storm event	---	---	500	2332	
Petroleum Hydrocarbons	Effluent Water from 30 January 2000 storm event	---	---	500	651	
Petroleum Hydrocarbons	Effluent Water from 21 February 2000 storm event	---	---	500	3379	
Petroleum Hydrocarbons	Effluent Water from 27 February 2000 storm event	---	---	500	1692	
Petroleum Hydrocarbons	Effluent Water from 17 April 2000 storm event	---	---	500	7226	
Petroleum Hydrocarbons	Estimated effluent from unsampled storm events	---	---	---	24142	
Petroleum Hydrocarbons	*Effluent Subtotal (Mean EMC x Total Runoff Volume)*			500.0	39422	1.227935
Petroleum Hydrocarbons	Estimated Influent Load					1.263051
Petroleum Hydrocarbons	**Efficiency (%)**					**3%**
Petroleum Hydrocarbons	**Efficiency w/o Litter Removal (%)**					**2%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (mg/L)	Runoff Volume (ft^3)	Load (lbs)
Sediment[1]	Used StreamGuard Geotextile Fabric	---	1056	---	---	2.328058
Sediment[1]	Used StreamGuard Absorbent Material	---	437	---	---	0.963410
Sediment	Used StreamGuard Debris/litter/sediment	---	1515	---	---	3.339969
Sediment	*Used Media Subtotal*					*6.631437*
Sediment	Unused StreamGuard Geotextile Fabric	---	943.9	---	---	2.080922
Sediment	Unused StreamGuard Absorbent Material	---	443.15	---	---	0.976968
Sediment	*Unused Media Subtotal*					*3.057890*
Sediment	Effluent Water from 25 January 2000 storm event	---	---	44	2332	
Sediment	Effluent Water from 30 January 2000 storm event	---	---	18	651	
Sediment	Effluent Water from 21 February 2000 storm event	---	---	28	3379	
Sediment	Effluent Water from 27 February 2000 storm event	---	---	27	1692	
Sediment	Effluent Water from 17 April 2000 storm event	---	---	45	7226	
Sediment	Estimated effluent from unsampled storm events	---	---	---	24142	
Sediment	*Effluent Subtotal (Mean EMC x Total Runoff Volume)*			32.4	39422	79.570213
Sediment	Estimated Influent Load					83.143759
Sediment	**Efficiency (%)**					**4%**
Sediment	**Efficiency w/o Litter Removal (%)**					**0%**

[1] Mass of unused DII element subtracted from mass of used DII element.

Note 1: Dissolved solids fraction and gross solids fraction of effluent not accounted for in mass balance.

Note 2: Efficiencies include sediment/debris entrapped by the DII. Extensive maintenance was conducted before, during, and after storm events to clear sediment and debris from the DII. Sediment and debis removed from the DII was temporarily stored onsite and then analyzed at the same time as DII.

Note 3: Where the individual storm EMCs showed evidence of normality, the mean EMC effluent concentration was estimated by averaging individual storm EMCs.

Note 4: Where the individual storm EMCs showed evidence of non normality, the mean EMC effluent concentration was estimated by log transforming individual storm EMCs, averaging, and then transforming back. These EMCs are italicized.

Note 5: Flow measured continuously while DII was installed.

Note 6: Reporting Limit was used where results were "<" Reporting Limit.

Calculated by: Byron Berger

Checked by: Ed Ohmer

Worksheet 12
Rosemead Maintenance Station Fossil Filter DII % Removal Efficiency Calculations (Aggregate Method)

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Copper	Used Fossil Filter Adsorbent	61.5	5443	---	---	0.000736
Copper	Used Fossil Filter Debris/litter/sediment	43.7	14061	---	---	0.001352
Copper	*Used Media Subtotal*					*0.002088*
Copper	*Unused Fossil Filter Adsorbent*	*0.2*	*1900*	---	---	*0.000001*
Copper	Effluent Water from 25 January 2000 storm event	---	---	2.4	456	
Copper	Effluent Water from 30 January 2000 storm event	---	---	1.8	94	
Copper	Effluent Water from 21 February 2000 storm event	---	---	2.8	2664	
Copper	Effluent Water from 27 February 2000 storm event	---	---	10.4	300	
Copper	Effluent Water from 17 April 2000 storm event	---	---	29.7	1593	
Copper	Estimated effluent from unsampled storm events	---	---	---	4698	
Copper	*Effluent Subtotal (Mean EMC x Total Runoff Volume)*			*5.2*	9805	0.003165
Copper	Estimated Influent Load					0.005253
Copper	**Efficiency (%)**					**40%**
Copper	**Efficiency w/o Litter Removal (%)**					**19%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Lead	Used Fossil Filter Adsorbent	135	5443	---	---	0.001617
Lead	Used Fossil Filter Debris/litter/sediment	70.2	14061	---	---	0.002172
Lead	*Used Media Subtotal*					*0.003788*
Lead	*Unused Fossil Filter Adsorbent*	*1.2*	*1900*	---	---	*0.000005*
Lead	Effluent Water from 25 January 2000 storm event	---	---	2.3	456	
Lead	Effluent Water from 30 January 2000 storm event	---	---	1	94	
Lead	Effluent Water from 21 February 2000 storm event	---	---	1.2	2664	
Lead	Effluent Water from 27 February 2000 storm event	---	---	6.5	300	
Lead	Effluent Water from 17 April 2000 storm event	---	---	16.8	1593	
Lead	Estimated effluent from unsampled storm events	---	---	---	4698	
Lead	*Effluent Subtotal (Mean EMC x Total Runoff Volume)*			*3.1*	9805	0.001913
Lead	Estimated Influent Load					0.005696
Lead	**Efficiency (%)**					**66%**
Lead	**Efficiency w/o Litter Removal (%)**					**46%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Zinc	Used Fossil Filter Adsorbent	705	5443	---	---	0.008442
Zinc	Used Fossil Filter Debris/litter/sediment	856	14061	---	---	0.026480
Zinc	*Used Media Subtotal*					*0.034922*
Zinc	*Unused Fossil Filter Adsorbent*	*1.2*	*1900*	---	---	*0.000005*
Zinc	Effluent Water from 25 January 2000 storm event	---	---	34.2	456	
Zinc	Effluent Water from 30 January 2000 storm event	---	---	19.8	94	
Zinc	Effluent Water from 21 February 2000 storm event	---	---	19.5	2664	
Zinc	Effluent Water from 27 February 2000 storm event	---	---	218	300	
Zinc	Effluent Water from 17 April 2000 storm event	---	---	436	1593	
Zinc	Estimated effluent from unsampled storm events	---	---	---	4698	
Zinc	*Effluent Subtotal (Mean EMC x Total Runoff Volume)*			*66.0*	9805	0.040332
Zinc	Estimated Influent Load					0.075249
Zinc	**Efficiency (%)**					**46%**
Zinc	**Efficiency w/o Litter Removal (%)**					**17%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (ug/L)	Runoff Volume (ft^3)	Load (lbs)
Petroleum Hydrocarbons	Used Fossil Filter Adsorbent	1460	5443	---	---	0.017483
Petroleum Hydrocarbons	Used Fossil Filter Debris/litter/sediment	2950	14061	---	---	0.091256
Petroleum Hydrocarbons	*Used Media Subtotal*					*0.108739*
Petroleum Hydrocarbons	*Unused Fossil Filter Adsorbent*	*26.6*	*1900*	---	---	*0.000111*
Petroleum Hydrocarbons	Effluent Water from 25 January 2000 storm event	---	---	500	456	
Petroleum Hydrocarbons	Effluent Water from 30 January 2000 storm event	---	---	500	94	
Petroleum Hydrocarbons	Effluent Water from 21 February 2000 storm event	---	---	500	2664	
Petroleum Hydrocarbons	Effluent Water from 27 February 2000 storm event	---	---	500	300	
Petroleum Hydrocarbons	Effluent Water from 17 April 2000 storm event	---	---	500	1593	
Petroleum Hydrocarbons	Estimated effluent from unsampled storm events	---	---	---	4698	
Petroleum Hydrocarbons	*Effluent Subtotal (Mean EMC x Total Runoff Volume)*			*500.0*	9805	0.305411
Petroleum Hydrocarbons	Estimated Influent Load					0.414038
Petroleum Hydrocarbons	**Efficiency (%)**					**26%**
Petroleum Hydrocarbons	**Efficiency w/o Litter Removal (%)**					**5%**

Analyte	Media	Concentration (mg/kg)	Mass (grams)	Event Mean Concentration (mg/L)	Runoff Volume (ft^3)	Load (lbs)
Sediment[1]	Used Fossil Filter Adsorbent	---	5443	---	---	11.999638
Sediment[1]	Used Fossil Filter Debris/litter/sediment	---	14061	---	---	30.998881
Sediment	*Used Media Subtotal*					*42.998518*
Sediment	*Unused Fossil Filter Adsorbent*	---	*1900*	---	---	4.188740
Sediment	Effluent Water from 25 January 2000 storm event	---	---	39	456	
Sediment	Effluent Water from 30 January 2000 storm event	---	---	19	94	
Sediment	Effluent Water from 21 February 2000 storm event	---	---	8	2664	
Sediment	Effluent Water from 27 February 2000 storm event	---	---	13	300	
Sediment	Effluent Water from 17 April 2000 storm event	---	---	38	1593	
Sediment	Estimated effluent from unsampled storm events	---	---	---	4698	
Sediment	*Effluent Subtotal (Mean EMC x Total Runoff Volume)*			*19.6*	9805	12.001664
Sediment	Estimated Influent Load					50.811443
Sediment	**Efficiency (%)**					**76%**
Sediment	**Efficiency w/o Litter Removal (%)**					**39%**

[1] Mass of unused DII element subtracted from mass of used DII element.

Note 1: Dissolved solids fraction and gross solids fraction of effluent not accounted for in mass balance.

Note 2: Each Fossil Filter DII used approximately 1900 grams of adsorbent material.

Note 3: Efficiencies include sediment/debris entrapped by the DII. Extensive maintenance was conducted before, during, and after storm events to clear sediment and debris from the DII. Sediment and debis removed from the DII was temporarily stored onsite and then analyzed at the same time as DII.

Note 4: Where the individual storm EMCs showed evidence of normality, the mean EMC effluent concentration was estimated by averaging individual storm EMCs.

Note 5: Where the individual storm EMCs showed evidence of non-normality, the mean EMC effluent concentration was estimated by log-transforming individual storm EMCs, averaging, and then transforming back. These EMCs are italicized.

Note 6: Flow measured continuously while DII was installed.

Note 7: Reporting Limit was used where results were "<" Reporting Limit

Calculated by: Byron Berger

Checked by: Ed Othmer

2.0 BMP OPERATIONS

Performance assessments of BMP operations were determined using empirical observations (Form H of the OMM Volume II *Field Guidance Notebooks*). Empirical observations were taken at variable times during monitored events. Field crews assessed BMP operations at the beginning, middle and end of a storm event. Traffic, weather and sufficient light sometimes limited these observations.

Observations generally provided information on the following:

- Present meteorological characteristics;
- Rainfall (start times and intensity indication);
- Hydrologic and hydraulic characteristics (flowing and/or standing water, channelization);
- Water level;
- Inlet conditions (problems affecting performance);
- Evidence of debris (organic or trash), scouring, resuspension or erosion ;
- Description of amount and location of sediment accumulation;
- Water quality appearance (visual, olfactory);
- Vegetation condition;
- Outlet conditions (problems affecting performance); and
- Structural condition of facility.

Other site-specific observations were taken according to the checklists present in Form H.

2.1 BMPs Evaluated

Tables 2-1a through 2-1e summarize empirical observations of BMP performance. An overall review of each BMP is provided following each table. More detail on BMP operations is available at the following web site: http://www.rbf.com/caltrans/.

2.1.1 Biofiltration Strips

Table 2-1a: Comparison of Biofiltration Strip Operational Performance

Site	No. of Observed Events	Hydrologic/ Hydraulic Characteristics	Inlet Conditions	Water Quality	Solids Deposition/ Resuspension	Erosion	Vegetation	Outlet	Comments
Altadena Maintenance Station (73211a)	6	Functioned as designed	During peak flow rates, runoff flowed from facility directly into spreader ditch bypassing flume.	Less suspended solids were observed in the effluent compared to influent.	Sediment was deposited in the spreader ditch. Numerous earthworms were flushed into the collector ditch.	No notable observations	Vegetation required irrigation to establish (i.e., meet the 90% coverage requirement)	Functioned as designed	Spreader ditch bypass plug to infiltration trench was enlarged to facilitate dewatering following storm events Spreader ditch required dewatering after each rain event

Table 2-1a: Comparison of Biofiltration Strip Operational Performance (concluded)

Site	No. of Observed Events	Hydrologic/ Hydraulic Characteristics	Inlet Conditions	Water Quality	Solids Deposition/ Resuspension	Erosion	Vegetation	Outlet	Comments
I-605/SR-91 (73222a)	7	Functioned as designed No outlet flow during 3 of 7 observed events because of infiltration	Functioned as designed	Less suspended solids were observed in the effluent compared to influent	Trash and debris accumulated at the asphalt/vegetation interface	No notable observations	Vegetation required irrigation to establish (i.e., meet the 90% coverage requirement) Gophers caused a few small bare patches Two transplanted areas had less vegetation cover/density than main portion of strip Hydroseeded areas outside of strip germinated and covered bare areas	Functioned as designed	Majority of runoff entering the strip infiltrated

Overall Review of Biofiltration Strips

In July 1999, the biofiltration strips were relinquished from RBF to Law Crandall for operation and maintenance. To provide adequate coverage at the I-605 at Carson Swale, RBF removed salt grass (10 percent of the strip's area) from two areas of the I-605/SR-91 Strip. Various strategies were used to re-establish vegetation in the donor areas (refer to Section 3.1.1). Law Crandall continued irrigation efforts in a weaning manner to establish the biofilters in meeting the 90 percent coverage requirement. Irrigation continued at the Altadena Maintenance Station Strip and I 605/SR 91 Strip through December 1999 and January 2000, respectively. During various periods, vegetation color changed from green to yellow and then to brown in some cases but density was always maintained. Subsequently, the vegetation consultant (Margot Griswold) reviewed the sites and determined that the soil within the strips was drying out because of the weaning process and because of relatively high temperatures, resulting in the change in vegetation color. She also determined that the vegetation was still alive because it had green tips. Consequently, the watering schedule was increased for approximately one month and then reduced.

Altadena Maintenance Station Biofiltration Strip

One of the necessary design features of the Altadena Maintenance Station Strip is a spreader ditch, which collects and uniformly distributes water across the strip. Originally, any water that was captured in the collector ditch was allowed to remain (i.e., the spreader ditch was not dewatered). However, mosquitoes breeding became prevalent. During the 7th Quarterly Status Meeting, it was decided that a new maintenance threshold be developed to dewater the spreader ditch. Subsequently, as part of the operational characteristics of the strip, the spreader ditch is dewatered following each rain event (refer to Photograph 2-1 at the end of this section).

During each monitored event, flow was uniformly distributed across the strip. No channelization or ponding was observed. At the beginning of the wet season, there was more infiltration than at the end; this is attributed to soil moisture and rainfall/runoff intensity.

I-605/SR-91 Biofiltration Strip

At the I-605/SR-91 Strip, gophers persistently burrowed through the strip. Consequently, gopher inspection and abatement efforts were undertaken (refer to Section 3.1.1). To minimize channelization and/or ponding, the gopher burrows were filled and compacted.

Errant drivers running off the I-605/SR-91 connector also proved to be a problem. On at least three occasions, vehicles ran off the road (accidentally) and drove across the strip.

Following each accident, inspections were made of the strip. Other than the salt grass being compacted by the tires, no other damage to the strip was observed.

During each monitored event, flow was uniformly distributed across the strip. Throughout the wet season, most of the runoff infiltrated before reaching the strip's outlet. When flow was perceptible across the strip, no channelization or ponding was observed. Also of note is that trash and debris tended to collect at the asphalt/biofilter interface (refer to Photograph 2-2 at the end of this section).

2.1.2 Biofiltration Swales

Table 2-1b: Comparison of Biofiltration Swale Operational Performance

Site	No. of Observed Events	Hydrologic/ Hydraulic Characteristics	Inlet Conditions	Water Quality	Solids Deposition/ Resuspension	Erosion	Vegetation	Outlet	Comments
I-605/SR-91 (73222b)	7	Functioned as designed; no outlet flow from first two events due to infiltration	Functioned as designed	Less suspended solids were observed in the effluent compared to influent	Trash and debris accumulated in the energy dissipater and at the concrete spreader/biofilter interface	Soil at the headwall of inlet pipe eroded and accumulated into the energy dissipater	Vegetation required irrigation to establish (i.e., meet the 90% coverage requirement) Gophers caused a few small bare patches Hydroseeded areas germinated and covered bare areas	Growth of vegetation in channel downstream of swale constricted flow causing backflow towards swale outlet	Energy dissipater and concrete spreader were grouted to eliminate ponding water conditions Runoff infiltrated through gopher holes

Table 2-1b: Comparison of Biofiltration Swale Operational Performance (continued)

Site	No. of Observed Events	Hydrologic/ Hydraulic Characteristics	Inlet Conditions	Water Quality	Solids Deposition/ Resuspension	Erosion	Vegetation	Outlet	Comments
Cerritos Maintenance Station (73223)	7	Flow bypassed through gopher holes during most events Runoff from freeway embankment discharged into swale through swale's side	Runoff during December 31, 1999 event caused erosion at the concrete spreader/biofilter interface	More suspended solids observed in effluent during some events because of bare areas caused by gophers	Trash and debris accumulated in the energy dissipater and in the first 3rd of the swale Most sediment was removed by energy dissipater	Erosion within the swale and along the north side slope caused by gophers Eroded areas were further aggravated during storm events when runoff bypassed through gopher holes	Vegetation required irrigation to establish (i.e., meet the 90% coverage requirement) Minimum % coverage not maintained throughout wet season because of gopher problem Hydroseeded areas germinated and covered bare areas	Gopher holes at biofilter/ concrete collector channel caused flow bypass	Energy dissipater and concrete spreader were grouted to eliminate ponding water conditions Structural integrity of the swale was compromised because of gopher problem

Table 2-1b: Comparison of Biofiltration Swale Operational Performance (concluded)

Site	No. of Observed Events	Hydrologic/ Hydraulic Characteristics	Inlet Conditions	Water Quality	Solids Deposition/ Resuspension	Erosion	Vegetation	Outlet	Comments
I-5/I-605 (73224)	6	No outlet flow from first two events due to infiltration Flow bypassed through gopher hole near effluent end during last event	Functioned as designed	Less suspended solids were observed in the effluent compared to influent	Trash and debris accumulated in the energy dissipater and at the concrete spreader/biofilter interface	None	Vegetation required irrigation to establish (i.e., meet the 90% coverage requirement) A few small bare spots in swale caused by gophers Hydroseeded areas germinated and covered bare areas	Gopher hole near effluent end caused flow bypass during last event	Energy dissipater and concrete spreader were grouted to eliminate ponding water conditions Runoff infiltrated through gopher holes
I-605 at Carson (73225)	5	Functioned as designed; outlet flow from first few events was much less than inflow due to infiltration Runoff from freeway embankment discharged into swale over the sideslopes of the swale	Functioned as designed	Less suspended solids were observed in the effluent compared to influent Oil and grease sheen observed in effluent during 3 of 5 events	Trash and debris accumulated in the energy dissipater and at the concrete spreader/biofilter interface	None	Vegetation required irrigation to establish (i.e., meet the 90% coverage requirement) Hydroseeded areas germinated and covered bare areas	Functioned as designed	Energy dissipater and concrete spreader were grouted to eliminate ponding water conditions

Overall Review of Biofiltration Swales

In July 1999, the biofiltration swales were relinquished from RBF to Law Crandall for operation and maintenance. To provide adequate coverage at the I-605 at Carson Swale, RBF removed salt grass (10 percent of the strip's area) from two areas of the I-605/SR-91 Strip (refer to Section 3.1.2). Law Crandall continued irrigation efforts in a weaning manner to establish the biofilters in meeting the 90 percent coverage requirement. Irrigation continued at the swale through December 1999. During various periods, vegetation color changed from green to yellow and then to brown in some cases but density was always maintained. Subsequently, the vegetation consultant (Margot Griswold) reviewed the sites and determined that the soil within the swales was drying out because of the weaning process and because of relatively high temperatures, resulting in the change in vegetation color. She also determined that the vegetation was still alive because it had green tips. Consequently, the watering schedule was increased for approximately one month and then reduced.

During the first week of December, the swale side slopes were scarified and hydroseeded (refer to Section 3.1.2). For the most part, the hydroseeded areas germinated and were fully vegetated by February.

I-605/SR-91 Biofiltration Swale

At the I-605/SR-91 Swale, gophers persistently burrowed through the swale. Consequently, gopher inspection and abatement efforts were undertaken (refer to Section 3.1.2). To minimize channelization and/or ponding, the gopher burrows were filled and compacted.

During each monitored event, flow was uniformly distributed across the swale. Throughout the wet season, most of the runoff infiltrated before reaching the swale's outlet. When flow was perceptible across the swale, no channelization or ponding was observed. During the February 20, 2000 event, vegetation in the downstream channel had grown enough to restrict flow, causing flow to backflow towards the swale. A team of technicians promptly enlarged the downstream channel and cut-back the vegetation so the flow was not restricted. Also of note is that trash and debris tended to collect in the energy dissipater and at the concrete spreader/biofilter interface (refer to Photograph 2-3 at the end of this section).

Cerritos Maintenance Station Biofiltration Swale

At the Cerritos Maintenance Station Swale, gophers persistently burrowed through the swale. Damaged caused by the gophers was so extensive that the swale's structural integrity was compromised. During storm events, the gopher problem became worse because runoff infiltrated through previously filled in gopher holes causing extensive

erosion (refer to Photograph 2-4 at the end of this section). In addition to the swale's structural problems, vegetation cover fell below the 90 percent criteria because of the gopher problem. Unlike other swales in the BMP Pilot Study, the Cerritos Maintenance Station Swale was constructed in fill material to establish an appropriate flow line. Instead of the swale's side slopes being at lower elevation than the surrounding topography (as at the other swales), one of the swale's side slopes is constructed completely of fill material. Refer to Section 3.1.2 for a description of mitigation strategies undertaken.

During each monitored event, flow was uniformly distributed across the swale. In addition to the swale receiving runoff from the inlet, runoff from the freeway embankment discharged into the swale over one of the swale's side slopes. When flow was perceptible across the swale, no channelization or ponding was observed. Also of note is that trash and debris tended to collect in the energy dissipater and in the first third of the swale (refer to Photograph 2-5 at the end of this section), with most of the sediment settling out in the energy dissipater.

I-5/I-605 Biofiltration Swale

At the I-5/I-605 Swale, gophers persistently burrowed through the swale. Consequently, gopher inspection and abatement efforts were undertaken (refer to Section 3.1.2). To minimize channelization and/or ponding, the gopher burrows were filled and compacted. A gopher hole near the effluent end of the swale caused flow bypass during the last storm event on April 17, 2000.

During each monitored event, flow was uniformly distributed across the swale. Throughout the first portion of the wet season, most of the runoff infiltrated before reaching the swale's outlet. When flow was perceptible across the swale, no channelization or ponding was observed. Also of note is that trash and debris tended to collect in the energy dissipater and at the concrete spreader/biofilter interface (refer to Photograph 2-6 at the end of this section).

I-605 at Carson Biofiltration Swale

During each monitored event, flow was uniformly distributed across the swale. In addition to the swale receiving runoff from the inlet, runoff from the freeway embankment discharged into the swale through its side. Throughout the first portion of the wet season, most of the runoff infiltrated before reaching the swale's outlet. When flow was perceptible across the swale, no channelization or ponding was observed. Also of note is that trash and debris tended to collect in the energy dissipater and at the concrete spreader/biofilter interface (refer to Photograph 2-7 at the end of this section).

2.1.3 Drain Inlet Inserts

Table 2-1c: Comparison of StreamGuard™ DII Operational Performance

Site	No. of Observed Events	Hydrologic/Hydraulic Characteristics	Inlet Conditions	Water Quality	Solids Deposition/ Resuspension	Outlet	Comments
Foothill Maintenance Station (73216N)	10	Bypass through the DII's bypass cut-outs was observed during 2 of 10 events Ponded water was observed in DII after storm events	No gaps observed between inlet and insert	Oil sheen in effluent observed during 3 of 10 events	Organic materials and sediment collected in DII during 4 of 10 events	Functioned as designed	Bypass occurred when water filled the cone and exited through the overflow cut-outs.
Las Flores Maintenance Station (73217N)	10	Bypass through the DII's bypass cut-outs was observed during 4 of 10 events Ponded water was observed in DII after storm events	Gaps between the inlet and DII were observed and DII refitted three times DII fell into drain inlet during event because of the weight of standing water and sediment	Oil sheen in effluent observed during 5 of 10 events	Organic materials, trash and debris, and/or and sediment collected in DII during 5 of 10 events	Functioned as designed	Bypass due to either (a) water filled the cone and exited the overflow cut-outs or (b) insert slipped (due to weight of standing water/sediment) downward into the inlet and created a gap between the inlet and the insert. A small hole was observed in the fabric during the last storm, but no bypass occurred.
Rosemead Maintenance Station (73218S)	10	Bypass through the DII's bypass cut-outs was observed during 3 of 10 events Flooding was observed during three events because of the DII's hydraulic capacity being exceeded Ponded water was observed in DII after storm events	A corner of DII slipped into drain inlet and was refitted twice	Oil sheen in effluent observed during 3 of 10 events	Organic materials, trash and debris, and/or and sediment collected in DII during 6 of 10 events	Functioned as designed	Bypass occurred when water filled the cone and exited through the overflow cut-outs. Three times these openings were not large enough to accommodate incoming runoff; onsite flooding resulted.

Overall Review of StreamGuard™ Inserts

During the 1998-1999 storm season no bypass was observed at any StreamGuard™ DIIs. However, due to concern that there could be flow bypass between the insert fabric-inlet interface, wood was inserted into the area between the insert and inlet edge to form a tight seal at the Foothill and Rosemead Maintenance Stations. Prior to the 1999-2000 storm season, wood was inserted into the area between the insert and inlet edge at Las Flores Maintenance Station. Additionally, to address the concern of runoff directly entering the monitoring vaults, a rubber berm was installed around each vault.

Unlike the 1998-1999 season, during the 1999-2000 season flow bypass was observed at StreamGuard™ DIIs at all three sites. There are two reasons for this:

1. Hydraulic capacity—runoff filled the cone and flowed through the overflow cut-outs. The cone of the StreamGuard™ DIIs is 24 inches in depth. When standing water in the cone reaches a depth of approximately 22 inches, bypass can occur through the two overflow cut-outs on the sides.

2. The weight of the standing water in the cone caused the insert to slip downward into the inlet, thereby causing a gap in the inlet-insert interface and subsequent bypass.

The first reason for bypass is interesting because it was not observed during the previous storm season. However, research into the manufacturing process of the filter fabric indicated that fabric pore size can vary from roll to roll of the fabric. Even though the manufacturing process is the same for each roll of fabric, variation in pore size is normal and is not subject to control. It is possible that the inserts used this year were constructed with a fabric having a smaller pore size, thereby potentially reducing flow rate through the filter fabric and consequently causing standing water in the insert.

Generally, standing water in the cones resulted in flow bypass only. However, on three occasions at Rosemead Maintenance Station flooding was observed (refer to Photograph 2-8 at the end of this section).

The second reason for bypass could be related to the first reason. More standing water in the cones meant more weight in the cones, thereby possibly causing the inserts to slip downward into the inlet. Slippage of the insert was observed at Las Flores Maintenance Station and Rosemead Maintenance Station, and bypass through the gap was observed once at Las Flores.

In February, when ponding water was first observed in the DIIs, Foss Environmental (StreamGuard™ DII manufacturer) was consulted. Foss Environmental subsequently

provided the following correspondence on May 23, 2000 detailing operation and maintenance tips for the DII used in this study:

StreamGuard Catch Basin Insert (Oil & Sediment) Operation & Maintenance Tips

The StreamGuard Oil & Sediment Insert is a temporary, water permeable, non-woven fabric bag which intercepts oily and dirty water in the catch basin capturing some portion of the oil and heavier sediment material (heavy silt, sand, and rock) which might otherwise build up in the catch basin sump or drain pipe.

The insert in not an oil or particulate filter although when first installed, water will penetrate through the fabric quite readily. The nominal Apparent Opening Size of the pores in the insert fabric is US Sieve 100 or approximately 150 microns (ASTM D-4751) which means that large silt/fine sand particles and larger can be retained in the fabric during the short period of time it behaves like a filter.

It should be noted that oil sheen and persistent turbidity in surface water runoff is caused by small oil, silt and clay particles which range in size from 0.001 to 10 microns in size; most of which can not be retained in the insert fabric during the short period it acts as a filter. At present, there is no known way to achieve long-duration filtration of particles in this size range using a static filtration process and the StreamGuard insert manufacturer does not claim or imply the insert's ability to filter particles smaller than about 100 microns in size during the short period of time it behaves like a filter. Oil sheen may be absorbed by the oilophilic, non-woven polypropylene insert fabric but smaller oil sheen particles will also tend to penetrate the fabric during the short period of time it behaves like a filter.

After several hours in a catch basin during a rain event, the insert fabric will begin to become blocked or clogged with oil and sediment and the water level will rise to the two underflow cutouts located near the top of the unit, discharging water outside into the catch basin. ***The insert is designed to do this and this does not indicate a need to maintenance the unit.*** From this point on the insert will operate full of water allowing heavier sediment particles to settle out in the bag and oil to rise to the surface where it is absorbed in the oil- absorbent media. When the insert has collected approximately 6 inches of sediment or the oil-absorbent media becomes saturated, it should be replaced. It is not recommended that the oil/sediment unit be reused as oil which has been absorbed in the unit may leach back out into stormwater.

Despite the flow bypass and flooding that occurred, the thresholds required for replacement of the unit (more than 6" of sediment in the cone or loss of structural integrity) were not reached. The units were removed at the end of the storm season for analysis.

Table 2-1d: Comparison of Fossil Filter™ DII Operational Performance

Site	No. of Observed Events	Hydrologic/Hydraulic Characteristics	Inlet Conditions	Water Quality	Solids Deposition/ Resuspension	Outlet	Comments
Foothill Maintenance Station (73216S)	10	Bypass was observed during 6 of 10 events	Gap observed between inlet and insert during April 17 storm	Oil sheen in effluent observed during 3 of 10 events	Organic material, trash and debris, and or sediment collected in DII during 7 of 10 events	Functioned as designed	Bypass generally due to flow rates exceeding hydraulic capacity of the insert. During the April 17 storm, the stainless steel flange holding the FF cartridges bent upward due to the weight of water and bypass occurred.
Las Flores Maintenance Station (73217S)	10	Bypass was observed during 1 of 10 events	No gaps observed between inlet and insert	Oil sheen in effluent observed during 6 of 10 events	Organic materials, trash and debris, and/or sediment collected in DII during 7 of 10 events	Functioned as designed	Bypass due to sediment deposition on filter cartridges, which inhibited flow through the filter cartridges
Rosemead Maintenance Station (73218N)	10	Bypass was observed during 4 of 10 events	No gaps observed between inlet and insert	Oil sheen in effluent observed during 1 of 10 events	Organic materials, trash and debris, and/or sediment collected in DII during 6 of 10 events	Functioned as designed	Bypass due to (a) deposition of organic material, trash and debris, or sediment on top of the filter cartridges, which inhibited flow through the filter cartridges or (b) exceedance of hydraulic capacity.

Overall Review of Fossil Filter™ Inserts

During the 1998-1999 storm season, three reasons for flow bypass in Fossil Filter™ DIIs were observed:

1. Structural fit (poor fit resulting in gaps between the inlet and insert);
2. Hydraulic capacity; and
3. Blockage and clogging of cartridges.

Prior to the 1999-2000 storm season, steps were taken to eliminate or minimize flow bypass around the peripheral of the Fossil Filter™ DII. To eliminate the first reason for flow bypass, the interface between the DII and the inlet was sealed at the beginning of the wet season, immediately after installation of the new units. Additionally, to promote flow into the DII at Rosemead Maintenance Station, a section of rubber was attached along interface of the curb inlet and the insert. Finally, to address the concern of runoff directly entering the monitoring vaults, a rubber berm was installed around each vault.

Hydraulic capacity of the units is an inherent limiting factor in the performance of the DIIs. The Fossil Filter™ DIIs are designed to not impede flows (due to flood control considerations). During higher discharge rates, runoff has sufficient velocity and/or volume to pass over the lip of the cartridges and go directly into the storm drain system. No alterations in the design of the units were undertaken to eliminate this factor.

The third factor that caused flow bypass was blockage and clogging of the DII. Blockage occurred from the accumulation of trash, debris, and/or sediment on top of the filter cartridge screens. This accumulation blocked the filter cartridge screens so that stormwater runoff could not pass through the screens. The resultant standing water pooled and eventually achieved a depth where it spilled over the cartridge lip into the storm drain. Clogging occurred when sediment passed through the cartridge screens and settled in the pore spaces between the adsorbent granules. This appeared to cause a slowing in the infiltration of water through the adsorbent. Water pooled and reached a depth where it spilled over the cartridge lip into the storm drain.

Therefore, for the 1999-2000 wet season, it was decided to increase the maintenance of the units to lessen the impact of blockage and clogging. Trash/debris and/or sediment were removed from the units once prior to a storm event and once during a storm event. The removed trash/debris and sediment removed from the DII was placed in an on-site storage container designed to emulate ambient conditions at the top of the cartridges.

The result of the additional structural work and increased maintenance during the 1999/2000 wet season was that no flow bypass due to interface gaps was observed until the last storm on April 17, 2000, at Foothill Maintenance Station. Hence, flow bypass was observed due to the following reasons:

1. Hydraulic capacity. This was observed at both Foothill Maintenance Station and Rosemead Maintenance Station. Based on several observations of hydraulic capacity exceedance at the Foothill Maintenance Station, bypass at the Foothill Maintenance Station Fossil Filter™ DII generally was observed to occur when a flow rate of 0.07 cfs (31 gpm) was reached. Refer to Photograph 2-9 at the end of this section.

2. Blockage and clogging of cartridges. Despite removing trash/debris/sediment prior to a storm event and once during a storm event, bypass continued to be observed. Typically, after the trash/debris/sediment removal occurred, more trash/debris/sediment would be deposited during the course of the storm, again leading to more bypass. Refer to Photograph 2-10 at the end of this section.

3. During the last storm at Foothill Maintenance Station, the stainless steel flange holding the cartridges bent upward due to the weight of water, and bypass occurred underneath the cartridges.

Despite the flow bypass and flooding that occurred, the thresholds required for replacement of the unit (adsorbent granules dark gray or darker, or structural integrity problems) were not reached. The units were removed at the end of the storm season for analysis.

2.1.4 Infiltration Basin

Table 2-1e: Comparison of Infiltration Basin Operational Performance

Site	No. of Observed Events	Hydrologic/ Hydraulic Characteristics	Inlet Conditions	Water Quality	Solids Deposition/ Resuspension	Erosion	Vegetation	Outlet	Comments
I-605/SR-91 Infiltration Basin (73101)	8	Influent bypass was observed 5 times. Maximum time to infiltrate was 34 hours. Maximum depth in basin was 7.4 inches.	Functioned as designed	No notable observations	Some sediment deposition near inlets. No noticeable deposition in other areas.	Minor erosion noted on north side slope beneath asphalt swales on access road	Hydroseeded areas germinated and covered bare areas Vegetation coverage met threshold requirement after being established in February 2000.	Functioned as designed	Overflow structure grouted with concrete to eliminate standing water condition Overflow weir plat height increased to maximum height to minimize flow bypass

Overall Review of the I-605/SR-91Infiltration Basin

During the first rain events of the 1999/2000 wet season (approximately 1.5 inches of precipitation), runoff immediately infiltrated into the areas surrounding the inlets and prior to any runoff ponding within the infiltration basin. After approximately 1.5 inches of rainfall, ponding water would accumulate in the infiltration basin for each storm with precipitation greater than 0.16 inches.

Stormwater discharge effectively infiltrated into the IB, with a maximum infiltration time of approximately 34 hours. During larger storms, as designed, some flow bypassed the infiltration basin by flowing over the overflow weir in the junction box (refer to Photograph 2-11 at the end of this section).

Observations of note include localized sediment deposition around the inlets and minor erosion on the north side slope beneath the swales in the asphalt access road (refer to Photograph 2-12 at the end of this section).

2.1.5 *Infiltration Trench*

Table 2-1f: Comparison of Infiltration Trench Operational Performance

Site	No. of Observed Events	Hydrologic/Hydraulic Characteristics	Inlet Conditions	Water Quality	Solids Deposition/ Resuspension	Overflow	Comments
Altadena Maintenance Station (73211b)	6	Functioned as designed; bypass of IT was observed during 3 of 6 events because of the IT's capacity being exceeded.	Functioned as designed	No notable observations	No notable observations	No notable observations	None

Overall Review of the Altadena Maintenance Station Infiltration Trench

Stormwater discharge effectively infiltrated into the Infiltration Trench (IT), never taking more than approximately 36 hours for complete infiltration. During larger storms, as designed, the IT filled and discharged through the overflow pipe. Refer to Photograph 2-12 at the end of this section.

SITE PHOTOGRAPHS

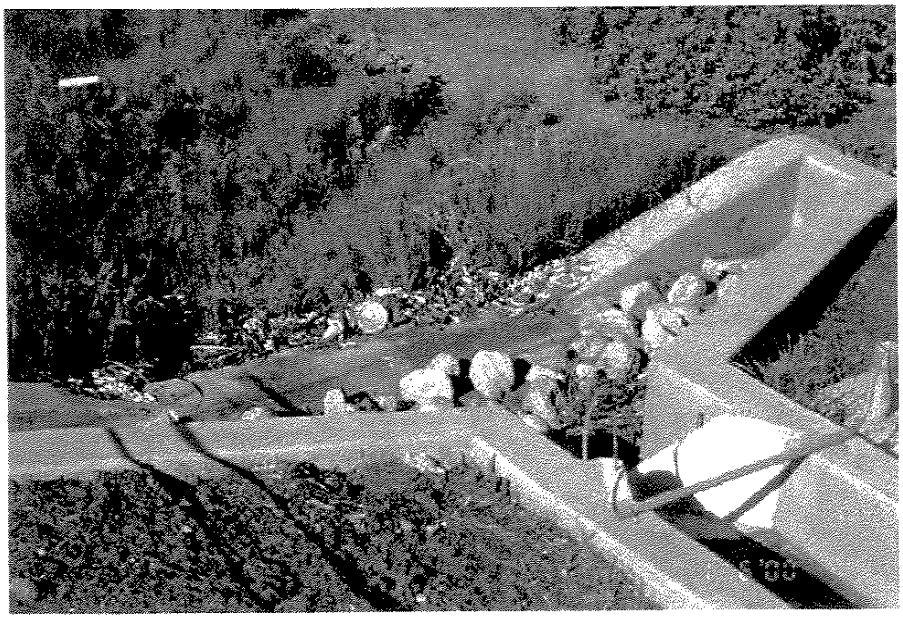
Photograph 2-1

Altadena Maintenance Station Biofiltration Strip (73211). As part of the operational characteristics of the strip, the spreader ditch is dewatered following each rain event.

Photograph 2-2

I-605/SR-91 Biofiltration Strip (73222a). Trash and debris at the asphalt/biofilter interface.

SITE PHOTOGRAPHS (continued)



Photograph 2-3

I-605/SR-91 Biofiltration Swale (73222b). Trash and debris in the concrete spreader/biofilter interface.

Photograph 2-4

Cerritos Maintenance Station Biofiltration Swale (73223). Runoff has infiltrated through previously filled-in gopher holes causing extensive erosion.

SITE PHOTOGRAPHS (continued)

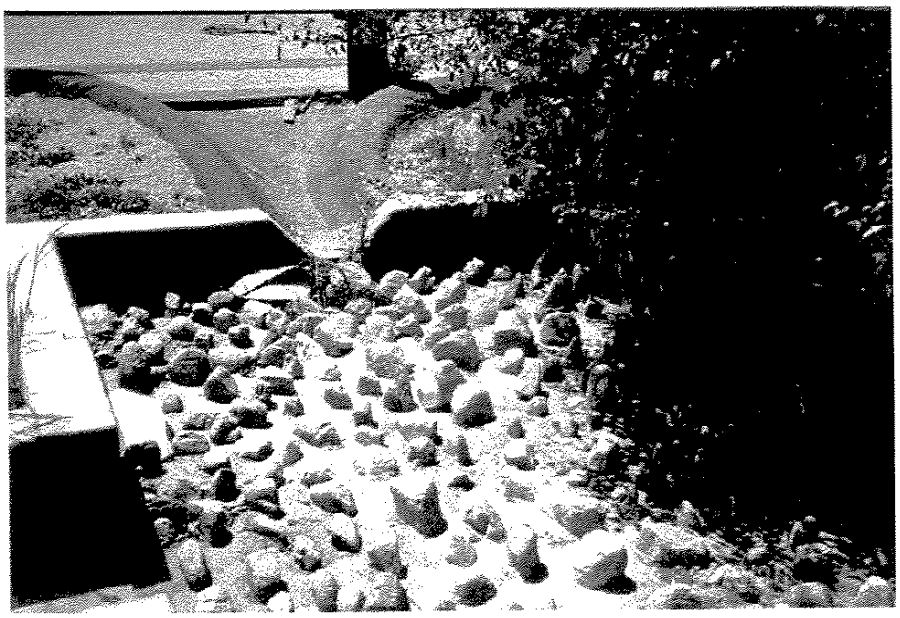
Photograph 2-5

Cerritos Maintenance Station Biofiltration Swale (73223). Trash and debris collected in the concrete spreader/biofilter interface and in the first third of the swale.

Photograph 2-6

I-5/I-605 Biofiltration Swale (73224). Trash and debris collected in the concrete spreader/biofilter interface.

SITE PHOTOGRAPHS (continued)



Photograph 2-7

I-605/Carson Biofiltration Swale (73225). Trash and debris collected in the energy dissipater.

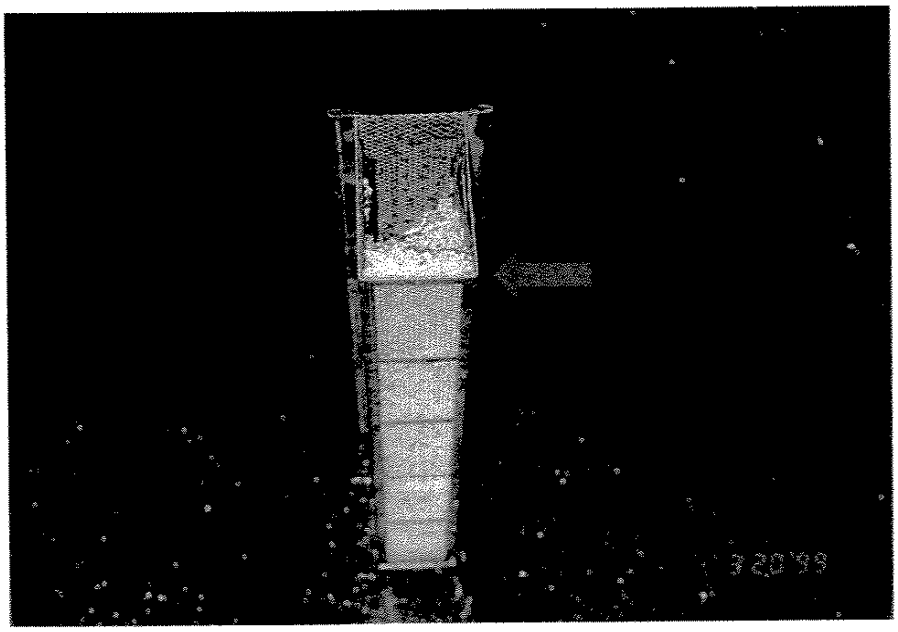
Photograph 2-8

Rosemead Maintenance Station South StreamGuard™ Drain Inlet Insert (73218). Localized flooding has occurred.

SITE PHOTOGRAPHS (continued)

Photograph 2-9

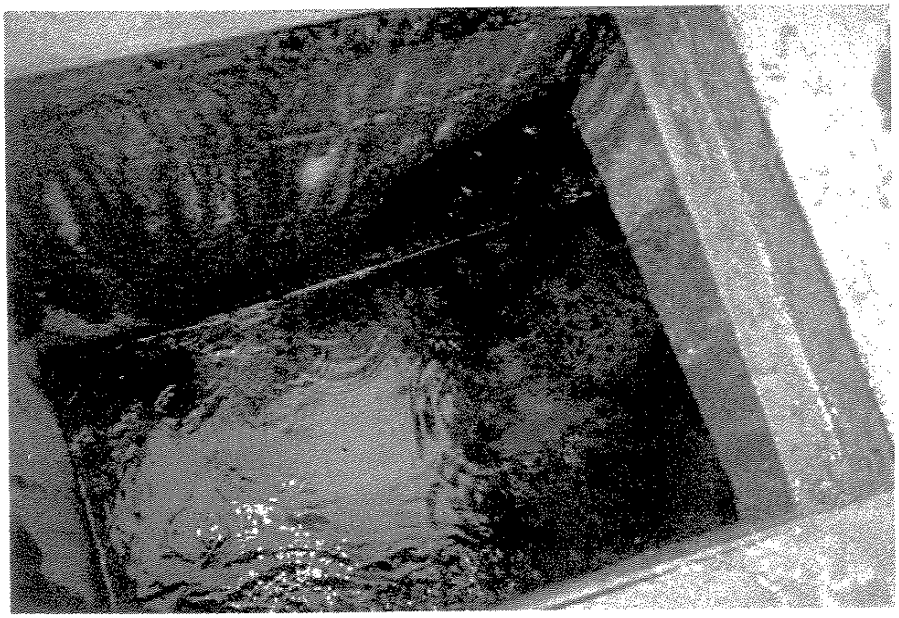
Storm water runoff bypassing Fossil Filter™ DII cartridges into overflow area at Foothill Maintenance Station (73216). This typically occurred when the flow rate exceeded 0.07 cfs.



Photograph 2-10

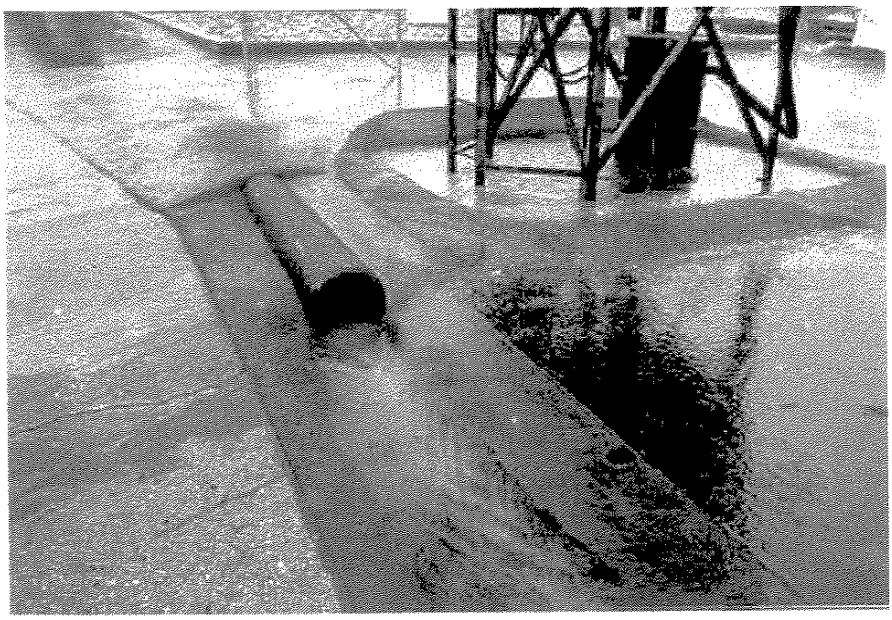
Las Flores Maintenance Station (73217). Layer of fine sediment in Fossil Filter™ DII adsorbent granules, impeding flow through filter cartridges and causing subsequent flow bypass.

SITE PHOTOGRAPHS (continued)



Photograph 2-11

I-605/SR-91 Infiltration Basin (73101) junction box. Flow bypassed the infiltration basin by flowing over the overflow weir.



Photograph 2-12

Altadena Maintenance Station Infiltration Trench (73211). Infiltration Trench filled and discharged through the overflow pipe.

3.0 BMP AND SITE MAINTENANCE

The primary objective of BMP maintenance is to ensure that each site is properly maintained to achieve optimum performance. Preventive and corrective maintenance measures were undertaken in accordance with the OMM Plan and the Maintenance Indicator Document (MID). These measures included:

- Removal of standing water;
- Sediment erosion control and removal;
- Structural integrity;
- Landscape management;
- Graffiti removal;
- Trash and debris removal; and
- General facility maintenance.

Regularly scheduled maintenance inspections were conducted monthly, with weekly surveys being performed during extended periods of wet weather. Maintenance visits were also conducted after each large storm event (greater that 0.5 inches). During the visits, maintenance observations and needs were documented on the "BMP Site Inspection Checklist" (Form C of the OMM Plan Volume II Field Guidance Notebooks). Based on this documentation, any immediate maintenance needs were arranged and documented on the "BMP Site Maintenance Form" (Form E of the OMM Plan Volume II Field Guidance Notebooks).

3.1 Summary of Inspection and Maintenance Activities

The following sections describe maintenance activities performed at each BMP site between June 1999 and June 2000. A comparison of maintenance requirements (frequencies and average times to perform) is graphically shown in Figures 3-1a through 3-4b. More detail on BMP maintenance is available at the following web site: http://www.rbf.com/caltrans/. Please note, however, that the maintenance times provided in the database are times required for each maintenance activity to be conducted, and do not distinguish whether one or more persons had performed the task (i.e., sometimes one person does a task while other times more than one person is involved). The average maintenance times illustrated in the figures have been adjusted to account for this.

3.1.1 Biofiltration Strips

Overall Review of Maintenance Activities at the Biofiltration Strips

Maintenance activities at the Biofiltration Strips consisted of unscheduled and routine maintenance. Unscheduled maintenance at both Biofiltration Strips consisted of the following:

1. Irrigating the salt grass for establishment. In July 1999, the strips were relinquished from RBF to Law Crandall for operation and maintenance. Law Crandall continued irrigation efforts in a weaning manner to establish the strips in meeting the 90 percent coverage requirement. The strips were brought up to the 90 percent coverage requirement by October 1, 1999 and irrigation continued through December 1999 at the Altadena Maintenance Station and January 2000 at the I-605/SR-91. During various periods, vegetation color changed from green to yellow and then to brown in some cases but density was always maintained. Subsequently, the vegetation consultant (Margot Griswold) reviewed each site and determined that the soil was drying out because of the weaning process and because of relatively warm temperatures, resulting in the change in vegetation color. She also determined that the vegetation was still alive because it had green tips. Consequently, the watering schedule was increased for approximately one month and then reduced.

2. Fertilization of salt grass in June 1999 by RBF.

Routine inspections were conducted on a monthly basis and weekly during extended periods of wet weather. In accordance with the MID and OMM Plan, routine maintenance activities at both the Altadena Maintenance Station and I-605/SR-91 Biofiltration Strips consisted of the following:

1. Cutting the salt grass twice to a nominal height of 6 inches and removing the cuttings. When cutting the salt grass, it first needs to be "fluffed up" so that it could be cut to the appropriate height. After the salt grass was cut, the cuttings were removed with a soft rake and disposed.

2. Manually removing weeds from the strips.

3. Removing trash and debris from the strips.

Overall Review of Maintenance Activities at the Altadena Maintenance Station Biofiltration Strip (73211a)

Site-specific maintenance activities at the Altadena Maintenance Station Biofiltration Strip consisted of the following:

1. Dewatering the strip's spreader ditch following each storm event to eliminate ponding water conditions, which could promote mosquito breeding. Originally, any water that was captured in the collector ditch was allowed to remain (i.e., the spreader ditch was not dewatered). However, mosquitoes breeding became prevalent. During the 7th Quarterly Status Meeting, it was decided that a new maintenance threshold be developed to dewater the spreader ditch. Subsequently, as part of the operational characteristics of the strip, the spreader ditch is dewatered following each rain event. At the end of the wet season, the bypass plug from the spreader ditch to the Infiltration Trench was opened to allow runoff from summer storm events to drain directly into the Infiltration Trench.

2. Removing sediment from the spreader ditch prior to the wet season and when the spreader ditch was dewatered.

Figure 3-1a summarizes the frequency of maintenance activities (i.e., number of times maintenance was conducted at the BMP) and Figure 3-1b summarizes the average amount of time spent performing each activity.

Overall Review of Maintenance Activities at the I-605/SR-91 Biofiltration Strip (73222a)

Site-specific maintenance activities at the I-605/SR-91 Biofiltration Strip consisted of the following:

1. Transplanting salt grass in two bare areas (448 sf and 60 sf). To promote adequate coverage at the I-605 at Carson Swale, RBF removed salt grass (10 percent of the strip's area) from two locations within the I-605/SR-91 Strip. Various strategies were used to re-establish vegetation in the donor areas including 1) applying seed, 2) transplanting salt grass plugs, and 3) transplanting salt grass flats. The first two methods were unsuccessful at re-establishing the salt grass despite intensive watering. The third method, transplanting salt grass flats, had limited success (i.e., vegetation growth and coverage was sparse). Establishment was limited because the transplanted salt grass was only irrigated once after being transplanted, in accordance with the MID.

2. Scarifying and hydroseeding bare areas outside of the strip but within its maintenance boundary for erosion control.

3. Cutting surrounding erosion control vegetation, which was located within the BMP's maintenance boundary. After the erosion control vegetation was cut, the cuttings were removed and disposed.

4. Gopher inspection and abatement.

Figure 3-1a summarizes the frequency of maintenance activities (i.e., number of times maintenance was conducted at the BMP) and Figure 3-1b summarizes the average amount of time spent performing each activity.

Figure 3-1a: Frequency of Maintenance Activities at the Biofiltration Strips

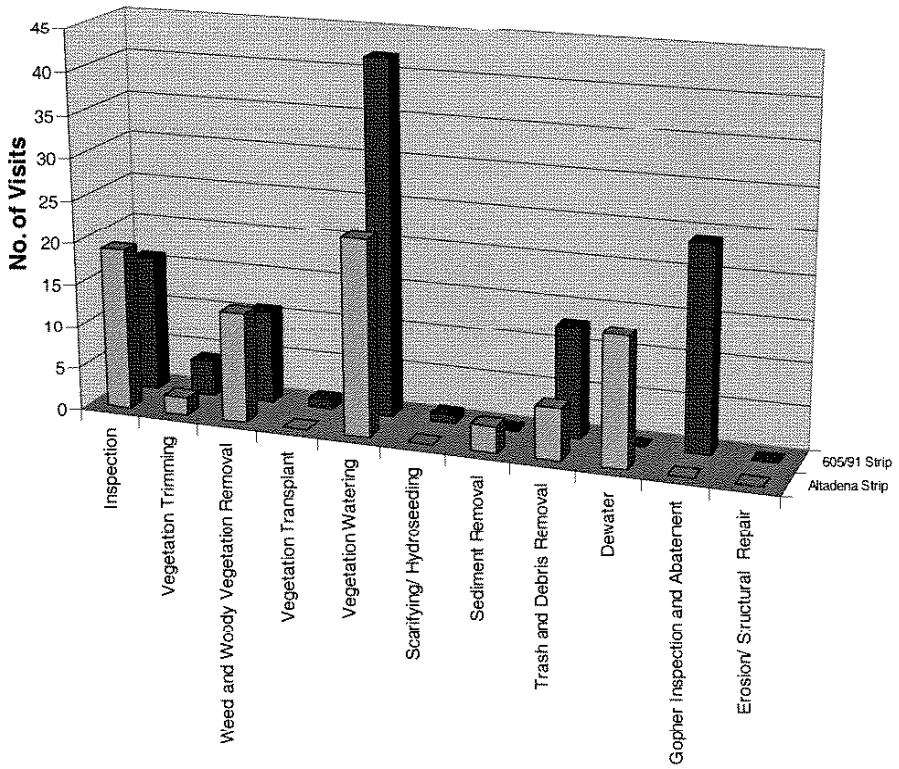
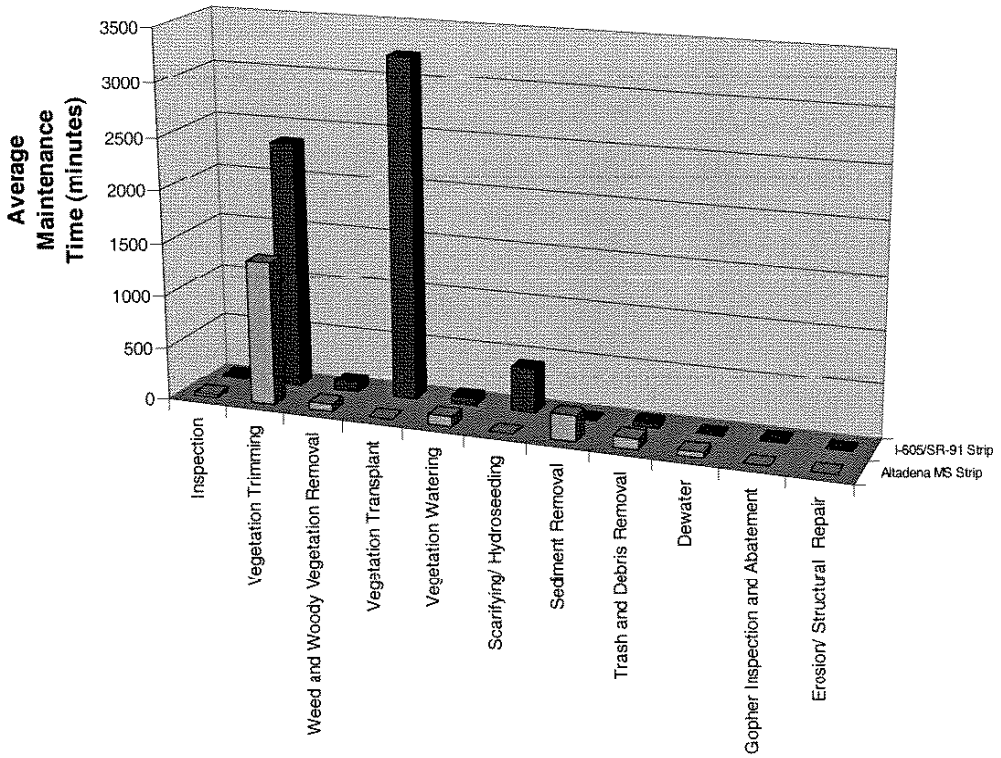


Figure 3-1b: Average Maintenance Times at the Biofiltration Strips



3.1.2 Biofiltration Swales

Overall Review of Maintenance Activities at the Biofiltration Swales

Maintenance activities at the Biofiltration Swales consisted of unscheduled and routine maintenance. Unscheduled maintenance at each Biofiltration Swale consisted of the following:

1. Irrigating the salt grass for establishment. In July 1999, the swales were relinquished from RBF to Law Crandall for operation and maintenance. Law Crandall continued irrigation efforts in a weaning manner to establish the swales in meeting the 90 percent coverage requirement. The swales were brought up to the 90 percent coverage requirement by October 1, 1999 and irrigation continued through December 1999. During various periods, vegetation color changed from green to yellow and then to brown in some cases but density was always maintained. Subsequently, the vegetation consultant (Margot Griswold) reviewed each site and determined that the soil was drying out because of the weaning process and because of relatively warm temperatures, resulting in the change in vegetation color. She also determined that the vegetation was still alive because it had green tips. Consequently, the watering schedule was increased for approximately one month and then reduced.

2. Fertilization of salt grass in June 1999 by RBF.

Routine inspections were conducted on a monthly basis and weekly during extended periods of wet weather. In accordance with the MID and OMM Plan, routine maintenance activities at each Biofiltration Swale consisted of the following:

1. Scarifying and hydroseeding the swale's side slopes and bare areas outside of the swale but within its maintenance boundary for erosion control.

2. Cutting the salt grass twice to a nominal height of 6 inches and removing the cuttings. When cutting the salt grass, it first needs to be "fluffed up" so that it could be cut to the appropriate height. After the salt grass was cut, the cuttings were removed with a soft rake and disposed.

3. Manually removing weeds from the swale.

4. Removing trash and debris from the swale.

Overall Review of Maintenance Activities at the I-605/SR-91 Biofiltration Swale (73222b)

Site-specific maintenance activities at the I-605/SR-91 Biofiltration Swale consisted of unscheduled and routine maintenance.

Unscheduled maintenance at the swale consisted of the following:

1. Removing eroded soil from the energy dissipater. On two occasions, minor erosion occurred at the headwall of the inlet pipe. Soil had eroded from the freeway embankment and deposited in the energy dissipater. Subsequently, the soil was removed from the energy dissipater.

2. Clearing the natural channel downstream of the swale to prevent backwater conditions in the swale. During the February 20, 2000 event, a team of technicians cleared vegetation in the downstream channel and removed high spots to allow free flowing condition from the swale.

Routine maintenance activities at the swale included:

1. Transplanting salt grass in a few small bare areas. Establishment was limited because the transplanted salt grass was only irrigated once after being transplanted, in accordance with the MID.

2. Cutting surrounding erosion control vegetation, which was located within the BMP's maintenance boundary. After the erosion control vegetation was cut, the cuttings were removed and disposed.

3. Gopher inspection and abatement.

Figure 3-2a summarizes the frequency of maintenance activities (i.e., number of times maintenance was conducted at the BMP) and Figure 3-2b summarizes the average amount of time spent performing each activity.

Overall Review of Maintenance Activities at the Cerritos Maintenance Station Biofiltration Swale (73223)

Site-specific maintenance activities at the I-605/SR-91 Biofiltration Swale consisted of unscheduled and routine maintenance.

Unscheduled maintenance at the swale consisted of the following:

1. Repaired structural damage caused by gophers. Despite regularly scheduled inspection and abatement, gophers continued to burrow through the swale, causing structural damage. Initially, burrows were backfilled and compacted with onsite soil. However, as

flow progressed through the swale during storm events, it infiltrated through previously filled-in gopher holes causing the runoff to flow into the subsurface gopher hole laterals. Flow eventually eroded areas of the side slope where gopher holes had been previously filled in and where new gopher holes had been burrowed during the storm event. This resulted in structural damage to the swale and flow bypass. A second strategy of filling gopher hole laterals with clay material was attempted. Similar to the first strategy, flow migrated around the clay-filled gopher holes and eroded areas of the side slope. Again, this resulted in structural damage to the swale and flow bypass. A third strategy of removing and rebuilding entire sections of the swale's side slope was undertaken. This strategy worked temporarily until the gophers migrated back to the repaired section. Another problem caused by the gophers was the reduction in vegetation cover below the MID requirement of 90 percent. In accordance with the MID, the bare areas will be transplanted with salt grass in the fall. Other strategies to minimize/prevent damage caused by gophers will be discussed during the summer of 2000.

Routine maintenance activities at the swale included:

1. Cutting surrounding erosion control vegetation, which was located within the BMP's maintenance boundary. After the erosion control vegetation was cut, the cuttings were removed and disposed.
2. Gopher inspection and abatement.

Figure 3-2a summarizes the frequency of maintenance activities (i.e., number of times maintenance was conducted at the BMP) and Figure 3-2b summarizes the average amount of time spent performing each activity.

Overall Review of Maintenance Activities at the I-5/I-605 Biofiltration Swale (73224)

Site-specific maintenance activities at the I-5/I-605 Biofiltration Swale consisted of routine maintenance.

Routine maintenance at the swale consisted of the following:

1. Cutting surrounding erosion control vegetation, which was located within the BMP's maintenance boundary. After the erosion control vegetation was cut, the cuttings were removed and disposed.

2. Gopher inspection and abatement.

Figure 3-2a summarizes the frequency of maintenance activities (i.e., number of times maintenance was conducted at the BMP) and Figure 3-2b summarizes the average amount of time spent performing each activity.

Overall Review of Maintenance Activities at the I-605 at Carson Biofiltration Swale (73225)

Site-specific maintenance activities at the I-605 at Carson Biofiltration Swale consisted of routine maintenance.

Routine maintenance activities at the swale included:

1. To promote adequate coverage at the I-605 at Carson Swale, RBF used various strategies establish vegetation including 1) transplanting salt grass from donor areas of the I-605/SR-91 Strip and 2) transplanting salt grass plugs.

2. Cutting surrounding erosion control vegetation, which was located within the BMP's maintenance boundary. After the erosion control vegetation was cut, the cuttings were removed and disposed.

3. Removing leaves from the swale, which fell from a nearby tree. The leaves had compacted the swale's vegetation.

Figure 3-2a summarizes the frequency of maintenance activities (i.e., number of times maintenance was conducted at the BMP) and Figure 3-2b summarizes the average amount of time spent performing each activity.

Figure 3-2a: Frequency of Maintenance Activities at the Biofiltration Swales

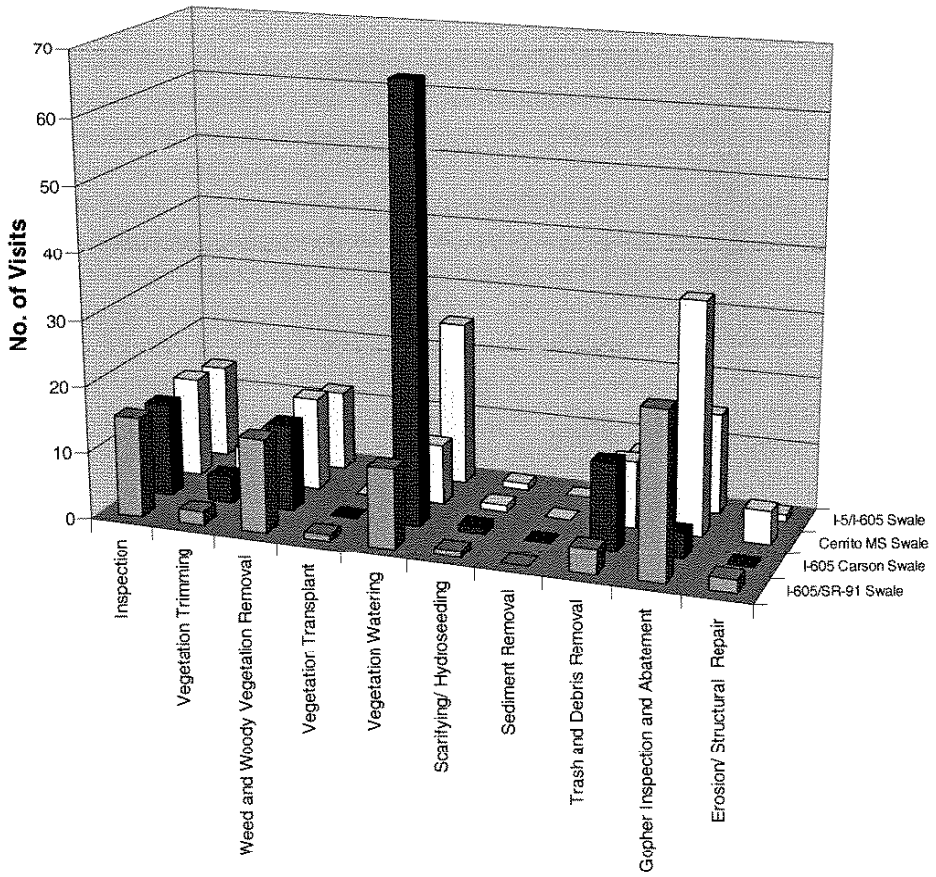
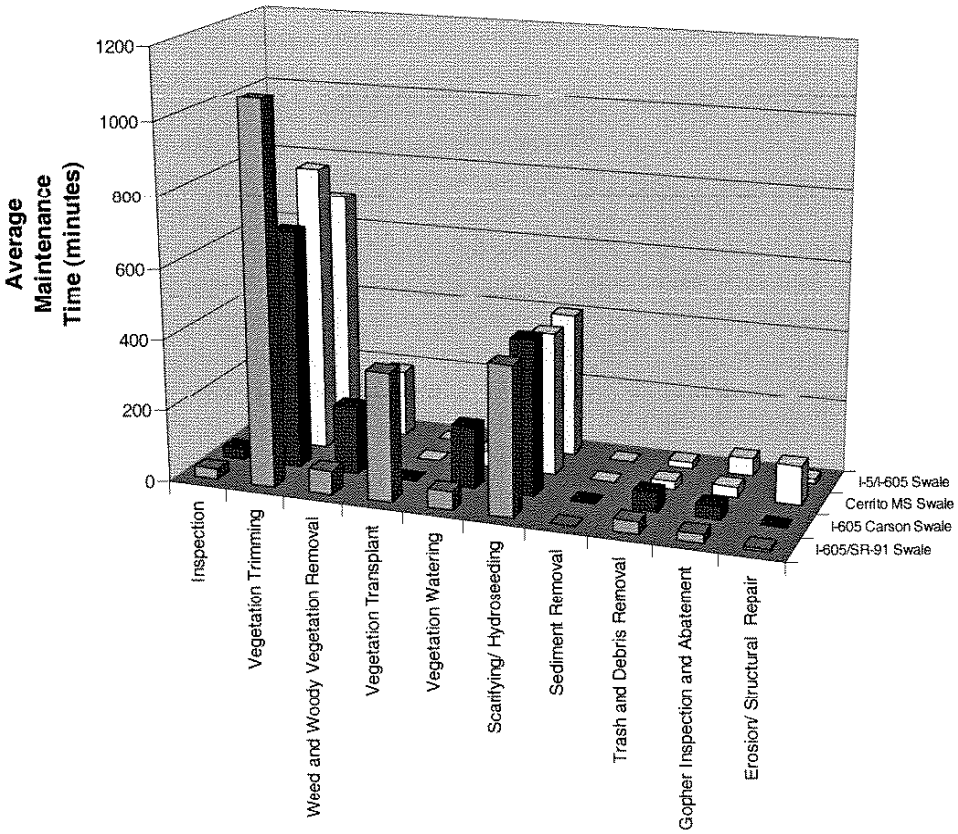


Figure 3-2b: Average Maintenance Times at the Biofiltration Swales



3.1.3 Drain Inlet Inserts

Overall Review of Maintenance Activities at the Foothill Maintenance Station StreamGuard™ DII (73216N)

Maintenance activities at the Foothill Maintenance Station StreamGuard™ DII consisted of one-time maintenance activities and routine maintenance activities.

One-time maintenance activities conducted at the site include the following:

1. Prior to the 1999-2000 wet season, the DII was installed and the interface gap between the DII fabric and the drain inlet was eliminated using wood shims to compress the DII fabric against the drain inlet walls.

2. Rubber berms were placed around the monitoring vaults to address the concern that untreated flow could enter the vaults.

Routine inspections were conducted at the site prior to and during each storm event. Organic material, mostly leaves, was removed from the DII once during the fall. Removed material was placed in an on-site storage container designed to emulate DII conditions. The thresholds for replacement of the DII provided in the MID were not reached. The DII was removed during the first week of June 2000 and subsequently analyzed.

Figure 3-3a summarizes the frequency of maintenance activities (i.e., number of times maintenance was conducted at the BMP) and Figure 3-3b summarizes the average amount of time spent performing each activity.

Overall Review of Maintenance Activities at the Las Flores Maintenance Station StreamGuard™ DII (73217N)

Maintenance activities at the Las Flores Maintenance Station StreamGuard™ DII consisted of one-time maintenance activities, unscheduled maintenance activities, and routine maintenance activities.

One-time maintenance activities conducted at the site include the following:

1. Prior to the 1999-2000 wet season, the DII was installed and the interface gap between the DII fabric and the drain inlet was eliminated using wood shims to compress the DII fabric against the drain inlet walls.

2. Rubber berms were placed around the monitoring vaults to address the concern that untreated flow could enter the vaults.

Unscheduled maintenance activities were conducted three times. The first time, standing water in the cone cause the DII to slip down and fall into the bottom of the drain inlet. Material was removed from the DII and the DII was subsequently reinstalled to its original position and the inlet-DII interface was tightened using additional wood shims. Removed material was placed in an on-site storage container designed to emulate DII conditions. The second and third time, standing water in the cone caused the DII to slip in one location along the inlet edge. The DII was returned to its original position and tightened using additional shims.

Routine inspections were conducted at the site prior to and during each storm event, but no maintenance was required because the DII did not meet the preventive maintenance thresholds in the Maintenance Indicator Document (MID). The thresholds for replacement of the DII provided in the MID were not reached. The DII was removed during the first week in June 2000 and subsequently analyzed.

Figure 3-3a summarizes the frequency of maintenance activities (i.e., number of times maintenance was conducted at the BMP) and Figure 3-3b summarizes the average amount o time spent performing each activity.

Overall Review of Maintenance Activities at the Rosemead Maintenance Station StreamGuard™ DII (73218S)

Maintenance activities at the Rosemead Maintenance Station StreamGuard™ DII consisted of one-time maintenance activities, unscheduled maintenance activities, and routine maintenance activities.

One-time maintenance activities conducted at the site include the following:

1. Prior to the 1999-2000 wet season, the DII was installed and the interface gap between the DII fabric and the drain inlet was eliminated using wood shims to compress the DII fabric against the drain inlet walls.

2. Rubber berms were placed around the monitoring vaults to address the concern that untreated flow could enter the vaults.

Two unscheduled maintenance activities were performed at the site. Standing water in the cone caused the DII to slip in one location along the inlet edge. The DII was reinstalled to its original position and tightened using available shim stock.

Routine inspections were conducted at the site prior to and during each storm event. Organic material, mostly leaves, was removed from the DII once during the fall. Removed material was placed in an on-site storage container designed to emulate DII conditions. The thresholds for replacement of the DII provided in the MID were not reached. The DII was removed during the first week in June 2000 and subsequently analyzed.

Figure 3-3a summarizes the frequency of maintenance activities (i.e., number of times maintenance was conducted at the BMP) and Figure 3-3b summarizes the average amount of time spent performing each activity.

Overall Review of Maintenance Activities at the Foothill Maintenance Station Fossil Filter™ DII (73216S)

Maintenance activities at the Foothill Maintenance Station Fossil Filter™ DII consisted of one-time maintenance activities, non-routine, and routine maintenance activities.

One-time maintenance activities conducted at the site include the following:

1. The interface between the DII and the inlet was checked for gaps prior to the beginning of the 1999-2000 wet season and throughout the wet season; no gaps were found.

2. Rubber berms were placed around the monitoring vaults to address the concern that untreated flow could enter the vaults.

Non-routine maintenance was conducted following the April 17 storm, when the stainless steel flange holding the cartridges bent upward due to the weight of water, and bypass occurred underneath the cartridges. Maintenance consisted of removing the DII, bending the flange back into its original position, and then reinstalling the DII.

Routine inspections were conducted at the site prior to and during each storm event. Generally, small amounts of trash, debris, and sediment were removed from the DII both before and once during a storm event. Removed trash, debris, and sediment were placed in an on-site storage container designed to emulate DII conditions.

The thresholds for replacement of the DII provided in the MID were not reached. The adsorbent granules were removed during the first week in June 2000. Subsequently, the adsorbent granules from the cartridges and trash, debris, and sediment collected during the 1999-2000 wet season were sent to the laboratory for analysis.

Figure 3-3a summarizes the frequency of maintenance activities (i.e., number of times maintenance was conducted at the BMP) and Figure 3-3b summarizes the average amount of time spent performing each activity.

Overall Review of Maintenance Activities at the Las Flores Maintenance Station Fossil Filter™ DII (73217S)

Maintenance activities at the Las Flores Maintenance Station Fossil Filter™ DII consisted of one-time maintenance activities and routine maintenance activities.

One-time maintenance activities conducted at the site include the following:

1. The interface gap between the DII and the inlet was sealed with spray foam prior to the beginning of the 1999-2000 wet season. The interface was also checked for gaps throughout the wet season; no gaps were found.

2. Rubber berms were placed around the monitoring vaults to address the concern that untreated flow could enter the vaults.

Routine inspections were conducted at the site prior to and during each storm event. Generally, small amounts of organic debris and sediment were removed from the DII both before and once during a storm event. Removed organic debris and sediment were placed in an on-site storage container designed to emulate DII conditions.

The thresholds for replacement of the DII provided in the MID were not reached. The adsorbent granules were removed during the first week in June 2000. Subsequently, the adsorbent granules from the cartridges and trash, debris, and sediment collected during the 1999-2000 wet season were sent to the laboratory for analysis.

Figure 3-3a summarizes the frequency of maintenance activities (i.e., number of times maintenance was conducted at the BMP) and Figure 3-3b summarizes the average amount of time spent performing each activity.

Overall Review of Maintenance Activities at the Rosemead Maintenance Station Fossil Filter™ DII (73218N)

Maintenance activities at the Rosemead Maintenance Station Fossil Filter™ DII consisted of one-time maintenance activities and routine maintenance activities.

One-time maintenance activities conducted at the site include the following:

1. The interface between the DII and the inlet was sealed with spray foam prior to the beginning of the 1999-2000 wet season. The interface was also checked for gaps throughout the wet season; no gaps were found.

2. A section of rubber was placed along the curb inlet-DII interface to promote flow into the DII.

3. Rubber berms were placed around the monitoring vaults to address the concern that untreated flow could enter the vaults.

Routine inspections were conducted at the site prior to and during each storm event. Generally, small amounts of organic debris, trash, and sediment were removed from the DII both before and

once during a storm event. Removed organic debris, trash, and sediment were placed in an on-site storage container designed to emulate the ambient conditions at the top of the screen in the cartridges.

The thresholds for replacement of the DII provided in the MID were not reached. The adsorbent granules were removed during the first week in June 2000. Subsequently, the adsorbent granules from the cartridges and organic debris, trash, and sediment collected during the 1999-2000 wet season were sent to the laboratory for analysis.

Figure 3-3a summarizes the frequency of maintenance activities (i.e., number of times maintenance was conducted at the BMP) and Figure 3-3b summarizes the average amount of time spent performing each activity.

Figure 3-3a: Frequency of Maintenance Activities at the DII Sites

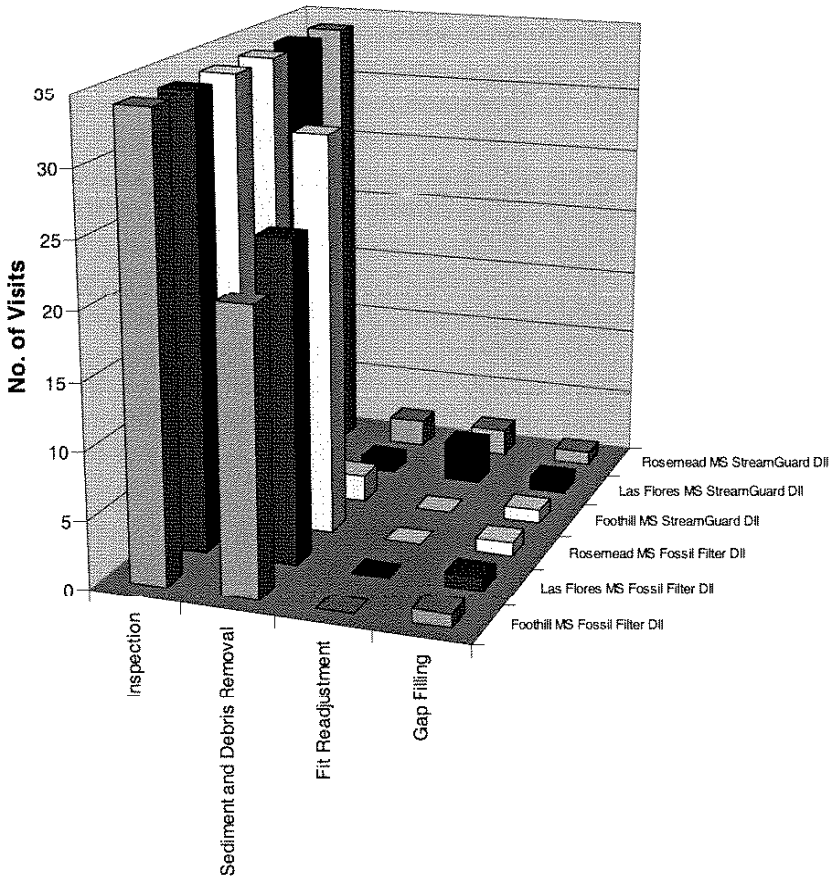
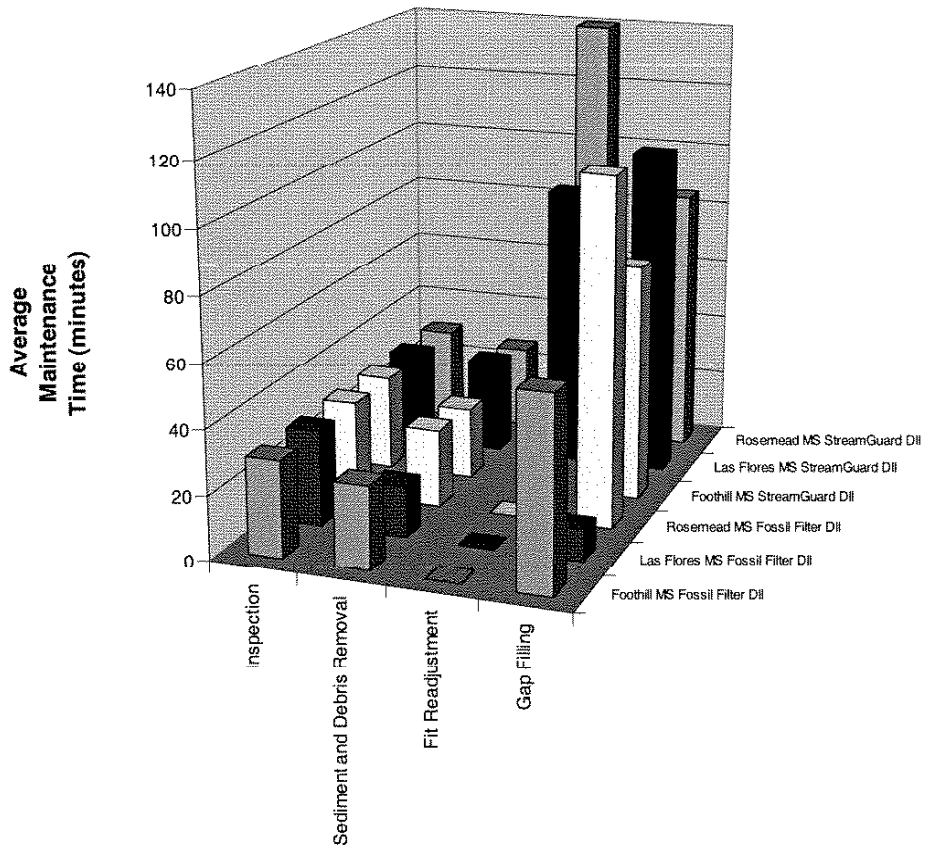


Figure 3-3b: Average Maintenance Times at the DII Sites



3.1.4 Infiltration Basin

Overall Review of Maintenance Activities at the I-605/SR-91 Infiltration Basin (73101)

Maintenance activities at the I-605/SR-91 Infiltration Basin (IB) consisted of one-time maintenance activities, unscheduled maintenance activities, and routine maintenance activities.

There was one one-time maintenance activity at the IB. In December of 1999, the bottom and side slopes of the IB was scarified and hydroseeded. By February 2000, the hydroseed sprouted and covered most of the IB.

The following unscheduled maintenance activities were performed at the site:

1. Removing ponded water from the overflow structure, prior to it being grouted with concrete.

2. Modifications were made to enhance flow into the IB. These consisted of (a) creating a shallow sump (approximately 3/4 inches in depth) in the bottom of the overflow structure and (b) increasing the height of a stainless steel weir plate in front of the overflow pipe.

3. Several times, minor erosion was observed at the downstream end of a shallow asphalt swale on the perimeter road. The erosion was repaired, and to prevent reoccurrence of problem, sandbags were placed at the end of the swale where it discharged into the edge of the IB.

Routine inspections were conducted per the OMM Plan and MID. Routine maintenance included removal of trash and debris, removal of woody vegetation, cutting the vegetation to a height of approximately six inches and removing and disposing of the cuttings, and compaction of ground squirrel holes and gopher burrows.

Figure 3-4a summarizes the frequency of maintenance activities (i.e., number of times maintenance was conducted at the BMP) and Figure 3-4b summarizes the average amount of time spent performing each activity.

3.1.5 Infiltration Trench

Overall Review of Maintenance Activities at the Altadena Maintenance Station Infiltration Trench (73211b)

Very little maintenance activity was conducted at the Altadena Maintenance Station Infiltration Trench. Routine inspections, required by the OMM Plan and MID, were conducted. Routine maintenance activities included the removal of small amounts of trash and debris.

Figure 3-5a summarizes the frequency of maintenance activities (i.e., number of times maintenance was conducted at the BMP) and Figure 3-5b summarizes the average amount of time spent performing each activity.

Figure 3-4a: Frequency of Maintenance Activities at the Infiltration Basin and Infiltration Trench

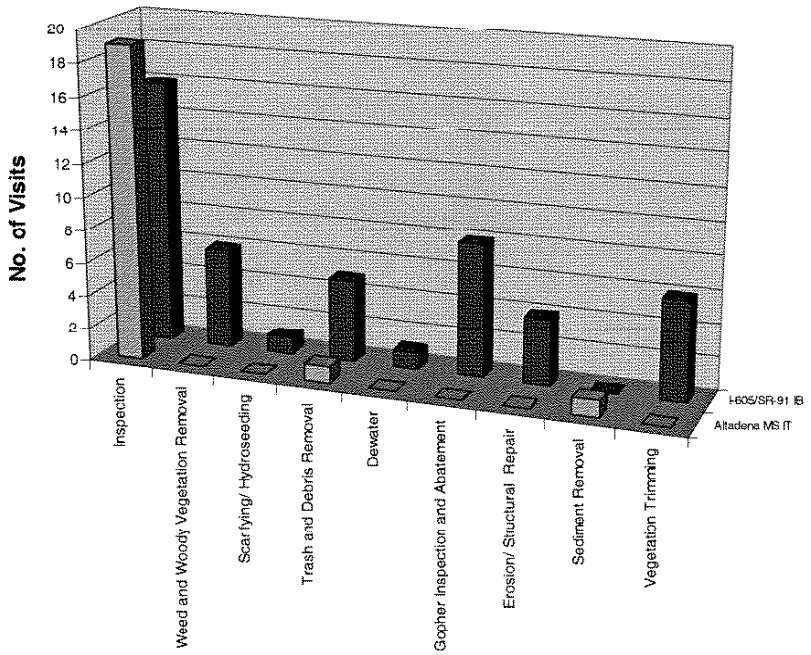
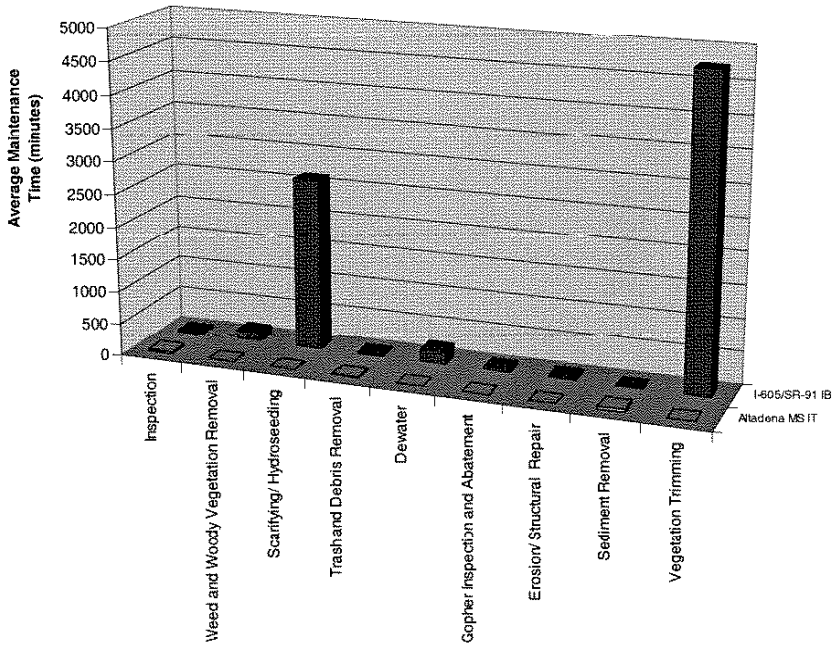


Figure 3-4b: Average Maintenance Times at the Infiltration Basin and Infiltration Trench



4.0 COST SUMMARY

A cost summary for maintenance of the BMPs during the 1999/2000 year is provided in the following spreadsheets. These cost summaries provided maintenance hours with generic rates.

BMP Retrofit Pilot Program
Maintenance Operation
Cost Accounting Summary, 1999-2000

DISTRICT: 7	LOCATION: I-605/SR-91 Interchange	SITE NO. 73101	BMP TYPE: Infiltration Basin	CONSULTANT: Montgomery Watson/LAW Crandall

	TASK	1999 Jun	Jul	Aug	Sep	Oct	Nov	Dec	2000 Jan	Feb	Mar	Apr	May	Jun	(hrs)	Rate	TOTAL $
Labor (hours)	***Administration***																
	General program support/Follow-up	3.0	7.8	12.0	2.5	5.3	4.7	10.3	8.5	4.8	14.9	8.9	9.6	14.4	106.6	$120	$ 12,786
	Encroachment Permits														0.0	$87	$ -
	Travel	2.6	1.7	7.8	5.1	6.0	0.8	5.0	5.1	5.0	10.0	5.5	4.8	10.8	70.1	$87	$ 6,094
	Unscheduled events						4.0								4.0	$87	$ 348
	Monthly Subtotal (hours)	5.6	9.5	19.8	7.6	11.3	9.5	15.3	13.6	9.8	24.9	4.4	14.4	25.1	180.6		
	Monthly Subtotal ($)	$586	$1,084	$2,114	$744	$1,152	$977	$1,671	$1,466	$1,005	$2,656	$1,547	$1,566	$2,660	$19,228		
																Task Subtotal =	$19,228
	Operation																
	Wet season inspections					1.0	0.5	1.0	1.3	1.3	1.5	1.5	0.5		8.5	$55	$ 468
	Dry season inspections	0.5	1.0	0.5	1.0									0.5	3.5	$55	$ 193
	Unscheduled inspections/field calls								1.5						1.5	$60	$ 90
	Monthly Subtotal (hours)	0.50	1.00	0.50	1.00	1.00	0.50	1.00	2.75	1.25	1.50	1.50	0.50	0.50	13.5		
	Monthly Subtotal ($)	$28	$55	$28	$55	$55	$28	$55	$159	$69	$83	$83	$28	$28	$750		
																Task Subtotal =	$750
	Maintenance																
	Scheduled maintenance	1.4		17.0	1.0	4.0		31.0	2.3	1.3	3.8	2.3	3.3	79.3	146.5	$55	$ 8,055
	Unscheduled maintenance			7.3											7.3	$55	$ 399
	Vandalism														0.0	$55	$ -
	Acts of God														0.0	$55	$ -
	Landscape Maintenance Contractor														0.0	$0	$ -
	Sediment Removal Contractor														0.0	$0	$ -
	Vegetation Consultant					0.9									0.9	$75	$ 65
	Other Contractor														0.0	$0	$ -
	Other Contractor														0.0	$0	$ -
	Monthly Subtotal (hours)	1.40	0.00	24.25	1.00	4.87	0.00	31.00	2.25	1.25	3.75	2.30	3.25	79.25	151.6		
	Monthly Subtotal ($)	$77	$0	$1,334	$55	$285	$0	$1,705	$124	$69	$206	$127	$179	$4,359	$8,519		
																Task Subtotal =	$8,519
	Vector Control																
	Contract & General administration	1.0	1.9	1.0	0.25				0.1	0.1	0.1	0.1	0.1	0.3	4.9	$120	$ 588
	Vector prevention maint. (consultant)														0.0	$65	$ -
	Response to VCD calls (consultant)														0.0	$55	$ -
	VCD efforts (contracted)	6.2	8.2	3.2	2.2	1.8	2.6	2.1	2.2	2.0		1.8	2.1	3.0	37.3	$46	$ 1,734
	Monthly Subtotal (hours)	7.20	10.10	4.20	2.45	1.76	2.60	2.10	2.30	2.10	0.10	1.90	2.15	3.26	42.22		
	Monthly Subtotal ($)	$408	$609	$269	$132	$82	$121	$98	$114	$105	$12	$96	$107	$170	$2,322		
																Task Subtotal =	$2,322
Non-Recurring Equipment (hours)	***Equipment***																
	Trash Pump			2.0											2.0	$5	$ 10
	Weed Wacker													39.3	39.3	$5	$ 196
	20" Push Lawnmower													0.5	0.5	$9	$ 5
	Self Powered Weed Mower													1.5	1.5	$20	$ 30
	Mounted Weed Eater													11.8	11.8	$7	$ 88
	Generator													11.8	11.8	$6	$ 71
	Trailer													2.8	2.8	$13	$ 36
	Monthly Subtotal (hours)	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	67.50	69.50		
	Monthly Subtotal ($)	$0	$0	$10	$0	$0	$0	$0	$0	$0	$0	$0	$0	$426	$436		
																Equipment Subtotal =	$436
Dollars ($)	***Direct Costs***																Total $
	VCD supplies (direct costs less labor)																$
	Reproduction	$ 8	$ 9	$ 13	$ 5		$ 2	$ 1	$ 1	$ 2	$ 4	$ 2	$ 2	$ 2			$ 49.99
	Postage/FedEx	$ 8	$ 9	$ 13	$ 5		$ 3	$ 1	$ 1	$ 3	$ 4	$ 2	$ 2	$ 2			$ 51.59
	Lodging			$ 5		$ 9		$ 15			$ 7	$ 4	$ 8				$ 47.31
	Per Diem			$ 3		$ 6		$ 10			$ 3	$ 2	$ 2				$ 26.41
	Incidentals	$ 8	$ 9	$ 13	$ 5		$ 10	$ 1	$ 1	$ 8	$ 18	$ 17	$ 18	$ 2			$ 108.42
	Vehicle Rental/Lease	$ 50	$ 74	$ 148	$ 10	$ 11	$ 5	$ 27	$ 80	$ 85	$ 6	$ 96	$ 97	$ 225			$ 914.00
	Airfare																$ -
	Field Supp./Expendables	$ 10	$ 1	$ 37	$ 1	$ 24	$ 3	$ 3		$ 4	$ 116		$ 8	$ 108			$ 316.00
	Equipment Rental																$ -
	Sediment Analyses																$ -
	Sediment Disposal																$ -
	Weed Wacker	$ 15															$ 15.00
	Vegetation Disposal			$ 34													$ 34.00
	Scarifying/Hydroseeding								$ 7,618								$ 7,618.23
	Storage Container			$ 4													$ 4.25
	Monthly Subtotal	$ 99	$ 102	$ 270	$ 25	$ 50	$ 23	$ 58	$ 7,701	$ 102	$ 158	$ 123	$ 136	$ 339			$ 9,185
	MONTHLY TOTAL	$1,138	$1,850	$4,024	$1,011	$1,524	$1,149	$3,587	$9,564	$1,343	$3,115	$1,974	$2,016	$7,981	**1999/2000 TOTAL =**		**$40,439**

BMP Retrofit Pilot Program
Maintenance Operation
Cost Accounting Summary, 1999-2000

DISTRICT: 7	LOCATION: Altadena Maintenance Station	SITE NO. 73211a	BMP TYPE: Infiltration Trench	CONSULTANT: Montgomery Watson - Chaudhary

Labor (hours)

TASK	1999 Jun	Jul	Aug	Sep	Oct	Nov	Dec	2000 Jan	Feb	Mar	Apr	May	Jun	(hrs)	Rate	TOTAL $
Administration																
General program support/Follow-up	2.0	3.0	6.3	2.5	6.3	1.9	6.7	6.0	2.0	13.7	10.3	8.8	8.8	78.2	$120	$ 9,378
Encroachment Permits														0.0	$87	$ -
Travel	2.1	1.0	4.0	2.6	1.7	0.8	2.8	0.9	4.3	9.1	2.3	2.9	1.8	36.1	$87	$ 3,136
Unscheduled events														0.0	$87	$ -
Monthly Subtotal (hours)	4.1	4.0	10.3	5.1	8.0	2.7	9.5	6.9	6.3	22.8	12.6	11.7	10.6	114.2		
Monthly Subtotal ($)	$423	$447	$1,098	$522	$898	$293	$1,043	$789	$614	$2,433	$1,436	$1,304	$1,213	$12,514		
														Task Subtotal =		$12,514
Operation																
Wet season inspections					2.0	0.5	1.0	1.3	1.3	2.5	0.5	0.8		9.8	$55	$ 536
Dry season inspections	0.8	1.0	0.5	0.5									0.5	3.3	$55	$ 182
Unscheduled inspections/field calls														0.0	$60	$ -
Monthly Subtotal (hours)	0.80	1.00	0.50	0.50	2.00	0.50	1.00	1.25	1.25	2.50	0.50	0.75	0.50	13.1		
Monthly Subtotal ($)	$44	$55	$28	$28	$110	$28	$55	$69	$69	$138	$28	$41	$28	$718		
														Task Subtotal =		$718
Maintenance																
Scheduled maintenance	1.5									0.5		0.3		2.3	$55	$ 124
Unscheduled maintenance														0.0	$55	$ -
Vandalism														0.0	$55	$ -
Acts of God														0.0	$55	$ -
Landscape Maintenance Contractor														0.0	$0	$ -
Sediment Removal Contractor														0.0	$0	$ -
Vegetation Consultant														0.0	$75	$ -
Other Contractor														0.0	$0	$ -
Other Contractor														0.0	$0	$ -
Monthly Subtotal (hours)	1.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.25	0.00	2.3		
Monthly Subtotal ($)	$83	$0	$0	$0	$0	$0	$0	$0	$0	$28	$0	$14	$0	$124		
														Task Subtotal =		$124
Vector Control																
Contract & General administration	0.3	0.6	0.5					0.1	0.1	0.1	0.1	0.1	0.3	2.1	$120	$ 246
Vector prevention maint. (consultant)														0.0	$65	$ -
Response to VCD calls (consultant)														0.0	$55	$ -
VCD efforts (contracted)	6.2	8.2	2.0	1.2	0.9	1.4	1.6	1.3	1.0	1.2	1.0	1.1	1.7	28.7	$46	$ 1,333
Monthly Subtotal (hours)	6.50	8.75	2.50	1.20	0.90	1.40	1.60	1.36	1.05	1.30	1.10	1.17	1.91	30.74		
Monthly Subtotal ($)	$324	$447	$153	$66	$42	$63	$74	$71	$56	$68	$58	$58	$107	$1,579		
														Task Subtotal =		$1,579

Non-Recurring Equipment (hours)

Equipment																
Trash Pump														0.0	$5	$ -
Piece of Equipment 2														0.0	$0	$ -
Piece of Equipment 3														0.0	$0	$ -
Piece of Equipment 4														0.0	$0	$ -
Piece of Equipment 5														0.0	$0	$ -
Piece of Equipment 6														0.0	$0	$ -
Monthly Subtotal (hours)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		
														Equipment Subtotal =		$0

Dollars ($)

Direct Costs																Total $
VCD supplies (direct costs less labor)																$ -
Reproduction	$ 4	$ 4	$ 7	$ 2		$ 1		$ 1	$ 1	$ 2	$ 1	$ 1	$ 1			$ 24.7
Postage/FedEx	$ 4	$ 4	$ 7	$ 2		$ 2		$ 1	$ 1	$ 2	$ 1	$ 1	$ 1			$ 26.3
Lodging			$ 5				$ 15			$ 7	$ 4	$ 8				$ 38.2
Per Diem			$ 3				$ 10			$ 3	$ 2	$ 2				$ 19.4
Incidentals	$ 4	$ 4	$ 7	$ 2		$ 6		$ 1	$ 6	$ 16	$ 16	$ 17	$ 1			$ 80.6
Vehicle Rental/Lease	$ 25	$ 37	$ 22	$ 10	$ 11	$ 5	$ 15	$ 13	$ 73	$ 6	$ 55	$ 58	$ 34			$ 364.3
Airfare																$ -
Field Supp./Expendables		$ 1	$ 1	$ 1	$ 9	$ 3	$ 3		$ 4	$ 9		$ 8				$ 38.2
Equipment Rental					$ 6											$ 6.4
Sediment Analyses																$ -
Sediment Disposal																$ -
Weed Wacker																$ -
Vegetation Disposal																$ -
Storage Container			$ 4													$ 4.2
Monthly Subtotal	$ 37	$ 50	$ 55	$ 17	$ 26	$ 17	$ 44	$ 16	$ 85	$ 44	$ 79	$ 95	$ 38			$ 60

MONTHLY TOTAL	$910	$999	$1,333	$622	$1,076	$401	$1,216	$944	$824	$2,711	$1,601	$1,512	$1,385	1999/2000 TOTAL	$15,537

BMP Retrofit Pilot Program
Maintenance Operation
Cost Accounting Summary, 1999-2000

DISTRICT: 7	LOCATION: Altadena Maintenance Station	SITE NO. 73211b	BMP TYPE: Biofiltration Strip	CONSULTANT: Montgomery Watson - Chaudhary

	TASK	1999 Jun	Jul	Aug	Sep	Oct	Nov	Dec	2000 Jan	Feb	Mar	Apr	May	Jun	(hrs)	Rate	TOTAL $
Labor (hours)	***Administration***																
	General program support/Follow-up	4.0	4.8	10.0	1.3	3.0	4.2	3.5	8.2	4.5	15.0	9.6	10.8	13.3	100.3	$120	$ 11,994
	Encroachment Permits														0.0	$87	$ -
	Travel	2.1	1.0	9.1	12.1	8.4	2.9	4.3	5.1	4.3	9.1	5.5	2.9	3.6	70.3	$87	$ 6,113
	Unscheduled events														0.0	$87	$ -
	Monthly Subtotal (hours)	6.1	5.8	19.1	15.3	11.4	7.1	13.7	13.3	8.8	24.0	15.1	13.7	16.9	170.2		
	Monthly Subtotal ($)	$663	$657	$1,992	$1,438	$1,091	$750	$1,504	$1,430	$914	$2,565	$1,631	$1,544	$1,908	$18,107		
															Task Subtotal =		$18,107
	Operation																
	Wet season inspections					1.0	0.5	1.5	1.3	1.3	4.0	1.0	1.0		11.5	$55	$ 633
	Dry season inspections	1.2	1.0	0.5	1.0									1.3	5.0	$55	$ 272
	Unscheduled inspections/field calls	1.0													1.0	$60	$ 60
	Monthly Subtotal (hours)	2.20	1.00	0.50	1.00	1.00	0.50	1.50	1.25	1.25	4.00	1.00	1.00	1.25	17.5		
	Monthly Subtotal ($)	$126	$55	$28	$55	$55	$28	$83	$69	$69	$220	$55	$55	$69	$965		
															Task Subtotal =		$965
	Maintenance																
	Scheduled maintenance	7.2	1.0	7.8	0.5	6.0	12.0	15.8	4.5	3.3	8.0	10.1	2.5	16.5	95.1	$55	$ 5,228
	Unscheduled maintenance			6.0	11.5	10.5	3.0	2.8							33.8	$55	$ 1,856
	Vandalism														0.0	$55	$ -
	Acts of God														0.0	$55	$ -
	Landscape Maintenance Contractor														0.0	$0	$ -
	Sediment Removal Contractor														0.0	$0	$ -
	Vegetation Consultant					0.9	0.9	3.0	1.2						5.9	$75	$ 445
	Other Contractor														0.0	$0	$ -
	Other Contractor														0.0	$0	$ -
	Monthly Subtotal (hours)	7.20	1.00	13.75	12.00	17.37	15.90	21.50	5.66	3.25	8.00	10.10	2.50	16.50	134.7		
	Monthly Subtotal ($)	$396	$55	$756	$660	$973	$863	$1,243	$335	$179	$440	$556	$138	$908	$7,529		
															Task Subtotal =		$7,529
	Vector Control																
	Contract & General administation	0.8	1.1	0.5	0.5		0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.3	4.0	$120	$ 474
	Vector prevention maint. (consultant)														0.0	$65	$ -
	Response to VCD calls (consultant)														0.0	$55	$ -
	VCD efforts (contracted)	6.2	8.2	2.0	1.2	0.9	1.4	1.6	1.3	1.0	1.2	1.0	1.1	1.7	28.7	$46	$ 1,333
	Monthly Subtotal (hours)	7.00	9.25	2.50	1.70	0.90	1.70	1.70	1.36	1.05	1.30	1.10	1.17	1.91	32.64		
	Monthly Subtotal ($)	$384	$507	$153	$116	$42	$101	$86	$71	$56	$68	$58	$58	$107	$1,807		
															Task Subtotal =		$1,807
Non-Recurring Equipment (hours)	***Equipment***																
	Trash Pump			6.0											6.0	$5	$ 30
	Weed Wacker						3.0							7.0	10.0	$5	$ 50
	20" Push Lawnmower													0.3	0.3	$9	$ 2
	Self Powered Weed Mower													0.3	0.3	$20	$ 5
	Mounted Weed Eater													2.0	2.0	$7	$ 15
	Generator													2.0	2.0	$6	$ 12
	Trailer													0.5	0.5	$13	$ 7
	Monthly Subtotal (hours)	0.00	0.00	6.00	0.00	0.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00	12.00	21.00		
	Monthly Subtotal ($)	$0	$0	$30	$0	$0	$15	$0	$0	$0	$0	$0	$0	$76	$121		
															Equipment Subtotal =		$121
Dollars ($)	***Direct Costs***																Total$
	VCD supplies (direct costs less labor)																$ -
	Reproduction	$ 4	$ 4	$ 11	$ 3		$ 1	$ 1	$ 1	$ 1	$ 2	$ 1	$ 1	$ 1			$ 31.41
	Postage/FedEx	$ 4	$ 4	$ 11	$ 3		$ 2	$ 1	$ 1	$ 1	$ 2	$ 1	$ 1	$ 1			$ 33.01
	Lodging			$ 5		$ 9		$ 15			$ 7	$ 4	$ 8				$ 46.88
	Per Diem			$ 3		$ 6		$ 10			$ 3	$ 2	$ 2				$ 25.91
	Incidentals	$ 4	$ 4	$ 11	$ 3		$ 6	$ 1	$ 1	$ 6	$ 16	$ 16	$ 17	$ 1			$ 37.38
	Vehicle Rental/Lease	$ 25	$ 37	$ 40	$ 10	$ 11	$ 19	$ 40	$ 87	$ 73	$ 6	$ 82	$ 58	$ 73			$ 560.92
	Airfare																$ -
	Field Supp./Expendables		$ 1	$ 3	$ 8	$ 24	$ 3	$ 3		$ 4	$ 5		$ 8	$ 24			$ 86.80
	Equipment Rental																$ -
	Sediment Analyses	$ 560							$ 850								$ 1,410.00
	Sediment Disposal							$ 300									$ 300.00
	Weed Wacker	$ 15															$ 15.00
	Vegetation Disposal																$ -
	Storage Container			$ 4													$ 4.25
	Monthly Subtotal	$ 612	$ 50	$ 89	$ 28	$ 50	$ 32	$ 371	$ 940	$ 85	$ 44	$ 106	$ 95	$ 101			$ 2,602
	MONTHLY TOTAL	$2,181	$1,324	$3,047	$2,297	$2,210	$1,878	$3,287	$2,844	$1,303	$3,356	$2,405	$1,889	$3,168	**1999/2000 TOTAL =**		**$31,129**

BMP Retrofit Pilot Program
Maintenance Operation
Cost Accounting Summary, 1999-2000

DISTRICT 7	LOCATION: Foothill Maintenance Station	SITE NO. 73H6a	BMP TYPE: Drain Inlet Insert (StreamGuard)	CONSULTANT: Montgomery Watson - Chaudhary

	TASK	1999 Jun	Jul	Aug	Sep	Oct	Nov	Dec	2000 Jan	Feb	Mar	Apr	May	Jun	(hr)	Rate	TOTAL $
Labor (hours)	***Administration***																
	General program support/Follow-up	2.1	4.4	6.0	4.0	6.8	2.9	7.2	5.7	4.8	14.7	11.4	10.1	2.6	82.1	$120	$ 10,728
	Encroachment Permits														0.0	$87	$ -
	Travel	4.1	1.6	3.3	3.6	0.6	0.8	1.5	1.7	5.0	6.4	2.8	1.0	3.6	35.3	$87	$ 3,115
	Unscheduled events														0.0	$87	$ -
	Monthly Subtotal (hours)	6.2	6.0	9.3	7.6	7.4	3.7	8.7	7.4	9.8	21.1	14.2	11.0	13.1	125.2		
	Monthly Subtotal ($)	$603	$661	$1,003	$789	$862	$413	$995	$833	$1,005	$2,321	$1,612	$1,289	$1,458	$13,843		
															Task Subtotal =		$13,843
	Operation																
	Wet season inspections					1.0	0.5	1.5	1.5	2.5	4.5	0.5	0.3		12.3	$55	$ 674
	Dry season inspections	0.5	0.5	0.5	1.5									1.0	4.0	$55	$ 220
	Unscheduled inspections/field calls														0.0	$60	$ -
	Monthly Subtotal (hours)	0.50	0.50	0.50	1.50	1.00	0.50	1.50	1.50	2.50	4.50	0.50	0.25	1.00	16.3		
	Monthly Subtotal ($)	$28	$28	$28	$83	$55	$28	$83	$83	$138	$248	$28	$14	$55	$894		
															Task Subtotal =		$894
	Maintenance																
	Scheduled maintenance	1.0	0.5		0.8	2.0				0.5				1.0	5.8	$55	$ 316
	Unscheduled maintenance														0.0	$55	$ -
	Vandalism														0.0	$55	$ -
	Acts of God														0.0	$55	$ -
	Landscape Maintenance Contractor														0.0	$0	$ -
	Sediment Removal Contractor														0.0	$0	$ -
	Other Contractor														0.0	$0	$ -
	Other Contractor														0.0	$0	$ -
	Other Contractor														0.0	$0	$ -
	Monthly Subtotal (hours)	1.00	0.50	0.00	0.75	2.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	1.00	5.8		
	Monthly Subtotal ($)	$55	$28	$0	$41	$110	$0	$0	$0	$28	$0	$0	$0	$55	$315		
															Task Subtotal =		$316
	Vector Control																
	Contract & General administration	0.4	0.6	0.5					0.1	0.1	0.1	0.1	0.1	0.3	2.2	$120	$ 258
	Vector prevention maint. (consultant)														0.0	$65	$ -
	Response to VCD calls (consultant)														0.0	$55	$ -
	VCD efforts (contracted)	1.0	1.1	1.0	1.2	0.7	0.8	0.8	0.8	0.8	1.3	1.0	0.8		11.5	$46	$ 533
	Monthly Subtotal (hours)	1.35	1.70	1.50	1.20	0.71	0.80	0.84	0.94	0.94	1.40	1.10	0.89	0.25	13.62		
	Monthly Subtotal ($)	$88	$123	$106	$56	$33	$37	$39	$51	$51	$72	$58	$45	$30	$791		
															Task Subtotal =		$791
Non-Recurring Equipment (hours)	***Equipment***																
	Trash Pump														0.0	$5	$ -
	Piece of Equipment 2														0.0	$0	$ -
	Piece of Equipment 3														0.0	$0	$ -
	Piece of Equipment 4														0.0	$0	$ -
	Piece of Equipment 5														0.0	$0	$ -
	Piece of Equipment 6														0.0	$0	$ -
	Monthly Subtotal (hours)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		
															Equipment Subtotal =		$0
Dollars ($)	***Direct Costs***															Total $	
	VCD supplies (direct costs less labor)															$ -	
	Reproduction	$ 4	$ 4	$ 6	$ 2		$ 1		$ 1	$ 1	$ 2	$ 1	$ 1	$ 1		$ 24.21	
	Postage/FedEx	$ 4	$ 4	$ 6	$ 2		$ 2		$ 1	$ 1	$ 2	$ 1	$ 1	$ 1		$ 25.81	
	Lodging			$ 5		$ 9		$ 15			$ 7	$ 4				$ 19.25	
	Per Diem			$ 3		$ 6		$ 10			$ 3	$ 2				$ 23.61	
	Incidentals	$ 4	$ 4	$ 6	$ 2		$ 5		$ 1	$ 6	$ 10	$ 16	$ 17	$ 1		$ 79.18	
	Vehicle Rental/Lease	$ 25	$ 37	$ 18	$ 10	$ 11	$ 6	$ 9	$ 27	$ 87	$ 6	$ 56	$ 21	$ 68		$ 381.23	
	Airfare															$ -	
	Field Supp./Expendables		$ 1	$ 1	$ 1	$ 24	$ 3	$ 3		$ 4	$ 4		$ 8			$ 49.37	
	Equipment Rental															$ -	
	Sediment Analysis															$ -	
	Sediment Disposal	$ 5														$ 5.00	
	Weed Wacker															$ -	
	Vegetation Disposal															$ -	
	Stream Guard Drain Inlet Insert ($93 each)	$ 93			$ 93											$ 186.00	
	Storage Container			$ 4												$ 4.25	
	Monthly Subtotal	$ 135	$ 50	$ 50	$ 110	$ 50	$ 17	$ 38	$ 30	$ 100	$ 35	$ 80	$ 47	$ 72		$ 818	
	MONTHLY TOTAL	$909	$882	$1,187	$1,078	$1,110	$495	$1,154	$996	$1,321	$2,680	$1,778	$1,395	$1,670		**1999/2000 TOTAL =**	**$16,661**

BMP Retrofit Pilot Program
Maintenance Operation
Cost Accounting Summary, 1999-2000

DISTRICT: 7	LOCATION: Foothill Maintenance Station	SITE NO. 732166	BMP TYPE: Drain inlet Insert (Fossil Filter)	CONSULTANT: Montgomery Watson - Chaudhary

	TASK	1999 Jun	Jul	Aug	Sep	Oct	Nov	Dec	2000 Jan	Feb	Mar	Apr	May	Jun	(hrs)	Rate	TOTAL $
Labor (hours)	***Administration***																
	General program support/Follow-up	2.1	4.4	6.0	4.0	7.3	2.8	7.5	5.2	4.8	14.7	11.4	10.6	9.6	90.1	$120	$ 10,806
	Encroachment Permits														0.0	$87	$ -
	Travel	4.1	1.6	3.3	3.6	0.6	0.8	1.5	1.7	5.0	6.4	3.9	2.9	3.6	38.8	$87	$ 3,376
	Unscheduled events														0.0	$87	$ -
	Monthly Subtotal (hours)	6.2	5.0	9.3	7.6	7.9	3.6	9.0	6.9	9.8	21.1	15.3	13.4	13.1	128.9		
	Monthly Subtotal ($)	$603	$661	$1,003	$789	$922	$401	$1,025	$773	$1,005	$2,321	$1,707	$1,514	$1,458	$14,182		
															Task Subtotal =		$14,182
	Operation																
	Wet season inspections					1.0	0.5	1.5	1.5	2.0	1.5	1.0	0.3		12.3	$55	$ 674
	Dry season inspections	0.5	0.5	0.5	1.5									0.5	3.5	$55	$ 193
	Unscheduled inspections/field calls														0.0	$60	$ -
	Monthly Subtotal (hours)	0.50	0.50	0.50	1.50	1.00	0.50	1.50	1.50	2.00	4.50	1.00	0.25	0.50	15.8		
	Monthly Subtotal ($)	$28	$28	$28	$83	$55	$28	$83	$83	$110	$248	$55	$14	$28	$866		
															Task Subtotal =		$866
	Maintenance																
	Scheduled maintenance	1.3	0.3		1.3	2.5			1.5	3.5	4.3	1.0	1.0	2.0	18.6	$55	$ 1,023
	Unscheduled maintenance	0.2													0.2	$55	$ 11
	Vandalism														0.0	$55	$ -
	Acts of God														0.0	$55	$ -
	Landscape Maintenance Contractor														0.0	$0	$ -
	Sediment Removal Contractor														0.0	$0	$ -
	Other Contractor														0.0	$0	$ -
	Other Contractor														0.0	$0	$ -
	Other Contractor														0.0	$0	$ -
	Monthly Subtotal (hours)	1.50	0.25	0.00	1.25	2.50	0.00	0.00	1.50	3.50	4.30	1.00	1.00	2.00	18.8		
	Monthly Subtotal ($)	$83	$14	$0	$69	$138	$0	$0	$83	$193	$237	$55	$55	$110	$1,034		
															Task Subtotal =		$1,034
	Vector Control																
	Contract & General administration	0.4	0.6	0.5					0.1	0.1	0.1	0.1	0.1	0.3	2.2	$120	$ 258
	Vector prevention maint. (consultant)														0.0	$65	$ -
	Response to VCD calls (consultant)														0.0	$55	$ -
	VCD efforts (contracted)	1.0	1.1	1.0	1.2	0.7	0.8	0.8	0.8	0.8	1.3	1.0	0.8		11.5	$46	$ 533
	Monthly Subtotal (hours)	1.35	1.70	1.50	1.20	0.71	0.80	0.84	0.94	0.94	1.40	1.10	0.89	0.25	13.62		
	Monthly Subtotal ($)	$88	$123	$106	$56	$33	$37	$39	$51	$51	$72	$58	$45	$30	$791		
															Task Subtotal =		$791
Non-Recurring Equipment (hours)	***Equipment***																
	Trash Pump														0.0	$5	$ -
	Piece of Equipment 2														0.0	$0	$ -
	Piece of Equipment 3														0.0	$0	$ -
	Piece of Equipment 4														0.0	$0	$ -
	Piece of Equipment 5														0.0	$0	$ -
	Piece of Equipment 6														0.0	$0	$ -
	Monthly Subtotal (hours)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		
															Equipment Subtotal =		$0
Dollars ($)	***Direct Costs***																Total $
	VCD supplies (direct costs less abov)																$ -
	Reproduction	$ 4	$ 4	$ 6	$ 2		$ 1		$ 1	$ 1	$ 2	$ 1	$ 1	$ 1			$ 24.21
	Postage/FedEx	$ 4	$ 4	$ 6	$ 2		$ 2		$ 1	$ 1	$ 2	$ 1	$ 1	$ 1			$ 25.81
	Lodging			$ 5		$ 9		$ 15			$ 7	$ 4					$ 39.25
	Per Diem			$ 3		$ 6		$ 10			$ 3	$ 2					$ 23.61
	Incidentals	$ 4	$ 4	$ 6	$ 2		$ 5		$ 1	$ 6	$ 16	$ 16	$ 17	$ 1			$ 79.18
	Vehicle Rental/Lease	$ 25	$ 37	$ 18	$ 10	$ 11	$ 6	$ 9	$ 27	$ 87	$ 6	$ 70	$ 60	$ 68			$ 434.22
	Airfare																$ -
	Field Supp./Expencables		$ 1	$ 1	$ 1	$ 24	$ 3	$ 3		$ 4	$ 4		$ 8				$ 49.37
	Equipment Rental																$ -
	Sediment Analyses																$ -
	Sediment Disposal	$ 5															$ 5.00
	Weed Wacker																$ -
	Vegetation Disposal																$ -
	Fossil Filter Adsorbent Material ($15/tsp)	$ 15			$ 15												$ 30.00
	Storage Container			$ 4													$ 4.25
	Monthly Subtotal	$ 57	$ 50	$ 50	$ 32	$ 50	$ 17	$ 38	$ 30	$ 100	$ 39	$ 94	$ 86	$ 72			$ 715
	MONTHLY TOTAL	$858	$876	$1,187	$1,028	$1,198	$481	$1,184	$1,018	$1,458	$2,916	$1,970	$1,714	$1,698	**1999/2000 TOTAL =**		**$17,568**

BMP Retrofit Pilot Program
Maintenance Operation
Cost Accounting Summary, 1999-2000

DISTRICT: 7	LOCATION: Las Flores Maintenance Station	SITE NO. 73217a	BMP TYPE: Drain Inlet Insert (StreamGuard)	CONSULTANT: Montgomery Watson - Chaudhary

	TASK	1999 Jun	Jul	Aug	Sep	Oct	Nov	Dec	2000 Jan	Feb	Mar	Apr	May	Jun	(hrs)	Rate	TOTAL $
Labor (hours)	***Administration***																
	General program support/Follow-up	2.1	3.9	4.0	4.5	10.0	2.9	6.7	5.5	4.8	14.7	11.4	10.1	9.6	89.9	$120	$ 10,788
	Encroachment Permits														0.0	$87	$ -
	Travel	2.1	1.6	2.5	2.1	2.2	0.8	1.5	1.7	6.4	6.4	2.8	1.0	3.6	34.6	$87	$ 3,006
	Unscheduled events														0.0	$87	$ -
	Monthly Subtotal (hours)	4.2	5.5	6.5	6.6	12.2	3.7	8.2	7.2	11.2	21.1	14.2	11.0	13.1	124.5		
	Monthly Subtotal ($)	$429	$601	$698	$718	$1,391	$413	$935	$803	$1,127	$2,321	$1,612	$1,289	$1,498	$13,794		
															Task Subtotal =		$13,794
	Operation																
	Wet season inspections					1.0	0.5	1.0	2.0	2.5	2.5	0.5	0.3		10.3	$55	$ 564
	Dry season inspections	0.5	0.5	0.5	1.5									0.5	3.5	$55	$ 193
	Unscheduled inspections/field calls		1.0	0.8											1.8	$60	$ 105
	Monthly Subtotal (hours)	0.50	1.50	1.25	1.50	1.00	0.50	1.00	2.00	2.50	2.50	0.50	0.25	0.50	15.5		
	Monthly Subtotal ($)	$28	$88	$73	$83	$55	$28	$55	$110	$138	$138	$28	$14	$28	$861		
															Task Subtotal =		$861
	Maintenance																
	Scheduled maintenance	1.0			0.8	2.0				0.5	1.5			1.5	7.3	$55	$ 399
	Unscheduled maintenance	0.2			2.0										2.2	$55	$ 121
	Vandalism														0.0	$55	$ -
	Acts of God														0.0	$55	$ -
	Landscape Maintenance Contractor														0.0	$0	$ -
	Sediment Removal Contractor														0.0	$0	$ -
	Other Contractor														0.0	$0	$ -
	Other Contractor														0.0	$0	$ -
	Other Contractor														0.0	$0	$ -
	Monthly Subtotal (hours)	1.20	0.00	0.00	2.75	2.00	0.00	0.00	0.00	0.50	1.50	0.00	0.00	1.50	9.5		
	Monthly Subtotal ($)	$66	$0	$0	$151	$110	$0	$0	$0	$28	$83	$0	$0	$82	$520		
															Task Subtotal =		$520
	Vector Control																
	Contract & General administration	0.4	0.6	0.5	1.3			3.0	0.1	0.1	0.1	0.1	0.1	0.3	6.4	$120	$ 768
	Vector prevention maint. (consultant)														0.0	$65	$ -
	Response to VCD calls (consultant)														0.0	$55	$ -
	VCD efforts (contracted)								4.0	5.0	4.0	4.0	4.0	4.0	25.0	$66	$ 1,638
	Monthly Subtotal (hours)	0.35	0.60	0.50	1.25	0.00	0.00	3.00	4.10	5.10	4.10	4.10	4.05	4.25	31.40		
	Monthly Subtotal ($)	$42	$72	$60	$150	$0	$0	$360	$274	$340	$274	$274	$268	$292	$2,406		
															Task Subtotal =		$2,406
Non-Recurring Equipment (hours)	***Equipment***																
	Trash Pump														0.0	$5	$ -
	Piece of Equipment 2														0.0	$0	$ -
	Piece of Equipment 3														0.0	$0	$ -
	Piece of Equipment 4														0.0	$0	$ -
	Piece of Equipment 5														0.0	$0	$ -
	Piece of Equipment 6														0.0	$0	$ -
	Monthly Subtotal (hours)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		
															Equipment Subtotal =		$0

	Direct Costs														Total $
Dollars ($)	VCD supplies (direct costs less labor)														$ -
	Reproduction	$ 4	$ 4	$ 1	$ 5		$ 1	$ 8	$ 1	$ 1	$ 2	$ 1	$ 1	$ 1	$ 30.11
	Postage/FedEx	$ 4	$ 4	$ 1	$ 5		$ 2	$ 8	$ 1	$ 1	$ 2	$ 1	$ 1	$ 1	$ 31.71
	Lodging			$ 5		$ 9		$ 15			$ 7	$ 4			$ 39.25
	Per Diem			$ 3		$ 6		$ 10			$ 3	$ 2			$ 23.61
	Incidentals	$ 4	$ 4	$ 1	$ 5		$ 5	$ 8	$ 1	$ 6	$ 16	$ 16	$ 17	$ 1	$ 85.08
	Vehicle Rental/Lease	$ 25	$ 37	$ 14	$ 10	$ 11	$ 5	$ 41	$ 35	$ 120	$ 16	$ 65	$ 32	$ 18	$ 489.34
	Airfare														$ -
	Field Supp./Expendables		$ 1	$ 1	$ 1	$ 24	$ 3	$ 3		$ 4	$ 4		$ 8		$ 49.37
	Equipment Rental														$ -
	Sediment Analyses														$ -
	Sediment Disposal	$ 5													$ 5.00
	Weed Wacker														$ -
	Vegetation Disposal														$ -
	Stream Guard Grain Inlet Insert ($93 each)	$ 93			$ 93										$ 186.00
	Storage Container			$ 4											$ 4.25
	Monthly Subtotal	$ 135	$ 50	$ 31	$ 119	$ 50	$ 16	$ 93	$ 38	$ 133	$ 50	$ 85	$ 58	$ 42	$ 944

MONTHLY TOTAL	$699	$811	$861	$1,221	$1,606	$457	$1,443	$1,225	$1,764	$2,864	$2,002	$1,629	$1,948	**1999/2000 TOTAL**	$18,525

BMP Retrofit Pilot Program
Maintenance Operation
Cost Accounting Summary, 1999-2000

DISTRICT: 7	LOCATION: Las Flores Maintenance Station	SITE NO. 73217b	BMP TYPE: Drain Inlet Insert (Fossil Filter)	CONSULTANT: Montgomery Watson - Chaudhary

Labor (hours)

TASK	1999 Jun	Jul	Aug	Sep	Oct	Nov	Dec	2000 Jan	Feb	Mar	Apr	May	Jun	(hrs)	Rate	TOTAL $
Administration																
General program support/Follow-up	2.1	4.4	4.0	4.0	7.3	2.9	7.0	4.7	4.8	14.7	11.4	10.1	9.6	86.7	$120	$ 10,398
Encroachment Permits														0.0	$87	$ -
Travel	2.1	1.6	2.5	2.1	2.2	0.8	1.5	1.7	6.4	6.4	3.9	1.0	3.6	35.7	$87	$ 3,102
Unscheduled events														0.0	$87	$ -
Monthly Subtotal (hours)	4.2	6.0	6.5	6.1	9.5	3.7	8.5	6.4	11.2	21.1	15.3	11.0	13.1	122.3		
Monthly Subtotal ($)	$429	$661	$698	$658	$1,061	$413	$965	$713	$1,127	$2,321	$1,707	$1,289	$1,458	$13,500		
														Task Subtotal =		$13,500
Operation																
Wet season inspections					1.0	0.5	1.0	2.0	2.5	2.5	1.0	0.3		10.8	$55	$ 591
Dry season inspections	0.5	0.5	0.5	1.5									0.5	3.5	$55	$ 193
Unscheduled inspections/field calls		1.0	0.8											1.8	$60	$ 105
Monthly Subtotal (hours)	0.50	1.50	1.25	1.50	1.00	0.50	1.00	2.00	2.50	2.50	1.00	0.25	0.50	16.0		
Monthly Subtotal ($)	$28	$88	$73	$83	$55	$28	$55	$110	$138	$138	$55	$14	$28	$889		
														Task Subtotal =		$889
Maintenance																
Scheduled maintenance	2.3	0.3		1.3	2.0		0.5	1.8	4.3	3.0	1.0	0.3	2.0	18.6	$55	$ 1,020
Unscheduled maintenance	0.2			1.5										1.7	$55	$ 94
Vandalism														0.0	$55	$ -
Acts of God														0.0	$55	$ -
Landscape Maintenance Contractor														0.0	$0	$ -
Sediment Removal Contractor														0.0	$0	$ -
Other Contractor														0.0	$0	$ -
Other Contractor														0.0	$0	$ -
Other Contractor														0.0	$0	$ -
Monthly Subtotal (hours)	2.50	0.25	0.00	2.75	2.00	0.00	0.50	1.75	4.25	3.00	1.00	0.25	2.00	20.3		
Monthly Subtotal ($)	$138	$14	$0	$151	$110	$0	$28	$96	$234	$165	$55	$14	$110	$1,114		
														Task Subtotal =		$1,114
Vector Control																
Contract & General administration	0.4	0.6	0.5	1.3			3.0	0.1	0.1	0.1	0.1	0.1	0.3	6.4	$120	$ 768
Vector prevention maint. (consultant)														0.0	$65	$ -
Response to VCD calls (consultant)														0.0	$55	$ -
VCD efforts (contracted)								4.0	5.0	4.0	4.0	4.0	4.0	25.0	$66	$ 1,638
Monthly Subtotal (hours)	0.35	0.60	0.50	1.25	0.00	0.00	3.00	4.10	5.10	4.10	4.10	4.05	4.25	31.40		
Monthly Subtotal ($)	$42	$72	$60	$150	$0	$0	$360	$274	$340	$274	$274	$268	$292	$2,406		
														Task Subtotal =		$2,406

Non-Recurring Equipment (hours)

Equipment																
Trash Pump														0.0	$5	$ -
Piece of Equipment 2														0.0	$0	$ -
Piece of Equipment 3														0.0	$0	$ -
Piece of Equipment 4														0.0	$0	$ -
Piece of Equipment 5														0.0	$0	$ -
Piece of Equipment 6														0.0	$0	$ -
Monthly Subtotal (hours)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		
														Equipment Subtotal =		$0

Dollars ($)

																	Total$
Direct Costs																	
VCD supplies (direct costs less labor)																	$ -
Reproduction	$ 4	$ 4	$ 1	$ 5			$ 8	$ 1	$ 1	$ 2	$ 1	$ 1	$ 1				$ 29.11
Postage/FedEx	$ 4	$ 4	$ 1	$ 5		$ 2	$ 8	$ 1	$ 1	$ 2	$ 1	$ 1	$ 1				$ 21.71
Lodging			$ 5		$ 9		$ 15			$ 7	$ 4						$ 39.25
Per Diem			$ 3		$ 6		$ 10			$ 3	$ 2						$ 23.61
Incidentals	$ 4	$ 4	$ 1	$ 5		$ 5	$ 8	$ 1	$ 6	$ 16	$ 16	$ 17	$ 1				$ 65.08
Vehicle Rental/Lease	$ 25	$ 37	$ 14	$ 10	$ 11	$ 5	$ 41	$ 35	$ 120	$ 16	$ 79	$ 32	$ 78				$ 503.34
Airfare																	$ -
Field Supp./Expendables		$ 1	$ 1	$ 1	$ 24	$ 3	$ 3		$ 4	$ 4		$ 8					$ 49.37
Equipment Rental																	$ -
Sediment Analyses																	$ -
Sediment Disposal	$ 5																$ 5.00
Weed Wacker																	$ -
Vegetation Disposal																	$ -
Fossil Filter Adsorbent Material (8x15/repl)	$ 15			$ 15													$ 30.00
Storage Container			$ 4														$ 4.25
Monthly Subtotal	$ 57	$ 50	$ 31	$ 41	$ 50	$ 15	$ 93	$ 38	$ 133	$ 50	$ 103	$ 58	$ 82				$ 801

MONTHLY TOTAL	$693	$884	$861	$1,083	$1,276	$456	$1,500	$1,231	$1,970	$2,947	$2,194	$1,643	$1,970	**1999/2000 TOTAL =** $18,709

BMP Retrofit Pilot Program
Maintenance Operation
Cost Accounting Summary, 1999-2000

DISTRICT: 7	LOCATION: Rosemead Maintenance Station	SITE NO. 73218a	BMP TYPE: Drain Inlet Insert (StreamGuard)	CONSULTANT: Montgomery Watson - Chaudhary

	TASK	1999 Jun	Jul	Aug	Sep	Oct	Nov	Dec	2000 Jan	Feb	Mar	Apr	May	Jun	(hrs)	Rate	TOTAL $
Labor (hours)	***Administration***																
	General program support/Follow-up	2.1	3.4	6.0	5.0	6.0	2.0	7.5	5.2	4.5	14.7	11.4	10.1	9.6	88.2	$120	$ 10,578
	Encroachment Permits														0.0	$87	$ -
	Travel	4.1	1.6	2.8	1.8	1.1	0.8	1.5	1.7	5.0	6.4	3.9	1.0	3.6	35.2	$87	$ 3,058
	Unscheduled events														0.0	$87	$ -
	Monthly Subtotal (hours)	6.2	5.0	8.8	6.8	7.1	3.7	9.0	6.9	9.5	21.1	15.3	11.0	13.1	123.3		
	Monthly Subtotal ($)	$603	$541	$959	$757	$816	$413	$1,025	$773	$975	$2,321	$1,707	$1,289	$1,458	$13,636		
															Task Subtotal =		$13,636
	Operation																
	Wet season inspections					1.0	0.5	1.0	1.8	2.0	4.0	0.5	0.3		11.0	$55	$ 605
	Dry season inspections	0.3	0.5	0.5	1.0									0.5	2.8	$55	$ 154
	Unscheduled inspections/field calls														0.0	$60	$ -
	Monthly Subtotal (hours)	0.30	0.50	0.50	1.00	1.00	0.50	1.00	1.75	2.00	4.00	0.50	0.25	0.50	13.8		
	Monthly Subtotal ($)	$17	$28	$28	$55	$55	$28	$55	$96	$110	$220	$28	$14	$28	$759		
															Task Subtotal =		$759
	Maintenance																
	Scheduled maintenance	0.5			0.8	1.0					1.5			1.5	5.3	$55	$ 289
	Unscheduled maintenance	0.2													0.2	$55	$ 11
	Vandalism														0.0	$55	$ -
	Acts of God														0.0	$55	$ -
	Landscape Maintenance Contractor														0.0	$0	$ -
	Sediment Removal Contractor														0.0	$0	$ -
	Other Contractor														0.0	$0	$ -
	Other Contractor														0.0	$0	$ -
	Other Contractor														0.0	$0	$ -
	Monthly Subtotal (hours)	0.70	0.00	0.00	0.75	1.00	0.00	0.00	0.00	0.00	1.50	0.00	0.00	1.50	5.5		
	Monthly Subtotal ($)	$39	$0	$0	$41	$55	$0	$0	$0	$0	$83	$0	$0	$83	$300		
															Task Subtotal =		$300
	Vector Control																
	Contract & General administration	0.7	0.4	0.5					0.1	0.1	0.1	0.1	0.1	0.3	2.3	$120	$ 270
	Vector prevention maint. (consultant)														0.0	$65	$ -
	Response to VCD calls (consultant)														0.0	$55	$ -
	VCD efforts (contracted)	1.4	1	1	1.2	1.0	0.9	1.0	1.2	1.1	1.4	1.2	0.9		13.4	$46	$ 621
	Monthly Subtotal (hours)	2.05	1.40	1.50	1.20	0.96	0.90	1.04	1.31	1.23	1.50	1.30	0.97	0.25	15.61		
	Monthly Subtotal ($)	$143	$94	$106	$56	$45	$42	$48	$68	$64	$77	$68	$49	$30	$891		
															Task Subtotal =		$891
Non-Recurring Equipment (hours)	***Equipment***																
	Trash Pump														0.0	$5	$ -
	Piece of Equipment 2														0.0	$0	$ -
	Piece of Equipment 3														0.0	$0	$ -
	Piece of Equipment 4														0.0	$0	$ -
	Piece of Equipment 5														0.0	$0	$ -
	Piece of Equipment 6														0.0	$0	$ -
	Monthly Subtotal (hours)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		
															Equipment Subtotal =		$0
Dollars ($)	***Direct Costs***																Total $
	VCD supplies (direct costs less labor)						$ 1										$ 1.38
	Reproduction	$ 4	$ 4	$ 6	$ 2		$ 1		$ 1	$ 1	$ 2	$ 1	$ 1	$ 1			$ 24.21
	Postage/FedEx	$ 4	$ 4	$ 6	$ 2		$ 2		$ 1	$ 1	$ 2	$ 1	$ 1	$ 1			$ 25.81
	Lodging			$ 5		$ 9		$ 15			$ 7	$ 4					$ 39.25
	Per Diem			$ 3		$ 6		$ 10			$ 3	$ 2					$ 23.61
	Incidentals	$ 4	$ 4	$ 6	$ 2		$ 5		$ 1	$ 6	$ 16	$ 16	$ 17	$ 1			$ 79.18
	Vehicle Rental/Lease	$ 25	$ 37	$ 14	$ 10	$ 11	$ 9	$ 12	$ 27	$ 90	$ 6	$ 73	$ 24	$ 68			$ 406.23
	Airfare																$ -
	Field Supp./Expendables		$ 1	$ 1	$ 1	$ 24	$ 3	$ 3		$ 4	$ 4		$ 8				$ 49.37
	Equipment Rental																$ -
	Sediment Analyses																$ -
	Sediment Disposal	$ 5															$ 5.00
	Weed Wacker																$ -
	Vegetation Disposal																$ -
	Stream Guard Drain Inlet Insert ($93 each)	$ 93			$ 93												$ 186.00
	Storage Container			$ 4													$ 4.25
	Monthly Subtotal	$ 135	$ 50	$ 46	$ 110	$ 50	$ 22	$ 41	$ 30	$ 102	$ 39	$ 97	$ 50	$ 72			$ 844
	MONTHLY TOTAL	$936	$713	$1,139	$1,019	$1,020	$505	$1,168	$967	$1,252	$2,140	$1,900	$1,401	$1,670	**1999/2000 TOTAL =**		**$16,430**

BMP Recoft Pilot Program
Maintenance Operation
Cost Accounting Summary, 1999-2000

DISTRICT: 7	LOCATION: Rosemead Maintenance Station	SITE NO. 73218b	BMP TYPE: Drain Inlet Insert (Fossil Filter)	CONSULTANT: Montgomery Watson - Chaudhary

	TASK	1999 Jun	Jul	Aug	Sep	Oct	Nov	Dec	2000 Jan	Feb	Mar	Apr	May	Jun	(hrs)	Rate	TOTAL $
Labor (hours)	***Administration***																
	General program support/Follow-up	2.1	4.4	6.0	4.0	6.5	2.9	6.7	4.7	4.5	14.7	11.4	10.1	9.6	87.4	$120	$ 10,488
	Encroachment Permits														0.0	$87	$ -
	Travel	4.1	1.6	2.8	1.8	1.1	0.8	1.5	2.6	5.0	6.4	3.9	1.0	3.6	36.0	$87	$ 3,133
	Unscheduled events														0.0	$87	$ -
	Monthly Subtotal (hours)	6.2	6.0	8.8	5.8	7.6	3.7	8.2	7.3	9.5	21.1	15.3	11.0	13.1	122.4		
	Monthly Subtotal ($)	$603	$661	$959	$637	$876	$413	$935	$788	$975	$2,321	$1,707	$1,289	$1,458	$13,621		
															Task Subtotal =		$13,621
	Operation																
	Wet season inspections					1.0	0.5	1.0	1.8	2.0	4.0	1.0	0.3		11.5	$55	$ 633
	Dry season inspections	0.5	0.5	0.5	0.8									0.5	2.8	$55	$ 151
	Unscheduled inspections/field calls														0.0	$60	$ -
	Monthly Subtotal (hours)	0.50	0.50	0.50	0.75	1.00	0.50	1.00	1.75	2.00	4.00	1.00	0.25	0.50	14.3		
	Monthly Subtotal ($)	$28	$28	$28	$4.	$55	$28	$55	$96	$110	$220	$55	$14	$28	$784		
															Task Subtotal =		$784
	Maintenance																
	Scheduled maintenance	1.7	0.5	0.5	1.1	2.0		1.0	1.8	3.8	3.0	1.0	0.3	1.5	18.2	$55	$ 1,001
	Unscheduled maintenance	0.2			2.0										2.2	$55	$ 121
	Vandalism														0.0	$55	$ -
	Acts of God														0.0	$55	$ -
	Landscape Maintenance Contractor														0.0	$0	$ -
	Sediment Removal Contractor														0.0	$0	$ -
	Other Contractor														0.0	$0	$ -
	Other Contractor														0.0	$0	$ -
	Other Contractor														0.0	$0	$ -
	Monthly Subtotal (hours)	1.90	0.50	0.50	3.25	2.00	0.00	1.00	1.75	3.75	3.00	1.00	0.25	1.50	20.4		
	Monthly Subtotal ($)	$105	$28	$28	$179	$110	$0	$55	$96	$206	$165	$55	$14	$83	$1,122		
															Task Subtotal =		$1,122
	Vector Control																
	Contract & General administration	0.4	0.6	0.5					0.1	0.1	0.1	0.1	0.1	0.3	2.2	$120	$ 258
	Vector prevention maint. (consultant)														0.0	$65	$ -
	Response to VCD calls (consultant)														0.0	$55	$ -
	VCD efforts (contracted)	1.4	1.0	1.0	1.2	1.0	0.9	1.0	1.2	1.1	1.4	1.2	0.9		13.4	$46	$ 621
	Monthly Subtotal (hours)	1.75	1.60	1.50	1.23	0.96	0.90	1.04	1.31	1.23	1.50	1.30	0.97	0.25	15.51		
	Monthly Subtotal ($)	$107	$118	$106	$56	$45	$42	$48	$68	$64	$77	$68	$49	$30	$879		
															Task Subtotal =		$879
Non-Recurring Equipment (hours)	***Equipment***																
	Trash Pump														0.0	$5	$ -
	Piece of Equipment 2														0.0	$0	$ -
	Piece of Equipment 3														0.0	$0	$ -
	Piece of Equipment 4														0.0	$0	$ -
	Piece of Equipment 5														0.0	$0	$ -
	Piece of Equipment 6														0.0	$0	$ -
	Monthly Subtotal (hours)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		
															Equipment Subtotal =		$0
Dollars ($)	***Direct Costs***																Total $
	VCD supplies (direct costs less labor)	$ 3					$ 1										$ 4.14
	Reproduction	$ 4	$ 4	$ 6	$ 2		$ 1		$ 1	$ 1	$ 2	$ 1	$ 1	$ 1			$ 24.21
	Postage/FedEx	$ 4	$ 4	$ 6	$ 2		$ 2		$ 1	$ 1	$ 2	$ 1	$ 1	$ 1			$ 25.81
	Lodging			$ 5		$ 9		$ 15			$ 7	$ 4					$ 39.25
	Per Diem			$ 3		$ 6		$ 10			$ 3	$ 2					$ 23.61
	Incidentals	$ 4	$ 4	$ 6	$ 2		$ 5		$ 1	$ 6	$ 16	$ 16	$ 17	$ 1			$ 79.18
	Vehicle Rental/Lease	$ 25	$ 37	$ 14	$ 10	$ 11	$ 5	$ 12	$ 40	$ 90	$ 6	$ 73	$ 24	$ 68			$ 419.48
	Airfare																$ -
	Field Supp./Expendables		$ 1	$ 1	$ 78	$ 24	$ 3	$ 3		$ 4	$ 4		$ 8				$ 126.26
	Equipment Rental																$ -
	Sediment Analyses																$ -
	Sediment Disposal	$ 5															$ 5.00
	Weed Wacker																$ -
	Vegetation Disposal																$ -
	Fossil Filter Adsorbent Material ($15/repl)	$ 15			$ 15												$ 30.00
	Storage Container			$ 4													$ 4.25
	Monthly Subtotal	$ 60	$ 50	$ 46	$ 109	$ 50	$ 22	$ 41	$ 43	$ 102	$ 39	$ 97	$ 50	$ 72			$ 781
	MONTHLY TOTAL	$901	$885	$1,167	$1,021	$1,135	$505	$1,133	$1,091	$1,458	$2,822	$1,982	$1,415	$1,670	**1999/2000 TOTAL =**		**$17,186**

BMP Retrofit Pilot Program
Maintenance Operation
Cost Accounting Summary, 1999-2000

DISTRICT: 7	LOCATION: I-605/SR-91 Interchange	SITE NO. 73222a	BMP TYPE: Biofiltration Strip	CONSULTANT: Montgomery Watson - Chaudhary

	TASK	1999 Jun	Jul	Aug	Sep	Oct	Nov	Dec	2000 Jan	Feb	Mar	Apr	May	Jun	(hrs)	Rate		TOTAL $
Labor (hours)	***Administration***																	
	General program support/Follow-up	3.9	6.7	9.5	4.5	3.0	3.0	8.7	8.5	4.8	15.4	9.6	10.3	16.1	104.8	$120	1	12,570
	Encroachment Permit														0.4	$87	1	-
	Travel	6.6	3.7	16.3	4.4	8.7	5.3	6.0	6.8	5.0	9.0	11.2	4.8	7.2	95.4	$87	1	8,296
	Unscheduled events		2.0	3.3	1.0										6.3	$87	1	544
	Monthly Subtotal (hours)	10.5	12.4	29.1	9.9	11.7	9.7	14.7	15.3	9.8	24.4	20.8	15.1	23.2	206.4			
	Monthly Subtotal ($)	$1,938	$1,296	$2,841	$1,005	$1,117	$973	$1,566	$1,609	$1,005	$2,631	$2,126	$1,550	$2,551	$21,410			
															Task Subtotal =			$21,410
	Operation																	
	Wet season inspections					1.0	0.5	1.5	0.8	0.8	1.5	1.3	0.5		7.8	$55	1	429
	Dry season inspections	0.5	1.0	0.5	1.0									0.8	3.8	$55	1	206
	Unscheduled inspections/field calls								1.5						1.5	$60	1	90
	Monthly Subtotal (hours)	0.50	1.00	0.50	1.00	1.00	0.50	1.50	2.25	0.75	1.50	1.30	0.50	0.75	13.1			
	Monthly Subtotal ($)	$28	$55	$28	$55	$55	$28	$83	$131	$41	$83	$72	$28	$41	$725			
															Task Subtotal =			$725
	Maintenance																	
	Scheduled maintenance	4.3	1.0	2.5	3.0	16.0	71.5	12.5	5.0	2.5	3.3	7.0	2.8	49.5	182.8	$55	1	10,054
	Unscheduled maintenance			14.8	16.5	10.8	3.1	4.0	1.3						50.5	$55	1	2,778
	Vandalism														0.0	$55	1	-
	Acts of God														0.0	$55	1	-
	Landscape Maintenance Contractor														0.0	$0	1	-
	Sediment Removal Contractor														0.0	$0	1	-
	Vegetation Consultant					0.9	0.9	3.0	1.2						5.5	$75	1	445
	Other Contractor														0.0	$0	1	-
	Other Contractor														0.0	$0	1	-
	Monthly Subtotal (hours)	4.30	1.00	17.25	20.50	27.62	75.45	19.50	7.41	2.50	3.25	7.00	2.75	49.50	239.2			
	Monthly Subtotal ($)	$237	$55	$949	$1,183	$1,537	$4,179	$1,133	$431	$138	$179	$385	$151	$2,723	$13,276			
															Task Subtotal =			$13,276
	Vector Control																	
	Contract & General administration		0.9	0.5	4.3				0.1	0.1	0.1	0.1	0.1	0.3	2.3	$120	1	276
	Vector prevention maint. (consultant)														0.0	$65	1	-
	Response to VCD calls (consultant)														0.0	$55	1	-
	VCD efforts (contracted)	6.2	8.2	1.3	1.2	1.0	1.4	1.1	1.2	1.0	1.1	0.9	1.1	1.6	27.5	$46	1	1,280
	Monthly Subtotal (hours)	6.20	9.05	1.80	1.45	0.99	1.40	1.10	1.29	1.12	1.20	1.00	1.17	1.88	29.85			
	Monthly Subtotal ($)	$288	$483	$120	$86	$46	$74	$51	$67	$59	$63	$54	$58	$106	$1,556			
															Task Subtotal =			$1,556
Non-Recurring Equipment (hours)	***Equipment***																	
	Trash Pump														0.0	$5	1	-
	Weed Wacker	1.7					10.0							23.8	35.5	$5	1	177
	Generator							2.5						7.3	9.8	$6	1	59
	Shop Vac							2.5							2.5	$5	1	13
	Mounted Weed Eater													7.3	7.3	$7	1	54
	20" Push Lawnmower													0.3	0.3	$9	1	2
	Self Powered Weed Mower													0.8	0.8	$20	1	15
	Trailer													1.8	1.8	$13	1	23
	Monthly Subtotal (hours)	1.70	0.00	0.00	0.00	0.00	10.00	5.00	0.00	0.00	0.00	0.00	0.00	41.00	57.70			
	Monthly Subtotal ($)	$9	$0	$0	$0	$0	$50	$28	$0	$0	$0	$0	$0	$257	$343			
															Equipment Subtotal =			$343
Dollars ($)	***Direct Costs***																	Total $
	VCD supplies (direct costs less labor)																	$ -
	Reproduction	$ 8	$ 9	$ 15	$ 5		$ 1		$ 1	$ 1	$ 2	$ 1	$ 1	$ 1				$ 44.66
	Postage/FedEx	$ 8	$ 9	$ 15	$ 5		$ 2		$ 1	$ 1	$ 2	$ 1	$ 1	$ 1				$ 46.26
	Lodging			$ 5		$ 9		$ 15			$ 7	$ 4	$ 8					$ 45.88
	Per Diem			$ 3		$ 6		$ 10			$ 3	$ 2	$ 2					$ 25.91
	Incidentals	$ 8	$ 9	$ 15	$ 5		$ 6		$ 1	$ 6	$ 15	$ 16	$ 17	$ 1				$ 100.63
	Vehicle Rental/Lease	$ 50	$ 74	$ 69	$ 10	$ 11	$ 59	$ 51	$ 113	$ 85	$ 6	$ 178	$ 97	$ 148				$ 931.48
	Airfare																	$ -
	Field Supp./Expendables	$ 10	$ 1	$ 29	$ 1	$ 56	$ 3	$ 3		$ 4	$ 9		$ 8	$ 60				$ 183.57
	Equipment Rental																	$ -
	Sediment Analyses																	$ -
	Sediment Disposal																	$ -
	Weed Wacker	$ 15																$ 15.00
	Vegetation Disposal																	$ -
	Scarifying/Hydroseeding								$ 3,339									$ 3,338.50
	Storage Container			$ 4														$ 4.25
	Monthly Subtotal	$ 99	$ 102	$ 156	$ 25	$ 81	$ 51	$ 80	$ 3,455	$ 98	$ 44	$ 202	$ 134	$ 212				$ 4,737
	MONTHLY TOTAL	$1,697	$1,990	$4,093	$2,353	$2,836	$5,354	$2,939	$5,593	$1,341	$3,001	$2,839	$2,021	$5,889	**1999/2000 TOTAL =**			**$42,047**

BMP Retrofit Pilot Program
Maintenance Operation
Cost Accounting Summary, 1999-2000

DISTRICT: 7	LOCATION: I-605/SR-91 Interchange	SITE NO. 75222b	BMP TYPE: Biofiltration Swale	CONSULTANT: Montgomery Watson - Chaudhary

	TASK	1999 Jun	Jul	Aug	Sep	Oct	Nov	Dec	2000 Jan	Feb	Mar	Apr	May	Jun	(hrs)	Rate	TOTAL $
Labor (hours)	***Administration***																
	General program support/Follow-up	3.9	5.1	8.0	3.3	3.0	5.2	9.5	8.0	5.3	15.4	9.5	9.8	15.3	102.9	$120	$ 12,342
	Encroachment Permits														0.0	$87	$ -
	Travel	6.6	3.7	7.4	4.4	8.7	4.4	5.5	7.7	7.9	9.0	11.2	5.7	5.3	88.4	$87	$ 7,693
	Unscheduled events		1.5	1.0	1.0										3.5	$87	$ 305
	Monthly Subtotal (hours)	10.5	12.0	16.4	8.6	11.7	9.6	15.0	15.7	13.2	24.4	20.8	15.5	21.6	194.8		
	Monthly Subtotal ($)	$1,042	$1,268	$1,686	$855	$1,117	$1,001	$1,613	$1,624	$1,317	$2,633	$2,126	$1,673	$2,383	$20,339		
															Task Subtotal =		$20,319
	Operation																
	Wet season inspections					1.0	0.5	1.5	0.8	0.8	1.5	1.9	0.5		8.4	$55	$ 462
	Dry season inspections	0.5	1.0	0.5	1.0									1.0	4.0	$55	$ 220
	Unscheduled inspections/field calls								1.5						1.5	$60	$ 90
	Monthly Subtotal (hours)	0.50	1.00	0.50	1.00	1.00	0.50	1.50	2.25	0.75	1.50	1.90	0.50	1.00	13.9		
	Monthly Subtotal ($)	$28	$55	$28	$55	$55	$28	$83	$131	$41	$83	$105	$28	$55	$772		
															Task Subtotal =		$772
	Maintenance																
	Scheduled maintenance	5.6	1.0	2.0	3.8	10.0	23.8	8.8	4.3	12.3	12.0	7.6	3.5	28.8	123.2	$55	$ 6,776
	Unscheduled maintenance			6.3	5.0	4.5	3.8	1.0							20.5	$55	$ 1,128
	Vandalism														0.0	$55	$ -
	Acts of God														0.0	$55	$ -
	Landscape Maintenance Contractor														0.0	$0	$ -
	Sediment Removal Contractor														0.0	$0	$ -
	Vegetation Consultant					0.9	0.9	3.0	1.2						5.9	$75	$ 445
	Other Contractor														0.0	$0	$ -
	Other Contractor														0.0	$0	$ -
	Monthly Subtotal (hours)	5.60	1.00	8.25	8.75	15.37	28.40	12.75	5.41	12.25	12.00	7.60	3.50	23.75	149.6		
	Monthly Subtotal ($)	$308	$55	$454	$481	$863	$1,580	$761	$321	$674	$660	$418	$193	$1,581	$8,348		
															Task Subtotal =		$8,348
	Vector Control																
	Contract & General administration	1.0	1.5	1.0	0.3				0.1	0.1	0.1	0.1	0.1	1.3	4.9	$120	$ 582
	Vector prevention maint. (consultant)														0.0	$55	$ -
	Response to VCD calls (consultant)														0.0	$55	$ -
	VCD efforts (contracted)	6.2	8.2	1.3	1.2	1.0	1.6	1.1	1.2	1.0		0.9	1.1	1.6	26.5	$46	$ 1,229
	Monthly Subtotal (hours)	7.20	10.10	2.30	1.45	0.99	1.60	1.10	1.29	1.12	0.10	1.00	1.17	1.88	31.30		
	Monthly Subtotal ($)	$408	$609	$180	$86	$46	$74	$51	$67	$59	$12	$54	$58	$106	$1,811		
															Task Subtotal =		$1,811
Non-Recurring Equipment (hours)	***Equipment***																
	Trash Pump	1.3													1.3	$5	$ 7
	Weed Wacker					0.6	3.0							13.5	17.1	$5	$ 85
	Generator							1.0						4.0	5.0	$6	$ 30
	Shop Vac							1.0							1.0	$5	$ 5
	Mounted Weed Eater													4.0	4.0	$7	$ 30
	20" Push Lawnmower													0.3	0.3	$9	$ 2
	Self Powered Weed Mower													0.5	0.5	$20	$ 10
	Trailer													1.0	1.0	$13	$ 13
	Monthly Subtotal (hours)	1.30	0.00	0.00	0.00	0.58	3.00	2.00	0.00	0.00	0.00	0.00	0.00	23.25	30.13		
	Monthly Subtotal ($)	$7	$0	$0	$0	$3	$15	$11	$0	$0	$0	$0	$0	$147	$182		
															Equipment Subtotal =		$182

	Direct Costs															Total $
Dollars ($)	VCD supplies (direct costs less labor)															$ -
	Reproduction	$ 8	$ 9	$ 13	$ 5		$ 1		$ 1	$ 2	$ 2	1 1	$ 1	$ 1		$ 43.31
	Postage/FedEx	$ 8	$ 9	$ 13	$ 5		$ 2		$ 1	$ 2	$ 2	1 1	$ 1	$ 1		$ 44.91
	Lodging			$ 5		$ 9		$ 15			$ 7	1 4	$ 8			$ 46.88
	Per Diem			$ 3		$ 6		$ 10			$ 3	1 2	$ 2			$ 25.91
	Incidentals	$ 8	$ 9	$ 13	$ 5		$ 6		$ 1	$ 8	$ 16	1 16	$ 17	$ 1		$ 99.28
	Vehicle Rental/Lease	$ 50	$ 74	$ 33	$ 10	$ 11	$ 29	$ 48	$ 127	$ 134	$ 6	1 178	$ 117	$ 124		$ 939.15
	Airfare															$ -
	Field Supp./Expendables	$ 10	$ 1	$ 3	$ 1	$ 56	$ 3	$ 3		$ 4	$ 4		$ 8	$ 24		$ 116.95
	Equipment Rental															$ -
	Sediment Analyses															$ -
	Sediment Disposal															$ -
	Weed Wacker	$ 15														$ 15.00
	Vegetation Disposal															$ -
	Scarifying/Hydroseeding								$ 1,659							$ 1,659.25
	Storage Container			$ 4												$ 4.25
	Monthly Subtotal	$ 99	$ 102	$ 85	$ 25	$ 81	$ 41	$ 76	$ 1,799	$ 150	$ 39	1 202	$ 153	$ 152		$ 3,905

MONTHLY TOTAL	$1,891	$2,089	$2,433	$1,502	$2,165	$2,739	$2,594	$3,942	$2,242	$3,427	$2,905	$2,104	$4,424	**1999/2000 TOTAL =** $34,458

BMP Retrofit Pilot Program
Maintenance Operation
Cost Accounting Summary, 1999-2000

DISTRICT: 7	LOCATION: Cerritos Maintenance Station	SITE NO. 73223	BMP TYPE: Biofiltration Swale	CONSULTANT: Montgomery Watson - Chaudhary

	TASK	1999 Jan	Jul	Aug	Sep	Oct	Nov	Dec	2000 Jan	Feb	Mar	Apr	May	Jun	(hrs)	Rate	TOTAL $
Labor (hours)	***Administration***																
	General program support/Follow-up	3.0	5.8	8.0	3.0	2.8	5.0	8.8	8.8	6.7	15.4	9.9	11.8	33.0	122.8	$120	$ 14,736
	Encroachment Permits														0.0	$87	$ -
	Travel	2.7	3.8	8.3	4.4	8.7	2.2	5.0	6.0	11.4	10.1	11.2	4.8	6.3	84.6	$87	$ 7,361
	Unscheduled events		3.0	2.0	1.0										6.0	$87	$ 522
	Monthly Subtotal (hours)	5.7	13.6	18.3	8.4	11.5	7.2	13.8	14.7	18.1	25.5	21.1	16.5	39.3	213.4		
	Monthly Subtotal ($)	$591	$1,403	$1,852	$825	$1,087	$785	$1,491	$1,571	$1,796	$2,724	$2,162	$1,824	$4,507	$22,619		
															Task Subtotal =		$22,619
	Operation																
	Wet season inspections					1.0	0.5	1.5	2.0	2.0	2.0	1.9	0.5		11.4	$55	$ 627
	Dry season inspections	0.5	1.0	0.5	1.0									1.0	4.0	$55	$ 220
	Unscheduled inspections/field calls			1.5					1.0						2.5	$60	$ 150
	Monthly Subtotal (hours)	0.50	1.00	2.00	1.00	1.00	0.50	1.50	3.00	2.00	2.00	1.90	0.50	1.00	17.9		
	Monthly Subtotal ($)	$28	$55	$118	$55	$55	$28	$83	$170	$110	$110	$105	$28	$55	$997		
															Task Subtotal =		$997
	Maintenance																
	Scheduled maintenance	2.0	0.8	1.3	0.8	7.0	1.0	8.5	4.5	28.3	16.0	5.8	2.8	25.8	104.3	$55	$ 5,737
	Unscheduled maintenance			6.3	9.5	2.5	2.0	1.0							21.3	$55	$ 1,169
	Vandalism														0.0	$55	$ -
	Acts of God														0.0	$55	$ -
	Landscape Maintenance Contractor														0.0	$0	$ -
	Sediment Removal Contractor														0.0	$0	$ -
	Vegetation Consultant					0.9	0.5	3.0	1.2						5.9	$75	$ 445
	Other Contractor														0.0	$0	$ -
	Other Contractor														0.0	$0	$ -
	Monthly Subtotal (hours)	2.00	0.75	7.50	10.25	10.37	3.90	12.50	5.66	28.25	16.00	5.80	2.75	25.75	131.5		
	Monthly Subtotal ($)	$110	$41	$413	$564	$588	$233	$748	$335	$1,554	$880	$319	$151	$1,416	$7,350		
															Task Subtotal =		$7,350
	Vector Control																
	Contract & General administration	1.0	1.9	1.0	0.3				0.1	0.1	0.1	0.1	0.1	0.3	4.9	$120	$ 588
	Vector prevention maint. (consultant)														0.0	$65	$ -
	Response to VCD calls (consultant)														0.0	$55	$ -
	VCD efforts (contracted)	6.2	8.2	2.9	2.3	1.8	2.6	2.1	2.3	1.9	2.2	1.8	2.1	2.9	39.3	$46	$ 1,824
	Monthly Subtotal (hours)	7.20	10.10	3.90	2.55	1.78	2.60	2.10	2.35	2.01	2.30	1.90	2.19	3.19	44.17		
	Monthly Subtotal ($)	$408	$609	$255	$137	$83	$121	$98	$117	$101	$114	$96	$109	$167	$2,412		
															Task Subtotal =		$2,412
Non-Recurring Equipment (hours)	***Equipment***																
	Trash Pump	0.8													0.8	$5	$ 4
	Weed Wacker					1.2								12.0	13.2	$5	$ 66
	Generator								0.8					3.5	4.3	$6	$ 26
	Shop Vac								0.8						0.8	$5	$ 4
	Wacker										8.0				8.0	$28	$ 222
	Mounted Weed Eater													3.5	3.5	$7	$ 26
	20" Push Lawnmower													0.3	0.3	$9	$ 2
	Self Powered Weed Mower													0.5	0.5	$20	$ 10
	Trailer													1.0	1.0	$13	$ 13
	Monthly Subtotal (hours)	0.80	0.00	0.00	0.00	1.16	0.00	0.00	1.50	0.00	8.00	0.00	0.00	20.75	32.21		
	Monthly Subtotal ($)	$4	$0	$0	$0	$6	$0	$0	$8	$0	$222	$0	$0	$133	$373		
															Equipment Subtotal =		$373
Dollars ($)	***Direct Costs***																Total $
	VCD supplies (direct costs less labor)																$ -
	Reproduction	$ 8	$ 9	$ 13	$ 5		$ 2	$ 1	$ 1	$ 3	$ 4	$ 2	$ 7	$ 32			$ 86.25
	Postage/FedEx	$ 8	$ 9	$ 13	$ 5		$ 3	$ 1	$ 1	$ 3	$ 4	$ 2	$ 7	$ 32			$ 87.85
	Lodging			$ 5		$ 9		$ 15			$ 7	$ 4	$ 8				$ 46.88
	Per Diem			$ 3		$ 6		$ 10			$ 3	$ 2	$ 2				$ 25.91
	Incidentals	$ 8	$ 9	$ 13	$ 5		$ 10	$ 1	$ 1	$ 8	$ 18	$ 17	$ 24	$ 32			$ 145.25
	Vehicle Rental/Lease	$ 50	$ 74	$ 36	$ 10	$ 11	$ 14	$ 44	$ 100	$ 195	$ 6	$ 178	$ 97	$ 124			$ 939.5
	Airfare																$ -
	Field Supp./Expendables	$ 10	$ 1	$ 3	$ 15	$ 45	$ 3	$ 3		$ 4	$ 9		$ 8	$ 24			$ 124.2
	Equipment Rental																$ -
	Sediment Analyses																$ -
	Sediment Disposal																$ -
	Weed Wacker	$ 15															$ 15.00
	Vegetation Disposal																$ -
	Scarifying/Hydroseeding								$ 1,701								$ 1,700.57
	Storage Container			$ 4													$ 4.25
	Monthly Subtotal	$ 99	$ 102	$ 89	$ 38	$ 71	$ 33	$ 75	$ 1,804	$ 213	$ 50	$ 205	$ 154	$ 244			$ 3,176

MONTHLY TOTAL	$1,239	$2,210	$2,725	$1,519	$1,889	$1,119	$2,494	$4,004	$3,773	$4,100	$2,887	$2,265	$5,522	**1999/2000 TOTAL =**	**$36,927**

BMP Retrofit Pilot Program
Maintenance Operation
Cost Accounting Summary, 1999-2000

DISTRICT: 7	LOCATION: I-5/I-605	SITE NO. 73224	BMP TYPE: Biofiltration Swale	CONSULTANT: Montgomery Watson - Chaudhary

	TASK	1999 Jan	Jul	Aug	Sep	Oct	Nov	Dec	2000 Jan	Feb	Mar	Apr	May	Jun	(hrs)	Rate	TOTAL $
Labor (hours)	***Administration***																
	General program support/Follow-up	5.2	5.8	8.0	3.8	2.8	5.2	9.8	7.8	5.0	15.4	9.9	10.6	14.9	104.0	$120	$ 12,480
	Encroachment Permits														0.0	$87	$ -
	Travel	8.2	3.7	9.2	7.4	10.0	2.9	5.0	5.1	6.4	10.1	9.0	6.7	4.5	89.0	$87	$ 7,743
	Unscheduled events		1.0	5.0	1.0										7.0	$87	$ 609
	Monthly Subtotal (hours)	13.4	10.5	22.2	12.1	13.7	8.1	14.8	12.9	11.4	25.5	18.9	17.3	19.3	200.0		
	Monthly Subtotal ($)	$1,337	$1,105	$2,195	$1,176	$1,278	$876	$1,611	$1,376	$1,157	$2,724	$1,971	$1,851	$2,173	$20,832		
															Task Subtotal =		$20,832
	Operation																
	Wet season inspections					1.0	0.5	1.5	0.8	0.8	1.8	1.9	1.0		9.2	$55	$ 503
	Dry season inspections		1.0	0.5	1.0									1.0	3.5	$55	$ 193
	Unscheduled inspections/Field calls	1.3							1.0						2.3	$60	$ 138
	Monthly Subtotal (hours)	1.30	1.00	0.50	1.00	1.00	0.50	1.50	1.75	0.75	1.75	1.90	1.00	1.00	15.0		
	Monthly Subtotal ($)	$78	$55	$28	$55	$55	$28	$83	$101	$41	$96	$105	$55	$55	$834		
															Task Subtotal =		$834
	Maintenance																
	Scheduled maintenance		1.0	4.3	16.0	5.0	13.0	8.5	5.0	7.5	6.0	5.3	6.8	18.3	90.6	$55	$ 4,980
	Unscheduled maintenance	7.0		6.3	35	1.0	1.0	1.0							19.8	$55	$ 1,086
	Vandalism						1.0								1.0	$55	$ 55
	Acts of God														0.0	$55	$ -
	Landscape Maintenance Contractor														0.0	$0	$ -
	Sediment Removal Contractor														0.0	$0	$ -
	Vegetation Consultant					0.9	0.9	3.0	1.2						5.9	$75	$ 445
	Other Contractor														0.0	$0	$ -
	Other Contractor														0.0	$0	$ -
	Monthly Subtotal (hours)	7.00	1.00	10.50	13.50	6.87	15.94	12.50	6.16	7.50	6.00	5.30	6.75	18.25	117.2		
	Monthly Subtotal ($)	$385	$55	$578	$743	$395	$892	$748	$362	$413	$330	$292	$371	$1,004	$6,566		
															Task Subtotal =		$6,566
	Vector Control																
	Contract & General administration	1.0	1.9	1.0	0.3		0.3		0.1	0.1	0.1	0.1	0.1	0.3	5.2	$120	$ 624
	Vector prevention maint. (consultant)														0.0	$65	$ -
	Response to VCD calls (consultant)														0.0	$55	$ -
	VCD efforts (contracted)	6.2	8.2	3.9	3.4	2.2	2.7	2.3	2.3	1.9	2.2	1.8	2.1	3.0	42.2	$46	$ 1,960
	Monthly Subtotal (hours)	7.20	10.10	4.90	3.65	2.24	3.00	2.30	2.44	1.98	2.30	1.90	2.15	3.24	47.40		
	Monthly Subtotal ($)	$408	$609	$301	$118	$104	$161	$107	$121	$99	$114	$96	$107	$169	$2,584		
															Task Subtotal =		$2,514
Non-Recurring Equipment (hours)	***Equipment***																
	Trash Pump														0.0	$5	$ -
	Weed Wacker	3.5		2.0	2.0	0.5	4.0							8.5	20.5	$5	$ 103
	Generator							0.4						2.5	2.9	$6	$ 17
	Shop Vac							0.4							0.4	$5	$ 2
	Mounted Weed Eater													2.5	2.5	$7	$ 19
	20" Push Lawnmower													0.3	0.3	$9	$ 2
	Self Powered Weed Mower													0.3	0.3	$20	$ 5
	Trailer													0.5	0.5	$13	$ 7
	Monthly Subtotal (hours)	3.50	0.00	2.00	2.00	0.50	4.00	0.80	0.00	0.00	0.00	0.00	0.00	14.50	27.30		
	Monthly Subtotal ($)	$18	$0	$10	$10	$3	$20	$4	$0	$0	$0	$0	$0	$90	$154		
															Equipment Subtotal =		$154

	Direct Costs	1999 Jan	Jul	Aug	Sep	Oct	Nov	Dec	2000 Jan	Feb	Mar	Apr	May	Jun	Total $
Dollars ($)	VCD supplies (direct costs less labor)														$ -
	Reproduction	$ 8	$ 9	$ 13	$ 5		$ 2	$ 1	$ 1	$ 1	$ 4	$ 2	$ 2	1 2	$ 49.41
	Postage/FedEx	$ 8	$ 9	$ 13	$ 5		$ 3	$ 1	$ 1	$ 2	$ 4	$ 2	$ 2	1 2	$ 51.04
	Lodging			$ 5		$ 9		$ 15			$ 7	$ 4	$ 8		$ 46.88
	Per Diem			$ 3		$ 6		$ 10			$ 3	$ 2	$ 2		$ 25.9
	Incidentals	$ 8	$ 9	$ 13	$ 5		$ 16	$ 1	$ 1	$ 7	$ 18	$ 17	$ 18	1 2	$ 108.44
	Vehicle Rental/Lease	$ 50	$ 74	$ 40	$ 10	$ 11	$ 11	$ 44	$ 87	$ 110	$ 6	$ 150	$ 136	1 90	$ 826.33
	Airfare														$ -
	Field Supp./Expenfables	$ 30	$ 1	$ 3	$ 1	$ 24	$ 3	$ 3		$ 4	$ 9		$ 8	1 24	$ 199.78
	Equipment Rental														$ -
	Sediment Analyses														$ -
	Sediment Disposal														$ -
	Weed Wacker	$ 15													$ 15.00
	Vegetation Disposal														$ -
	Scarifying/Hydroseeding								$ 2,882						$ 2,882.4
	Storage Container			$ 4											$ 4.25
	Monthly Subtotal	$ 119	$ 102	$ 93	$ 25	$ 50	$ 38	$ 75	$ 2,972	$ 124	$ 50	$ 177	$ 175	1 120	$ 4,120
	MONTHLY TOTAL	$2,345	$1,926	$3,204	$2,137	$1,885	$2,015	$2,627	$4,933	$1,834	$3,314	$2,640	$2,560	$3,610	**1999/2000 TOTAL =** $35,090

BMP Retrofit Pilot Program
Maintenance Operation
Cost Accounting Summary, 1999-2000

DISTRICT: 7	LOCATION: I-605/Carson & Del Amo Avenue	SITE NO. 73255	BMP TYPE: Biofiltration Swale	CONSULTANT: Montgomery Watson - Chaudhary

	TASK	1999 Jun	Jul	Aug	Sep	Oct	Nov	Dec	2000 Jan	Feb	Mar	Apr	May	Jun	(hrs)	Rate	TOTAL $
Labor (hours)	***Administration***																
	General program support/Follow-up	3.0	5.8	8.0	4.8	3.3	7.0	9.3	7.3	4.5	15.4	9.0	9.9	4.1	102.1	$120	$ 12,246
	Encroachment Permits														0.0	$87	$ -
	Travel	2.7	3.8	15.4	32.4	37.0	5.1	5.5	6.8	6.4	8.6	5.5	3.8	6.3	139.2	$87	$ 12,109
	Unscheduled events		1.0	8.3	1.0										10.3	$87	$ 892
	Monthly Subtotal (hours)	5.7	10.6	31.6	38.1	40.3	12.1	14.8	14.1	10.9	24.0	15.4	13.7	20.4	251.5		
	Monthly Subtotal ($)	$591	$1,114	$3,013	$3,471	$3,609	$1,278	$1,595	$1,465	$1,097	$2,597	$1,667	$1,513	$2,239	$25,247		
															Task Subtotal =		$25,247
	Operation																
	Wet season inspections					1.0	0.5	1.5	0.8	1.3	1.5	1.9	0.5		8.9	$55	$ 490
	Dry season inspections	0.5	1.0	0.5	1.0									1.0	4.0	$55	$ 220
	Unscheduled inspections/field calls								1.0						1.0	$60	$ 60
	Monthly Subtotal (hours)	0.50	1.00	0.50	1.00	1.00	0.50	1.50	1.75	1.25	1.50	1.90	0.50	1.00	13.9		
	Monthly Subtotal ($)	$28	$55	$28	$55	$55	$28	$83	$101	$69	$83	$105	$28	$55	$770		
															Task Subtotal =		$770
	Maintenance																
	Scheduled maintenance	1.5	1.0	0.5	5.0	11.0		14.5	6.3	6.8	3.5	3.5	2.0	18.5	74.0	$55	$ 4,070
	Unscheduled maintenance			38.3	46.0	33.8	10.0	6.0							134.0	$55	$ 7,370
	Vandalism														0.0	$55	$ -
	Acts of God														0.0	$55	$ -
	Landscape Maintenance Contractor														0.0	$0	$ -
	Sediment Removal Contractor														0.0	$0	$ -
	Vegetation Consultant					0.9	0.9	3.0	1.2						5.9	$75	$ 445
	Other Contractor														0.0	$0	$ -
	Other Contractor														0.0	$0	$ -
	Monthly Subtotal (hours)	1.50	1.00	38.75	51.00	45.62	10.90	23.50	7.41	6.75	3.50	3.50	2.00	18.50	213.9		
	Monthly Subtotal ($)	$83	$55	$2,131	$2,805	$2,527	$618	$1,353	$431	$371	$193	$193	$110	$1,018	$11,885		
															Task Subtotal =		$11,885
	Vector Control																
	Contract & General administration	1.0	1.3	1.0	0.3				0.1	0.1	0.1	0.1	0.1	0.3	4.3	$120	$ 516
	Vector prevention maint. (consultant)														0.0	$65	$ -
	Response to VCD calls (consultant)														0.0	$55	$ -
	VCD efforts (contracted)	6.2	8.2	2.8	2.3	1.9	2.6	2.1	2.3	1.8	2.2	1.9	2.2	3.2	39.6	$46	$ 1,841
	Monthly Subtotal (hours)	7.20	9.50	3.80	2.55	1.93	2.60	2.10	2.41	1.88	2.30	2.00	2.25	3.41	43.93		
	Monthly Subtotal ($)	$408	$537	$250	$137	$90	$121	$98	$119	$95	$114	$100	$112	$177	$2,357		
															Task Subtotal =		$2,357
Non-Recurring Equipment (hours)	***Equipment***																
	Water Tank with Pump			38.3	46.0	33.8	10.0	6.0							134.1	$5	$ 670
	Weed Wacker					2.0								8.5	10.5	$5	$ 53
	20" Push Lawnmover													0.3	0.3	$9	$ 2
	Self Powered WeedMower													0.3	0.3	$20	$ 5
	Mounted Weed Eater													2.5	2.5	$7	$ 19
	Generator													2.5	2.5	$6	$ 15
	Trailer													0.5	0.5	$13	$ 7
	Monthly Subtotal (hours)	0.00	0.00	38.25	46.00	35.80	10.00	6.00	0.00	0.00	0.00	0.00	0.00	14.50	150.55		
	Monthly Subtotal ($)	$0	$0	$191	$230	$179	$50	$30	$0	$0	$0	$0	$0	$90	$770		
															Equipment Subtotal =		$770
Dollars ($)	***Direct Costs***																Total $
	VCD supplies (direct costs less labor)																$ -
	Reproduction	$ 8	$ 9	$ 13	$ 5		$ 2	$ 1	$ 1	$ 1	$ 4	$ 2	$ 2	$ 2			$ 45.39
	Postage/FedEx	$ 8	$ 9	$ 13	$ 5		$ 3	$ 1	$ 1	$ 2	$ 4	$ 2	$ 2	$ 2			$ 50.99
	Lodging			$ 5		$ 9		$ 15			$ 7	$ 4	$ 8				$ 46.88
	Per Diem			$ 3		$ 6		$ 10			$ 3	$ 2	$ 2				$ 25.91
	Incidentals	$ 8	$ 9	$ 13	$ 5		$ 10	$ 1	$ 1	$ 7	$ 18	$ 17	$ 18	$ 2			$ 108.36
	Vehicle Rental/Lease	$ 50	$ 74	$ 65	$ 10	$ 11	$ 24	$ 48	$ 113	$ 110	$ 6	$ 96	$ 78	$ 124			$ 809.38
	Airface																$ -
	Field Supp./Expendables	$ 10	$ 1	$ 3	$ 1	$ 24	$ 3	$ 3		$ 4	$ 9		$ 8	$ 24			$ 86.70
	Equipment Rental																$ -
	Sediment Analyses																$ -
	Sediment Disposal																$ -
	Weed Wacker	$ 15															$ 15.00
	Vegetation Disposal																$ -
	Stacifying/Hydroseeding								$ 2,374								$ 2,374.45
	Storage Container			$ 4													$ 4.25
	Monthly Subtotal	$ 99	$ 102	$ 118	$ 25	$ 50	$ 42	$ 79	$ 2,491	$ 124	$ 50	$ 123	$ 117	$ 154			$ 3,573
	MONTHLY TOTAL	$1,208	$1,862	$5,731	$6,723	$6,509	$2,136	$3,236	$4,607	$1,756	$3,035	$2,187	$1,879	$3,733		1999/2000 TOTAL =	$44,601

APPENDIX C

2ND YEAR REPORT – D7 BROWN AND CALDWELL SITES

CALTRANS
BMP RETROFIT PILOT PROGRAM

DISTRICT 7, LOS ANGELES

SECOND YEAR 1999-2000 REPORT

BEST MANAGEMENT PRACTICES

OPERATIONS, MONITORING & MAINTENANCE

BROWN AND CALDWELL

August 2000

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1.0 STORMWATER DATA

This summary report encapsulates the 1999-2000 water quality monitoring at a portion of the District 7 sites involved in the Caltrans Best Management Practices (BMP) Retrofit Pilot Program. The BMP facilities addressed in this report are listed in Table 1-1, and are graphically referenced in Figure 1-1. For ease of presentation, tables and graphic figures are provided at the end of each respective section.

This report addresses District 7 BMP locations that were monitored under the responsibility of Brown and Caldwell. Montgomery Watson and Law/Crandall also share the BMP Pilot Program monitoring responsibility in District 7, and it is suggested that the corresponding synopsis authored by these consultants be reviewed to gain a full perspective of the District 7 BMP effort.

1.1 Objective

One objective of the Caltrans BMP Pilot Program is to evaluate the performance of BMPs in various Caltrans stormwater runoff settings (freeway, maintenance station, and Park & Ride facilities). A comprehensive water quality monitoring study has been designed to meet these objectives by evaluating BMP performance in the removal of contaminants from stormwater runoff and by understanding the level of effort required to maintain the BMPs at optimal effectiveness. Data collected from the 1999-2000 wet season is contained in this report and is used to initially evaluate BMP performance, which includes:

- Rainfall data from storm events during the study period;
- Water quality and quantity of runoff into and discharged from the BMPs;
- Empirical observations of water quality, traffic, rainfall, and antecedent conditions; and
- Documentation records of inspection and maintenance activities performed.

1.2 Hydrology

The sections that follow describe BMP and site hydrological characteristics as observed during storm monitoring events and maintenance inspections during 1999-2000.

1.2.1 Precipitation During the Wet Season

The 1999/2000 wet season was manifested by an uncharacteristically dry winter, with nearly all substantial rainfall occurring between late January and early March. Although February was the wettest month of the season, a substantial precipitation event occurred on April 17, which essentially marked the end of the 1999-2000 wet season.

Throughout the season, rainfall patterns varied among BMP sites. BMPs situated within local foothills (Foothill MS/Via Verde P&R) generally experienced different weather patterns than others. Total rainfall for the 1999-2000 wet season averaged about 13.2 inches, ranging from 10.3 inches at Lakewood P&R to 15.6 inches at Eastern Regional MS. Precipitation in the Los Angeles metropolitan area normally averages about 12 inches per year. Albeit storm occurrence was lower than normal, there were two single storm events (2/20/00 and 4/17/00) that significantly contributed to the total seasonal precipitation, which reflects an above-average wet season. Figures 1-2a through 1-2c illustrate daily precipitation totals for the 1999-2000 wet season at select BMP sites. Daily rainfall is presented for the I-5/I-605 EDB, the Foothill sand filter, and the Termination sand filter, which serve to represent geographically related rainfall patterns for the District 7 BMPs discussed here.

1.2.2 Precipitation During Monitored Events

Table 1-2 presents precipitation characteristics during each monitored storm event in terms of rainfall duration, total rainfall, maximum intensity, days since last rainfall, and the rainfall preceding monitored storm events (antecedent rainfall). Cumulative rainfall variability among BMP sites during monitored events is shown in Figure 1-3.

For this study, 3 days of antecedent dry weather are preferred between sampled storms, however, a minimum of 48 hours dry was deemed acceptable. This criterion attempts to provide for a clear separation of storms in order to differentiate water quality without the effect of commingled stormwater. During the 1999-2000 wet season, there were four storms that met sampling deployment criteria but failed to have the needed antecedent dry period prior to their occurrence: February 12, 16, and 23, and March 5, 2000. Although presented in Figure 1-3, stormwater samples could not be collected for the January 25 storm due to an inaccurate storm-duration forecast and congested traffic conditions. Nonetheless, field crews were deployed to collect empirical observations on BMP operational characteristics during the abatement of this 3-hour storm.

1.2.3 Stormwater Runoff During Monitored Events

For the District 7 BMP facilities presented here, there were four successful storm events monitored during the 1999-2000 wet season: February 20 and 27, March 8, and April 17, 2000. Table 1-3 summarizes runoff flow measured at each BMP station in conjunction with each monitored storm event, while Figures 1-4 through 1-11 graphically summarize the correlating BMP influent and effluent flow along with cumulative rainfall. These figures also depict the collection timing of each sample aliquot for composite samples.

It is important to note that because detention is an integral function of extended detention basins, sand filters, and MCTTs, stormwater was often draining from these BMPs when target storms occurred. Therefore, the chemistry of collected stormwater samples was often a representation of the targeted storm events, as well as runoff from previous rainfall. Hence, commingled stormwater samples were unavoidable for all 1999-2000 monitored events, except for the following:

- I-5/I-605 EDB — February 20 and 27
- I-605/SR-91 EDB — February 20 and 27, and March 8
- Eastern MS Sand Filter — February 27
- All BMPs — April 17

Monitoring during 1999-2000 marked the second wet season for the I-5/I-605 EDB, I-605/SR-91 EDB, Eastern Regional MS sand filter, and Foothill MS sand filter. Monitoring at Alameda MS, Lakewood P&R, Termination P&R, and Via Verde P&R began with the onset of the wet season in October 1999. Despite the number of storms treated, monitoring of weather and runoff conditions with electronic instrumentation had its inherent challenges. Below is a summary of the complications experienced during sample collection that may have affected data quality.

Extended Detention Basins

- I-605/SR-91, February 20: effluent flow monitoring station bubbler failure. For flow-weighted composite sampling, it is important that the datalogger correctly measure the level of the water over the effluent weir. Since this did not occur, it was impossible to obtain sufficient sample for paired analyses (influent and effluent), and monitoring was therefore aborted at this site. A spare bubbler was put into place before the next storm.
- I-605/SR-91, February 27: rainfall and the subsequent runoff were much lower than predicted. Much of the water entering this earthen BMP exfiltrated into the ground before passing through the effluent outlet. As a result, only eight aliquots in the composite sample were collected. The influent volume was adequate with 25 aliquots collected. Effluent analyses were prioritized, with hardness and TKN being the only parameters not analyzed.
- I-605/SR-91, March 8: datalogger program became corrupted and did not operate the composite sampler correctly. A new program was installed immediately upon discovery and no data was lost. Percent capture was slightly reduced to 87 percent capture.

Sand Filters

- Foothill Maintenance Station: influent flow meter proved to be problematic. Influent flow monitoring at this BMP consists of an area-velocity meter used in conjunction with an ultrasonic deadband level sensor. Because of a relatively short, straight section of pipe delivering the inflow to the basin, the water tends to be quite turbulent at the sensor, which affects the sensor accuracy. Due to retrofit opportunity, sufficient lengths of straight piping (for laminar flow) were not possible, which in turn creates flow monitoring difficulty at this influent station. This is most notable during low, shallow flows.

Throughout the history of monitoring at the Foothill sand filter, the influent flow volume has been substantially lower than the effluent volume. The ultrasonic device that measures the influent water level has been problematic in the past and is suspect for all events monitored to date.

- Termination Park & Ride. February 20 / March 8 / April 17: effluent sump pump frequently failed to operate when the parking lights were illuminated at night. Although power was applied to the discharge pump under these conditions, the available power was insufficient to operate the pump properly. Effluent flow rate is calculated using flow curves from the manufacturer based on pump run-time. During the night, available voltage was too low to operate the effluent pump, and although power was insufficient to pump water, the datalogger interpreted this weak signal to mean actual pump operation. However, there was no flow present under these conditions which caused automated aliquot sample collection to be based on false pump run-times. This was apparent in the data when the discharge sump stage level remained constant (no draw-down) during the night. As a result, composite sample aliquots were collected from static water held within the discharge sump, even though no water was being discharged. Although false flow volumes were removed from total effluent storm volume calculations, composite effluent samples were comprised of more aliquots than necessary. This occurred in varying degrees for three of the four storm events monitored (20 February, 8 March, and 17 April).

- Eastern Maintenance Station, March 8: the discharge sump pump partially failed due to excessive current draw from the motor. Because pump operation was erratic, it was operated only when field crews were onsite. Percent capture was unaffected by this pump failure. The pump was replaced during the April 17 event with no appreciable affect on the BMP performance.

Multi-chambered Treatment Trains

- Via Verde Park and Ride, February 20: effluent sump pump failure. A replacement pump was installed and the percent capture was unaffected. The original pump was subsequently sent back to the manufacturer and found to have faulty motor windings.

- Lakewood Park and Ride, all storms: erratic transfer pump operation and failure. Due to excessive current draw from the motor, transfer of stormwater to the filter media bed persistently failed. Therefore, water transfer was done manually and monitored by field crews. Percent storm capture was unaffected by this situation.

Detention Time

Variation in stormwater detention (Table 1-3) was a factor of storm volume, BMP design, BMP age (two wet seasons versus one), and other water-management characteristics. For extended detention basins, the discharge structure apertures regulated effluent flow. Sand filter detention times relied on sedimentation chamber throughput and sand bed percolation rate, while

stormwater detention in MCTTs was controlled by retaining stormwater in the settling chamber and later pumping it to the media bed where filtration characteristics regulated outflow.

Detention times were calculated as the period between the start of inlet flow and the end of discharge flow. Some of the longer detention times are attributed to sediment and debris buildup that restricted flow through the BMP. This was particularly noted at the Foothill Maintenance Station when the sedimentation chamber drain pipe weep holes became severely covered in sediment and had to be cleaned out by field crews in order to drain. At the Termination Park & Ride, the discharge pump often did not operate adequately at night when the parking lot lights were on, which prolonged the drain time.

Flow Volumes

Consistent with the problems encountered with flow measurement instrumentation, in-pipe laminar flow, and pump sites, differences in inflow versus outflow are apparent at some sites. There are several reasons for these differences, which include commingling of stormwater captured from previous storms, and the ability to accurately measure low stormwater flows. This inaccuracy probably affected the inflow volumes more than the outflow, due in part to the steady, regulated manner in which the outflow is discharged, whereas the inflow fluctuates rapidly in direct response to rain intensity. Other differences can be attributed to exfiltration. Some notable differences and possible causes of volume discrepancies are:

- I-5/I-605 EDB, February 20: another storm occurred approximately 1.5 days after the storm ended and while the effluent was still draining. Sampling was ceased at that time. For the March 8 event, standing water was in the basin from a previous storm.
- I-605/SR-91 EDB, February 27 and March 8: exfiltration through the earthen basin is suspected of reducing the outflow volumes measured.
- Foothill Sand Filter, February 20 & 27 and March 8: the sedimentation chamber had standing water from previous rainfall. During the fourth event (April 17), the influent flow meter is suspected of reporting low volume entering the BMP.
- Termination Sand Filter, February 27 and March 8: the basin had standing water from previous storms.
- Eastern Sand Filter, March 8: there was standing water from a previous storm.

Storm Capture

During the monitoring season, percent storm capture (the ratio of the runoff volume through the BMP relative to the collection of flow-weighted samples) for most sites was acceptable (equal to or greater than 75 percent and comprising of twelve or more aliquot samples). In most cases the percent capture was greater than 90 percent (see Table 1-3).

The stated acceptable capture was not met at the following locations, for the following reasons:

- I-605/SR-91 EDB, February 27: water volume rapidly diminished at the effluent sample location. It is suspected that the low rainfall amount and exfiltration contributed to collecting less than 12 sample aliquots, however, 100 percent capture was achieved.

- Via Verde MCTT, February 27: during the transfer of stormwater from the settling chamber to the filter media chamber, the datalogger went out of the sample mode for approximately 24 minutes, causing the percent capture to drop below 75 percent. However, the water detained in the settling chamber is characteristic of overall storm runoff quality because it is well mixed within the settling chamber prior to transfer to the media filter bed. Thus, with the loss of some sample aliquots during discharge, the sample composite integrity is not viewed as being grossly compromised because water quality characteristics are relatively consistent due to the "homogeneous" nature of settling chamber water.

- Lakewood Sand Filter, March 8: a sudden increase in rain intensity resulted in the composite sample bottle filling to capacity, which halts further aliquot collection to avoid overfilling. This condition coincided with peak storm inflow and reduced the percent capture below 75 percent. Despite attempts to reach the site prior to reaching bottle capacity, traffic congestion prevented timely arrival of the field crew. Bottle changeout was swiftly done to maximize capture to the extent possible.

- Termination Sand Filter, February 20: traffic congestion prevented the ability to replace a full influent composite bottle just before the occurrence of peak flow. However, the overall capture rate was 90 percent.

Flow proportioning of sample aliquots was good in most cases, as represented by Figures 1-4 through 1-11.

1.3 Analytical Results

The following sections provide an assessment of the overall quality of the analytical data set and a summary of water quality data for each monitored event sampled during the 1999-2000 wet season. Analytical results and associated data qualifiers are summarized in Table 1-4.

1.3.1 Assessment of Quality Assurance/Quality Control Results

Prior to presenting BMP pollutant removal data, an overview of the quality control (QC) and quality assurance (QA) methods employed in preparing and qualifying the data before evaluation is provided below.

1.3.1.1 Introduction

Prior to determining BMP performance, laboratory reports were assessed and the data validated for overall precision, accuracy, representativeness, and completeness to establish data quality and usability. As part of this process, field and laboratory QC data were assessed for compliance with the procedures and methods outlined in the *Operation, Maintenance and Monitoring Plan, District 7, Volume II* (i.e., OMM Plan – Quality Assurance Project Plan [QAPP]). Table 1-5 summarizes the QC samples collected during each storm event monitored.

The data quality indicators used to evaluate the overall usability of the data for meeting the project data quality objectives (DQOs) are described in the following paragraphs.

Precision

Precision measures the reproducibility of individual measurements under a given set of conditions. Precision was evaluated for each analyte based on field and laboratory duplicates as well as MS/MSD analyses. Field duplicate analyses were used to measure both field and laboratory precision, and to make an overall judgement as to whether the contaminants detected in the environmental samples are representative of conditions at the BMP sites. Laboratory duplicates were used to demonstrate method precision at the time of the analyses. Additionally, calculated RPD between the two MS/MSD measurements were used to assess matrix specific precision. Overall, precision was evaluated in terms related to the mean concentration (relative percent difference). The relative percent difference (RPD) between the pair of samples was calculated using the following formula:

$$\% \text{ RPD} = \frac{S-D}{S + D/2} \times 100$$

Where:

S = first sample value, and
D = duplicate sample value

Results for RPD calculations for both field duplicates and laboratory splits are presented in Tables 1-6 and 1-7, respectively. MS/MSD precision data is typically reported by the laboratory and are presented along with the associated analytical results in Attachment 1.

Accuracy

Accuracy measures the bias in a measurement system by the degree of agreement between a measured value and an accepted reference or true value. The accuracy of the analytical determinations was evaluated using laboratory QC analyses such as laboratory control samples (LCS), matrix spikes (MS/MSD), and surrogate spikes (where applicable). Standard Reference Materials (SRM) were analyzed in place of LCSs for hardness, TSS, nitrate and total phosphorous. SRMs were assessed in the same manner as LCSs. Accuracy results for the LCS/SRM analyses were used to monitor the overall performance of all steps in the analysis,

including sample preparation. Matrix spike accuracy data was used to provide information about the effect of each sample matrix on the preparation and analyses methodology. Surrogate spike recovery results (where applicable) were used to establish if the analytical method was performed properly. Accuracy is expressed as the percent recovery of a known concentration added and the measured concentration as shown in the following formula:

$$\% \text{ Recovery} = \frac{S - U}{Cs} \times 100$$

Where:

S = Measure concentration of spiked aliquot, and
U = Measure concentration of unspiked aliquot, and
Cs = Concentration of spike added

Accuracy results are typically reported by the laboratory and are presented along with the associated analytical results in Attachment 1.

Representativeness

Representativeness expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Sample representativeness was assessed in terms of percent storm capture, number of aliquots, and ultimately the evaluation of all associated blanks. Sample integrity was also evaluated with respect to adherence to the required preservation, storage, and holding times. Since there are no criteria established in the data validation process to evaluate percent capture and the number of aliquots, these parameters are discussed below.

Percent storm capture calculations were above 75 percent for all BMPs except for Via Verde on the February 27, 2000 event (66 percent capture for effluent sample) and Lakewood on the March 8, 2000 event (68 percent capture for influent sample). A review of the data indicate that these samples are representative of the storm event because detained MCTT settling chamber water is well mixed, which is reflective of a composite sample in itself that is not characteristic of one particular flow aspect of the storm hydrograph.

Except for one sample collected during the February 27, 2000 event from the I-605/SR-91 EDB (effluent), all composite samples consisted of more than 12 aliquots (0.25 liters per aliquot). Although this effluent sample was less than 12 aliquots (8 aliquots), the laboratory was able to perform all analysis except for TKN and hardness. As depicted by Figure 1-5a, the 8 aliquots collected at this BMP are uniformly distributed along the hydrograph and therefore are considered representative of the storm monitored.

Completeness

Completeness is a measurement of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. Completeness is determined based on validation results and the number of valid data points (not

rejected) relative to the total number of validated data. For data collected during the 1999-2000 wet season, the overall completeness objective of 95 percent was met for all parameters. Percent completeness was calculated using the following formula:

$$\% \text{ Completeness} = \frac{V}{T} \times 100$$

Where:

V = number of valid data points, and
T = total number of planned measurements

1.3.1.2 Field QA/QC

A field program conforming to procedures outlined in the QAPP was implemented to help maintain the required level of confidence in the field data and to cross check the contracted analytical laboratory. The following types of field QC samples were submitted for analysis:

Blank Samples

In accordance with project requirements, several blank analyses were performed to determine whether external contaminants, if any, were introduced into stormwater samples collected during the 1999-2000 wet season. Blank data were evaluated during various stages of the field sampling and laboratory activities to verify that field sampling equipment, sub-sampling equipment, laboratory containers, and procedures were not a source of contamination. In addition to the required blanks, the analysis of trip blanks and field blanks (associated with grab samples collected using an intermediate container) were also incorporated in the field QC program. Laboratory reports for blank results are included in Attachment 2 (*Blank Analysis Results*).

Trip blanks were included with each shipment of samples for analysis of volatiles (TPH-gasoline) during each sampling event. Trip blanks were prepared by the laboratory using organic-free water and the same containers and preservatives used for water samples. The trip blank was carried to the field and returned to the laboratory with the samples without being opened. Trip blanks were analyzed for the TPH-gasoline fraction only. All trip blanks were analyte-free and are not discussed further.

Field blanks were collected in the field from at least one BMP location during each storm event monitored. Field blanks were collected for TPH analyses from all sites, and for oil and grease, pH, specific conductance, hardness, and TSS associated with the oil/water separator BMP (Alameda MS). At this BMP, samples were collected as grabs since there is no automatic sampler in place. Field blanks were prepared by pouring organic-free water directly into the intermediate sample containers and analyzed for the same parameters as the environmental samples collected. All field blanks were analyte-free and are not discussed further.

Equipment Blanks were analyzed at the required frequency during various steps in the sampling activities to monitor and prevent, to the extent possible, the use of potentially contaminating equipment that could impact sampling results. Equipment blanks were collected for:

- Intake tubing (e.g., Hose-1, Hose-2, etc.) used to collect samples in the field,
- Sub-sampling hoses used by the analytical lab to extract individual samples from the 20-liter borosilicate bottles for respective analyses (i.e., tubing blank #2, #3, etc.), and
- Filter blanks for filters used for the preparation of dissolved metals samples (filter blank # 1, #2, etc.).

Overall, equipment blanks were analyte-free with the exception of the following:

- Dissolved zinc was detected in three out of five filter blanks (filter blank #1, filter blank #2, and filter blank 2000-4) at concentrations of 3.29 ug/L, 6.3 ug/L, and 1.5 ug/L respectively.

- Nitrate was detected in one out of three tubing blanks (tubing blank # 2) at a concentration of 0.98 mg/L.

Bottle Blanks were analyzed to account for any contamination introduced by sampling containers. These included 20-liter composite bottles and laboratory containers used for sample storage for the different analytes. It should be noted that while the first set of composite bottle blanks were labeled as 20L-1, 20L-2, etc…(bottle cleaning performed by KLI), subsequent blanks were labeled as bottle cleaning blank #2, #3, etc…(bottle cleaning performed by a contracted laboratory). Composite bottle blanks were analyzed at a frequency of 5 percent each time a batch of bottles was cleaned. Although laboratory containers were manufacturer-cleaned, one bottle was blanked from each new lot number. Overall, bottle blanks were analyte-free with the exception of the following:

- Total zinc was detected in one laboratory container (bottle blank –1 for first lot) at a concentration of 1.71 ug/L and three composite bottle blanks (bottle cleaning blank #3, #4, and #5) at concentrations of 5.72 ug/L, 2.88 ug/L, and 1.83 ug/L, respectively.
- Nitrate was detected in five out of fifteen composite bottle blanks (20L-1, bottle blank #1, bottle blanks #4A, #5, and #7) at concentrations of 0.038 mg/L, 0.029 mg/L, 0.039 mg/L, 0.026 mg/L, and 0.037 mg/L, respectively. It should be noted that in some cases, blank results were received prior to bottle usage, and in these cases bottles were submitted for re-rinsing before field use. This was the case for composite bottle blank # 3 and # 4 for both TKN and nitrate. Bottles associated with these blanks went through additional rinsing steps and were blanked once again before being used. These blanks (bottle blank # 3A and 4A) were reported with acceptable results.

- TKN and total phosphorous were detected in one out of fifteen composite bottle blanks (bottle blank #7) at concentrations of 0.11 mg/L and 0.021 mg/L, respectively. TKN was also detected in bottle blank # 5 at a concentration of 0.11 mg/L.

During the data validation process, environmental sample results were evaluated in conjunction with their associated blanks. Sample results that were attributed to blank contamination were qualified accordingly and are discussed later on a method-specific basis along with laboratory method blanks.

Field Duplicates

As shown in Table 1-5, a field duplicate sample was collected from one BMP location during each storm event monitored, for a total of four field duplicates. These samples were submitted "blind" to the laboratory and analyzed for the full list of analytes associated with grab and composite samples. Precision data as measured by the RPD was calculated for all parameters reported above the reporting limit. As indicated in Table 1-6, RPD results are less than 35 percent in most samples, except for total metals and fecal coliform in the samples collected on February 20, 2000, and fecal coliform for the samples collected on February 27, 2000 and April 17, 2000. RPD results in these samples are greater than 50 percent.

There are no review criteria for field duplicate analyses comparability. It is expected that the results may have more variability than lab duplicates, which serve to measure only lab performance. It is likely that the variance in the RPD observed in these samples is due to the heterogeneity of the samples.

1.3.1.3 Laboratory QA/QC

To achieve the data quality needed to support project DQOs, all analyses for this investigation were performed in accordance with methods and procedures outlined in the Operation, Maintenance and Monitoring Plan, District 7, Volume II (i.e., OMM Plan – Quality Assurance Project Plan) and as specified by applicable EPA methods. The respective parameters, analytical methods, and reporting limits are presented in Table 1-8. To ensure comparability of the results and to maintain a high level of QC, a laboratory certified in the State of California under the Environmental Laboratory Accreditation Program (ELAP) performed all project sample analyses.

The subsections below describe how each laboratory QC parameter was assessed for compliance with method-specific requirements.

Method Blanks

A method blank was included in every analytical batch (twenty samples or less) to demonstrate that the laboratory materials and environment were not introducing contamination to the analysis. Sample concentrations associated with method blanks containing target analytes were evaluated with respect to blank concentrations during the data validation to determine the need for qualification.

Laboratory Control Samples (LCS)

One LCS was prepared with each analytical batch of 20 samples or less, which consists of laboratory prepared blanks to which is added a known concentration of all of the target analytes. The LCS was carried through the entire sample preparation and analysis procedure with the sample unknowns. As previously mentioned, SRMs were analyzed in place of LCSs for hardness, TSS, nitrate and total phosphorous. LCS/SRMs recoveries were used to demonstrate that the method is operating within acceptable limits. LCS/SRM accuracy results were evaluated with respect to the acceptance criteria specified in the QAPP.

Laboratory Splits

As shown in Table 1-5, a minimum of one laboratory split sample was collected from one BMP location during each storm event monitored and assigned to be tested for the full list of analytes. These samples are split by the laboratory, and each aliquot of the sample is then analyzed and reported. Precision data (as measured by the RPD) was calculated for all parameters reported above the reporting limit and are presented in Table 1-7. Precision data generated from laboratory splits were evaluated during the data validation with respect to the control limits specified in the QAPP.

Matrix Spikes/Matrix Spike Duplicates (MS/MSD)

One set of matrix spikes/matrix spike duplicates (MS/MSD) was typically prepared and analyzed for every analytical batch of 20 samples or less. As shown in Table 1-5, a minimum of one set of MS/MSD analyses were performed on a project sample (sample collected from a monitored BMP location) during each storm event. In this process, three sample aliquots were measured out, and a known amount of the target analyte(s) was spiked into two of the aliquots at the same concentration. The three portions were then prepared and analyzed in the same manner. The analysis of the two spiked aliquots generated recovery data that was used to measure the effects of interferences in the sample matrix and reflect the overall accuracy of the determination. Additionally, calculated RPD between the two measurements were used to assess matrix-specific precision. The selection of spiking analytes was consistent with the published method. Matrix spike accuracy and precision results were evaluated during the data validation with respect to the control limits specified in the QAPP.

Surrogates

Surrogate standards were added to all samples and QC samples tested by gas chromatography (i.e., TPH). Surrogates are non-target compounds that are analytically similar to the analytes of interest. The surrogate compounds are spiked into the sample prior to the extraction or analysis. Surrogate recoveries were evaluated with respect to the acceptance criteria specified in the QAPP.

Holding Times

Holding times were evaluated by reviewing sample collection time with respect to sample analysis time. For composite samples, the time of the last aliquot was considered the sample collection time. Holding times were met for all sample analyses, except for a few pH sample results, which is further discussed below.

Reporting Limits

Specified project data reporting limits (Table 1-8) were met for all analytical parameters.

1.3.1.4 Data Validation Process

The following sections present a summary of the QA/QC review and the data validation effort performed to evaluate the usability of the sample data for meeting the project objectives. Data validation was performed in accordance with the *National Functional Guidelines for Organic and Inorganic Data Review (EPA/540/R/94/090)* and *Guidance on the Documentation and Evaluation of Trace Metals Data Collected for the Clean Water Act Compliance Monitoring (EPA/821/B/95/002)*. Data validation was based on the review of laboratory hard copy data packages. Qualifiers assigned during the data validation are discussed in the following sections.

Verification

Inherit in the data validation process is the verification of laboratory data for compliance with method-specific and contractual requirements. During this process, the data was subject to two levels of review within the laboratory. A chemistry supervisory-level review was done to verify analyte identification, quantification, and QC data. Further verification was performed by Brown and Caldwell's project QA/QC Officer to ensure compliance with project requirements. Evidence of that review is maintained in the project files in the form of a checklist outlining project requirements.

Technical Review

Subsequent to the data verification, analytical results for QC samples were reviewed with respect to the data validation criteria. The approach used in the data validation involved the review of QC sample results relative to the control limits specified in the QAPP. Data that did not meet the applicable criteria were qualified in accordance with the applicable U.S. EPA functional guidelines and were used to provide data users with an estimate of the level of certainty associated with the result "flagged." It is important to note that while a data point may be qualified, the data quality may be still adequate for performance evaluations.

The following code letters were used as qualifiers for data collected during each storm event.

U = Indicates the compound or analyte was analyzed for but not detected at or above the associated detection limit. Also, samples associated with contaminated blanks were qualified with a "U" if sample results were positive but less than five times (or ten times, as applicable) blank result. This approach directly follows EPA guidance.

J = The associated value is an estimated quantity. Data accuracy, precision, surrogate spike recovery or compound quantitation were slightly outside the established criteria, but do not signify substantial problems. While the quantity is estimated, and the value may be slightly higher or lower than the "actual" value, the data may still be used quantitatively (USEPA, 1989).

R = QC indicates that the data are not usable. Compound may or may not be present.

1.3.1.5 Data Validation Results

The following subsections include a general discussion of the data validation results on a method-specific basis. Refer to Table 1-4 for validated water quality results.

One sample collected from Via Verde effluent station during the March 8, 2000 storm event was rejected for all composite sample analytes listed below due to suspect contamination of the 20-liter composite bottle with nitric acid. As shown in Table 1-4, the low results for pH (3.4) and relatively elevated value for nitrate (8.60 mg/L) suggest possible contamination from the nitric acid, which is used during the bottle cleaning procedure. Although the associated blanks (bottles, tubing, filters, method blanks, etc.) are not indicating contamination, this data set is considered suspect and therefore has been rejected.

pH and Specific Conductance

Analyses for these parameters met all quality control criteria except for holding times for some samples analyzed for pH. Although samples were analyzed just slightly beyond the technical holding time, results were flagged by the laboratory and further qualified during the data validation as estimated ("J"). All environmental sample results within this analyte group are considered valid and usable.

Hardness

Analyses for hardness met all quality control criteria except for precision data as measured by the RPD in the laboratory split samples collected during the February 20, 2000 and April 17, 2000 events. Associated sample results for samples collected during the February 20, 2000 were not qualified on this basis since sample concentration was near the reporting limit (less than five times the reporting limit value). Calculated RPD values for associated MS/MSD as well as field duplicates were well within project objectives. Associated sample results for samples collected

during the April 17, 2000 event were qualified as estimated ("J") given that sample concentrations (samples used to calculate RPD) were higher (greater than five times the reporting limit value) than the laboratory splits collected on February 20, 2000. All environmental sample results within this analyte group are considered valid and usable.

TSS

Analyses for TSS met all quality control criteria and therefore are not qualified. All environmental sample results within this analyte group are considered valid and usable.

Nitrate-N

Analyses for Nitrate-N met all quality control criteria and therefore are not qualified. The detection of nitrate in one of the tubing blanks (tubing blank # 2, see Section 1.3.1.2) was carefully evaluated with respect to all associated environmental sample results (all effluent samples collected during February 20, 2000 event) to determine whether qualification was deemed necessary. Although some of the associated sample results were less than five times the blank concentration, 1998-1999 wet season data are consistent with levels found during this monitoring season, suggesting that the detection of nitrate in the tubing blank may be an isolated case of contamination. As previously mentioned, small levels of nitrate were also detected in some of the bottle blanks (i.e., bottle blank #1). With the exception of one sample result associated with bottle blank #1 (influent sample for Via Verde collected during February 20, 2000 event), all sample concentrations were greater than five times their associated blank concentration and therefore were not qualified. The influent sample from Via Verde was qualified as non-detected ("U"). All environmental sample results within this analyte group are considered valid and usable.

TKN

The data validation review of TKN results indicates that there were minor discrepancies noted in laboratory QC samples associated with this analyte group. All LCS/LCSD and MS/MSD were within the established acceptance criteria except for one batch analyzed in which the MSD percent recovery was above the upper control limit. Associated sample results (effluent samples collected on February 20, 2000 for Eastern, Termination, and Lakewood) were qualified as estimated ("J"). The detection of low concentrations of TKN in two bottle blanks (bottle blank #5 and #7), as previously mentioned (Section 1.3.1.2), were evaluated with respect to their associated environmental sample to determine whether qualification was deemed necessary. Environmental sample results less than five time their associated blank concentration (effluent samples collected on March 8, 2000 from Termination and Lakewood and the effluent sample collected on April 17, 2000 from Eastern MS) were qualified as non-detected ("U").

As shown in Table 1-7, the RPD calculated for the split sample collected at I-5/I-605 during the March 8, 2000 event was above the acceptance criteria of 20 percent. Associated sample results (influent samples for Foothill, I-5/I-605, I-605/SR-91, and Lakewood) were qualified as estimated ("J"). All environmental samples are considered valid and usable.

Total Phosphorous

Analyses for total phosphorous met all quality control criteria except for precision data as measured by the RPD calculated for the split samples collected at I-5/I-605 during the February 27, 2000. As shown in Table 1-7, the calculated RPD was above the acceptance criteria of 20 percent. Associated sample results (influent and effluent samples for both EDBs and influent for Eastern, Foothill, Via Verde, and Lakewood) were qualified as estimated ("J"). All environmental samples are considered valid and usable.

Total/Dissolved Metals

The data validation review of both total and dissolved metal results indicates that there were some discrepancies noted in laboratory QC samples associated with this analyte group. In general, precision and accuracy data for both fractions were within project objectives except for precision data as measured by the RPD calculations for the laboratory split samples collected during the February 20, 2000 and March 8, 2000. The RPD for total lead in the first event sampled is greater than the specified criteria of 20 percent (Table 1-7). Associated sample results (all samples collected during the February 20, 2000 except for I-5/I-605) were qualified as estimated ("J"). The higher variability observed in the duplicates from the third event sampled, were attributed to a non-homogeneous distribution of solids between the two sample containers as observed by the laboratory (sample was re-digested and re-analyzed with similar results). In this case, qualification was limited to the sample (influent sample for I-5/I-605) used to calculate the RPD value.

With the exception of zinc, all method blanks were free of metals. As previously mentioned (Section 1.3.1.2), zinc was detected in some of the filter (dissolved zinc only) and bottle blanks. Zinc was also detected in some of the method blanks. Environmental sample concentrations at less than five times the amount detected in the associated blank were qualified as non-detected ("U") and, therefore, are considered not present above the reported value. Dissolved zinc results for four samples (effluent for Foothill, Eastern, Termination, and Via Verde) collected during the February 20, 2000 event, are slightly higher than the total concentration reported (Table 1-4). In all cases, zinc was detected in at least one associated blank. It should be noted that although effluent samples collected from Termination (February 20, 2000), I-5/I-605 (April 17, 2000), Via Verde (April 17, 2000), and Lakewood (April 17, 2000) were associated with blank contamination, the data were not qualified since sample concentrations were greater than five times the concentration found in the blank. However, because sample results were less than ten times the associated blank concentration, the reported value should be considered an upper limit of the true sample concentration (biased high). All environmental sample results within this analyte group are considered valid and usable.

TPH

Analyses for TPH including gasoline, diesel, and oil fractions met all quality control criteria except for accuracy data in one analytical batch for TPH diesel. TPH-diesel range results were quantified based on the response factor of a Diesel No. 2 standard. TPH-motor oil range was

identified in some samples and it was also quantified based on the response factor for diesel. The percent recovery for the MSD sample for TPH diesel collected during the February 27, 2000 event was below the lower control limit. Associated sample results for both diesel and oil (all samples collected during the February 27, 2000 event except for Alameda samples and the influent sample for Via Verde) should be considered biased low and are qualified as estimated ("J"). TPH diesel/oil surrogate recoveries for the influent sample collected from I-605/SR-91 during the April 17, 2000 event were above the upper control limit. TPH diesel /oil results for this sample were qualified as estimated ("J"). All environmental sample results within this analyte group are considered valid and usable.

Oil & Grease

Analyses for oil & grease met all quality control criteria except for sample preservation during the April 17, 2000. Because the containers used to collect oil & grease samples were inadvertently not preserved with H_2S0_4 (or HCL) as required by the method, sample results were qualified as estimated ("J"). All environmental sample results within this analyte group are considered valid and usable.

Bacteria

Analyses for bacteria met all quality control criteria and therefore are not qualified. All samples were analyzed within the 24 hours technical holding time. Although field duplicates and laboratory splits were collected for bacteria samples (Table 1-6 and Table 1-7), no qualification was performed based on precision data since there is no established criteria to evaluate sample comparability for bacteria analysis. All sample results for bacteria are considered valid and usable.

1.3.2 Water Quality Results

The sections below present the results of analytical testing of stormwater samples during the first quarter of the 1999-2000 wet season. These results are evaluated in terms of BMP performance, while considering the data validation qualifiers shown in Table 1-4.

1.3.3 Solids Sampling Results

Due the relatively short service life of the BMPs under this evaluation, the sampling and removal of accumulated sediments was not necessary. Based on trends to date, removal of accumulated solids in the District 7 BMPs discussed here is not anticipated for another year or two.

Trash, debris, and sediment were often removed from the trench drain leading to the Alameda Maintenance Station oil/water separator. Sediment waste has been retained in a properly designed and labeled waste drum that is stored on site. Once this drum approaches capacity, sampling of its contents will be conducted, which will govern proper disposal methods.

1.4 Preliminary BMP Performance Evaluations

A preliminary evaluation of BMP performance was conducted to provide initial estimates of event-related BMP efficiencies (Table 1-9). The BMP efficiencies were calculated based upon relative percent difference of the event-mean concentrations (EMCs) of BMP influent and effluent samples. In situations where a given analyte was reported as undetected, the reporting limit value was used as the concentration (e.g., "1" substituted for "<1;" see Table 1-9). However, in situations where both influent and effluent samples yielded undetectable amounts of an analyte, calculations are not possible. BMP efficiency was calculated by:

$$\text{Efficiency (\%)} = [(\text{EMC in} - \text{EMC out})/\text{EMC in}] \times 100$$

In determining pollutant load reduction per storm event, the calculated influent and effluent load values (EMCs multiplied by runoff volume) were substituted for the EMC value above. Event-based BMP efficiencies and corresponding percent differences in pollutant loads are shown as positive or negative values, which respectively indicate a pollutant load decrease (+) or a pollutant load increase (-) as a result of stormwater passing through a BMP.

In contrast, pollutant-loading determinations for the entire wet season were calculated in accordance with the methodology outlined in Appendix F of the *Operation, Maintenance and Monitoring Plan, District 7, Volume I*. Pollutant load-reduction values based on these data are presented along with average, minimum, and maximum efficiency rates in Table 1-10. Apart from effluent data for nitrate-nitrogen collected at one of the MCTT sites (Via Verde), the calculated coefficient of variation values for determining average efficiency were all below 1.5. At the MCTT site, the coefficient of variation was only slightly above (1.552) the criteria.

There are several factors that are known to have influenced efficiency results:

- Commingling storms
- Biases in determining flow volume associated with:
  - inaccuracies in monitoring low-flow conditions (shallow pipe flows)
  - exfiltration or other unintended water losses from the BMP
- Matrix variation inherent to stormwater sampling
- Mechanical and/or electrical conditions

Critical to the depth of this evaluation is the lack of rainfall during the monitoring season, the number of storms captured, and the inherent difficulties in accurately measuring flow at pump sites. As noted in the data validation section above, one event was also rejected (Via Verde, 3/8/00 event), presumably due to nitric-acid residue contamination from sample bottle decontamination. Even though the sample population is small and insufficient for useful statistical analyses, general trends are apparent in the data collected.

As shown by Table 1-9 and the corresponding plots in Figure 1-12 through 1-14, the BMPs evaluated as part of the District 7 program manifested the following performance qualities during the 1999-2000 wet season:

- **Extended detention basins** (Figure 1-12; Table 1-9) had variable success at reducing particulates (TSS), with percent removal efficiencies ranging from -53 to 83 and averaging 9 percent (I-5/I-605) and 75 percent (I-605/SR-91) at the two EDB sites. The relatively higher pollutant removals observed at the I-605/SR-91 (Table 1-9) are partially due to the difference in influent and effluent volumes. The loss of water in this BMP is a direct result of exfiltration through the earth basin. Slightly higher effluent TSS values at the I-5/I-605 EDB for the second (February 27) and fourth storm event (April 17) skewed removal efficiency. Calculated efficiencies for total metals were generally positive, showing the greater removals overall during the third event. Dissolved metals removals were not as consistent nor dramatic. Removal of nutrients was mixed, with no parameter presenting consistent removal. Average pollutant removals (Table 1-10) were highest for dissolved lead and dissolved zinc at the concrete-lined EDB (I-5/I605) and for TSS, total lead, and total zinc at the earthen EDB (I-605/SR-91).

- **Sand Filters** (Figure 1-12; Tables 1-9 and 1-10) were very effective in removing suspended particulates (TSS), with removal efficiencies falling no lower than 78 percent at Eastern MS, and as high as 99 percent at Termination P&R. Total metals concentrations were also reduced significantly for most events and sites, except for lead for event 1 at Eastern MS. Trends in dissolved metals removal were not as consistent, with dissolved copper being least affected overall. Dissolved lead was detected least among the dissolved metals analyzed, and generally not detected at the Termination P&R BMP except for the influent sample collected during the fourth event. Nitrate-nitrogen levels were generally unaffected although effluent sample concentrations were nearly always slightly higher than influent levels. Conversely, TKN and total phosphorous removals were generally good, with removal averages ranging from 45 to 64 percent (TKN) and –12 to 57 percent (T-P). Total phosphorous concentrations in runoff were consistently low, and the extremely low phosphorous concentrations at Foothill MS (2/27/00) along with the associated "estimated" influent value appear to have biased phosphorous removals in a negative direction. Among the sand filters, average TSS removal was significant, remaining greater than 80 percent. The high degree of particulate removal was reflected in similar reductions in total metals. Average concentrations of dissolved metals and nutrients (except for nitrate-nitrogen and dissolved copper) were also reduced appreciably.

- **MCTTs** (Figure 1-12; Tables 1-9 and 1-10), similar to the sand filters, were also effective in removing suspended particulates (TSS). Removal of total metals exhibited similar general trends as TSS, with total copper being the least affected. Similar to the sand filter results, dissolved lead was not found in any Park & Ride BMP stormwater samples. Removal of dissolved copper was not consistent among MCTTs, but dissolved zinc was effectively removed for all events at both BMP locations. Similar to sand filter results, MCTT samples showed no affect in reducing nitrate-nitrogen. Although nitrate-nitrogen levels were consistently higher in effluent samples, concentrations were very low and similar in scale to

influent values. Removal of TKN and total phosphorous was generally good. Average removal efficiencies were highest for total/dissolved zinc and TSS among the MCTTs. Nutrients were removed at moderate levels, however there was no effect in removing nitrate-nitrogen.

- **Oil/Water Separator** (Table 1-9) removal efficiencies for TSS, TPH, and oil & grease were mixed, with diesel-range TPH showing the only consistent detection and removal by the oil/water separator. With the exception of the influent sample collected during the April 17 event, oil & grease was not detected in any influent or effluent stormwater sample.

- **Average Efficiencies** (Figure 1-13; Table 1-10) for TSS removal were 70 percent or better for all BMPs, except the I605/SR-91 EDB where slightly higher effluent values appear to have biased performance downward. Again, the I-605/SR-91 EDB removal averages are also biased high due to inflow/outflow volume discrepancies from water loss through the BMP. In general, all BMPs exhibited better removal of total zinc and lead than total copper. Most BMPs had fairly good removal of dissolved zinc, but had less effect on removing dissolved lead and variable impact on reducing average dissolved copper concentrations. With the minor exception of the EDBs, none of the BMPs were effective on reducing average nitrate-nitrogen. However, sand filters and MCTTs had fairly good average removal rates of TKN. Total phosphorous removals averaged between 40 and 50 percent, except for the I-5/I-605 EDB and the Lakewood MCTT.

- **Load Reductions** (Figure 1-14; Table 1-10) were most significant for TSS, with all other parameters measuring substantially less. Removal of nutrients was notable, but the addition of nitrate-nitrogen was also measured at sand filters and MCTTs. Load removals for total and dissolved metals were small, with total and dissolved zinc being removed with the greatest success. Because loading calculations are largely dependent on influent and effluent flow volumes (which have experienced persistent measurement problems), these data should be loosely interpreted until other confirming data can be collected.

Overall, the BMP efficiencies calculated for the 1999-2000 wet season appear promising on several fronts. However, variations and differences among influent and effluent flow volumes influenced these values. The affects of prolonged, low-flow BMP drain times, the presence of residual stormwater from preceding rainfall, and the water loss due to exfiltration (I-605/SR-91 EDB) and leakage (Via Verde MCTT) impacted these results. It should be noted that in one case (4/17/00 event at Foothill MS), the influent volume was adjusted upward by applying an additional 5 percent to the effluent volume to account for minor water loss through the BMP. This was done because conditions prior to the April 17 storm were completely dry and the BMP was devoid of any residual stormwater that would have contributed to the effluent flow. Since this site has consistently experienced problems in measuring influent flow, and the influent value was a fraction of the presumed flow through the BMP, the influent flow volume at Foothill was adjusted to provide a more realistic performance value. Until further confirmation measurements can be taken or other calibrating corrections can be applied to the existing data, caution should be used in interpreting these results.

Although initial data indicate that the OWS was not effective for reducing the levels of oil and grease found at the maintenance yard, results from the April 17 event suggest that some reduction may be taking place. Additional data is required to support further evaluation of this BMP performance.

Table 1-1.
District 7 BMP Locations, Brown and Caldwell.

Site ID	BMP Location	BMP Type
74101	I-5/I-605	Extended Detention Basin
74102	I-605/SR-91	Extended Detention Basin
74201	Alameda Maintenance Station	Oil/Water Separator
74202	Eastern Regional Maintenance Station	Austin-type Media Filter (Sand)
74203	Foothill Maintenance Station	Austin-type Media Filter (Sand)
74204	Termination Park & Ride	Austin-type Media Filter (Sand)
74206	Via Verde Park & Ride	Multi-chambered Treatment Train
74208	Lakewood Park & Ride	Multi-chambered Treatment Train

Table 1-2. Rainfall Data for Each Monitored Event.

Site/Event	Start Rain (date / time)	Stop Rain (date / time)	Duration Rain (hh:mm)	Total Rain (inches)	Maximum Intensity (inches/hour)	Antecedent Rain (days)	Antecedent Rain (inches)
January 25 Event							
I-5/I605	25-Jan-00 01:00	25-Jan-00 21:00	20:00	0.55	0.84	24.9	0.21
I-605/SR-91	25-Jan-00 05:00	25-Jan-00 22:00	17:00	0.48	0.96	24.1	0.42
Alameda	25-Jan-00 03:00	25-Jan-00 21:00	18:00	0.51	0.36	24.5	0.11
Eastern	25-Jan-00 00:00	25-Jan-00 22:00	22:00	0.71	1.80	24.1	0.27
Foothill	25-Jan-00 02:00	25-Jan-00 21:45	19:45	0.68	1.68	24.3	0.28
Lakewood	24-Jan-00 23:10	25-Jan-00 21:05	21:55	0.53	0.36	24.3	0.06
Termination	25-Jan-00 00:00	25-Jan-00 20:55	20:55	0.61	1.44	24.2	0.10
Via Verde	25-Jan-00 00:00	25-Jan-00 21:00	21:00	0.88	1.68	24.2	0.35
February 20 Event							
I-5/I605	20-Feb-00 06:00	21-Feb-00 16:40	34:40	2.29	1.32	3.4	0.65
I-605/SR-91*	20-Feb-00 05:49	21-Feb-00 17:19	35:30	2.14	0.96	3.3	0.62
Alameda	20-Feb-00 06:20	21-Feb-00 13:55	31:35	1.69	0.96	3.4	0.79
Eastern	20-Feb-00 06:20	21-Feb-00 18:35	36:15	2.35	0.72	3.4	0.72
Foothill	20-Feb-00 06:45	21-Feb-00 17:50	35:05	2.95	1.08	3.4	0.91
Lakewood	20-Feb-00 05:55	21-Feb-00 16:40	34:45	1.89	0.60	3.4	0.55
Termination	20-Feb-00 05:55	21-Feb-00 17:20	35:25	2.16	0.96	3.4	0.66
Via Verde	20-Feb-00 06:35	21-Feb-00 17:10	34:35	2.52	1.44	3.4	1.15
February 27 Event							
I-5/I605	27-Feb-00 13:00	27-Feb-00 14:15	1:15	0.21	0.84	3.9	1.06
I-605/SR-91*	27-Feb-00 13:04	27-Feb-00 14:08	1:04	0.16	0.36	4.0	0.98
Alameda	27-Feb-00 12:00	27-Feb-00 15:25	3:25	0.20	0.48	3.9	1.40
Eastern	27-Feb-00 12:20	27-Feb-00 14:30	2:10	0.33	0.36	3.9	1.44
Foothill	27-Feb-00 12:00	27-Feb-00 17:40	5:40	0.49	0.60	3.9	1.01
Lakewood	27-Feb-00 12:40	27-Feb-00 14:15	1:35	0.14	0.24	3.9	1.06
Termination	27-Feb-00 13:10	27-Feb-00 15:30	2:20	0.15	0.24	4.0	1.01
Via Verde	27-Feb-00 12:55	27-Feb-00 14:45	1:50	0.40	0.48	3.9	1.47
March 8 Event							
I-5/I605	08-Mar-00 02:55	08-Mar-00 11:00	8:05	0.96	0.72	1.5	1.66
I-605/SR-91*	08-Mar-00 02:12	08-Mar-00 10:58	8:46	0.83	0.48	2.7	0.92
Alameda	08-Mar-00 00:45	08-Mar-00 13:45	13:00	0.68	0.36	1.8	2.53
Eastern	08-Mar-00 03:20	08-Mar-00 11:15	7:55	1.21	0.60	2.0	2.40
Foothill	08-Mar-00 02:00	08-Mar-00 11:20	9:20	0.80	0.48	2.5	2.14
Lakewood	08-Mar-00 03:00	08-Mar-00 11:00	8:00	0.98	3.00	1.9	1.63
Termination	08-Mar-00 03:00	08-Mar-00 11:00	8:00	0.92	1.44	1.9	1.53
Via Verde	08-Mar-00 01:45	08-Mar-00 13:15	11:30	0.75	0.36	1.9	1.50
April 17 Event							
I-5/I605	17-Apr-00 11:00	18-Apr-00 09:20	22:20	2.57	2.88	40.0	0.96
I-605/SR-91	17-Apr-00 11:00	18-Apr-00 09:25	22:25	1.46	3.72	40.0	0.83
Alameda	17-Apr-00 10:00	18-Apr-00 08:45	22:45	1.44	0.48	39.8	0.68
Eastern	17-Apr-00 10:55	18-Apr-00 09:10	22:15	2.31	0.96	40.0	1.21
Foothill	17-Apr-00 10:45	18-Apr-00 11:00	24:15	2.92	1.20	40.0	0.80
Lakewood	17-Apr-00 10:45	18-Apr-00 09:15	22:30	1.62	1.20	40.0	0.98
Termination	17-Apr-00 10:55	18-Apr-00 09:20	22:25	1.68	1.44	40.0	0.92
Via Verde	17-Apr-00 11:20	18-Apr-00 10:25	23:05	2.29	3.00	39.9	0.75

* Rain gauge malfunction suspected. Data reflects Law/Gibb rain gauge at nearby I-605/SR-91 swale or Cerritos swale.

Table 1-3. Flow Data for Each Monitored Event.

Site/Event	Start Flow		End Flow		Flow Duration (hh:mm)	Total Flow (ft^3)	Vol to Sample	Sample Aliquots	Peak Flow (cfs)	% Capture	Peak Capture	Detention Time (hrs)
	Date	Time	Date	Time								
February 20 Event												
I-5/I-605-Inf	02/20/00	06:10	02/22/00	06:15	24:05	32021	0.19/0.37	120	3.422	94	Y	NA
I-5/I-605-Eff	02/20/00	06:25	02/23/00	05:54	47:29	23071	0.19/0.37	94	0.172	100	Y	47.73
I-605/SR-91-Inf	---	---	---	—	---	---	---	---	—	---	---	—
I-605/SR-91-Eff	---	---	---	—	---	---	---	---	—	---	---	—
Alameda MS-Eff	02/20/00	06:16	02/21/00	13:50	31:34	1702	N/A	N/A	0.343	N/A	N/A	N/A
Eastern MS-Inf	02/20/00	06:18	02/21/00	19:20	37:02	10677	0.07/0.13	120	0.468	100	Y	N/A
Eastern MS-Eff	02/20/00	08:43	02/23/00	05:45	69:02	10767	0.07/0.13	118	0.095	100	Y	71.45
Foothill MS-Inf	02/20/00	06:40	02/21/00	15:25	32:45	27240	0.09/0.18	154	4.72	75	Y	N/A
Foothill MS-Eff	02/20/00	08:48	02/23/00	04:05	67:17	35854	0.09/0.18	241	0.168	99	Y	69.42
Lakewood-Inf	02/20/00	06:05	02/21/00	12:50	30:45	4385	0.10/0.20	74	0.838	100	Y	N/A
Lakewood-Eff	02/22/00	11:48	02/22/00	21:03	9:15	6812	0.10	69	0.203	100	Y	62.97
Termination-Inf	02/20/00	06:13	02/21/00	17:20	35:07	16033	0.13/0.25	96	2.407	90	N	N/A
Termination-Eff	02/20/00	08:54	02/23/00	05:25	68:31	15952	0.13/0.25	114	0.199	100	Y	71.20
Via Verde-Inf	02/20/00	07:03	02/21/00	15:05	32:02	6194	0.05/0.10	94	0.901	100	Y	N/A
Via Verde-Eff	02/22/00	13:45	02/22/00	19:35	53:50	4936	0.05/0.10	87	0.255	100	Y	60.53
February 27 Event												
I-5/I-605-Inf	02/27/00	13:10	02/27/00	23:10	10:10	1776	0.06	32	0.366	100	Y	N/A
I-5/I-605-Eff	02/27/00	13:25	02/28/00	03:05	13:40	1221	0.06	22	0.097	100	Y	13.92
I-605/SR-91-Inf	02/27/00	13:21	02/27/00	15:00	1:39	304	0.01	25	0.162	100	Y	N/A
I-605/SR-91-Eff	02/27/00	14:55	02/27/00	17:55	3:00	037	0.005	08	0.01	100	Y	4.57
Alameda MS-Eff	02/27/00	12:04	02/27/00	15:35	3:31	181	N/A	N/A	0.074	N/A	N/A	N/A
Eastern MS-Inf	02/27/00	12:18	02/27/00	16:00	3:42	1253	0.01	80	0.228	84	Y	N/A
Eastern MS-Eff	02/27/00	13:59	02/29/00	08:00	42:01	1184	0.01	88	0.036	98	Y	43.70
Foothill MS-Inf	02/27/00	12:27	02/27/00	15:00	2:33	1272	0.04	36	0.591	100	Y	N/A
Foothill MS-Eff	02/27/00	14:40	03/01/00	06:15	63:35	5437	0.04	153	0.17	99	Y	65.80
Lakewood-Inf	02/27/00	13:05	02/27/00	16:30	3:25	847	0.03	29	0.243	100	Y	N/A
Lakewood-Eff	02/28/00	09:55	02/28/00	11:30	1:35	873	0.01	70	0.19	87	Y	22.42
Termination-Inf	02/27/00	13:06	02/27/00	17:35	4:29	2397	0.04	62	0.57	100	Y	N/A
Termination-Eff	02/27/00	13:43	03/02/00	11:11	93:28	5079	0.04	133	0.154	100	Y	94.08
Via Verde-Inf	02/27/00	12:55	02/27/00	15:50	2:55	859	0.02	58	0.232	100	Y	N/A
Via Verde-Eff	02/28/00	07:38	02/28/00	08:45	1:07	832	0.005	57	0.231	66	Y	19.83

Table 1-3. Flow Data for Each Monitored Event (continued).

Site/Event	Start Flow		End Flow		Flow Duration (hh:mm)	Total Flow (ft^3)	Vol to Sample	Sample Aliquots	Peak Flow (cfs)	% Capture	Peak Capture	Detention Time (hrs)
	Date	Time	Date	Time								
March 8 Event												
I-5/I-605-Inf	03/08/00	03:25	03/08/00	10:50	7:25	10634	0.09/0.19	84	1.43	79	Y	N/A
I-5/I-605-Eff	03/08/00	03:35	03/10/00	21:10	65:35	12355	0.09/0.19	103	0.109	97	Y	65.75
I-605/SR-91-Inf	03/08/00	03:10	03/09/00	06:55	27:45	6658	0.02/0.04	183	0.653	87	Y	N/A
I-605/SR-91-Eff	03/08/00	04:20	03/09/00	16:05	35:45	1793	0.01/0.16	136	0.03	87	Y	36.92
Alameda MS-Eff	03/08/00	00:45	03/08/00	10:50	10:05	600	N/A	N/A	0.1	N/A	N/A	N/A
Eastern MS-Inf	03/08/00	03:20	03/08/00	15:30	12:10	6134	0.03/0.07	131	0.511	99	Y	N/A
Eastern MS-Eff	03/07/00	05:15	03/10/00	22:00	88:45	4804	0.03/0.07	97	0.144	100	Y	66.67
Foothill MS-Inf	03/08/00	03:00	03/08/00	17:30	14:30	4825	0.04/0.09	93	0.58	99	Y	N/A
Foothill MS-Eff	03/08/00	05:15	03/11/00	05:25	72:10	6927	0.04	157	0.171	100	Y	74.42
Lakewood-Inf	03/08/00	03:15	03/08/00	20:50	17:35	6606	0.05/0.10	85	0.88	68	N	N/A
Lakewood-Eff	03/10/00	07:35	03/10/00	16:35	9:00	7009	0.10	72	0.226	100	Y	61.33
Termination-Inf	03/08/00	03:40	03/08/00	10:50	7:10	6332	0.06/0.13	87	1.388	100	Y	N/A
Termination-Eff	03/08/00	04:05	03/11/00	05:55	73:50	12280	0.06/0.13	178	0.188	99	Y	74.25
Via Verde-Inf	03/08/00	02:55	03/08/00	12:15	9:20	1972	0.02/0.05	78	0.296	100	Y	N/A
Via Verde-Eff	03/09/00	15:40	03/09/00	18:10	2:30	1930	0.02	78	0.235	100	Y	39.25
April 17 Event												
I-5/I-605-Inf	04/17/00	12:00	4/18/2000	10:10	22:10	33768	0.07/0.20	178	8.17	75	Y	N/A
I-5/I-605-Eff	04/17/00	11:35	4/20/2000	22:55	83:20	32214	0.07/0.27	175	5.339	100	Y	83
I-605/SR-91-Inf	04/17/00	13:55	4/18/2000	10:35	20:40	7504	0.02/0.05	200	2.312	89	Y	N/A
I-605/SR-91-Eff	04/17/00	10:20	4/19/2000	4:10	41:50	2428	0.02/0.04	102	0.05	100	Y	38
Alameda MS-Eff	04/17/00	10:20	4/18/2000	9:05	22:45	1481	NA	NA	0.098	N/A	N/A	N/A
Eastern MS-Inf	04/17/00	11:00	4/18/2000	14:00	27:00	7616	0.02/0.07	155	0.627	99	Y	N/A
Eastern MS-Eff	04/17/00	13:40	4/21/2000	6:10	88:30	9543	0.02/0.07	168	0.173	100	Y	91
Foothill MS-Inf	04/17/00	11:50	4/18/2000	12:15	24:25	4677	0.03/0.10/0.06	99	0.611	99	Y	N/A
Foothill MS-Eff	04/17/00	12:20	4/21/2000	6:05	89:45	36492	0.03/0.10/0.13	370	0.183	99	Y	90
Lakewood-Inf	04/17/00	11:30	4/18/2000	9:35	22:05	10812	0.03/0.11	149	2.027	95	Y	N/A
Lakewood-Eff	04/19/00	09:15	4/20/2000	8:40	23:25	7311	0.09	73	0.218	100	Y	69
Termination-Inf	04/17/00	11:00	4/18/2000	10:30	23:30	12692	0.05/0.09/0.19	161	4.363	97	Y	N/A
Termination-Eff	04/18/00	09:45	4/22/2000	12:10	98:25	15034	0.19	146	0.199	100	Y	121
Via Verde-Inf	04/17/00	11:20	4/18/2000	10:40	23:20	6642	0.02/0.06	172	3.328	100	Y	N/A
Via Verde-Eff	04/19/00	10:50	4/19/2000	13:45	02:55	2341	0.03	78	0.235	100	Y	50

Table 1-4. Summary of Storm Water Quality Results for Monitored Events.

Sample Date	BMP Location	Site ID	BMP Type	Sampling Location	Percent Storm Capture	pH	Specific Conductance (µmhos/cm)	Hardness (mg/L)	TSS (mg/L)	Total Metals (ug/L) Cu	Total Metals (ug/L) Pb	Total Metals (ug/L) Zn	Dissolved Metals (ug/L) Cu	Dissolved Metals (ug/L) Pb	Dissolved Metals (ug/L) Zn	Nitrate Nitrogen (mg/L)	TKN (mg/L)	Total P (mg/L)	Fecal Coliform (MPN/100mL)	TPH Diesel (µg/L)	TPH Gasoline (µg/L)	TPH Oil (µg/L)	Oil & Grease (mg/L)
Storm Water Matrix																							
February 20, 2000	I-5/I-605 Intersection	074101	EDB [1]	Influent	94	7.3	77	40	110	15.1	31.7	104.0	4.32	2.80	44.4	0.59	1.4	0.420	28,000	1,300	50 U	690	---
February 20, 2000	I-5/I-605 Intersection	074101	EDB [1]	Effluent	99	7.5	81	29	32	17.6	49.0	79.8	4.85	2.13	36.1	0.64	1.1	0.310	3,000	800	50 U	340	---
February 20, 2000	I-605/SR-91 Intersection	074102	EDB [2]	Influent	---	---	---	---	---	---	---	---	---	---	---	---	---	---	500	2,100	50 U	1,000	---
February 20, 2000	I-605/SR-91 Intersection	074102	EDB [2]	Effluent	---	---	---	---	---	---	---	---	---	---	---	---	---	---	500	1,100	50 U	470	---
February 20, 2000	Alameda MS	074201	OWS	Influent	NA	7.4	88	32	68	---	---	---	---	---	---	---	---	---	---	770	50 U	250	5 U
February 20, 2000	Alameda MS	074201	OWS	Effluent	NA	6.8	57	20	13	---	---	---	---	---	---	---	---	---	---	590	50 U	260	5 U
February 20, 2000	Eastern Regional MS	074202	SF	Influent	100	7.3 J	37	10	23	9.18	11.6 J	47.8	5.00	1.17	33.7	0.36	0.87	0.085	900	530	50 U	210	---
February 20, 2000	Eastern Regional MS	074202	SF	Effluent	100	7.2 J	42	15	5	8.42	18.9 J	13.3	3.74	1.0 U	15.1 U	0.45	0.42 J	0.032	500	340	50 U	200 U	---
February 20, 2000	Foothill MS	074203	SF	Influent	75	7.0 J	55	20	75	19.6	28.2 J	252.0	5.36	2.47	151.0	0.20	2.1	0.470	70,000	930	50 U	380	---
February 20, 2000	Foothill MS	074203	SF	Effluent	99	7.2	51	14	5	8.47	9.65 J	21.1	4.15	1.0 U	22.6	0.44	1.0	0.180	500	260	50 U	200 U	---
February 20, 2000	Termination P&R	074204	SF	Influent	90	7.4	49	16	44	15.0	12.1 J	83.0	3.94	1.0 U	27.2	0.20	0.78	0.160	900	1,000	50 U	370	---
February 20, 2000	Termination P&R	074204	SF	Effluent	100	7.3	69	18	4	6.18	4.43 J	13.5	3.56	1.0 U	17.1	0.63	0.48 J	0.077	110	290	50 U	200 U	---
February 20, 2000	Via Verde P&R	074206	MCTT	Influent	100	6.9 J	15	4.8	41	4.89	6.50 J	52.9	1.02	1.0 U	23.4	0.10 U	0.90	0.160	6,000	910	50 U	410	---
February 20, 2000	Via Verde P&R	074206	MCTT	Effluent	80	7.2	36	11.0	3	4.92	4.39 J	8.74	1.35	1.0 U	10.6 U	0.37	0.78	0.088	110	110	50 U	200 U	---
February 20, 2000	Lakewood	074208	MCTT	Influent	100	6.9	22	8.0	24	8.42	11.0 J	58.1	2.84	1.0 U	41.6	0.18	0.95	0.091	500	600	50 U	240	---
February 20, 2000	Lakewood	074208	MCTT	Effluent	100	7.1	44	18	8.2	6.15	8.18 J	25.0	3.15	1.0 U	19.0	0.81	0.42 J	0.091	500	160	50 U	200 U	---
February 27, 2000	I-5/I-605 Intersection	074101	EDB [1]	Influent	100	7.6	110	58	34	19.3	34.2	110.0	8.49	3.99	57.8	0.75	2.1	0.250 J	500	1,000	50 U	460	---
February 27, 2000	I-5/I-605 Intersection	074101	EDB [1]	Effluent	100	7.5	120	48	52	18.6	33.4	91.3	9.06	4.01	47.3	0.77	2.6	0.850 J	500	1,200	50 U	510	---
February 27, 2000	I-605/SR-91 Intersection	074102	EDB [2]	Influent	100	7.8	160	73	110	39.9	124.0	541	14.5	3.92	263	1.50	2.7	0.50 J	2,800	2,200 J	50 U	820 J	---
February 27, 2000	I-605/SR-91 Intersection	074102	EDB [2]	Effluent	100	7.8	270	---	19	37.0	38.5	250	24.3	3.55	175	1.80	---	0.69 J	1,700	1,100 J	50 U	220 J	---
February 27, 2000	Alameda MS	074201	OWS	Influent	NA	7.2	94	30	37	--- ---	--- ---	---	---	---	---	---	---	---	---	970	50 U	260	5 U
February 27, 2000	Alameda MS	074201	OWS	Effluent	NA	7.1	52	18	170	--- ---	--- ---	---	---	---	---	---	---	---	---	490	50 U	250	5 U
February 27, 2000	Eastern Regional MS	074202	SF	Influent	84	7.2	45	15	31	15.3	24.0	72.7	8.02	1.81	37.1	0.79	1.1	0.130 J	300	1,100 J	50 U	340 J	---
February 27, 2000	Eastern Regional MS	074202	SF	Effluent	98	7.0	56	24	6.2	8.63	4.71	25.1	7.51	1.30	20.4	1.20	0.84	0.058	500	390 J	50 U	200 UJ	---
February 27, 2000	Foothill MS	074203	SF	Influent	100	6.9	30	5.6	38	11.9	17.8	226.0	4.49	1.62	155.0	0.66	1.2	0.036 J	24,000	1,100 J	50 U	220 J	---
February 27, 2000	Foothill MS	074203	SF	Effluent	99	7.1	60	31	7.4	6.96	2.34	41.3	5.52	1.0 U	34.4	0.93	0.14	0.097	21	100 UJ	50 U	200 UJ	---
February 27, 2000	Termination P&R	074204	SF	Influent	100	7.4	54	18	96	23.8	16.5	156.0	6.90	1.0 U	55.5	0.68	1.8	0.230	220	1,400 J	50 U	410 J	---
February 27, 2000	Termination P&R	074204	SF	Effluent	99	7.3	90	28	1 U	6.53	1.0 U	21.5	6.33	1.0 U	20.2	1.00	0.50	0.069	2 U	100 J	50 U	200 UJ	---
February 27, 2000	Via Verde P&R	074206	MCTT	Influent	100	6.8	25	12	26	5.40	4.89	69.3	1.75	1.0 U	33.3	0.70	1.6	0.160 J	500	230	50 U	200 U	---
February 27, 2000	Via Verde P&R	074206	MCTT	Effluent	65	7.8	45	17	7.6	2.16	1.0 U	4.92 U	1.25	1.0 U	4.40 U	0.70	0.56	0.084	50	160 J	50 U	200 UJ	---
February 27, 2000	Lakewood	074208	MCTT	Influent	100	6.9	32	12	8.5	7.87	2.40	83.2	5.37	1.0 U	53.7	0.63	1.4	0.120 J	30	830 J	50 U	200 J	---
February 27, 2000	Lakewood	074208	MCTT	Effluent	100	7.0	46	17	7.4	3.81	1.0 U	17.7	3.00	1.0 U	17.4	0.98	0.48	0.093	21	210 J	50 U	200 UJ	---

Table 1-4. Summary of Storm Water Quality Results for Monitored Events (continued).

Sample Date	BMP Location	Site ID	BMP Type	Sampling Location	Percent Storm Capture	pH	Specific Conductance (µmhos/cm)	Hardness (mg/L)	TSS (mg/L)	Total Metals (ug/L) Cu	Total Metals (ug/L) Pb	Total Metals (ug/L) Zn	Dissolved Metals (ug/L) Cu	Dissolved Metals (ug/L) Pb	Dissolved Metals (ug/L) Zn	Nitrate Nitrogen (mg/L)	TKN (mg/L)	Total P (mg/L)	Fecal Coliform (MPN/100mL)	TPH Diesel (µg/L)	TPH Gasoline (µg/L)	TPH Oil (µg/L)	Oil & Grease (mg/L)
Storm Water Matrix																							
March 8, 2000	I-5/I-605 Intersection	074101	EDB (1)	Influent	79	7.4	75	30	91	29.8 J	94.7 J	219.0 J	6.42	6.89	42.9	0.51	1.30 J	0.380	5,000	450	50 U	200 U	
March 8, 2000	I-5/I-605 Intersection	074101	EDB (1)	Effluent	97	7.3	71	30	50	15.2	41.8	82.9	8.35	2.20	23.9 U	0.40	0.90	0.320	4,000	830	50 U	290	
March 8, 2000	I-605/SR-91 Intersection	074102	EDB (2)	Influent	87	7.7	620	190	41	33.7	185.0	288.0	14.5	13.5	176.0	9.50	2.1 J	0.240	300	470	50 U	200 U	
March 8, 2000	I-605/SR-91 Intersection	074102	EDB (2)	Effluent	100	7.3	97	46	14	16.3	55.2	115.0	10.3	8.10	75.6	0.60	1.5	0.340	300	1800	50 U	710 U	
March 8, 2000	Alameda MS	074201	OWS	Influent	NA	7.5	41	14	9.3	--- ---	--- ---	---	---	---	---	---	---	---	---	200	50 U	200 U	5 U
March 8, 2000	Alameda MS	074201	OWS	Effluent	NA	6.7	50	20	130	--- ---	--- ---	---	---	---	---	---	---	---	---	270	50 U	200 U	5 U
March 8, 2000	Eastern Regional MS	074202	SF	Influent	99	6.2 J	27	10	81	15.0	43.2	106.0	3.29	1.55	39.9	1.60	1.1	0.150	500	310	50 U	200 U	
March 8, 2000	Eastern Regional MS	074202	SF	Effluent	100	7.3	32	9.5	13	4.79	7.03	24.3 U	3.03	1.0 U	1.0 U	0.44	0.45	0.066	500	140	50 U	200 U	
March 8, 2000	Foothill MS	074203	SF	Influent	99	6.9	33	18	51	29.1	19.2	229.0	18.0	2.80	157.0	0.39	0.84 J	0.210	3,300	390	50 U	200 U	
March 8, 2000	Foothill MS	074203	SF	Effluent	100	7.1	47	15	8.2	9.29	3.72	102.0	7.00	1.0 U	87.4	0.62	0.48	0.092	2,100	200	50 U	200 U	
March 8, 2000	Termination P&R	074204	SF	Influent	100	7.4 J	36	8.0	25	8.18	5.25	62.9	2.65	1.0 U	16.5 U	0.65	0.73	0.083	90	420	50 U	200 U	
March 8, 2000	Termination P&R	074204	SF	Effluent	99	7.2	59	6.0	2.5	3.98	1.0 U	20.5 U	3.68	1.0 U	15.8 U	0.73	0.39 U	0.048	11	100	50 U	200 U	
March 8, 2000	Via Verde P&R	074206	MCTT	Influent	100	6.9 J	14	2 U	37	6.14	10.9	87.9	1.20	1.0 U	23.5 U	0.16	0.95	0.140	80	220	50 U	200 U	
March 8, 2000	Via Verde P&R	074206	MCTT	Effluent	100	3.4 R	210 R	2 R	6.6 R	1.56 R	1.0 R	9.27 R	1.38 R	1.0 R	9.28 R	8.60 R	0.56 R	0.075 R	50	100 U	50 U	200 U	
March 8, 2000	Lakewood	074208	MCTT	Influent	68	6.8	21	4.9	18	4.50	3.31	51.5	1.98	1.0 U	32.7	0.38	0.78 J	0.076	350	390	50 U	200	
March 8, 2000	Lakewood	074208	MCTT	Effluent	100	7.2	40	10	1.5	1.62	1.0 U	6.66 U	1.5	1.0 U	1.0 U	0.69	0.45 U	0.057	170	100 U	50 U	200 U	---
																							---
April 17, 2000	I-5/I-605 Intersection	074101	EDB (1)	Influent	75	7.1	95	33 J	150	30	89	220	9.4	5.3	65	1.2	2.3	0.70	---	---	---	---	---
April 17, 2000	I-5/I-605 Intersection	074101	EDB (1)	Effluent	100	7.1	90	38 J	190	20	72	130	5.8	1.4	15	0.62	1.4	0.72	---	---	---	---	---
April 17, 2000	I-605/SR-91 Intersection	074102	EDB (2)	Influent	89	7.6	100	36 J	58	36	120	240	14	6.2	79	0.85	1.3	0.35	1600	8500 J	50 U	3200 J	---
April 17, 2000	I-605/SR-91 Intersection	074102	EDB (2)	Effluent	100	7.1	120	37 J	13	22	40	110	16	5.0	79	0.98	2.1	0.62	500	990	50 U	220	---
April 17, 2000	Alameda MS	074201	OWS	Influent	NA	6.9 J	470	160	30										---	3100	50 U	420	13 J
April 17, 2000	Alameda MS	074201	OWS	Effluent	NA	6.7	61	20	34										---	690	50 U	200 U	5 UJ
April 17, 2000	Eastern Regional MS	074202	SF	Influent	99	6.7	42	17 J	62	20	26	86	7.3	1.0 U	35	0.35	0.92	0.21	---	---	---	---	---
April 17, 2000	Eastern Regional MS	074202	SF	Effluent	100	6.9	50	18 J	10	8.0	4.0	23	6.9	1.0	19	0.57	0.50 U	0.098	---	---	---	---	---
April 17, 2000	Foothill MS	074203	SF	Influent	99	6.5	52	36 J	89	17	35	360	6.8	3.1	220	0.21	1.5	0.28	---	---	---	---	---
April 17, 2000	Foothill MS	074203	SF	Effluent	99	6.9	70	28 J	19	9.3	5.8	160	7.3	1.3	110	0.16	0.39	0.27	---	---	---	---	---
April 17, 2000	Termination P&R	074204	SF	Influent	97	6.8	61	18 J	100	27	13	210	16	1.5	130	0.58	3.0	0.31	---	---	---	---	---
April 17, 2000	Termination P&R	074204	SF	Effluent	100	6.9	73	21 J	6	14	1.4	59	13.0	1.0 U	57	0.90	0.4	0.14	---	---	---	---	---
April 17, 2000	Via Verde P&R	074206	MCTT	Influent	100	6.6	26	16 J	49	7.0	7.6	120	3.6	1.0 U	44	0.37	1.7	0.46	300	580	50 U	200 U	---
April 17, 2000	Via Verde P&R	074206	MCTT	Effluent	100	6.9	59	21 J	8.7	4.8	1.3	9.3	4.6	1.0 U	8.0	0.67	1.6	0.18	170	370	50 U	200 U	---
April 17, 2000	Lakewood	074208	MCTT	Influent	95	6.6	45	21 J	25	24	3.8	160	18	1.0 U	120	0.45	1.8	0.22	26	7700	50 U	1100	---
April 17, 2000	Lakewood	074208	MCTT	Effluent	100	7.1	74	19 J	3.1	6.6	1.0	14	5.5	1.0 U	11	0.48	1.4	0.14	300	350	50 U	200 U	---

EDB = Extended Detention Basin, 1=Unlined, 2 = Lined; OWS = Oil/Water Separator; SF = Sand Filter; MCTT = Multi-Chambered Treatment Train
"---" - Not Analyzed; NA = Not Applicable. "<" and "U" are used when values are less than detection limits

Table 1-5. Summary of Quality Control (QC) Samples Collected per Event.

Site	Site ID.	EVENT SAMPLE			
		February 20, 2000	**February 27, 2000**	**March 8, 2000**	**April 17, 2000**
I-5/I-605 Intersection	74101	Field Duplicate (composite samples only)	Lab Split	Lab Split	MS/MSD
I-605/SR-91 Intersection	74102	Field Duplicate (grab samples only)	None	Field Duplicate	Field Duplicate; Field Blank; Lab Split; MS/MSD (grab samples only)
Alameda MS	74201	MS/MSD; Field Duplicate; Lab Split; and Field Blank (Oil and Grease) + field blank for conventionals	MS/MSD; Field Duplicate; Lab Split; and Field Blank (Oil andGrease) + field blank for conventionals	MS/MSD; Field Duplicate; Lab Split; and Field Blank (Oil and Grease) + field blank for conventionals	MS/MSD; Field Duplicate; Lab Split; and Field Blank (Oil and Grease) + field blank for conventionals
Eastern Regional MS	74202	Lab Split	MS/MSD	none	Field Duplicate
Foothill MS	74203	MS/MSD	none	Field Blank	None
Termination P&R	74204	Field Blank	Field Duplicate	None	None
Via Verde P&R	74206	None	Field Blank	MS/MSD	None
Lakewood P&R	74208	None	None	None	Lab Split

MS/MSD = Matrix Spike / Matrix Spike Duplicate.

Table 1-6. Precision Data for Field Duplicates.

Constituent	Units	February 20 Event			February 27 Event			March 8 Event			April 17 Event		
		I-5/I-605[1]			Termination			I-605/SR-91			Eastern		
		74101-IN-05100-001	74101-IN-05100-501	RPD	74204-IN-05800-002	74204-IN-05800-502	RPD	74102-IN-06800-003	74102-IN-06800-503	RPD	74202-IN-10800-004	74202-IN-10800-504	RPD
Conventionals													
EC	umhos/cm	77	78	1	54	52	4	620	620	0	42	42	0
Hardness	mg/L	40	34	16	18	25	**33**	190	200	5	17	13	**27**
pH		7.3	7.3	0	7.4	7.3	1	7.7	7.8	1	6.7	6.7	0
TSS	mg/L	100	87	14	96	76	**23**	41	43	5	62	45	**32**
Dissolved Metals													
Cu	ug/L	4.32	4.11	5	6.99	7.57	8	14.5	13.7	6	7.3	7.4	1
Pb	ug/L	2.8	2.69	4	<1	<1	NA	13.5	11.8	13	<1	<1	NA
Zn	ug/L	44.4	39.9	11	55.5	52.3	6	176	158	11	35	35	0
Total Metals													
Cu	ug/L	15.1	8	**61**	23.8	18.1	**27**	33.7	32	5	20	15	**29**
Pb	ug/L	31.7	12.6	**86**	16.5	14.1	16	185	179	3	26	22	17
Zn	ug/L	104	59.2	**55**	156	130	18	288	273	5	86	73	16
Nutrients													
Nitrate	mg/L	0.59	0.61	3	0.23	0.23	0	9.5	9.4	1	0.35	0.35	0
Total Phosphorous	mg/L	0.42	0.4	5	0.68	0.68	0	0.24	0.24	0	0.21	0.17	**21**
TKN	mg/L	1.4	1.5	7	1.8	1.6	12	2.1	2.0	5	0.92	0.76	19
Organics													
TPH (Diesel)	mg/L	2.1	1.7	21	1.4	1.2	15	470	570	19	8500	9500	11
TPH (Gasoline)	mg/L	<0.05	<0.05		<0.05	<0.05	NA	<0.05	<0.05	NA	<0.05	<0.05	NA
TPH (Heavy Oil)	mg/L	1	0.71	34	0.41	0.38	8	<200	<200	NA	3200	3500	9
Oil & Grease[2]	mg/L	<5	<5	NA	<5	<5	NA	<5	<5	NA	13	17	**27**
Microbial													
Fecal Coliform	MPN/100 mL	500	3000	**143**	220	50	**126**	300	300	0	1600	900	**56**

1. Since composite samples for I-605/SR-91 could not be obtained, composite samples from I-5/I-605 were used for obtaining some of the duplicates

2 - Samples collected from Alameda site

Table 1-7. Precision Data for Laboratory Split Samples.

		February 20 Event			February 27 Event			March 8 Event			April 17, Event		
		Easterm MS			I-5/I-605			I-5/I-605			Lakewood		
Constituent	**Units**	**74202-IN-05100-001**	**74202-IN-05100-001 (split)**	**RPD**	**74101-IN-05800-002**	**74101-IN-05800-002 (split)**	**RPD**	**74101-IN-06800-003**	**74101-IN-06800-003 (split)**	**RPD**	**74208-IN-10800-004**	**74208-IN-10800-004 (split)**	**RPD**
Conventionals													
EC	umhos/cm	37	38	*3*	110	130	*17*	75	76	1	45	45	0
Hardness	mg/L	10	16	***46***	58	52	*11*	30	34	13	21	14	**40**
pH		7.3	7.3	*0*	7.6	7.6	*0*	7.4	7.4	0	6.6	6.5	2
TSS	mg/L	23	25	*8*	34	32	*6*	91	95	4	25	23	8
Dissolved Metals													
Cu	ug/L	5	5.03	*1*	8.49	8.69	*2*	6.42	6.58	2	18	18	0
Pb	ug/L	1.17	1.07	*9*	3.99	4.88	*20*	6.89	6.8	1	<1	<1	NA
Zn	ug/L	33.7	34.4	*2*	57.8	57.4	*1*	42.9	41.7	3	120	120	0
Total Metals													
Cu	ug/L	9.18	8.57	*7*	19.3	19.2	*1*	29.8	83.7	**95**	24	23	4
Pb	ug/L	11.6	7.08	***48***	34.2	33.7	*1*	94.7	442	**129**	3.8	3.3	14
Zn	ug/L	47.8	46.9	*2*	110	109	*1*	219	799	**114**	160	150	6
Nutrients													
Nitrate	mg/L	0.36	0.36	*0*	0.75	0.73	*3*	0.51	0.54	6	0.45	0.45	0
Total Phosphorous	mg/L	0.085	0.079	*7*	0.25	0.41	***48***	0.38	0.41	8	0.22	0.24	9
TKN	mg/L	0.87	0.84	*4*	2.1	2.2	*5*	1.3	0.95	**31**	1.8	2	11
Organics													
TPH (Diesel)	mg/L	0.53	0.59	*11*	1	1.2	*18*	450	460	2	8500	10000	16
TPH (Gasoline)	mg/L	<0.05	<0.05	*NA*	<0.05	<0.05	*NA*	<0.05	<0.05	*NA*	<0.05	<0.05	*NA*
TPH (Heavy Oil)	mg/L	0.21	0.23	*9*	0.46	0.6	*26*	<200	<200	*NA*	3200	3600	12
Oil & Grease[1]	mg/L	<5	<5	*NA*	<5	<5	*NA*	<5	<5	*NA*	13	18	32
Microbial													
Fecal Coliform	MPN/100 mL	900	900	*0*	500	500	*0*	5000	5000	0	1600	1600	0

[1] - Samples collected from Alameda site

Table 1-8. Summary of Parameters, Methods, and Reporting Limits.

Parameter	Analytical Method	Sample Type	Reporting Limits
Conventionals			
pH	EPA 150.1	Composite	0.1 unit
Specific Conductance	EPA 120.1	Composite	1 umhos/cm
Hardness	EPA 130.2	Composite	2 mg/L
TSS	EPA 160.2	Composite	1 mg/L
Nutrients			
Nitrate-N	EPA 300	Composite	0.01 mg/L
TKN	EPA 351.1	Composite	0.1 mg/L
Total Phosphorus	EPA 365.3	Composite	0.002 mg/L
Total/Dissolved Metal			
Copper	EPA 200.8	Composite	1 ug/L
Lead	EPA 200.8	Composite	1 ug/L
Zinc	EPA 200.8	Composite	1 ug/L
Organics			
TPH-diesel	EPA 8015M	Grab	250 ug/L*
TPH-oil	EPA 8015M	Grab	200 ug/L
TPH-gasoline	EPA 8015M	Grab	50 ug/L
Oil & Grease	EPA 413.2	Grab	5 mg/L
Bacteria			
Fecal Coliform	SM 9221E	Grab	2 MPN/100 ml

* Contracted laboratory reporting limit was 100 ug/L.

Table 1-9. BMP Pollutant Removal Efficiencies.

EMCs and Loads for Extended Detention Basins

	I-5/I-605 Intersection 20 February, 2000				I-5/I-605 Intersection 27 February, 2000				I-5/I-605 Intersection 8 March, 2000				I-5/I-605 Intersection 17 April, 2000			
	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load
	Influent	Effluent			Influent	Effluent			Influent	Effluent			Influent	Effluent		
TSS (mg/L)	110	32	71	79	34	52	-53	-5	91	50	45	36	150	190	-27	-21
Total Cu (ug/L)	15.1	17.6	-17	16	19.3	18.6	4	34	29.8 J	15.2	49	41	30	20	33	36
Total Pb (ug/L)	31.7	49.0	-55	-11	34.2	33.4	2	33	94.7 J	41.8	56	49	89	72	19	23
Total Zn (ug/L)	104.0	79.8	23	45	110	91.3	17	43	219 J	82	63	56	220	130	41	44
Dissolved Cu (ug/L)	4.32	4.85	-12	19	8.49	9.06	-7	27	6.42	8.35	-30	-51	9.4	5.8	38	41
Dissolved Pb (ug/L)	2.8	2.13	24	45	3.99	4.01	-1	31	6.89	2.2	68	63	5.3	1.4	74	75
Dissolved Zn (ug/L)	44.4	36.1	19	41	57.8	47.3	18	44	42.9	23.9 U	44	35	65	15	77	78
Nitrate-Nitrogen (mg/L)	0.59	0.64	-8	22	0.75	0.77	-3	29	0.51	0.4	22	9	1.2	0.62	48	51
TKN (mg/L)	1.4	1.1	21	43	2.1	2.6	-24	15	1.3 J	0.9	31	20	2.3	1.4	39	42
Total P (mg/L)	0.42	0.31	26	47	0.25 J	0.85 J	-240	-134	0.38	0.32	16	2	0.7	0.72	-3	2
Storm Volume (liters)	906,835	653,371			50,296	34,579			301,155	349,894			956,310	912,300		

	I-605/SR-91 Intersection 20 February, 2000				I-605/SR-91 Intersection 27 February, 2000				I-605/SR-91 Intersection 8 March, 2000				I-605/SR-91 Intersection 17 April, 2000			
	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load
	Influent	Effluent			Influent	Effluent			Influent	Effluent			Influent	Effluent		
TSS (mg/L)	--	--			110	19	83	98	41	14	66	91	58	13	78	93
Total Cu (ug/L)	--	--			39.9	37	7	89	33.7	16.3	52	87	36	22	39	80
Total Pb (ug/L)	--	--			124	38.5	69	96	185	55.2	70	92	120	40	67	89
Total Zn (ug/L)	--	--			541	250	54	94	288	115	60	89	240	110	54	85
Dissolved Cu (ug/L)	--	--			14.5	24.3	-68	80	14.5	10.3	29	81	14	16	-14	63
Dissolved Pb (ug/L)	--	--			3.92	3.55	9	89	13.5	8.1	40	84	6.2	5.0	19	74
Dissolved Zn (ug/L)	--	--			263	175	33	92	176	75.6	57	88	79	79	0	68
Nitrate-Nitrogen (mg/L)	--	--			1.5	1.8	-20	85	9.5	0.6	94	98	0.85	0.98	-15	63
TKN (mg/L)	--	--			2.7	--			2.1 J	1.5	29	81	1.3	2.1	-62	48
Total P (mg/L)	--	--			0.5 J	0.69 J	-38	83	0.24	0.34	-42	62	0.35	0.62	-77	43
Storm Volume (liters)	--	--			8,609	1,048			188,555	50,778			212,513	68,733		

Table 1-9. BMP Pollutant Removal Efficiencies (continued).

EMCs for Media Filters

	Eastern Regional Maintenance Station 20 February, 2000				Eastern Regional Maintenance Station 27 February, 2000				Eastern Regional Maintenance Station 8 March, 2000				Eastern Regional Maintenance Station 17 April, 2000			
	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load
	Influent	Effluent			Influent	Effluent			Influent	Effluent			Influent	Effluent		
TSS (mg/L)	23	5	78	78	31	6.2	80	81	81	13	84	87	62	10	84	80
Total Cu (ug/L)	9.18	8.42	8	8	15.3	8.63	44	47	15	4.79	68	75	20	8.0	60	50
Total Pb (ug/L)	11.6 J	18.9 J	-63	-64	24	4.71	80	81	43.2	7.03	84	87	26	4.0	85	81
Total Zn (ug/L)	47.8	13.3	72	72	72.7	25.1	65	67	106	24.3 U	77	82	86	23	73	66
Dissolved Cu (ug/L)	5	3.74	25	25	8.02	7.51	6	12	3.29	3.03	8	28	7.3	6.9	5	-18
Dissolved Pb (ug/L)	1.17	1 U	15	14	1.81	1.3	28	32	1.55	1 U	35	49	1 U	1	0	-25
Dissolved Zn (ug/L)	33.7	15.1 U	55	55	37.1	20.4	45	48	39.9	1 U	97	98	35	19	46	32
Nitrate-Nitrogen (mg/L)	0.36	0.45	-25	-26	0.79	1.2	-52	-44	1.6	0.44	73	78	0.35	0.57	-63	-104
TKN (mg/L)	0.87	0.42 J	52	51	1.1	0.84	24	28	1.1	0.45	59	68	0.92	0.5 U	46	32
Total P (mg/L)	0.085	0.032	62	62	0.13 J	0.058	55	58	0.15	0.066	56	66	0.21	0.098	53	42
Storm Volume (liters)	302,373	304,921			35,485	33,531			173,715	136,049			215,685	270,258		

	Foothill Maintenance Station 20 February, 2000				Foothill Maintenance Station 27 February, 2000				Foothill Maintenance Station 8 March, 2000				Foothill Maintenance Station 17 April, 2000			
	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load
	Influent	Effluent			Influent	Effluent			Influent	Effluent			Influent	Effluent		
TSS (mg/L)	75	5	93	91	38	7.4	81	17	51	8.2	84	77	89	19	79	80
Total Cu (ug/L)	19.6	8.47	57	43	11.9	6.96	42	-150	29.1	9.29	68	54	17	9.3	45	48
Total Pb (ug/L)	28.2 J	9.65 J	66	55	17.8	2.34	87	44	19.2	3.72	81	72	35	5.8	83	84
Total Zn (ug/L)	252	21.1	92	89	226	41.3	82	22	229	102	55	36	360	160	56	58
Dissolved Cu (ug/L)	5.36	4.15	23	-2	4.49	5.52	-23	-425	18	7	61	44	6.8	7.3	-7	-2
Dissolved Pb (ug/L)	2.47	1 U	60	47	1.62	1 U	38	-164	2.8	1 U	64	49	3.1	1.3	58	60
Dissolved Zn (ug/L)	151	22.6	85	80	155	34.4	78	5	157	87.4	44	20	220	110	50	52
Nitrate-Nitrogen (mg/L)	0.2	0.44	-120	-190	0.66	0.93	-41	-502	0.39	0.62	-59	-128	0.21	0.16	24	27
TKN (mg/L)	2.1	1	52	37	1.2	0.14	88	50	0.84 J	0.48	43	18	1.5	0.39	74	75
Total P (mg/L)	0.47	0.18	62	50	0.036 J	0.097	-169	-1052	0.21	0.092	56	37	0.28	0.27	4	8
Storm Volume (liters)	771,437	#######			36,023	153,976			136,644	196,173			1.085.126*	1.033.453		

* Equals effluent value plus 5%.

	Termination Park and Ride 20 February, 2000				Termination Park and Ride 27 February, 2000				Termination Park and Ride 8 March, 2000				Termination Park and Ride 17 April, 2000			
	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load
	Influent	Effluent			Influent	Effluent			Influent	Effluent			Influent	Effluent		
TSS (mg/L)	44	4	91	91	96	1 U	99	98	25	2.5	90	81	100	6	94	93
Total Cu (ug/L)	15	6.18	59	59	23.8	6.53	73	42	8.18	3.98	51	6	27	14	48	39
Total Pb (ug/L)	12.1 J	4.43 J	63	64	16.5	1 U	94	87	5.25	1 U	81	63	13	1.4	89	87
Total Zn (ug/L)	83	13.5	84	84	156	21.5	86	71	62.9	20.5 U	67	37	210	59	72	67
Dissolved Cu (ug/L)	3.94	3.56	10	10	6.9	6.33	8	-94	2.65	3.68	-39	-169	16	13	19	4
Dissolved Pb (ug/L)	1 U	1 U	0	1	1 U	1 U	0	-112	1 U	1 U	0	-94	1.5	1 U	33	21
Dissolved Zn (ug/L)	27.2	17.1	37	37	55.5	20.2	64	23	16.5 U	15.8 U	4	-86	130	57	56	48
Nitrate-Nitrogen (mg/L)	0.2	0.63	-215	-213	0.68	1	-47	-211	0.65	0.73	-12	-118	0.58	0.9	-55	-84
TKN (mg/L)	0.78	0.48 J	38	39	1.8	0.5	72	41	0.73	0.39 U	47	-4	3.0	0.4	87	84
Total P (mg/L)	0.16	0.077	52	52	0.23	0.069	70	36	0.083	0.048	42	-12	0.31	0.14	55	47
Storm Volume (liters)	454,055	451,761			67,883	143,781			179,322	347,770			359,437	425,763		

EMCs for Multi-chamber Treatment Trains

	Lakewood Park and Ride 20 February 2000				Lakewood Park and Ride 27 February 2000				Lakewood Park and Ride 8 March 2000				Lakewood Park and Ride 17 April 2000			
	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load
	Influent	Effluent			Influent	Effluent			Influent	Effluent			Influent	Effluent		
TSS (mg/L)	24	8.2	66	47	8.5	7.4	13	10	18	1.5	92	91	25	3.1	88	92
Total Cu (ug/L)	8.42	8.15	3	-50	7.87	3.81	52	50	4.5	1.62	64	62	24	6.6	73	81
Total Pb (ug/L)	11.0 J	8.18 J	26	-16	2.4	1.0 U	58	57	3.31	1.0 U	70	68	3.8	1.0	74	82
Total Zn (ug/L)	58.1	25	57	33	83.2	17.7	79	78	51.5	6.66 U	87	86	160	14	91	94
Dissolved Cu (ug/L)	2.84	3.15	-11	-72	5.37	3	44	42	1.98	1.5	24	20	18	5.5	69	79
Dissolved Pb (ug/L)	1 U	1 U	0	-55	1 U	1 U	0	-3	1 U	1 U	0	-6	1 U	1 U	0	32
Dissolved Zn (ug/L)	41.6	19	54	29	53.7	17.4	68	67	32.7	1.0 U	97	97	120	11	91	94
Nitrate-Nitrogen (mg/L)	0.18	0.81	-350	-599	0.63	0.98	-56	-60	0.38	0.69	-82	-93	0.45	0.48	-7	28
TKN (mg/L)	0.95	0.42 J	56	31	1.4	0.48	66	65	0.78 J	0.45 U	42	39	1.8	1.4	22	47
Total P (mg/L)	0.091	0.091	0	-55	0.12 J	0.093	23	20	0.076	0.057	25	20	0.22	0.14	36	57
Storm Volume (liters)	124,183	192,916			23,987	24,723			187,082	198,495			306,196	207,048		

	Via Verde Park and Ride 20 February 2000				Via Verde Park and Ride 27 February 2000				Via Verde Park and Ride 8 March 2000				Via Verde Park and Ride 17 April 2000			
	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load
	Influent	Effluent			Influent	Effluent			Influent	Effluent			Influent	Effluent		
TSS (mg/L)	41	3	93	94	26	7.6	71	70	37	6.6 R	Rejected effluent values negate calculations		49	8.7	82	88
Total Cu (ug/L)	4.89	4.92	-1	20	5.4	2.16	60	61	6.14	1.56 R			7	4.8	31	76
Total Pb (ug/L)	6.5 J	4.39 J	32	46	4.89	1 U	80	80	10.9	1 R			7.6	1.3	83	94
Total Zn (ug/L)	52.9	8.74	83	87	69.3	4.92 U	93	93	87.9	9.27 R			120	9.3	92	97
Dissolved Cu (ug/L)	1.02	1.35	-32	-5	1.75	1.25	29	31	1.2	1.38 R			3.6	4.6	-28	55
Dissolved Pb (ug/L)	1 U	1 U	0	20	1 U	1 U	0	3	1 U	1 R			1 U	1 U	0	65
Dissolved Zn (ug/L)	23.4	10.6 U	55	64	33.3	4.4 U	87	87	23.5 U	9.28 R			44	8	82	94
Nitrate-Nitrogen (mg/L)	0.1 U	0.37	-270	-195	0.7	0.7	0	3	0.16	8.6 R			0.37	0.67	-81	36
TKN (mg/L)	0.9	0.78	13	31	1.6	0.56	65	66	0.95	0.56 R			1.70	1.6	6	67
Total P (mg/L)	0.16	0.088	45	56	0.16 J	0.084	48	49	0.14	0.075 R			0.46	0.18	61	86
Storm Volume (liters)	175,414	139,788			24,270	23,562			55,847	54,658			188,101	66,297		

EMCs for Oil/Water Separator

	Alameda MS 20 February 2000				Alameda MS 27 February 2000				Alameda MS 8 March 2000				Alameda MS 17 April 2000			
	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load
	Influent	Effluent			Influent	Effluent			Influent	Effluent			Influent	Effluent		
TSS (mg/L)	68	13	81	81	37	170	-359	-359	9.3	130	-1298	-1298	30	34	-13	-13
TPH - Diesel (ug/L)	770	590	23	23	970	490	49	49	200	270	-35	-35	3100	690	78	78
TPH - Gasoline (ug/L)	50 U	50 U	0	0	50 U	50 U	0	0	50 U	50 U	0	0	50 U	50 U	0	0
TPH - Oil (ug/L)	250	260	-4	-4	260	250	4	4	200 U	200 U	0	0	420	200 U	52	52
Oil & Grease (mg/L)	5 U	5 U	0	0	5 U	5 U	0	0	5 U	5 U	0	0	13 J	5 UJ	62	62
Storm Volume (liters)	48,201	48,201			5,126	5,126			16,992	16,992			41,942	41,942		

Table 1-9. BMP Pollutant Removal Efficiencies (continued).

Table 1-10. Summary of Event & Season Removal Efficiencies.

I-5/I-605 Extended Detention Basin			
1999-2000 Wet Season Statistics			
Parameter	Minimum Load Removal (%)	Maximum Load Removal (%)	Average Season Removal (%)
TSS	-21	79	28
T-Cu	16	41	34
T-Pb	-11	49	33
T-Zn	43	56	49
D-Cu	-51	41	14
D-Pb	31	75	55
D-Zn	35	78	47
N-N	9	51	30
TKN	15	43	25
T-P	-134	47	-12

I-605/SR-91 Extended Detention Basin			
1999-2000 Wet Season Statistics			
Parameter2	Minimum Load Removal (%)	Maximum Load Removal (%)	Average Season Removal (%)
TSS	91	98	94
T-Cu	80	89	79
T-Pb	89	96	91
T-Zn	85	94	87
D-Cu	63	81	64
D-Pb	74	89	80
D-Zn	68	92	82
N-N	63	98	93
TKN	48	81	74
T-P	43	83	55

Eastern Reg. MS Sand Filter			
1999-2000 Wet Season Statistics			
Parameter	Minimum Load Removal (%)	Maximum Load Removal (%)	Average Season Removal (%)
TSS	78	87	83
T-Cu	8	75	49
T-Pb	-64	87	66
T-Zn	66	82	72
D-Cu	-18	28	8
D-Pb	-25	49	21
D-Zn	32	98	30
N-N	-104	78	16
TKN	28	68	43
T-P	42	66	54

Foothill MS Sand Filter			
1999-2000 Wet Season Statistics			
Parameter	Minimum Load Removal (%)	Maximum Load Removal (%)	Average Season Removal (%)
TSS	17	91	81
T-Cu	-150	54	49
T-Pb	44	84	74
T-Zn	22	89	59
D-Cu	-425	44	20
D-Pb	-164	60	50
D-Zn	5	80	52
N-N	-502	27	-86
TKN	18	75	54
T-P	-1052	50	41

Termination P & R Sand Filter			
1999-2000 Wet Season Statistics			
Parameter	Minimum Load Removal (%)	Maximum Load Removal (%)	Average Season Removal (%)
TSS	81	98	93
T-Cu	6	59	47
T-Pb	63	87	79
T-Zn	37	84	71
D-Cu	-169	10	-13
D-Pb	-112	21	-14
D-Zn	-86	48	43
N-N	-213	-84	-88
TKN	-4	84	66
T-P	-12	52	47

Via Verde P & R MCTT			
1999-2000 Wet Season Statistics			
Parameter	Minimum Load Removal (%)	Maximum Load Removal (%)	Average Season Removal (%)
TSS	70	94	89
T-Cu	20	76	55
T-Pb	46	94	79
T-Zn	87	97	94
D-Cu	-5	55	15
D-Pb	3	65	36
D-Zn	64	94	84
N-N	-195	36	-3
TKN	31	67	50
T-P	49	86	67

Lakewood & R MCTT			
1999-2000 Wet Season Statistics			
Parameter	Minimum Load Removal (%)	Maximum Load Removal (%)	Average Season Removal (%)
TSS	10	92	72
T-Cu	-50	81	54
T-Pb	-16	82	46
T-Zn	33	94	82
D-Cu	-72	79	57
D-Pb	-55	32	3
D-Zn	29	97	69
N-N	-599	28	-70
TKN	31	65	46
T-P	-55	57	27

Alameda MS			
1999-2000 Wet Season Statistics			
Parameter	Minimum Load Removal (%)	Maximum Load Removal (%)	Average Season Removal (%)
TSS	-1298	81	-397
TPH – Diesel	-35	78	29
TPH – Gas	0	0	0
TPH – Oil	-4	52	13
Oil & Grease	0	62	16

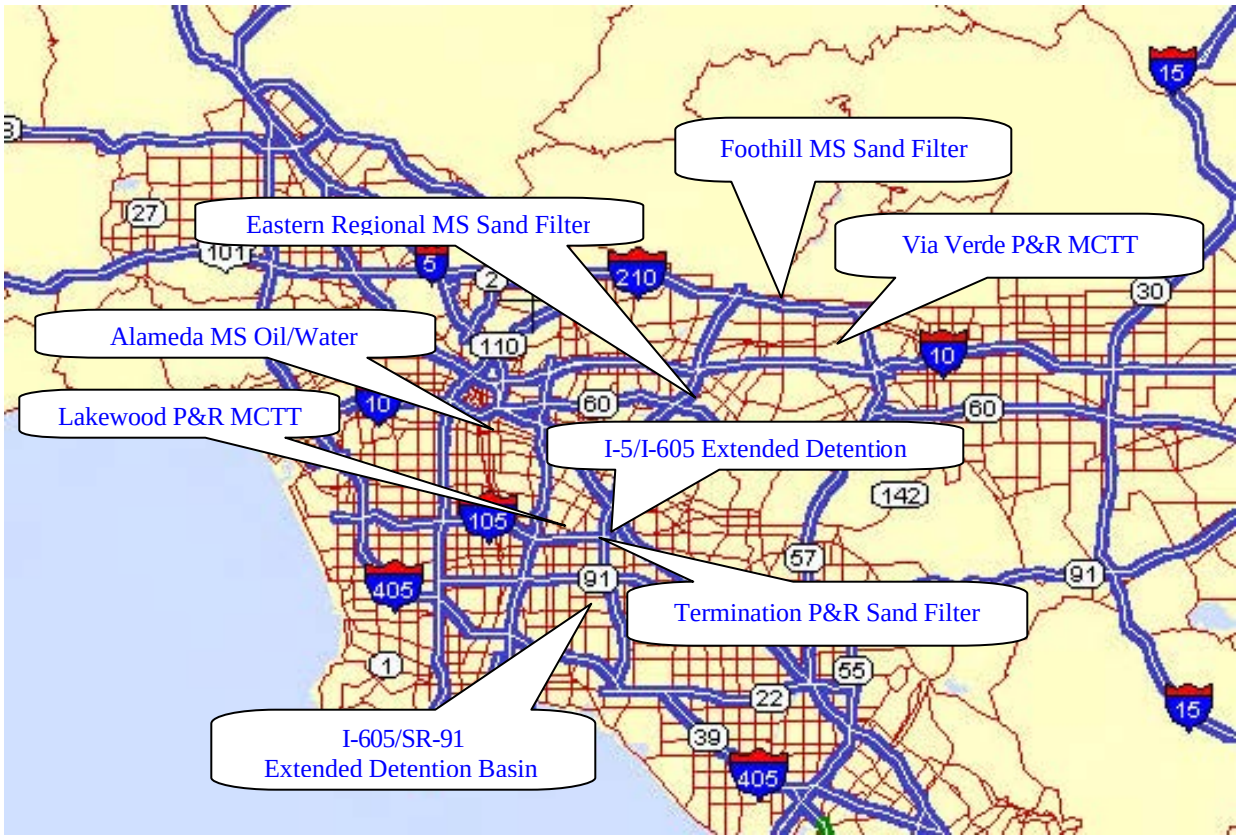


Figure 1-1.
Regional Map of District 7 BMP Monitoring Facilities, Brown and Caldwell.

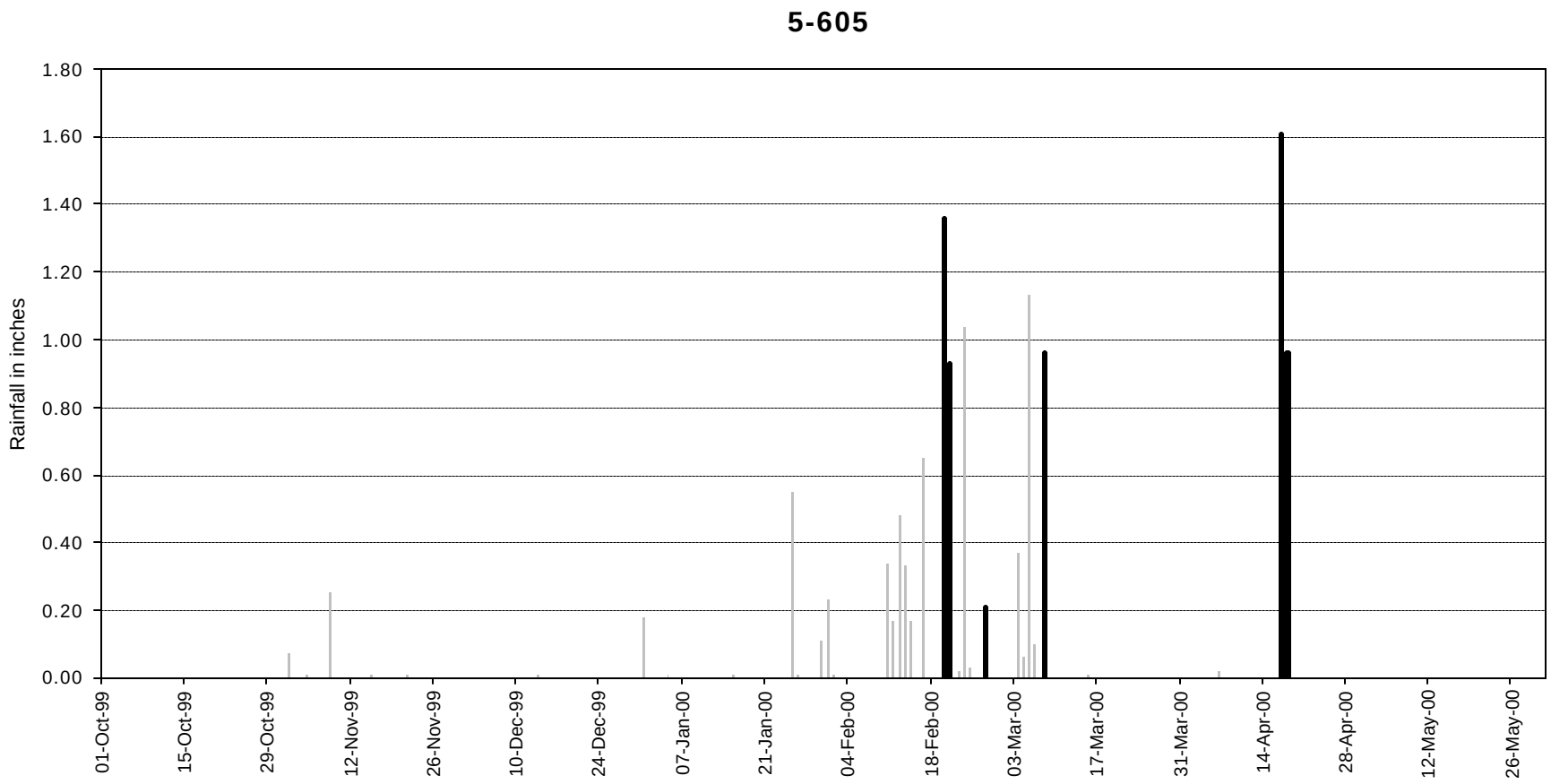


Figure 1-2a. Daily Total Rainfall for 1999-2000 Wet Season, I-5/I-605 Extended Detention Basin.

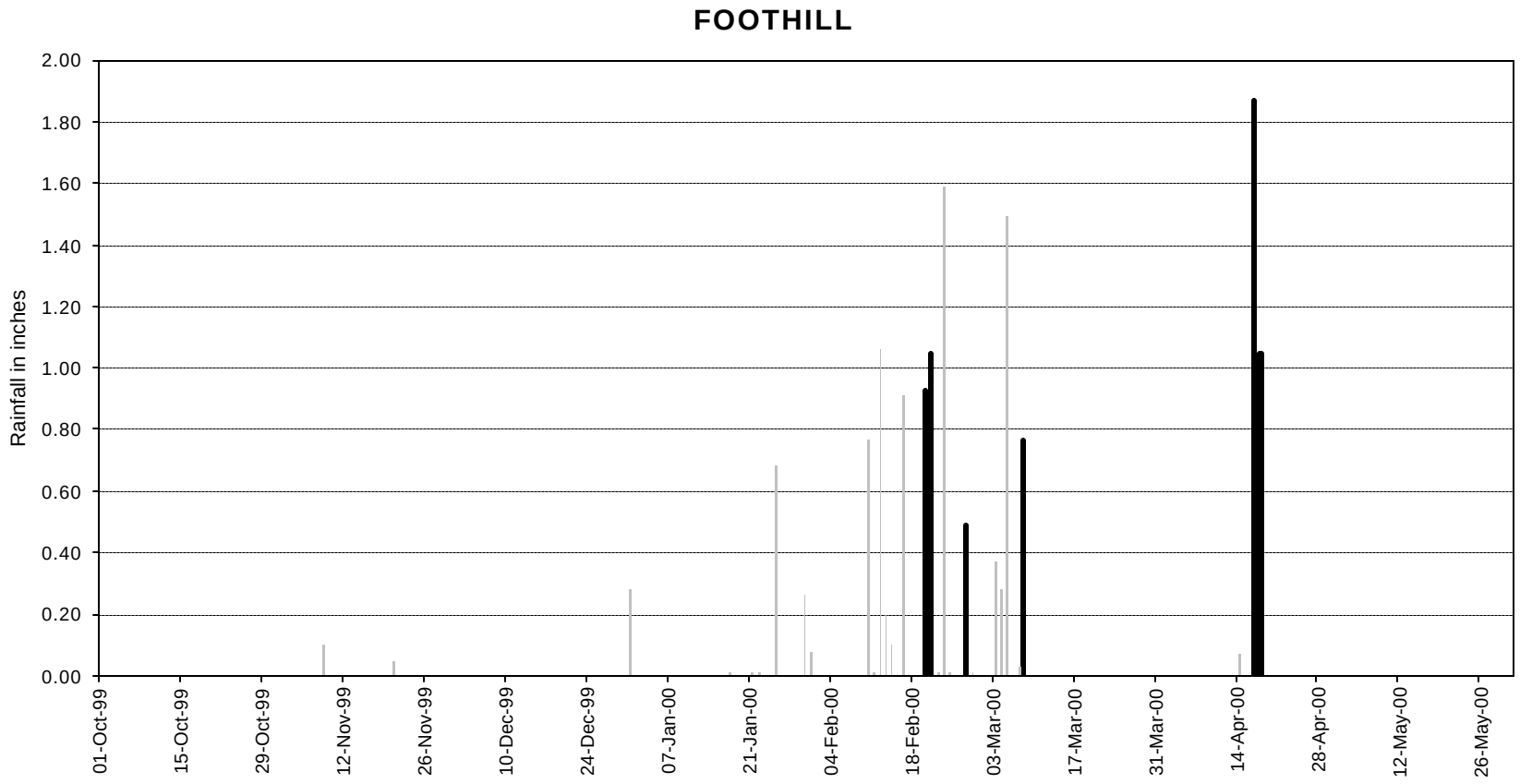


Figure 1-2b. Daily Total Rainfall for 1999-2000 Wet Season, Foothill MS Sand Filter.

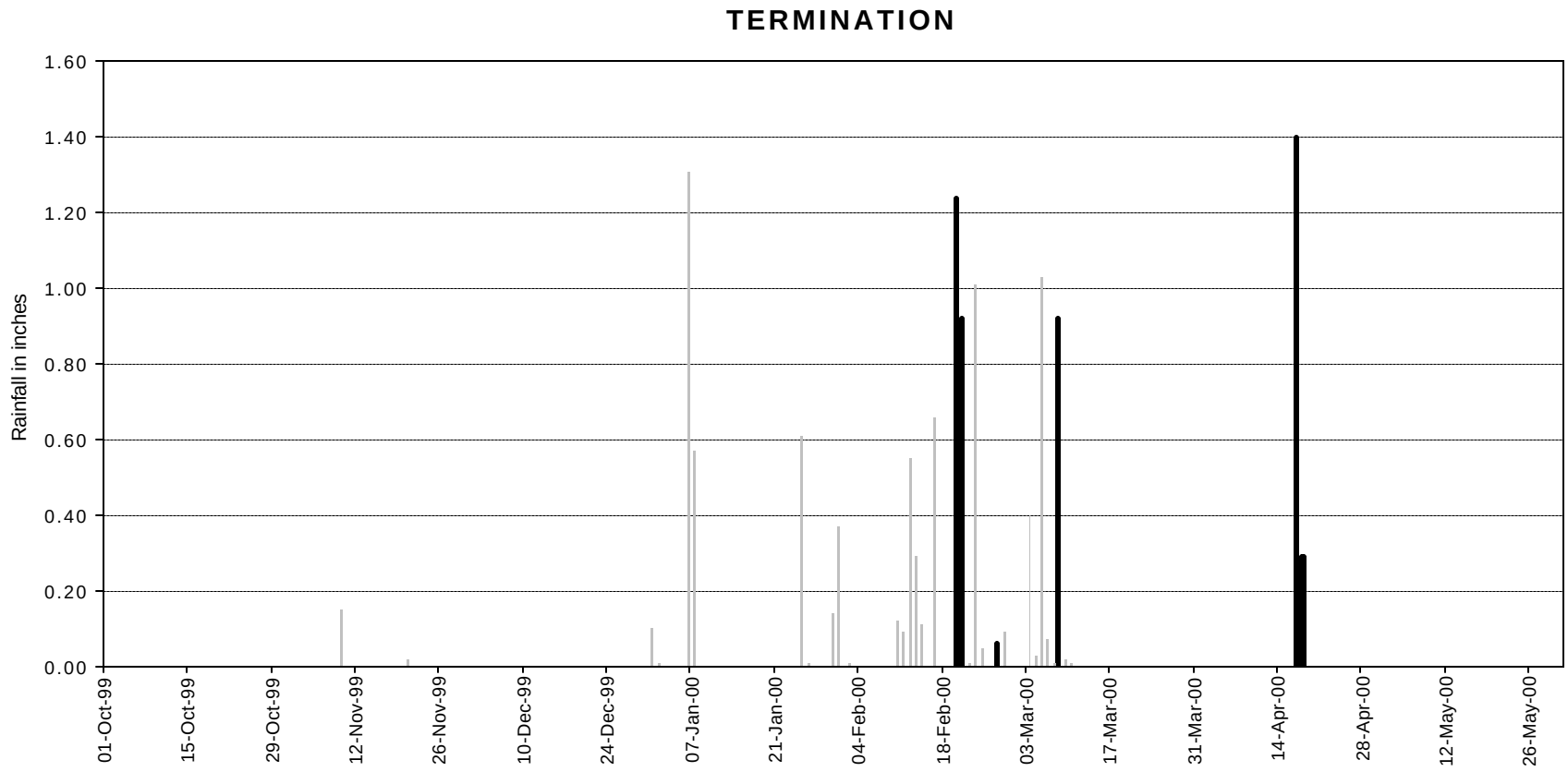
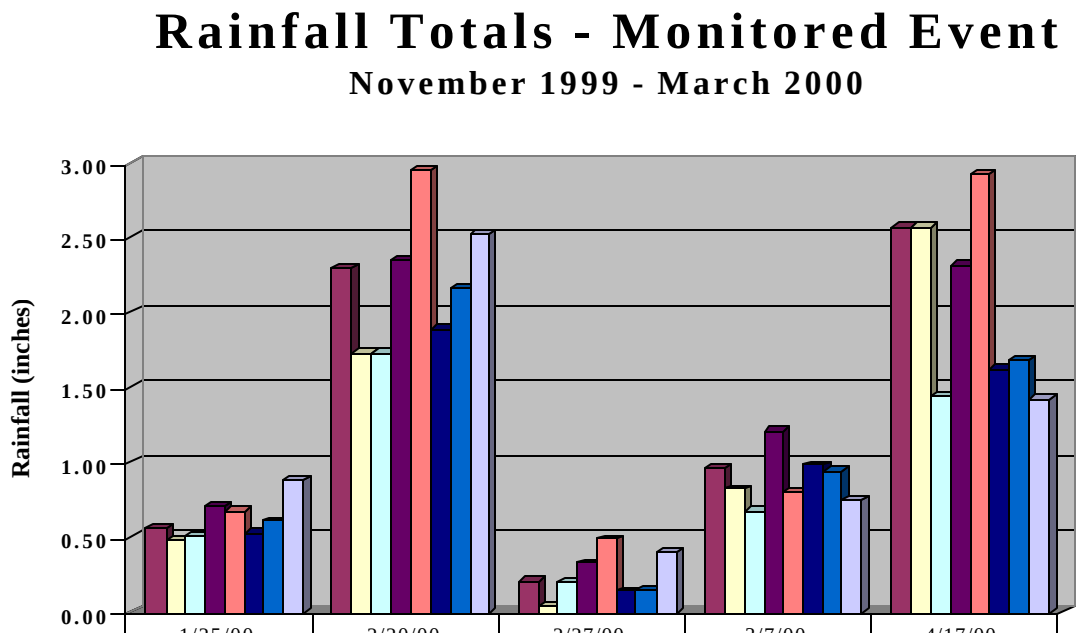


Figure 1-2c. Daily Total Rainfall for 1999-2000 Wet Season, Termination P&R Sand Filter.

Figure 1-3. Cumulative Rainfall During Monitored Events.



	1/25/00	2/20/00	2/27/00	3/7/00	4/17/00
I-5/I-605 Extended Detention Basin	0.56	2.29	0.21	0.96	2.57
I-605/SR-91 Extended Detention Basin	0.48	1.73	0.04	0.82	2.57
Alameda MS Oil/Water Separator	0.51	1.73	0.20	0.68	1.44
Eastern Regional MS Sand Filter	0.71	2.35	0.33	1.21	2.31
Foothill MS Sand Filter	0.68	2.95	0.49	0.80	2.92
Lakewood P&R MCTT	0.53	1.89	0.14	0.98	1.62
Termination P&R Sand Filter	0.61	2.16	0.15	0.94	1.68
Via Verde P&R MCTT	0.88	2.52	0.40	0.75	1.42

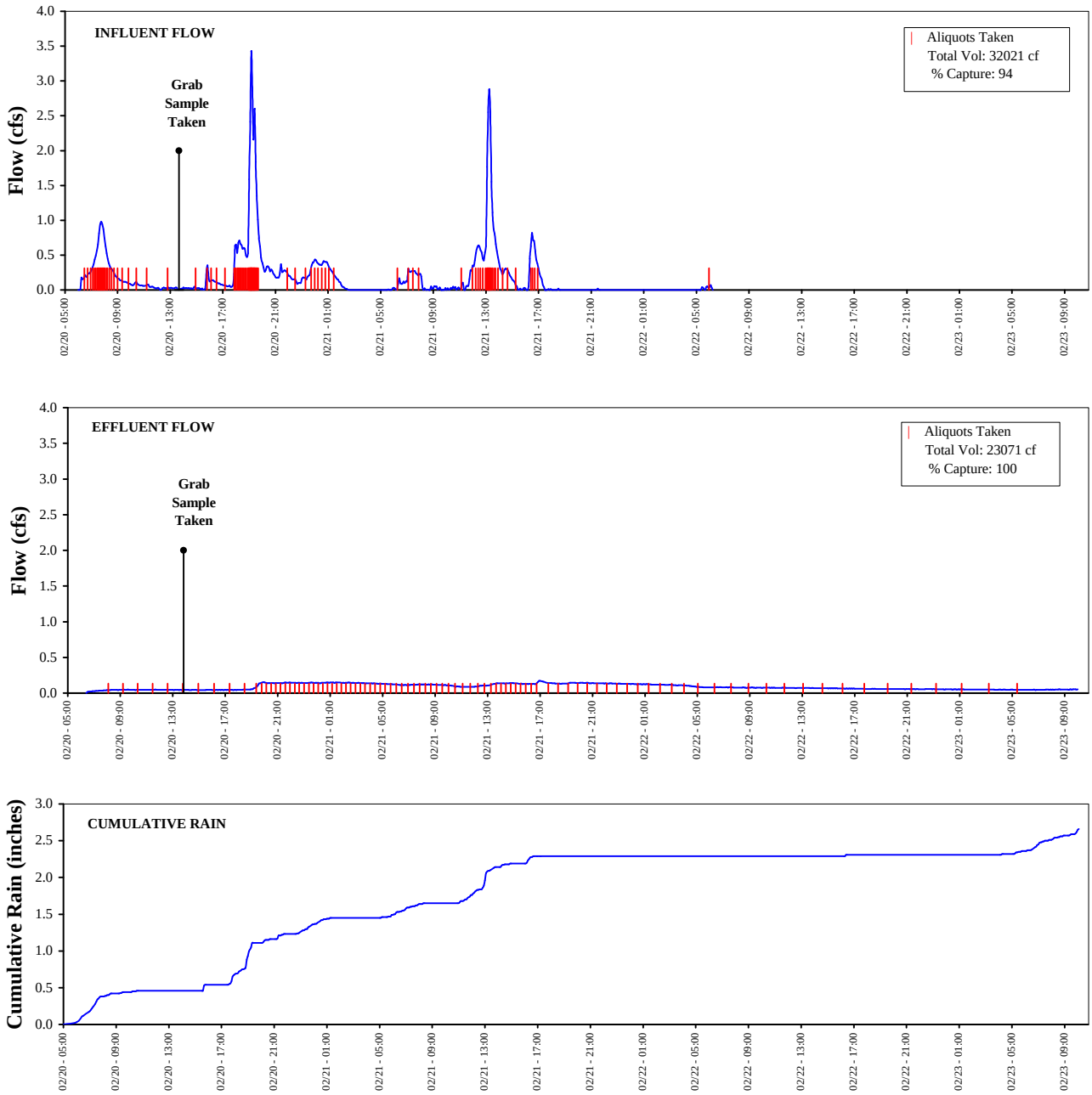


Figure 1-4a. Influent and Effluent Hydrographs and Cumulative Rainfall for the I-5/I-605 EDB on 20 February 2000.

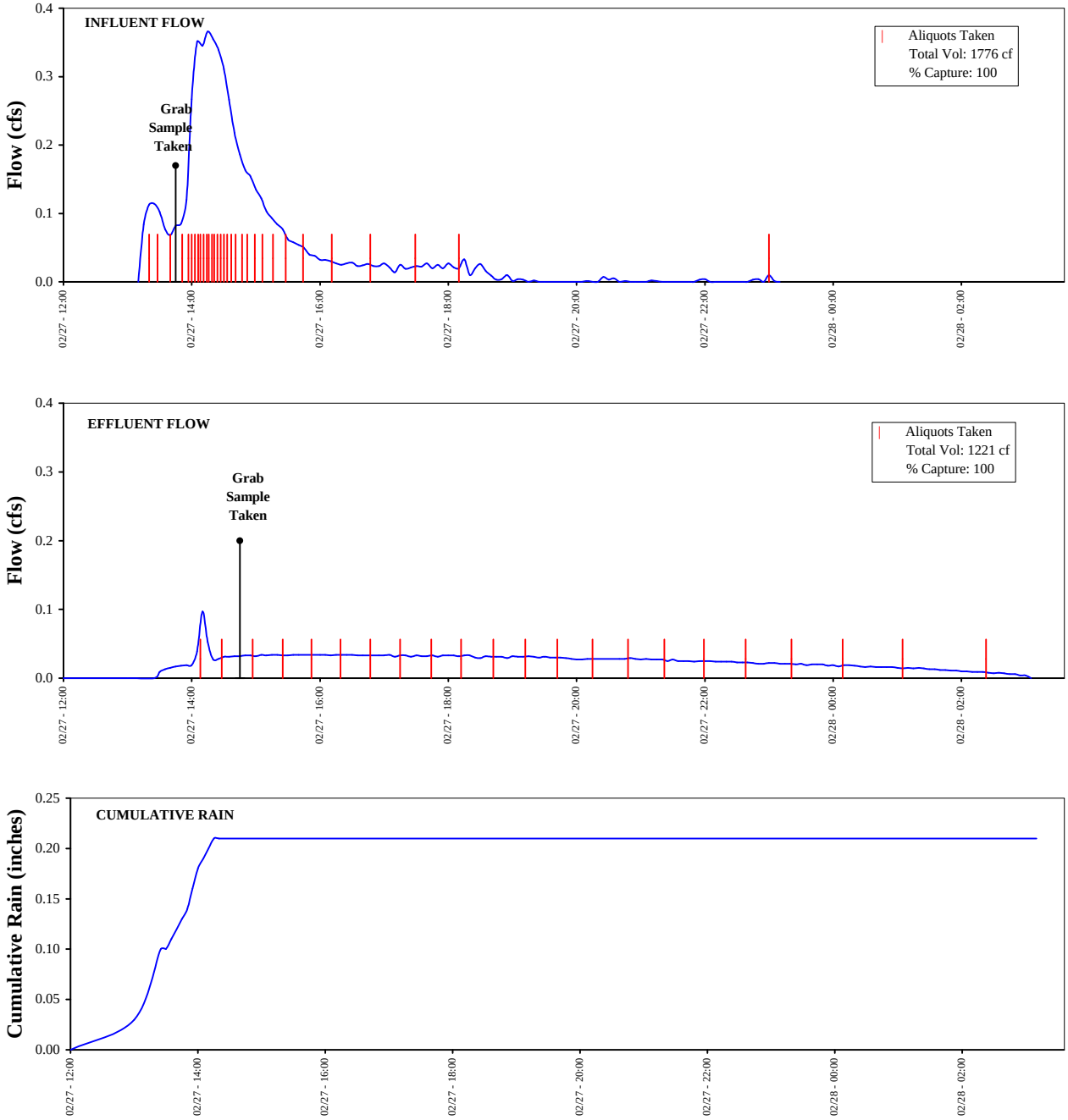


Figure 1-4b. Influent and Effluent Hydrographs and Cumulative Rainfall for the I-5/I-605 EDB on 27 February 2000.

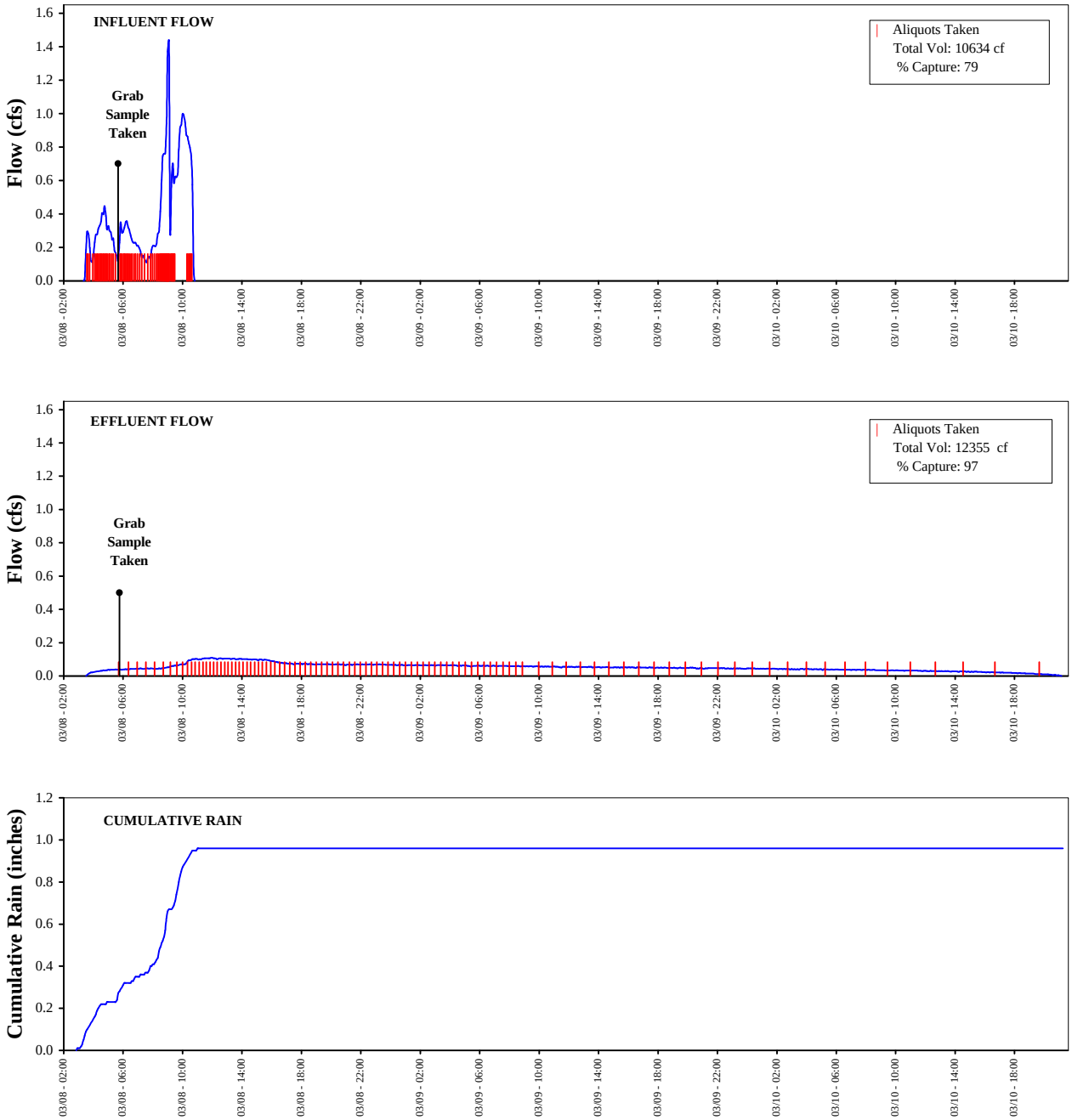


Figure 1-4c. Influent and Effluent Hydrographs and Cumulative Rainfall for the I-5/I-605 EDB on 8 March 2000.

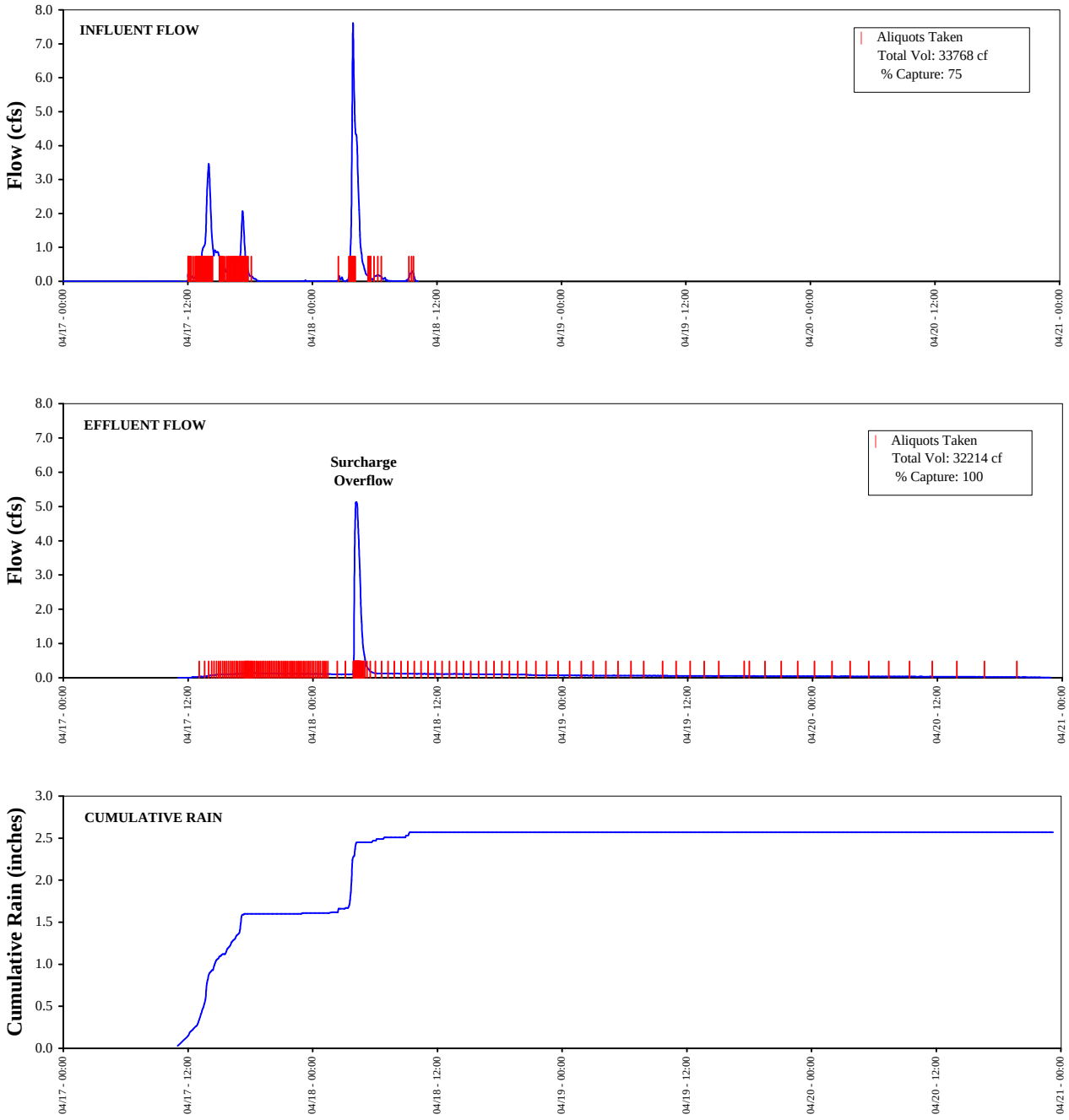


Figure 1-4d. Influent and Effluent Hydrographs and Cumulative Rainfall for the I-5/I-605 EDB on 17 April 2000.

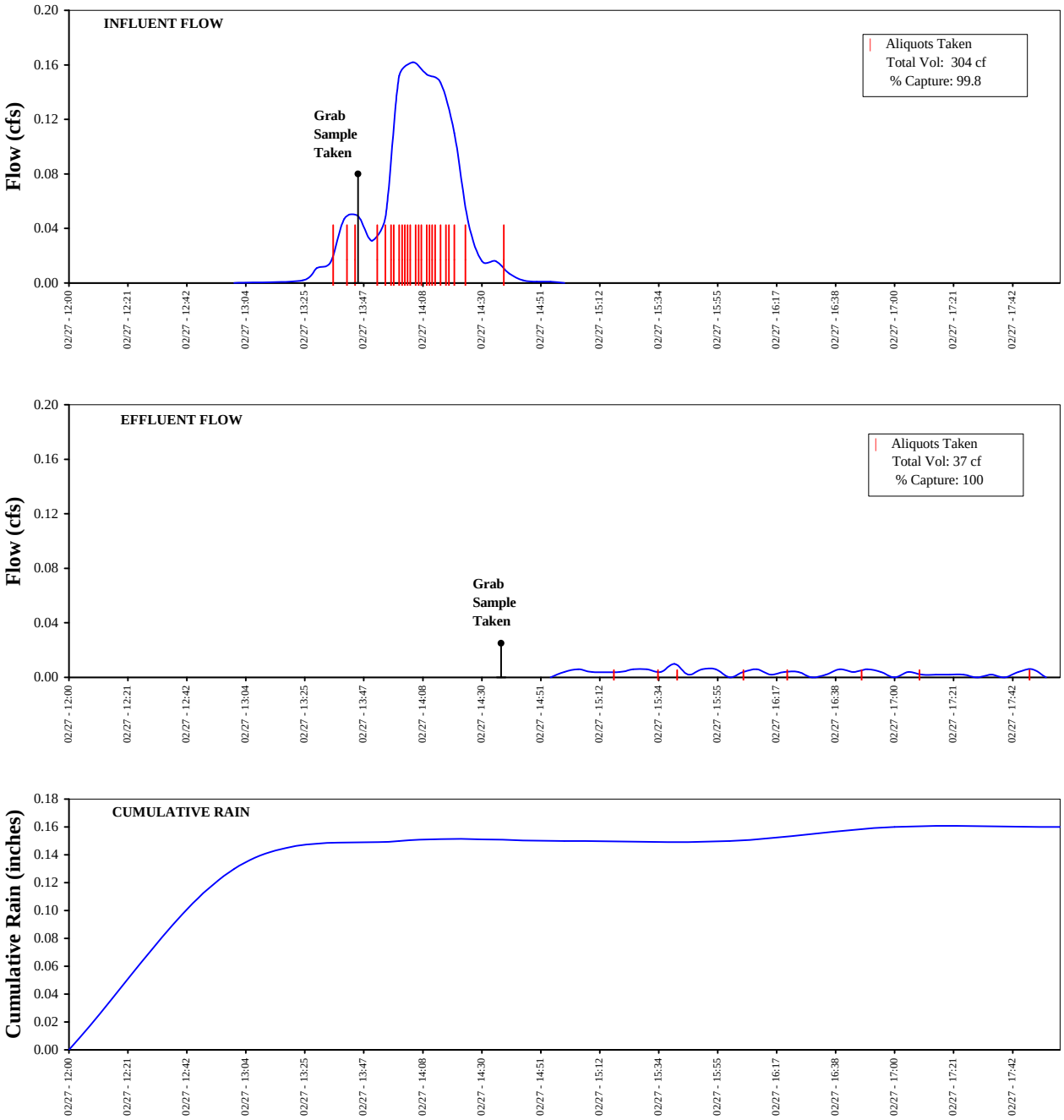


Figure 1-5a. Influent and Effluent Hydrographs and Cumulative Rainfall for the I-605/SR-91 EBD on 27 February 2000.

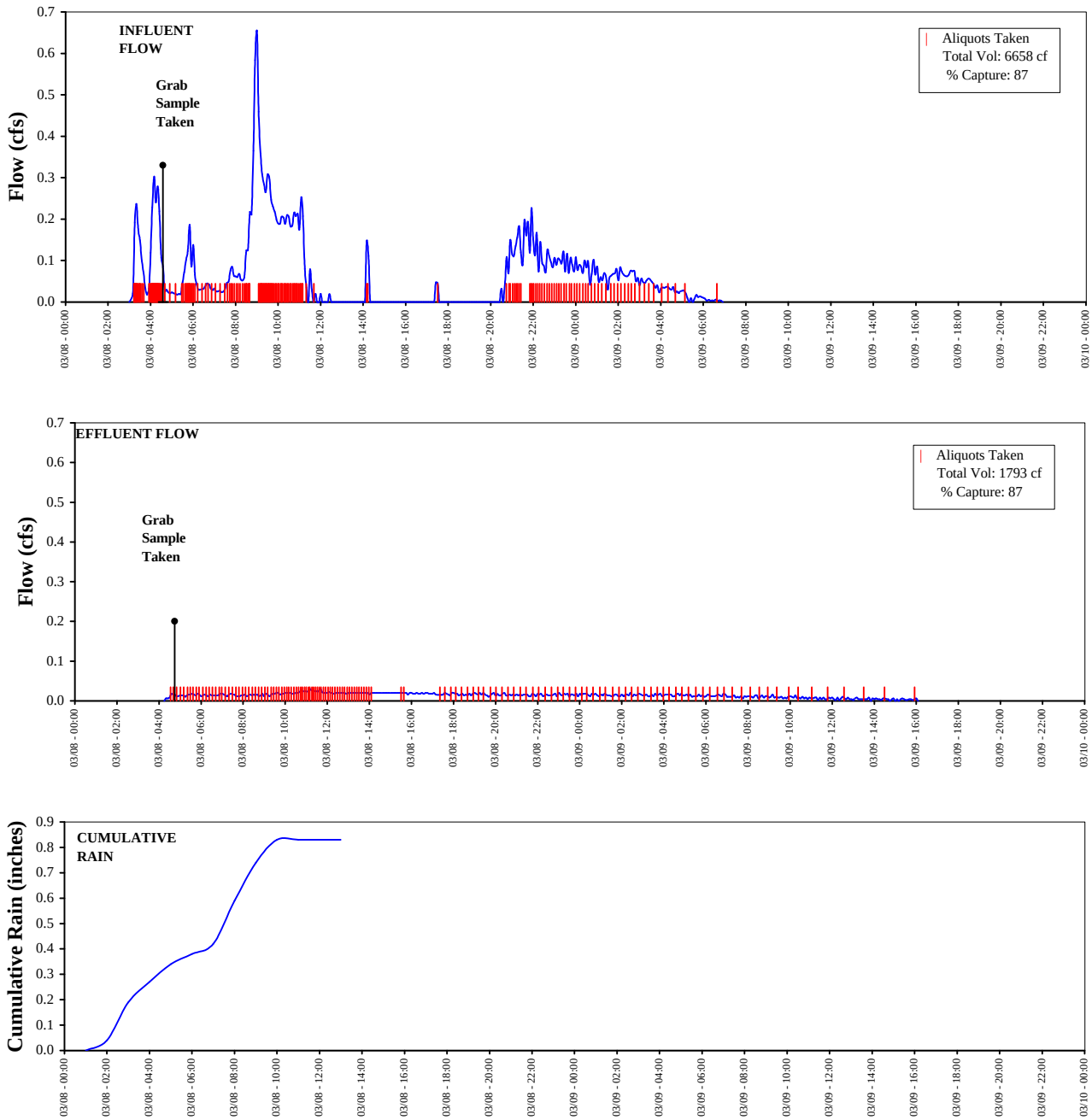


Figure 1-5b. Influent and Effluent Hydrographs and Cumulative Rainfall for the I-605/SR-91 EDB on 8 March 2000.

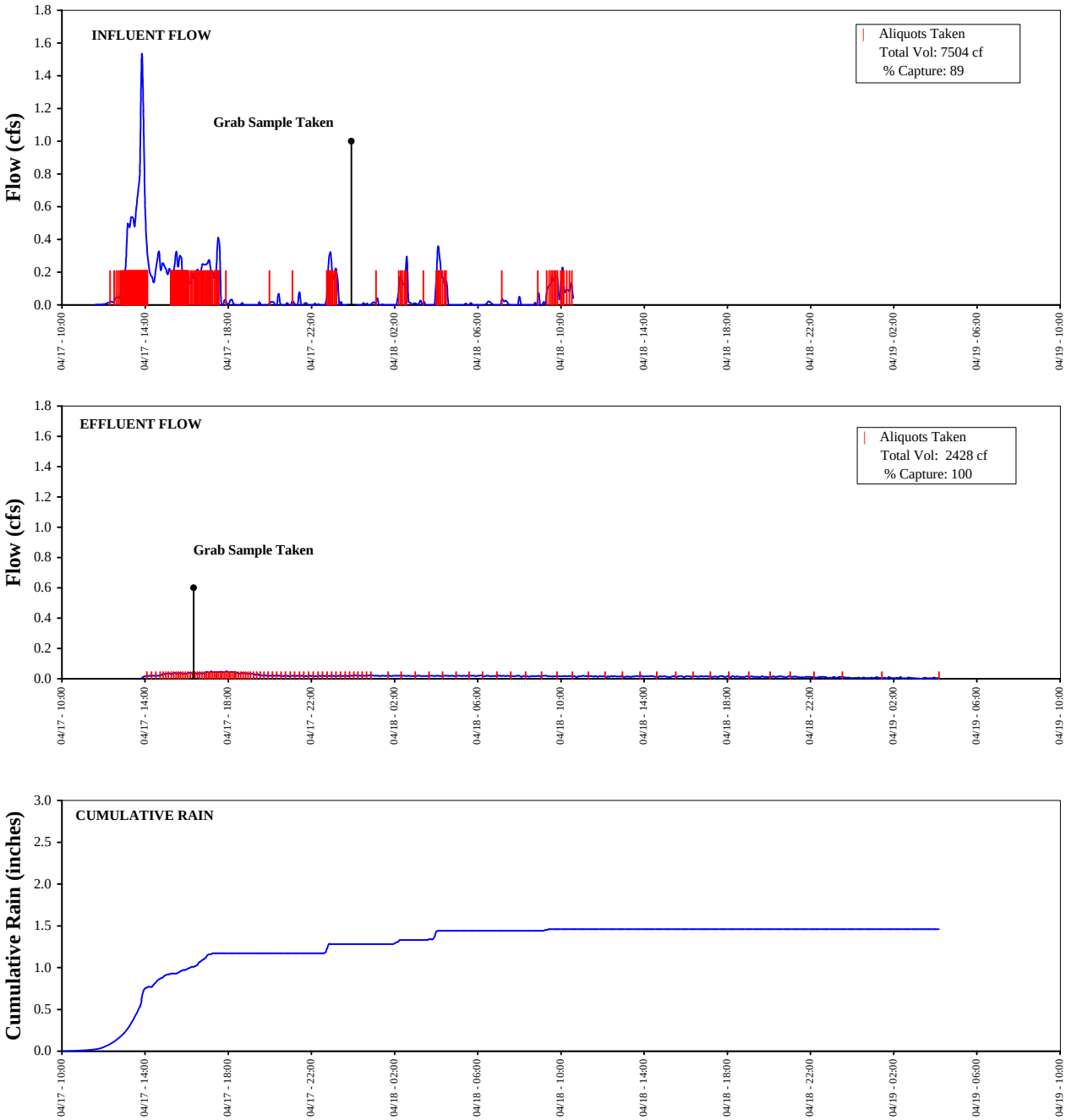


Figure 1-5c. Influent and Effluent Hydrographs and Cumulative Rainfall for the I-605/SR-91 EDB on 17 April 2000.

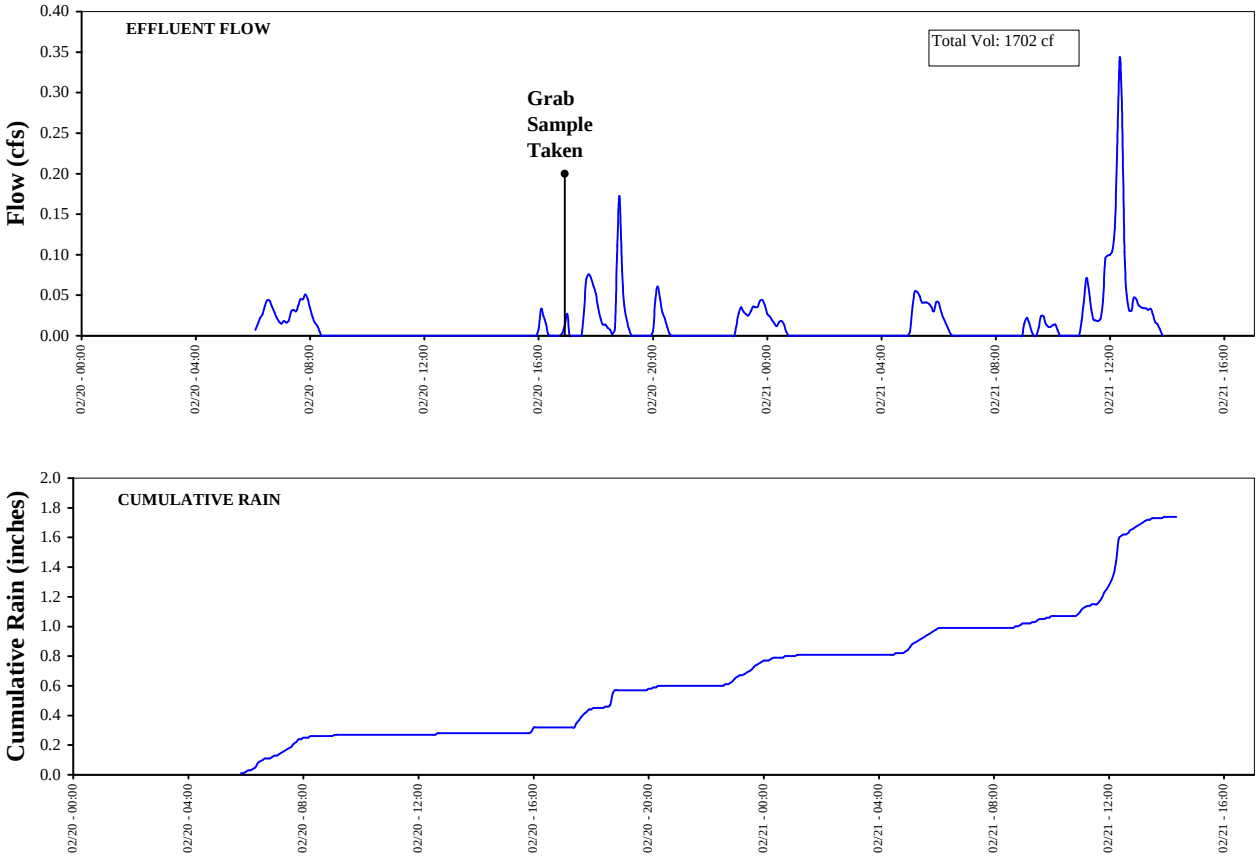


Figure 1-6a. Effluent Hydrograph and Cumulative Rainfall for the Alameda MS Oil/Water Separator on 20 February 2000.

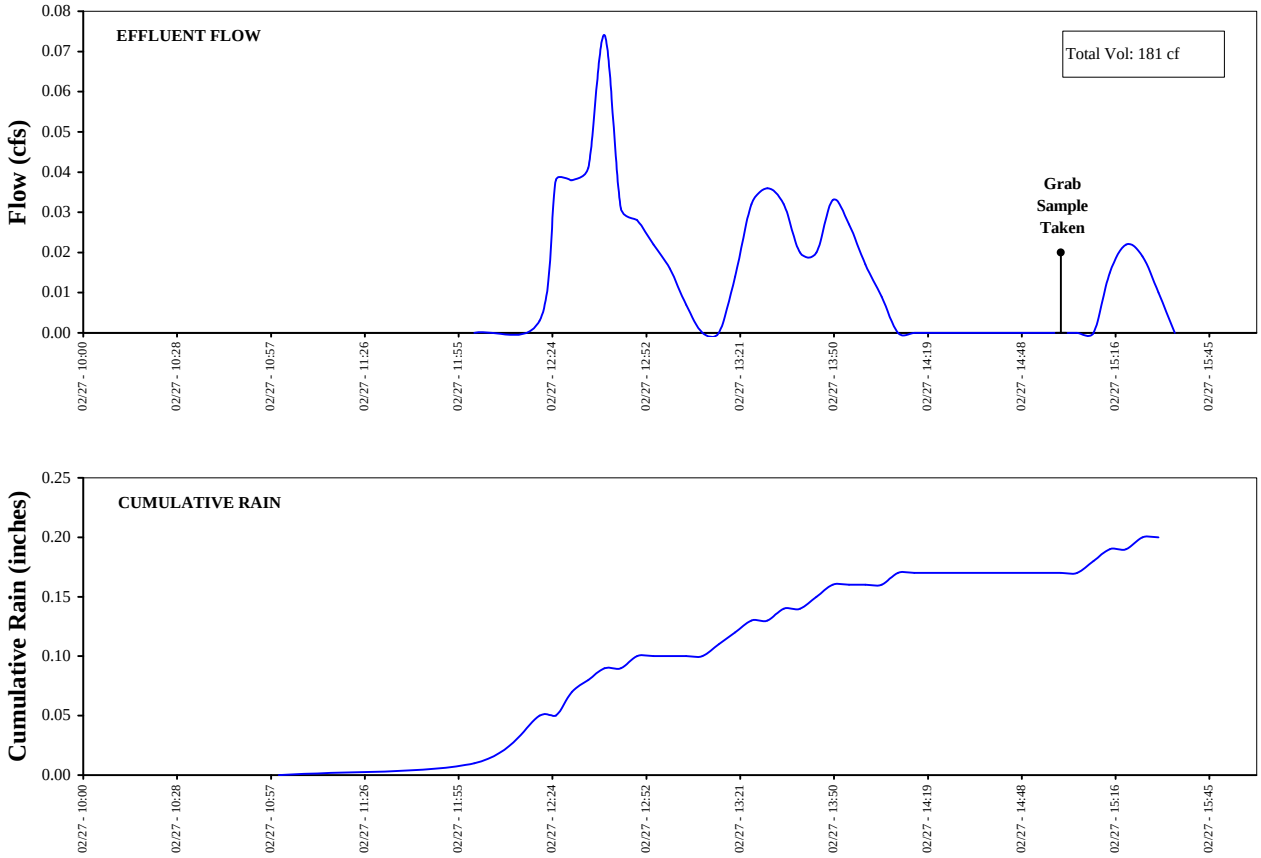


Figure 1-6b. Effluent Hydrograph and Cumulative Rainfall for the Alameda MS Oil/Water Separator on 27 February 2000.

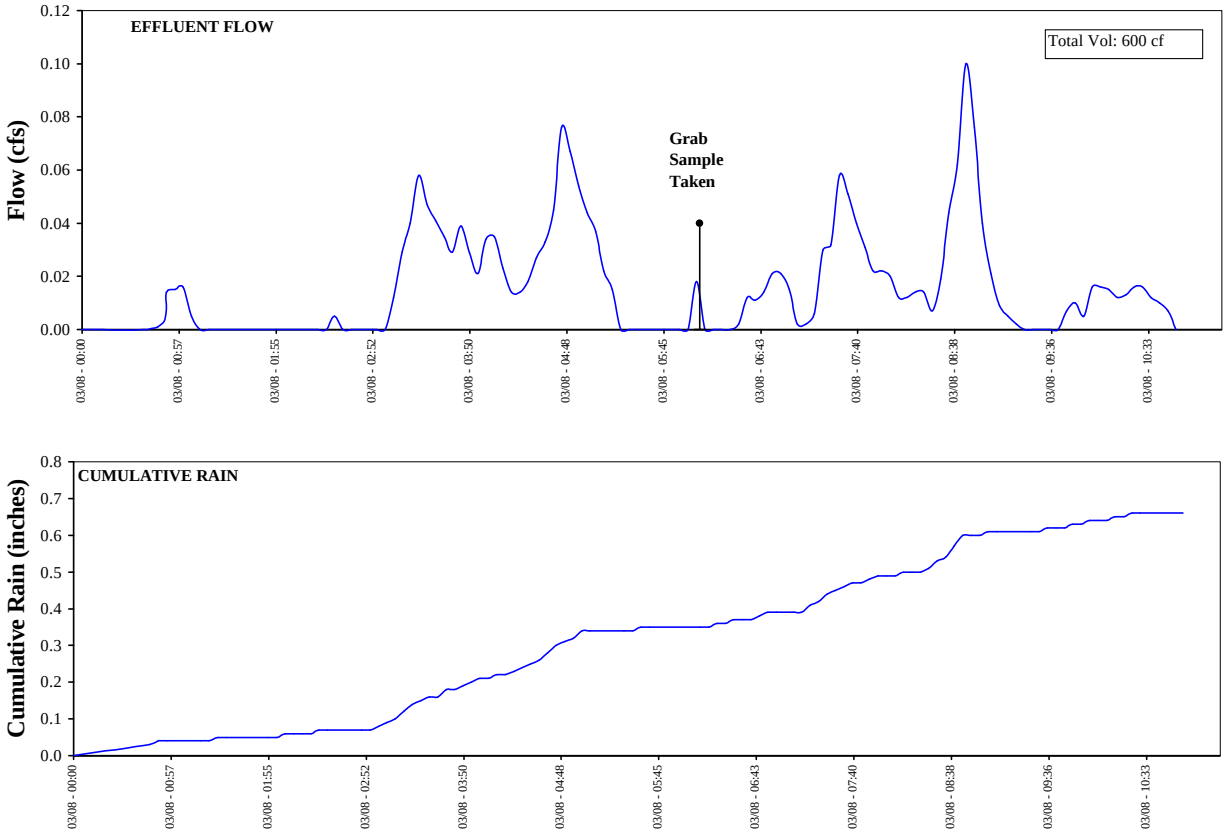


Figure 1-6c. Effluent Hydrograph and Cumulative Rainfall for the Alameda MS Oil/Water Separator on 8 March 2000.

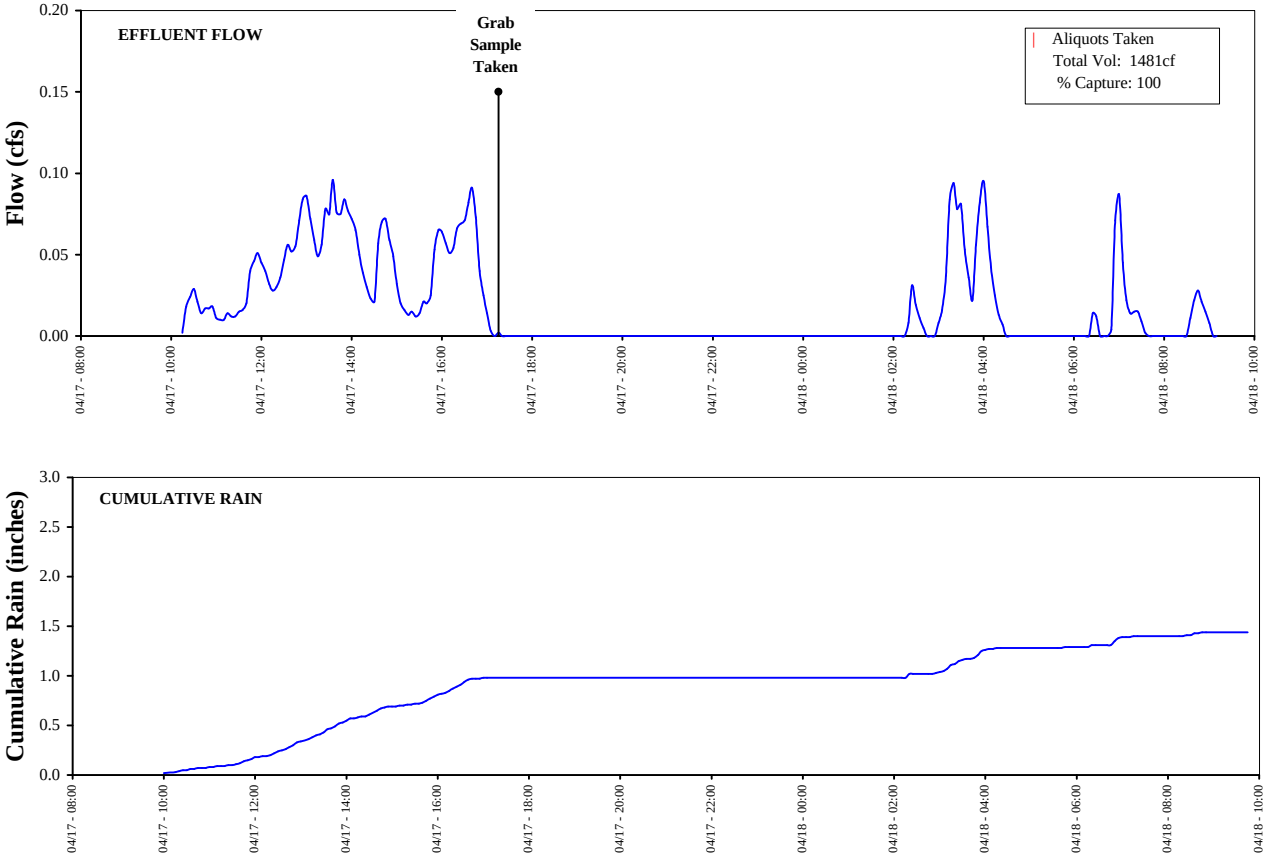


Figure 1-6d. Effluent Hydrograph and Cumulative Rainfall for the Alameda MS Oil/Water Separator on 17 April 2000.

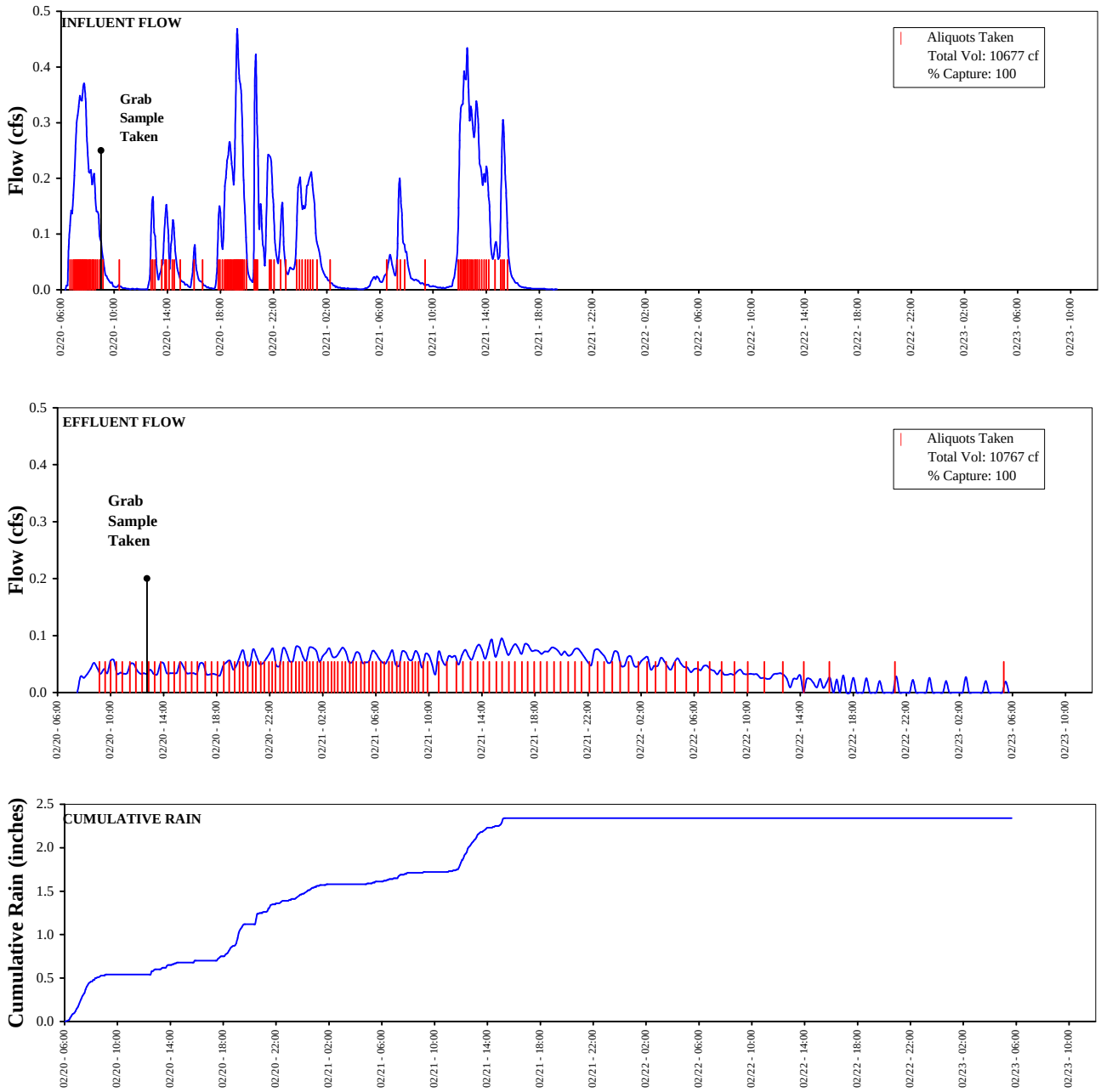


Figure 1-7a. Influent and Effluent Hydrographs and Cumulative Rainfall for the Eastern Regional MS Sand Filter on 20 February 2000.

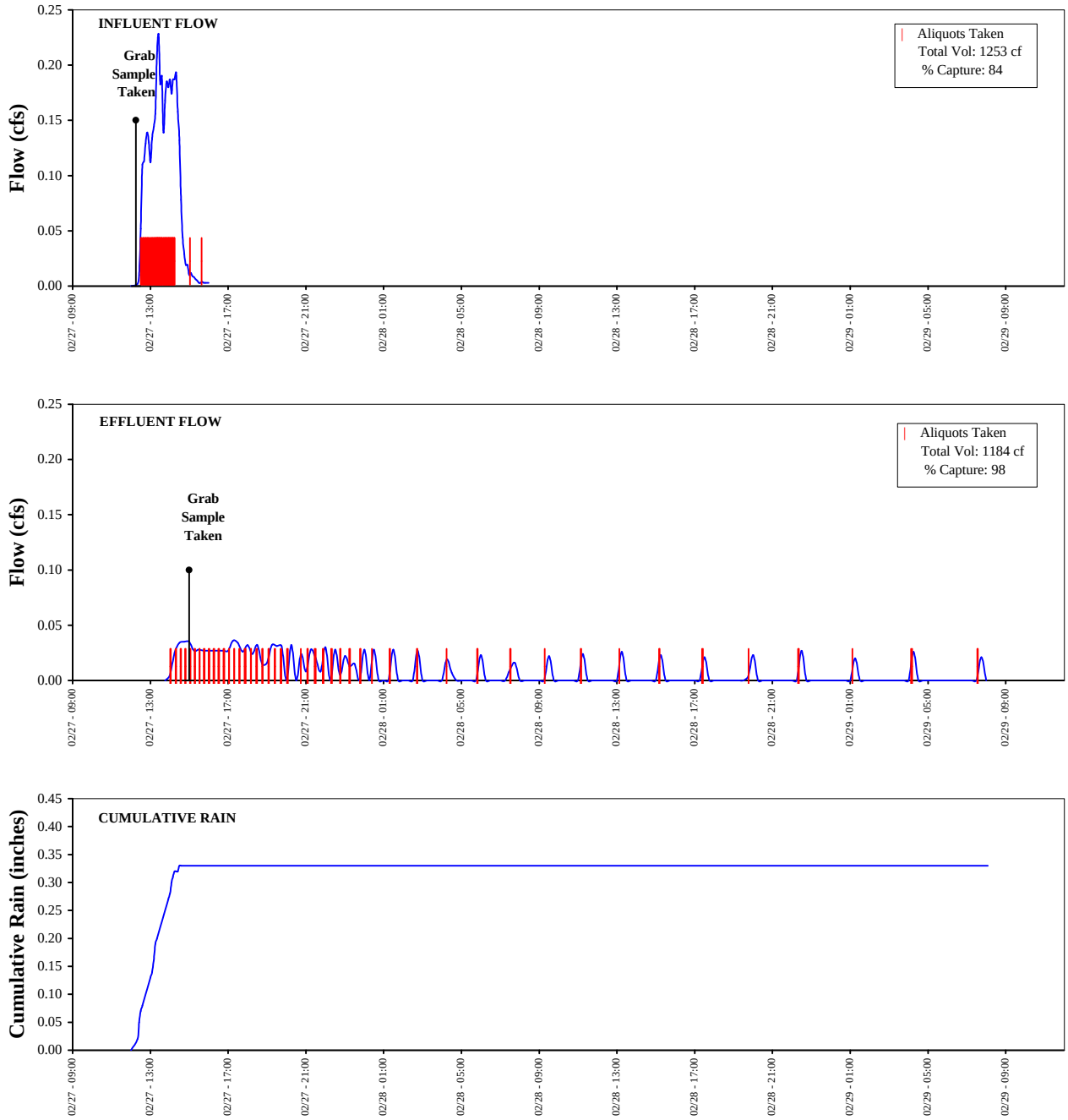


Figure 1-7b. Influent and Effluent Hydrographs and Cumulative Rainfall for the Eastern Regional MS Sand Filter on 27 February 2000.

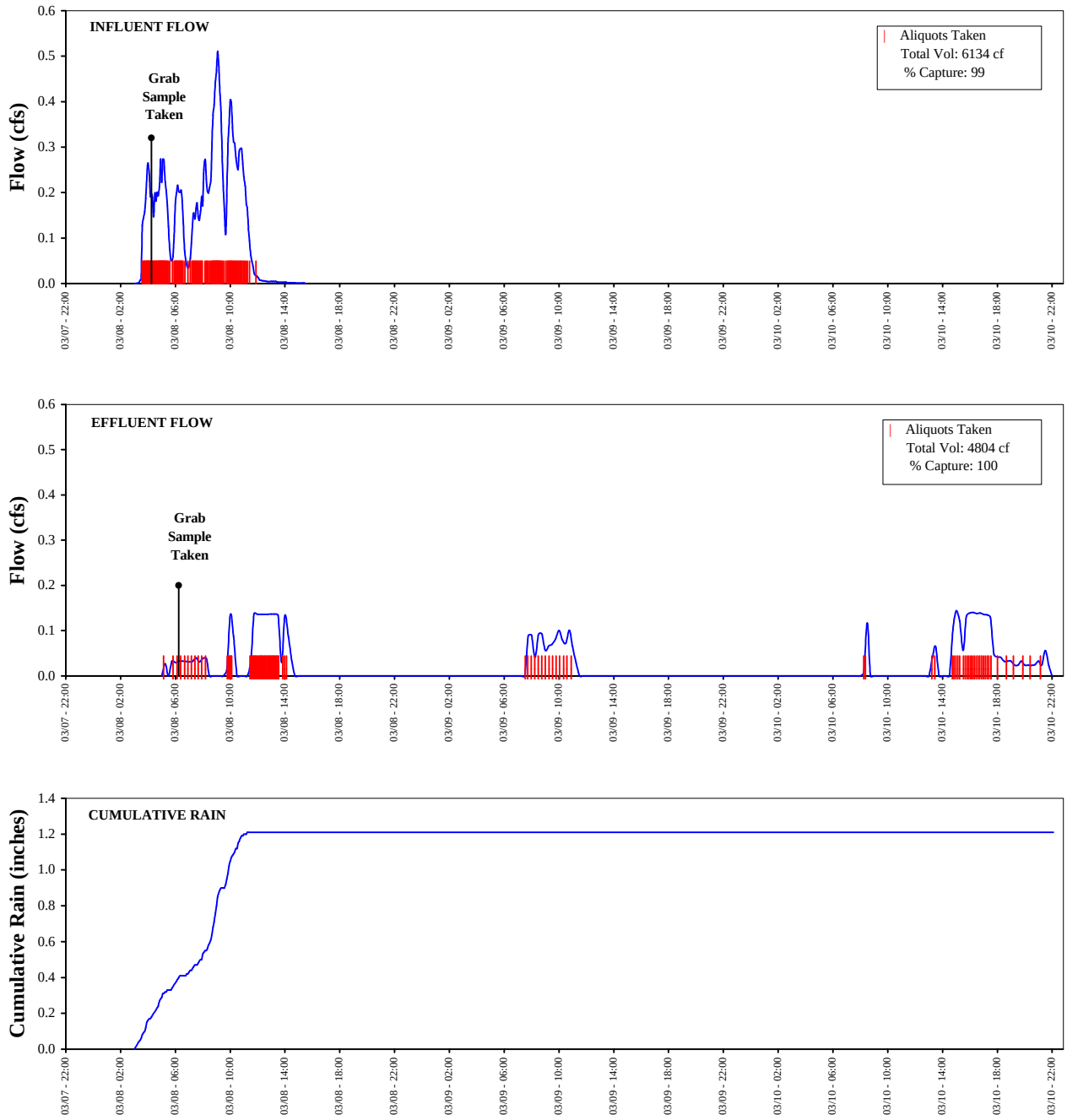


Figure 1-7c. Influent and Effluent Hydrographs and Cumulative Rainfall for the Eastern Regional MS Sand Filter on 8 March 2000.

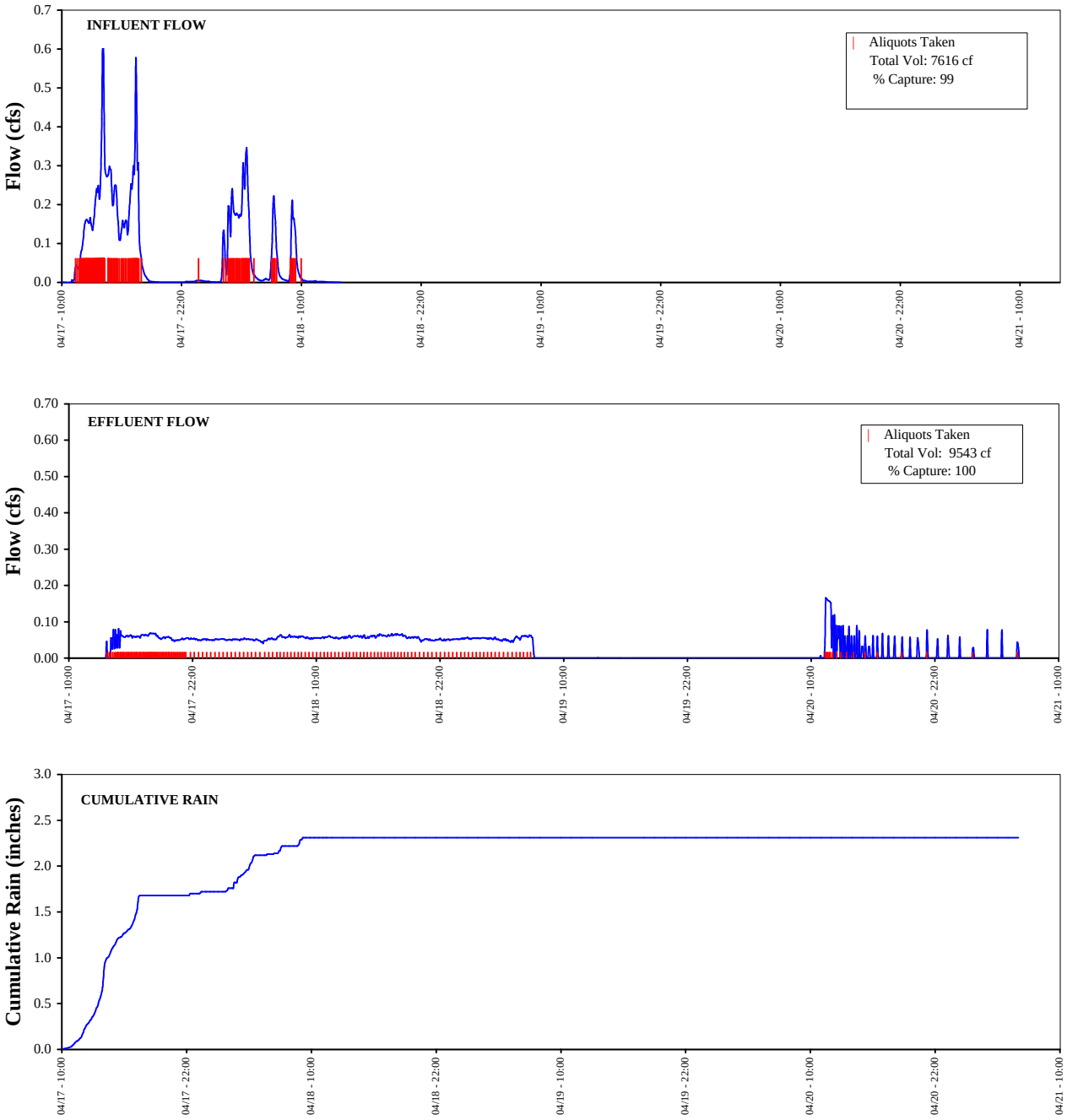


Figure 1-7d. Influent and Effluent Hydrographs and Cumulative Rainfall for the Eastern Regional MS Sand Filter on 17 April 2000.

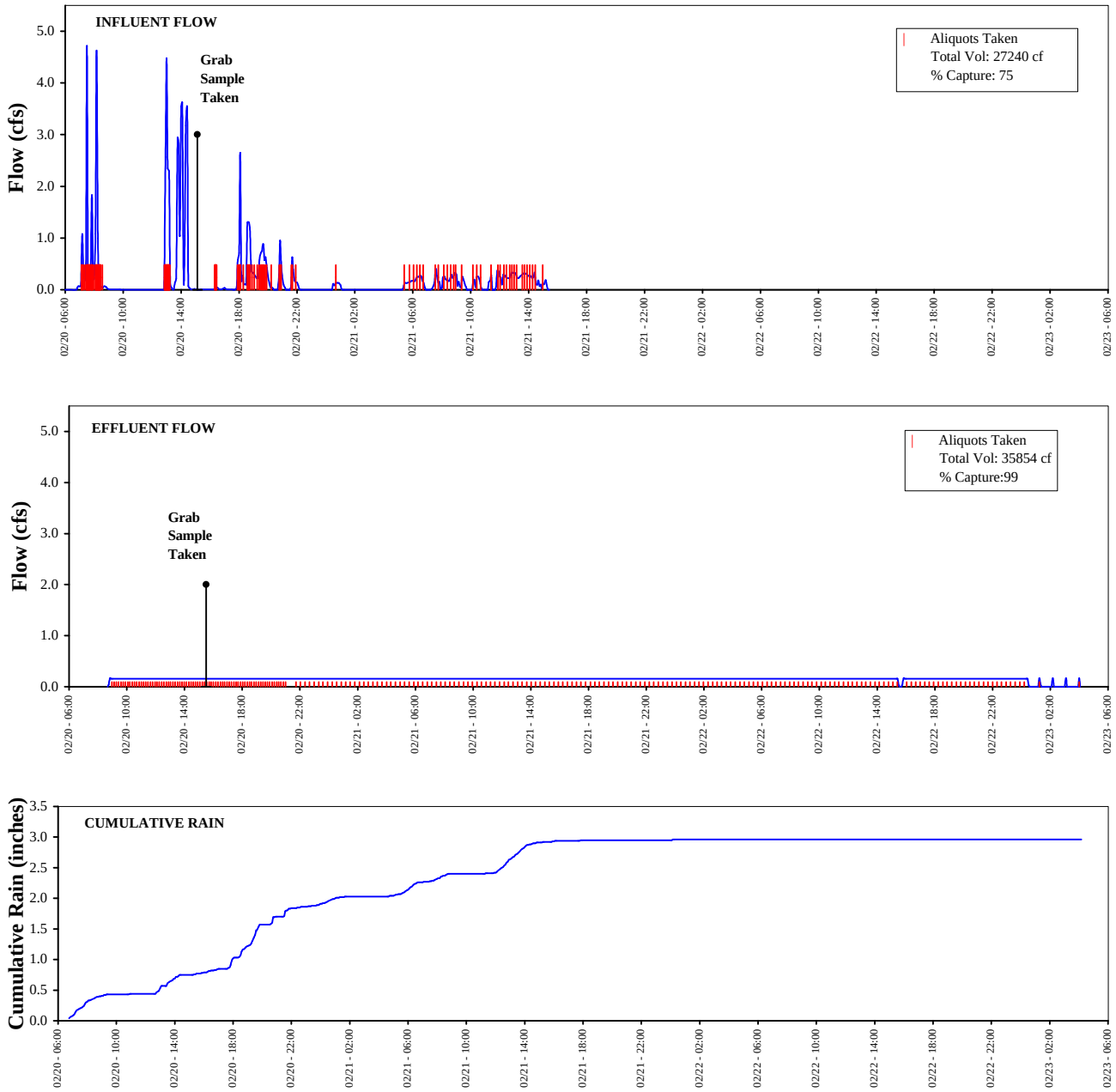


Figure 1-8a. Influent and Effluent Hydrographs and Cumulative Rainfall for the Foothill MS Sand Filter on 20 February 2000.

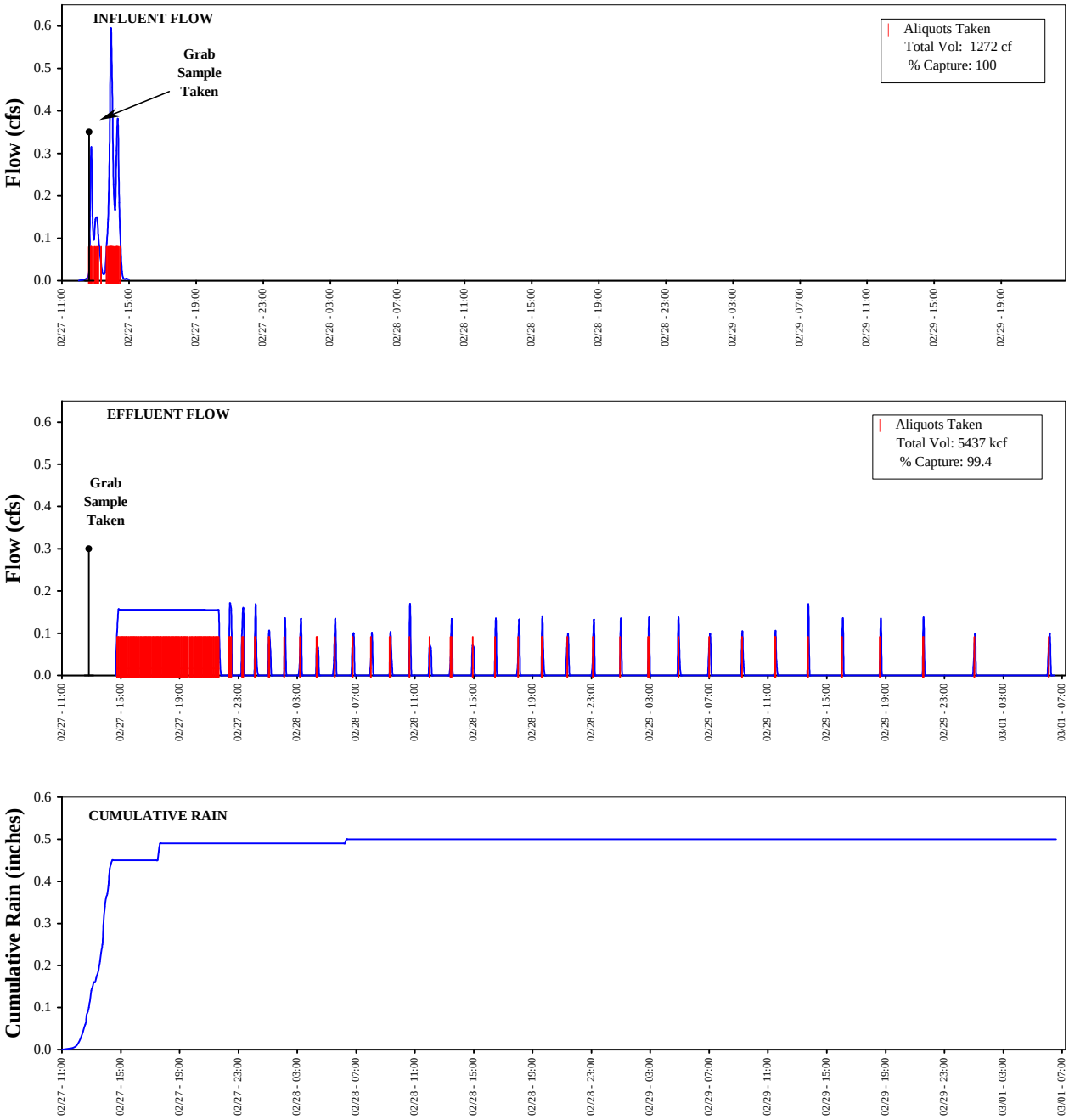


Figure 1-8b. Influent and Effluent Hydrographs and Cumulative Rainfall for the Foothill MS Sand Filter on 27 February 2000.

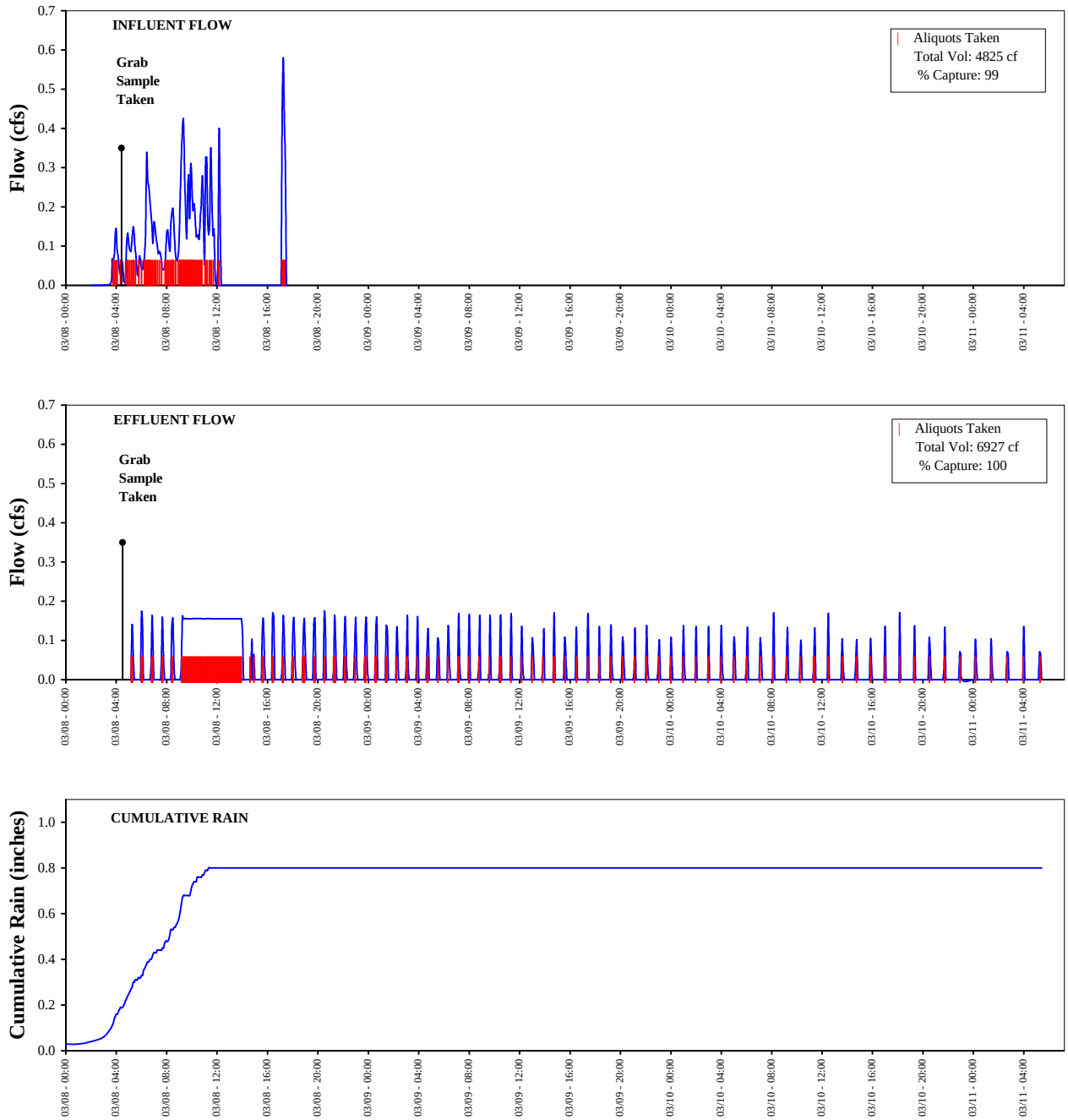


Figure 1-8c. Influent and Effluent Hydrographs and Cumulative Rainfall for the Foothill MS Sand Filter on 8 March 2000.

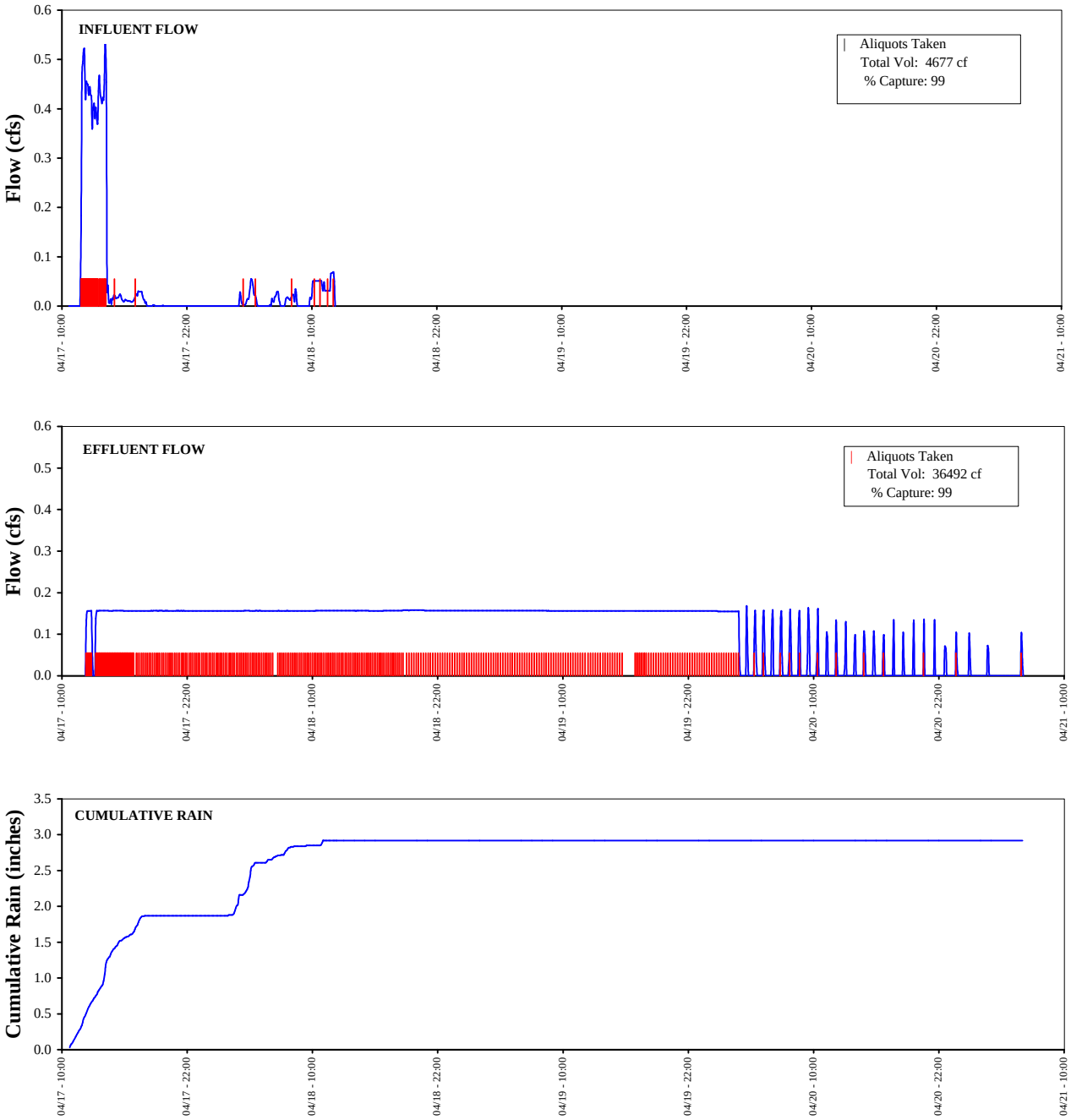


Figure 1-8d. Influent and Effluent Hydrographs and Cumulative Rainfall for the Foothill MS Sand Filter on 17 April 2000.

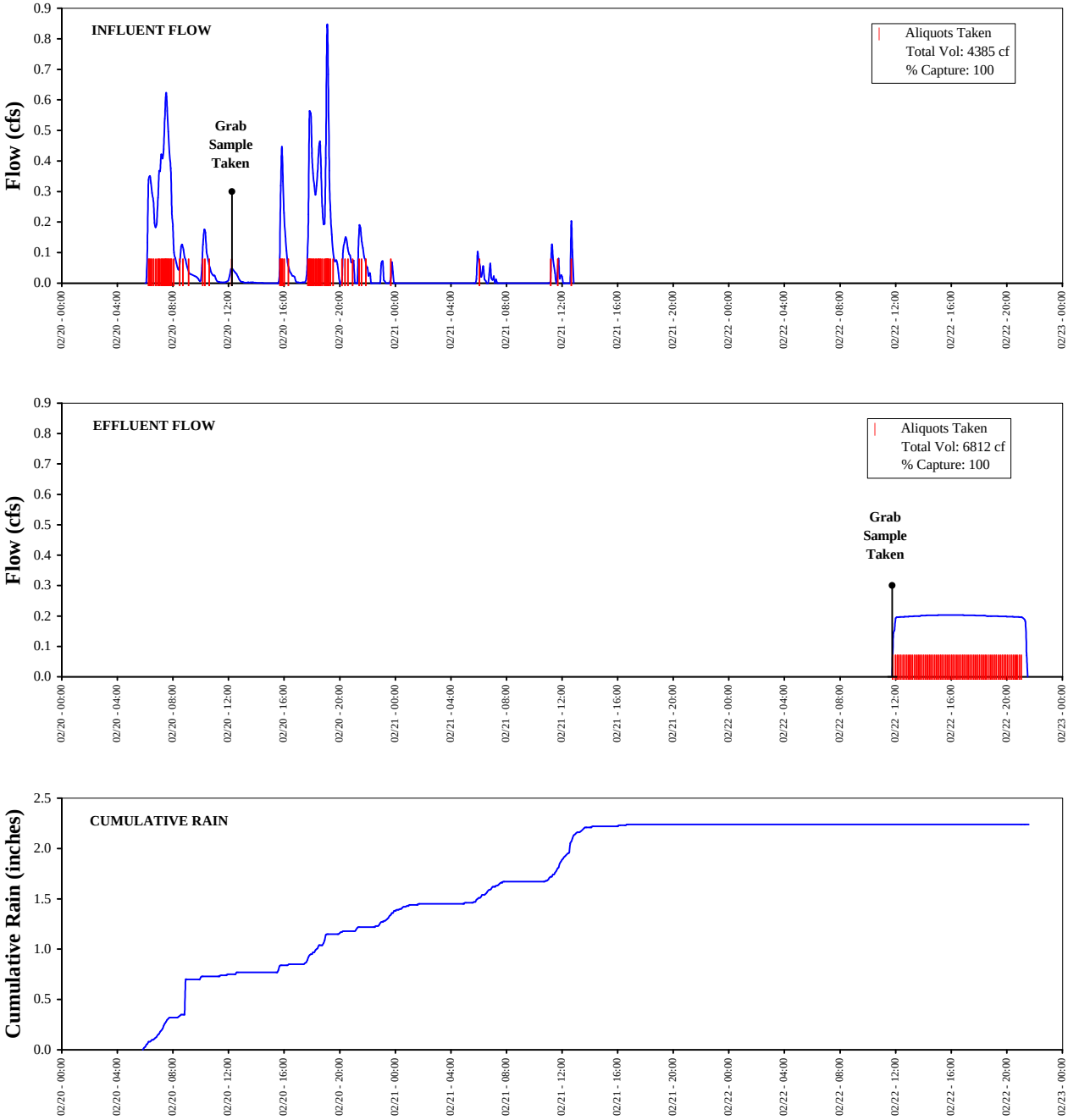


Figure 1-9a. Influent and Effluent Hydrographs and Cumulative Rainfall for the Lakewood P&R MCTT on 20 February 2000.

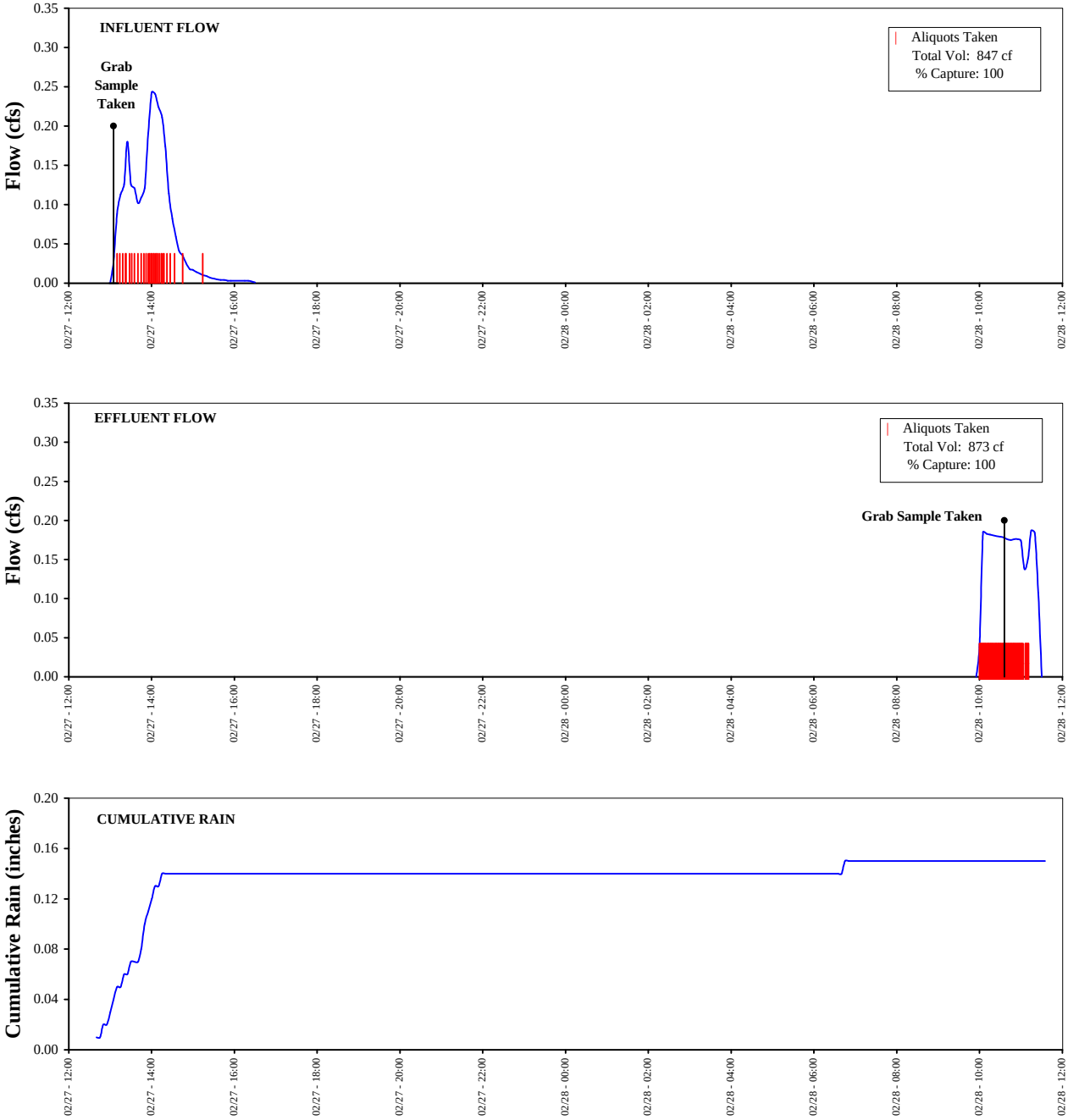


Figure 1-9b. Influent and Effluent Hydrographs and Cumulative Rainfall for the Lakewood P&R MCTT on 27 February 2000.

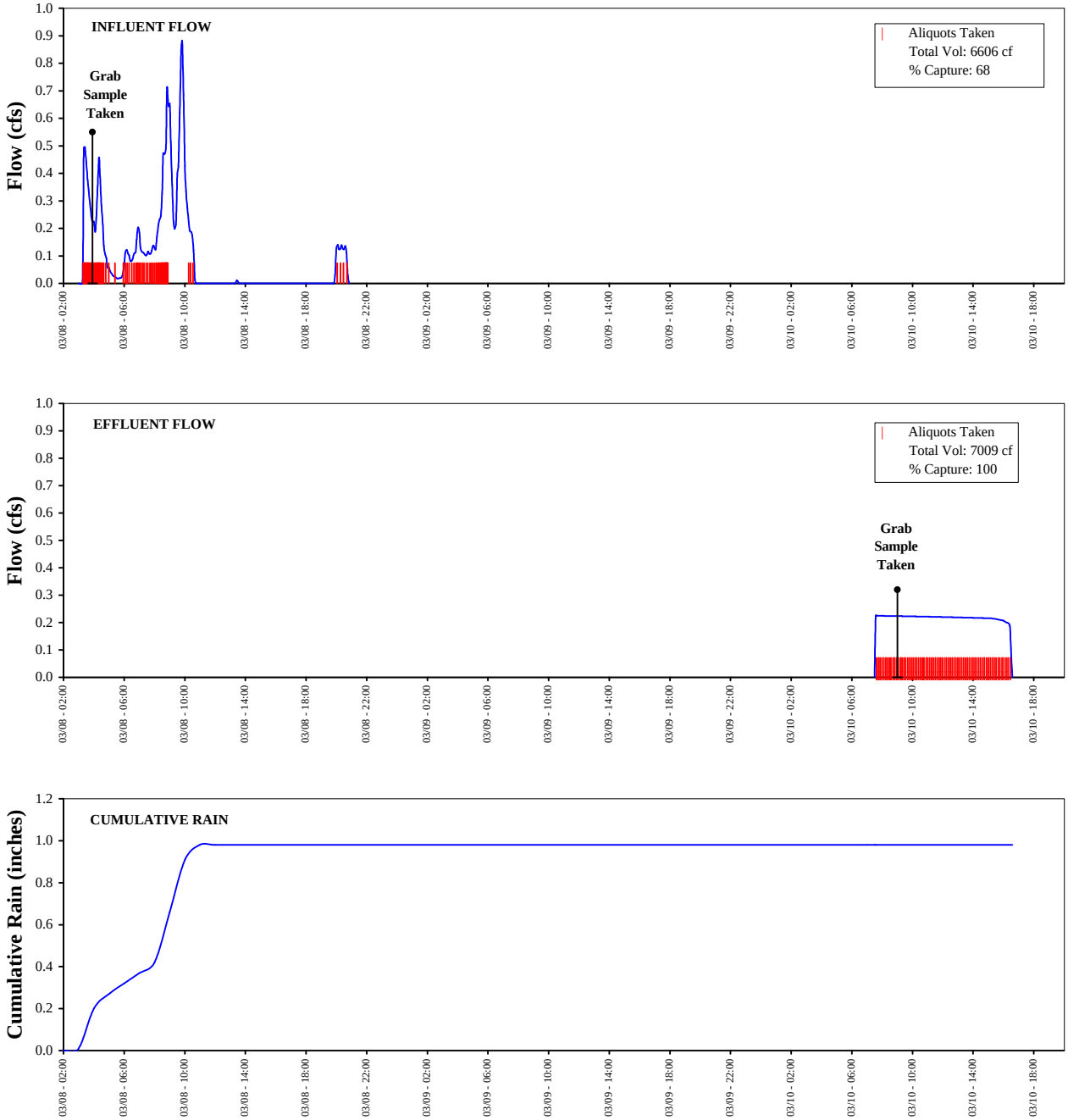


Fig 1-9c. Influent and Effluent Hydrographs and Cumulative Rainfall for the Lakewood P&R MCTT on 8 March 2000.

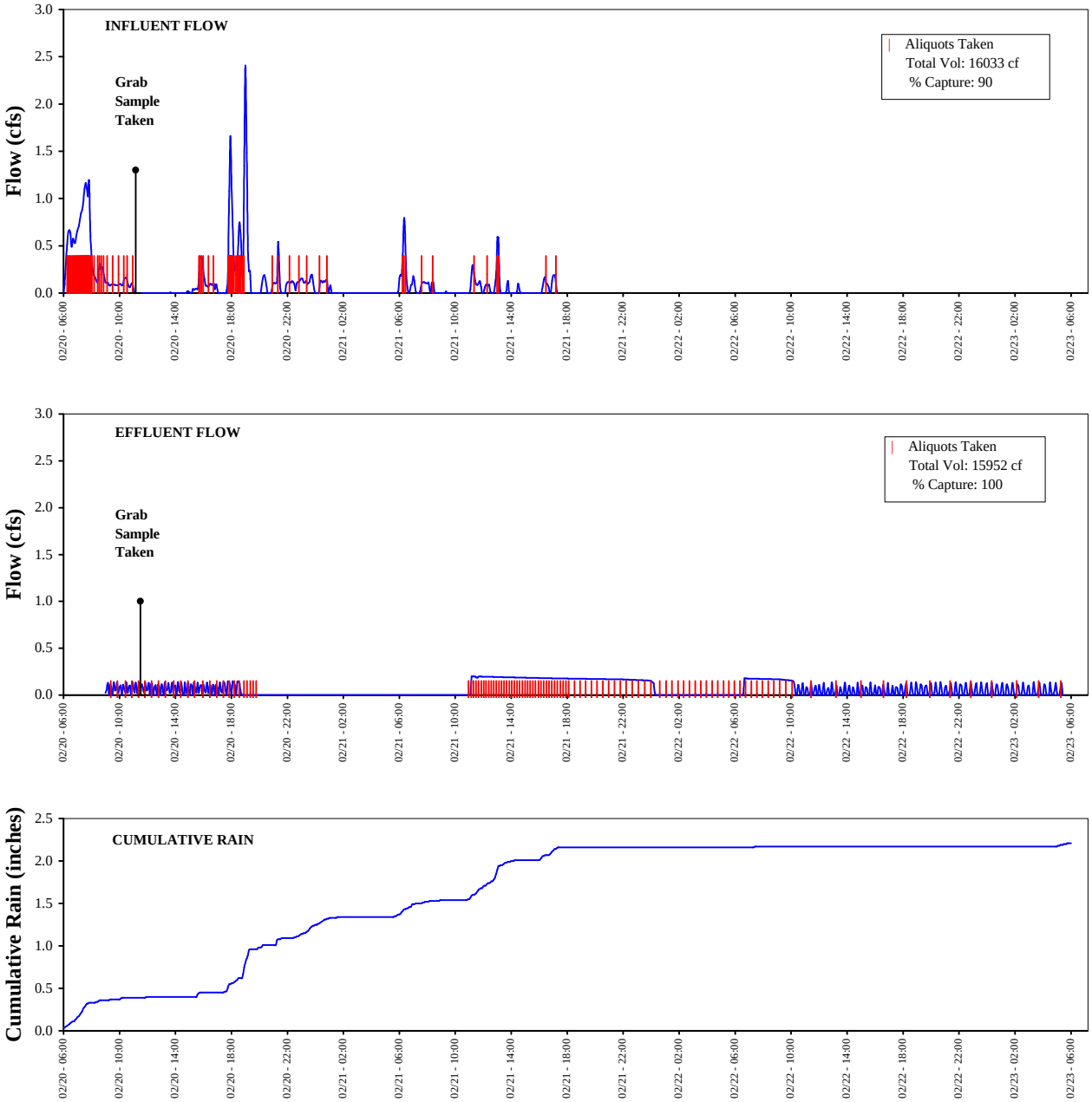


Figure 1-10a. Influent and Effluent Hydrographs and Cumulative Rainfall for the Termination P&R Sand Filter on 20 February 2000.

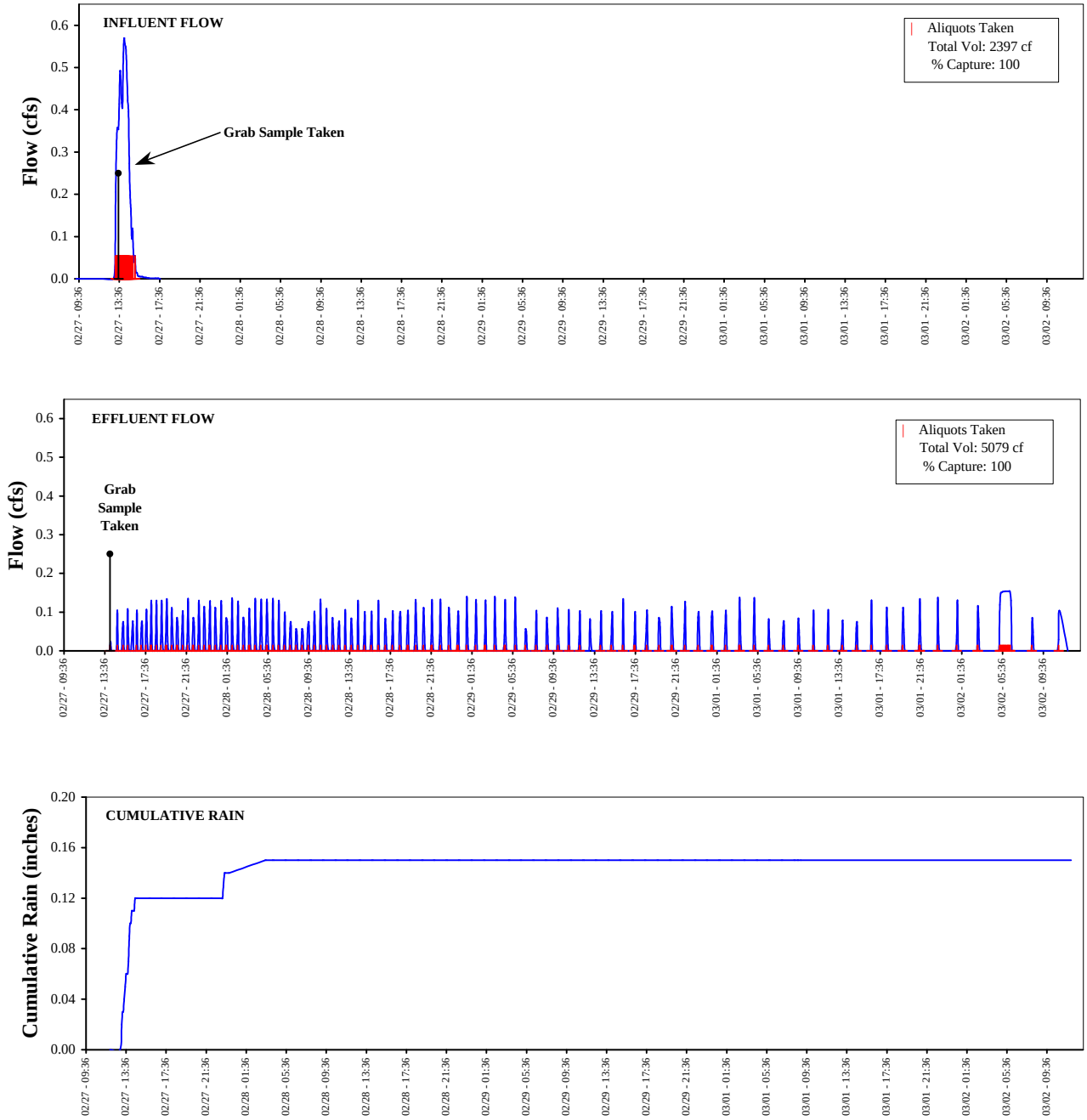


Figure 1-10b. Influent and Effluent Hydrographs and Cumulative Rainfall for the Termination P&R Sand Filter on 27 February 2000.

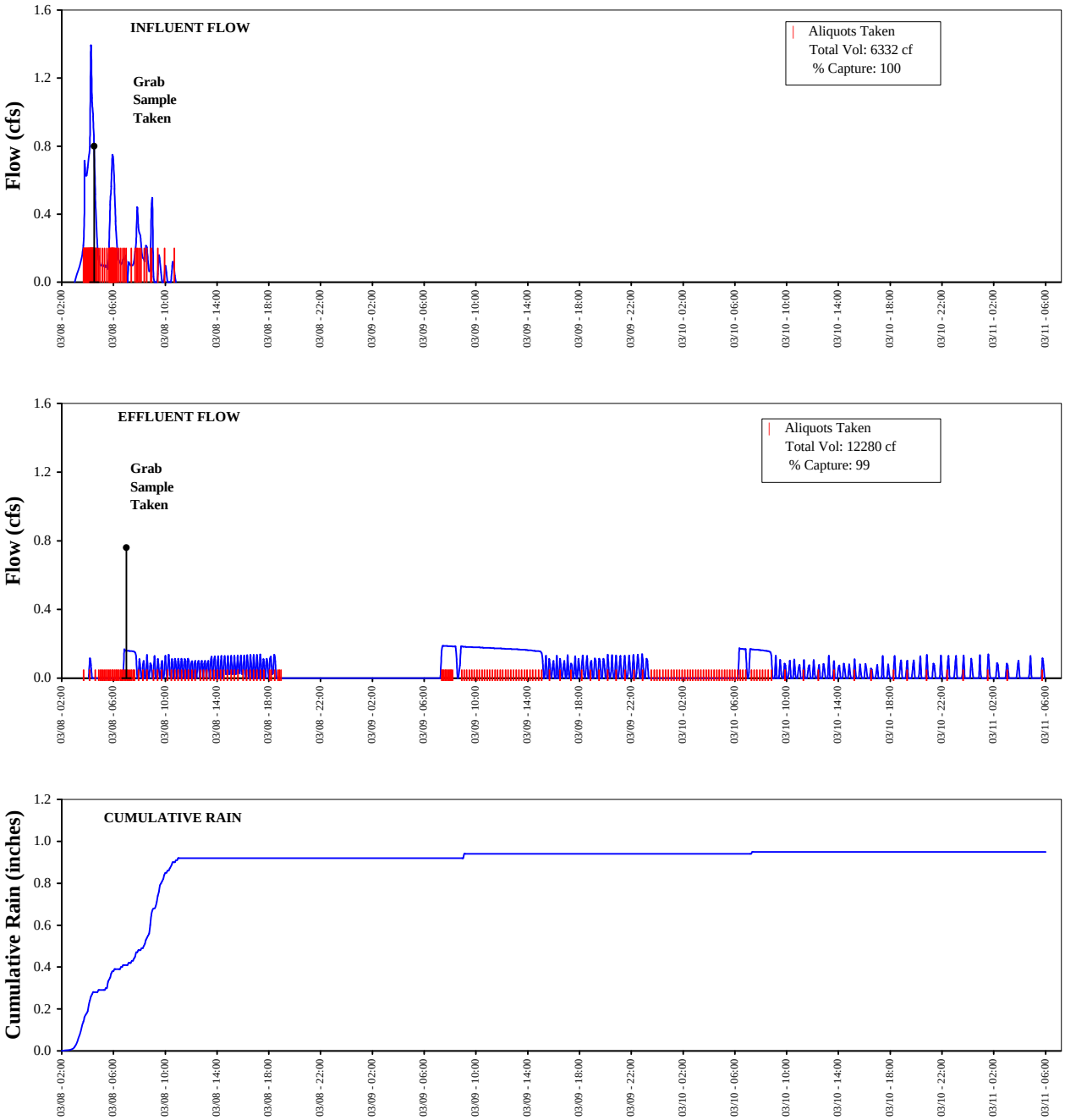


Figure 1-10c. Influent and Effluent Hydrographs and Cumulative Rainfall for the Termination P&R Sand Filter on 8 March 2000.

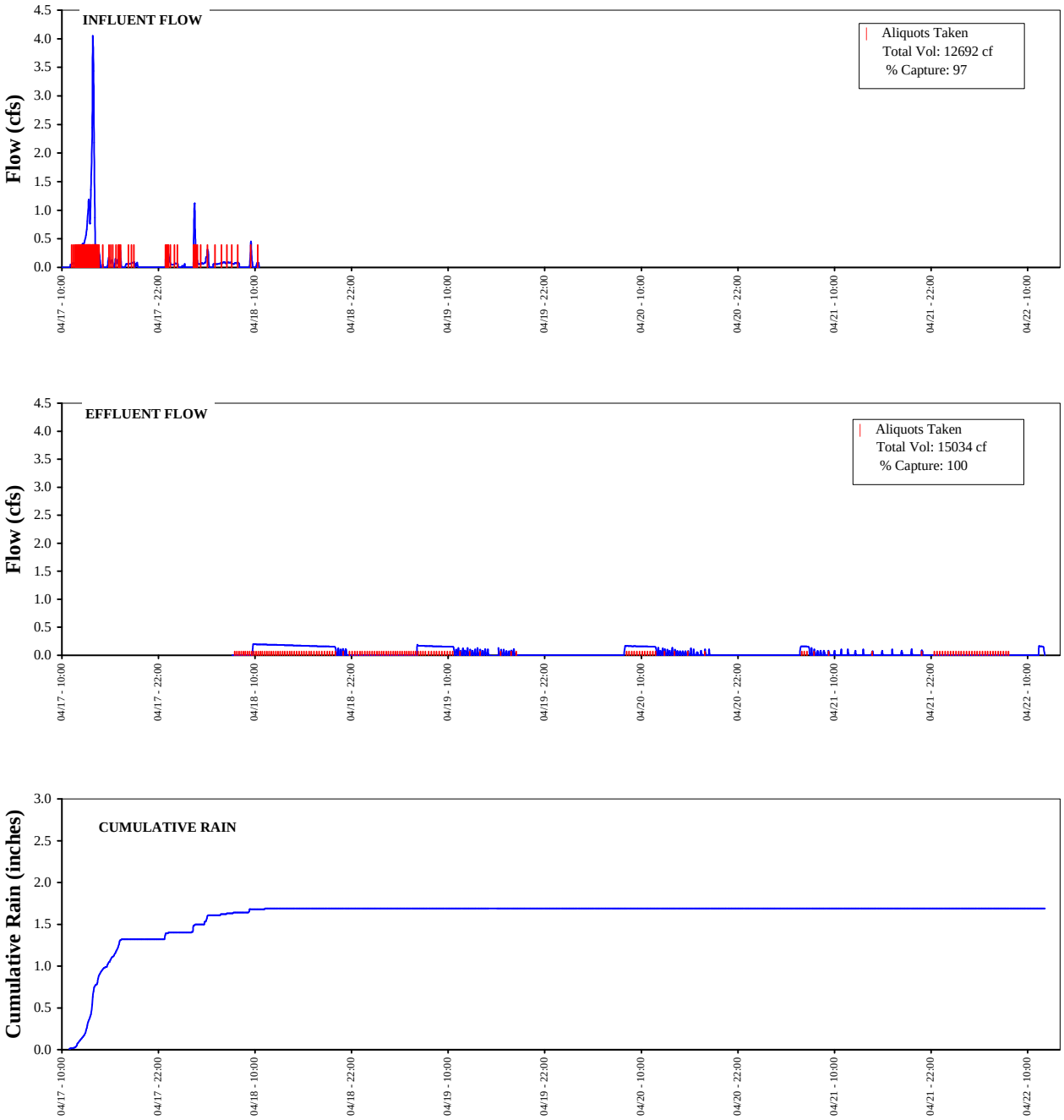


Figure 1-10d. Influent and Effluent Hydrographs and Cumulative Rainfall for the Termination P&R Sand Filter on 17 April 2000.

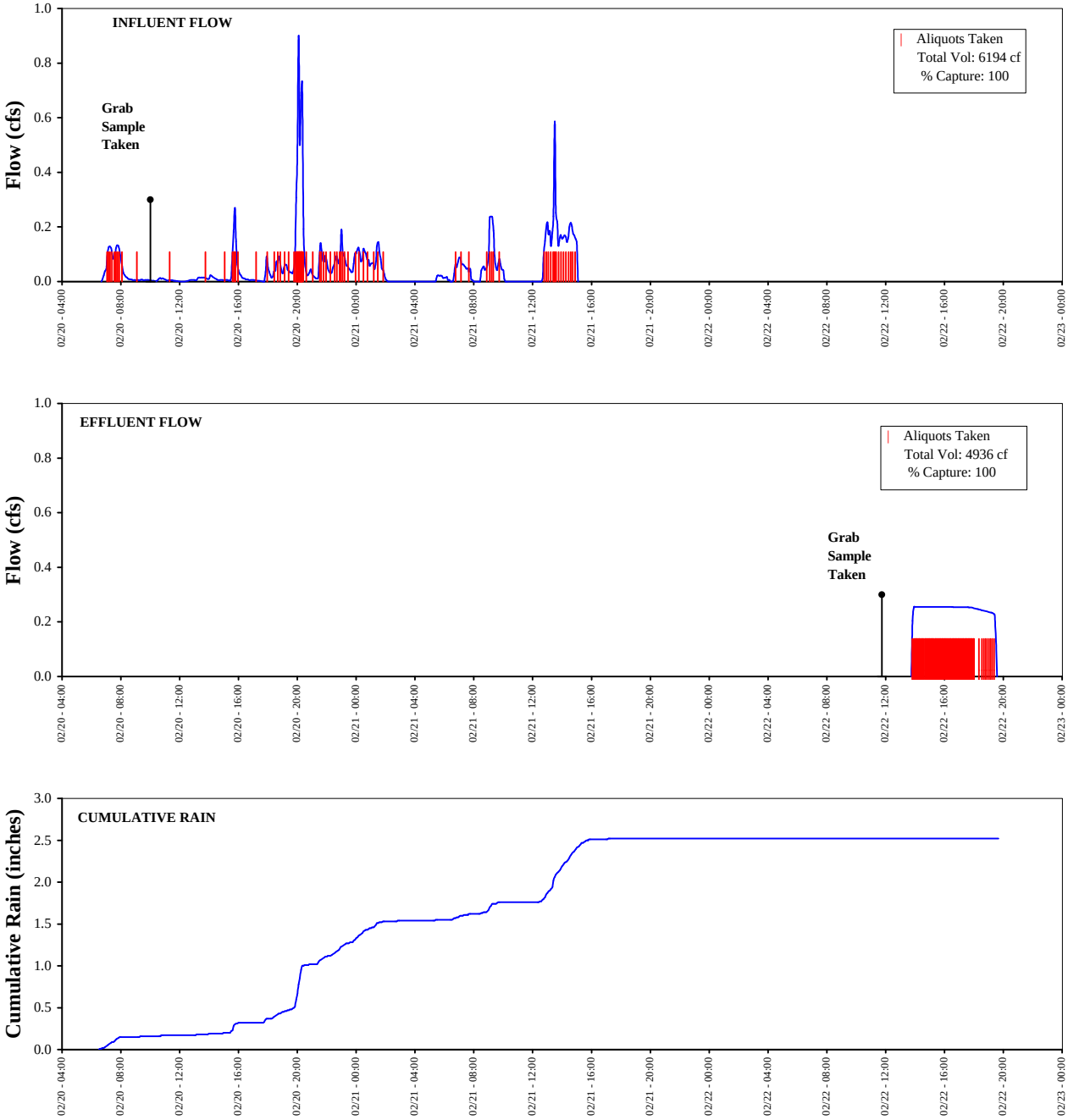


Figure 1-11a. Influent and Effluent Hydrographs and Cumulative Rainfall for the Via Verde P&R MCTT on 20 February 2000.

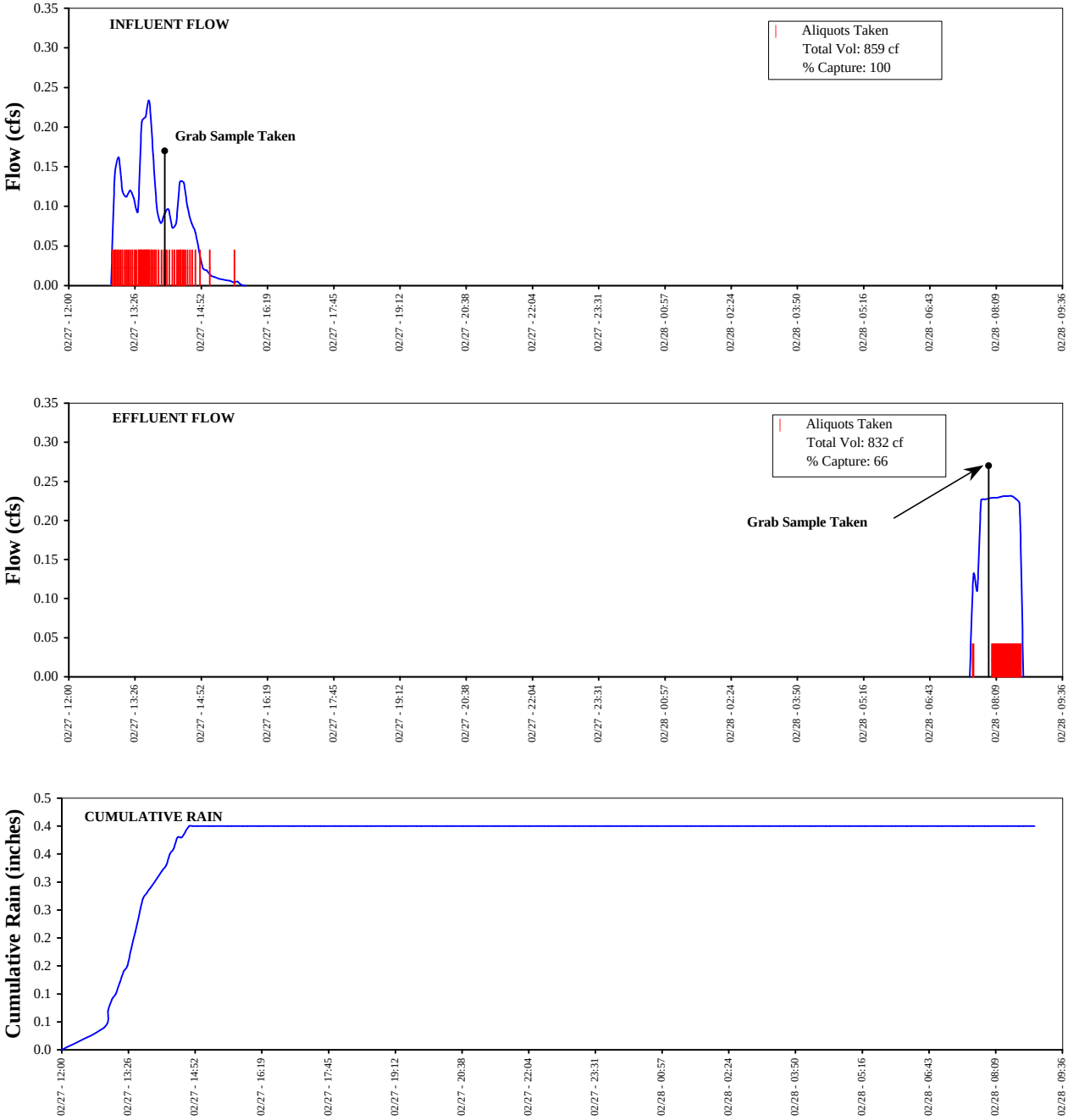


Figure 1-11b. Influent and Effluent Hydrographs and Cumulative Rainfall for the Via Verde P&R MCTT on 27 February 2000.

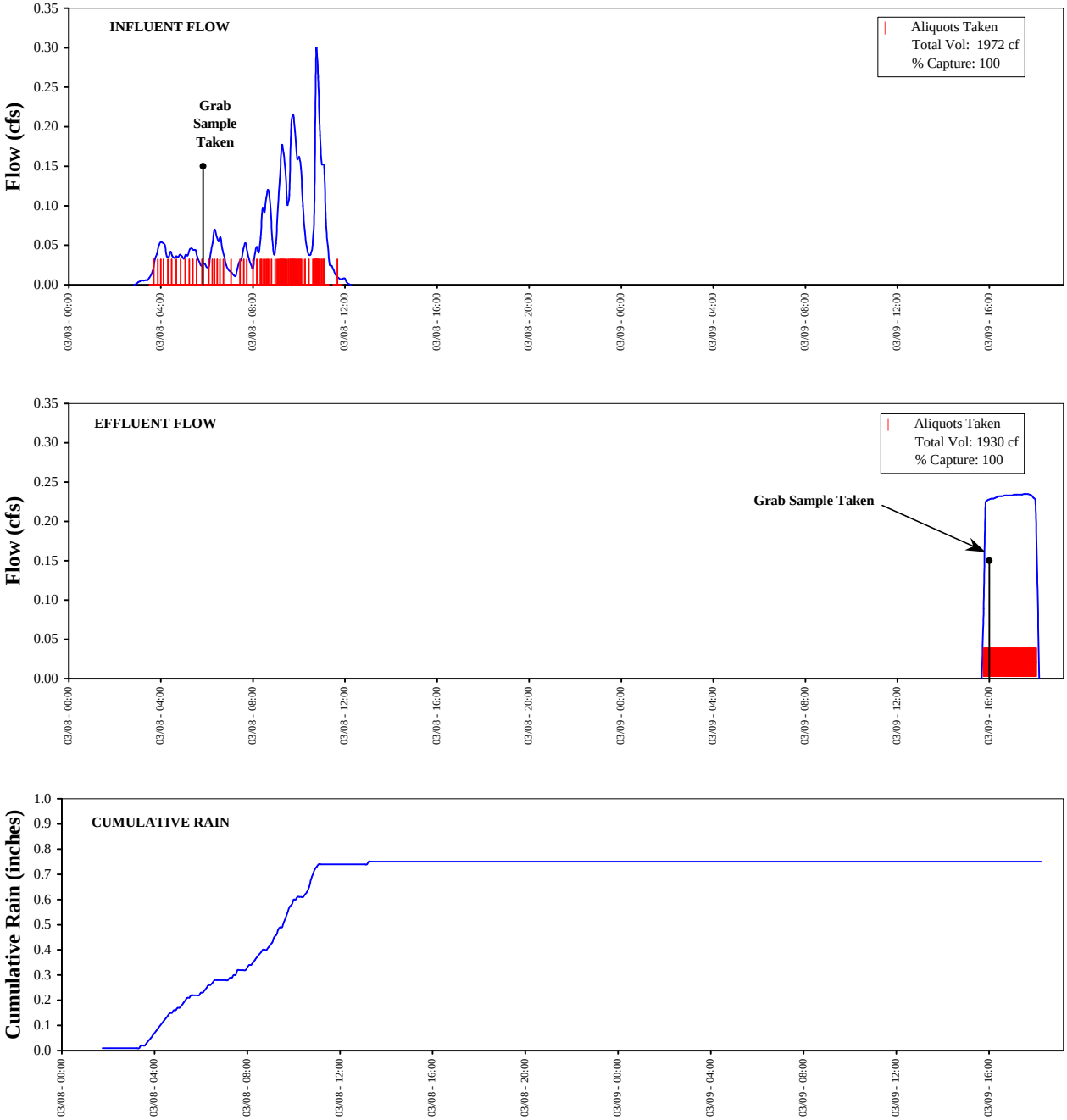


Figure 1- 11c. Influent and Effluent Hydrographs and Cumulative Rainfall for the Via Verde P&R MCTT on 8 March 2000.

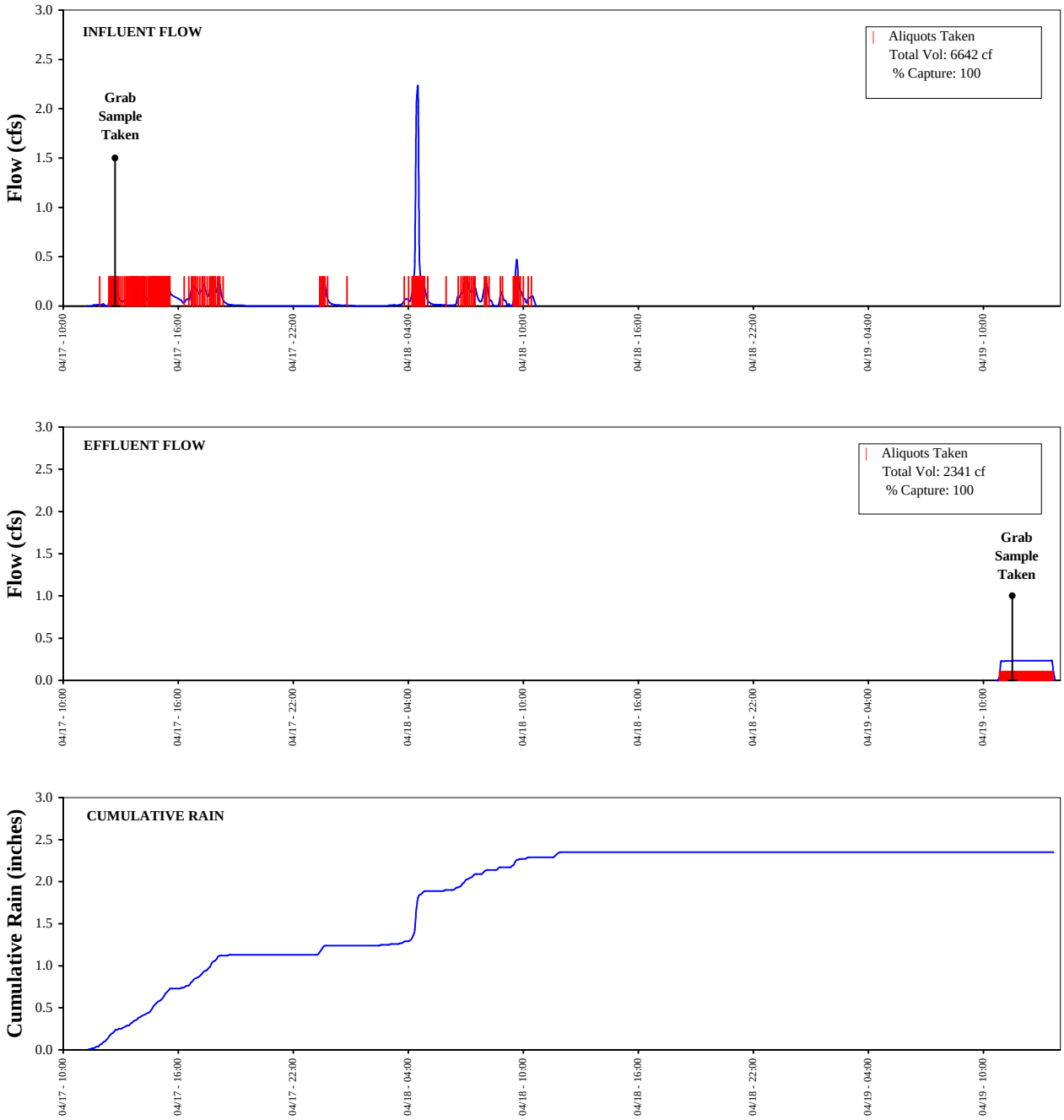


Figure 1-11d. Influent and Effluent Hydrographs and Cumulative Rainfall for the Via Verde MCTT on 17 April 2000.

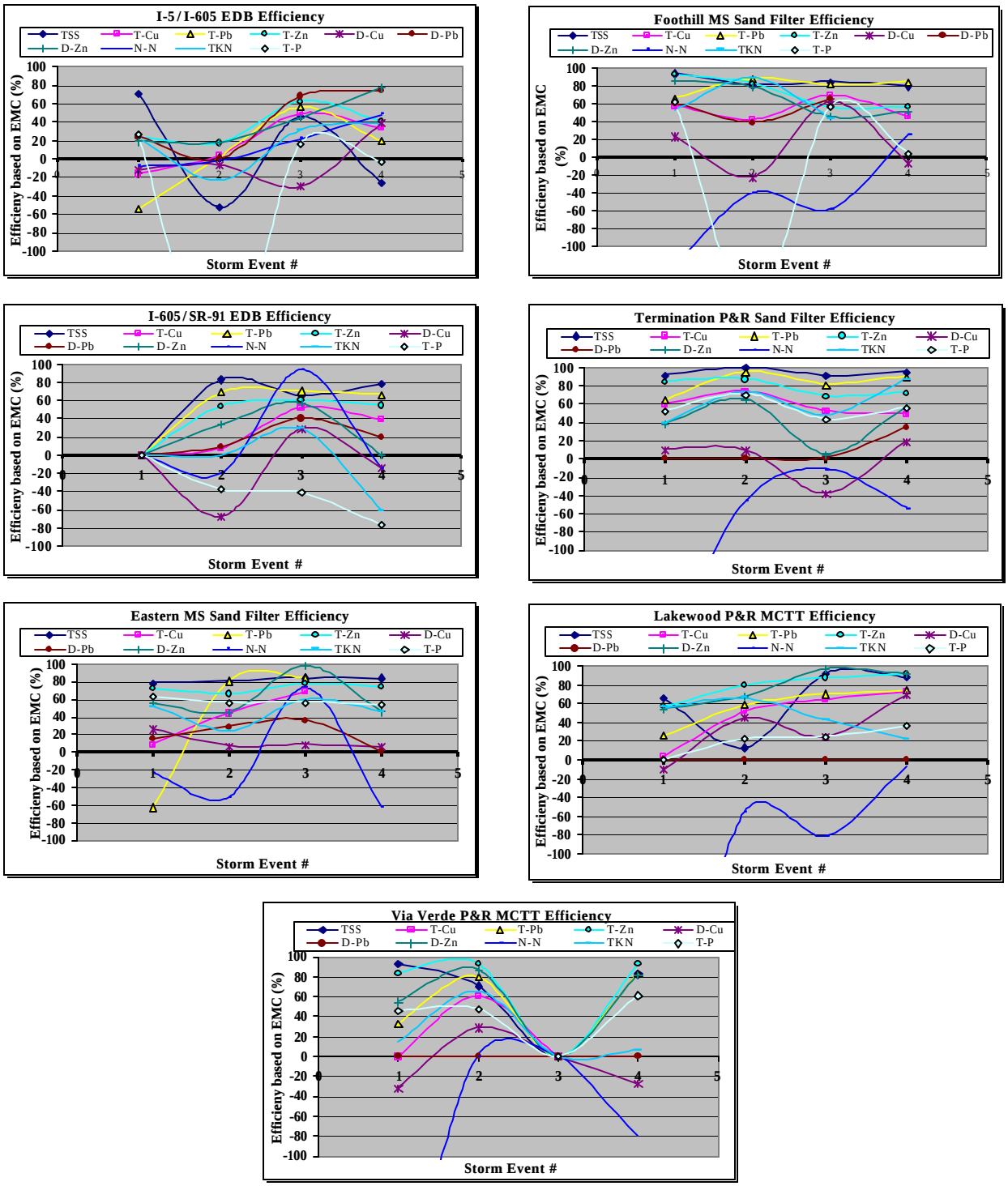
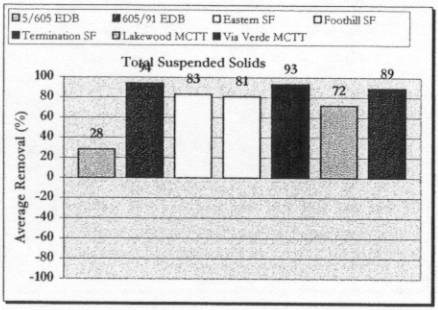
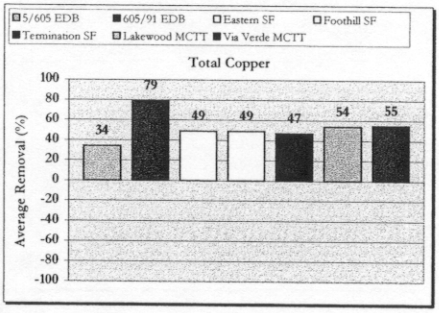
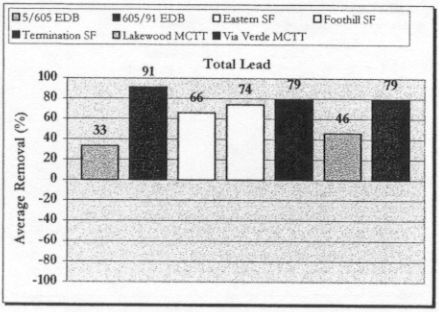
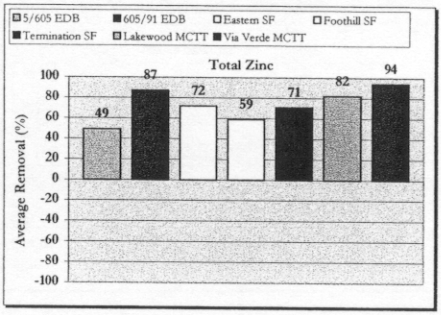


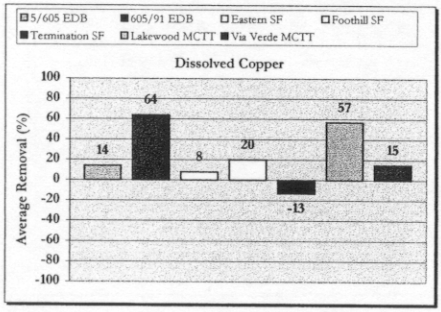
Figure 1-12. Event-based BMP Pollutant Removal Efficiencies.

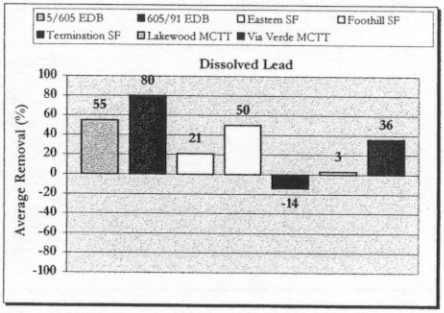


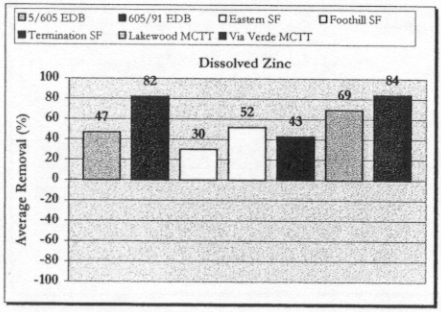


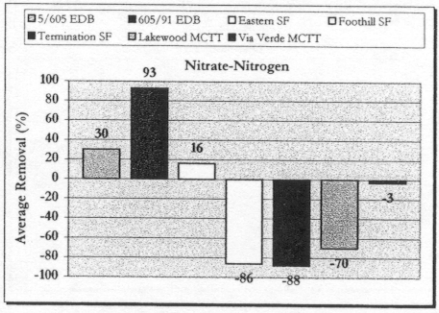


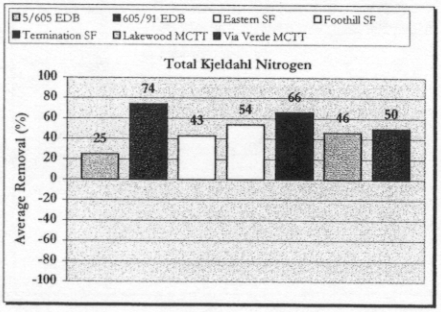












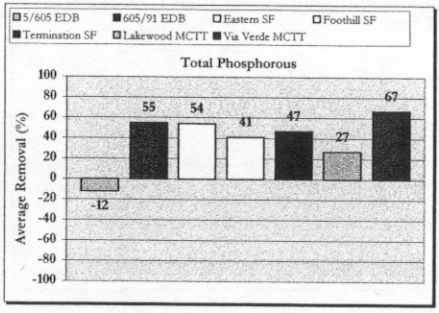


Figure 1-13. Seasonal BMP Pollutant Removal Efficiencies.

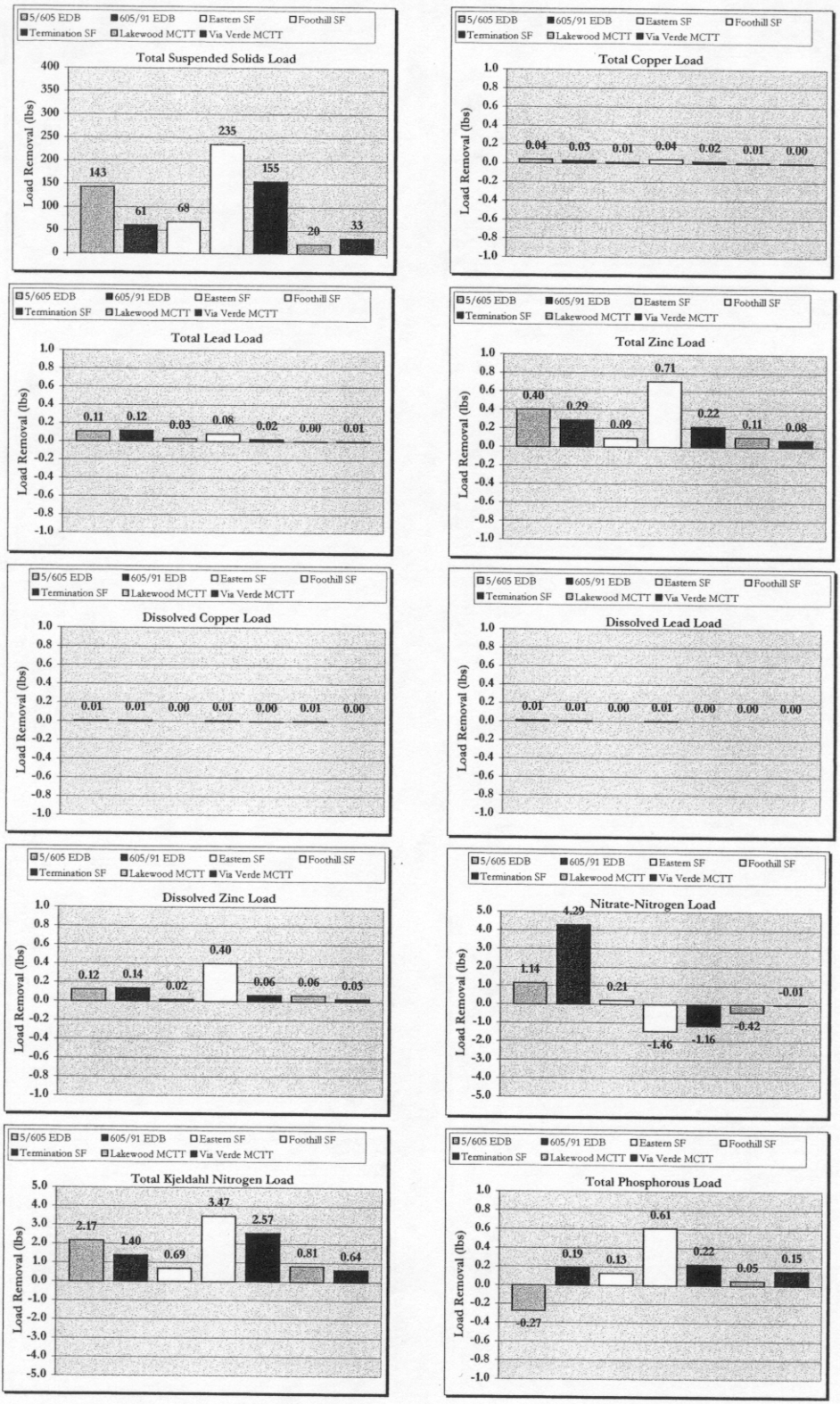


Figure 1-14. Seasonal BMP Pollutant Load Removals.

2.0 BMP OPERATIONS

Performance assessments of BMP operations are determined using empirical observations (*cf*. Form H, OM&M Plan, Volume II: Field Guidance Notebooks). Empirical observations were taken at variable times during monitored events. Field crew attempted to assess BMP operations at the beginning, middle, and end of a storm event. Traffic, weather, and sufficient light sometimes limited the collection of these observations.

Observations generally provided information on the following:

- Present meteorological characteristics
- Rainfall (start times and intensity indication)
- Hydrologic and hydraulic characteristics (flowing and/or standing water, channelization)
- Water level
- Inlet conditions (problems affecting performance)
- Evidence of debris (organic or trash), scouring, resuspension or erosion
- Description of amount and location of sediment accumulation
- Water quality appearance (visual, olfactory)
- Vegetation condition
- Outlet conditions (problems affecting performance)
- Structural condition of facility

Other site-specific observations were taken according to the BMP-specific checklist items in Form H.

2.1 BMPs Evaluated

Tables 2-1a through 2-1d summarize BMP performance relative to the various categories of empirical observation presented in monitoring forms. In addition to the observations recorded, historical knowledge of BMP operations has also been included where appropriate for completeness. Following each table, an overall review of each BMP is provided. More detail on BMP operations is available at the following web site: http://www.rbf.com/caltrans/

2.1.1 Extended Detention Basins

For the concrete-lined (I-5/I-605) and earthen (I-605/SR-91) extended detention basins, summarized empirical observations during the 1999-2000 wet season are presented in Table 2-1a below.

Table 2-1a: Comparison of Extended Detention Basin Operational Performance

Site	No. of Observed Events	Hydrologic / Hydraulic Characteristics	Inlet Conditions	Influent Water Quality	Solids Deposition/ Resuspension	Erosion	Vegetation	Outlet	Comments
I-5/I-605	5	Functioned as designed. Standing water present for one monitored event (3/8/00).	Functioned as designed.	Scum film/oil sheen on basin water surface. Cloudy/transparent /brown inflow. Light trash/debris.	Resuspension around inlet area during strong storms. Deposition near outlet riser. Light sedimentation in effluent discharge channel/H-flume.	No notable observations.	Few bare spots. 90-100% coverage from 1999 hydroseed.	Functioned as designed. Bypass water is metered and sampled.	None.
I-605/ SR-91	5	Functioned as designed.	Notable influent sediment load. Minor resuspension around inlet rip rap.	Organic flotsam. Sediment loading in/around inlet pipe. Cloudy/transparent /brown inflow. Light trash/debris.	Solids deposition in influent channel and on basin bottom.	No notable observations.	Few bare spots. 90-100% coverage from 1999 hydroseed.	Functioned as designed. Bypass water is metered and sampled.	None.

Overall Review

The I-5/I-605 and I-605/SR-91 EDBs functioned as expected during the wet season with generally good operational results and no major problems. The I-5/I-605 EDB went into bypass mode (overflow into discharge structure) during the March 8 and April 17 event. Storm water bypass at the I-605/SR-91 EDB was not observed during this monitoring season. Detention times at the I-605/SR-91 EDB were notably shorter than the concrete-lined I-5/I-605 BMP, which appears to be influenced by stormwater loss through at the earthen EDB.

Inlet fouling by floating materials was more notable at the I-605/SR-91 EDB, particularly around the inlet riprap. Influent sediment loading was more significant at the I-605/SR-91 EDB, and may be due to smaller conveyance piping at this location. Sedimentation within the influent conveyance often fouled the monitoring equipment sample intake strainer. These conditions were not as pronounced at the I-5/I-605 EDB, as the larger pipe diameter and flow gradients were less favorable to sedimentation. Visible water quality of inlet flow appeared similar at both EDB locations.

A majority of the I-605/SR-91 site was re-hydroseeded in November 1999 to improve internal basin vegetation coverage and filtration characteristics, while the I-5/I-605 EDB only required hydroseed in various bare spots for general erosion control. Vegetation coverage during the 1999-2000 winter season was very good (>90 percent) at both sites.

2.1.2 Sand Filter-Austin Type

For each of the Austin-type sand media filter BMPs, summarized empirical observations during the 1999-2000 wet season are shown in Table 2-1b below.

Table 2-1b: Comparison of Media Filter - Sand Operational Performance

Site	No. of Observed Events	Hydrologic / Hydraulic Characteristics	Inlet Conditions	Influent Water Quality	Solids Deposition/ Resuspension	Treatment Medium	Outlet	Effluent Water Quality	Comments
Eastern Regional MS	5	Functioned as designed. Standing water present for two of the three monitored events (2/20/00, 3/8/00).	Functioned as designed.	Scum film / oily sheen common in sedimentation chamber. High influent turbidity, opaque brown. Light trash/debris.	Resuspension common below inlet (turbulence). Sedimentation chamber deposition fairly uniform away from inlet turbulence.	V-notches in weir plate improved water distribution to sand bed. Sedimentation buildup on sand bed slowed percolation & improved filtration.	Functioned as designed.	No turbidity, generally clear / colorless.	Bypass occurred during three events (2/20/00, 3/8/00, 4/17/00).
Foothill MS	5	Functioned as designed. Standing water present for three of the four monitored events.	Functioned as designed. Subject to surcharge.	Organic flotsam. Scum film / oily sheen common in sedimentation chamber. Influent colorless/cloudy or transparent brown. Occasional musty odor.	Leaves, trash, debris in sedimentation chamber. Resuspension common below inlet. Sedimentation chamber deposition fairly uniform away from inlet turbulence.	V-notch in weir plate improved water distribution to sand bed. Sedimentation buildup on sand bed slowed percolation & improved filtration.	Functioned as designed.	Generally cloudy but transparent.	Bypass occurred during three events (2/20/00, 3/8/00, 4/17/00). Dead lizard in sand bed (2/27/00).
Termin-ation P&R	5	Functioned as designed. Standing water present for three of the four monitored events.	Functioned as designed. Strong inflow due to large drainage area.	Oil sheen in sedimentation chamber. Influent opaque brown to cloudy & colorless.	Leaves, trash, debris in sedimentation chamber. Resuspension common below inlet. Sedimentation chamber deposition fairly uniform away from inlet turbulence.	V-notch in weir plate improved water distribution to sand bed. Sedimentation buildup on sand bed slowed percolation & improved filtration.	Functioned as designed when power adequate for pump (daytime).	Generally colorless, cloudy but transparent.	Bypass occurred during three events (2/20/00, 3/8/00, 4/17/00).

Overall Review

Operation of these sand filters was generally good throughout the monitoring season. Residual stormwater was present in each sand filter prior to most monitored events. Overflow structures operated as designed during the bypass conditions noted during three storm events. Water quality appearance was generally consistent between locations, with Termination Park & Ride capturing more trash and debris than the other locations. The Foothill MS sand filter also accumulated notable trash and debris, which is likely a contribution from the waste pile storage bins adjacent to, and within the drainage area of, the BMP.

The installation of v-notches in the weir plates of the sand filter chambers improved the uniformity of water distribution of the sand bed. Prior to this modification, stormwater tended to spill over the weir plates at the point of entry into the filter chamber and concentrate over a small area of the sand bed. During this monitoring year, the sand beds have notably accumulated a fairly uniform layer of sediment. Standing water over the entire sand bed was commonly observed for sand filters this monitoring year, testifying to slower percolation rates than seen in the previous monitoring year.

Sand filter outlet structures performed as expected. However, because the site hydraulics did not allow for gravity flow to the municipal stormwater system, discharge pumps are required to discharge stormwater from the sand filter sump. Particular problems were encountered at the Termination P&R, where available AC power was observed to be inadequate to continually power overhead parking-lot lighting, as well as the needs of the BMP discharge pump. During several events, nighttime lighting at Termination P&R was sporadic, sometimes dimming, flickering, or failing periodically. Coincidentally, the effluent discharge pump had similar difficulty in maintaining proper operation at night due to inadequate available power supply.

2.1.3 Multi-chambered Treatment Trains

For each of the multi-chambered treatment train BMPs, summarized empirical observations during the 1999-2000 wet season are included in Table 2-1c below.

Table 2-1c: Comparison of Multi-chambered Treatment Trains Operational Performance

Site	No. of Observed Events	Hydrologic / Hydraulic Characteristics	Inlet Conditions	Influent Water Quality	Solids Deposition/ Resuspension	Treatment Medium	Outlet	Effluent Water Quality	Comments
Lakewood P&R	5	Functioned as designed. Standing water present for each of the three monitored events.	Functioned as designed.	Surface film / oily sheen common in settling chamber. Cloudy/ brown/transparent influent.	Leaves, trash, debris in settling chamber. Resuspension not evident.	Functioned as designed.	Functioned as designed, but transfer pump continually malfunctioned.	No turbidity, generally clear / colorless.	Bypass occurred during three monitored events (2/20/00, 3/8/00, 4/17/00).
Via Verde P&R	5	Functioned as designed. Standing water present for each of the three monitored events.	Functioned as designed. Landscaping causes leafy buildup in catch basin.	Organic flotsam & oil sheen in settling chamber. Influent cloudy/transparent brown.	Abundant leaves. No visible resuspension.	Functioned as designed.	Functioned as designed.	Generally colorless, cloudy but transparent.	Bypass occurred during three monitored events (2/20/00, 3/8/00, 4/17/00).

Overall Review

Operation of the MCTTs listed above was generally good throughout the monitoring season. Because these devices are designed to retain water in various locations for proper operation, residual stormwater was always present in each BMP prior to each event monitored. When required, overflow weirs in the diversion structures routed bypass flow as designed. Water quality appearance was generally consistent between locations, except that Via Verde Park & Ride captured more leaf debris due to denser landscaping in the vicinity of this BMP.

Most notable of the operational characteristics at MCTTs was the performance of the sump pumps. On several occasions automatic pump operation either failed completely or had difficulty in maintaining persistent operation at these two Park & Ride facilities. Power quality at the Lakewood P&R was found to be marginal for BMP operation, which caused unreliable pumping during storm events.

Consequently, pumps from each of these locations were removed and returned to the manufacturer for QC testing, where they were found to have defective stator windings. Replacement pumps were installed.

Although not summarized above, vector issues were significant for these units due to their designed nature to retain standing water for proper function. Several alternative designs, modifications, and water management protocols were discussed with public health officials. These are discussed further in the Vector Control section of this report.

2.1.4 Oil/Water Separator

Summarized oil/water separator empirical observations during the 1999-2000 wet season are summarized in Table 2-1d below.

Table 2-1d: Comparison of Oil/Water Separator Operational Performance

Site	No. of Observed Events	Hydrologic/Hydraulic Characteristics	Inlet Conditions	Influent Water Quality	Solids Deposition/ Resuspension	Outlet	Effluent Water Quality	Comments
Alameda MS	5	Functioned as designed. *In-situ* water present for each of the four monitored events (normal condition).	Functioned as designed.	Oil sheen, organic flotsam, translucent / transparent brown.	None visible.	Functioned as designed.	Translucent / transparent brown.	None.

Overall Review

As anticipated, the oil/water separator at the Alameda MS functioned properly. This unit was filled with potable water for a final integrity test following installation. As these units require internal standing water for proper pollutant removal, effluent discharge from this BMP was characteristic of multiple water qualities.

3.0 BMP AND SITE MAINTENANCE

The primary objective of BMP maintenance is to ensure that each site is properly maintained to achieve optimum performance. Preventive and corrective maintenance measures were undertaken in accordance with the OMM Plan and the Maintenance Indicator Document (MID). These measures included:

- Removal of standing water.
- Sediment erosion control and removal.
- Structural integrity.
- Landscape management.
- Graffiti removal.
- Trash and debris removal.
- General facility maintenance.

Regularly scheduled maintenance inspections were conducted monthly, with weekly surveys being performed during extended periods of wet weather. Maintenance visits were also conducted after each large storm event (greater that 0.5”). During the visits, maintenance observations and needs were documented on the “BMP Site Inspection Checklist” (Form C of the OMM Volume II Field Guidance Notebooks). Based on this documentation, any immediate maintenance needs were arranged

3.1 Summary of Inspection and Maintenance Activities

The following sections describe maintenance activities performed at each BMP site. Graphic comparisons of maintenance effort (hours) and frequencies (visits) required of each BMP are presented in Figure 3-1. These presentations span 1 October 1999 BMP through 28 June 2000.

Variation of BMP maintenance correlated to the presence of hydraulic pumps, proximity to and presence of significant landscaping, and potential for standing water. As shown by Figure 3-1a, inspections for all BMPs were relatively uniform, with the earthen EDB (I-605/SR-91) requiring more vegetation management, and the MCTT units (Lakewood & Via Verde) succumbing to perpetual pump problems. Pump failure and power demands caused many service calls to remove and test or replace poor performing pumps.

Trash and debris removal was fairly equal at most sites, with the I-605/SR-91 EDB requiring added attention to vegetation cover, and the Termination sand filter accumulating more wind-blown debris than most other sites. Conveyance fouling was most significant at the I-605/SR-91 EDB where runoff-derived sediment concentrated in the inlet structure, affecting stormwater sampling. In the absence of sampling equipment, these blockages would not have been significant enough to upset BMP function.

Structurally, the Eastern sand filter was found leaking late in the 1998-1999 monitoring season and further integrity testing was performed early in the 1999-2000 monitoring year to insure the best treatment conditions possible. The overflow (bypass) weir at the Lakewood MCTT needed

to be lowered to avoid flooding. The overflow structure had to be installed at a higher elevation to avoid impacts to existing service utilities discovered during site construction.

The Lakewood MCTT required the greatest effort overall to maintain adequate BMP operation (i.e., unscheduled maintenance). Early in the monitoring season, substantial effort was expended to improve the quality of electricity supplied to the BMP. Diagnostic tests were performed, which led to the installation of a booster transformer to improve amperage to BMP pumps. Exacerbating this problem was the built-in design of standing water in the MCTT units. Standing water affected the number of unscheduled maintenance calls, vector response calls, and vector control district administration (not presented).

Unique to Figure 3-1a is the presentation of subcontracted efforts relative to vegetation cutting and vector control. As shown, grass cutting and hydroseeding effort was divided as appropriate between the EDB units, whereas vector control services were visibly different for BMPs inspected by San Gabriel Valley VCD (Foothill/Via Verde) and those by Greater Los Angeles VCD (all others). Clearly, the Lakewood MCTT presented the greatest vector control challenges, requiring abatement services at least monthly. However, due to the inherent standing water to both MCTT units, VCD efforts were greatest for these locations.

Figure 3-1b shows maintenance effort depicted as the number of onsite visits, which reflects similar but less exaggerated trends as Figure 3-1a. Among the parameters presented, pump servicing was the most notable of the service visits required. Apart from pump servicing and MCTT vector issues, the number of service calls were not drastically different.

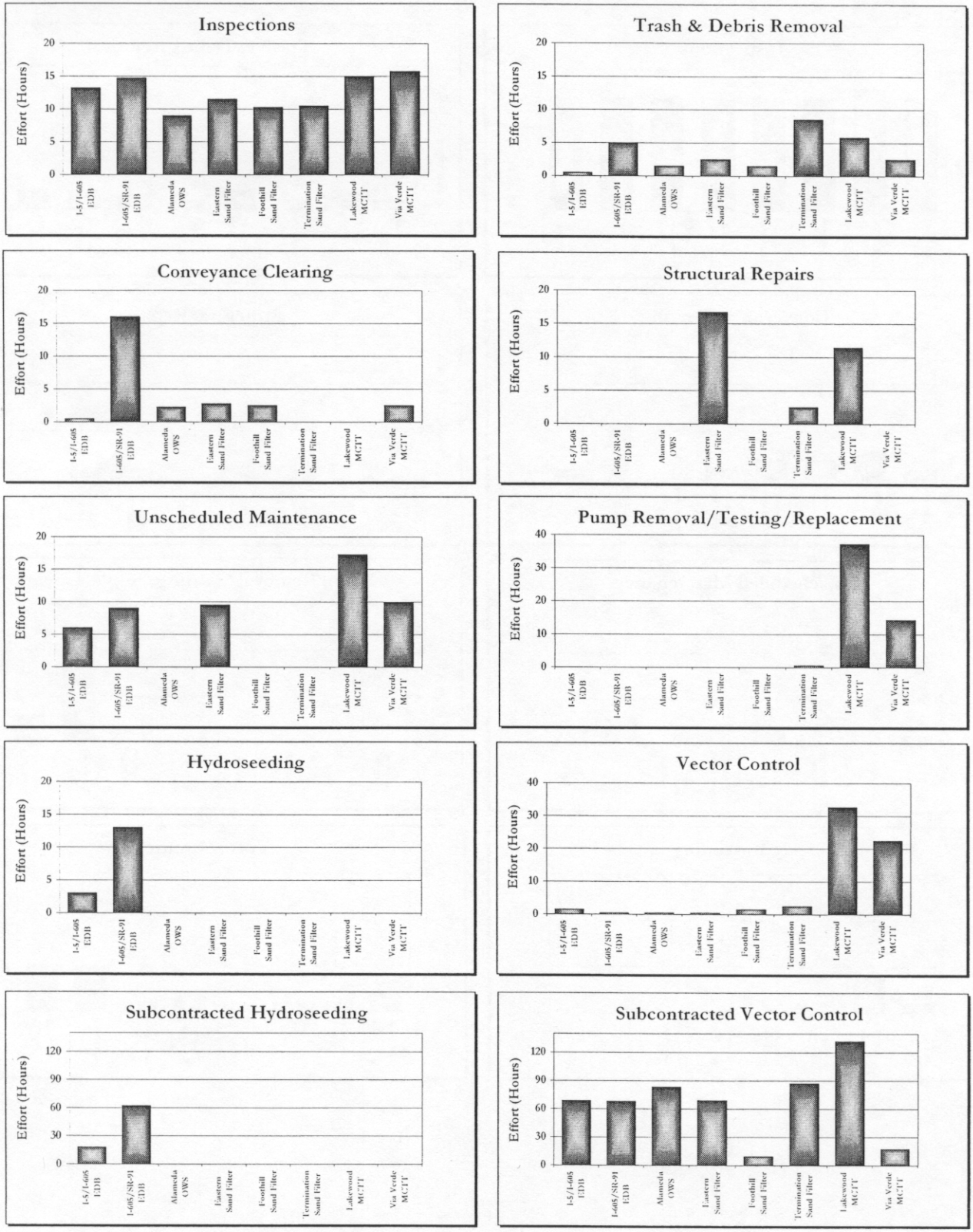
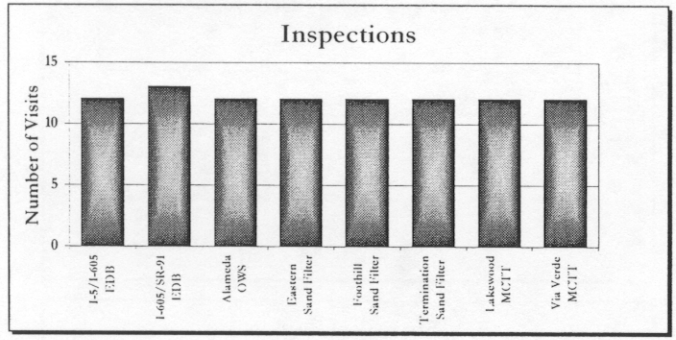
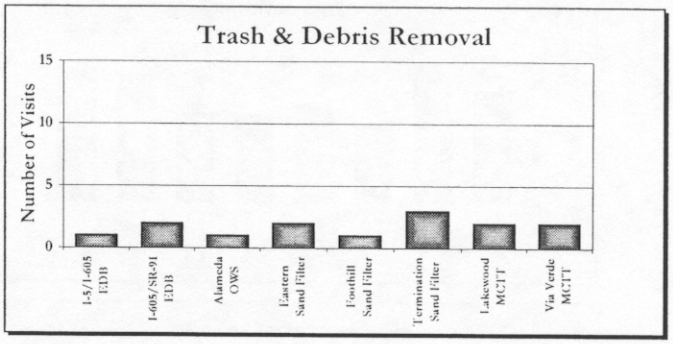
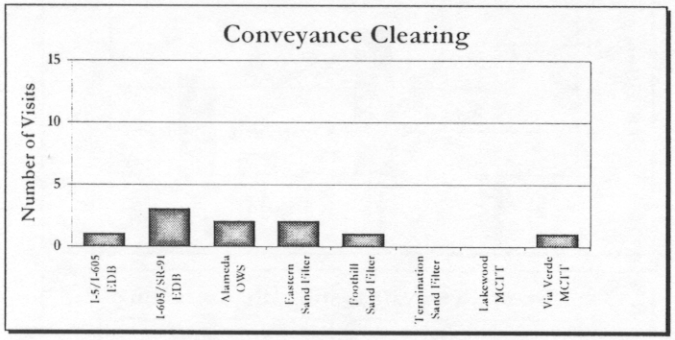
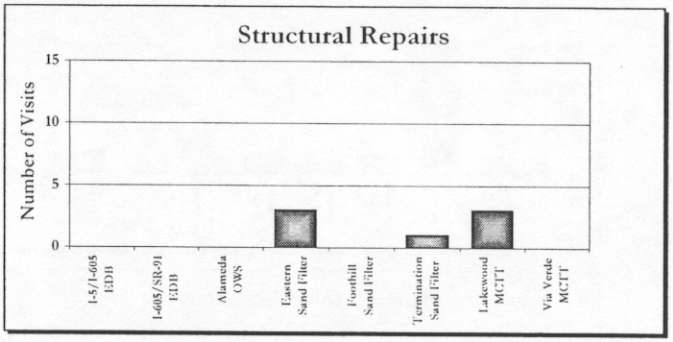


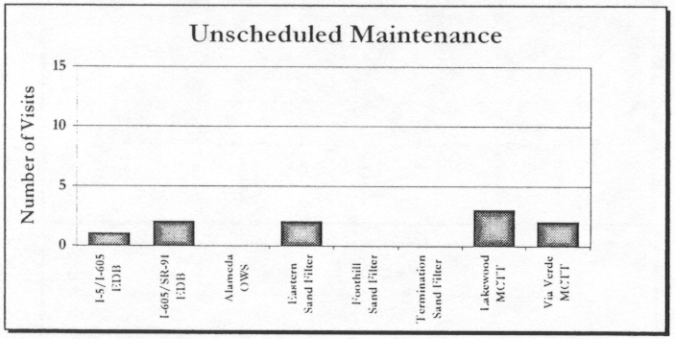
Figure 3-1a. Maintenance Hours Expended for BMP Facilities.

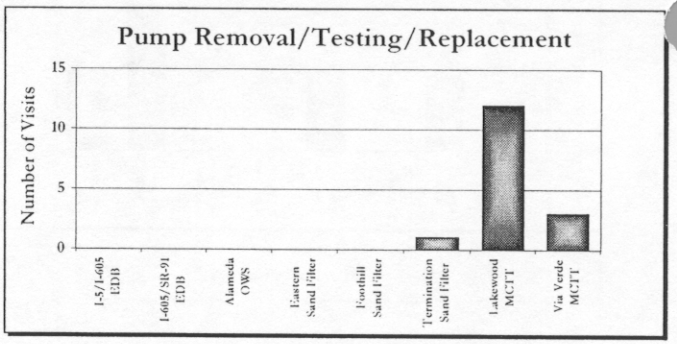

Inspections
Number of Visits
15
10
5
0
I-5/I-605 EDB
I-605/SR-91 EDB
Alameda OWS
Eastern Sand Filter
Foothill Sand Filter
Termination Sand Filter
Lakewood MCTT
Via Verde MCTT

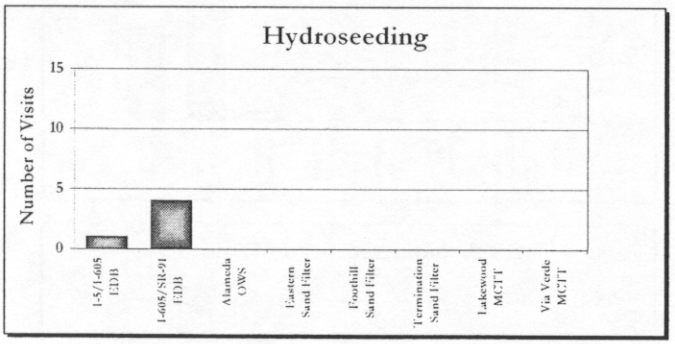

Trash & Debris Removal
Number of Visits
15
10
5
0
I-5/I-605 EDB
I-605/SR-91 EDB
Alameda OWS
Eastern Sand Filter
Foothill Sand Filter
Termination Sand Filter
Lakewood MCTT
Via Verde MCTT

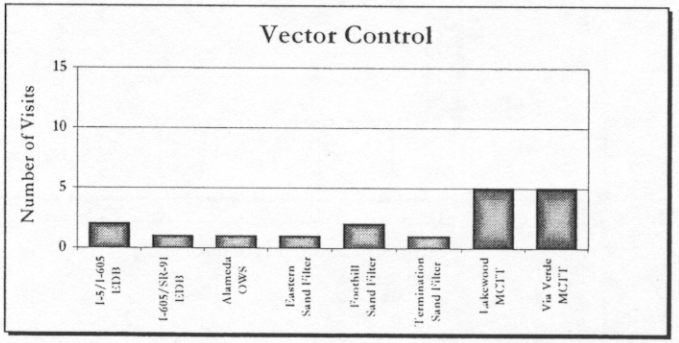

Conveyance Clearing
Number of Visits
15
10
5
0
I-5/I-605 EDB
I-605/SR-91 EDB
Alameda OWS
Eastern Sand Filter
Foothill Sand Filter
Termination Sand Filter
Lakewood MCTT
Via Verde MCTT


Structural Repairs
Number of Visits
15
10
5
0
I-5/I-605 EDB
I-605/SR-91 EDB
Alameda OWS
Eastern Sand Filter
Foothill Sand Filter
Termination Sand Filter
Lakewood MCTT
Via Verde MCTT


Unscheduled Maintenance
Number of Visits
15
10
5
0
I-5/I-605 EDB
I-605/SR-91 EDB
Alameda OWS
Eastern Sand Filter
Foothill Sand Filter
Termination Sand Filter
Lakewood MCTT
Via Verde MCTT


Pump Removal/Testing/Replacement
Number of Visits
15
10
5
0
I-5/I-605 EDB
I-605/SR-91 EDB
Alameda OWS
Eastern Sand Filter
Foothill Sand Filter
Termination Sand Filter
Lakewood MCTT
Via Verde MCTT


Hydroseeding
Number of Visits
15
10
5
0
I-5/I-605 EDB
I-605/SR-91 EDB
Alameda OWS
Eastern Sand Filter
Foothill Sand Filter
Termination Sand Filter
Lakewood MCTT
Via Verde MCTT


Vector Control
Number of Visits
15
10
5
0
I-5/I-605 EDB
I-605/SR-91 EDB
Alameda OWS
Eastern Sand Filter
Foothill Sand Filter
Termination Sand Filter
Lakewood MCTT
Via Verde MCTT

4.0 COST SUMMARY

A cost summary for maintenance of the BMPs during the 1999/2000 monitoring year is provided in the following spreadsheets. These cost summaries provide maintenance hours with generic rates. These costs are reflected in the maintenance efforts described earlier in Section 3.

BMP Retrofit Pilot Program
Maintenance Operation
Cost Accounting Summary, 1999-2000

DISTRICT: 7	LOCATION: I-5/I-605 EDB	SITE NO. 074101	BMP TYPE: Extended Detention Basins	CONSULTANT: BROWN AND CALDWELL

	TASK	1999			2000									Total (hrs)	Total (days)	Avg. Rate	TOTAL $
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep				
Labor (hours)	***Administration***																
	General program support/Follow-up	4.4	3.8	4.6	2.6	2.2	0.8	1.6	0.7	3.1	2.1	0.0	0.0	25.7	3.2	$120	$ 3,083
	Encroachment Permits	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	$85	$ -
	Travel	1.0	1.0	0.5	0.5	1.3	0.8	1.5	1.0	1.0	0.5			9.0	1.1	$85	$ 765
	Unscheduled events													0.0	0.0	$85	$ -
	Monthly Subtotal (hours)	5.4	4.8	5.1	3.1	3.4	1.6	3.1	1.7	4.1	2.6	0.0	0.0	34.7			
	Monthly Subtotal ($)	$610	$543	$590	$354	$365	$165	$315	$164	$453	$290	$0	$0	$3,848			
																Task Subtotal =	$3,848
	Operation																
	Wet season inspections	1.5	1.0	0.5	1.5	1.0	1.0	1.3	0.5					8.3	1.0	$45	$ 371
	Dry season inspections									1.0	0.5			1.5	0.2	$45	$ 68
	Unscheduled inspections/field calls													0.0	0.0	$90	$ -
	Monthly Subtotal (hours)	1.5	1.0	0.5	1.5	1.0	1.0	1.3	0.5	1.0	0.5	0.0	0.0	9.8			
	Monthly Subtotal ($)	$68	$45	$23	$68	$45	$45	$56	$23	$45	$23	$0	$0	$439			
																Task Subtotal =	$439
	Maintenance																
	Scheduled maintenance		3.0			2.0								5.0	0.6	$45	$ 225
	Unscheduled maintenance													0.0	0.0	$45	$ -
	Vandalism													0.0	0.0	$45	$ -
	Acts of God													0.0	0.0	$45	$ -
	Landscape Maintenance Contractor			14.3										14.3	1.8	$45	$ 645
	Sediment Removal Contractor													0.0	0.0	$45	$ -
	Other Contractor													0.0	0.0	$45	$ -
	Other Contractor													0.0	0.0	$45	$ -
	Other Contractor													0.0	0.0	$45	$ -
	Monthly Subtotal (hours)	0.0	3.0	14.3	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.3			
	Monthly Subtotal ($)	$0	$135	$645	$0	$90	$0	$0	$0	$0	$0	$0	$0	$225			
																Task Subtotal =	$870
	Vector Control																
	Contract & General administration	1.9	0.4	0.3	0.1	0.4	2.4	1.3	0.1	0.3	0.0	0.0	0.0	7.0	0.9	$120	$ 844
	Vector prevention maint. (consultant)							1.0						1.0	0.1	$65	$ 65
	Response to VCD calls (consultant)													0.0	0.0	$80	$ -
	VCD efforts (contracted)	3.5	5.8	8.2	4.5	8.3	7.8	6.1	4.3	6.0	0.0	0.0	0.0	54.5	6.8	$49	$ 2,668
	Monthly Subtotal (hours)	5.3	6.2	8.4	4.6	8.6	10.2	8.4	4.4	6.3	0.0	0.0	0.0	62.5			
	Monthly Subtotal ($)	$395	$336	$431	$228	$449	$671	$522	$220	$324	$0	$0	$0	$3,577			
																Task Subtotal =	$3,577
Non-Recurring Equipment (hours)	***Equipment***																
	Backhoe-loader													0.0	0.0	$250	$ -
	Tractor Loader													0.0	0.0	$375	$ -
	Dump Truck													0.0	0.0	$175	$ -
	Mowing/Landscape Equip.													0.0	0.0	$150	$ -
	Vacuum Truck													0.0	0.0	$300	$ -
	Vehicle / Pickup Truck													0.0	0.0	$75	$ -
	Monthly Subtotal (hours)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0			
																Equipment Subtotal =	$0
Dollars ($)	***Direct Costs***													Total $			
	VCD supplies (direct costs less labor)													$ -			
	Reproduction	$ 3	$ 1	$ 0	$ 2	$ 2	$ 2	$ 2	$ 0	$ 1	$ 1	$ -	$ -	$ 15			
	Postage/FedEx	$ 5	$ -	$ -	$ -	$ 1	$ 1	$ -	$ 0	$ 0	$ -	$ -	$ -	$ 7			
	Lodging													$ -			
	Per Diem													$ -			
	Incidentals	$ -	$ 11	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 11			
	Vehicle Rental/Lease	$ -	$ 261	$ 155	$ 70	$ 117	$ 138	$ -	$ -	$ 260	$ 31	$ -	$ -	$ 1,031			
	Airfare													$ -			
	Field Supp./Expendables	$ 58	$ 84	$ 5	$ 13	$ 5	$ -	$ 7	$ 21	$ -	$ -	$ -	$ -	$ 194			
	Equipment Rental													$ -			
	Sediment Analyses													$ -			
	Sediment Disposal													$ -			
	Other Direct Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -			
	Transfer Pump Replacement/Repair													$ -			
	Other Direct Costs																
	Monthly Subtotal	$ 65	$ 357	$ 160	$ 85	$ 124	$ 142	$ 9	$ 22	$ 260	$ 33	$ -	$ -	$ 1,258			
	MONTHLY TOTAL	$1,137	$1,416	$1,849	$735	$1,073	$1,023	$903	$428	$1,082	$345	$0	$0	**1999/2000 TOTAL =**			**$9,991**

Mark E. Williams: Coordination oversight for hydroseeding contractor

Mark E. Williams: Conveyance cleaning; trash/debris removal

Mark E. Williams: ~23% share of $2,792.85 for reseeding EDBs ($645 divided by $45 hourly rate)

BMP Retrofit Pilot Program
Maintenance Operation
Cost Accounting Summary, 1999-2000

DISTRICT: 7	LOCATION: I-605/SR-91 EDB	SITE NO. 074102	BMP TYPE: Extended Detention Basins	CONSULTANT: BROWN AND CALDWELL

	TASK	1999			2000									Total (hrs)	Total (days)	Avg. Rate	TOTAL $
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep				
Labor (hours)	***Administration***																
	General program support/Follow-up	4.4	3.8	4.6	2.6	2.2	0.8	1.6	0.7	3.1	2.1	0.0	0.0	25.7	3.2	$120	$ 3,083
	Encroachment Permits	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	$85	$ -
	Travel	2.5	2.8	0.8	0.3	2.0	0.5	0.5	0.5	0.3	0.5			10.5	1.3	$85	$ 893
	Unscheduled events													0.0	0.0	$85	$ -
	Monthly Subtotal (hours)	6.9	6.6	5.3	2.8	4.2	1.3	2.1	1.2	3.3	2.6	0.0	0.0	36.2			
	Monthly Subtotal ($)	$738	$691	$611	$333	$429	$144	$230	$121	$389	$290	$0	$0	$3,975			
																Task Subtotal =	$3,975
	Operation																
	Wet season inspections	1.0	1.3	1.3	0.5	1.0	0.5	1.5	0.8					7.8	1.0	$45	$ 349
	Dry season inspections									0.5	2.0			2.5	0.3	$45	$ 113
	Unscheduled inspections/field calls													0.0	0.0	$90	$ -
	Monthly Subtotal (hours)	1.0	1.3	1.3	0.5	1.0	0.5	1.5	0.8	0.5	2.0	0.0	0.0	10.3			
	Monthly Subtotal ($)	$45	$56	$56	$23	$45	$23	$68	$34	$23	$90	$0	$0	$461			
																Task Subtotal =	$461
	Maintenance																
	Scheduled maintenance	9.0	4.0			3.0								16.0	2.0	$45	$ 720
	Unscheduled maintenance													0.0	0.0	$45	$ -
	Vandalism													0.0	0.0	$45	$ -
	Acts of God													0.0	0.0	$45	$ -
	Landscape Maintenance Contractor			47.7										47.7	6.0	$45	$ 2,148
	Sediment Removal Contractor													0.0	0.0	$45	$ -
	Other Contractor													0.0	0.0	$45	$ -
	Other Contractor													0.0	0.0	$45	$ -
	Other Contractor													0.0	0.0	$45	$ -
	Monthly Subtotal (hours)	9.0	4.0	47.7	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	63.7			
	Monthly Subtotal ($)	$405	$180	$2,148	$0	$135	$0	$0	$0	$0	$0	$0	$0	$720			
																Task Subtotal =	$2,868
	Vector Control																
	Contract & General administration	1.9	0.4	0.3	0.1	0.4	2.4	1.3	0.1	0.3	0.0	0.0	0.0	7.0	0.9	$120	$ 844
	Vector prevention maint. (consultant)													0.0	0.0	$65	$ -
	Response to VCD calls (consultant)													0.0	0.0	$80	$ -
	VCD efforts (contracted)	3.9	6.2	8.2	4.9	7.7	7.3	5.0	4.3	6.0	0.0	0.0	0.0	53.5	6.7	$49	$ 2,622
	Monthly Subtotal (hours)	5.7	6.7	8.4	4.9	8.1	9.7	6.4	4.4	6.3	0.0	0.0	0.0	60.5			
	Monthly Subtotal ($)	$414	$358	$431	$246	$422	$645	$404	$220	$324	$0	$0	$0	$3,465			
																Task Subtotal =	$3,465
Non-Recurring Equipment (hours)	***Equipment***																
	Backhoe-loader													0.0	0.0	$250	$ -
	Tractor Loader													0.0	0.0	$375	$ -
	Dump Truck													0.0	0.0	$175	$ -
	Mowing/Landscape Equip.													0.0	0.0	$150	$ -
	Vacuum Truck													0.0	0.0	$300	$ -
	Vehicle / Pickup Truck													0.0	0.0	$75	$ -
	Monthly Subtotal (hours)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0			
																Equipment Subtotal =	$0
Dollars ($)	***Direct Costs***																**Total $**
	VCD supplies (direct costs less labor)																$ -
	Reproduction	$ 3	$ 1	$ 0	$ 2	$ 2	$ 2	$ 2	$ 0	$ 1	$ 1	$ -	$ -				$ 15
	Postage/FedEx	$ 12.75	$ -	$ -	$ -	$ 1	$ 1	$ -	$ 0	$ 0	$ -	$ -	$ -				$ 15
	Lodging																$ -
	Per Diem																$ -
	Incidentals	$ -	$ 11	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -				$ 11
	Vehicle Rental/Lease	$ -	$ 261	$ 155	$ 70	$ 117	$ 138	$ -	$ -	$ 260	$ 31	$ -	$ -				$ 1,031
	Airfare																$ -
	Field Supp./Expendables	$ 64.43	$ 84	$ 5	$ 13	$ 5	$ -	$ 7	$ 21	$ -	$ -	$ -	$ -				$ 200
	Equipment Rental																$ -
	Sediment Analyses																$ -
	Sediment Disposal																$ -
	Other Direct Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -				$ -
	Transfer Pump Replacement/Repair																$ -
	Other Direct Costs																
	Monthly Subtotal	$ 80	$ 357	$ 160	$ 85	$ 124	$ 142	$ 9	$ 22	$ 260	$ 33	$ -	$ -	$ 1,273			
	MONTHLY TOTAL	$1,681	$1,643	$3,407	$687	$1,155	$953	$711	$397	$996	$413	$0	$0	**1999/2000 TOTAL =**			**$12,042**

Mark E. Williams: Hydroseeding coordination

Mark E. Williams: Hydroseeding coordination

Mark E. Williams: Trash/debris removal, general maintenance

Mark E. Williams: ~77% share of $2,792.85 for reseeding EDBs ($2147.85 divided by $45 hourly rate)

BMP Retrofit Pilot Program
Maintenance Operation
Cost Accounting Summary, 1999-2000

DISTRICT: 7	LOCATION: Alameda Maintenance Sta	SITE NO. 074201	BMP TYPE: Oil/Water Separator	CONSULTANT: BROWN AND CALDWELL

	TASK	1999			2000									Total (hrs)	Total (days)	Avg. Rate	TOTAL $
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep				
Labor (hours)	***Administration***																
	General program support/Follow-up	4.4	3.8	4.6	2.6	2.2	0.8	1.6	0.7	3.1	2.1	0.0	0.0	25.7	3.2	$120	$ 3,083
	Encroachment Permits	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	$85	$ -
	Travel	1.5	1.0	1.5	0.5	2.5	1.5	6.5	1.5	1.0	2.0			19.5	2.4	$85	$ 1,658
	Unscheduled events													0.0	0.0	$85	$ -
	Monthly Subtotal (hours)	5.9	4.8	6.1	3.1	4.7	2.3	8.1	2.2	4.1	4.1	0.0	0.0	45.2			
	Monthly Subtotal ($)	$653	$543	$675	$354	$471	$229	$740	$206	$453	$418	$0	$0	$4,740			
																Task Subtotal =	$4,740
	Operation																
	Wet season inspections	0.8	1.0	0.8	0.5	0.5	1.5	1.5	0.5					7.0	0.9	$45	$ 315
	Dry season inspections									0.5	1.0			1.5	0.2	$45	$ 68
	Unscheduled inspections/field calls													0.0	0.0	$90	$ -
	Monthly Subtotal (hours)	0.8	1.0	0.8	0.5	0.5	1.5	1.5	0.5	0.5	1.0	0.0	0.0	8.5			
	Monthly Subtotal ($)	$34	$45	$34	$23	$23	$68	$68	$23	$23	$45	$0	$0	$383			
																Task Subtotal =	$383
	Maintenance																
	Scheduled maintenance			0.8		1.5		1.5						3.8	0.5	$45	$ 169
	Unscheduled maintenance													0.0	0.0	$45	$ -
	Vandalism													0.0	0.0	$45	$ -
	Acts of God													0.0	0.0	$45	$ -
	Landscape Maintenance Contract													0.0	0.0	$45	$ -
	Sediment Removal Contractor													0.0	0.0	$45	$ -
	Other Contractor													0.0	0.0	$45	$ -
	Other Contractor													0.0	0.0	$45	$ -
	Other Contractor													0.0	0.0	$45	$ -
	Monthly Subtotal (hours)	0.0	0.0	0.8	0.0	1.5	0.0	1.5	0.0	0.0	0.0	0.0	0.0	3.8			
	Monthly Subtotal ($)	$0	$0	$34	$0	$68	$0	$68	$0	$0	$0	$0	$0	$169			
																Task Subtotal =	$169
	Vector Control																
	Contract & General administration	1.9	0.4	0.3	0.1	0.4	2.4	1.3	0.1	0.3	0.0	0.0	0.0	7.0	0.9	$120	$ 844
	Vector prevention maint. (consultant)													0.0	0.0	$65	$ -
	Response to VCD calls (consultant)													0.0	0.0	$80	$ -
	VCD efforts (contracted)	6.9	5.8	8.2	4.1	7.2	7.3	4.7	4.3	6.0	0.0	0.0	0.0	54.5	6.8	$49	$ 2,670
	Monthly Subtotal (hours)	8.8	6.2	8.4	4.2	7.5	9.7	6.0	4.4	6.3	0.0	0.0	0.0	61.5			
	Monthly Subtotal ($)	$565	$336	$431	$210	$395	$645	$387	$220	$324	$0	$0	$0	$3,513			
																Task Subtotal =	$3,513
Non-Recurring Equipment (hours)	***Equipment***																
	Backhoe-loader													0.0	0	$250	$ -
	Tractor Loader													0.0	0	$375	$ -
	Dump Truck													0.0	0	$175	$ -
	Mowing/Landscape Equip.													0.0	0	$150	$ -
	Vacuum Truck													0.0	0	$300	$ -
	Vehicle / Pickup Truck													0.0	0	$75	$ -
	Monthly Subtotal (hours)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0			
																Equipment Subtotal =	$0
Dollars ($)	***Direct Costs***													Total $			
	VCD supplies (direct costs less labor)													$ -			
	Reproduction	$ 3	$ 1	$ 0	$ 2	$ 2	$ 2	$ 2	$ 0	$ 1	$ 1	$ -	$ -	$ 15			
	Postage/FedEx	$ 5	$ -	$ -	$ -	$ 1	$ 1	$ -	$ 0	$ 0	$ -	$ -	$ -	$ 7			
	Lodging													$ -			
	Per Diem													$ -			
	Incidentals	$ -	$ 11	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 11			
	Vehicle Rental/Lease	$ -	$ 261	$ 155	$ 70	$ 117	$ 138	$ -	$ -	$ 260	$ 31	$ -	$ -	$ 1,031			
	Airfare													$ -			
	Field Supp./Expendables	$ 58	$ 84	$ 5	$ 13	$ 5	$ -	$ 7	$ 21	$ -	$ -	$ -	$ -	$ 194			
	Equipment Rental													$ -			
	Sediment Analyses													$ -			
	Sediment Disposal													$ -			
	Other Direct Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -			
	Transfer Pump Replacement/Repair													$ -			
	Other Direct Costs																
	Monthly Subtotal	$ 65	$ 357	$ 160	$ 85	$ 124	$ 142	$ 9	$ 22	$ 260	$ 33	$ -	$ -	$ 1,258			
	MONTHLY TOTAL	$1,316	$1,281	$1,334	$671	$1,081	$1,083	$1,271	$471	$1,059	$495	$0	$0	**1999/2000 TOTAL =**			**$10,062**

Mark E. Williams: Cleaning trench drain of sed & debris; containerize sed in 55-gal drum, label, and secure onsite.

Mark E. Williams: Trech drain sediment removal and collection in drum.

Mark E. Williams: General site cleanup and maintenance inspection

BMP Retrofit Pilot Program
Maintenance Operation
Cost Accounting Summary, 1999-2000

DISTRICT: 7	LOCATION: Eastern Regional Mainten	SITE NO. 074202	BMP TYPE: Sand Filter	CONSULTANT: BROWN AND CALDWELL

	TASK	1999			2000									Total (hrs)	Total (days)	Avg. Rate	TOTAL $
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep				
Labor (hours)	***Administration***																
	General program support/Follow-up	4.4	3.8	4.6	2.6	2.2	0.8	1.6	0.7	3.1	2.1	0.0	0.0	25.7	3.2	$120	$ 3,083
	Encroachment Permits	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	$85	$ -
	Travel	1.0	1.0	0.5	1.5	3.0	1.0	3.5	1.0	0.5	1.0			14.0	1.8	$85	$ 1,190
	Unscheduled events													0.0	0.0	$85	$ -
	Monthly Subtotal (hours)	5.4	4.8	5.1	4.1	5.2	1.8	5.1	1.7	3.6	3.1	0.0	0.0	39.7			
	Monthly Subtotal ($)	$610	$543	$590	$439	$514	$186	$485	$164	$410	$333	$0	$0	$4,273			
																Task Subtotal =	$4,273
	Operation																
	Wet season inspections	0.8	1.0	0.8	1.0	1.5	1.0	1.0	0.5					7.5	0.9	$45	$ 338
	Dry season inspections									1.5	1.0			2.5	0.3	$45	$ 113
	Unscheduled inspections/field calls													0.0	0.0	$90	$ -
	Monthly Subtotal (hours)	0.8	1.0	0.8	1.0	1.5	1.0	1.0	0.5	1.5	1.0	0.0	0.0	10.0			
	Monthly Subtotal ($)	$34	$45	$34	$45	$68	$45	$45	$23	$68	$45	$0	$0	$450			
																Task Subtotal =	$450
	Maintenance																
	Scheduled maintenance				1.0	3.5			0.8					5.3	0.7	$45	$ 236
	Unscheduled maintenance						2.0	14.8						16.8	2.1	$45	$ 754
	Vandalism													0.0	0.0	$45	$ -
	Acts of God													0.0	0.0	$45	$ -
	Landscape Maintenance Contractor													0.0	0.0	$45	$ -
	Sediment Removal Contractor													0.0	0.0	$45	$ -
	Other Contractor													0.0	0.0	$45	$ -
	Other Contractor													0.0	0.0	$45	$ -
	Other Contractor													0.0	0.0	$45	$ -
	Monthly Subtotal (hours)	0.0	0.0	0.0	1.0	3.5	2.0	14.8	0.8	0.0	0.0	0.0	0.0	22.0			
	Monthly Subtotal ($)	$0	$0	$0	$45	$158	$90	$664	$34	$0	$0	$0	$0	$990			
																Task Subtotal =	$990
	Vector Control																
	Contract & General administration	1.9	0.4	0.3	0.1	0.4	2.4	1.3	0.1	0.3	0.0	0.0	0.0	7.0	0.9	$120	$ 844
	Vector prevention maint. (consultant)							0.8						0.8	0.1	$65	$ 49
	Response to VCD calls (consultant)													0.0	0.0	$80	$ -
	VCD efforts (contracted)	3.5	6.2	8.2	6.8	8.3	7.3	5.0	4.3	5.2	0.0	0.0	0.0	54.7	6.8	$49	$ 2,683
	Monthly Subtotal (hours)	5.3	6.7	8.4	6.8	8.6	9.7	7.1	4.4	5.5	0.0	0.0	0.0	62.5			
	Monthly Subtotal ($)	$395	$358	$431	$338	$449	$645	$453	$220	$285	$0	$0	$0	$3,575			
																Task Subtotal =	$3,575
Non-Recurring Equipment (hours)	***Equipment***																
	Backhoe-loader													0.0	0	$250	$ -
	Tractor Loader													0.0	0	$375	$ -
	Dump Truck													0.0	0	$175	$ -
	Mowing/Landscape Equip.													0.0	0	$150	$ -
	Vacuum Truck													0.0	0	$300	$ -
	Vehicle / Pickup Truck													0.0	0	$75	$ -
	Monthly Subtotal (hours)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0			
																Equipment Subtotal =	$0
Dollars ($)	***Direct Costs***																**Total $**
	VCD supplies (direct costs less labor)																$ -
	Reproduction	$ 3	$ 1	$ 0	$ 2	$ 2	$ 2	$ 2	$ 0	$ 1	$ 1	$ -	$ -				$ 15
	Postage/FedEx	$ 5	$ -	$ -	$ -	$ 1	$ 1	$ -	$ 0	$ 0	$ -	$ -	$ -				$ 7
	Lodging																$ -
	Per Diem																$ -
	Incidentals	$ -	$ 11	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -				$ 11
	Vehicle Rental/Lease	$ -	$ 261	$ 155	$ 70	$ 117	$ 138	$ -	$ -	$ 260	$ 31	$ -	$ -				$ 1,031
	Airfare																$ -
	Field Supp./Expendables	$ 58	$ 84	$ 5	$ 13	$ 5	$ -	$ 7	$ 21	$ -	$ -	$ -	$ -				$ 194
	Equipment Rental																$ -
	Sediment Analyses																$ -
	Sediment Disposal																$ -
	Other Direct Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -				$ -
	Transfer Pump Replacement/Repair																$ -
	Other Direct Costs																
	Monthly Subtotal	$ 65	$ 357	$ 160	$ 85	$ 124	$ 142	$ 9	$ 22	$ 260	$ 33	$ -	$ -				$ 1,258
	MONTHLY TOTAL	$1,104	$1,303	$1,215	$952	$1,312	$1,108	$1,656	$462	$1,023	$410	$0	$0	**1999/2000 TOTAL =**			**$10,545**

Mark E. Williams: Unclog sedimentation basin line to sand bed

Mark E. Williams: Unclog pipe to sand bed, clear sed chamber of debris, general maintenance

Mark E. Williams: Concrete repair of sink hole forming near effluent sampler enclosure.

Mark E. Williams: Concrete repair of sink hole forming near effluent sampler enclosure. 2 hours for R+R effluent pump.

Mark E. Williams: repair mosquito netting

BMP Retrofit Pilot Program
Maintenance Operation
Cost Accounting Summary, 1999-2000

DISTRICT: 7	LOCATION: Foothill Maintenance Stat	SITE NO. 074203	BMP TYPE: Sand Filter	CONSULTANT: BROWN AND CALDWELL

	TASK	1999			2000									Total (hrs)	Total (days)	Avg. Rate	TOTAL $
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep				
Labor (hours)	***Administration***																
	General program support/Follow-up	4.4	3.8	4.6	2.6	2.2	0.8	1.6	0.7	3.1	2.1	0.0	0.0	25.7	3.2	$120	$ 3,083
	Encroachment Permits	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	$85	$ -
	Travel	0.5	1.0	0.5	1.0	1.0	1.5	1.5	1.0	1.0	0.5			9.5	1.2	$85	$ 808
	Unscheduled events													0.0	0.0	$85	$ -
	Monthly Subtotal (hours)	4.9	4.8	5.1	3.6	3.2	2.3	3.1	1.7	4.1	2.6	0.0	0.0	35.2			
	Monthly Subtotal ($)	$568	$543	$590	$396	$344	$229	$315	$164	$453	$290	$0	$0	$3,890			
																Task Subtotal =	$3,890
	Operation																
	Wet season inspections	0.5	1.0	0.8	0.5	1.5	1.0	1.5	0.5					7.3	0.9	$45	$ 326
	Dry season inspections									1.0	0.5			1.5	0.2	$45	$ 68
	Unscheduled inspections/field calls													0.0	0.0	$90	$ -
	Monthly Subtotal (hours)	0.5	1.0	0.8	0.5	1.5	1.0	1.5	0.5	1.0	0.5	0.0	0.0	8.8			
	Monthly Subtotal ($)	$23	$45	$34	$23	$68	$45	$68	$23	$45	$23	$0	$0	$394			
																Task Subtotal =	$394
	Maintenance																
	Scheduled maintenance					1.5								1.5	0.2	$45	$ 68
	Unscheduled maintenance													0.0	0.0	$45	$ -
	Vandalism													0.0	0.0	$45	$ -
	Acts of God													0.0	0.0	$45	$ -
	Landscape Maintenance Contractor													0.0	0.0	$45	$ -
	Sediment Removal Contractor													0.0	0.0	$45	$ -
	Other Contractor													0.0	0.0	$45	$ -
	Other Contractor													0.0	0.0	$45	$ -
	Other Contractor													0.0	0.0	$45	$ -
	Monthly Subtotal (hours)	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5			
	Monthly Subtotal ($)	$0	$0	$0	$0	$68	$0	$0	$0	$0	$0	$0	$0	$68			
																Task Subtotal =	$68
	Vector Control																
	Contract & General administration	1.9	0.4	0.3	0.1	0.4	2.4	1.3	0.1	0.3	0.0	0.0	0.0	7.0	0.9	$120	$ 844
	Vector prevention maint. (consultant)								1.0					1.0	0.1	$65	$ 65
	Response to VCD calls (consultant)													0.0	0.0	$80	$ -
	VCD efforts (contracted)	0.4	0.6	0.6	0.8	0.9	2.2	0.6	0.8					6.9	0.9	$68	$ 466
	Monthly Subtotal (hours)	2.3	1.0	0.8	0.9	1.3	4.6	1.9	1.9	0.3	0.0	0.0	0.0	14.9			
	Monthly Subtotal ($)	$253	$92	$70	$64	$107	$435	$196	$129	$30	$0	$0	$0	$1,375			
																Task Subtotal =	$1,375
Non-Recurring Equipment (hours)	***Equipment***																
	Backhoe-loader													0.0	0.0	$250	$ -
	Tractor Loader													0.0	0.0	$375	$ -
	Dump Truck													0.0	0.0	$175	$ -
	Mowing/Landscape Equip.													0.0	0.0	$150	$ -
	Vacuum Truck													0.0	0.0	$300	$ -
	Vehicle / Pickup Truck													0.0	0.0	$75	$ -
	Monthly Subtotal (hours)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0			
																Equipment Subtotal =	$0

Mark E. Williams: Unclog pipe to sand bed, clear sed chamber of debris, general maintenance

Mark E. Williams: Repair mosquito netting

Dollars ($)	***Direct Costs***													Total $
	VCD supplies (direct costs less labor)													$ -
	Reproduction	$ 3	$ 1	$ 0	$ 2	$ 2	$ 2	$ 2	$ 0	$ 1	$ 1	$ -	$ -	$ 15
	Postage/FedEx	$ 5	$ -	$ -	$ -	$ 1	$ 1	$ -	$ 0	$ 0	$ -	$ -	$ -	$ 7
	Lodging													$ -
	Per Diem													$ -
	Incidentals	$ -	$ 11	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 11
	Vehicle Rental/Lease	$ -	$ 261	$ 155	$ 70	$ 117	$ 138	$ -	$ -	$ 260	$ 31	$ -	$ -	$ 1,031
	Airfare													$ -
	Field Supp./Expendables	$ 58	$ 84	$ 5	$ 13	$ 5	$ -	$ 7	$ 21	$ -	$ -	$ -	$ -	$ 194
	Equipment Rental													$ -
	Sediment Analyses													$ -
	Sediment Disposal													$ -
	Other Direct Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Transfer Pump Replacement/Repair													$ -
	VCD Mileage Costs	$ 3	$ 3	$ 4	$ 4	$ 4	$ 4	$ 4	$ 4					$ 27
	Monthly Subtotal	$ 68	$ 360	$ 163	$ 89	$ 127	$ 146	$ 13	$ 26	$ 260	$ 33	$ -	$ -	$ 1,285

	MONTHLY TOTAL	$911	$1,039	$857	$571	$713	$855	$591	$340	$788	$345	$0	$0	**1999/2000 TOTAL = $7,011**

BMP Retrofit Pilot Program
Maintenance Operation
Cost Accounting Summary, 1999-2000

DISTRICT: 7	LOCATION: Termination Park & Ride	SITE NO. 074204	BMP TYPE: Sand Filter	CONSULTANT: BROWN AND CALDWELL

	TASK	1999			2000									Total (hrs)	Total (days)	Avg. Rate	TOTAL $
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep				
Labor (hours)	***Administration***																
	General program support/Follow-up	4.4	3.8	4.6	2.6	2.2	0.8	1.6	0.7	3.1	2.1	0.0	0.0	25.7	3.2	$120	$ 3,083
	Encroachment Permits	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	$85	$ -
	Travel	0.5	0.8	0.3	0.3	1.3	1.5	0.8	1.0	0.5	0.5			7.3	0.9	$85	$ 616
	Unscheduled events													0.0	0.0	$85	$ -
	Monthly Subtotal (hours)	4.9	4.6	4.8	2.8	3.4	2.3	2.3	1.7	3.6	2.6	0.0	0.0	32.9			
	Monthly Subtotal ($)	$568	$521	$569	$333	$365	$229	$251	$164	$410	$290	$0	$0	$3,699			
																Task Subtotal =	$3,699
	Operation																
	Wet season inspections	1.0	1.3	1.0	0.5	1.0	2.0	0.8	0.5					8.0	1.0	$45	$ 360
	Dry season inspections									1.0	2.0			3.0	0.4	$45	$ 135
	Unscheduled inspections/field calls													0.0	0.0	$90	$ -
	Monthly Subtotal (hours)	1.0	1.3	1.0	0.5	1.0	2.0	0.8	0.5	1.0	2.0	0.0	0.0	11.0			
	Monthly Subtotal ($)	$45	$56	$45	$23	$45	$90	$34	$23	$45	$90	$0	$0	$495			
																Task Subtotal =	$495
	Maintenance																
	Scheduled maintenance					6.3			1.0					7.3	0.9	$45	$ 326
	Unscheduled maintenance	2.5			0.5									3.0	0.4	$45	$ 135
	Vandalism													0.0	0.0	$45	$ -
	Acts of God													0.0	0.0	$45	$ -
	Landscape Maintenance Contractor													0.0	0.0	$45	$ -
	Sediment Removal Contractor													0.0	0.0	$45	$ -
	Other Contractor													0.0	0.0	$45	$ -
	Other Contractor													0.0	0.0	$45	$ -
	Other Contractor													0.0	0.0	$45	$ -
	Monthly Subtotal (hours)	2.5	0.0	0.0	0.5	6.3	0.0	0.0	1.0	0.0	0.0	0.0	0.0	10.3			
	Monthly Subtotal ($)	$113	$0	$0	$23	$281	$0	$0	$45	$0	$0	$0	$0	$461			
																Task Subtotal =	$461
	Vector Control																
	Contract & General administration	1.9	0.4	0.3	0.1	0.4	2.4	1.3	0.1	0.3	0.0	0.0	0.0	7.0	0.9	$120	$ 844
	Vector prevention maint. (consultant)													0.0	0.0	$65	$ -
	Response to VCD calls (consultant)													0.0	0.0	$80	$ -
	VCD efforts (contracted)	13.1	9.3	8.8	5.3	11.0	8.8	6.5	4.3	5.6	0.0	0.0	0.0	72.7	9.1	$49	$ 3,563
	Monthly Subtotal (hours)	15.0	9.8	9.0	5.3	11.4	11.2	7.8	4.4	5.9	0.0	0.0	0.0	79.8			
	Monthly Subtotal ($)	$866	$510	$460	$265	$584	$722	$475	$220	$304	$0	$0	$0	$4,407			
																Task Subtotal =	$4,407
Non-Recurring Equipment (hours)	***Equipment***																
	Backhoe-loader													0.0	0.0	$250	$ -
	Tractor Loader													0.0	0.0	$375	$ -
	Dump Truck													0.0	0.0	$175	$ -
	Mowing/Landscape Equip.													0.0	0.0	$150	$ -
	Vacuum Truck													0.0	0.0	$300	$ -
	Vehicle / Pickup Truck													0.0	0.0	$75	$ -
	Monthly Subtotal (hours)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0			
																Equipment Subtotal =	$0
Dollars ($)	***Direct Costs***																**Total $**
	VCD supplies (direct costs less labor)																$ -
	Reproduction	$ 3	$ 1	$ 0	$ 2	$ 2	$ 2	$ 2	$ 0	$ 1	$ 1	$ -	$ -				$ 15
	Postage/FedEx	$ 5	$ -	$ -	$ -	$ 1	$ 1	$ -	$ 0	$ 0	$ -	$ -	$ -				$ 7
	Lodging																$ -
	Per Diem																$ -
	Incidentals	$ -	$ 11	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -				$ 11
	Vehicle Rental/Lease	$ -	$ 261	$ 155	$ 70	$ 117	$ 138	$ -	$ -	$ 260	$ 31	$ -	$ -				$ 1,031
	Airfare																$ -
	Field Supp./Expendables	$ 58	$ 84	$ 5	$ 13	$ 5	$ -	$ 7	$ 21	$ -	$ -	$ -	$ -				$ 194
	Equipment Rental																$ -
	Sediment Analyses																$ -
	Sediment Disposal																$ -
	Other Direct Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -				$ -
	Transfer Pump Replacement/Repair																$ -
	Other Direct Costs																$ -
	Monthly Subtotal	$ 65	$ 357	$ 160	$ 85	$ 124	$ 142	$ 9	$ 22	$ 260	$ 33	$ -	$ -				$ 1,258
	MONTHLY TOTAL	$1,657	$1,445	$1,234	$728	$1,399	$1,182	$769	$473	$1,020	$413	$0	$0	**1999/2000 TOTAL =**			**$10,320**

Mark E. Williams: Clean up site of leaves, debris, and trash; general maintenance; weed control.

Mark E. Williams: Patch asphalt sink hole

Mark E. Williams: Order replacement pump

BMP Retrofit Pilot Program
Maintenance Operation
Cost Accounting Summary, 1999-2000

DISTRICT: 7	LOCATION: Paxton Park & Ride	SITE NO. 074103	BMP TYPE: Sand Filter	CONSULTANT: BROWN AND CALDWELL

	TASK	1999			2000									Total (hrs)	Total (days)	Avg. Rate	TOTAL $
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep				
Labor (hours)	***Administration***																
	General program support/Follow-up	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	$120	$ -
	Encroachment Permits	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	$85	$ -
	Travel													0.0	0.0	$85	$ -
	Unscheduled events													0.0	0.0	$85	$ -
	Monthly Subtotal (hours)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0			
																Task Subtotal =	$0
	Operation																
	Wet season inspections													0.0	0.0	$45	$ -
	Dry season inspections													0.0	0.0	$45	$ -
	Unscheduled inspections/field calls													0.0	0.0	$90	$ -
	Monthly Subtotal (hours)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0			
																Task Subtotal =	$0
	Maintenance																
	Scheduled maintenance													0.0	0.0	$45	$ -
	Unscheduled maintenance													0.0	0.0	$45	$ -
	Vandalism													0.0	0.0	$45	$ -
	Acts of God													0.0	0.0	$45	$ -
	Landscape Maintenance Contractor													0.0	0.0	$45	$ -
	Sediment Removal Contractor													0.0	0.0	$45	$ -
	Other Contractor													0.0	0.0	$45	$ -
	Other Contractor													0.0	0.0	$45	$ -
	Other Contractor													0.0	0.0	$45	$ -
	Monthly Subtotal (hours)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0			
																Task Subtotal =	$0
	Vector Control																
	Contract & General administration										0.0	0.0	0.0	0.0	0.0	$120	$ -
	Vector prevention maint. (consultant)													0.0	0.0	$65	$ -
	Response to VCD calls (consultant)													0.0	0.0	$80	$ -
	VCD efforts (contracted)										0.0	0.0	0.0	0.0	0.0	$49	$ -
	Monthly Subtotal (hours)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0			
																Task Subtotal =	$0
Non-Recurring Equipment (hours)	***Equipment***																
	Backhoe-loader													0.0	0.0	$250	$ -
	Tractor Loader													0.0	0.0	$375	$ -
	Dump Truck													0.0	0.0	$175	$ -
	Mowing/Landscape Equip.													0.0	0.0	$150	$ -
	Vacuum Truck													0.0	0.0	$300	$ -
	Vehicle / Pickup Truck													0.0	0.0	$75	$ -
	Monthly Subtotal (hours)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0			
																Equipment Subtotal =	$0
Dollars ($)	***Direct Costs***													**Total $**			
	VCD supplies (direct costs less labor)													$ -			
	Reproduction										$ -	$ -	$ -	$ -			
	Postage/FedEx										$ -	$ -	$ -	$ -			
	Lodging													$ -			
	Per Diem													$ -			
	Incidentals										$ -	$ -	$ -	$ -			
	Vehicle Rental/Lease										$ -	$ -	$ -	$ -			
	Airfare													$ -			
	Field Supp./Expendables										$ -	$ -	$ -	$ -			
	Equipment Rental													$ -			
	Sediment Analyses													$ -			
	Sediment Disposal													$ -			
	Other Direct Costs										$ -	$ -	$ -	$ -			
	Transfer Pump Replacement/Repair													$ -			
	Other Direct Costs													$ -			
	Monthly Subtotal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -			
	MONTHLY TOTAL	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**1999/2000 TOTAL =**			**$0**

BMP Retrofit Pilot Program
Maintenance Operation
Cost Accounting Summary, 1999-2000

DISTRICT: 7	LOCATION: Metro Maintenance Statio	SITE NO. 074104	BMP TYPE: Multi-chambered Treatment Train	CONSULTANT: BROWN AND CALDWELL

	TASK	1999			2000									Total (hrs)	Total (days)	Avg. Rate	TOTAL $
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep				
Labor (hours)	***Administration***																
	General program support/Follow-up	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	$120	$ -
	Encroachment Permits	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	$85	$ -
	Travel													0.0	0.0	$85	$ -
	Unscheduled events													0.0	0.0	$85	$ -
	Monthly Subtotal (hours)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0			
																Task Subtotal =	$0
	Operation																
	Wet season inspections													0.0	0.0	$45	$ -
	Dry season inspections													0.0	0.0	$45	$ -
	Unscheduled inspections/field calls													0.0	0.0	$90	$ -
	Monthly Subtotal (hours)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0			
																Task Subtotal =	$0
	Maintenance																
	Scheduled maintenance													0.0	0.0	$45	$ -
	Unscheduled maintenance													0.0	0.0	$45	$ -
	Vandalism													0.0	0.0	$45	$ -
	Acts of God													0.0	0.0	$45	$ -
	Landscape Maintenance Contractor													0.0	0.0	$45	$ -
	Sediment Removal Contractor													0.0	0.0	$45	$ -
	Other Contractor													0.0	0.0	$45	$ -
	Other Contractor													0.0	0.0	$45	$ -
	Other Contractor													0.0	0.0	$45	$ -
	Monthly Subtotal (hours)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0			
																Task Subtotal =	$0
	Vector Control																
	Contract & General administration										0.0	0.0	0.0	0.0	0.0	$120	$ -
	Vector prevention maint. (consultant)													0.0	0.0	$65	$ -
	Response to VCD calls (consultant)													0.0	0.0	$80	$ -
	VCD efforts (contracted)										0.0	0.0	0.0	0.0	0.0	$49	$ -
	Monthly Subtotal (hours)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0			
																Task Subtotal =	$0
Non-Recurring Equipment (hours)	***Equipment***																
	Backhoe-loader													0.0	0.0	$250	$ -
	Tractor Loader													0.0	0.0	$375	$ -
	Dump Truck													0.0	0.0	$175	$ -
	Mowing/Landscape Equip.													0.0	0.0	$150	$ -
	Vacuum Truck													0.0	0.0	$300	$ -
	Vehicle / Pickup Truck													0.0	0.0	$75	$ -
	Monthly Subtotal (hours)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0			
																Equipment Subtotal =	$0
Dollars ($)	***Direct Costs***																**Total $**
	VCD supplies (direct costs less labor)																$ -
	Reproduction										$ -	$ -	$ -				$ -
	Postage/FedEx										$ -	$ -	$ -				$ -
	Lodging																$ -
	Per Diem																$ -
	Incidentals										$ -	$ -	$ -				$ -
	Vehicle Rental/Lease										$ -	$ -	$ -				$ -
	Airfare																$ -
	Field Supp./Expendables										$ -	$ -	$ -				$ -
	Equipment Rental																$ -
	Sediment Analyses																$ -
	Sediment Disposal																$ -
	Other Direct Costs										$ -	$ -	$ -				$ -
	Transfer Pump Replacement/Repair																$ -
	Other Direct Costs																$ -
	Monthly Subtotal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -				$ -
	MONTHLY TOTAL	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**1999/2000 TOTAL =**			**$0**

BMP Retrofit Pilot Program
Maintenance Operation
Cost Accounting Summary, 1999-2000

DISTRICT: 7	LOCATION: Lakewood Park & Ride	SITE NO. 074208	BMP TYPE: Multi-chambered Treatment Train	CONSULTANT: BROWN AND CALDWELL

Labor (hours)

TASK	1999 Oct	1999 Nov	1999 Dec	2000 Jan	2000 Feb	2000 Mar	2000 Apr	2000 May	2000 Jun	2000 Jul	2000 Aug	2000 Sep	Total (hrs)	Total (days)	Avg. Rate	TOTAL $
Administration																
General program support/Follow-up	4.4	3.8	4.6	2.6	2.2	0.8	1.6	0.7	3.1	2.1	0.0	0.0	25.7	3.2	$120	$ 3,083
Encroachment Permits	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	$85	$ -
Travel	7.0	5.3	1.3	5.8	9.0	3.8	0.8	0.8	2.5	5.5			41.5	5.2	$85	$ 3,528
Unscheduled events													0.0	0.0	$85	$ -
Monthly Subtotal (hours)	11.4	9.1	5.8	8.3	11.2	4.6	2.3	1.4	5.6	7.6	0.0	0.0	67.2			
Monthly Subtotal ($)	$1,120	$904	$654	$800	$1,024	$420	$251	$143	$580	$715	$0	$0	$6,610			
															Task Subtotal =	$6,610
Operation																
Wet season inspections	1.5	1.0	1.5	1.3	2.3	2.0	1.5	0.3					11.3	1.4	$45	$ 506
Dry season inspections									1.0	2.0			3.0	0.4	$45	$ 135
Unscheduled inspections/field calls					11.4								11.4	1.4	$90	$ 1,026
Monthly Subtotal (hours)	1.5	1.0	1.5	1.3	13.7				1.0	2.0	0.0	0.0	25.7			
Monthly Subtotal ($)	$68	$45	$68	$56	$1,127				$45	$90	$0	$0	$1,667			
															Task Subtotal =	$1,667
Maintenance																
Scheduled maintenance					4.3								4.3	0.5	$45	$ 191
Unscheduled maintenance	17.5	3.8	10.5	16.3	19.4	1.0				3.0			71.4	8.9	$45	$ 3,211
Vandalism													0.0	0.0	$45	$ -
Acts of God													0.0	0.0	$45	$ -
Landscape Maintenance Contracto													0.0	0.0	$45	$ -
Sediment Removal Contractor													0.0	0.0	$45	$ -
Other Contractor													0.0	0.0	$45	$ -
Other Contractor													0.0	0.0	$45	$ -
Other Contractor													0.0	0.0	$45	$ -
Monthly Subtotal (hours)	17.5	3.8	10.5	16.3	23.8	1.0				3.0	0.0	0.0	75.6			
Monthly Subtotal ($)	$788	$169	$473	$731	$1,062	$45				$135	$0	$0	$3,402			
															Task Subtotal =	$3,402
Vector Control																
Contract & General administration	1.9	0.4	0.3	0.1	6.1	9.9	1.3	0.1	2.3	0.0	0.0	0.0	22.3	2.8	$120	$ 2,674
Vector prevention maint. (consultant)								0.5	1.8	6.5			8.8	1.1	$65	$ 569
Response to VCD calls (consultant)													0.0	0.0	$80	$ -
VCD efforts (contracted)	7.7	11.1	17.0	12.0	12.7	13.5	8.6	9.3	11.2	0.0	0.0	0.0	103.1	12.9	$49	$ 5,052
Monthly Subtotal (hours)	9.6	11.6	17.2	12.1	18.8	23.4	10.0	9.9	15.2	6.5	0.0	0.0	134.1			
Monthly Subtotal ($)	$602	$598	$861	$596	$1,355	$1,851	$581	$496	$933	$423	$0	$0	$8,294			
															Task Subtotal =	$8,294

Non-Recurring Equipment (hours)

Equipment																
Backhoe-loader													0.0	0	$250	$ -
Tractor Loader													0.0	0	$375	$ -
Dump Truck													0.0	0	$175	$ -
Mowing/Landscape Equip.													0.0	0	$150	$ -
Vacuum Truck													0.0	0	$300	$ -
Vehicle / Pickup Truck													0.0	0	$75	$ -
Monthly Subtotal (hours)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0			
															Equipment Subtotal =	$0

Dollars ($)

Direct Costs													Total $
VCD supplies (direct costs less labor)			$ 0.26										$ 0
Reproduction	$ 3	$ 1	$ 0	$ 2	$ 2	$ 2	$ 2	$ 0	$ 1	$ 1	$ -	$ -	$ 15
Postage/FedEx	$ 5	$ -	$ -	$ -	$ 1	$ 1	$ -	$ 0	$ 0	$ -	$ -	$ -	$ 7
Lodging													$ -
Per Diem	$ 20												$ 20
Incidentals	$ -	$ 11	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 11
Vehicle Rental/Lease	$ -	$ 261	$ 155	$ 70	$ 117	$ 138	$ 6.76	$ -	$ 260	$ 31	$ -	$ -	$ 1,038
Airfare	$ 104												$ 104
Field Supp./Expendables	$ 58	$ 84	$ 5	$ 13	$ 5	$ -	$ 7	$ 21	$ -	$ -	$ -	$ -	$ 194
Equipment Rental										$ 113			$ 113
Sediment Analyses													$ -
Sediment Disposal													$ -
Other Direct Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Transfer Pump Replacement/Repair					$ 540	$ 540							$ 1,080
Other Direct Costs													$ -
Monthly Subtotal	$ 189	$ 357	$ 160	$ 85	$ 664	$ 682	$ 16	$ 22	$ 260	$ 146	$ -	$ -	$ 2,582

MONTHLY TOTAL	$2,767	$2,072	$2,215	$2,268	$5,232	$3,088	$915	$672	$1,818	$1,508	$0	$0	**1999/2000 TOTAL = $22,556**

Mark E. Williams: Buck-booster installation oversight

Mark E. Williams: Trash/debris cleanup

Mark E. Williams: 60% of weekly charges for contractor oversight during weir cutting work.

Mark E. Williams: Settling chamber pump change out

Mark E. Williams: Removal of transfer pump, testing pump, coordinating buck/booster installation

Mark E. Williams: Transfer pump re-installation

Mark E. Williams: Order replacement pump and filter fabric (1.5), and install filter fabric

Mark E. Williams: Remove transfer pump and install new. Pump out sed chamber after unsampled storm.
WE 2/18: Pump out sed chamber prior to storm event. 40% of weekly charges; 60% applied to operation for contractor oversight during weir cutting work.

Mark E. Williams: Partially remove tube settlers to allow VCD access/evaporation

Mark E. Williams: Settling chamber pump-down for vector mgmt.

APPENDIX D

2ND YEAR REPORT – D11 KINNETICS SITES

CALTRANS
BMP RETROFIT PILOT PROGRAM

DISTRICT 11, SAN DIEGO

SECOND YEAR 1999-2000 REPORT

BEST MANAGEMENT PRACTICES

OPERATIONS, MONITORING & MAINTENANCE

KINNETIC LABORATORIES, INC.

August 2000

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1.0 STORMWATER DATA

This section encapsulates the 1999/2000 monitoring at all the Caltrans District 11 sites involved in the Caltrans Best Management Practices (BMP) Retrofit Pilot Program. The 13 BMPs monitored under the program are summarized in Table 1-1. BMP locations are depicted in Figure 1-1.

This report addresses all the District 11 BMP locations that were monitored under the responsibility of Kinnetic Laboratories, Inc (KLI). Sampling and analytical methods including Quality Assurance / Quality Control guidelines for the District 11 BMP Retrofit Pilot Program are located in a comprehensive Volume II Operation, Maintenance, and Monitoring (OMM) Plan (KLI, 1999).

1.1 Objective

The objective of the Caltrans BMP Pilot Program is to evaluate the performance of BMPs. A comprehensive monitoring study has been designed to meet this objective by evaluating the BMPs performance in the removal of contaminants from stormwater runoff and by understanding the level of effort required to maintain each BMP at optimal effectiveness. Data collected from the 1999/2000 wet season are contained in this report and are used to initially evaluate the BMP's performance. Data includes the following:

- Rainfall data from storm events during the study period.
- Water quality and quantity of runoff into and discharged from the BMPs.
- Empirical observations of water quality, traffic, rainfall, and antecedent conditions; and
- Documentation records of inspection and maintenance activities performed.

In addition to the data collected above, a hydraulic residence time evaluation was performed at the Palomar biofiltration swale (swale). Baseline soil sampling was performed at the La Costa infiltration basin (IB). Baseline and wet season groundwater samples were taken at the La Costa IB and the Carlsbad Maintenance Station (MS) biofiltration strip / infiltration trench (strip/IT). Field crews attempted to obtain vadose zone samples at the Carlsbad MS strip/IT. Also, baseline water quality samples of the flow into the permanent pool at the La Costa wet basin (WB) were taken on a monthly basis.

1.2 Hydrology

1.2.1 Precipitation During the Wet Season

Seasonal precipitation totals during the 1999/2000 wet season were nearly the same as totals during the 1998/1999 wet season. Both seasons are considered dryer than normal. Mean yearly precipitation for San Diego is 10.04 inches, as compiled from the National Weather Service Lindbergh Field rain gauge for 1851-1999. Cumulative totals for the 1999/2000 season ranged from 4.87 inches at the La Costa WB to 8.74 inches at the I-

15/SR-78 extended detention basin (EDB). During the 1998/1999 season, precipitation totals ranged from 5.43 inches to 7.50 inches.

Rainfall data collection began on October 1, 1999. Figure 1-2a, b, and c illustrate daily precipitation totals and yearly accumulation for the 1999/2000 wet season within the northern (Escondido), mid (La Costa) and southern (Kearny Mesa) extent of the District 11 study area. February was by far the wettest month of the wet season with the two wettest days occurring on February 20 and 21. Most rainfall for the year occurred during a period beginning around February 10 and ending around March 8. For the most part, only slight amounts of rain fell before January 25, 2000. The exception to this was for certain areas in northern San Diego County.

1.2.2 Precipitation During Monitored Events

Precipitation during each storm event was characterized by total rainfall, duration of rainfall, maximum intensity, days since last rainfall, and the magnitude of the event immediately preceding the monitored storm event (antecedent rainfall). Precipitation characteristics for the six events monitored during the 1999/2000 wet season are summarized in Table 1-3. Event totals for each station are presented in Figure 1-3. Cumulative rainfall for each of the six monitored events is summarized graphically at each BMP site in Figures 1-4 through 1-54.

Total rainfall for monitored events varied somewhat from storm to storm and BMP to BMP. This variability is graphically illustrated in Figure 1-3. Event 3, beginning on 20 February 2000, had the most rainfall and the most variability among stations. Cumulative rainfall during Event 3 ranged from 0.58 inches at the Carlsbad MS strip/IT to 2.32 inches at the Kearny Mesa MS StormFilter™ (StF). It is important to note that a lot less rainfall occurred at the Carlsbad MS strip/IT and Palomar swale during Event 3 because monitoring was called off after a period of six hours with no recorded rainfall and the effluent sampling had ceased. Rainfall totals were similarly low for Events 1, 2 and 5, with precipitation totals among stations ranging from a few hundredths to 0.5 inches.

Rainfall intensities (calculated as twelve times the maximum rainfall recorded in any five-minute period) can help in interpreting water quality results. The higher the rainfall intensity, the higher the runoff and suspension of particulate pollutants. Rainfall intensities, for the most part, were the greatest during the third and fourth events (Table 1-3). Rainfall intensities reached as high as 2.52 inches per hour during Event 3 at the I-5/SR-78 Park and Ride (P&R) sand filter (SF) and 2.76 inches per hour during Event 4 at the Manchester EDB. The average maximum rainfall intensity between all BMPs for the 1999/2000 season was 0.63 inches per hour.

Antecedent conditions also play an important role in interpreting water quality results. Less runoff and transport of suspended pollutants is expected after drier antecedent periods between storm event. For the most part, all storm events and BMPs monitored during the 1999/2000 wet season were preceded by more than 72 hours of less than 0.1 inches of rain over a 6-hour period (Table 1-3). There were five exceptions to this. One of the exceptions was an antecedent period of 70 hours at the Escondido MS SF prior to

Event 2. Also for the same event, 0.12 inches of rain fell 50 hours prior at the I-5/SR-78 P&R SF and 0.3 inches fell 65 hours prior at the Manchester EDB. The two stations monitored during Event 5 (I-5/SR-78 P&R SF and Kearny Mesa MS StF) received around an inch of rain 48 hours prior to the beginning of the event. Besides Event 5, Events 2 and 3 had the wettest antecedent conditions prior to monitoring. The dry weather in excess of 40 days before Event 6 represented the driest period prior to a monitored event.

1.2.3 Stormwater Runoff During Monitored Events

Monitoring was designed to isolate rainfall events and the runoff created by those events. For information on monitoring equipment and methods refer to the Volume II OMM Plan (KLI, 1999). Table 1-4 provides a summary of the runoff measured at each station in conjunction with each storm event. Figures 1-4 through 1-54 graphically summarize the influent and effluent flow during each monitored event at each BMP in response to rainfall. These figures also show how the aliquoting of each composite sample was conducted. Note that in a few cases, influent and effluent volumes did not match up well, and the percent storm captures were less than ideal. However, in most cases the flow proportioning of each sample aliquot was more than adequate. Most differences in influent and effluent volumes and reduced storm captures are readily explainable and are related to rainfall and antecedent storm characteristics or a direct failure of some portion of a BMP. Very few problems occurred that are related to the monitoring equipment itself. Problems encountered with the monitoring equipment and/or the BMP will be discussed in more detail later.

In general, the drainage areas at each of the BMP sites are relatively small and impervious. This resulted in quick response times of inlet flow in relation to the advent of rain and fluctuations in rainfall intensity. As designed, the EDB and WB effluent discharges occurred at a steady regulated rate. In contrast, effluent flow from the Kearny Mesa MS StF responded directly to rainfall intensity and inlet flow. Discharge flow from the sand filters responded directly to water levels within the pre-sedimentation chambers and indirectly to inflow intensity. The biofiltration swales and strips responded in a delayed manner to inlet flow, and in some cases there was a lack of response due to the infiltration properties of the swale.

The extent to which discharge flow was regulated determined the total time runoff was detained in a facility. Detention times, calculated as the period between the start of inlet flow and the end of discharge flow, were highest for the Manchester EDB (40.1 to 81.7 hours over 3 events) followed by the La Costa P&R SF (18.1 to 73.9 hours over 5 events). Note that during Event 3 the detention times were somewhat higher than reported at these two sites because monitoring was called off near the start of a separate storm event that began about 38 hours after Event 3 had stopped.

Detention times calculated in the previous manner may be somewhat misleading. Perhaps a better measure of how long a facility retains runoff may be estimated by backing out the total time of inlet flow from the calculated detention time. Recalculating detention time in this manner shows that the Manchester EDB held runoff for 24.6 to

70.3 hours after the cessation of inflow, and the La Costa P&R SF held runoff for 1.2 to 62.9 hours after the cessation of inflow.

The difference between the intensity of inlet and outlet flows is a further measure of the extent runoff is detained in a facility. Maximum outlet flows were as little as 1% of the maximum inlet flows at the Manchester EDB. On the other end of the scale, maximum outlet flows from the Kearny Mesa MS StF were in some cases slightly more than the maximum inlet flows. Occasional higher peak flow out of the Kearny Mesa MS StF appears to be due to the design of the site. Water accumulates in the BMP until reaching a level where the siphon is actuated resulting in a sudden discharge.

In most cases, the total volume of treated runoff discharged from a BMP facility was only slightly different than the volume of runoff into the facility during any particular monitored event. Most of these differences can be attributed to the inability to accurately measure the very tail end of the discharge flow, infiltration, direct rainfall and runoff into the BMP, flow into the BMP from other than the inlet conveyance, and water that is unable to flow out of pre-sedimentation chambers and/or rip-rap.

In a few cases, treated runoff discharged from a BMP facility was different from the runoff into the facility. This was particularly true at the Palomar swale during Event 3 and the La Costa WB during Event 1. At the Palomar swale, a large quantity of runoff was observed bypassing the influent conveyance as direct sheet flow entered the swale along its complete length. At the La Costa WB, the gate valve separating the wet basin from the adjacent trapezoidal channel was leaking, causing runoff in the trapezoidal channel to enter the BMP. As was described earlier, there was a difference between influent and effluent volumes at the Manchester EDB during Event 3 because monitoring was terminated early. Furthermore, during Events 1, 2 and 5 at the Palomar swale and Carlsbad MS strip/IT and all events at the Melrose swale, significant (or sufficient) flow never reached the discharge conveyance because of infiltration.

The percent storm capture for most events at most sites was excellent (>90%). At a few locations during Event 1 the percent storm capture was less than 90% but still greater than 70%. This was a result of the termination of influent sampling before late showers occurred at the BMPs while the effluents were still sampling. The decision to terminate influent sampling early was made in order to prevent samples from being submitted to the laboratory out of holding times, which would have happened if the late showers never occurred. The least successful storm capture (31.1%) occurred at the La Costa WB effluent during Event 1. Sampling was terminated when the leaky gate valve described above was discovered. Because sampling was terminated early during Event 3 at the discharges to the Manchester EDB and the La Costa P&R SF and the addition of runoff to the BMPs from a separate storm after the termination of sampling, the exact storm captures for these effluents could not be determined. However, based on influent volumes (Table 1-4), it appears that nearly 100% of the La Costa P&R SF discharge was sampled but less than 50% of the Manchester EDB discharge was sampled.

The only equipment malfunction related to reduced storm capture occurred at the Carlsbad MS strip/IT during Event 4. The system data logger locked up at the very

beginning of the event. As a result, an estimated 168 cubic feet or 7.5% of the initial flow was not sampled. This estimation was based on the rain that fell prior to the start of sampling. The only other problem related to reduced storm capture was that the effluent composite sample bottle from Event 4 at the I-5/SR-78 P&R SF broke, resulting in a total loss of that sample.

1.2.4 Hydraulic Residence Time Evaluation

In accordance with the OMM Plan (KLI, 1999), a hydraulic residence time evaluation was conducted at the Palomar biofiltration swale once during the 1999/2000 wet season. A hydraulic residence time evaluation did not occur at Melrose biofiltration swale during the 1999/2000 wet season because there was never sufficient effluent flow to perform the test. The intent of this evaluation was to confirm that the designed hydraulic residence time for a 1-year, 24-hour storm event was achieved by the biofiltration swale. After conducting the measurements and evaluating the data, inherent problems in the current approach were identified. These problems included:

- Varying rainfall intensity caused fluctuating flow rates that resulted in unsteady flow (flow depth changes over time);
- Infiltration of runoff within the swale resulted in non-uniform flow (flow depth changes over distance);
- Additional sheet flow from the side of the swale resulted in non-uniform flow (flow depth changes over distance);
- Measurements were not taken during steady, 1-year, 24-hour flow rates.

The following paragraphs describe the results of the 1999/2000 hydraulic residence time evaluation at Palomar.

The hydraulic residence time evaluation for the Palomar biofiltration swale was conducted on February 23, 2000. After there was sufficient flow through the swale, all flow monitoring equipment was checked and reset. A one-liter solution of Formulabs yellow/green dye was then poured into the inlet pipe and a peristaltic portable sampler was simultaneously initiated. The peristaltic sampler was programmed to take a discrete sample every five minutes for two hours. Observations were noted as the dye flowed through the swale. A total of 48 discrete samples were collected in individual pre-cleaned HDPE plastic containers to be analyzed for absorbance at a later time using a Turner Model 10 Fluorometer.

The swale vegetation height was measured at approximately 9 inches. Fluorescein dye was poured into the inlet pipe at 16:21 PST. The dye reached the beginning of the vegetated swale at 16:28 PST. Visual observations suggested that the dye reached the end of the swale at 17:09 PST. A peak absorbance of 2600 R_u was recorded at 17:21 PST. The peak absorbance at the effluent was noted 53 minutes after the dye had reached the beginning of the swale. Hydraulic residence time was measured as the point in time when 50% of the mass of the dye had passed through the swale, which was calculated as 53 minutes. However, varying flow rates through the evaluation compromised the accuracy of the calculated hydraulic residence time. The designed hydraulic residence

time for the Palomar swale is 14 minutes. Figures 1-55a through 1-55d graphically show the events of the hydraulic residence time evaluation.

1.3 Analytical Results

The following sections provide an assessment of the overall quality of the data set, a summary of water quality data for each monitored event and baseline soil sampling results.

1.3.1 Assessment of Quality Assurance/Quality Control Results

Overall, data quality was found to meet the program objectives. A complete analysis of the QA/QC data can be found in the attached Appendix A and all QA/QC data are included in data packs provided as a separate Appendix. Very little evidence of contamination was detected in numerous blanking tests conducted to assess potential sources of contaminants in field sampling equipment, subsampling equipment, sample containers and testing procedures. The only contamination identified was some minor (2-3 ug/L) zinc contamination in 2 out of 53 field blanking operations.

Only two data points, both fecal coliform measurements, were rejected due to exceedance of holding times. Although some four nitrate analyses and two TSS measurements also exceeded holding times, assessment of the data indicated they should be qualified as estimates rather than be rejected.

Analysis of trace metals and nutrients consistently met accuracy objectives for matrix spikes, matrix spike duplicates, laboratory control standards (LCS), and standard reference materials.

Only TSS and TPH measurements were found to be out of compliance. Recovery of total suspended solids from the standard reference material during the March 5, 2000 event was low (69%). Based upon the low recovery, all TSS values associated with the event were qualified as estimates.

Precision as measured by the relative percent difference for matrix spike/spike duplicate and laboratory duplicates were within project QA objectives except in several cases for bacteria and TPH-diesel/motor oil. Field duplicate variability was very low except in the case of two constituents, total phosphorus and TKN, during one of the six events. Data associated with that event were qualified as estimates due to the high variability.

1.3.2 Water Quality Results

Stormwater and groundwater analyses were conducted by a certified laboratory under the California Environmental Laboratory Accreditation Program (ELAP). The analyses were performed in accordance with methods and procedures outlined in the OMM Plan - Quality Assurance Project Plan (KLI, 1999) and as specified by applicable EPA methods. The laboratory analyses performed on stormwater and groundwater samples are listed below. Analytical results are summarized in Tables 1-5a and 1-5b.

Table 1-1 Analytical Methods Summary

Analyte	Sample Type	Analytical Method
Conventionals		
pH	Composite	EPA 150.1
Specific Conductance	Composite	EPA 120.1
Hardness	Composite	EPA 130.2
TSS	Composite	EPA 160.2
Nutrients		
Nitrate-N	Composite	EPA 300
TKN	Composite	EPA 351.1
Total Phosphorus	Composite	EPA 365.3
Total/Dissolved Metal		
Copper	Composite	EPA 200.8
Lead	Composite	EPA 200.8
Zinc	Composite	EPA 200.8
Organics		
TPH-diesel	Grab	EPA 8015M
TPH-oil	Grab	EPA 8015M
TPH-gasoline	Grab	EPA 8015M
Bacteria		
Fecal Coliform	Grab	SM 9221E

1.3.3 Baseline Soil Sampling Results

Core samples of the La Costa IB floor were collected on February 8, 2000. Samples were collected to establish baseline soil conditions. Four sampling points were chosen from a research randomizer and sampled within the basin invert. Each of the four cores was collected using a powered vibracore with 4-inch diameter aluminum tubes. The vibracore and tubes were driven 1 meter (3.28 ft) below the ground surface and then retrieved. Each core was then subdivided into three sections as follows:

- Section 1 was from the ground surface to 0.3 m (0.98 ft) below the ground surface.
- Section 2 was from 0.3 m (0.98 ft) to 0.5 m (1.64 ft) below the ground surface.
- Section 3 was from 0.6 m (1.97 ft) to 0.8 m (2.62 ft) below the ground surface.

Each like section from each of the four cores was then composited together inside stainless steel bowls. Each composite sample was then sent to the Laboratory for total metals, TRPH and grain size distribution analyses using methods specified in the OMM Plan (KLI, 1999).

Analytical results are summarized in Table 1-5c.

1.3.4 Vadose Zone Sampling

One pressure-vacuum lysimeter is installed in the Carlsbad MS strip/IT. On at least two occasions, vacuums were applied to the lysimeter in an attempt to obtain pore fluid samples. A few drops of liquid were obtained from the infiltration trench on both occasions. Vacuums were applied to the lysimeter at different times during and after rain events and for varying lengths of times (5 minutes to 1 hour).

Based on review of the sampling procedures, site lithology and performance of the lysimeters, the most likely causes preventing the lysimeters from collecting samples are that the silica flour encasing the lysimeter may have dried out and/or that water is not available to be collected. Per plaintiff request and Caltrans agreement, future attempts to collect vadose zone samples will be performed by applying vacuum to the lysimeter for a 24-hour period following a storm event.

1.4 Preliminary BMP Performance Evaluations

A preliminary evaluation of BMP performance was conducted to provide initial estimates of BMP efficiency (Table 1-6 and Figures 1-56a – 1-56d) Due to the limited number of storm events, BMP efficiencies are presented individually for each site and event. During the 1999/2000 wet season, only 3 to 6 events were sampled at each location. Calculation of lognormal statistics based upon the current data set is therefore premature.

BMP efficiencies presented in Table 1-6 were calculated based upon Event Mean Concentrations (EMCs) measured at the influent and effluent monitoring sites for each BMP. BMP efficiencies were calculated based upon EMCs and load estimates. For purposes of these preliminary calculations, the value of the reporting limit was used in cases where an analyte was reported as undetected. The following equation was used:

$$\text{Efficiency (\%)} = [(\text{EMC in} - \text{EMC out})/\text{EMC in}] \times 100$$

For calculation of load reductions, the calculated loads for the influent and effluent site are substituted for the EMCs. Load estimates were calculated by multiplying EMC values by the total volume of BMP influent or effluent per storm event. Positive values indicate decreases in either mean concentration or load.

The methodology for computing influent and effluent constituent loadings was based on methods detailed in the *Caltrans BMP Retrofit Pilot Program Scoping Study*. Event Mean concentrations (EMC) were determined and tabulated for each storm. A log normal distribution of the EMCs was assumed when computing the mean and variance. Seasonal expected values and upper and lower 90% confidence limits were calculated for EMCs. Constituent loadings for the season were determined by multiplying the expected

value of the EMCs by the computed runoff volume that was based on the seasonal rainfall, watershed area, and runoff coefficient. Minimum, maximum and average efficiencies based on EMCs are reported.

Note that on occasion EMC values for dissolved metals at the EDBs may increase while load values decrease. This results from less water leaving the EDB than what entered. This mainly occurred during Event 1 because a significant portion of the runoff that entered the EDBs infiltrated into the soils of the BMP.

Efficiencies the Carlsbad MS strip/IT are not provided in this report because this site has special conditions that must be accounted for in the final analysis. Efficiencies for the Palomar swale are included in this report but it should be noted that they are biased by the first storm event where runoff exceeded the capacity of the swale and bypassed the outlet. This site also receives runoff throughout the length of the swale that is not included in water quantity and quality measurements at the inlet.

Table 1-2 District 11 BMP Monitoring Sites, Kinnetic Laboratories, Inc.

Site ID.	BMP Location	Coordinates Datum NAD83		BMP Type
		Latitude	Longitude	
111101	I-5/SR-56	32.92741 N	117.24089 W	Extended Detention Basin
111102	I-15/SR-78	33.12571 N	117.10598 W	Extended Detention Basin
111103	I-5/La Costa Ave (W)	33.05112 N	117.18012 W	Infiltration Basin
111104	I-5/La Costa Ave (SE)	33.0832 N	117.2968 W	Wet Basin
111105	I-5/Manchester Ave	33.0114 N	117.2643 W	Extended Detention Basin
112201	Kearny Mesa MS	32.8233 N	117.16192 W	Media Filter StormFilter™
112202	Escondido MS	33.12941 N	117.11805 W	Media Filter Sand Delaware
112203	I-5/La Costa Ave Park & Ride	33.08585 N	117.2972 W	Media Filter Sand Austin
112204	I-5/SR-78 Park & Ride	33.17732 N	117.35199 W	Media Filter Sand Austin
112205	SR-78/Melrose Dr	33.19402 N	117.25972 W	Biofiltration Swale
112206	I-5/Palomar Airport Rd	33.12822 N	117.32603 W	Biofiltration Swale
112207a	Carlsbad MS	33.12074 N	117.31768 W	Biofiltration Strip
112207b	Carlsbad MS	33.12074 N	117.31768 W	Infiltration Trench

Table 1-3 Rainfall and Runoff Statistics for Each Monitored Event

Site/Event	Start Rain Date	Start Rain Time	End Rain Date	End Rain Time	Duration Rain (hours:minutes)	Total Rain (inches)	Max Intensity (Inches/hour)	Antecedent Dry (days)	Antecedent Rain (inches)
Event 1									
SR78/I15	1/25/00	11:20	01/26/00	4:05	16:45:00	0.3	0.36	23.4	0.11
SR56/I5	1/25/00	11:20	01/26/00	1:40	14:20:00	0.17	0.12	24.5	0.21
ESCONDIDO MS	1/25/00	11:15	01/26/00	2:45	15:30:00	0.29	0.24	23.4	0.13
SR78/I5 P&R	1/25/00	9:30	01/26/00	0:20	14:50:00	0.27	0.12	>90	
LACOSTA P&R	1/25/00	10:45	01/26/00	0:55	14:10:00	0.19	0.12	24.4	0.10
KEARNYMESA MS	1/25/00	14:50	01/26/00	1:45	10:55:00	0.08	0.12	>90	
LACOSTA WB	1/25/00	11:20	01/26/00	0:30	13:10:00	0.16	0.12	24.3	0.11
CARLSBAD MS	1/25/00	10:05	01/26/00	0:45	14:40:00	0.29	0.24	45.0	0.10
Event 2									
SR78/I15	2/16/00	6:20	2/17/00	8:00	25:40:00	0.38	NA	3.9	0.55
SR56/I5	2/16/00	6:10	2/16/00	20:30	14:20:00	0.2	0.36	4.1	0.33
MANCHESTER	2/16/00	6:05	2/17/00	~2:00	19:55:00	0.22	NA	2.7	0.3
ESCONDIDO MS	2/16/00	6:15	2/17/00	2:40	20:25:00	0.5	0.84	2.9	0.17
SR78/I5 P&R	2/16/00	5:50	2/16/00	21:40	15:50:00	0.14	0.12	2.1	0.12
LACOSTA P&R	2/16/00	6:10	2/17/00	4:20	22:10:00	0.16	0.24	4.0	0.27
KEARNYMESA MS	2/16/00	6:15	2/16/00	20:55	14:40:00	0.1	0.24	3.9	0.4
LACOSTA WB	2/16/00	6:05	2/17/00	4:30	22:25:00	0.16	0.24	4.0	0.26
CARLSBAD MS	2/16/00	5:50	2/17/00	2:05	20:15:00	0.16	0.24	4.0	0.3
Event 3									
SR78/I15	2/20/00	6:00	2/22/00	5:20	47:20:00	1.99	0.84	2.9	0.38
SR56/I5	2/20/00	5:30	2/21/00	19:00	37:30:00	1.64	0.48	3.4	0.20
MANCHESTER	2/20/00	5:00	2/22/00	0:55	43:55:00	1.53	0.72	3.1	0.22
ESCONDIDO MS	2/20/00	6:00	2/22/00	1:35	43:35:00	2.12	1.08	3.1	0.50
SR78/I5 P&R	2/20/00	4:40	2/22/00	3:00	46:20:00	2.16	2.52	3.3	0.12
LACOSTA P&R	2/20/00	5:05	2/22/00	2:25	45:20:00	1.45	0.6	3.6	0.14
KEARNYMESA MS	2/20/00	5:40	2/22/00	1:05	43:25:00	2.32	1.68	3.3	0.1
LACOSTA WB	2/20/00	4:55	2/22/00	7:55	51:00:00	1.45	0.6	3.6	0.13
PALOMAR SW	2/20/00	4:50	2/20/00	9:50	5:00:00	0.62	0.24	3.6	0.14
CARLSBAD MS	2/20/00	4:45	2/20/00	7:40	2:55:00	0.58	0.36	3.6	0.14
Event 4									
SR78/I15	3/3/00	19:10	3/5/00	15:30	44:20:00	1.12	1.08	9.1	0.62
SR56/I5	3/4/00	21:25	3/6/00	2:25	29:00:00	1.12	1.2	10.1	0.93
MANCHESTER	3/4/00	23:15	3/5/00	15:40	16:25:00	1.19	2.76	10.2	0.77
ESCONDIDO MS	3/3/00	18:55	3/5/00	16:07	45:12:00	1.19	1.2	4.9	0.13
SR78/I5 P&R	3/4/00	23:15	3/6/00	6:10	30:55:00	1.15	1.44	10.1	0.54
LACOSTA P&R	3/4/00	22:55	3/5/00	17:50	18:55:00	0.69	0.48	10.2	0.62
KEARNYMESA MS	3/4/00	2:05	3/5/00	18:00	39:55:00	1.00	0.6	9.3	0.74
LACOSTA WB	3/5/00	0:00	3/5/00	15:20	15:20:00	0.63	0.48	10.2	0.68

NA=Not available

Table 1-3 Rainfall and Runoff Statistics for Each Monitored Event (continued)

Site/Event	Start Rain Date	Start Rain Time	End Rain Date	End Rain Time	Duration Rain (hours:minutes)	Total Rain (inches)	Max Intensity (Inches/hour)	Antecedent Dry (days)	Antecedent Rain (inches)
Event 4 cont.									
PALOMAR SW	3/4/00	23:20	3/6/00	4:50	29:30:00	0.65	0.24	10.2	0.27
CARLSBAD MS	3/5/00	5:40	3/5/00	15:10	9:30:00	0.40	0.24	10.2	0.55
MELROSE	3/4/00	16:00	3/6/00	5:05	37:05:00	0.58	0.24	9.8	0.61
Event 5									
SR78/I5 P&R-IN	3/8/00	10:00	3/8/00	13:45	3:45:00	0.19	0.24	2.1	1.15
KEARNYMESA MS-IN	3/7/00	15:45	3/8/00	15:05	23:20:00	0.29	1.08	1.9	1
Event 6									
SR78/I15	4/17/00	14:35	4/18/00	7:45	17:10:00	0.91	0.6	40	0.1
SR56/I5	4/17/00	15:15	4/18/00	11:25	20:10:00	0.82	1.32	42.5	1.12
MANCHESTER	4/17/00	15:15	4/18/00	7:35	16:20:00	0.81	1.32	40	0.1
ESCONDIDO MS	4/17/00	14:25	4/18/00	7:55	17:30:00	0.88	0.48	40	0.1
SR78/I5 P&R	4/17/00	13:40	4/18/00	7:20	17:40:00	0.49	0.36	40	0.18
LACOSTA P&R	4/17/00	14:30	4/18/00	7:50	17:20:00	0.61	0.6	42.7	0.69
KEARNYMESA MS	4/17/00	15:40	4/17/00	18:45	3:05:00	0.5	0.6	40	0.29
LACOSTA WB	4/17/00	14:30	4/18/00	7:50	17:20:00	0.61	0.6	42.9	0.6
PALOMAR SW	4/17/00	15:00	4/18/00	8:00	17:00:00	0.48	0.12	40.1	0.11
CARLSBAD MS	4/17/00	15:10	4/17/00	19:50	4:40:00	0.47	0.36	43	0.37
MELROSE	4/17/00	14:00	4/18/00	13:00	23:00:00	0.67	0.48	2.1	0.15

Table 1-4 Flow Data for Each Monitored Event

Site/Event	Start Flow Date	Start Flow Time	End Flow Date	End Flow Time	Duration Flow (hrs:min)	Total Flow (cubic feet)	Vol. To Samp	No. of Sample Aliquots Collected	Peak Flow (cfs)	% Capture	Peak Capture	Detention Time (hours)
Event 1												
SR78/I15-IN	1/25/00	11:37	1/26/00	9:40	22:03:00	2159	0.04	52	0.171	100	Y	24.58
SR78/I15-EFF	1/25/00	12:47	1/26/00	12:12	23:25:00	371.4	0.03	12	0.036	100	Y	
SR56/I5-IN	1/25/00	11:40	1/26/00	2:10	14:30:00	912.1	0.08	11	0.193	100	Y	18.00
SR56/I5-EFF	1/25/00	22:38	1/26/00	5:40	7:02:00	362.2	0.08	4	0.024	100	Y	
ESCONDIDO MS-IN	1/25/00	1:19	1/26/00	10:25	33:06:00	1020	0.02	49	0.094	98.1	Y	36.35
ESCONDIDO MS-EFF	1/25/00	15:27	1/26/00	13:40	22:13:00	854.5	0.02	42	0.061	100	Y	
SR78/I5 P&R-IN	1/25/00	9:39	1/25/00	13:20	3:41:00	493.7	0.03	13	0.086	75	Y	19.85
SR78/I5 P&R-EFF	1/25/00	11:28	1/26/00	5:30	18:02:00	417.1	0.03	13	0.042	100	Y	
LACOSTA P&R-IN	1/25/00	10:47	1/26/00	2:40	15:53:00	683	0.03	17	0.133	79	Y	26.72
LACOSTA P&R-EFF	1/25/00	11:00	1/26/00	13:30	26:30:00	>167.9	0.03	5	0.005	100	Y	
KEARNYMESA MS-IN	1/25/00	13:42	1/26/00	9:05	19:23:00	603.8	0.08	7	0.146	100	Y	24.62
KEARNYMESA MS-EFF	1/26/00	0:32	1/26/00	14:19	13:47:00	463	0.02	25	0.098	100	Y	
LACOSTA WB-IN	1/25/00	11:05	1/26/00	2:00	14:55:00	338.4	0.03	9	0.069	83.4	Y	23.80
LACOSTA WB-EFF	1/25/00	11:19	1/26/00	10:53	23:34:00	1823	0.03	43	0.036	31.1	Y	
CARLSBAD MS-IB	1/25/00	10:06	1/26/00	3:00	16:54:00	1145	0.02	38	0.207	100	Y	NA
Event 2												
SR78/I15-IN	2/16/00	6:24	2/17/00	7:55	25:31:00	3828	0.04	96	0.974	100	Y	28.35
SR78/I15-EFF	2/16/00	7:04	2/17/00	10:45	27:41:00	2193	0.03	72	0.091	99.3	Y	
SR56/I5-IN	2/16/00	6:14	2/16/00	22:40	16:26:00	1614	0.08	20	0.241	100	Y	21.10
SR56/I5-EFF	2/16/00	9:24	2/17/00	3:20	17:56:00	953.5	0.08	13	0.115	100	Y	
MANCHESTER-IN	2/16/00	6:08	2/17/00	15:30	33:22:00	1672	0.06	27	1.142	99.6	Y	40.12
MANCHESTER-EFF	2/16/00	11:00	2/17/00	22:15	35:15:00	1174	0.06	19	0.012	100	Y	
ESCONDIDO MS-IN	2/16/00	6:20	2/17/00	10:32	28:12:00	2134	0.02	106	0.514	98.1	Y	37.25
ESCONDIDO MS-EFF	2/16/00	6:58	2/17/00	19:35	36:37:00	1622	0.02	80	0.129	100	Y	
SR78/I5 P&R-IN	2/16/00	5:49	2/17/00	6:55	25:06:00	274.3	0.03	9	0.048	100	Y	32.52
SR78/I5 P&R-EFF	2/16/00	7:08	2/17/00	14:20	31:12:00	258.7	0.03	8	0.016	100	Y	
LACOSTA P&R-IN	2/16/00	6:06	2/17/00	11:01	28:55:00	678	0.03	22	0.241	100	Y	38.23
LACOSTA P&R-EFF	2/16/00	8:13	2/17/00	20:20	36:07:00	>330	0.03	14	0.008	100	Y	
KEARNYMESA MS-IN	2/16/00	6:26	2/17/00	22:15	39:49:00	481.1	0.03	16	0.224	100	Y	40.07
KEARNYMESA MS-EFF	2/16/00	6:38	2/17/00	22:30	39:52:00	370.1	0.03	12	0.28	100	Y	
LACOSTA WB-IN	2/16/00	6:02	2/17/00	3:10	21:08:00	477	0.03	14	0.549	93.3	Y	21.75
LACOSTA WB-EFF	2/16/00	6:05	2/17/00	3:47	21:42:00	765	0.03	25	0.032	93.5	Y	
CARLSBAD MS-IT	2/16/00	5:56	2/17/00	22:55	40:59:00	560.1	0.03	18	0.114	100	Y	NA
Event 3												
SR78/I15-IN	2/20/00	5:13	2/22/00	3:05	45:52:00	25102	0.1/0.3	135	1.226	99.6	Y	72.62
SR78/I15-EFF	2/20/00	5:29	2/23/00	5:50	72:21:00	28311	0.09/0.27	156	0.181	100	Y	
SR56/I5-IN	2/20/00	5:07	2/22/00	8:30	51:23:00	18312	0.12/0.36	101	1.851	97.3	Y	66.80
SR56/I5-EFF	2/20/00	5:21	2/22/00	23:55	66:34:00	21250	0.1/0.3	122	0.265	100	Y	
MANCHESTER-IN	2/20/00	4:58	2/22/00	1:10	44:12:00	19243	0.1/0.3	115	1.101	98.4	Y	74.03
MANCHESTER-EFF	2/20/00	5:00	2/23/00	7:00	74:00:00	6593*	0.09	73	0.051	<100	Y	
ESCONDIDO MS-IN	2/20/00	5:43	2/22/00	10:10	52:27:00	9028	0.06/.18	102	0.72	99.7	Y	52.28
ESCONDIDO MS-EFF	2/20/00	6:04	2/22/00	10:00	51:56:00	7048	0.06/.18	92	0.129	100	Y	
SR78/I5 P&R-IN	2/20/00	4:38	2/22/00	0:55	44:17:00	4190	0.05	87	1.46	100	Y	57.32
SR78/I5 P&R-EFF	2/20/00	5:12	2/22/00	13:57	56:45:00	4981	0.05	99	0.246	100	Y	
LACOSTA P&R-IN	2/20/00	5:04	2/22/00	11:00	53:56:00	7474	0.06/.18	93	0.448	99.9	Y	73.93
LACOSTA P&R-EFF	2/20/00	5:31	2/23/00	7:00	73:29:00	7374*	0.05/.15	101	0.22	<99.9	Y	
KEARNYMESA MS-IN	2/20/00	5:33	2/21/00	22:00	40:27:00	27444	0.1/0.3	97	2.4	<93.9	N	41.87
KEARNYMESA MS-EFF	2/20/00	5:36	2/21/00	23:25	41:49:00	28306	0.1/0.3	148	3.18	98.9	Y	

*** Sampling called off early to prevent the commingling of a separate storm event.**

Table 1-4 Flow Data for Each Monitored Event (continued)

Site/Event	Start Flow Date	Start Flow Time	End Flow Date	End Flow Time	Duration Flow (hrs:min)	Total Flow (cubic feet)	Vol. To Samp	No. of Sample Aliquots Collected	Peak Flow (cfs)	% Capture	Peak Capture	Detention Time (hours)
Event 3 cont.												
LACOSTA WB-IN	2/20/00	4:55	2/22/00	2:55	46:00:00	5776	0.1/0.3	85	0.807	99.8	Y	51.00
LACOSTA WB-EFF	2/20/00	5:03	2/22/00	7:55	50:52:00	7520	0.1	78	0.113	100	Y	
PALOMAR SW-IN	2/20/00	4:55	2/20/00	10:05	5:10:00	1289	0.06	24	0.197	100	Y	10.50
PALOMAR SW-EFF	2/20/00	4:55	2/20/00	15:25	10:30:00	3754	0.05	75	0.485	100	Y	
CARLSBAD MS-IT	2/20/00	4:42	2/20/00	12:45	8:03:00	2926	0.06	48	0.447	92.5	Y	NA
CARLSBAD MS-ST	2/20/00	4:45	2/20/00	11:10	6:25:00	454.5	0.02	22	0.057	100	Y	
Event 4												
SR78/I15-IN	3/3/00	19:10	3/5/00	14:45	43:35:00	12868	0.07	102	1.81	100	Y	72.83
SR78/I15-EFF	3/3/00	19:41	3/6/00	20:00	72:19:00	12404	0.06	110	0.183	100	Y	
SR56/I5-IN	3/4/00	23:24	3/6/00	3:20	27:56:00	13296	0.12	91	3.508	100	Y	51.18
SR56/I5-EFF	3/5/00	2:07	3/7/00	2:35	48:28:00	13803	0.1	108	0.642	100	Y	
MANCHESTER-IN	3/4/00	23:19	3/5/00	11:25	12:06:00	5760	0.10	57	3.901	100	Y	81.68
MANCHESTER-EFF	3/5/00	2:49	3/8/00	9:00	78:11:00	6505	0.08	81	0.058	100	Y	
ESCONDIDO MS-IN	3/3/00	19:10	3/6/00	9:30	62:20:00	3935	0.04/0.12	85	0.84	100	Y	54.50
ESCONDIDO MS-EFF	3/3/00	20:10	3/6/00	1:40	53:30:00	3442	0.04/0.12	78	0.111	100	Y	
SR78/I5 P&R-IN	3/4/00	23:43	3/6/00	7:05	31:22:00	2679	0.05	53	0.226	100	Y	44.95
SR78/I5 P&R-EFF	3/5/00	2:35	3/6/00	20:40	42:05:00	2504	0.05	50	0.2	100	Y	
LACOSTA P&R-IN	3/4/00	22:58	3/6/00	8:30	33:32:00	2816	0.07	40	0.367	100	Y	45.37
LACOSTA P&R-EFF	3/5/00	4:25	3/6/00	20:20	39:55:00	3097	0.07	44	0.114	100	Y	
KEARNYMESA MS-IN	3/4/00	2:09	3/6/00	0:35	46:26:00	10283	0.08/0.24	94	1.14	99.5	Y	42.52
KEARNYMESA MS-EFF	3/4/00	20:27	3/5/00	20:40	24:13:00	10300	0.08/0.24	93	1.06	100	Y	
LACOSTA WB-IN	3/4/00	23:43	3/5/00	21:55	22:12:00	5776	0.11	52	2.616	99.8	Y	55.20
LACOSTA WB-EFF	3/5/00	3:25	3/7/00	6:55	51:30:00	4096	0.1	40	0.093	100	Y	
PALOMAR SW-IN	3/5/00	4:10	3/5/00	15:50	11:40:00	4750	0.06	79	0.502	100	Y	12.75
PALOMAR SW-EFF	3/5/00	7:06	3/5/00	16:55	9:49:00	4382	0.07	62	0.625	100	Y	
CARLSBAD MS-IT	3/5/00	6:00	3/5/00	16:20	10:20:00	2241	0.06	34	0.434	92.5	Y	NA
CARLSBAD MS-ST	3/5/00	7:15	3/5/00	15:05	7:50:00	324	0.03	12	0.05	100	Y	
MELROSE-IN	3/5/00	3:25	3/6/00	5:55	26:30:00	1094	0.06	17	0.194	100	Y	NA
MELROSE-EFF	-	-	-	-	-	0	0.05	0	-	-	-	
Event 5												
SR78/I5 P&R-IN	3/8/00	10:05	3/8/00	16:55	6:50:00	416.2	0.04	10	0.172	100	Y	18.08
SR78/I5 P&R-EFF	3/8/00	11:50	3/9/00	4:10	16:20:00	251.6	0.04	6	0.02	100	Y	
KEARNYMESA MS-IN	3/7/00	15:45	3/9/00	4:00	36:15:00	3106	0.08	38	1.29	100	Y	27.08
KEARNYMESA MS-EFF	3/7/00	15:46	3/8/00	18:50	27:04:00	3031	0.08	37	0.95	100	Y	

Table 1-4 Flow Data for Each Monitored Event (continued)

Site/Event	Start Flow Date	Start Flow Time	End Flow Date	End Flow Time	Duration Flow (hours:minutes)	Total Flow (cubic feet)	Vol. To Samp	No. of Sample Aliquots Collected	Peak Flow (cfs)	% Capture	Peak Capture	Detention Time (hours)
Event 6												
SR78/I15-IN	4/17/00	14:50	4/18/00	15:15	24:25:00	8300	0.07	108	0.947	91.4	Y	28.75
SR78/I15-EFF	4/17/00	16:05	4/18/00	19:35	27:30:00	9770	0.06	158	0.147	97.2	Y	
SR56/I5-IN	4/17/00	15:29	4/18/00	12:25	20:56:00	6329	0.07	90	1.01	<100	Y	35.43
SR56/I5-EFF	4/17/00	15:48	4/19/00	2:55	35:07:00	8752	0.07	145	0.142	99.8	Y	
MANCHESTER-IN	4/17/00	15:23	4/18/00	7:45	16:22:00	4180	0.06	69	0.89	100	Y	69.75
MANCHESTER-EFF	4/17/00	15:30	4/20/00	13:08	69:38:00	3770	0.06	62	0.02	100	Y	
ESCONDIDO MS-IN	4/17/00	14:33	4/18/00	14:25	23:52:00	4228	0.03	134	0.33	94.9	Y	51.28
ESCONDIDO MS-EFF	4/17/00	16:33	4/19/00	17:50	49:17:00	2340	0.03	77	0.13	100	Y	
SR78/I5 P&R-IN	4/17/00	15:10	4/17/00	18:45	3:35:00	776	0.03	25	0.23	100	Y	29.17
SR78/I5 P&R-EFF	4/17/00	16:19	4/18/00	20:20	28:01:00	903	0.03	30	0.44	100	Y	
LACOSTA P&R-IN	4/17/00	14:33	4/18/00	9:10	18:37:00	2518	0.04	71	0.411	100	Y	62.03
LACOSTA P&R-EFF	4/17/00	16:30	4/20/00	4:35	60:05:00	2633	0.03	87	0.11	100	Y	
KEARNYMESA MS-IN	4/17/00	15:42	4/17/00	20:30	4:48:00	3371	0.07	47	1.29	100	Y	5.30
KEARNYMESA MS-EFF	4/17/00	15:57	4/17/00	21:00	5:03:00	4226	0.07	62	0.935	100	Y	
LACOSTA WB-IN	4/17/00	14:47	4/18/00	9:00	18:13:00	4025	0.03/0.06	106	1.44	100	Y	39.88
LACOSTA WB-EFF	4/17/00	12:35	4/19/00	6:40	42:05:00	3431	0.03	114	0.073	100	Y	
PALOMAR SW-IN	4/17/00	15:10	4/17/00	22:50	7:40:00	2871	0.04	71	0.438	100	Y	9.83
PALOMAR SW-EFF	4/17/00	16:17	4/18/00	1:00	8:43:00	2534	0.04	63	0.347	100	Y	
CARLSBAD MS-IT	4/17/00	15:15	4/17/00	22:50	7:35:00	2267	0.04	56	0.377	100	Y	7.00
CARLSBAD MS-ST	4/17/00	16:10	4/17/00	22:15	6:05:00	253	0.01	25	0.053	100	Y	
MELROSE-IN	4/17/00	15:25	4/18/00	12:00	20:35:00	1325	0.03	44	0.211	100	Y	16.58
MELROSE-EFF	4/17/00	23:55	4/18/00	8:00	8:05:00	0.7	0.01	0	0.004	-	-	

Table 1-5a BMP Retrofit Pilot Study, Stormwater Lab Data - District 11 (Kinnetic Laboratories Inc.)

PRELIMINARY DATA

Submitted 8/24/00

Sample Date	BMP Location	Site ID	BMP Type	Sampling Location	% Storm Capture	pH	Specific Conductance (umhos/cm)	Hardness (mg/L)	TSS (mg/L)	Total (µg/L) Cu	Total (µg/L) Pb	Total (µg/L) Zn	Dissolved (µg/L) Cu	Dissolved (µg/L) Pb	Dissolved (µg/L) Zn	Nitrate-Nitrogen (mg/L)	TKN (mg/L)	Total P (mg/L)	Fecal Coliform (MPN/100ml)	TPH Diesel (µg/L)	TPH Gasoline (µg/L)	TPH Oil (µg/L)
Storm Water Matrix																						
January 25, 2000	SR56/I-5-IN	111101	Extended Detention Basin	Influent	100	7.3	320	69	100	46	15	120	20	1 U	21	NA2	4.1	0.67	3000J	5700J	50 U	8100J
January 25, 2000	SR56/I-5-EFF	111101	Extended Detention Basin	Effluent	100	7.5	500	120	34	32	5.5	42	26	1.5	23	NA2	2.9	0.24	NA	NA	NA	NA
January 25, 2000	SR78/I-15-IN	111102	Extended Detention Basin	Influent	100	7.7	260	83	82	63	41	270	29	1 U	38	4.7	4.6	0.66	400J	7100J	50 U	9400J
January 25, 2000	SR78/I-15-EFF	111102	Extended Detention Basin	Effluent	100	7.7	300	110	48	50	29	200	27	1.4	110	4.2	8.9	0.5	800J	6900J	50 U	9300J
January 25, 2000	LaCostaWB-IN	111104	Wet Basin	Influent	100	7.5	310	98	170	100	170	360	36	33	110	5.7	8.1	0.64	700J	12000J	50 U	16000J
January 25, 2000	LaCostaWB-EFF	111104	Wet Basin	Effluent	100	8.4	2700	1000	4	18	1.1	41	16	1	40	1.1	3.1	1.5	8	340J	50 U	490J
January 25, 2000	KearnyMS-IN	112201	Compost Filter	Influent	100	7.3	260	91	86	140	34	580	100	9.5	370	2.5	7.6	0.57	NA	NA	NA	NA
January 25, 2000	KearnyMS-EFF	112201	Compost Filter	Effluent	100	7.6	360	130	70	62	28	310	17	1.4	92	1.9	5.3	0.28	NA	NA	NA	NA
January 25, 2000	EsconMS-IN	112202	Sand Filter	Influent	98.1	6.8	130	38	68	32	12	310	22	2.4	210	1.1	3.5	0.59	3000J	4900J	50 U	6100J
January 25, 2000	EsconMS-EFF	112202	Sand Filter	Effluent	100	7.2	180	66	34	20	4.8	47	13	1 U	16	1.7	2.4	0.49	80J	2900J	50 U	3700J
January 25, 2000	LaCostaP&R-IN	112203	Sand Filter	Influent	100	6.8	150	31	170	75	26	620	22	1.7	220	1.7	7	1	130J	3900J	50 U	5500J
January 25, 2000	LaCostaP&R-EFF	112203	Sand Filter	Effluent	100	7.3	260	68	10	17	2.2	11	17	1.2	4.5U	2.4	3.5	0.38	8J	3500J	50 U	4400J
January 25, 2000	SR78/I5P&R-IN	112204	Sand Filter	Influent	100	6.2	150	28	30.0	36	14	260	28	5.8	200	2.5	7.9	0.66	13000J	2600J	50 U	3400J
January 25, 2000	SR78/I5P&R-EFF	112204	Sand Filter	Effluent	100	7.3	240	55	26.0	39	3.3	86	27	1 U	29	2.4	6.2	1.3	24000J	3100J	50 U	3900J
January 25, 2000	Melrose - IN	112205	Biofiltration Swale	Influent	100	6.8	310	85	34	110	6.5	720	88	1.3	570	3.4	11	0.35	3400J	14000J	50 U	23000J
January 25, 2000	Palomar - IN	112206	Biofiltration Swale	Influent	100	7.1	480	91	44	64	16	170	53	1.3	110	3.6	7	1	700J	8200J	50 U	13000J
January 25, 2000	Carlsbad MS-IN	112207	Biostrip/Infiltration Trench	Influent	100	6.4	200	45	140	150	44	360	93	5	200	1.5	4.8	0.62	3000J	6500J	50 U	8000J
February 16, 2000	SR56/I-5-IN	111101	Extended Detention Basin	Influent	100	7.9	240	40	82	28	15	130	12	1 U	22	1.2	1.7	0.46	900J	2000*J	50 U	3400*
February 16, 2000	SR56/I-5-EFF	111101	Extended Detention Basin	Effluent	100	7.9	330	63	36	15	5.9	40	11	1 U	17	0.93	1.2	0.27	300J	1400*J	50 U	2000*
February 16, 2000	SR78/I-15-IN	111102	Extended Detention Basin	Influent	100	8.0	140	47	100	51	83	440	15	3.8	100	1.4	2.6	1.2	300J	1000*J	50 U	1500*
February 16, 2000	SR78/I-15-EFF	111102	Extended Detention Basin	Effluent	99.3	7.5	220	59	46	21	18	120	11	1 U	31	0.93	1.7	0.35	1700J	1900*J	50 U	3500*
February 16, 2000	Manchester-IN	111105	Extended Detention Basin	Influent	99.6	7.2	150	35	330	230	440	1600	16	1 U	74	1.2	3.5	1.2	17000J	3100*J	50 U	5300*
February 16, 2000	Manchester-EFF	111105	Extended Detention Basin	Effluent	100	7.1	170	38	76	41	43	250	15	1 U	76	0.89	4.3	0.62	90000J	4100*J	50 U	8200*
February 16, 2000	LaCostaWB-IN	111104	Wet Basin	Influent	100	8.1	190	63	240	210	660	700	28	37	96	1.6	3.6	1.6	50000J	2400*J	50 U	4100*
February 16, 2000	LaCostaWB-EFF	111104	Wet Basin	Effluent	93.5	9.1	2300	720	28	17	4	41	13	2	34	0.033	3.5	1.1	17J	500*J	50 U	600*
February 16, 2000	KearnyMS-IN	112201	Compost Filter	Influent	100	7.4	110	34	100	140	56	600	40	5.3	220	1.2	2.8	0.52	8J	4100*J	50 U	4800*
February 16, 2000	KearnyMS-EFF	112201	Compost Filter	Effluent	100	7.5	150	43	90	58	28	320	30	4.6	130	1.2	2.3	0.47	50J	2100*J	50 U	3700*
February 16, 2000	EsconMS-IN	112202	Sand Filter	Influent	98.1	6.7	49	11	170	15	24	300	3.5	1 U	110	0.38	2.0	0.72	240J	1900*J	50 U	2200*
February 16, 2000	EsconMS-EFF	112202	Sand Filter	Effluent	100	7.1	75	22	12	6	3.5	34	3	1 U	9U	0.42	0.77	0.34	500J	600*J	50 U	700*
February 16, 2000	LaCostaP&R-IN	112203	Sand Filter	Influent	100	7.1	110	22	30	12	9.0	110	9.3	3.2	64	0.65	3.0	0.45	800J	1800*J	50 U	2600*
February 16, 2000	LaCostaP&R-EFF	112203	Sand Filter	Effluent	100	7.4	140	38	1 U	6.7	1 U	5.2	6.5	1 U	3.2	0.69	1.1	0.18	2 UJ	690*J	50 U	1000*
February 16, 2000	SR78/I5P&R-IN	112204	Sand Filter	Influent	100	7.7	550	130	420	31	23	360	12	1 U	49	1.3	13	2.3	13000J	1400*J	50 U	2100*
February 16, 2000	SR78/I5P&R-EFF	112204	Sand Filter	Effluent	100	7.7	490	110	10	14	1.9	54	10	1 U	24	1.8	3.6	1.0	30J	1100*J	50 U	1600*
February 16, 2000	Carlsbad MS-IN	112207	Biostrip/Infiltration Trench	Influent	100	7.0	120	23	120	73	29	200	46	1.6	93	0.82	3.0	0.63	50000J	1900*J	50 U	2500*
February 20, 2000	EsconMS-IN	112202	Sand Filter	Influent	99.7	6.8	31.0	5.5	40	9.1	7.2	230	2.7	1 U	97	0.14	0.69J	0.23J	50J	1600*J	50 U	2900*
February 20, 2000	EsconMS-EFF	112202	Sand Filter	Effluent	100	7.3	43	12	8	3.7	1.6	11	2.7	1 U	6.2	0.21	0.6J	0.091J	50J	800*J	50 U	1400*
February 20, 2000	SR78/I-15-IN	111102	Extended Detention Basin	Influent	99.6	7.9	110	25	48	28	29	260	8.8	2.4	48	1.6	0.84J	0.48J	110J	800*J	50 U	700*
February 20, 2000	SR78/I-15-EFF	111102	Extended Detention Basin	Effluent	100	7.4	170	48	14	10	6.6	57	7	1 U	27	1.1	0.8J	0.21J	300J	700*J	50 U	2300*
February 20, 2000	LaCostaWB-IN	111104	Wet Basin	Influent	100	7.7	97	28	60	800	310	440	11	4.2	28	0.84	0.83J	2.6J	170J	1200*J	50 U	1800*
February 20, 2000	LaCostaWB-EFF	111104	Wet Basin	Effluent	100	8.8	1900	560	12	13	11	36	12	4.1	33	0.062	1.9J	1.1J	110J	500*J	50 U	700*
February 20, 2000	LaCostaP&R-IN	112203	Sand Filter	Influent	99.9	6.7	41	4.3	58	14	20	210	3.8	1 U	25	0.37	0.9J	0.34J	1300J	500*J	50 U	800*
February 20, 2000	LaCostaP&R-EFF	112203	Sand Filter	Effluent	99.9	7.2	64	11	2	3.2	1 U	3.7	2.4	1 U	1.6	0.5	0.6J	0.17J	17J	400*J	50 U	1600*
February 20, 2000	SR56/I-5-IN	111101	Extended Detention Basin	Influent	97.3	8.1	270	48	125J	81	120	2100	9.2	1.6	29	0.45	0.52J	0.34J	300J	900*J	50 U	1400*
February 20, 2000	SR56/I-5-EFF	111101	Extended Detention Basin	Effluent	100	7.6	220	40	18	10	7	34	7	3.3	18	0.43	1.6J	0.25J	500J	600*J	50 U	800*
February 20, 2000	Manchester-IN	111105	Extended Detention Basin	Influent	98.4	7.4	76	19	92	44	55	280	14	7.6	110	0.58	1.1J	0.66J	110J	1500*J	50 U	2300*
February 20, 2000	Manchester-EFF	111105	Extended Detention Basin	Effluent	100	7.2	110	24	18	17	19	94	12	6.1	60	1.1	1.1J	0.24J	500J	1900*J	50 U	2900*
February 20, 2000	SR78/I5P&R-IN	112204	Sand Filter	Influent	100	7.2	52	10	200	28	49	430	5.9	1 U	27	0.17	0.79J	1.4J	300J	400*J	50 U	500*
February 20, 2000	SR78/I5P&R-EFF	112204	Sand Filter	Effluent	100	8	68	11	4	4.1	1 U	8.8	4	1 U	5.8	0.44	0.71J	0.21J	240J	400*J	50 U	500*
February 20, 2000	Melrose-IN	112205	Biofiltration Swale	Influent	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	17J	1100*J	50 U	1600*
February 20, 2000	Melrose-EFF	112205	Biofiltration Swale	Effluent	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	17J	700*J	50 U	1000*
February 20, 2000	KearnyMS-IN	112201	Compost Filter	Influent	93.9	7.3	63	15	110	300	140	1000	20	2.6	110	0.45	1.8J	0.63J	1100J	2600*J	50 U	3900*
February 20, 2000	KearnyMS-EFF	112201	Compost Filter	Effluent	98.9	7.3	62	16	74	72	44	410	12	1.7	68	0.45	1.5J	0.47J	1700J	900*J	50 U	1300*
February 20, 2000	Carlsbad MS-IN	112207	Biostrip/Infiltration Trench	Influent	100	7	53	12	170	78	37	220	39	4.9	100	0.45	2J	0.82J	80000J	800*J	50 U	1100*
February 20, 2000	Carlsbad MS-EFF	112207	Biostrip/Infiltration Trench	Effluent	100	7.4	110	17	16	5.9	3	37	5.1	1 U	29	0.4	2J	0.69J	17J	600*J	50 U	1800*
February 20, 2000	Palomar-IN	112206	Biofiltration Swale	Influent	100	7.2	130	20	8	8.3	7.6	26	7.2	1.8	23	0.73	1.8J	0.81J	140J	2400*J	50 U	3600*
February 20, 2000	Palomar-EFF	112206	Biofiltration Swale	Effluent	100	7.5	88	20	36	19	25	93	9.7	2.9	41	0.52	1.4J	0.22J	1700J	800*J	50 U	1100*

Table 1-5a BMP Retrofit Pilot Study, Stormwater Lab Data - District 11 (Kinnetic Laboratories Inc.) continued

PRELIMINARY DATA

Submitted 5/18/00

Sample Date	BMP Location	Site ID	BMP Type	Sampling Location	% Storm Capture	pH	Specific Conductance (umhos/cm)	Hardness (mg/L)	TSS (mg/L)	Total (g/L) Cu	Total (g/L) Pb	Total (g/L) Zn	Dissolved (g/L) Cu	Dissolved (g/L) Pb	Dissolved (g/L) Zn	Nitrate-Nitrogen (mg/L)	TKN (mg/L)	Total P (mg/L)	Fecal Coliform (MPN/100 ml)	TPH Diesel (mg/L)	TPH Gasoline (mg/L)	TPH Oil (mg/L)
Storm Water Matrix																						
March 5, 2000	EsconMS-IN	112202	Sand Filter	Influent	100	6.9	32	14	110J	7	9.8	250	2.6	1 U	170	0.34	1.3	0.36	NA	NA	NA	NA
March 5, 2000	EsconMS-EFF	112202	Sand Filter	Effluent	100	7.3	45	25	6J	1.8	1.1	7.7	1 U	1 U	1.4	0.46	0.43	0.14	NA	NA	NA	NA
March 5, 2000	SR78/I-15-IN	111102	Extended Detention Basin	Influent	100	8	90	34	100J	68	42	280	6.2	1.7	42	1.1	1.5	0.37	NA	NA	NA	NA
March 5, 2000	SR78/I-15-EFF	111102	Extended Detention Basin	Effluent	100	7.6	150	60	22J	10	7.9	52	7	1.8	32	0.68	0.86	0.25	NA	NA	NA	NA
March 5, 2000	LaCostaWB-IN	111104	Wet Basin	Influent	100	7.7	79	31	350J	9500	2300	2000	8	17	44	0.66	1.5	2.6	NA	NA	NA	NA
March 5, 2000	LaCostaWB-EFF	111104	Wet Basin	Effluent	100	8.7	1600	930	12J	14	5.2	45	12	2.2	38	1.3	1.6	1.2	NA	NA	NA	NA
March 5, 2000	LaCostaP&R-IN	112203	Sand Filter	Influent	100	6.7	42	15	46J	5.4	16	66	1.6	1 U	23	0.32	1.7	0.19	NA	NA	NA	NA
March 5, 2000	LaCostaP&R-EFF	112203	Sand Filter	Effluent	100	7.4	72	26	2J	3.2	1 U	3.2	3.3	1 U	3	0.47	0.52	0.16	NA	NA	NA	NA
March 5, 2000	SR56/I-5-IN	111101	Extended Detention Basin	Influent	100	8.1	200	52	64J	19	25	140	3.8	2.2	11	0.38	0.83	0.25	NA	NA	NA	NA
March 5, 2000	SR56/I-5-EFF	111101	Extended Detention Basin	Effluent	100	7.7	240	60	22J	8.7	10	30	5.6	2.5	13	0.38	0.5	0.2	NA	NA	NA	NA
March 5, 2000	Manchester-IN	111105	Extended Detention Basin	Influent	100	7.8	63	24	400J	97	360	940	8.6	9.6	67	0.43	1.5	0.86	NA	NA	NA	NA
March 5, 2000	Manchester-EFF	111105	Extended Detention Basin	Effluent	100	7.3	83	29	33J	21	34	120	10	6.3	63	0.48	1.3	0.33	NA	NA	NA	NA
March 5, 2000	Melrose-IN	112205	Biofiltration Swale	Influent	100	6.9	81	22	26J	22	6.4	230	11	1 U	170	0.96	2.1	0.16	1700	1100*	50 U	1500*
March 5, 2000	KearnyMS-IN	112201	Compost Filter	Influent	99.5	7.3	67	27	200J	340	55	1900	23	3.2	120	0.41	1.2	0.26	NA	NA	NA	NA
March 5, 2000	KearnyMS-EFF	112201	Compost Filter	Effluent	100	7.2	58	23	34J	32	16	180	13	1 U	78	0.42	1.5	0.34	NA	NA	NA	NA
March 5, 2000	Carlsbad MS-IN	112207	Biostrip/Infiltration Trench	Influent	92.5	6.8	53	20	88J	65	20	160	30	1.1	84	0.22	1.7	0.33	90000R	1400*	50 U	1900
March 5, 2000	Carlsbad MS-EFF	112207	Biostrip/Infiltration Trench	Effluent	100	7.6	94	28	18J	3.7	3.6	32	2.7	1 U	23	0.25	1.5	0.5	130R	400*	50 U	500
March 5, 2000	Palomar-IN	112206	Biofiltration Swale	Influent	100	7.6	79	26	28J	19	36	99	8.6	6.9	42	0.45	1.2	0.2	300	4600*	50 U	5500
March 5, 2000	Palomar-EFF	112206	Biofiltration Swale	Effluent	100	7.3	82	30	12J	8.6	13	29	5.1	2.5	16	0.65	1.2	0.45	160	1300*	50 U	1700
March 8, 2000	KearnyMS-IN	112201	Compost Filter	Influent	100	7.5	90	28	270	1400	140	1300	25	6.7	170	0.49	2.2	0.62	NA	NA	NA	NA
March 8, 2000	KearnyMS-EFF	112201	Compost Filter	Effluent	100	7.4	95	30	170	64	59	410	23	5.4	160	0.53	1.8	0.45	NA	NA	NA	NA
March 8, 2000	SR78/I5P&R-IN	112204	Sand Filter	Influent	100	7.2	62	22	36	11	7.4	110	5.2	1 U	35	0.4	1.2	0.26	NA	NA	NA	NA
March 8, 2000	SR78/I5P&R-EFF	112204	Sand Filter	Effluent	100	7.5	100	31	1 U	5.2	1 U	8.5	5	1 U	6.5	0.68	1.6	0.68	NA	NA	NA	NA
April 17, 2000	Melrose-IN	112205	Biofiltration Swale	Influent	100	6.5	100	31	38	43	9.5	480	31	2.8	400	1.1	5.4	0.23	24000 J	50 U	50 U	9700
April 17, 2000	EsconMS-IN	112202	Sand Filter	Influent	95.3	6.4	43	27	46	9.4	9.7	270	5.5	1.2	170	0.2	1.7	0.24	NA	NA	NA	NA
April 17, 2000	EsconMS-EFF	112202	Sand Filter	Effluent	100	6.6	73	39	30	8.4	3.1	61	7	1.4	46	0.96	1.2	0.28	NA	NA	NA	NA
April 17, 2000	SR78/I-15-IN	111102	Extended Detention Basin	Influent	91.4	7.7	120	47	160	43	47	300	12	1 U	26	1.3	2.6	0.48	NA	NA	NA	NA
April 17, 2000	SR78/I-15-EFF	111102	Extended Detention Basin	Effluent	97.2	7.3	160	58	38	21	13	91	12	1 U	34	1	1.6	0.29	NA	NA	NA	NA
April 17, 2000	LaCostaWB-IN	111104	Wet Basin	Influent	100	7.8	140	57	230	71	270	330	17	9.4	43	1.8	4.9	0.68	NA	NA	NA	NA
April 17, 2000	LaCostaWB-EFF	111104	Wet Basin	Effluent	100	8	2600	910	4	31	5.4	92	27	2.5	85	8.2	1.7	1.1	NA	NA	NA	NA
April 17, 2000	LaCostaP&R-IN	112203	Sand Filter	Influent	100	6	82	23	70	18	27	170	8.4	2.9	81	0.68	3.8	0.42	NA	NA	NA	NA
April 17, 2000	LaCostaP&R-EFF	112203	Sand Filter	Effluent	100	6.7	130	41	10	12	1.4	1	10	1 U	9.8	1.1	2.3	0.36	NA	NA	NA	NA
April 17, 2000	SR56/I-5-IN	111101	Extended Detention Basin	Influent	100	7.7	200	56	46	23	17	92	7.9	1 U	13	0.64	1.8	0.21	NA	NA	NA	NA
April 17, 2000	SR56/I-5-EFF	111101	Extended Detention Basin	Effluent	99.8	7	150	44	44	20	12	57	12	1 U	17	0.61	1.2	0.24	NA	NA	NA	NA
April 17, 2000	Manchester-IN	111105	Extended Detention Basin	Influent	100	7.5	110	35	190	86	93	460	24	1 U	100	1.2	4.3	1.8	NA	NA	NA	NA
April 17, 2000	Manchester-EFF	111105	Extended Detention Basin	Effluent	100	7.1	160	56	59	42	27	170	29	1 U	91	0.88	3.6	0.44	NA	NA	NA	NA
April 17, 2000	KearnyMS-IN	112201	Compost Filter	Influent	100	6.9	120	40	98	100	39	660	53	5.9	360	1.2	5.2	0.51	NA	NA	NA	NA
April 17, 2000	KearnyMS-EFF	112201	Compost Filter	Effluent	100	6.9	120	37	46	61	18	400	37	3.7	280	1.5	3.9	0.41	NA	NA	NA	NA
April 17, 2000	Carlsbad MS-IN	112207	Biostrip/Infiltration Trench	Influent	100	6.6	100	28	66	79	22	250	51	1.4	160	0.51	4	0.4	NA	NA	NA	NA
April 17, 2000	Carlsbad MS-EFF	112207	Biostrip/Infiltration Trench	Effluent	100	7	120	30	12	10	4.5	66	7.5	1 U	49	0.7	2.2	0.42	NA	NA	NA	NA
April 17, 2000	Palomar-IN	112206	Biofiltration Swale	Influent	100	7.4	150	40	48	40	39	190	19	5	83	1.3	3	0.27	NA	NA	NA	NA
April 17, 2000	Palomar-EFF	112206	Biofiltration Swale	Effluent	100	6.9	200	46	22	18	13	49	11	1 U	26	1.9	4	0.74	NA	NA	NA	NA
April 17, 2000	SR78/I5P&R-IN	112204	Sand Filter	Influent	100	6.6	120	33	120	38	19	630	18	1.1	220	1.1	8.9	0.8	NA	NA	NA	NA
April 17, 2000	SR78/I5P&R-EFF	112204	Sand Filter	Effluent	100	6.7	210	71	14	28	1.3	59	20	1 U	35	2.3	5.8	0.81	NA	NA	NA	NA

NA not sampled

Sample contains hydrocarbons that does not match diesel and oil pattern. However, quantitation is

* based on diesel oil standard

Table 1-5b BMP Retrofit Pilot Study, Groundwater Lab Data - District 11 (Kinnetic Laboratories, Inc.)

PRELIMINARY DATA

Submitted 8/24/00

Sample Date	Location	Site ID	BMP Type	pH	Specific Conductance (umhos/cm)	Hardness (mg/L)	TSS (mg/L)	Total (ug/L) Cu	Total (ug/L) Pb	Total (ug/L) Zn	Dissolved (ug/L) Cu	Dissolved (ug/L) Pb	Dissolved (ug/L) Zn	Nitrate-Nitrogen (mg/L)	TKN (mg/L)	Total P (mg/L)	Fecal Coliform (MPN/ 100 ml)	TPH - Diesel (ug/L)	TPH - Oil (ug/L)	TPH - Gasoline (ug/L)
Groundwater Matrix																				
10/27/99	Carlsbad MS GW Well (Baseline)	112207	Biofiltration strip/ infiltration trench	6.5	16000	2500	12	29	0.5	18	22	0.5	15	58	0.7	0.21	200 U	100 U	200 U	50 U
2/24/00	Carlsbad MS GW Well	112207	Biofiltration strip/ infiltration trench	6.5	17000	3600	12	11	1.9	5.1	10	1 U	4.9	37	0.43	0.26	2 U	100 U	100 U	50 U
4/20/00	Carlsbad MS GW Well	112207	Biofiltration strip/ infiltration trench	6.6	12000	2400	55	4.7	1 U	4.4	4.6	1 U	3.9	63	0.63	0.26	2 U	50 U	250 U	50 U
1/18/00	La Costa Infiltration (Baseline)	111103	Infiltration Basin	7.8	110000	14000	380	55	6	42	49	2.6	28	0.5 U	14	1.1	200 U	100 U	200 U	50 U
2/29/00	La Costa Infiltration	111103	Infiltration Basin	7.4	120000	14000	120	1 U	1 U	14	1 U	1 U	7.4	0.5 U	15	1.3	2 U	500	600	50 U
4/24/00	La Costa Infiltration	111103	Infiltration Basin	7.3	130000	14000	170	4.6	10	15	1 U	1 U	2.4	0.5 U	13	1.4	2 U	50 U	250 U	50 U

Table 1-5c BMP Retrofit Pilot Study, Sediment Lab Data - District 11 (Kinnetic Laboratories, Inc.)

PRELIMINARY DATA

Submitted 8/24/00

Sample Date	Location	Site ID	BMP Type	Wet Wt. Values Total (ug/L) Cu	Wet Wt. Values Total (ug/L) Pb	Wet Wt. Values Total (ug/L) Zn	Wet Wt. Values TRPH (mg/kg)	Dry Wt. Values Total (ug/L) Cu	Dry Wt. Values Total (ug/L) Pb	Dry Wt. Values Total (ug/L) Zn	Dry Wt. Values TRPH (mg/kg)	Grain Size Distribution %Sand	Grain Size Distribution %Silt	Grain Size Distribution % Clay
Sediment Matrix														
2/8/00	LaCostaIB, Top Section	111103	Infiltration Basin	3.8	6.3	25	21	4.2	7.1	28	24	91.7	5.7	2.6
2/8/00	LaCostaIB, Mid Section	111103	Infiltration Basin	3.6	3.4	15	55	4.2	4	17	64	87.2	8.7	4.1
2/8/00	LaCostaIB, Bottom Section	111103	Infiltration Basin	3.7	2.5	16	57	4.5	3.1	20	71	85.7	9.8	4.4

Table 1-5d BMP Retrofit Pilot Study, Monthly Wet Basin Baseline Lab Data - District 11 (Kinnetic Laboratories, Inc.)

PRELIMINARY DATA

Submitted 8/24/00

Sample Date	Location	Site ID	BMP Type	% Storm Capture	pH	Specific Conductance (umhos/cm)	Hardness (mg/L)	TSS (mg/L)	Total (ug/L) Cu	Total (ug/L) Pb	Total (ug/L) Zn	Dissolved (ug/L) Cu	Dissolved (ug/L) Pb	Dissolved (ug/L) Zn	Nitrate-Nitrogen (mg/L)	TKN (mg/L)	Total P (mg/L)	Fecal Coliform (MPN/ 100 ml)	TPH - Diesel (ug/L)	TPH - Oil (ug/L)	TPH - Gasoline (ug/L)
Baseline																					
9/30/99	La Costa WET inflow (Baseline)	111104	Wet Basin	NA	7.5	3100	1700	1U	130	3.3	56	130	2.0	52	25	2.2	3.7	200U	1100*	310	50U
10/28/99	La Costa WET inflow (Baseline)	111104	Wet Basin	NA	7.5	2900	910	2	120	1.2	72	110	1.2	70	11	0.78	3.6	200U	100U	200U	50U
11/30/99	La Costa WET inflow (Baseline)	111104	Wet Basin	NA	7.4	2700	1100	9	60	3.8	38	58	1.8	37	12	1.5	3.0	200U	100U	200U	50U
12/28/99	La Costa WET inflow (Baseline)	111104	Wet Basin	NA	7.5	2800	1100	44	80	8.2	140	53	1.9	100	20	2	4.6	50	100U	100U	50U
2/3/00	La Costa WET inflow (Baseline)	111104	Wet Basin	NA	7.3	2800	950	50	170	17	190	95	3.2	92	22	2.7	3.4	9000	200U	200U	50U
3/1/00	La Costa WET inflow (Baseline)	111104	Wet Basin	NA	7.5	2600	1100	6	75	5.2	110	61	2.1	94	18	2.1	1.5	1100	900*	900	50U
3/30/00	La Costa WET inflow (Baseline)	111104	Wet Basin	NA	7.5	3000	1000	1U	64	1.5	81	62	1.3	77	23	1.5	1.5	50000	680	200U	50U
5/3/00	La Costa WET inflow (Baseline)	111104	Wet Basin	NA	7.4	2600	850	16	45	1U	88	39	1U	76	24	2.7	1.8	24000	13000J	16000J	50U
6/1/00	La Costa WET inflow (Baseline)	111104	Wet Basin	NA	7.6	2700	980	6	34	1.9	71	29	1U	61	16	8.6	1.8	240	100U	200U	50U

*Quantified as diesel but chromatographic pattern does not match that of diesel

Table 1-6 BMP Pollutant Removal Efficiencies

Extended Detention Basins EMCs and Loads

	I-5/SR-56 January 25, 2000				I-5/SR-56 February 16, 2000				I-5/SR-56 February 20, 1999				I-5/SR-56 March 5, 2000			
	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load
	Influent	Effluent			Influent	Effluent			Influent	Effluent			Influent	Effluent		
TSS (mg/L)	100	34	66	86	82	36	56	74	125	18	86	83	64	22	66	64
Total Cu (ug/L)	46	32	30	72	28	15	46	68	81	10	88	86	19	8.7	54	52
Total Pb (ug/L)	15	5.5	63	85	15	5.9	61	77	120	7	94	93	25	10	60	58
Total Zn (ug/L)	120	42	65	86	130	40	69	82	2100	34	98	98	140	30	79	78
Dissolved Cu (ug/L)	20	26	-30	48	12	11	8	46	9.2	7	24	12	3.8	5.6	-47	-53
Dissolved Pb (ug/L)	1 U	1.5	< -50	< 40	1 U	1 U	NA	NA	1.6	3.3	-106	-139	2.2	2.5	-14	-18
Dissolved Zn (ug/L)	21	23	-10	57	22	17	23	54	29	18	38	28	11	13	-18	-23
Nitrate-Nitrogen (mg/L)	NA	NA	NA	NA	1.2	0.93	23	54	0.45	0.43	4	-11	0.38	0.38	0	-4
TKN (mg/L)	4.1	2.9	29	72	1.7	1.2	29	58	0.52	1.6	-208	-257	0.83	0.5	40	37
Total P (mg/L)	0.67	0.24	64	86	0.46	0.27	41	65	0.34	0.25	26	15	0.25	0.2	20	17
Volume (liters)	25834	10258			45708	27003			518596	601800			376543	390901		

	I-5/SR-56 April 17, 2000			
	EMCs		Efficiency (%)	% Diff. in Load
	Influent	Effluent		
TSS (mg/L)	46	44	4	-32
Total Cu (ug/L)	23	20	13	-20
Total Pb (ug/L)	17	12	29	2
Total Zn (ug/L)	92	57	38	14
Dissolved Cu (ug/L)	7.9	12	-52	-110
Dissolved Pb (ug/L)	1 U	1 U	NA	NA
Dissolved Zn (ug/L)	13	17	-31	-81
Nitrate-Nitrogen (mg/L)	0.64	0.61	5	-32
TKN (mg/L)	1.8	1.2	33	8
Total P (mg/L)	0.21	0.24	-14	-58
Volume (liters)	179237	247857		

I-5/SR-56 *1999 - 2000 Wet Season Statistics*			
Parameter	Minimum Load Removal (%)	Maximum Load Removal (%)	Average Season Removal (%)
TSS	-32	86	58
T-Cu	-20	86	55
T-Pb	2	93	76
T-Zn	14	98	91
D-Cu	-110	48	-14
D-Pb	-139	-18	-63
D-Zn	-81	57	0
N-N	-32	54	3
TKN	-257	72	16
T-P	-58	86	32

	I-15/SR-78 January 25, 2000				I-15/SR-78 February 16, 2000				I-15/SR-78 February 20, 2000				I-15/SR-78 March 5, 2000			
	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load
	Influent	Effluent			Influent	Effluent			Influent	Effluent			Influent	Effluent		
TSS (mg/L)	82	48	41	90	100	46	54	74	48	14	71	67	100	22	78	79
Total Cu (ug/L)	63	50	21	86	51	21	59	76	28	10	64	60	68	10	85	86
Total Pb (ug/L)	41	29	29	88	83	18	78	88	29	6.6	77	74	42	8	81	82
Total Zn (ug/L)	270	200	26	87	440	120	73	84	260	57	78	75	280	52	81	82
Dissolved Cu (ug/L)	29	27	7	84	15	11	27	58	8.8	7	20	10	6	7	-13	-9
Dissolved Pb (ug/L)	1 U	1.4	< -40	< 76	3.8	1 U	> 74	> 85	2.4	1 U	> 58	> 53	2	2	-6	-2
Dissolved Zn (ug/L)	38	105	-176	52	100	31	69	82	48	27	44	37	42	32	24	27
Nitrate-Nitrogen (mg/L)	4.7	4.2	11	85	1.4	0.93	34	62	1.6	1.1	31	22	1.10	0.68	38	40
TKN (mg/L)	4.6	8.9	-93	67	2.6	1.7	35	63	0.84	0.8	5	-7	1.50	0.86	43	45
Total P (mg/L)	0.66	0.5	24	87	1.2	0.35	71	83	0.48	0.21	56	51	0.37	0.25	32	35
Volume (liters)	61143	10518			108409	62106			710889	801768			364422	351281		

	I-15/SR-78 April 17, 2000			
	EMCs		Efficiency (%)	% Diff. in Load
	Influent	Effluent		
TSS (mg/L)	160	38	76	72
Total Cu (ug/L)	43	21	51	43
Total Pb (ug/L)	47	13	72	67
Total Zn (ug/L)	300	91	70	64
Dissolved Cu (ug/L)	12	12	0	-18
Dissolved Pb (ug/L)	1 U	1 U	NA	NA
Dissolved Zn (ug/L)	26	34	-31	-54
Nitrate-Nitrogen (mg/L)	1.3	1	23	9
TKN (mg/L)	2.6	1.6	38	28
Total P (mg/L)	0.48	0.29	40	29
Volume (liters)	235056	276686		

I-15/SR-78 *1999 - 2000 Wet Season Statistics*			
Parameter	Minimum Load Removal (%)	Maximum Load Removal (%)	Average Season Removal (%)
TSS	67	90	64
T-Cu	43	86	60
T-Pb	67	88	70
T-Zn	64	87	68
D-Cu	-18	84	19
D-Pb	-2	> 85	37
D-Zn	-54	82	22
N-N	9	85	37
TKN	-7	67	25
T-P	29	87	51

	Manchester February 16, 1999				Manchester February 20, 2000				Manchester March 5, 2000			
	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load
	Influent	Effluent			Influent	Effluent			Influent	Effluent		
TSS (mg/L)	330	76	77	84	92	18	80	93	400	33	92	91
Total Cu (ug/L)	230	41	82	87	44	17	61	87	97	21	78	76
Total Pb (ug/L)	440	43	90	93	55	19	65	88	360	34	91	89
Total Zn (ug/L)	1600	250	84	89	280	94	66	88	940	120	87	86
Dissolved Cu (ug/L)	16	15	6	34	14	12	14	71	9	10	-16	-31
Dissolved Pb (ug/L)	1 U	1 U	NA	NA	7.6	6.1	20	73	10	6	34	26
Dissolved Zn (ug/L)	74	76	-3	28	110	60	45	81	67	63	6	-6
Nitrate-Nitrogen (mg/L)	1.2	0.89	26	48	0.58	1.1	-90	35	0.43	0.48	-12	-26
TKN (mg/L)	3.5	4.3	-23	14	1.1	1.1	0	66	1.50	1.30	13	2
Total P (mg/L)	1.2	0.62	48	64	0.66	0.24	64	88	0.86	0.33	62	57
Volume (liters)	47351	33248			544962	186714			163123	184222		

	Manchester April 17, 2000			
	EMCs		Efficiency (%)	% Diff. in Load
	Influent	Effluent		
TSS (mg/L)	190	59	69	73
Total Cu (ug/L)	86	42	51	57
Total Pb (ug/L)	93	27	71	74
Total Zn (ug/L)	460	170	63	67
Dissolved Cu (ug/L)	24	29	-21	-7
Dissolved Pb (ug/L)	1 U	1 U	NA	NA
Dissolved Zn (ug/L)	100	91	9	19
Nitrate-Nitrogen (mg/L)	1.2	0.88	27	35
TKN (mg/L)	4.3	3.6	16	26
Total P (mg/L)	1.8	0.44	76	78
Volume (liters)	118378	104784		

Manchester *1999 - 2000 Wet Season Statistics*			
Parameter	Minimum Load Removal (%)	Maximum Load Removal (%)	Average Season Removal (%)
TSS	73	92	89
T-Cu	57	82	84
T-Pb	74	91	93
T-Zn	67	87	89
D-Cu	-31	14	34
D-Pb	26	34	57
D-Zn	-6	45	48
N-N	-26	27	40
TKN	2	16	37
T-P	57	76	77

The value of the reporting limit was used in cases where an analyte was reported as undetected.

Table 1-6 BMP Pollutant Removal Efficiencies (continued)

Media Filters (Perlite/Zeolite) EMCs

	Kearny Mesa MS January 25, 2000				Kearny Mesa MS February 16, 2000				Kearny Mesa MS February 20, 2000				Kearny Mesa MS March 5, 2000				Kearny Mesa MS March 8, 2000				Kearny Mesa MS April 17, 2000			
	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load
	Influent	Effluent			Influent	Effluent			Influent	Effluent			Influent	Effluent			Influent	Effluent			Influent	Effluent		
TSS (mg/L)	86	70	19	38	100	90	10	31	110	74	33	31	200	34	83	83	270	170	37	39	98	46	53	41
Total Cu (ug/L)	140	62	56	66	140	58	59	68	300	72	76	75	340	32	91	91	1400	64	95	96	100	61	39	24
Total Pb (ug/L)	34	28	18	37	56	28	50	62	140	44	69	68	55	16	71	71	140	59	58	59	39	18	54	42
Total Zn (ug/L)	580	310	47	59	600	320	47	59	1000	410	59	58	1900	180	91	91	1300	410	68	69	660	400	39	24
Dissolved Cu (ug/L)	100	17	83	87	40	30	25	42	20	12	40	38	23	13	43	43	25	23	8	10	53	37	30	12
Dissolved Pb (ug/L)	9.5	1.4	85	89	5.3	4.6	13	33	2.6	1.7	35	33	3.2	1 U	> 69	> 69	6.7	5.4	19	21	5.9	3.7	37	21
Dissolved Zn (ug/L)	370	92	75	81	220	130	41	55	110	68	38	36	120	78	35	35	170	160	6	8	360	280	22	2
Nitrate-Nitrogen (mg/L)	2.5	1.9	24	42	1.2	1.2	0	23	0.45	0.45	0	-3	0.41	0.42	-2	-3	0.49	0.53	-8	-6	1.2	1.5	-25	-57
TKN (mg/L)	7.6	5.3	30	47	2.8	2.3	18	37	1.8	1.5	17	14	1.2	1.5	-25	-25	2.2	1.8	18	20	5.2	3.9	25	6
Total P (mg/L)	0.57	0.28	51	62	0.52	0.47	10	30	0.63	0.47	25	23	0.26	0.34	-31	-31	0.62	0.45	27	29	0.51	0.41	20	-1
Volume (liters)	17100	13112			13625	10481			776846	801626			291215	291696			87962	85838			95467	119680		

Kearny Mesa MS *1999 - 2000 Wet Season Statistics*			
Parameter	Minimum Load Removal (%)	Maximum Load Removal (%)	Average Season Removal (%)
TSS	31	83	28
T-Cu	24	91	82
T-Pb	37	71	48
T-Zn	24	91	59
D-Cu	12	87	37
D-Pb	21	89	32
D-Zn	2	81	26
N-N	-57	42	-13
TKN	-25	47	12
T-P	-31	62	7

Media Filters (Sand Type I) EMCs

	La Costa Park and Ride January 25, 2000				La Costa Park and Ride February 16, 2000				La Costa Park and Ride February 20, 2000				La Costa Park and Ride March 5, 2000				La Costa Park and Ride April 17, 2000			
	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load
	Influent	Effluent			Influent	Effluent			Influent	Effluent			Influent	Effluent			Influent	Effluent		
TSS (mg/L)	170	10.0	94	98	30	1.0	97	98	58	2	97	97	46	2	96	95	70	10	86	85
Total Cu (ug/L)	75	17.0	77	93	12	6.7	44	73	14	3.2	77	77	5.4	3.2	41	35	18	12	33	30
Total Pb (ug/L)	26	2.2	92	97	9	1	89	95	20	1	95	95	16	1	94	93	27	1.4	95	95
Total Zn (ug/L)	620	11	98	99	110	5.2	95	98	210	3.7	98	98	66	3.2	95	95	170	12	93	93
Dissolved Cu (ug/L)	22	17	23	76	9.3	6.5	30	66	3.8	2.4	37	38	1.6	3.3	-106	-127	8.4	10	-19	-24
Dissolved Pb (ug/L)	1.7	1.2	29	79	3.2	1 U	> 69	> 85	1 U	1 U	NA	NA	1 U	1 U	NA	NA	2.9	1 U	> 66	> 64
Dissolved Zn (ug/L)	220	4.5	98	99	64	3.2	95	98	25	1.6	94	94	23	3	87	86	81	9.8	88	87
Nitrate-Nitrogen (mg/L)	1.7	2.4	-41	57	0.65	0.69	-6	48	0.37	0.50	-35	-33	0.32	0.47	-47	-62	0.68	1.1	-62	-69
TKN (mg/L)	7	3.5	50	85	3	1.1	63	82	0.9	0.6	33	34	1.7	0.52	69	66	3.8	2.3	39	37
Total P (mg/L)	1	0.38	62	88	0.45	0.18	60	81	0.34	0.17	50	51	0.19	0.16	16	7	0.42	0.36	14	10
Volume (liters)	15633	4755			19201	9346			211664	208832			79749	87707			71310	74567		

La Costa Park and Ride *1999 - 2000 Wet Season Statistics*			
Parameter	Minimum Load Removal (%)	Maximum Load Removal (%)	Average Season Removal (%)
TSS	85	98	93
T-Cu	30	93	69
T-Pb	93	97	94
T-Zn	93	99	97
D-Cu	-127	76	28
D-Pb	79	> 85	49
D-Zn	86	99	95
N-N	-69	57	-18
TKN	34	85	57
T-P	7	88	50

	SR-78/I-5 Park and Ride January 25, 2000				SR-78/I-5 Park and Ride February 16, 2000				SR-78/I-5 Park and Ride February 20, 2000				SR-78/I-5 Park and Ride March 8, 2000				SR-78/I-5 Park and Ride April 17, 2000			
	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load
	Influent	Effluent			Influent	Effluent			Influent	Effluent			Influent	Effluent			Influent	Effluent		
TSS (mg/L)	30	26	13	8	420	10	98	98	200	4	98	98	36	1	97	98	120	14	88	86
Total Cu (ug/L)	36	39	-8	-14	31	14	55	57	28	4.1	85	83	11	5.2	53	71	38	28	26	14
Total Pb (ug/L)	14	3.3	76	75	23	1.9	92	92	49	1 U	> 98	> 98	7.4	1 U	> 86	> 92	19	1.3	93	92
Total Zn (ug/L)	260	86	67	65	360	54	85	86	430	8.8	98	98	110	8.5	92	95	630	59	91	89
Dissolved Cu (ug/L)	28	27	4	-2	12	10	17	21	5.9	4	32	19	5.2	5	4	42	18	20	-11	-29
Dissolved Pb (ug/L)	5.8	1 U	> 83	> 82	1 U	1 U	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	1.1	1 U	> 9	> -6
Dissolved Zn (ug/L)	200	29	86	85	49	24	51	54	27	5.8	79	74	35	6.5	81	89	220	35	84	81
Nitrate-Nitrogen (mg/L)	2.5	2.4	4	-1	1.3	1.8	-38	-31	0.17	0.44	-159	-208	0.40	0.68	-70	-3	1.1	2.3	-109	-143
TKN (mg/L)	7.9	6.2	22	17	13	3.6	72	74	0.79	0.71	10	-7	1.2	1.6	-33	19	8.9	5.8	35	24
Total P (mg/L)	0.66	1.3	-97	-108	2.3	1	57	59	1.40	0.21	85	82	0.26	0.68	-162	-58	0.8	0.81	-1	-18
Volume (liters)	11178	11812			7768	7326			118661	141062			11787	7125			21976	25573		

SR-78/I-5 Park and Ride *1999 - 2000 Wet Season Statistics*			
Parameter	Minimum Load Removal (%)	Maximum Load Removal (%)	Average Season Removal (%)
TSS	8	98	93
T-Cu	-14	83	36
T-Pb	75	92	93
T-Zn	65	98	86
D-Cu	-29	21	8
D-Pb	NA	> 82	48
D-Zn	54	85	80
N-N	-208	-1	-31
TKN	-7	74	52
T-P	-108	82	25

The value of the reporting limit was used in cases where an analyte was reported as undetected.

Table 1-6 BMP Pollutant Removal Efficiencies (continued)

Media Filters (Sand Type II) EMCs

	Escondido MS January 25, 2000				Escondido MS February 16, 2000				Escondido MS February 20, 2000				Escondido MS March 5, 2000				Escondido MS April 17, 2000			
	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load
	Influent	Effluent			Influent	Effluent			Influent	Effluent			Influent	Effluent			Influent	Effluent		
TSS (mg/L)	68	34	50	58	170	12	93	95	40	8	80	84	110	6	95	95	46	30	35	64
Total Cu (ug/L)	32	20	38	48	15	6	60	70	9.1	3.7	59	68	7	1.8	74	78	9.4	8.4	11	51
Total Pb (ug/L)	12	4.8	60	66	24	3.5	85	89	7.2	1.6	78	83	9.8	1.1	89	90	9.7	3.1	68	82
Total Zn (ug/L)	310	47	85	87	300	34	89	91	230	11	95	96	250	7.7	97	97	270	61	77	87
Dissolved Cu (ug/L)	22	13	41	50	3.5	3	14	35	2.7	2.7	0	22	2.6	1	62	66	5.5	7	-27	30
Dissolved Pb (ug/L)	2.4	1 U	> 58	> 65	1 U	1 U	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	1.2	1.4	-17	35
Dissolved Zn (ug/L)	210	16	92	94	110	9	92	94	97	6.2	94	95	170	1.4	99	99	170	46	73	85
Nitrate-Nitrogen (mg/L)	1.1	1.7	-55	-29	0.38	0.42	-11	16	0.14	0.21	-50	-17	0.34	0.46	-35	-18	0.2	0.96	-380	-166
TKN (mg/L)	3.5	2.4	31	43	2	0.77	62	71	0.69	0.6	13	32	1.3	0.43	67	71	1.7	1.2	29	61
Total P (mg/L)	0.59	0.49	17	30	0.72	0.34	53	64	0.23	0.091	60	69	0.36	0.14	61	66	0.24	0.28	-17	35
Volume (liters)	28886	24199			60435	45935			255673	199599			111439	97477			119737	66269		

Escondido MS *1999 - 2000 Wet Season Statistics*			
Parameter	Minimum Load Removal (%)	Maximum Load Removal (%)	Average Season Removal (%)
TSS	58	95	85
T-Cu	48	78	63
T-Pb	66	90	83
T-Zn	87	97	89
D-Cu	22	66	47
D-Pb	35	35	39
D-Zn	85	99	88
N-N	-166	16	-18
TKN	32	71	61
T-P	30	69	53

Wet Basin EMCs

	La Costa Wet Basin January 25, 2000				La Costa Wet Basin February 16, 2000				La Costa Wet Basin February 20, 2000				La Costa Wet Basin March 5, 2000				La Costa Wet Basin April 17, 2000			
	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load
	Influent	Effluent			Influent	Effluent			Influent	Effluent			Influent	Effluent			Influent	Effluent		
TSS (mg/L)	170	4	98	85	240	28	88	80	60	12	80	85	350	12	97	98	230	4	98	99
Total Cu (ug/L)	100	18	82	-15	210	17	92	86	800	13	98	99	9500	14	100	100	71	31	56	63
Total Pb (ug/L)	170	1.1	99	96	660	4	99	99	310	11	96	97	2300	5.2	100	100	270	5.4	98	98
Total Zn (ug/L)	360	41	89	27	700	41	94	90	440	36	92	94	2000	45	98	98	330	92	72	76
Dissolved Cu (ug/L)	36	16	56	-185	28	13	54	20	11	12	-9	17	8	12	-50	-7	17	27	-59	-35
Dissolved Pb (ug/L)	33	1	97	81	37	2	95	91	4.2	4.1	2	26	17	2.2	87	91	9.4	2.5	73	77
Dissolved Zn (ug/L)	110	40	64	-133	96	34	65	39	28	33	-18	11	44	38	14	39	43	85	-98	-69
Nitrate-Nitrogen (mg/L)	5.7	1.1	81	-24	1.6	0.033	98	96	0.84	0.062	93	94	0.66	1.3	-97	-40	1.8	8.2	-356	-288
TKN (mg/L)	8.1	3.1	62	-146	3.6	3.5	3	-67	0.83	1.9	-129	-73	1.5	1.6	-7	24	4.9	1.7	65	70
Total P (mg/L)	0.64	1.5	-134	-1404	1.6	1.1	31	-18	2.6	1.1	58	68	2.6	1.2	54	67	0.68	1.1	-62	-38
Volume (liters)	7995	51288			12602	21665			281104	212966			163350	115999			113988	97166		

La Costa Wet Basin *1999 - 2000 Wet Season Statistics*			
Parameter	Minimum Load Removal (%)	Maximum Load Removal (%)	Average Season Removal (%)
TSS	80	99	94
T-Cu	-15	100	99
T-Pb	96	100	99
T-Zn	27	98	93
D-Cu	-185	20	18
D-Pb	26	91	90
D-Zn	-133	39	26
N-N	-288	96	-547
TKN	-146	70	42
T-P	-1404	68	28

The value of the reporting limit was used in cases where an analyte was reported as undetected.

Biofiltration Swales EMCs

	Palomar February 20, 2000				Palomar March 5, 2000				Palomar April 17, 2000			
	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load	EMCs		Efficiency (%)	% Diff. in Load
	Influent	Effluent			Influent	Effluent			Influent	Effluent		
TSS (mg/L)	8	36	-350	-1211	28	12	57	60	48	22	54	60
Total Cu (ug/L)	8.3	19	-129	-567	19	8.6	55	58	40	18	55	60
Total Pb (ug/L)	7.6	25	-229	-858	36	13	64	67	39	13	67	71
Total Zn (ug/L)	26	93	-258	-942	99	29	71	73	190	49	74	77
Dissolved Cu (ug/L)	7.2	9.7	-35	-292	8.6	5.1	41	45	19	11	42	49
Dissolved Pb (ug/L)	1.8	2.9	-61	-369	6.9	2.5	64	67	5	1 U	> 80	> 82
Dissolved Zn (ug/L)	23	41	-78	-419	42	16	62	65	83	26	69	72
Nitrate-Nitrogen (mg/L)	0.73	0.52	29	-107	0.45	0.65	-44	-33	1.3	1.9	-46	-29
TKN (mg/L)	1.8	1.4	22	-127	1.2	1.2	0	8	3	4	-33	-18
Total P (mg/L)	0.81	0.22	73	21	0.2	0.45	-125	-108	0.27	0.74	-174	-142
Volume (liters)	36504	106313			134520	124098			81307	71763		

Palomar *1999 - 2000 Wet Season Statistics*			
Parameter	Minimum Load Removal (%)	Maximum Load Removal (%)	Average Season Removal (%)
TSS	-1211	57	12
T-Cu	-567	55	25
T-Pb	-858	67	38
T-Zn	-942	74	45
D-Cu	-292	42	12
D-Pb	-369	> 82	46
D-Zn	-419	69	35
N-N	-107	29	-51
TKN	-127	22	-35
T-P	-142	73	-31

The value of the reporting limit was used in cases where an analyte was reported as undetected.

Palomar Feb 20, 2000 event flow volumes are suspect

Palomar seasonal statistics are suspect due to flow problems with February 20, 2000 event

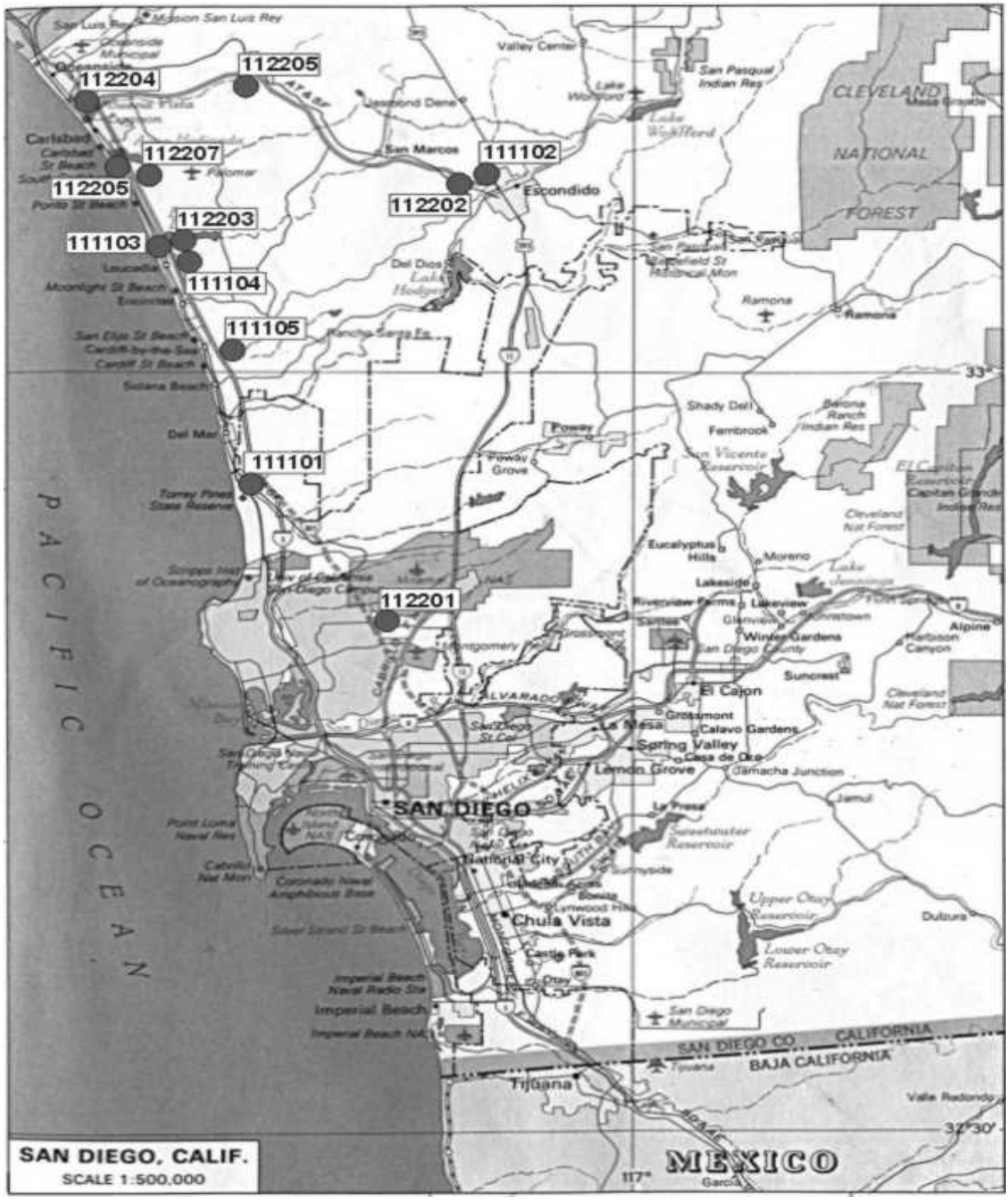


Figure 1-1 Map of Study Area: Caltrans District 11 San Diego

Figure 1-2a Daily Precipitation Totals and Yearly Cumulative Rainfall for North County San Diego (Escondido MS)

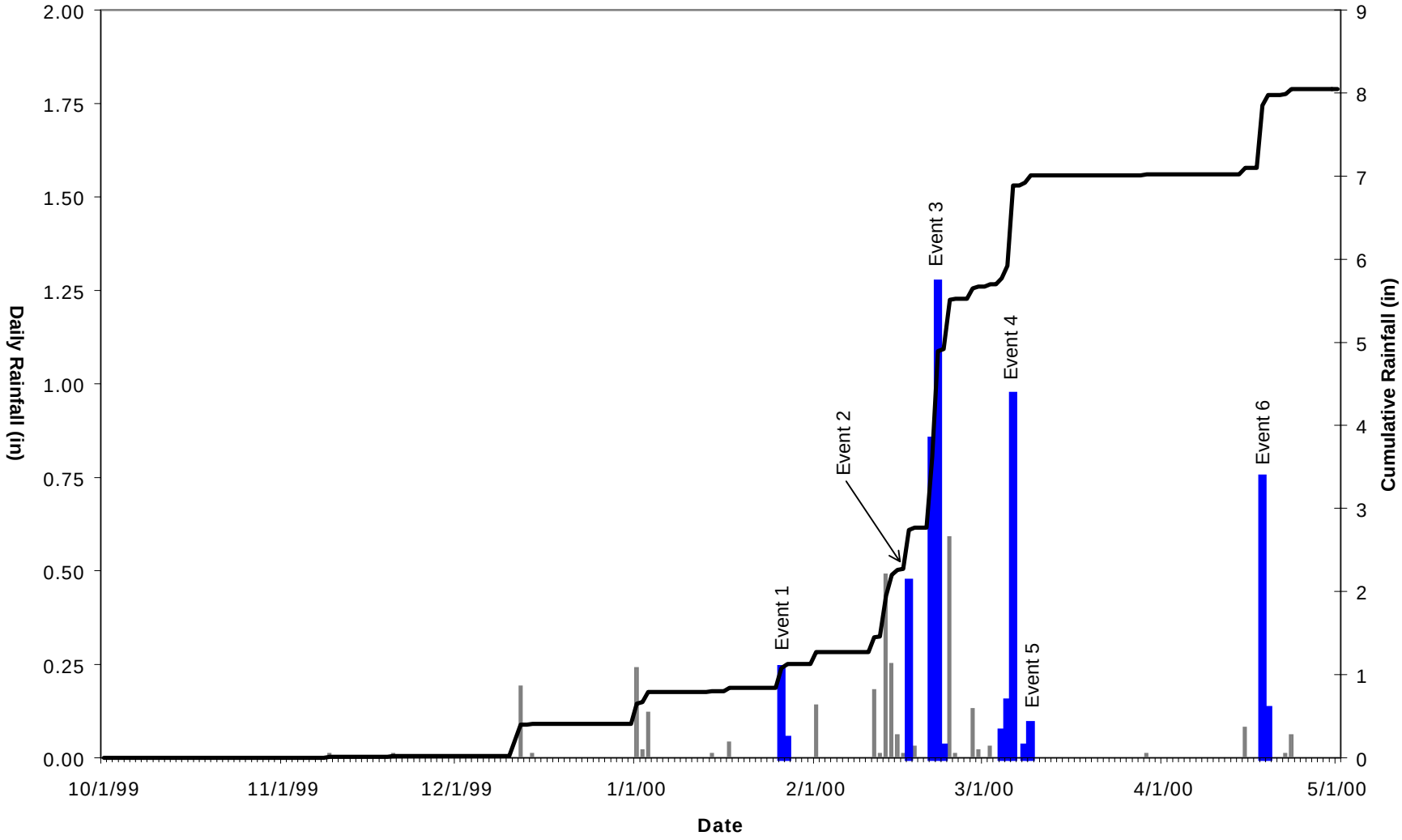


Figure 1-2b Daily Precipitation Totals and Yearly Cumulative Rainfall for Mid-County San Diego (La Costa P&R)

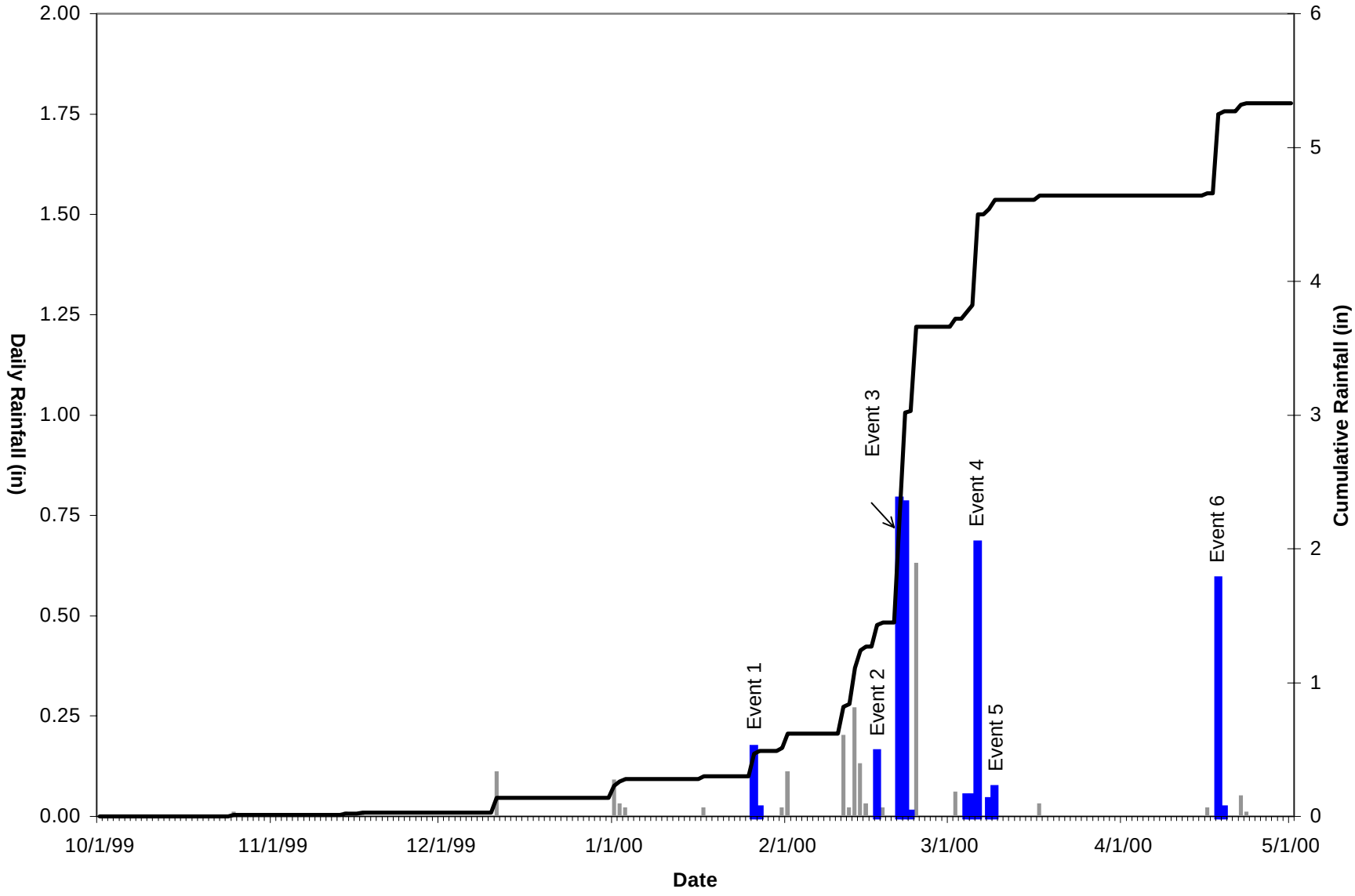


Figure 1-2c Daily Precipitation Totals and Yearly Cumulative Rainfall for South County San Diego (Kearny Mesa MS)

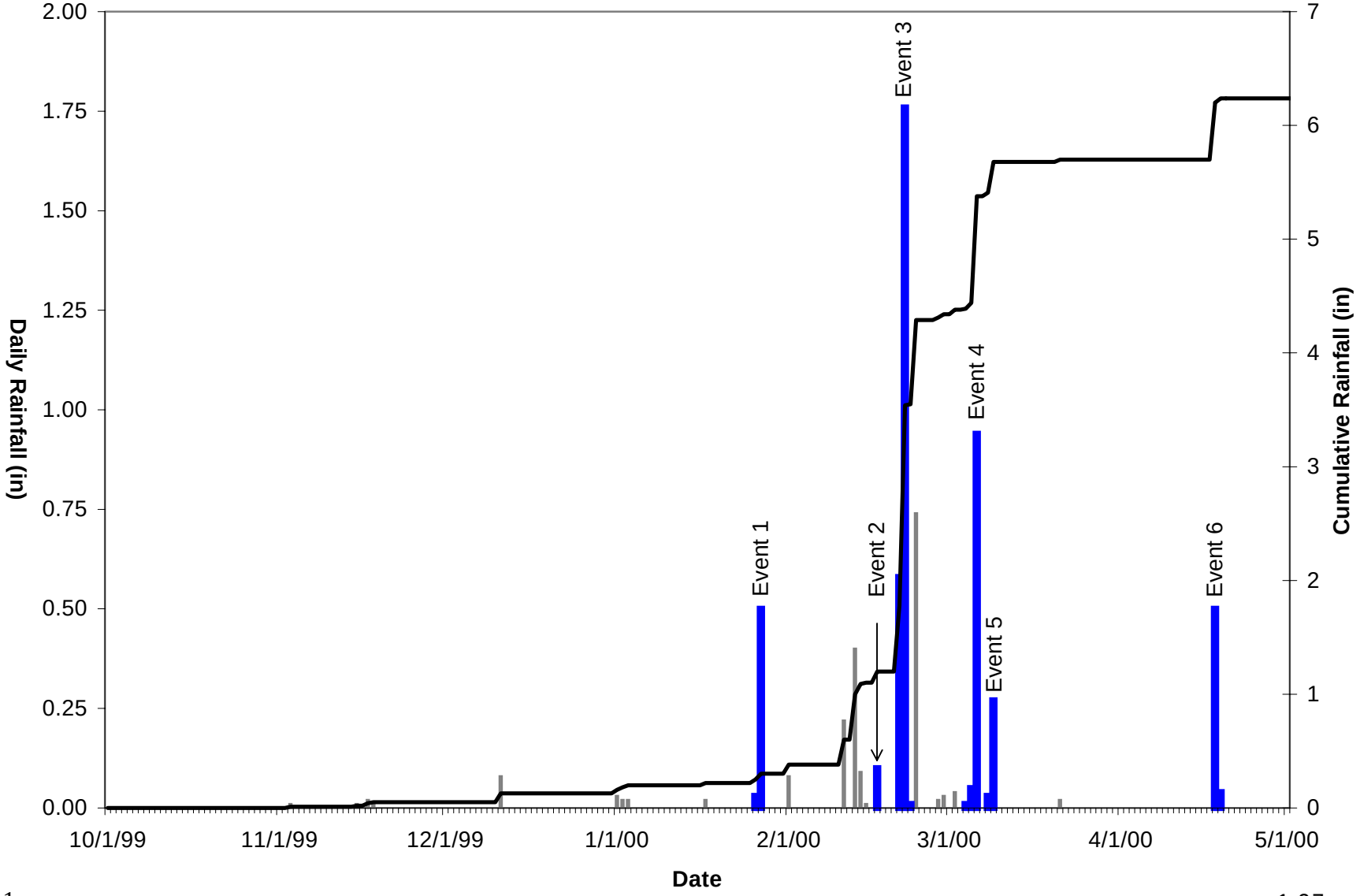
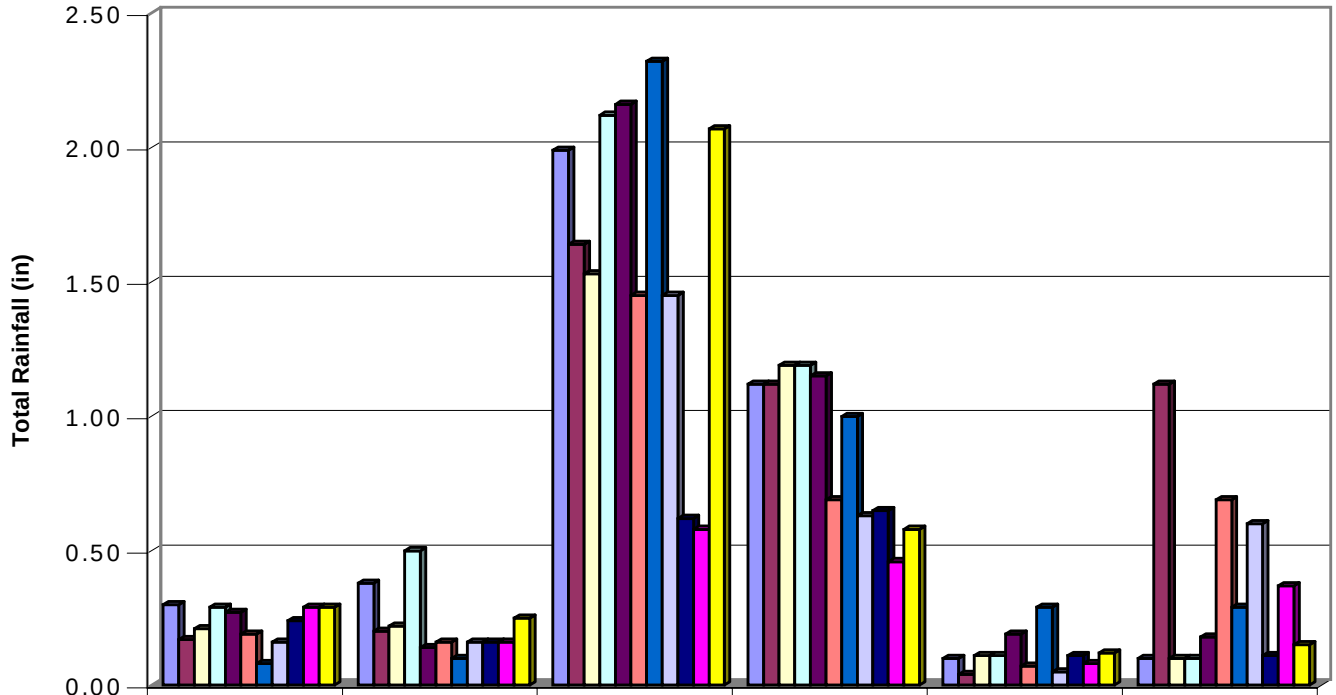


Figure 1-3 Event Rainfall Totals for the 1999/2000 Wet Season for all BMPs



	Event 1: 1/25/00	Event 2: 2/16/00	Event 3: 2/20/00	Event 4: 3/5/00	Event 5: 3/8/00	Event 6: 4/16/00
SR78/I15	0.30	0.38	1.99	1.12	0.10	0.10
SR56/I5	0.17	0.20	1.64	1.12	0.04	1.12
Manchester	0.21	0.22	1.53	1.19	0.11	0.10
Escondido MS	0.29	0.50	2.12	1.19	0.11	0.10
SR78/I5 P&R	0.27	0.14	2.16	1.15	0.19	0.18
LaCosta P&R	0.19	0.16	1.45	0.69	0.07	0.69
Kearny Mesa MS	0.08	0.10	2.32	1.00	0.29	0.29
LaCosta WB	0.16	0.16	1.45	0.63	0.05	0.60
Palomar Sw	0.24	0.16	0.62	0.65	0.11	0.11
Carlsbad MS	0.29	0.16	0.58	0.46	0.08	0.37
Melrose	0.29	0.25	2.07	0.58	0.12	0.15

Fig. 1-4. State Route 78 & I15 Extended Detention Basin-Event 1 (25 January 2000)

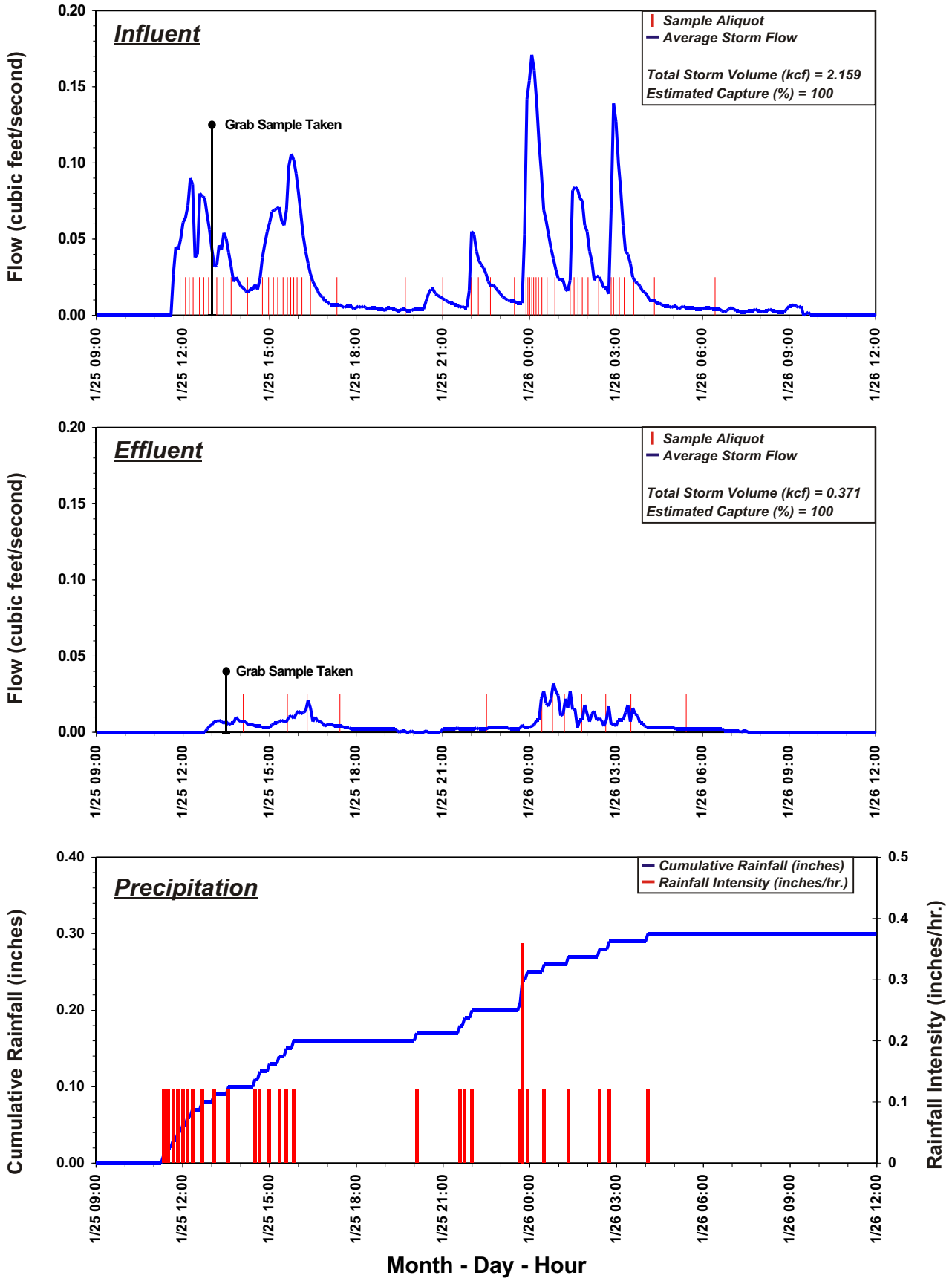


Fig. 1-5. State Route 78 & I15 Extended Detention Basin-Event 2 (16-17 February 2000)

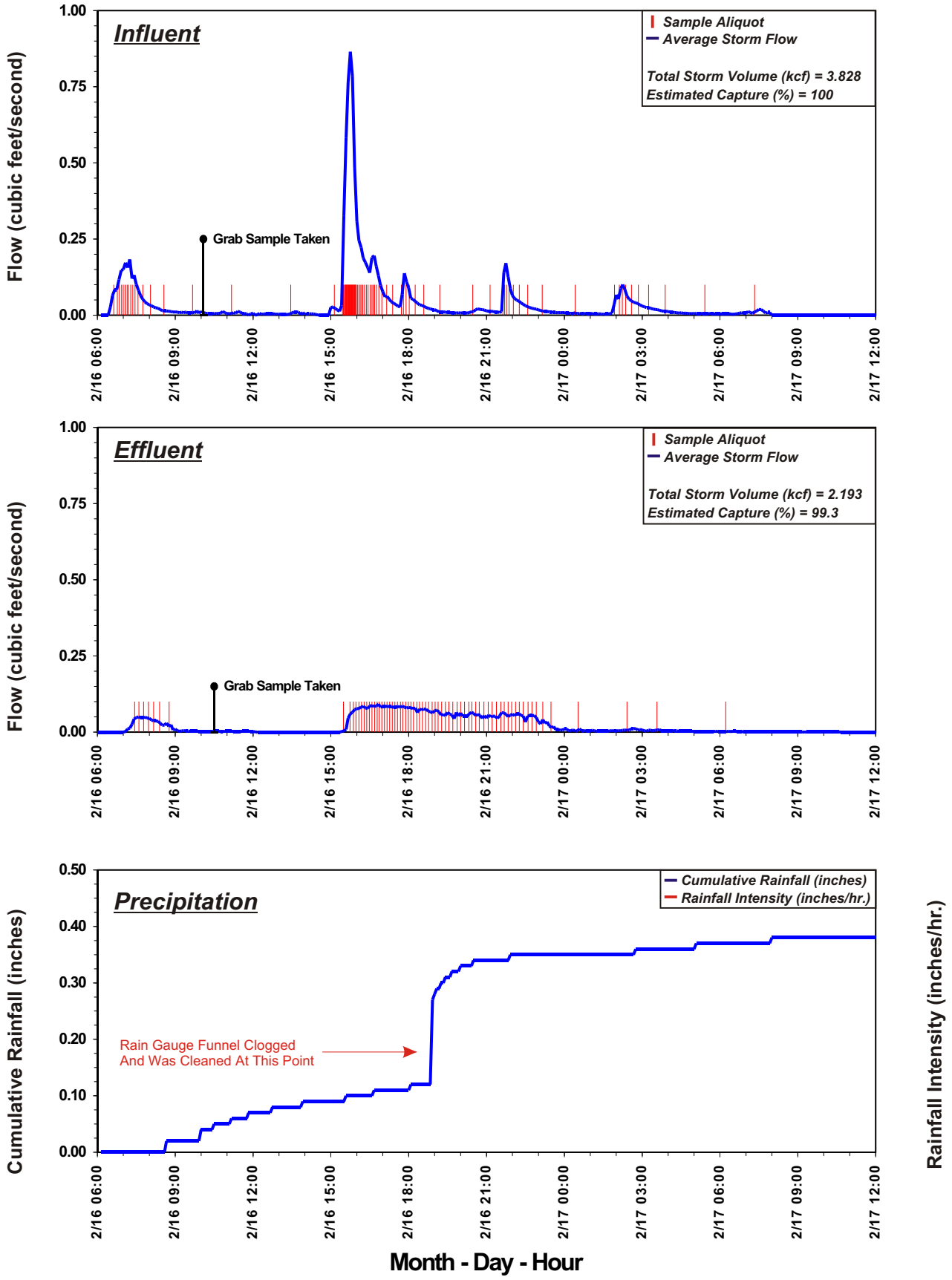


Fig. 1-6. State Route 78 & I15 Extended Detention Basin-Event 3 (20-23 February 2000)

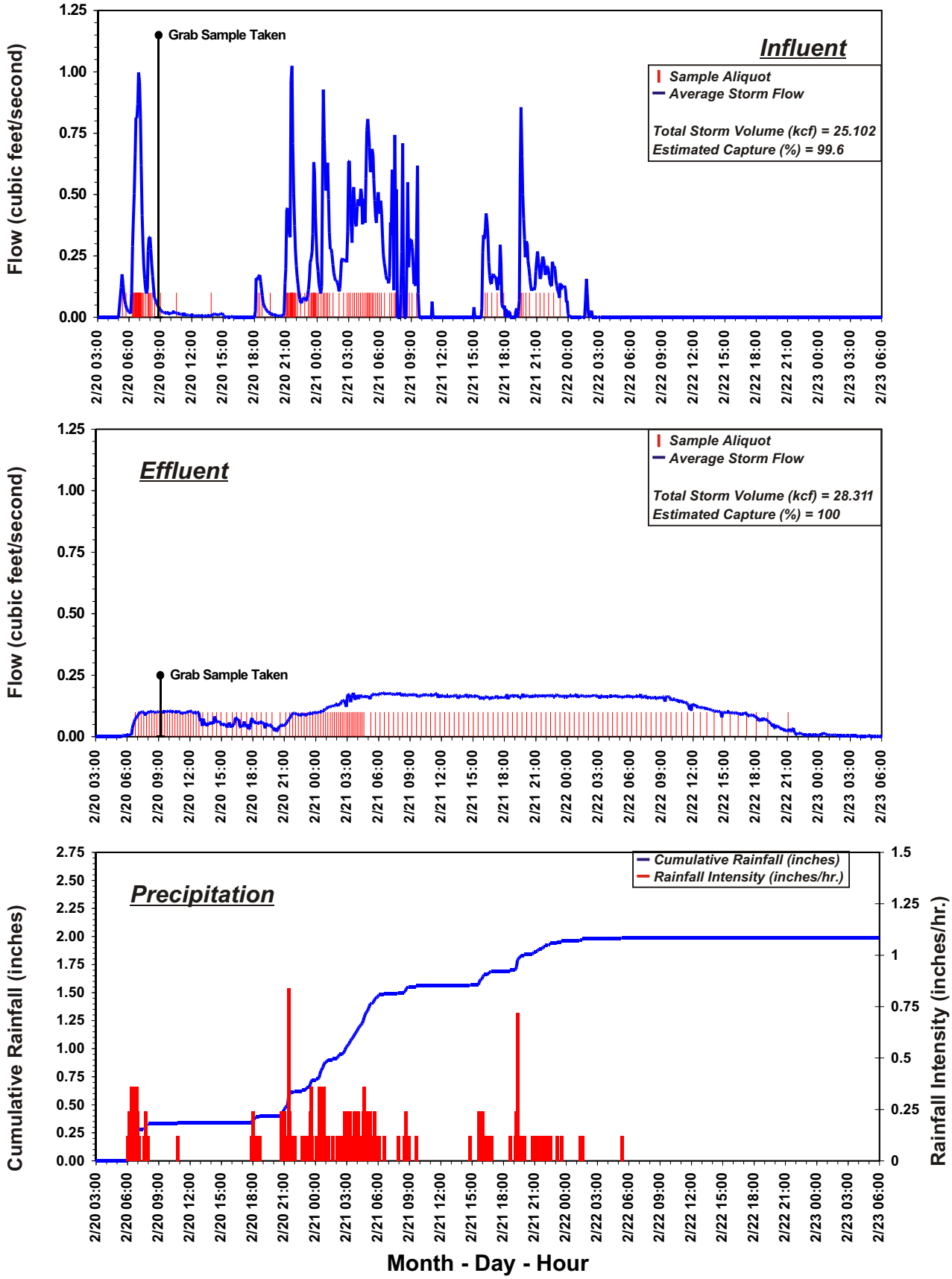


Fig. 1-7. State Route 78 & I15 Extended Detention Basin-Event 4 (3-6 March 2000)

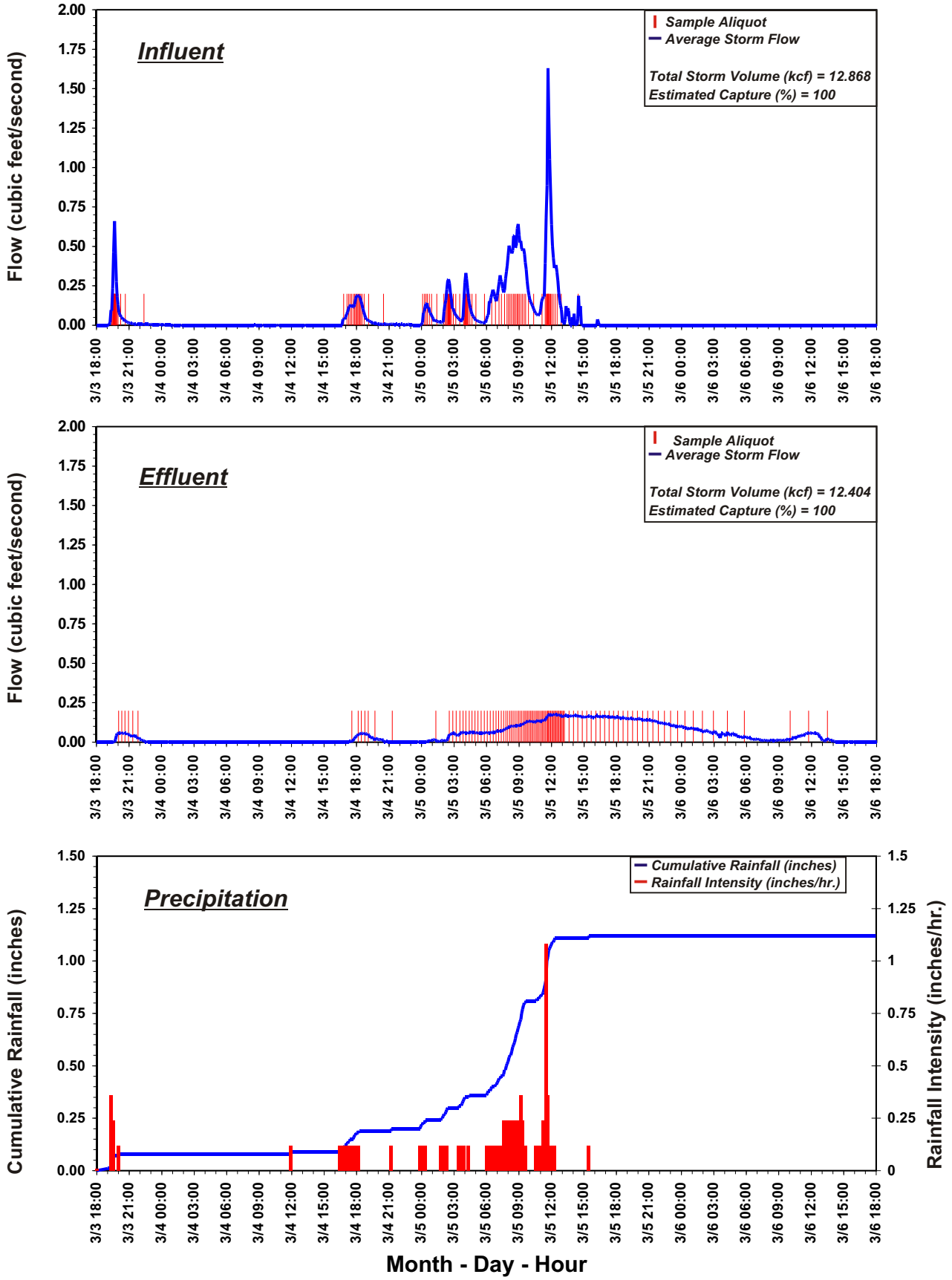


Fig. 1-8. State Route 78 & I15 Extended Detention Basin-Event 6 (17-18 April, 2000)

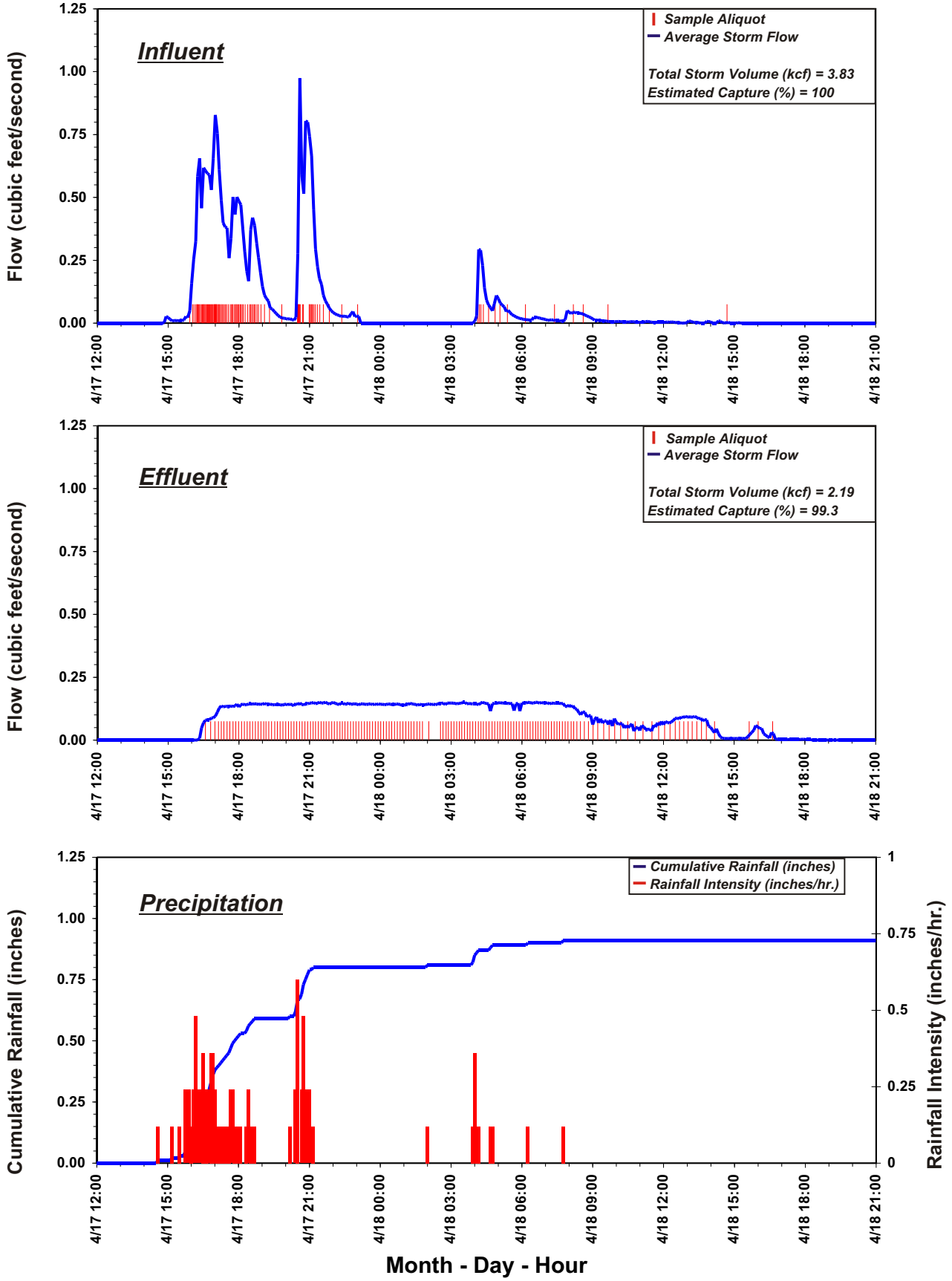


Fig. 1-9. State Route 56 and I5 Extended Detention Basin-Event 1 (25-26 January 2000)

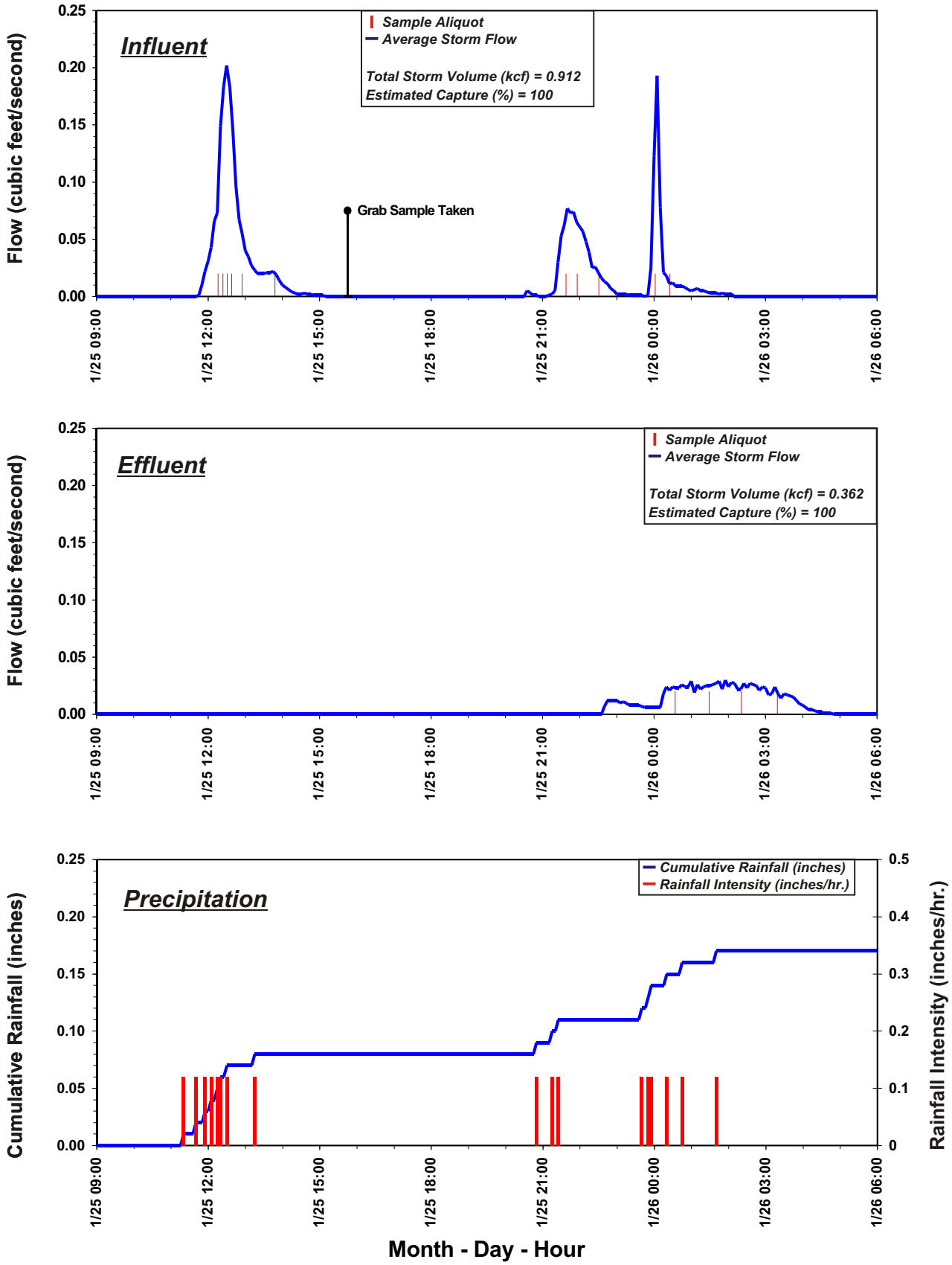


Fig. 1-10. State Route 56 and I5 Extended Detention Basin-Event 2 (16-17 February 2000)

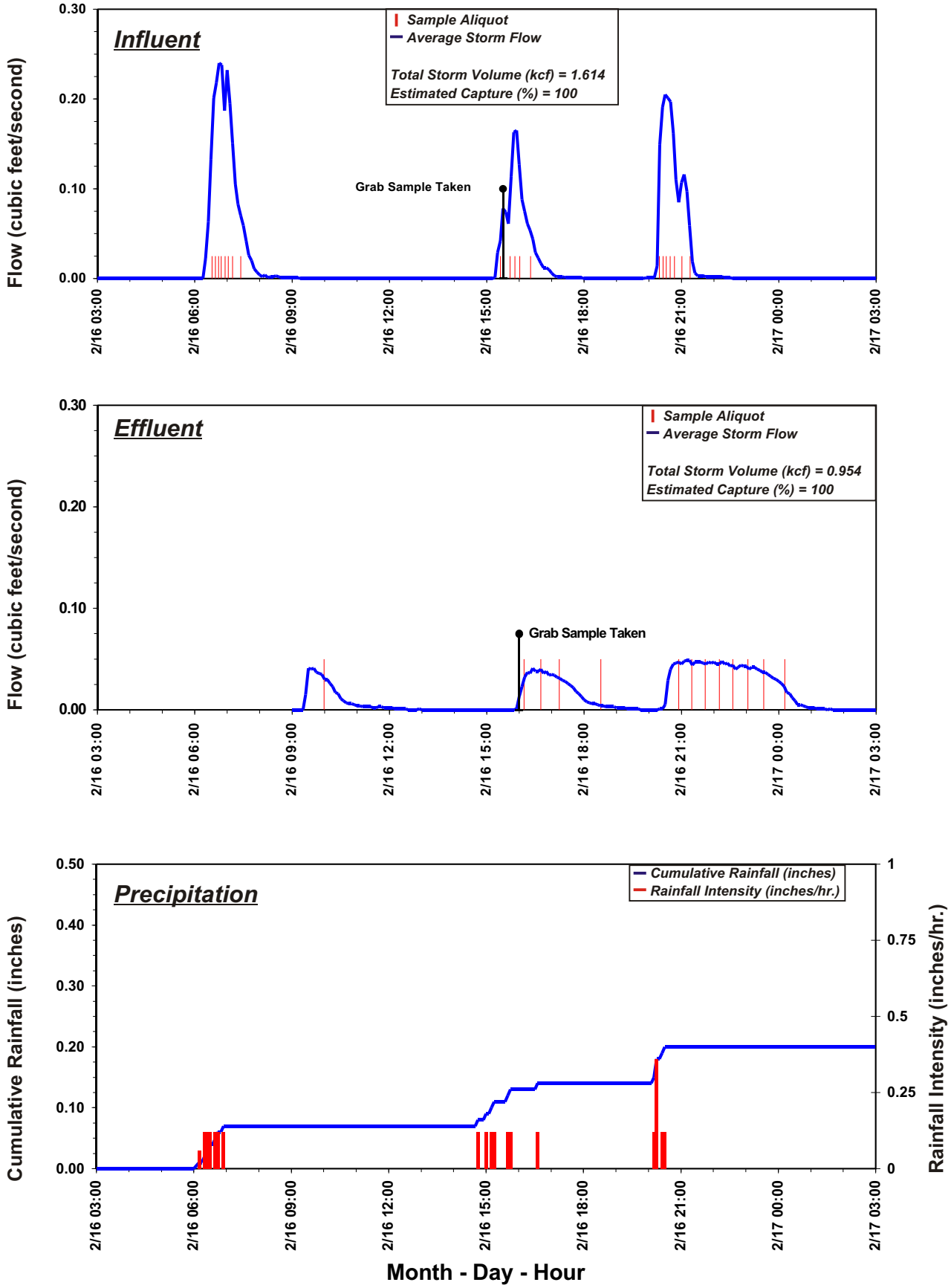


Fig. 1-11. State Route 56 and I5 Extended Detention Basin-Event 3 (20-23 February 2000)

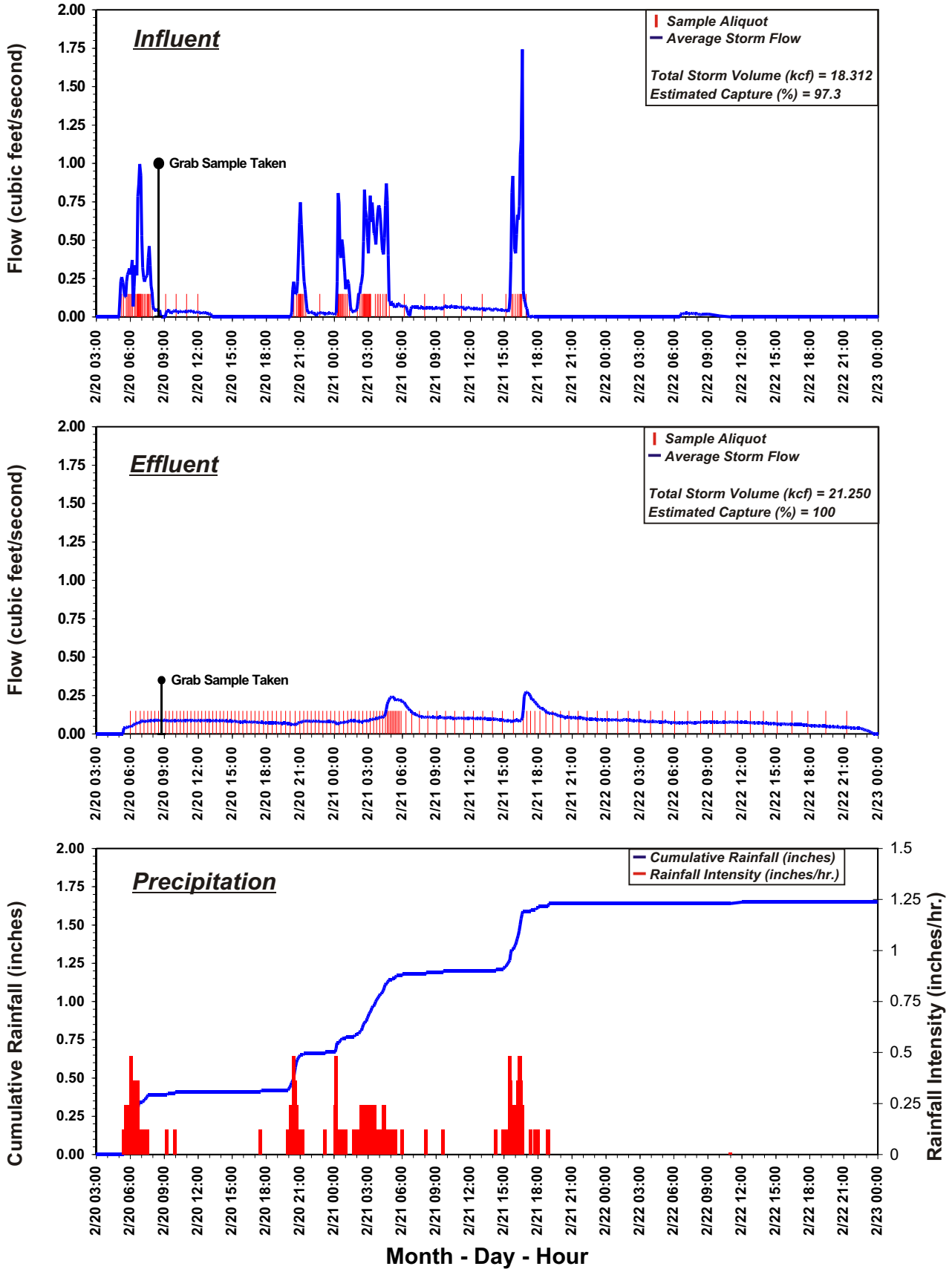


Fig. 1-12 . State Route 56 and I5 Extended Detention Basin-Event 4 (4-6 March 2000)

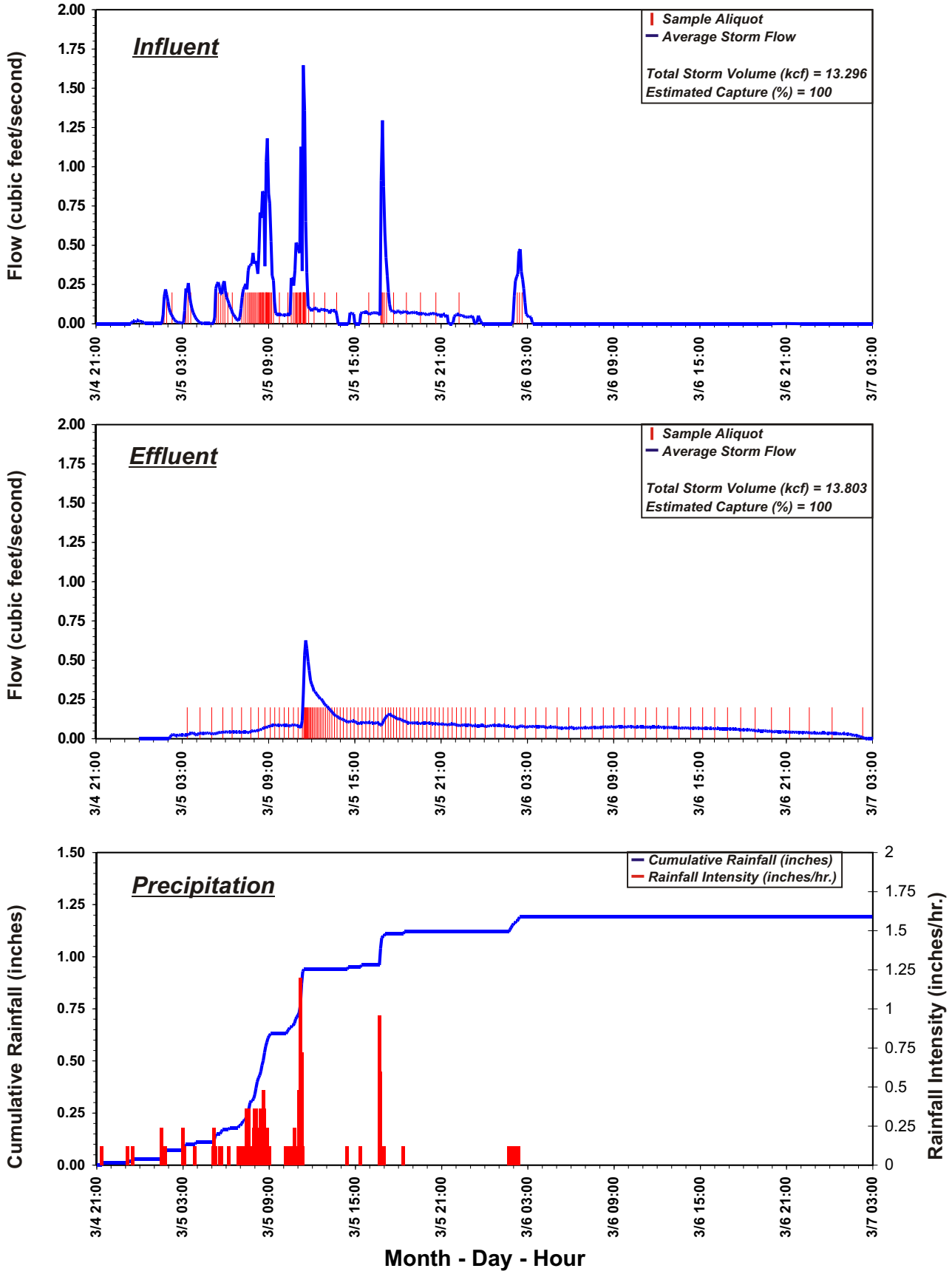


Fig. 1-13. State Route 56 and I5 Extended Detention Basin-Event 6 (17-19 April 2000)

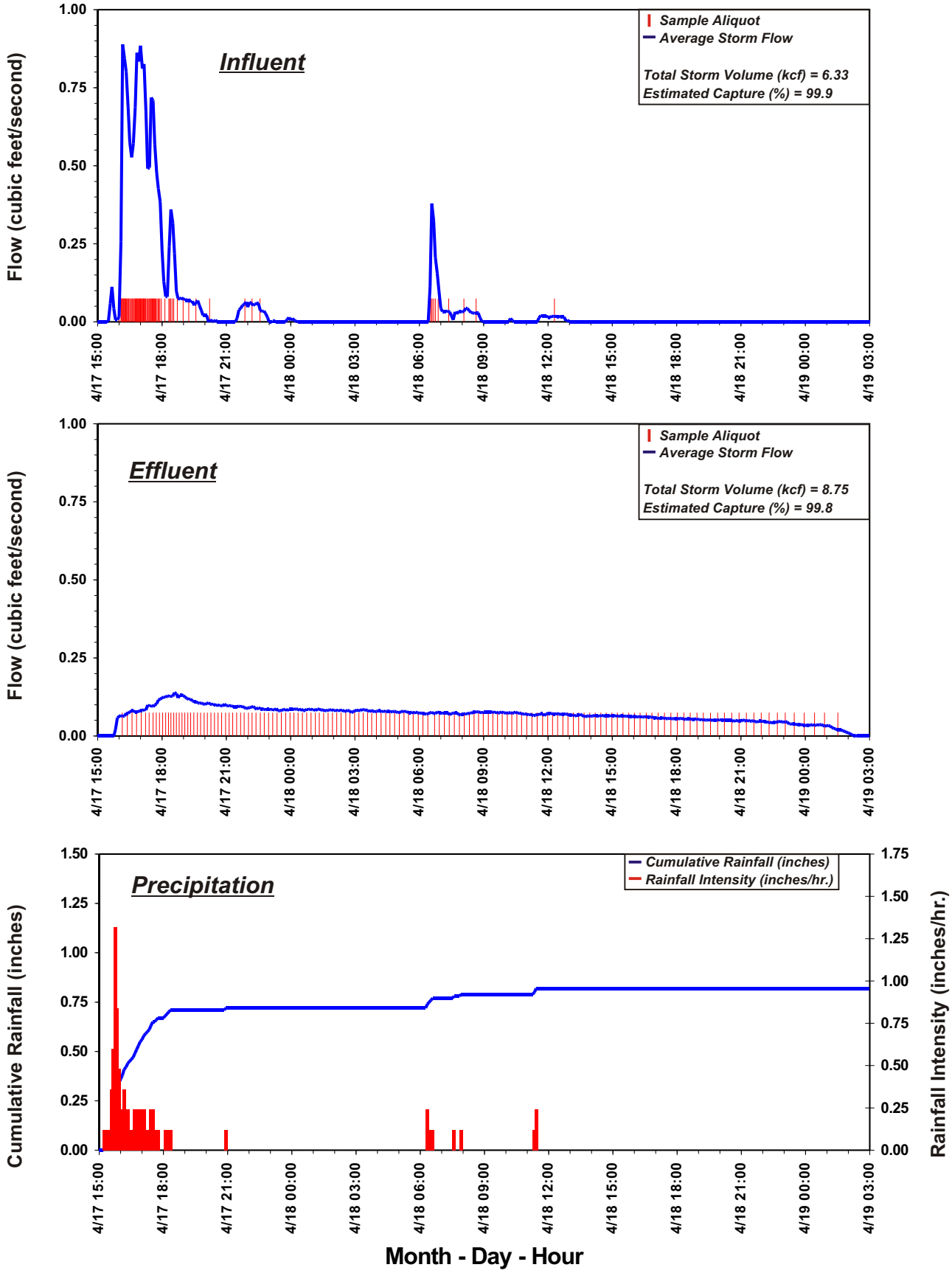


Fig. 1-14. I5 North/Manchester Extended Detention Basin-Event 2 (16-17 February 2000)

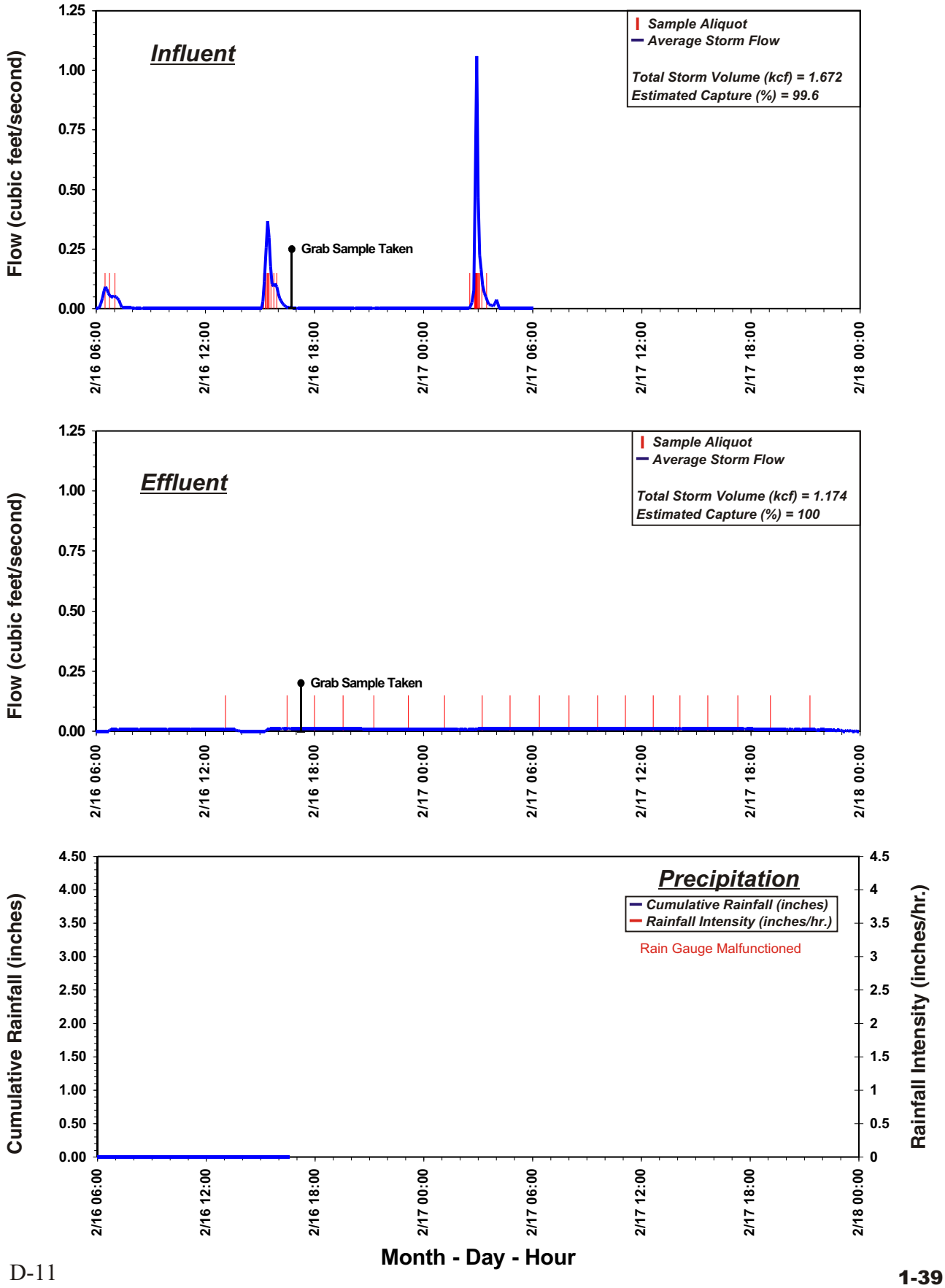


Fig. 1-15. I5 North/Manchester Extended Detention Basin-Event 3 (20-22 February 2000)

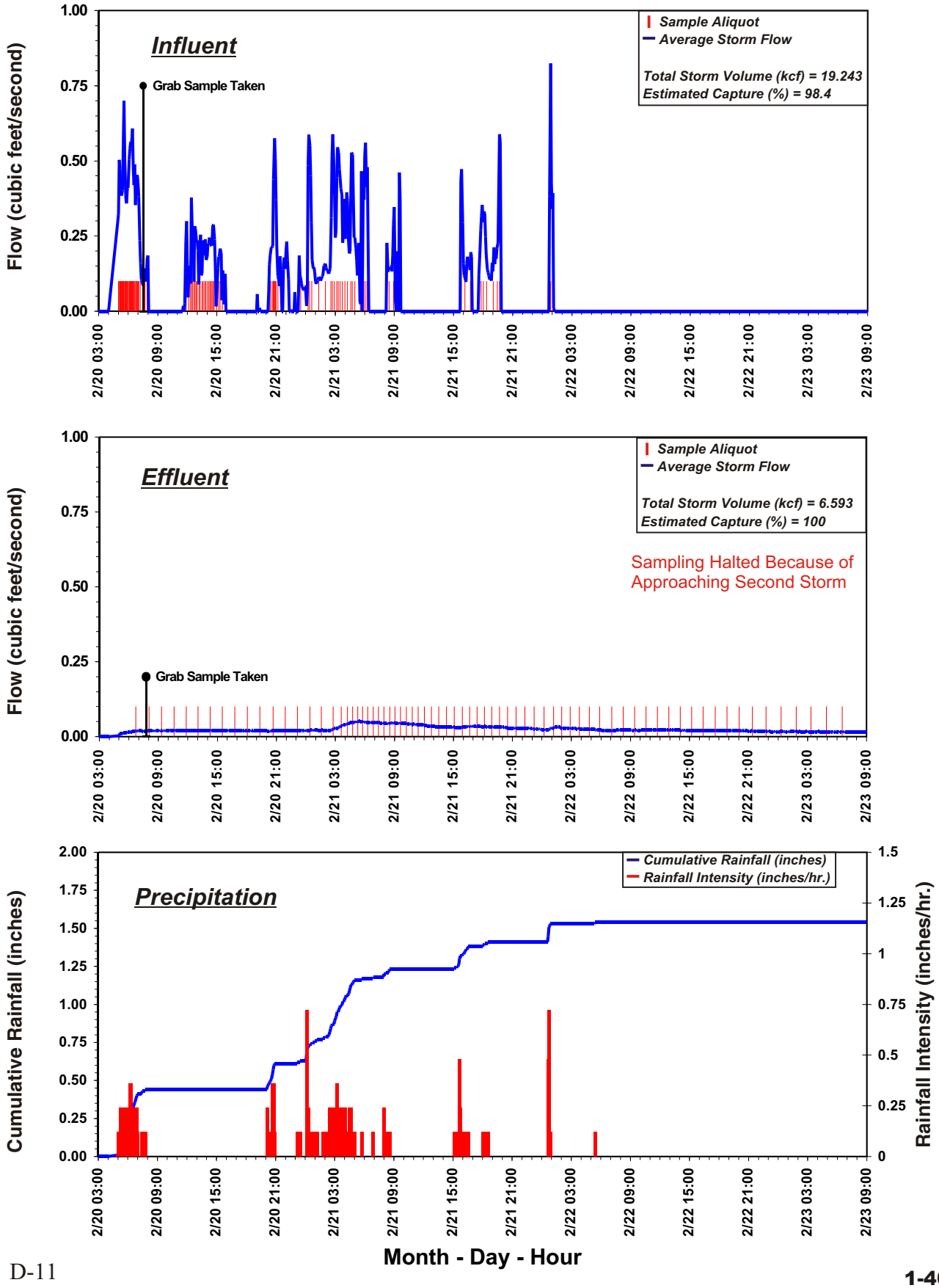


Fig. 1-16. I5 North/Manchester Extended Detention Basin-Event 4 (4-8 March 2000)

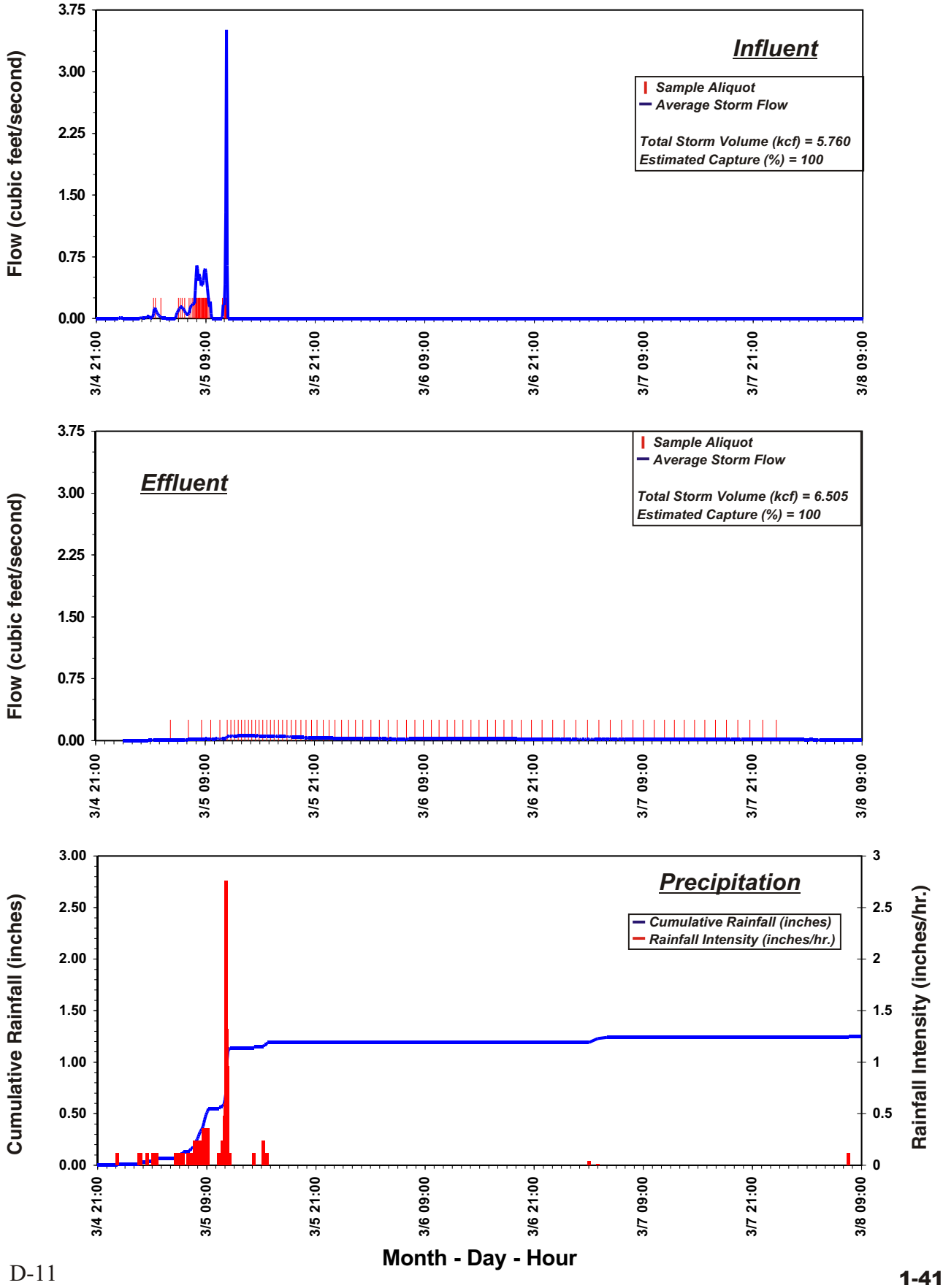


Fig. 1-17. I5 North/Manchester Extended Detention Basin-Event 6 (17-20 April 2000)

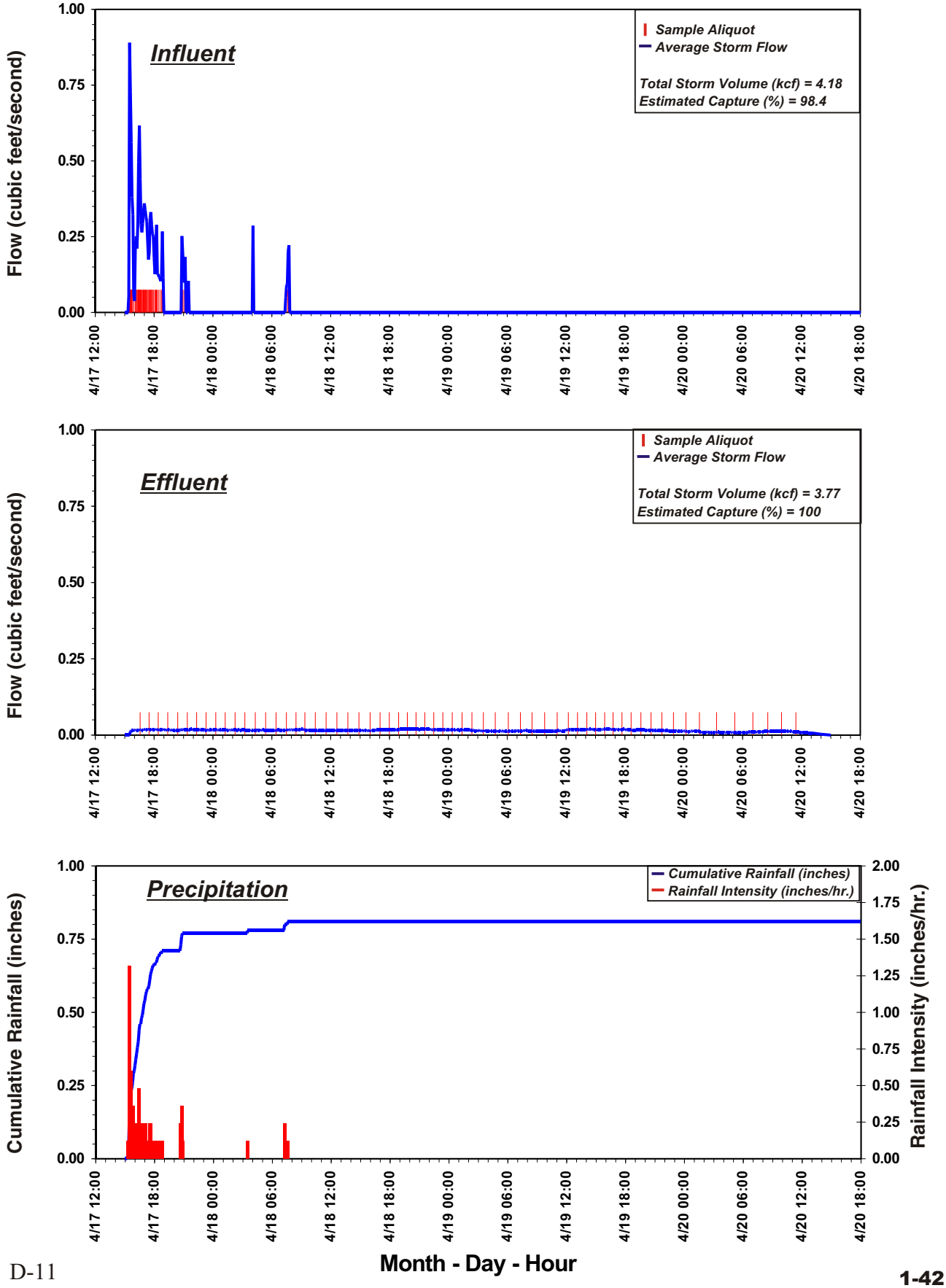


Fig. 1-18. Escondido Maintenance Station Sand Filter-Event 1 (25 January 2000)

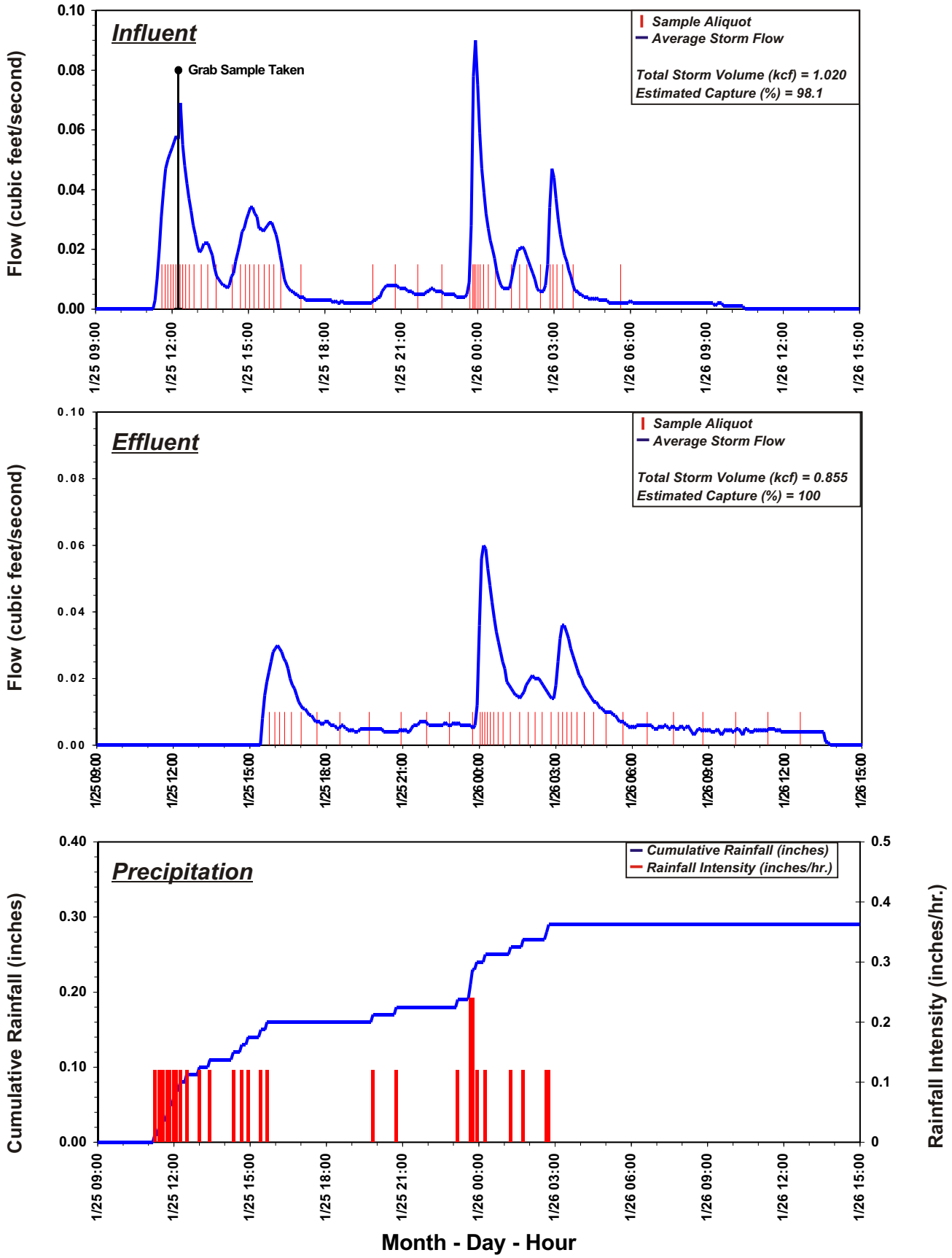


Fig. 1-19. Escondido Maintenance Station Sand Filter-Event 2 (16-17 February 2000)

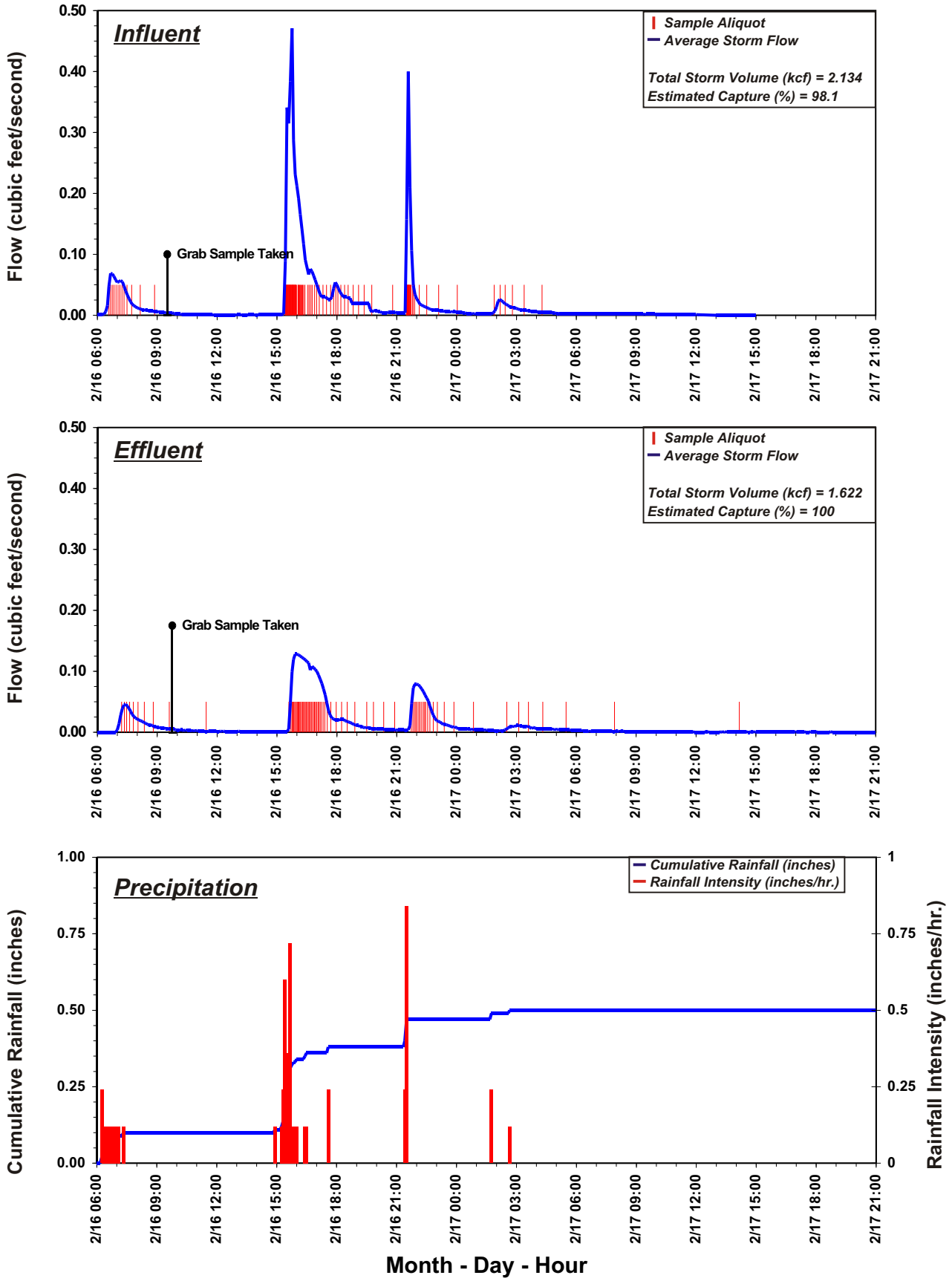


Fig. 1-20. Escondido Maintenance Station Sand Filter-Event 3 (20-22 February 2000)

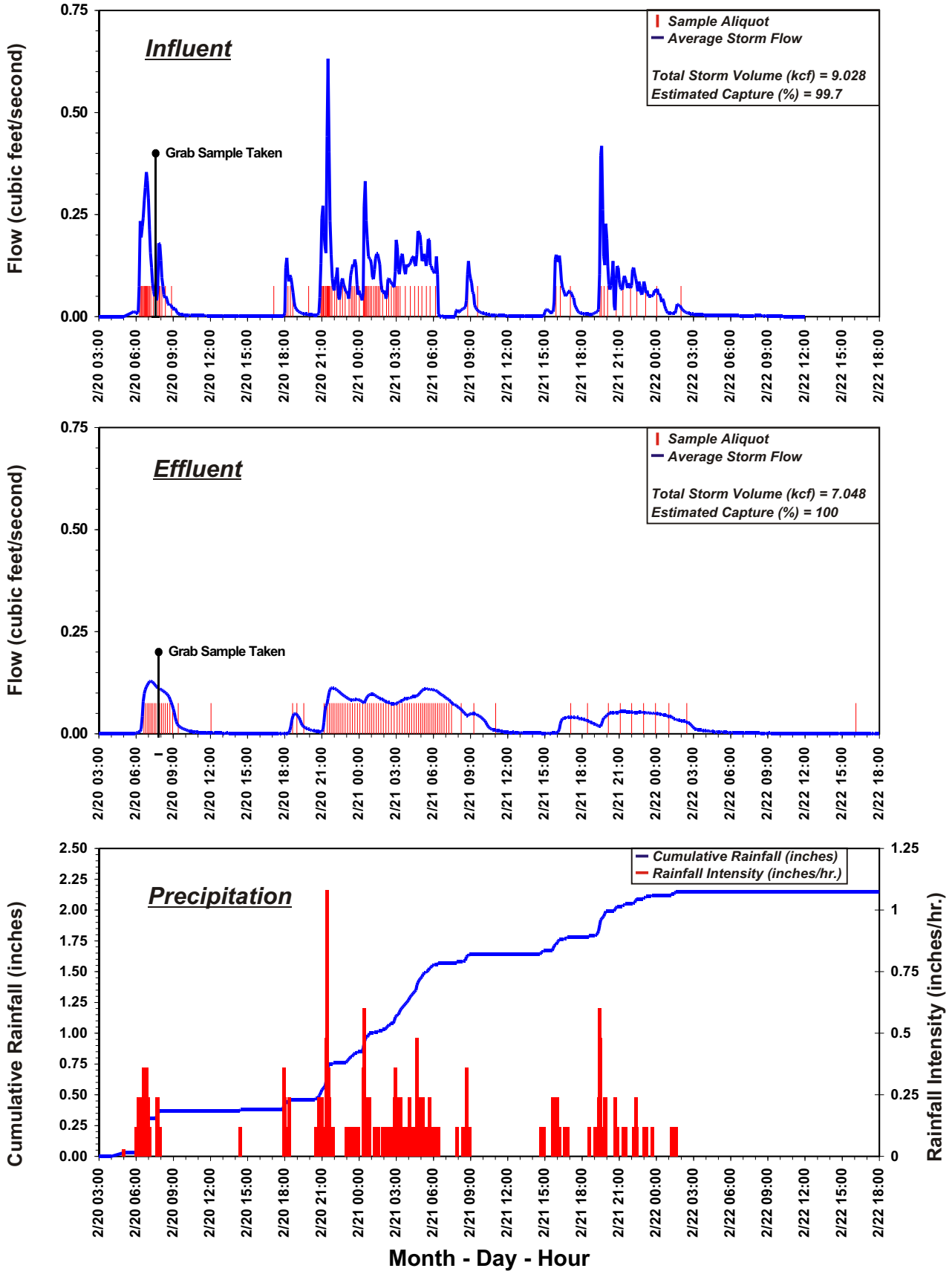


Fig. 1-21. Escondido Maintenance Station Sand Filter-Event 4 (3-6 March 2000)

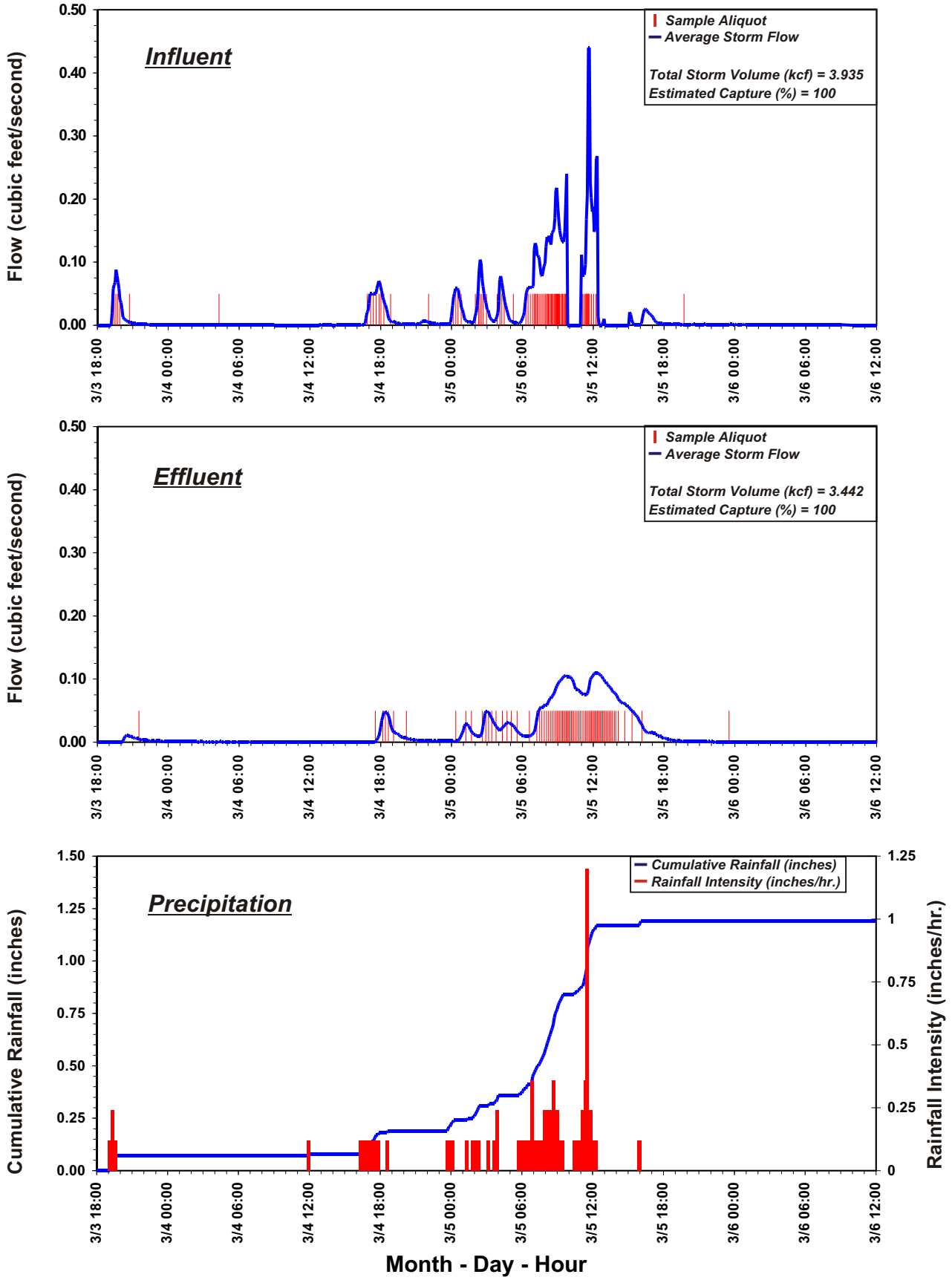


Fig. 1-22. Escondido Maintenance Station Sand Filter-Event 6 (17-19 April 2000)

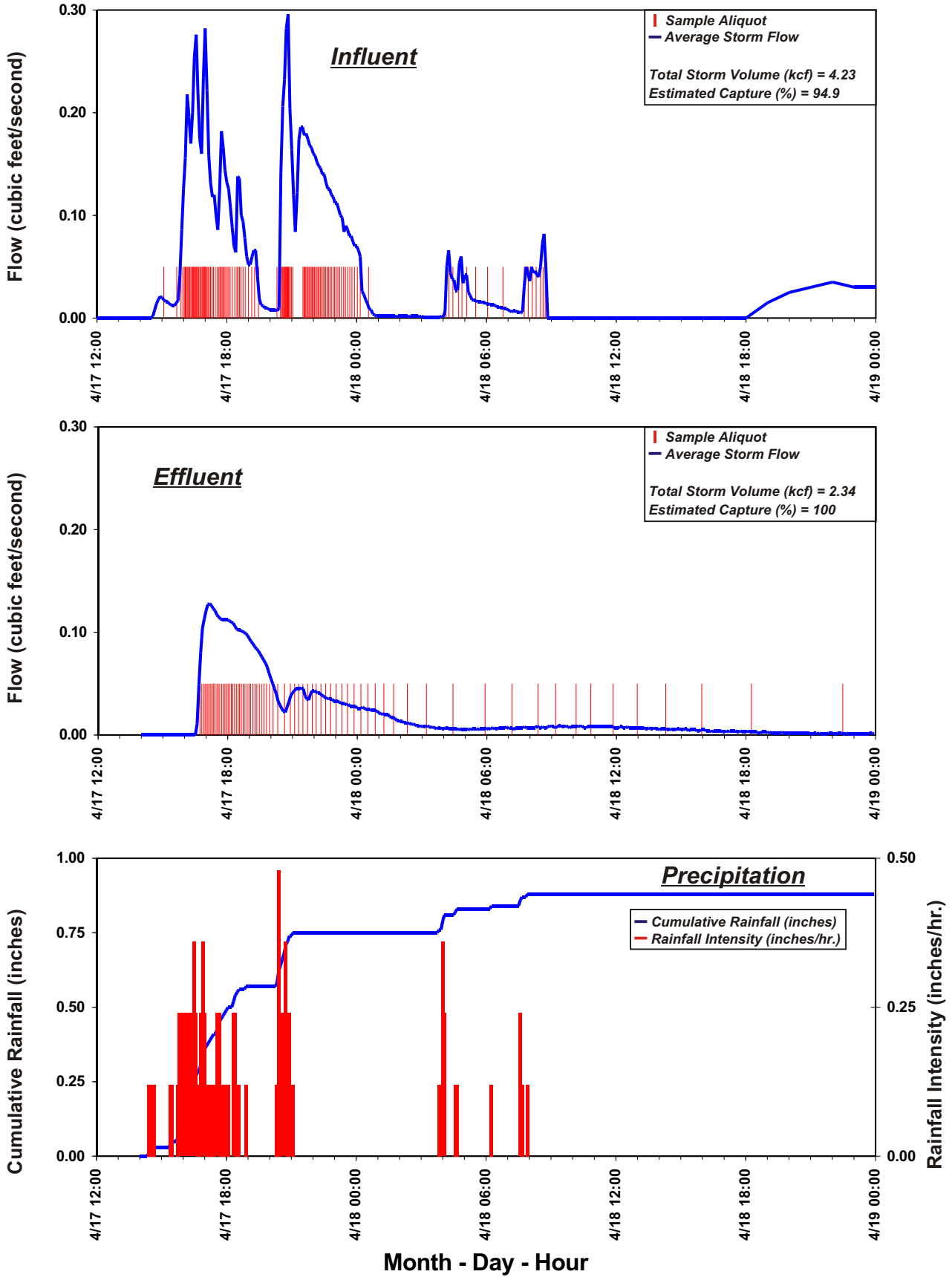


Fig. 1-23. State Route 78 and I5 Park & Ride Sand Filter-Event 1 (25 January 2000)

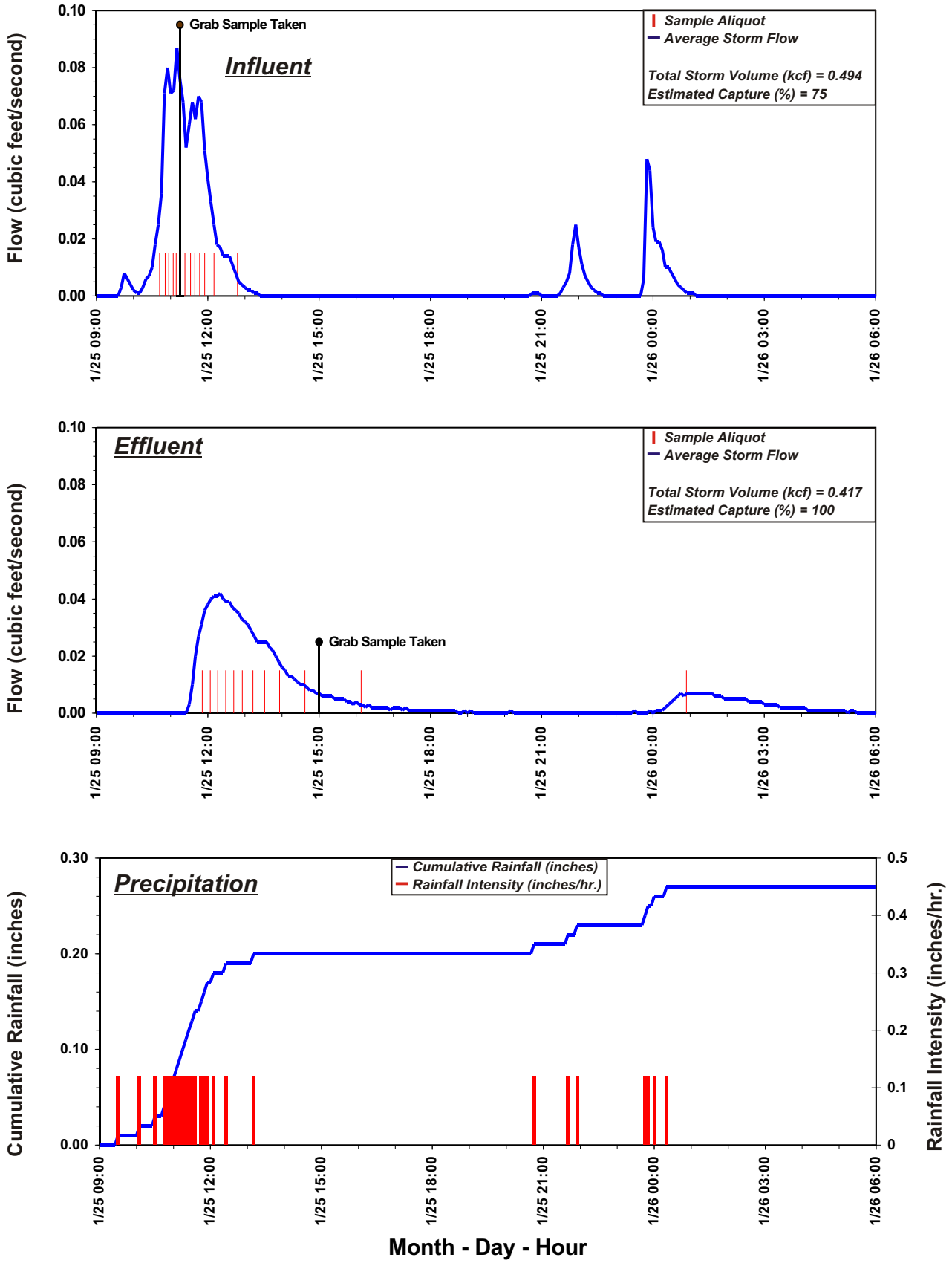


Fig. 1-24. State Route 78 and I5 Park & Ride Sand Filter-Event 2 (16-17 February 2000)

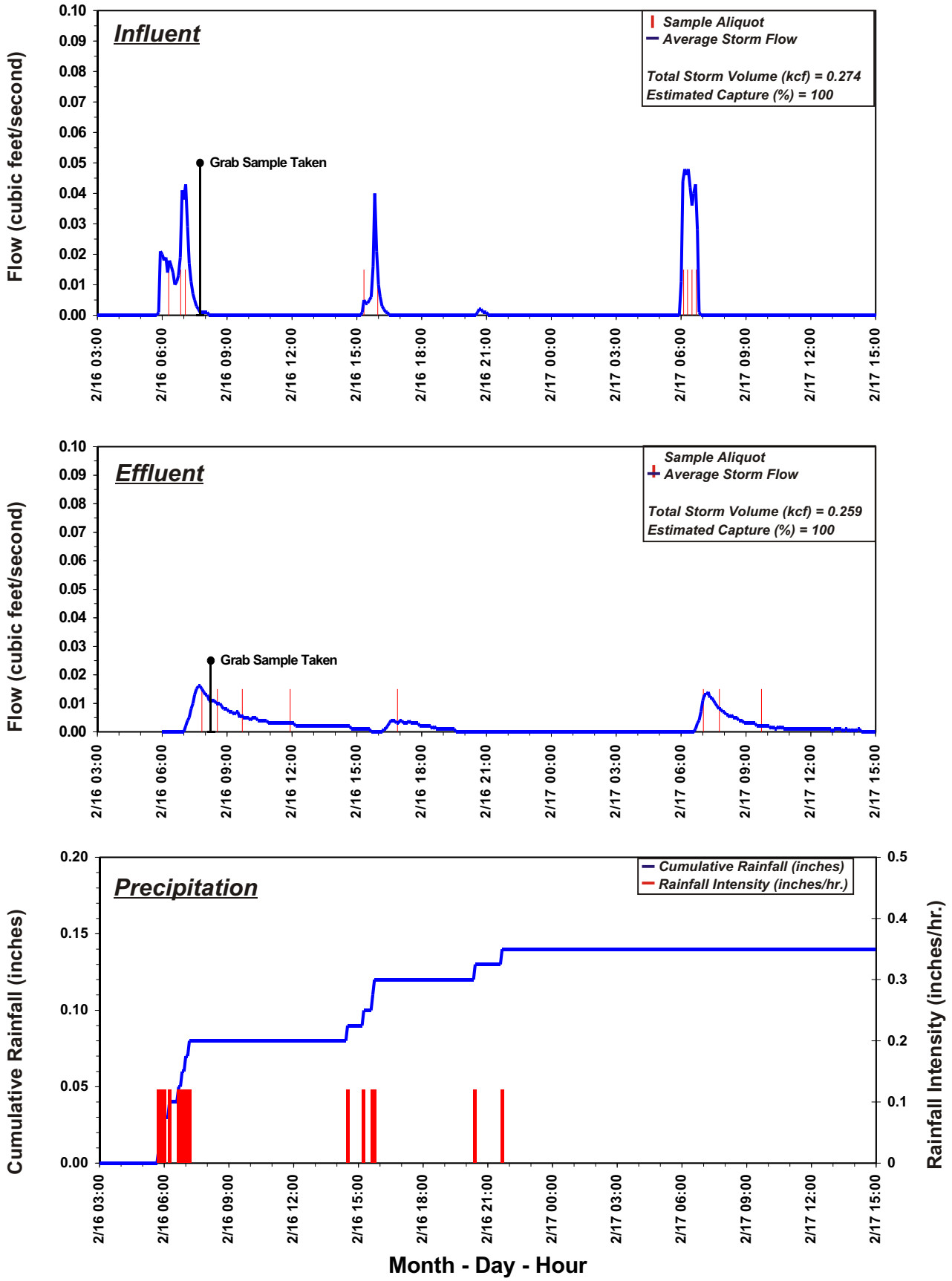


Fig. 1-25. State Route 78 and I5 Park & Ride Sand Filter-Event 3 (20-22 February 2000)

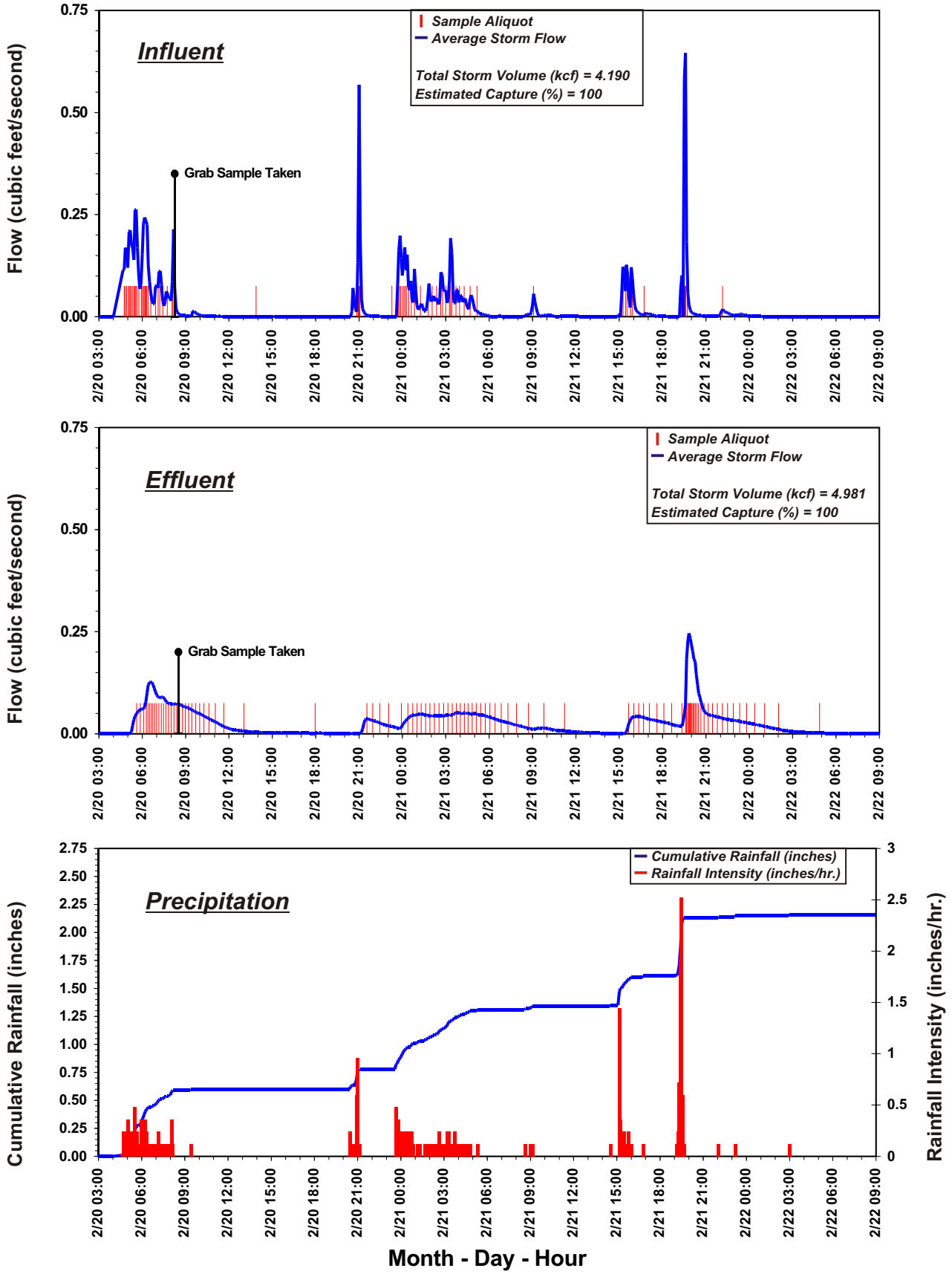


Fig. 1-26. State Route 78 and I5 Park & Ride Sand Filter-Event 4 (3-6 March 2000)

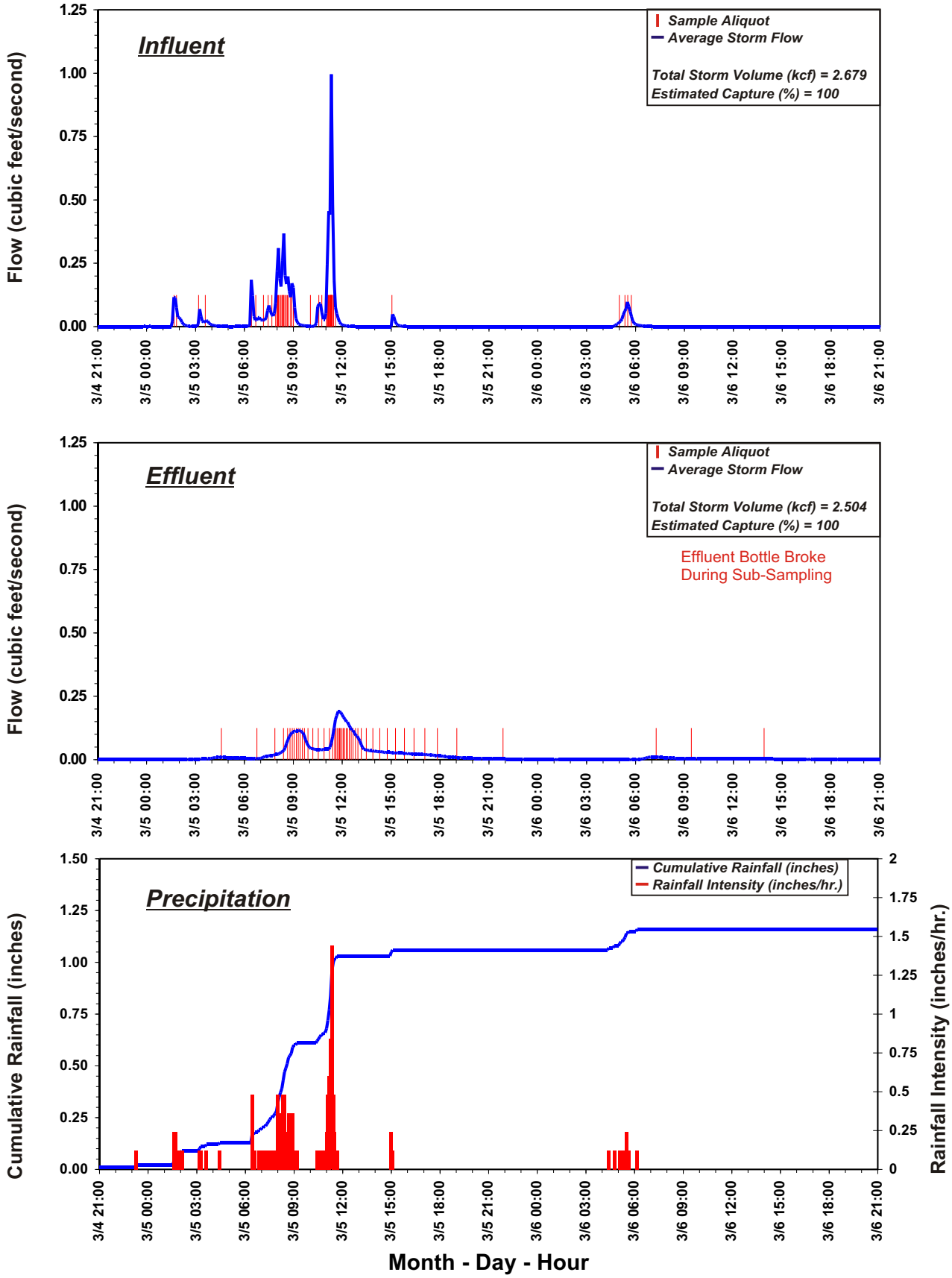


Fig. 1-27. State Route 78 and I5 Park & Ride Sand Filter-Event 5 (8-9 March 2000)

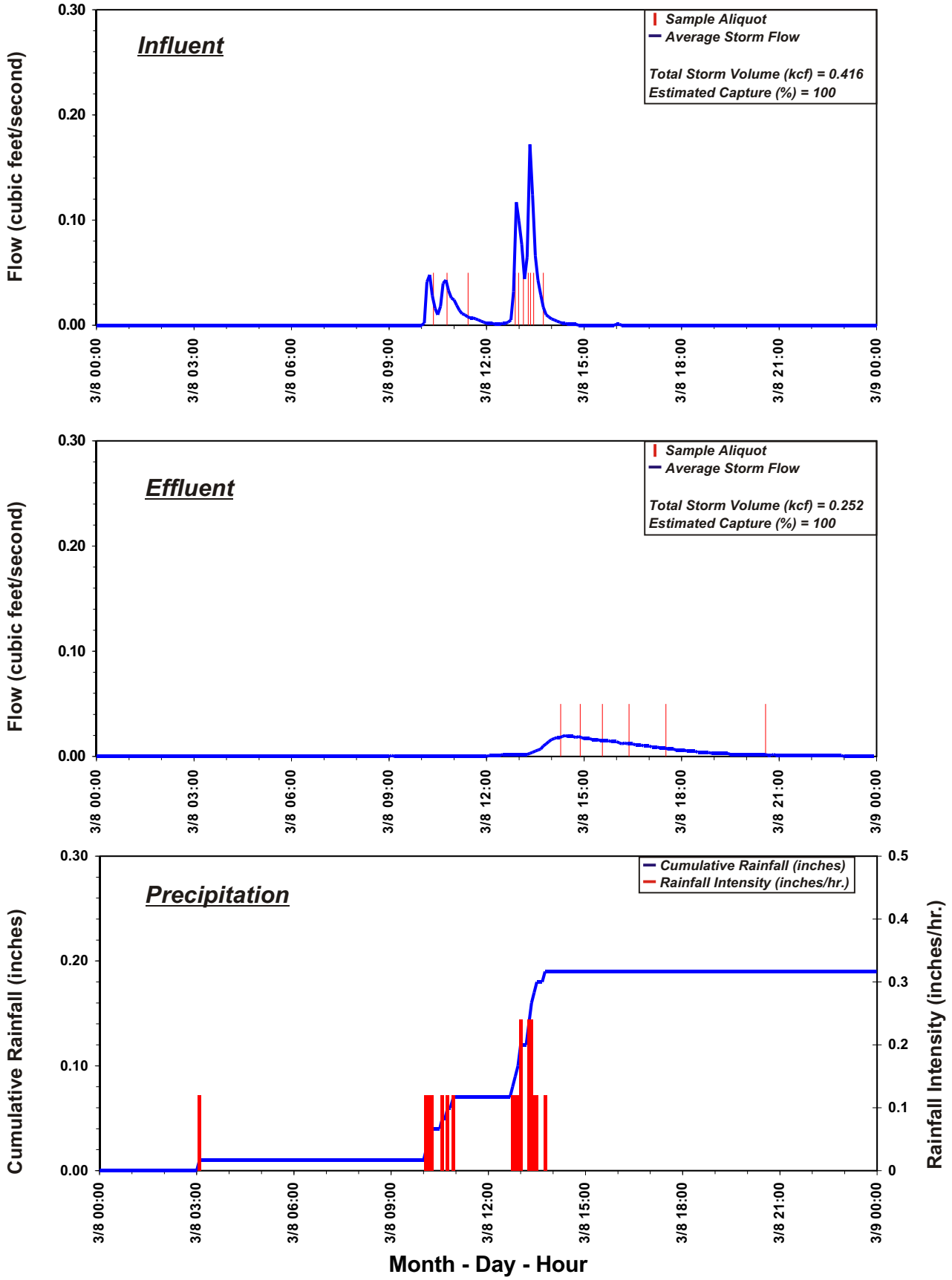


Fig. 1-28. State Route 78 and I5 Park & Ride Sand Filter-Event 6 (17-18 April 2000)

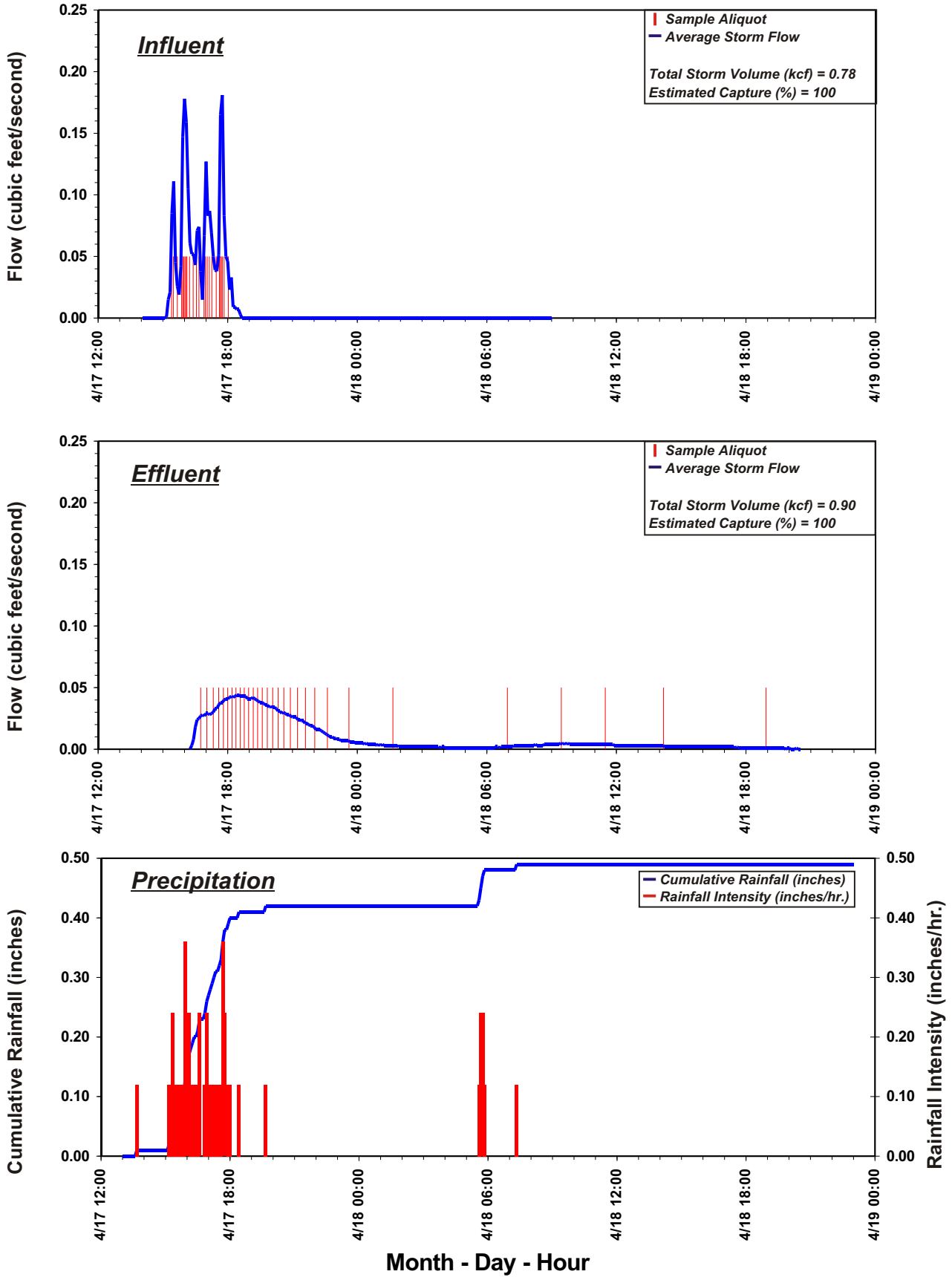


Fig. 1-29. La Costa Ave. Park & Ride Sand Filter-Event 1 (25 January 2000)

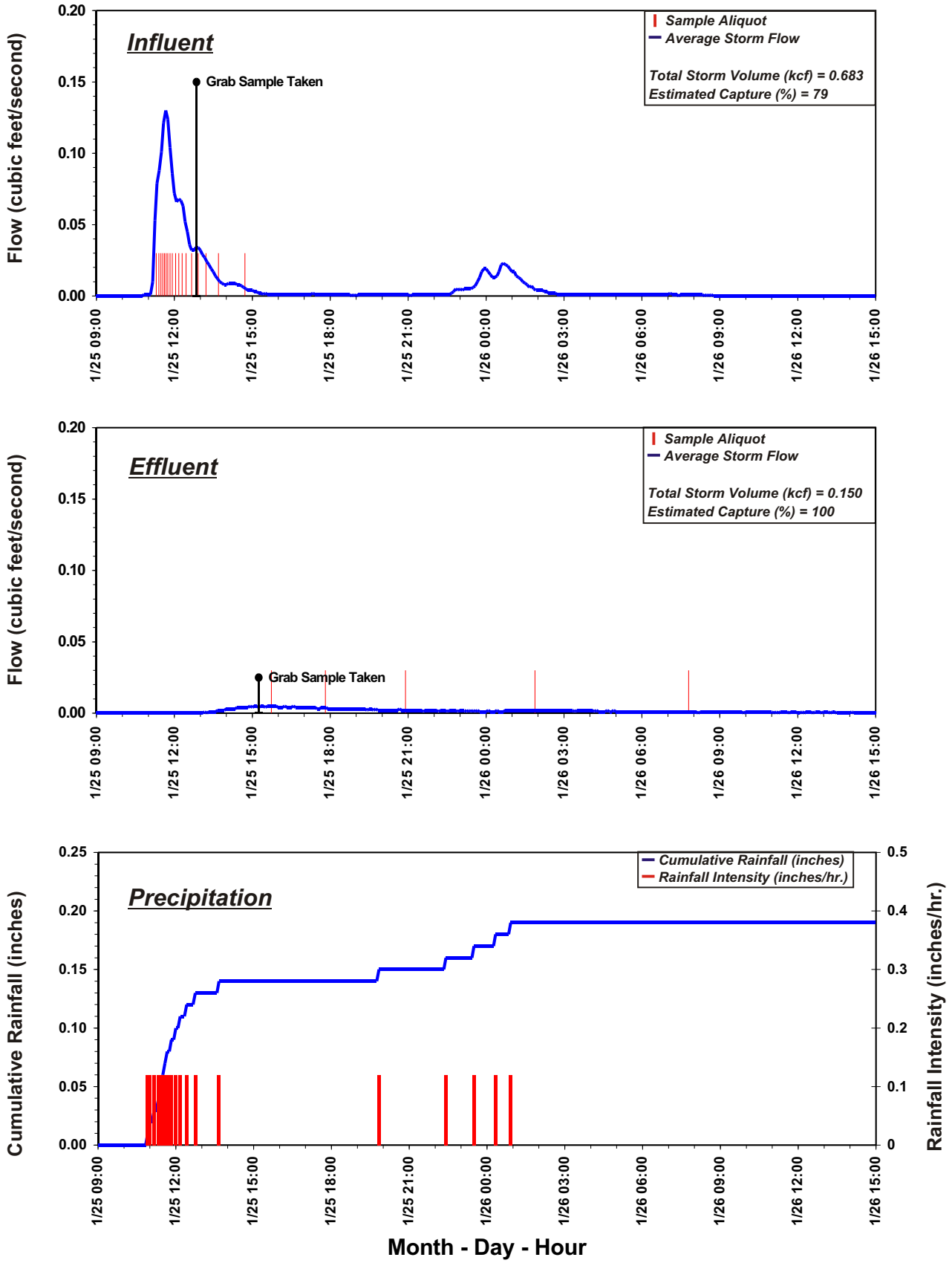


Fig. 1-30. La Costa Ave. Park & Ride Sand Filter-Event 2 (16-17 February 2000)

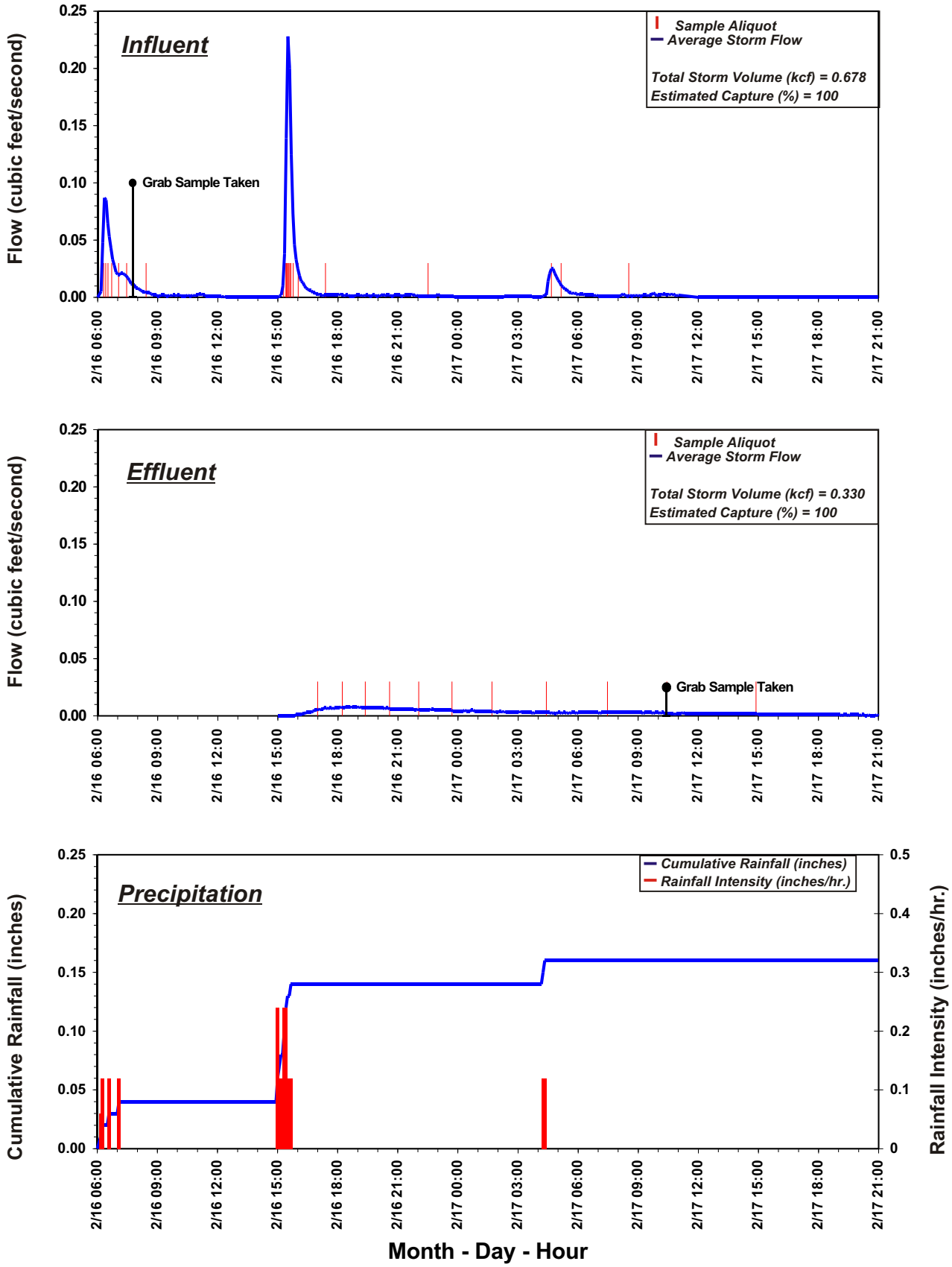


Fig. 1-31. La Costa Ave. Park & Ride Sand Filter-Event 3 (20-22 February 2000)

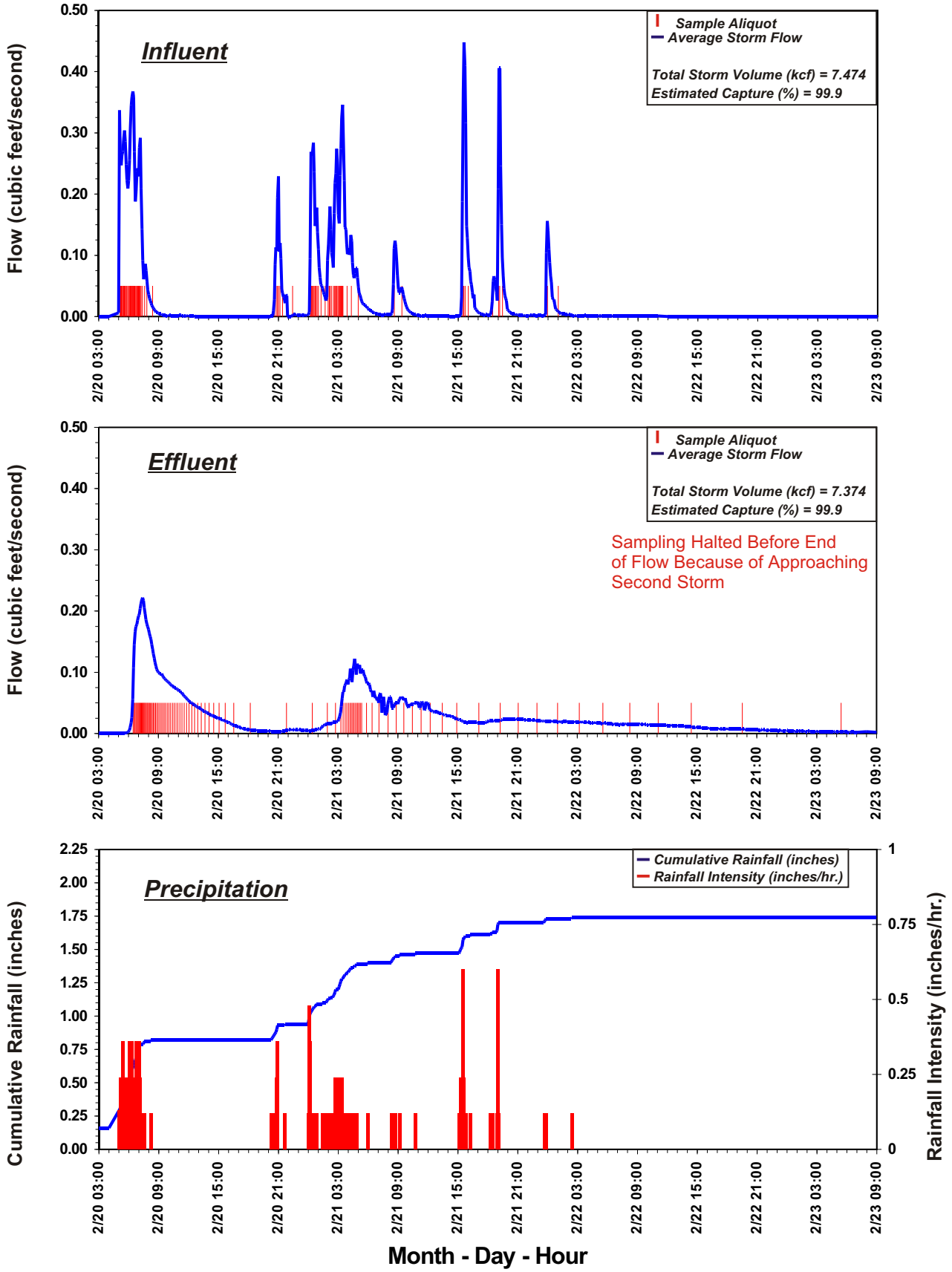


Fig. 1-32. La Costa Ave. Park & Ride Sand Filter-Event 4 (3-6 March 2000)

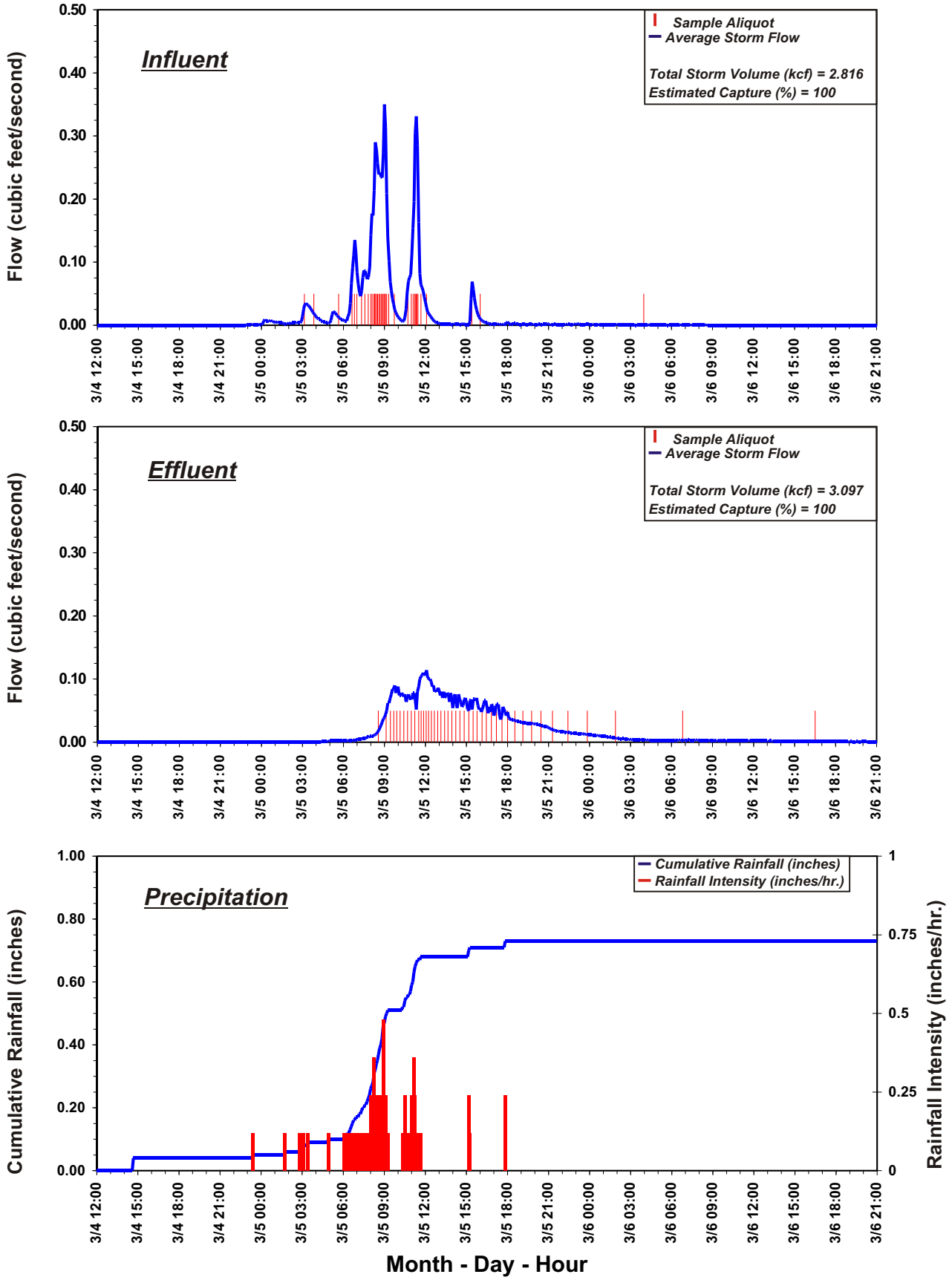


Fig. 1-33. La Costa Ave. Park & Ride Sand Filter-Event 6 (17-20 April 2000)

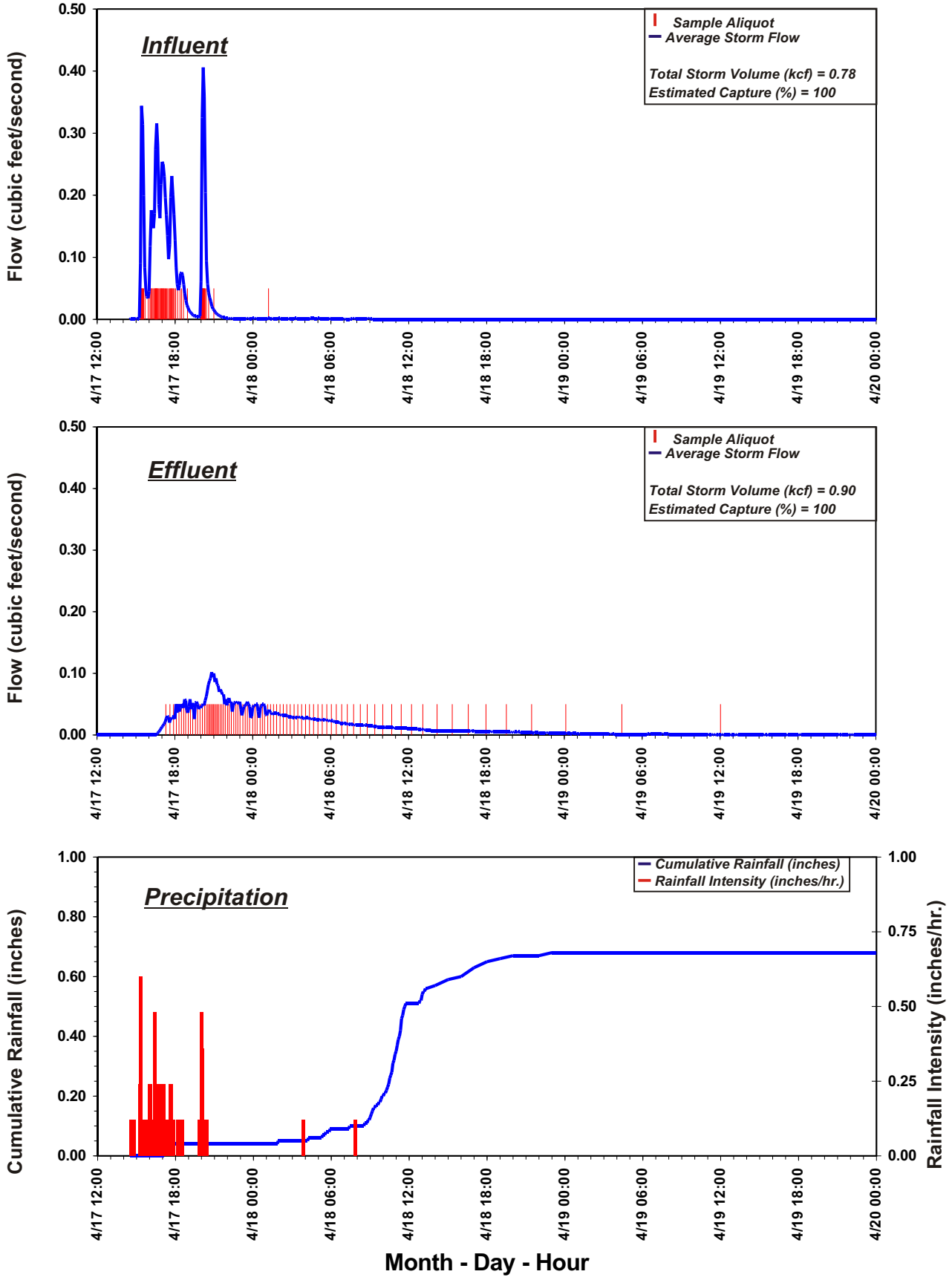


Fig. 1-34. Kearny Mesa Storm Filter-Event 1 (25-27 January 2000)

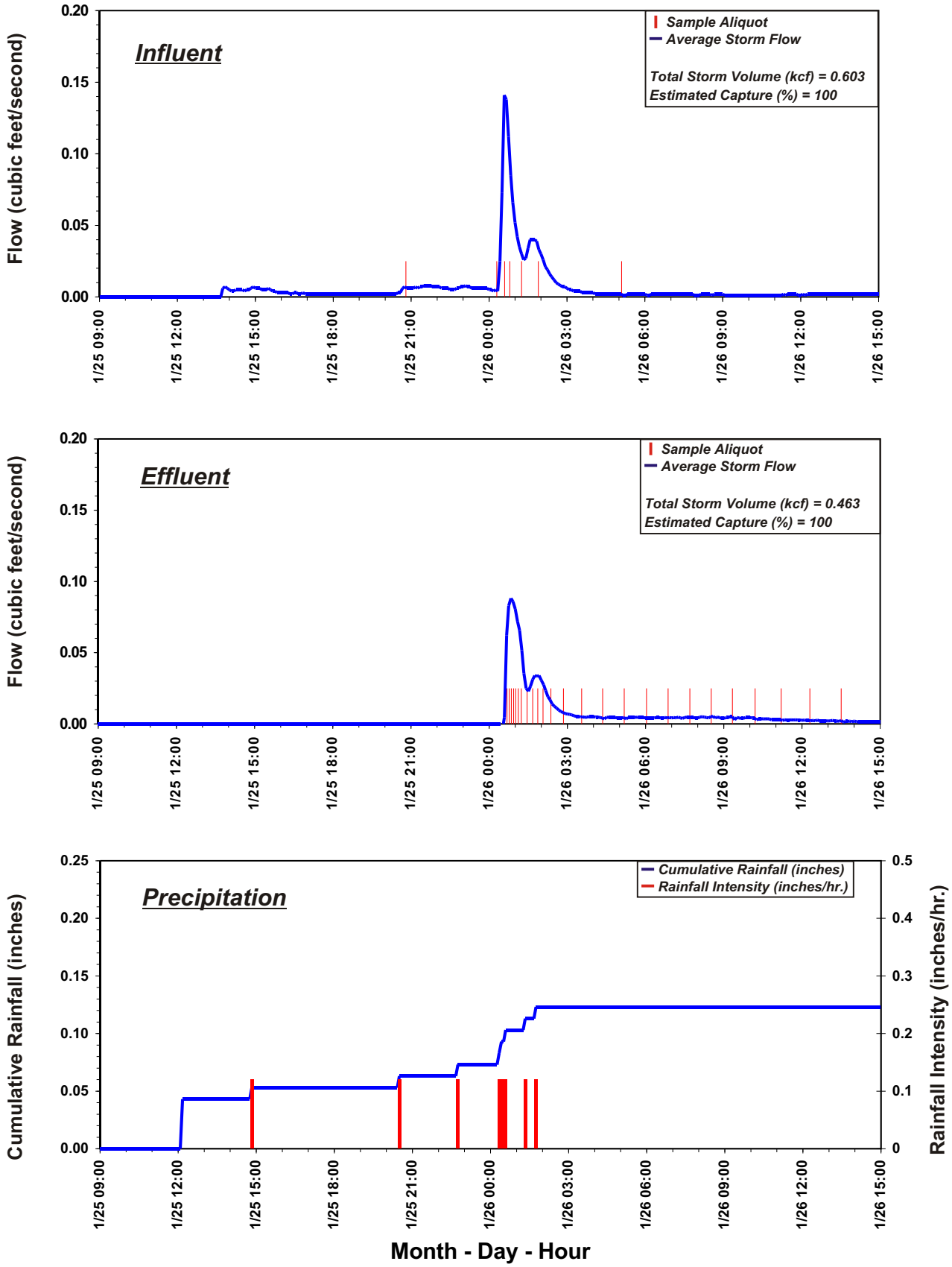


Fig. 1-35. Kearny Mesa Storm Filter-Event 2 (16-17 February 2000)

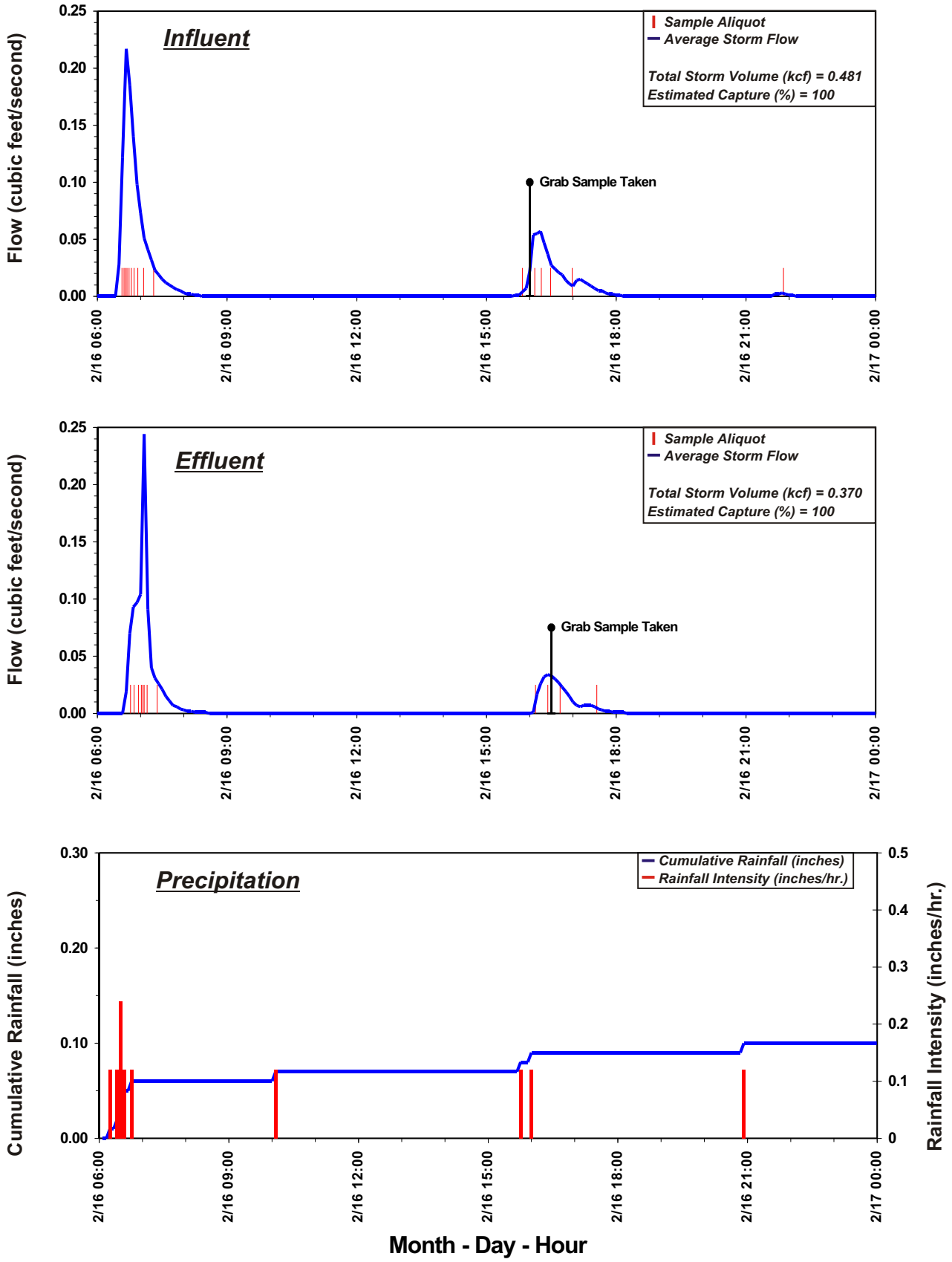


Fig. 1-36. Kearny Mesa Storm Filter-Event 3 (20-22 February 2000)

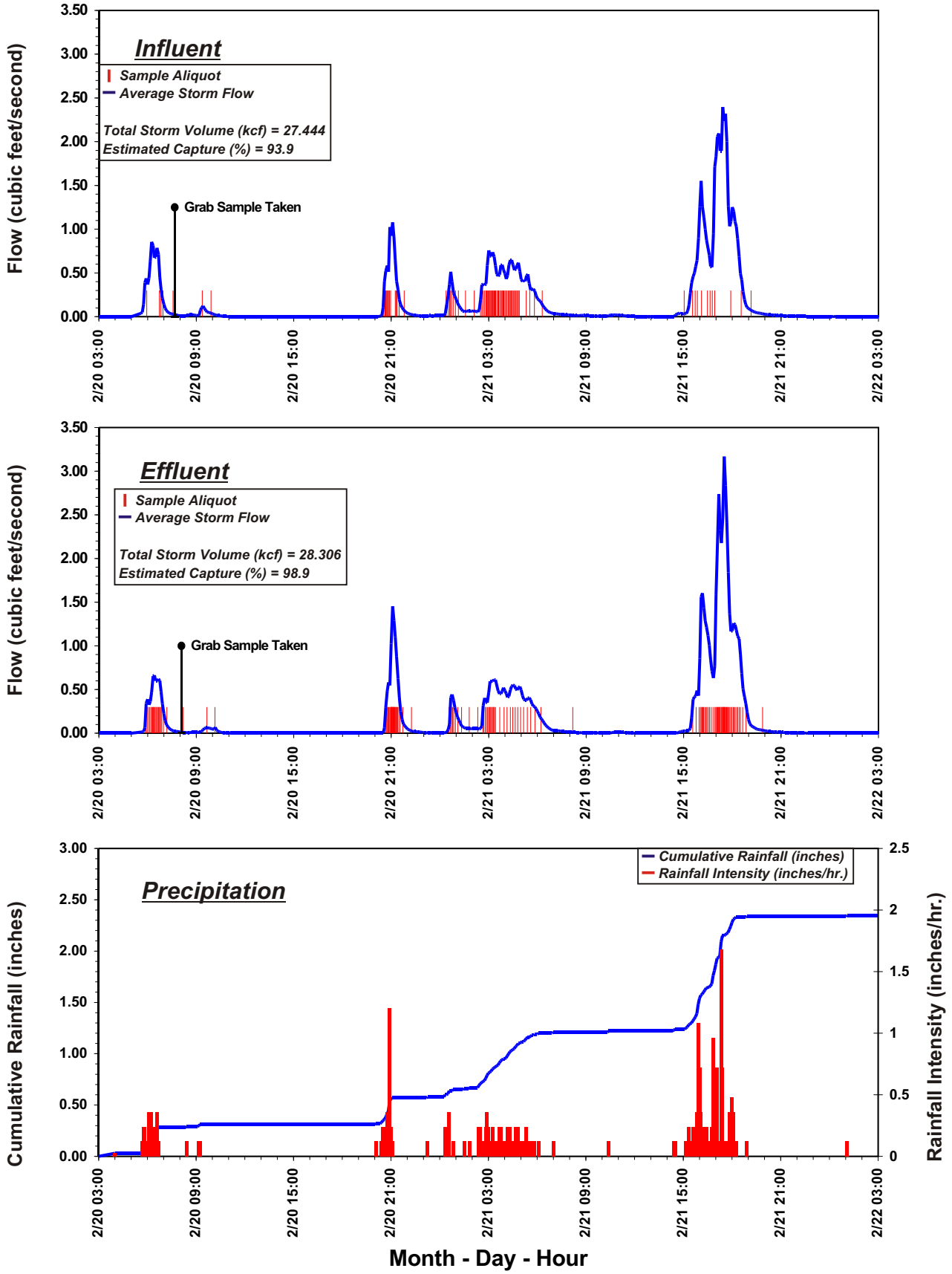


Fig. 1-37. Kearny Mesa Storm Filter-Event 4 (3-6 March 2000)

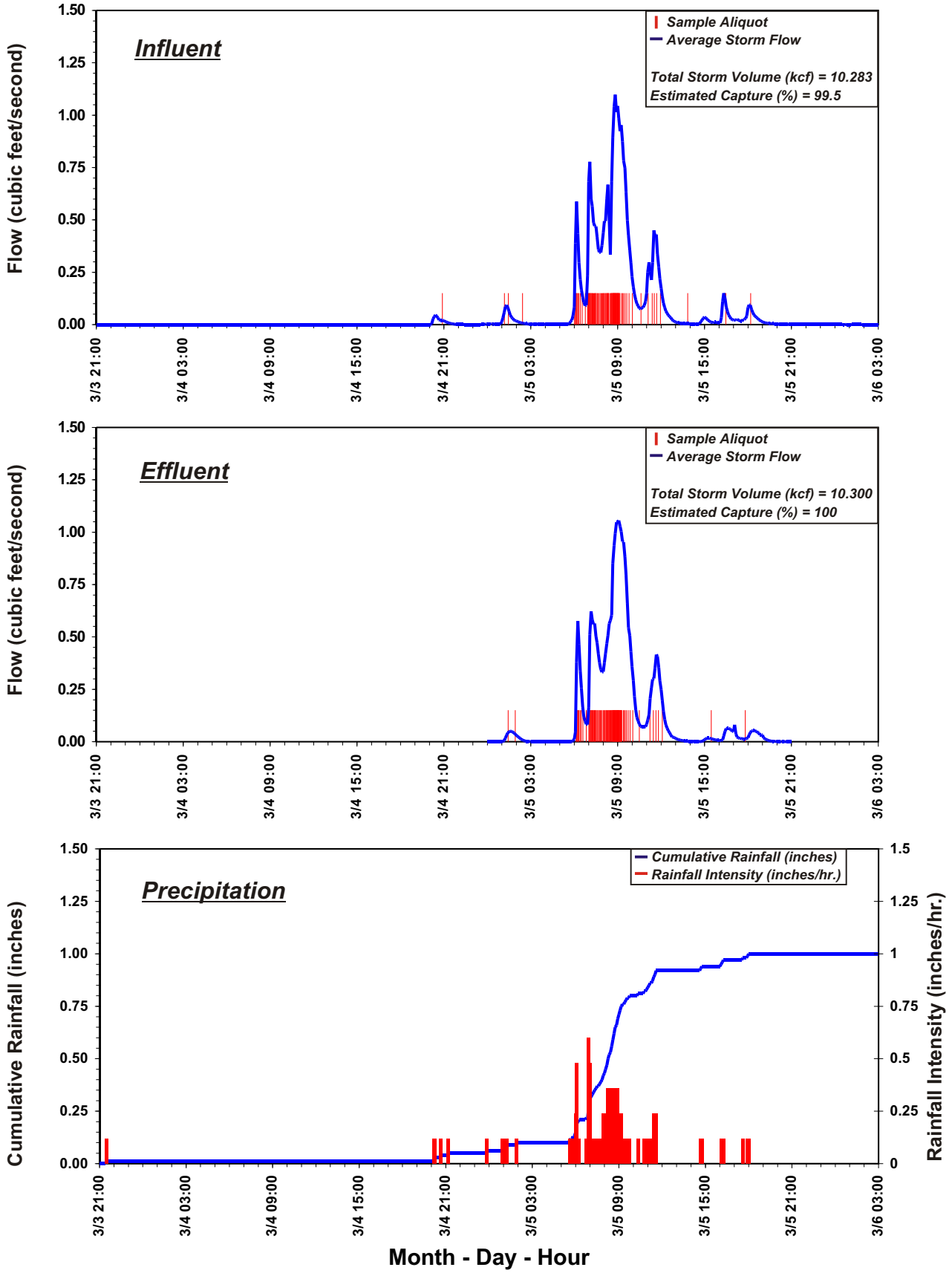


Fig. 1-38. Kearny Mesa Storm Filter-Event 5 (7-8 March 2000)

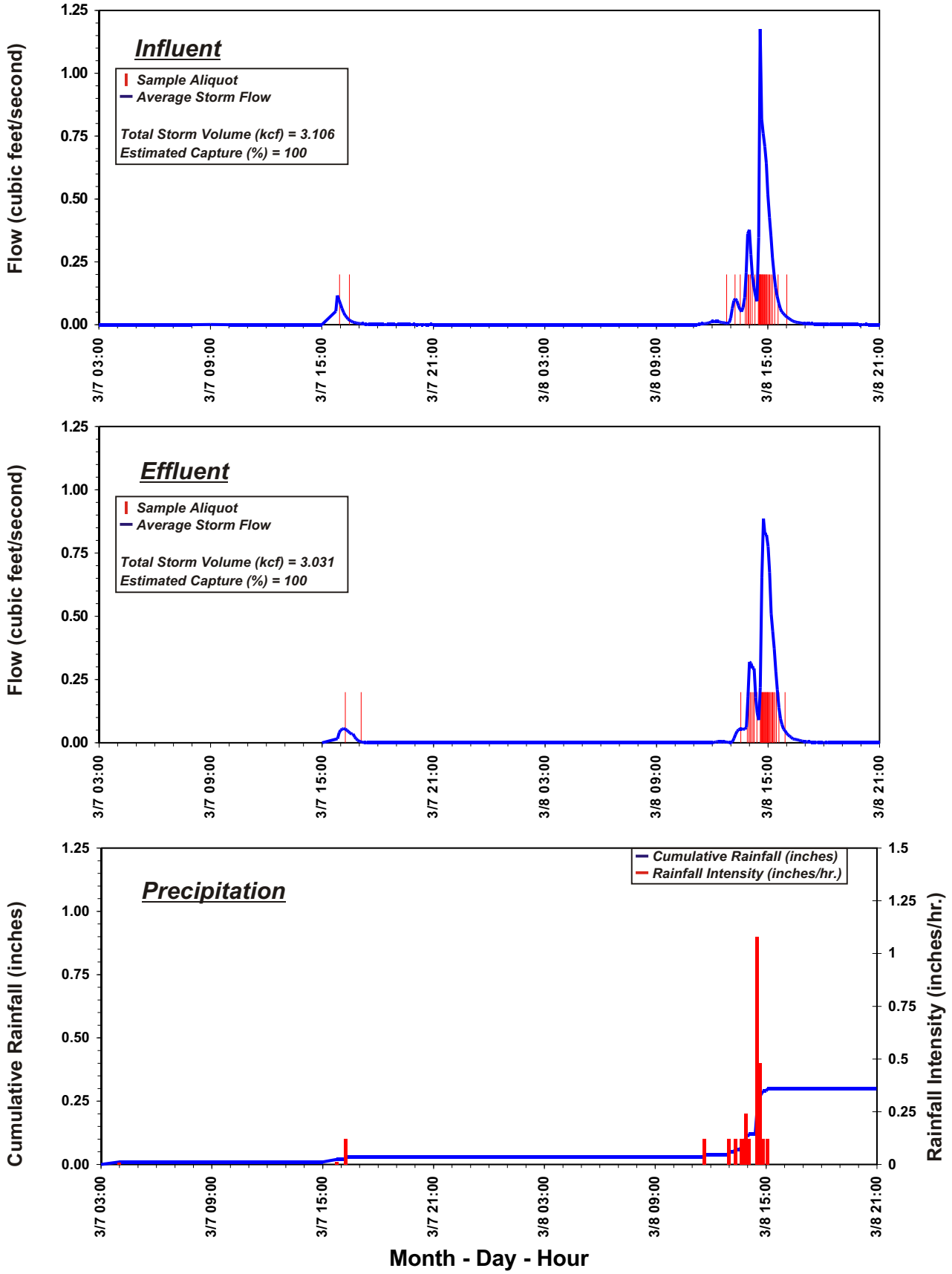


Fig. 1-39. Kearny Mesa Storm Filter-Event 6 (17-18 April 2000)

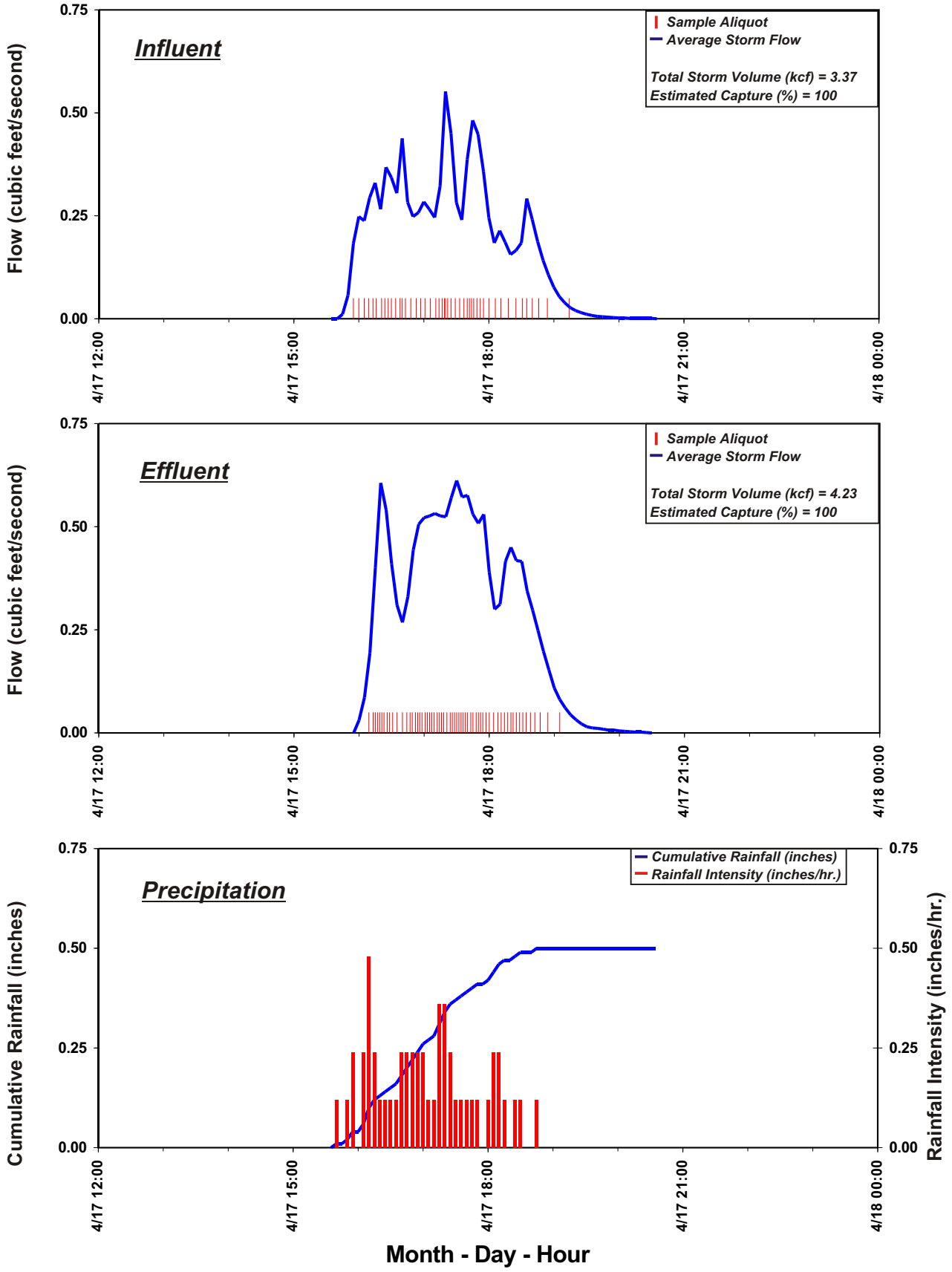


Fig. 1-40. La Costa Ave. Wet Basin-Event 1 (25 January 2000)

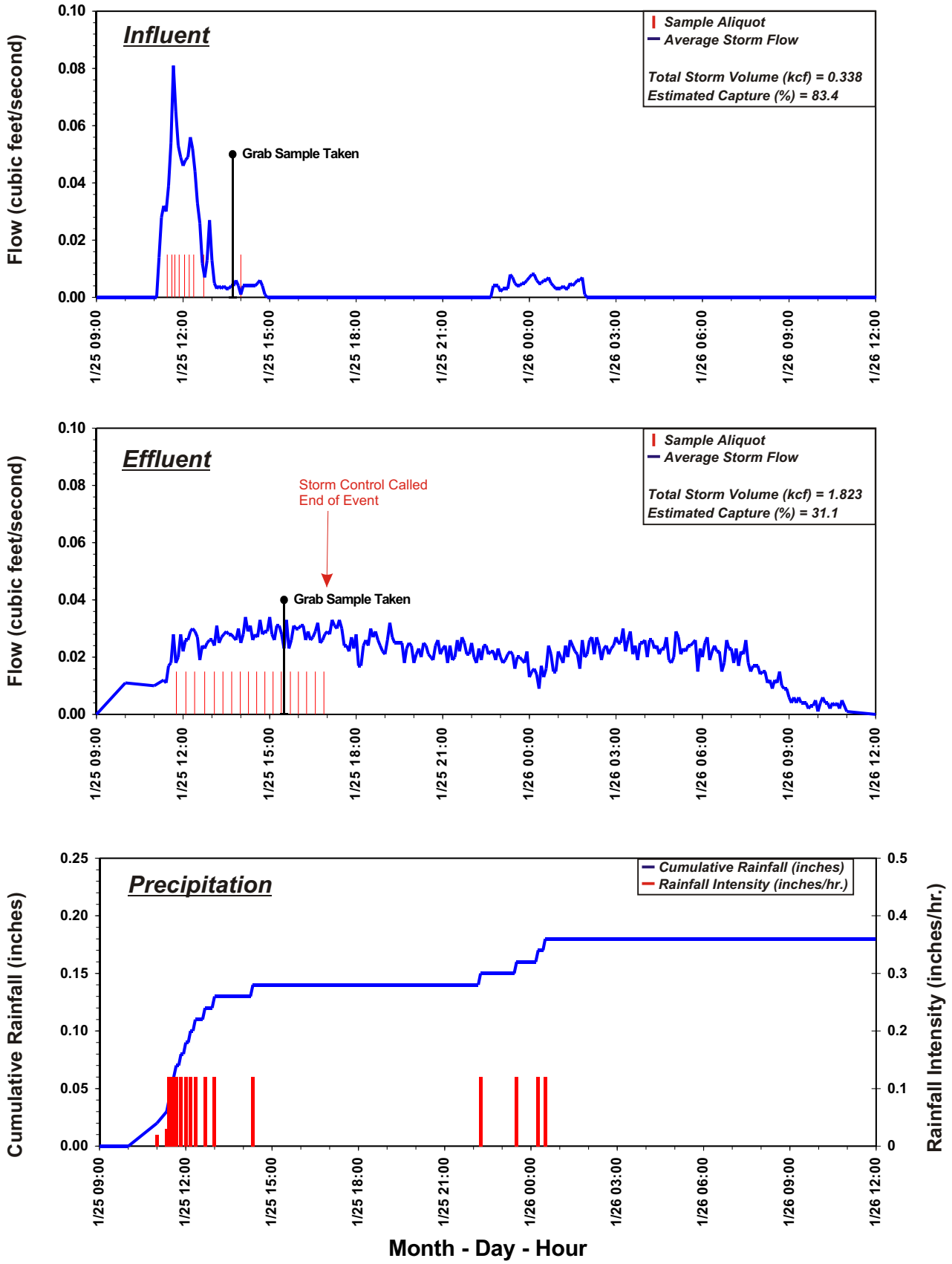


Fig. 1-41. La Costa Ave. Wet Basin-Event 2 (16-17 February 2000)

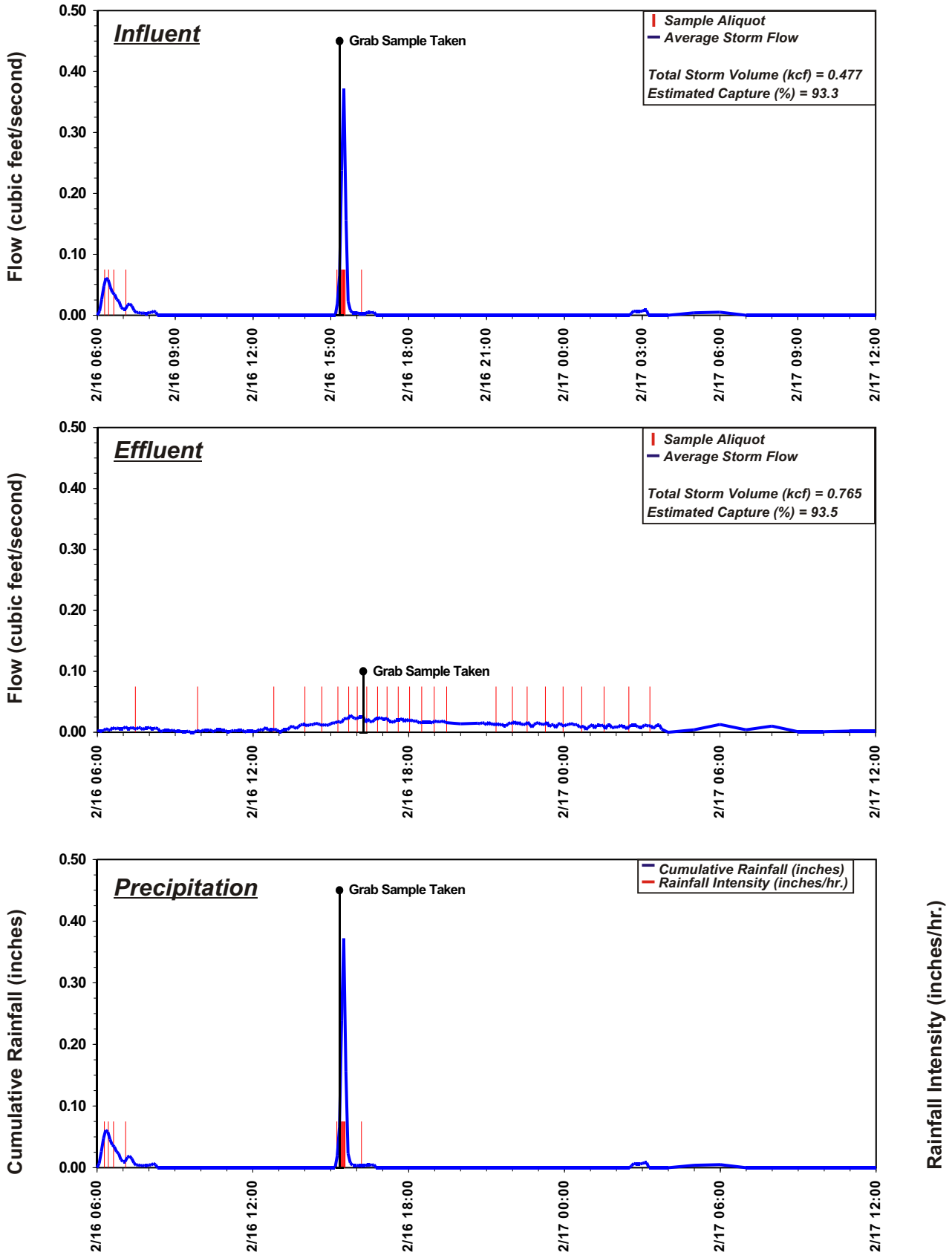


Fig. 1-42. La Costa Ave. Wet Basin-Event 3 (20-22 February 2000)

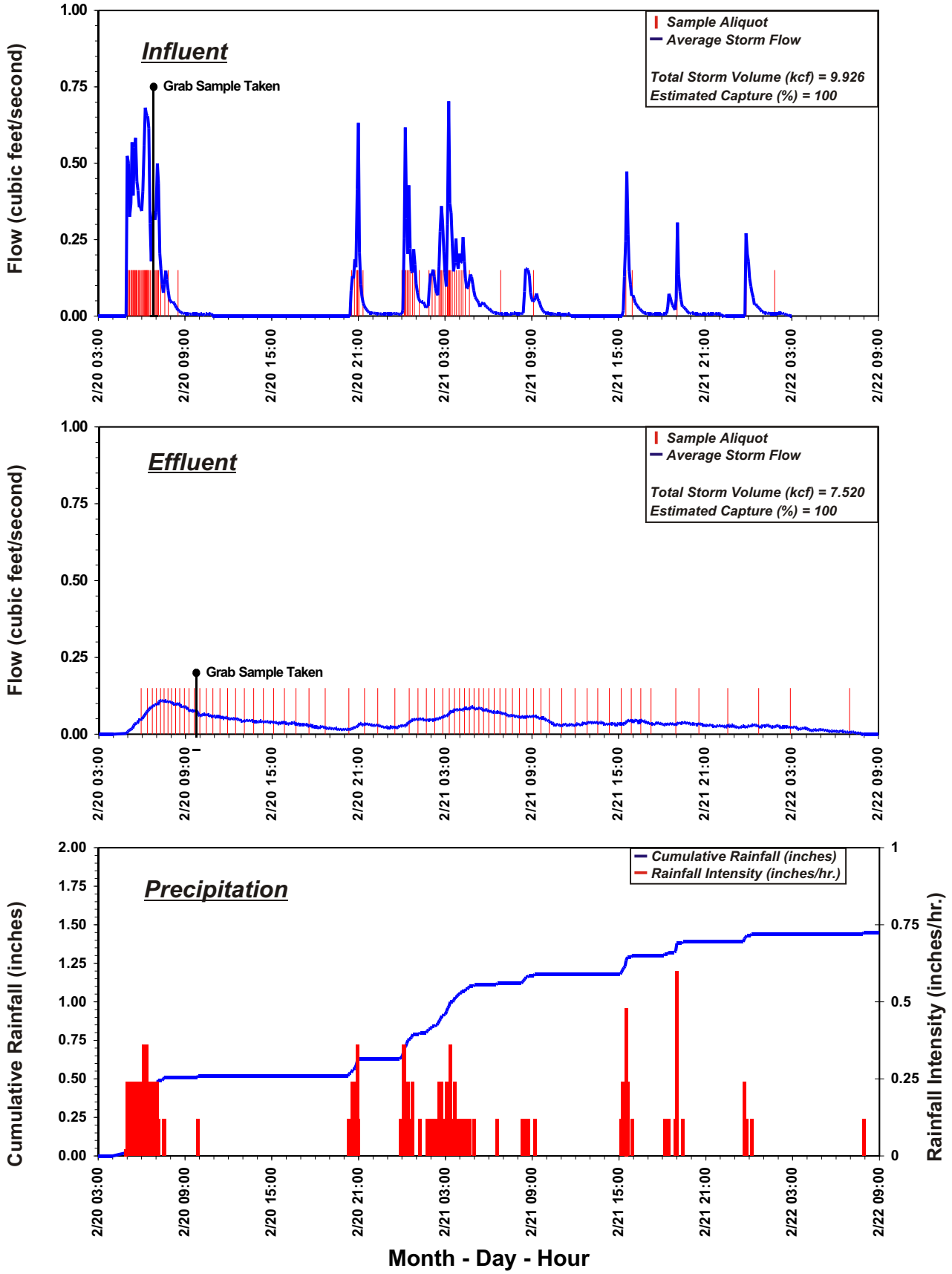


Fig. 1-43. La Costa Ave. Wet Basin-Event 4 (5-7 March 2000)

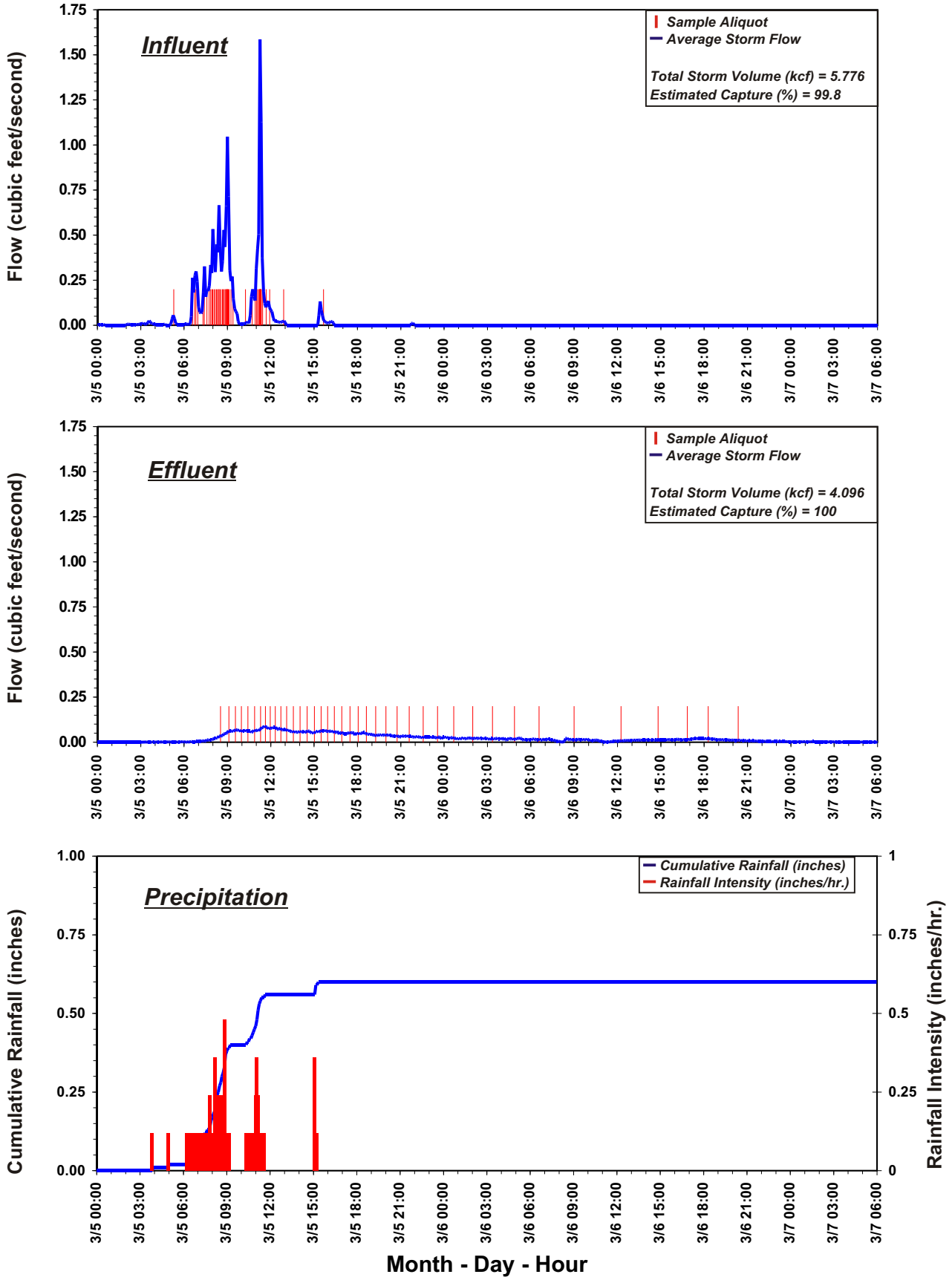


Fig. 1-44. La Costa Ave. Wet Basin-Event 6 (17-19 April 2000)

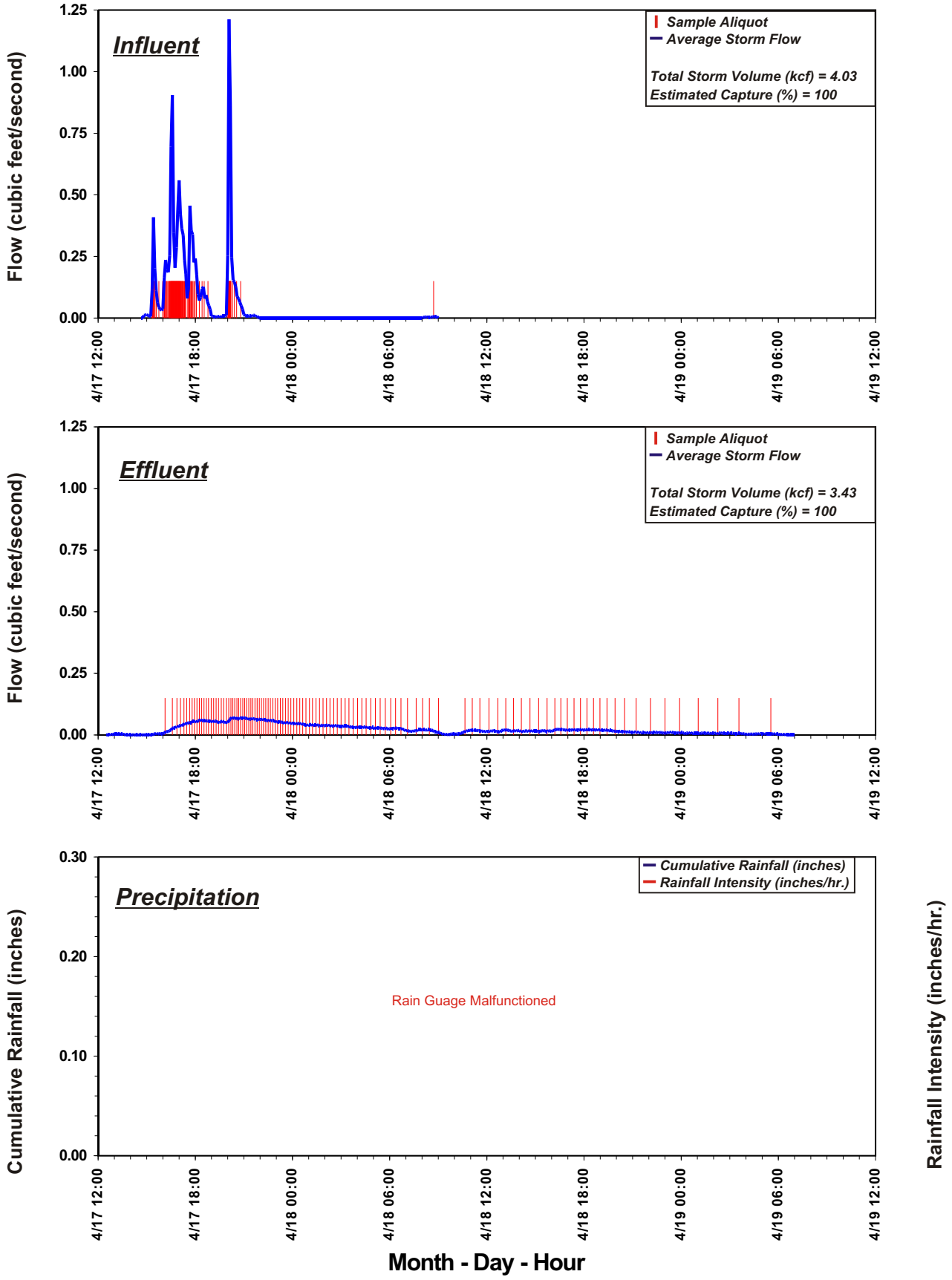


Fig. 1-45. Palomar Biofiltration Swale-Event 3 (20 February 2000)

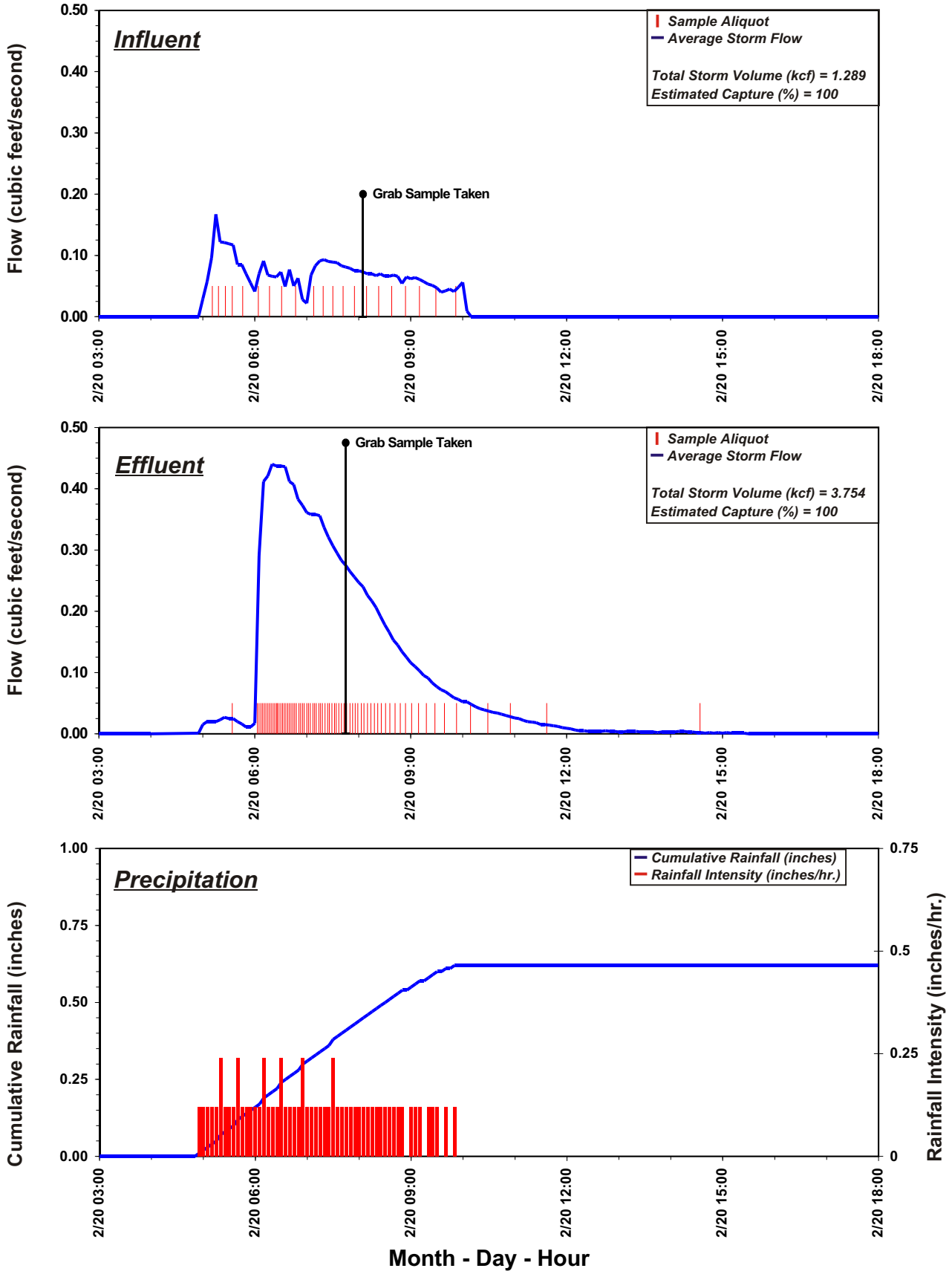


Fig. 1-46. Palomar Biofiltration Swale-Event 4 (4-5 March 2000)

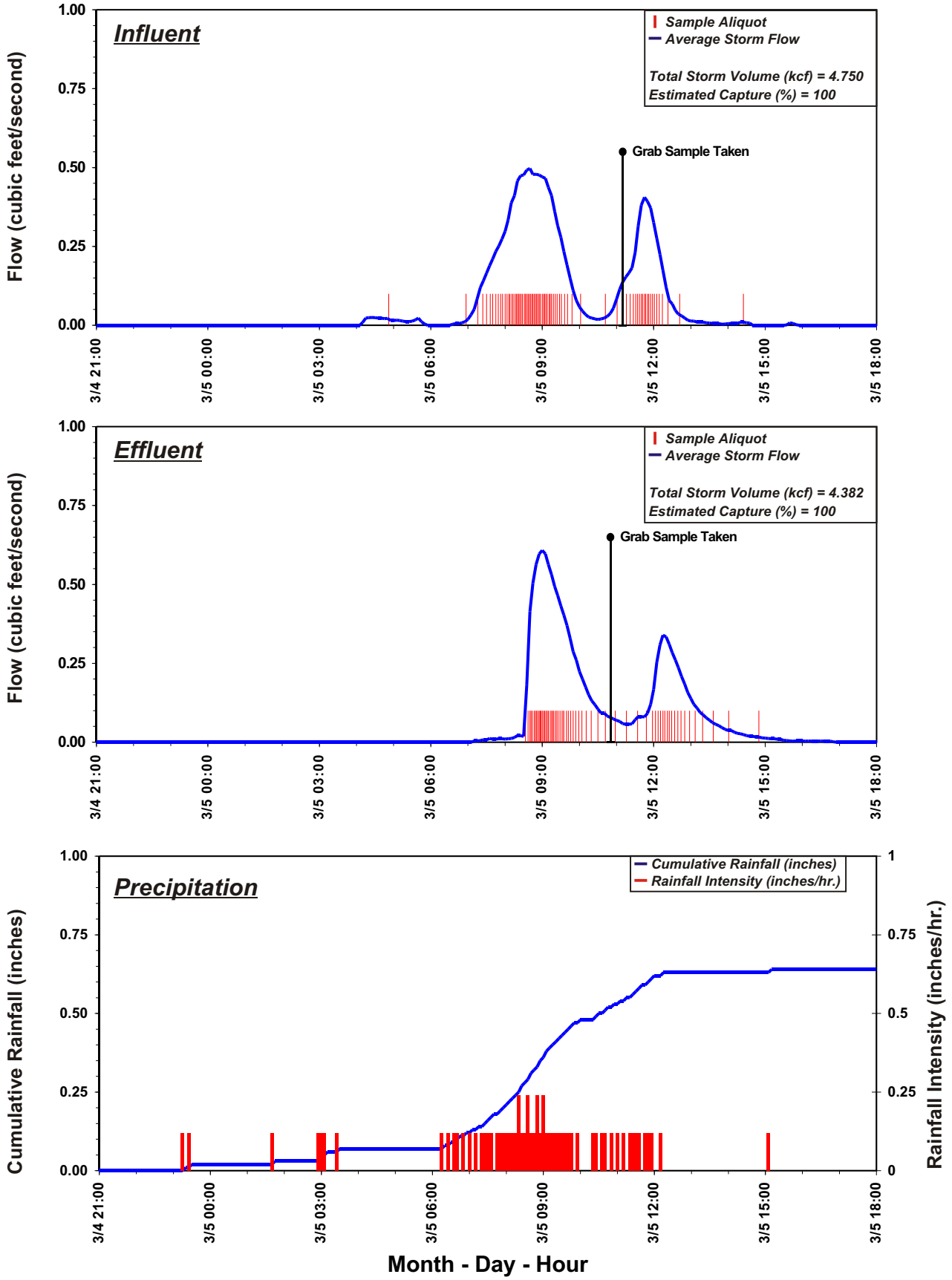


Fig. 1-47. Palomar Biofiltration Swale-Event 6 (17 April 2000)

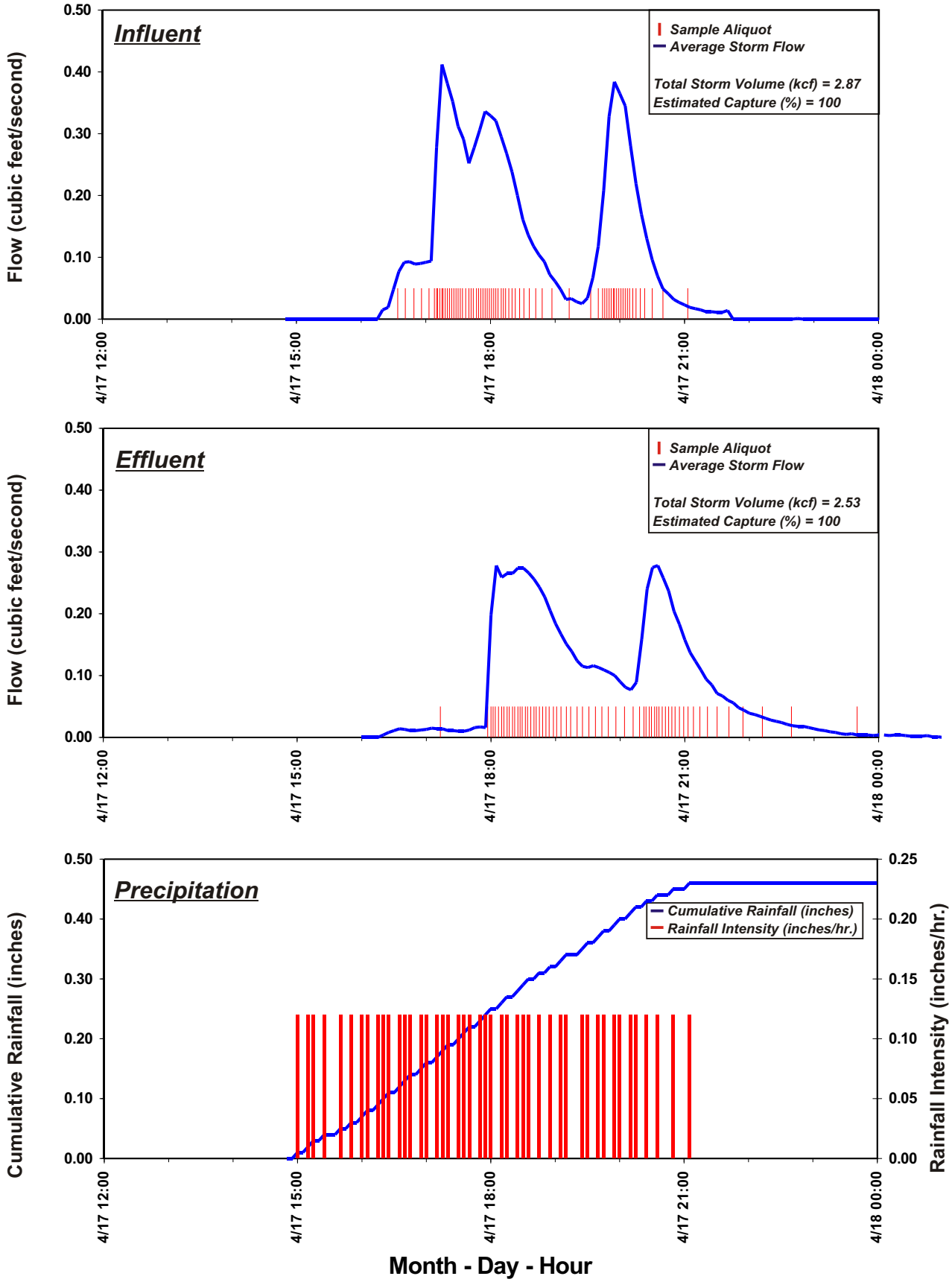


Fig. 1-48. Carlsbad MS Biofiltration Strip/Infiltration Trench-Event 1 (25-26 January 2000)

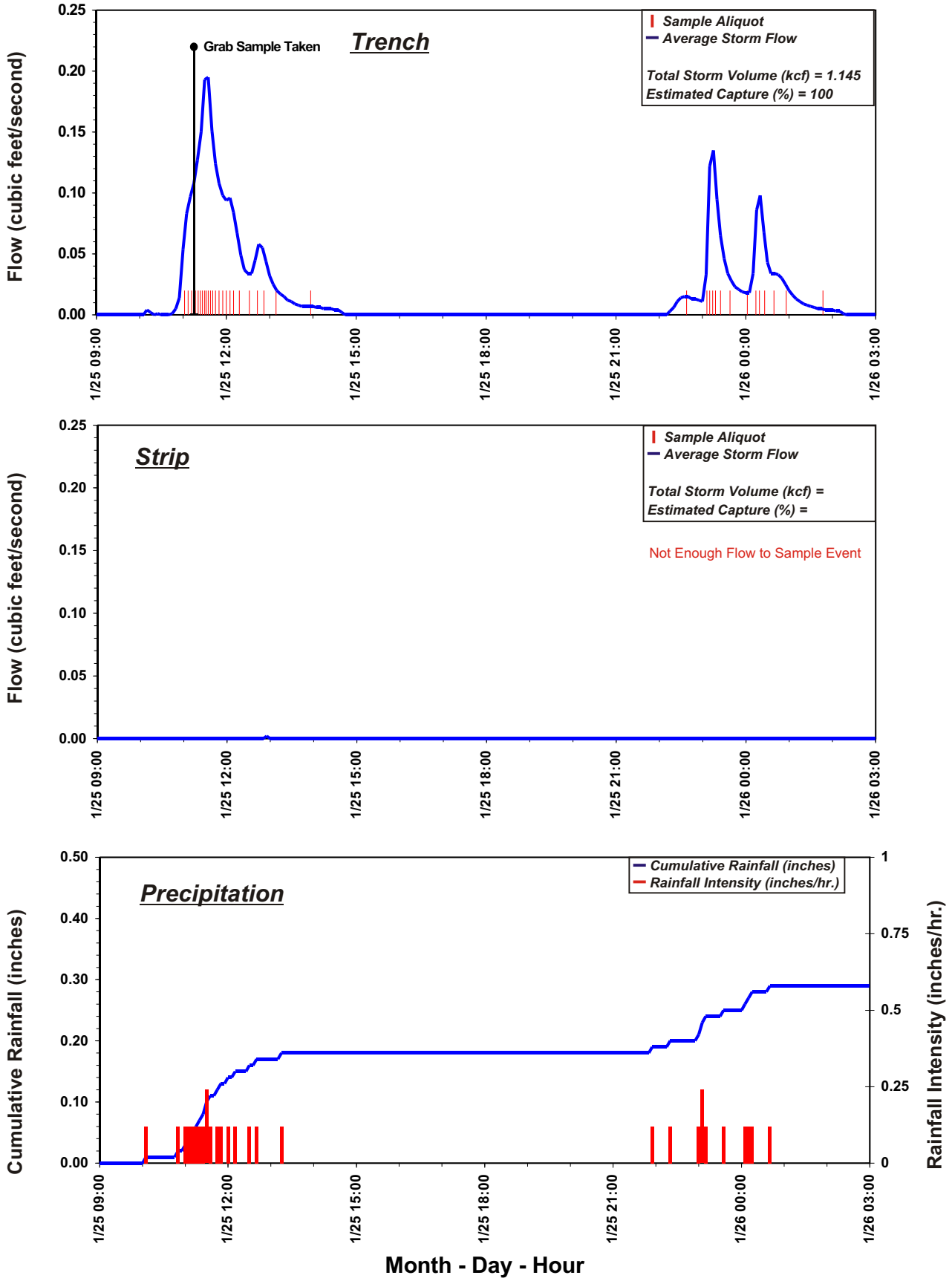


Fig. 1-49. Carlsbad MS Biofiltration Strip/Infiltration Trench-Event 2 (16 February 2000)

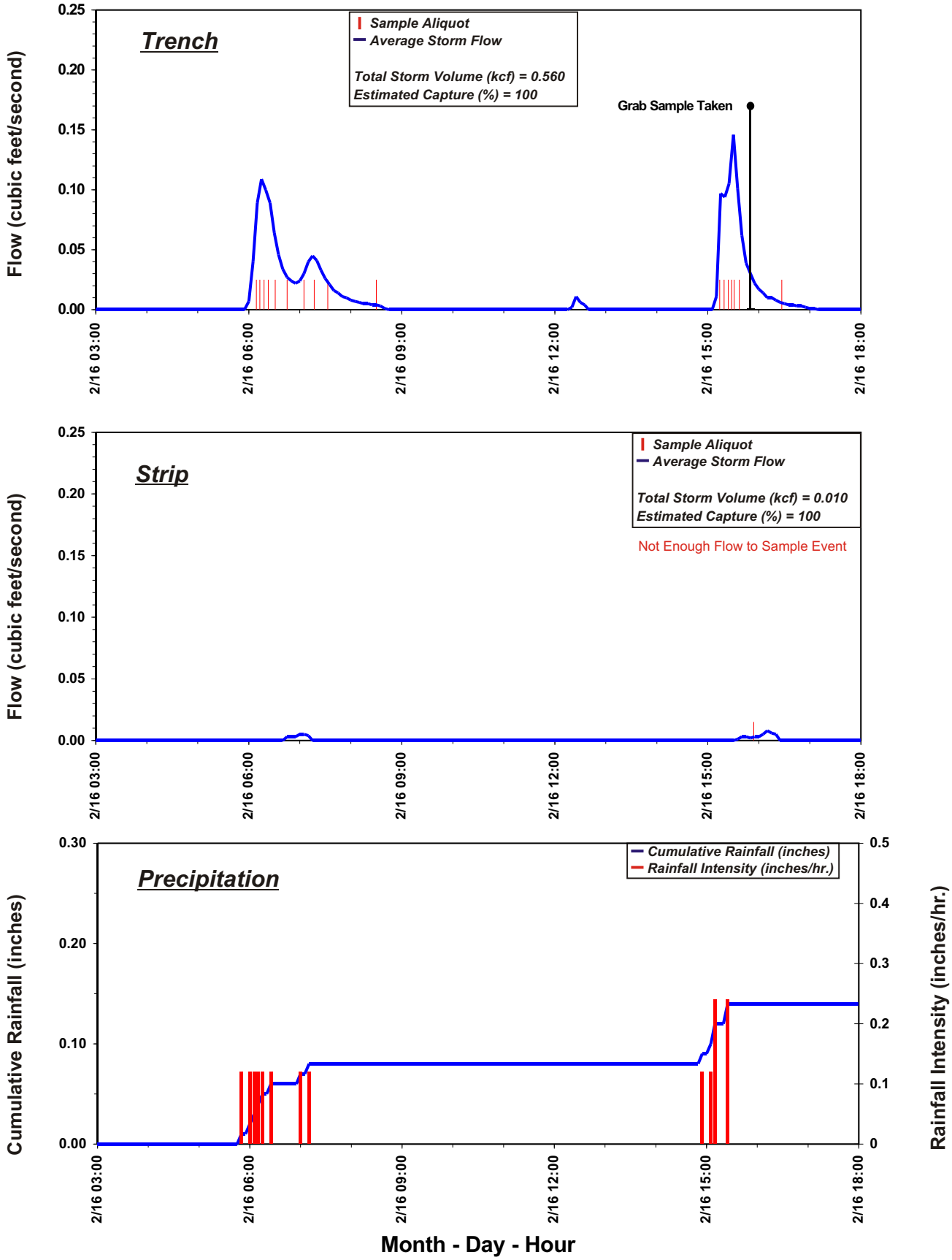


Fig. 1-50. Carlsbad MS Biofiltration Strip/Infiltration Trench-Event 3 (20 February 2000)

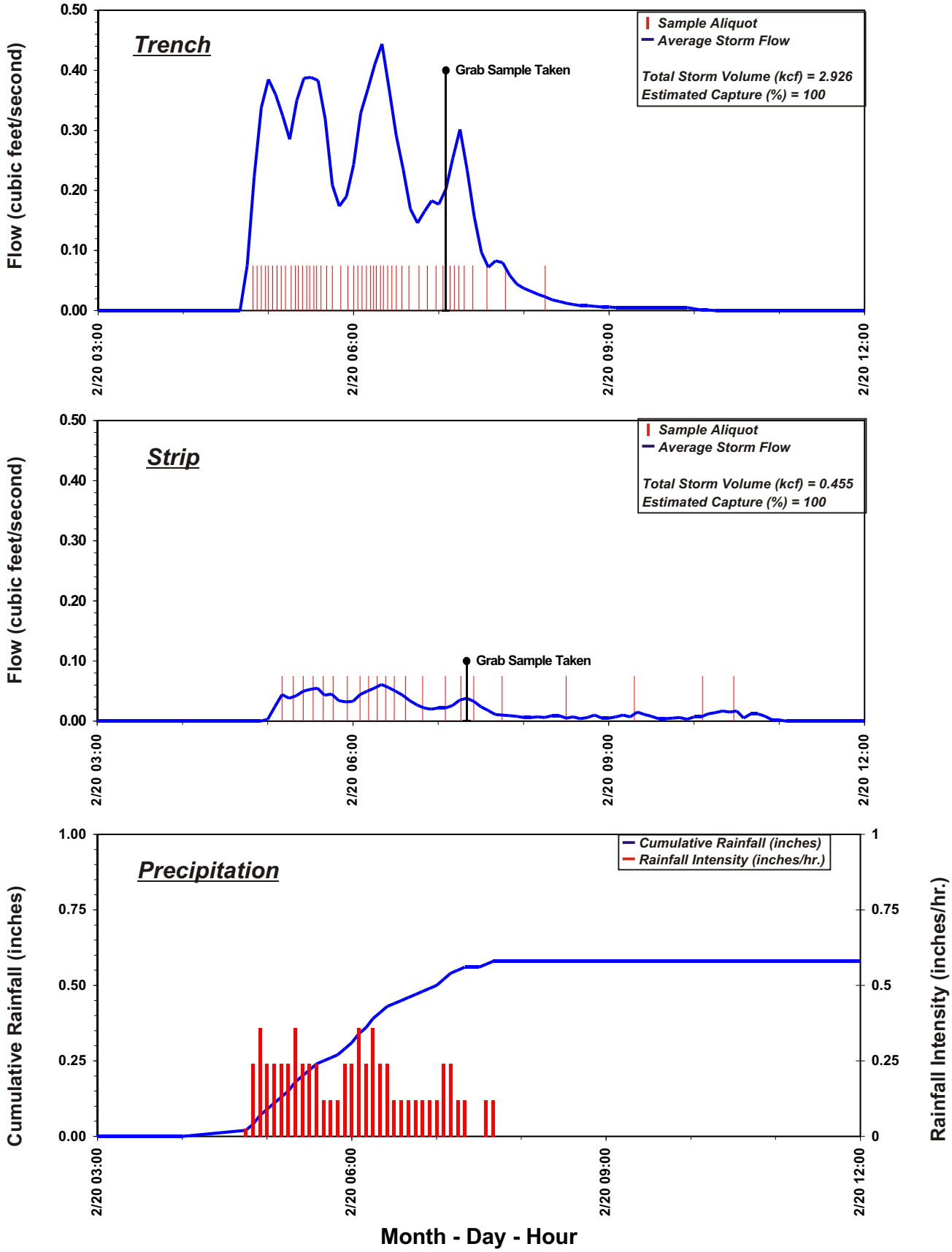


Fig. 1-51. Carlsbad MS Biofiltration Strip/Infiltration Trench-Event 4 (3-5 March 2000)

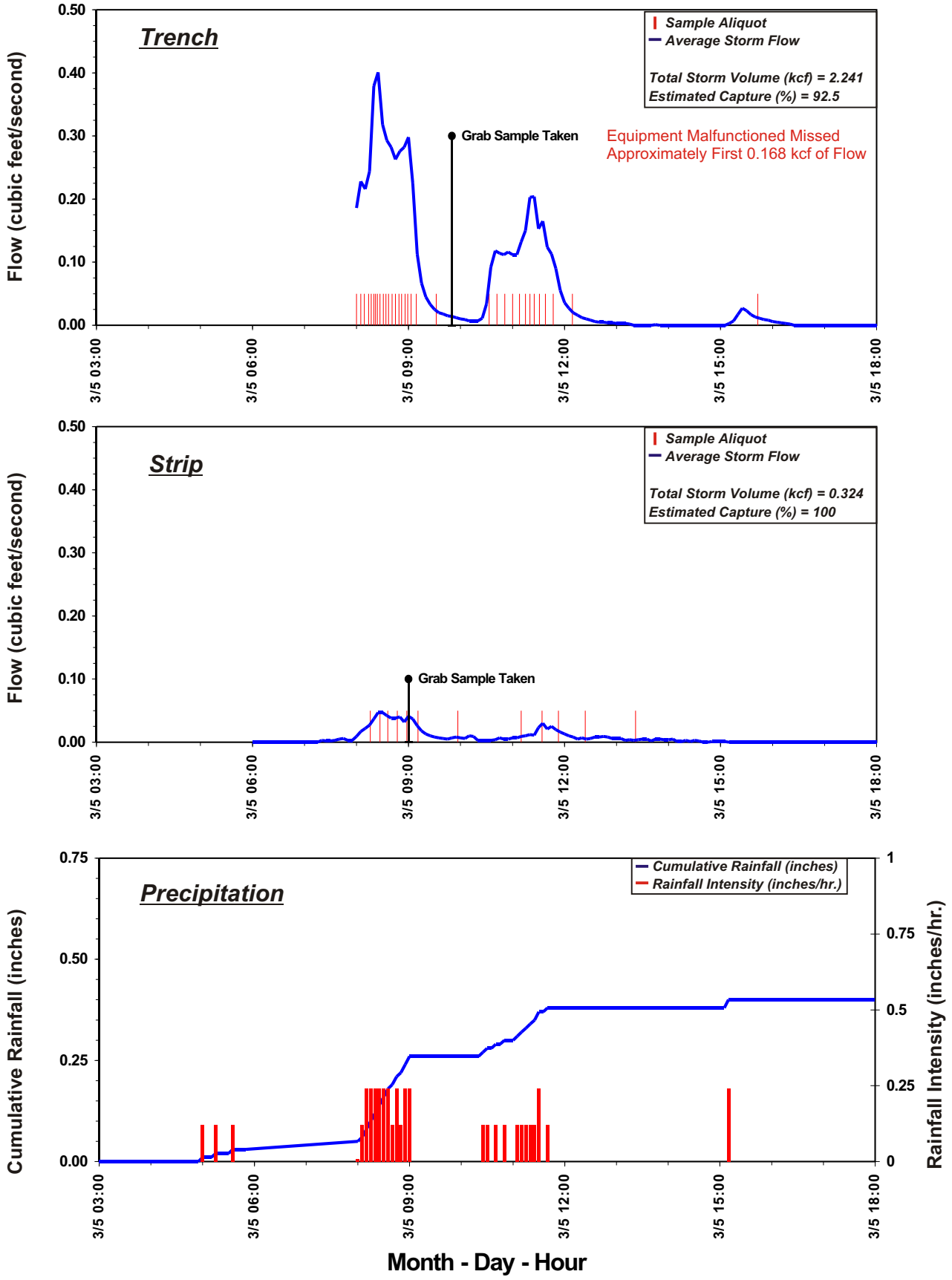


Fig. 1-52. Carlsbad MS Biofiltration Strip/Infiltration Trench-Event 6 (17-18 April 2000)

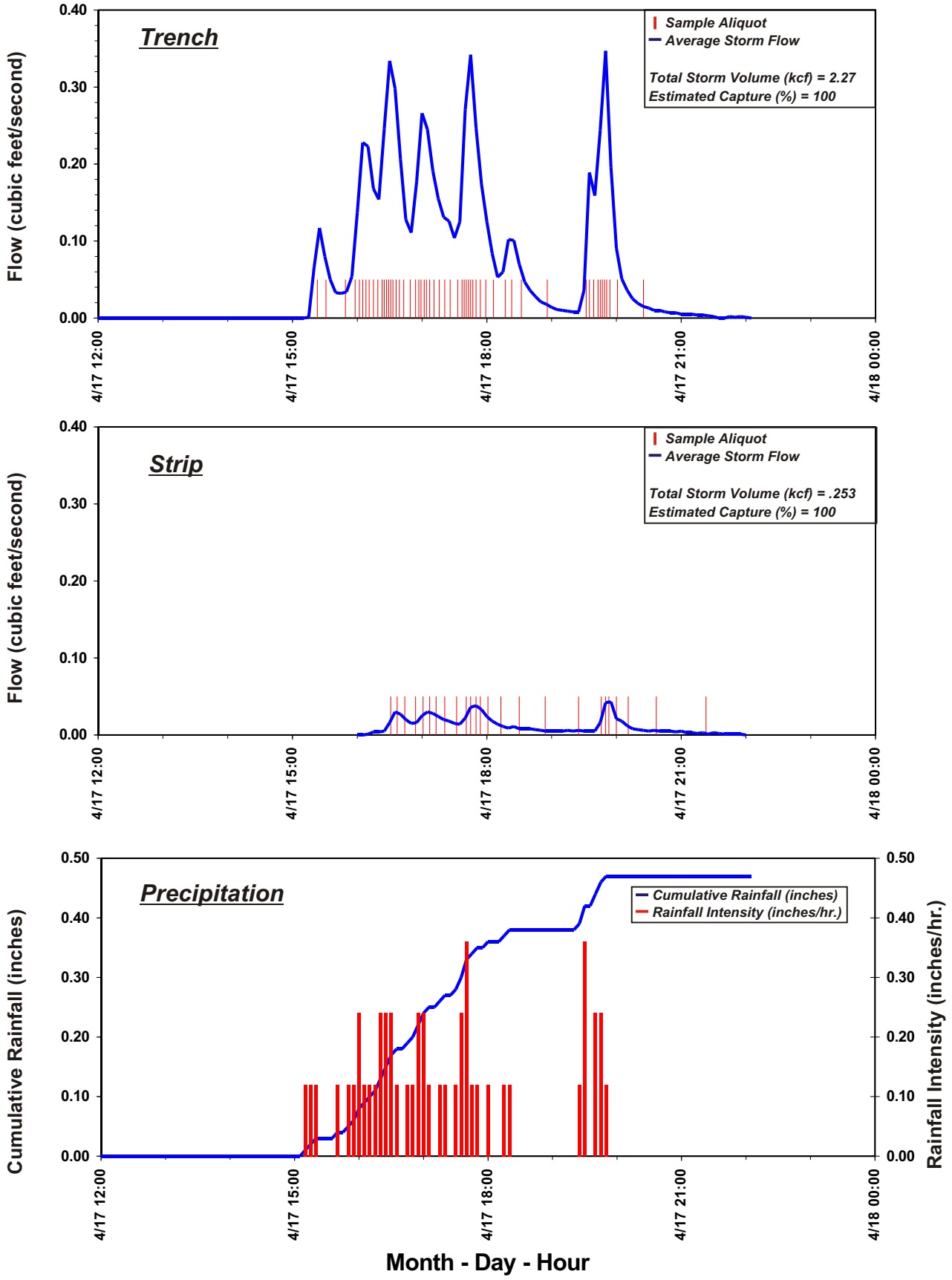


Fig. 1-53. Melrose Ave./SR78 Biofiltration Swale-Event 4 (4-6 March 2000)

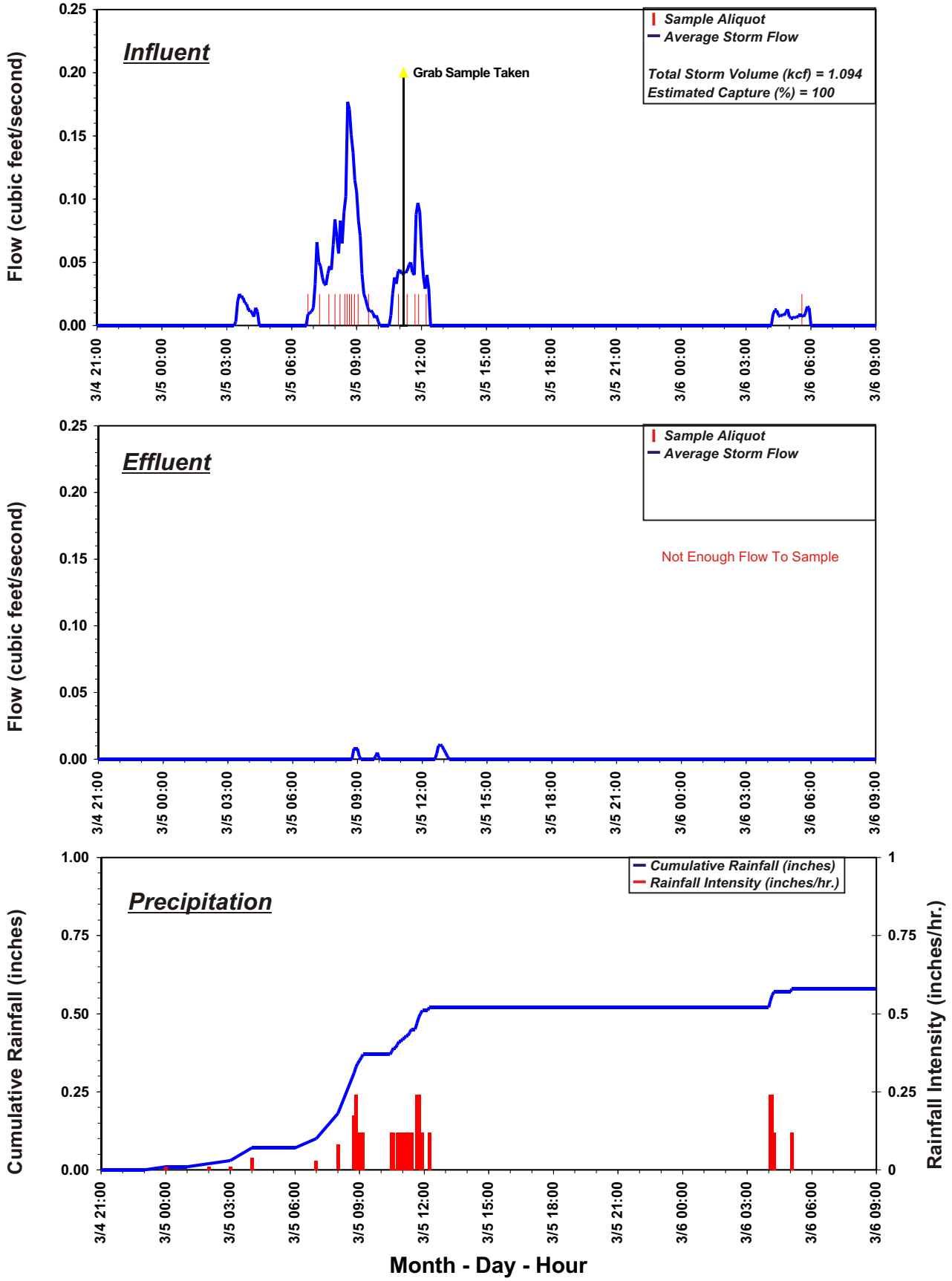


Fig. 1-54. Melrose Ave./SR78 Biofiltration Swale-Event 6 (17-18 April 2000)

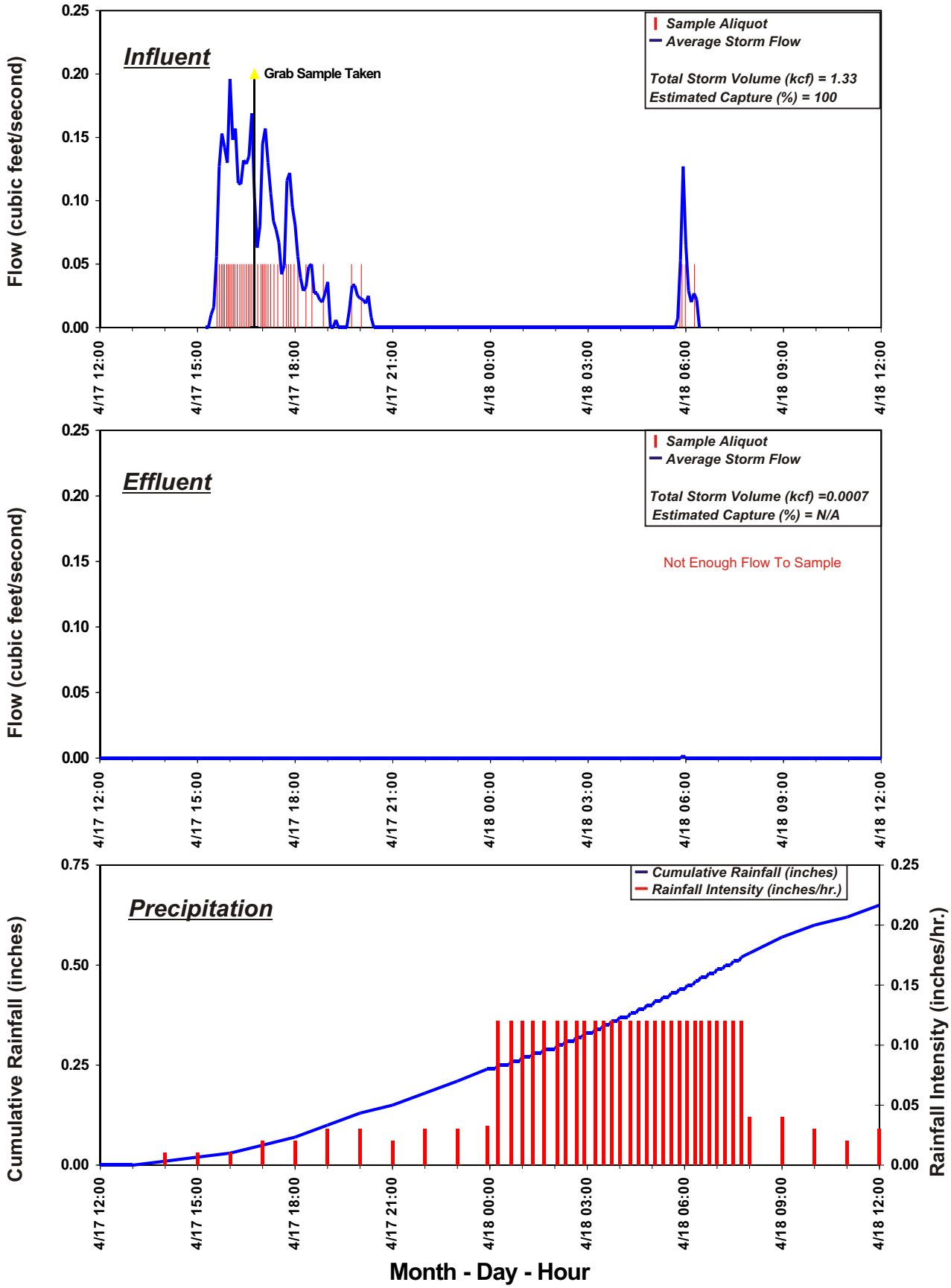
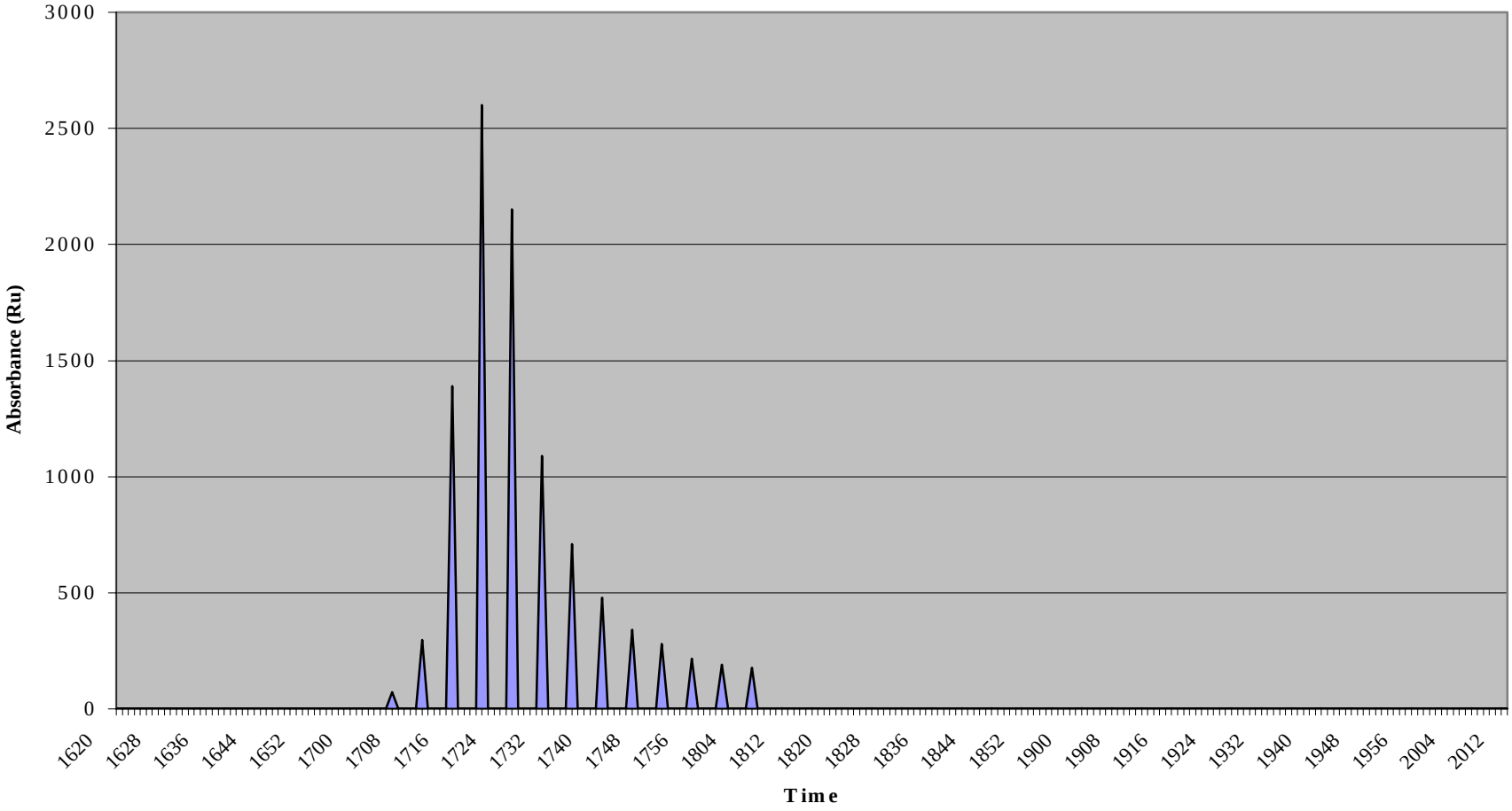


Figure 1-55a Palomar Hydraulic Residence Time Evaluation: Absorbance



Each spike represents an individual grab sample taken at 5-minute intervals.

Figure 1-55b Palomar Hydraulic Residence Time Evaluation: Total Volume

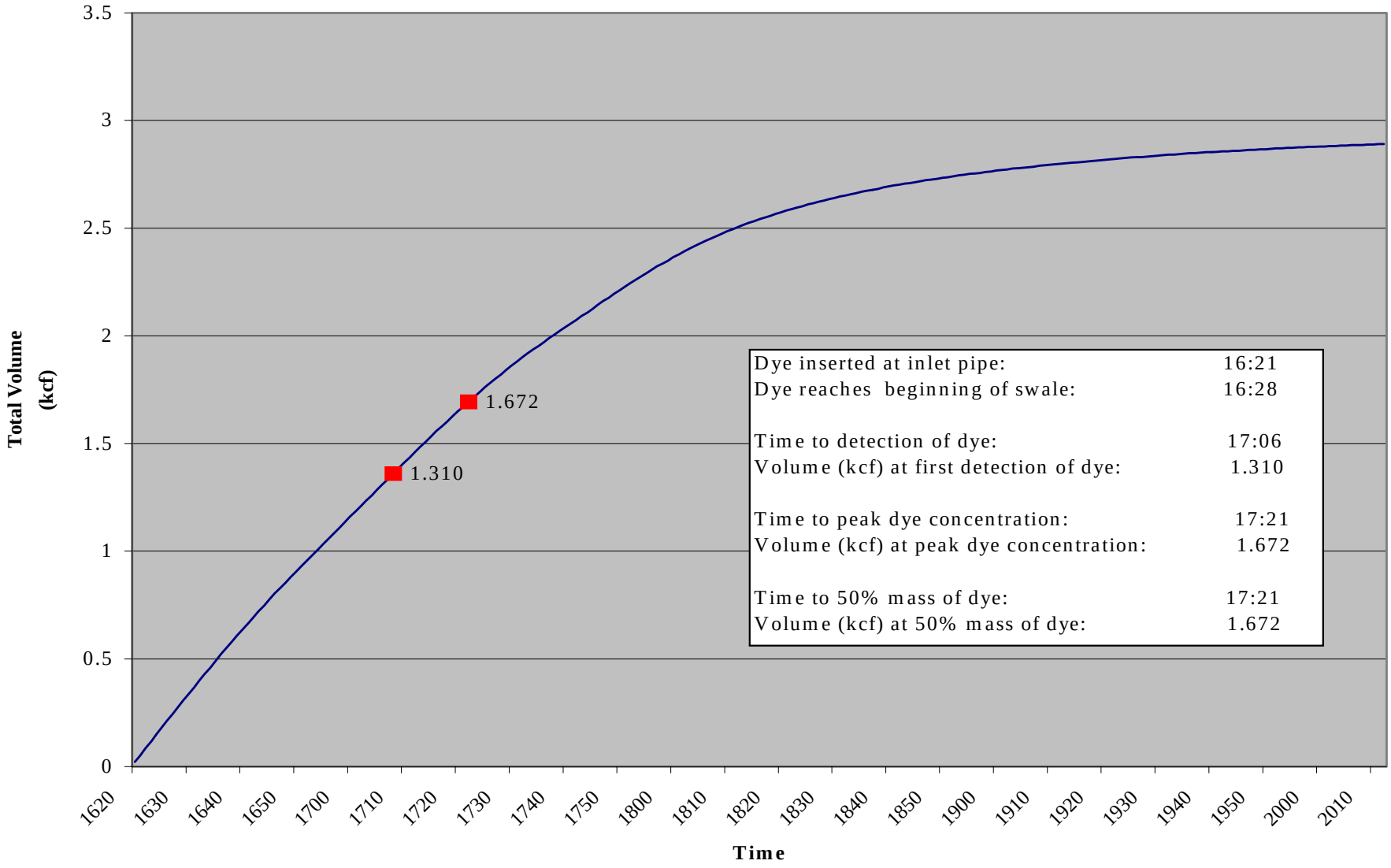


Figure 1-55c Palomar Hydraulic Residence Time Evaluation: Flow (Effluent)

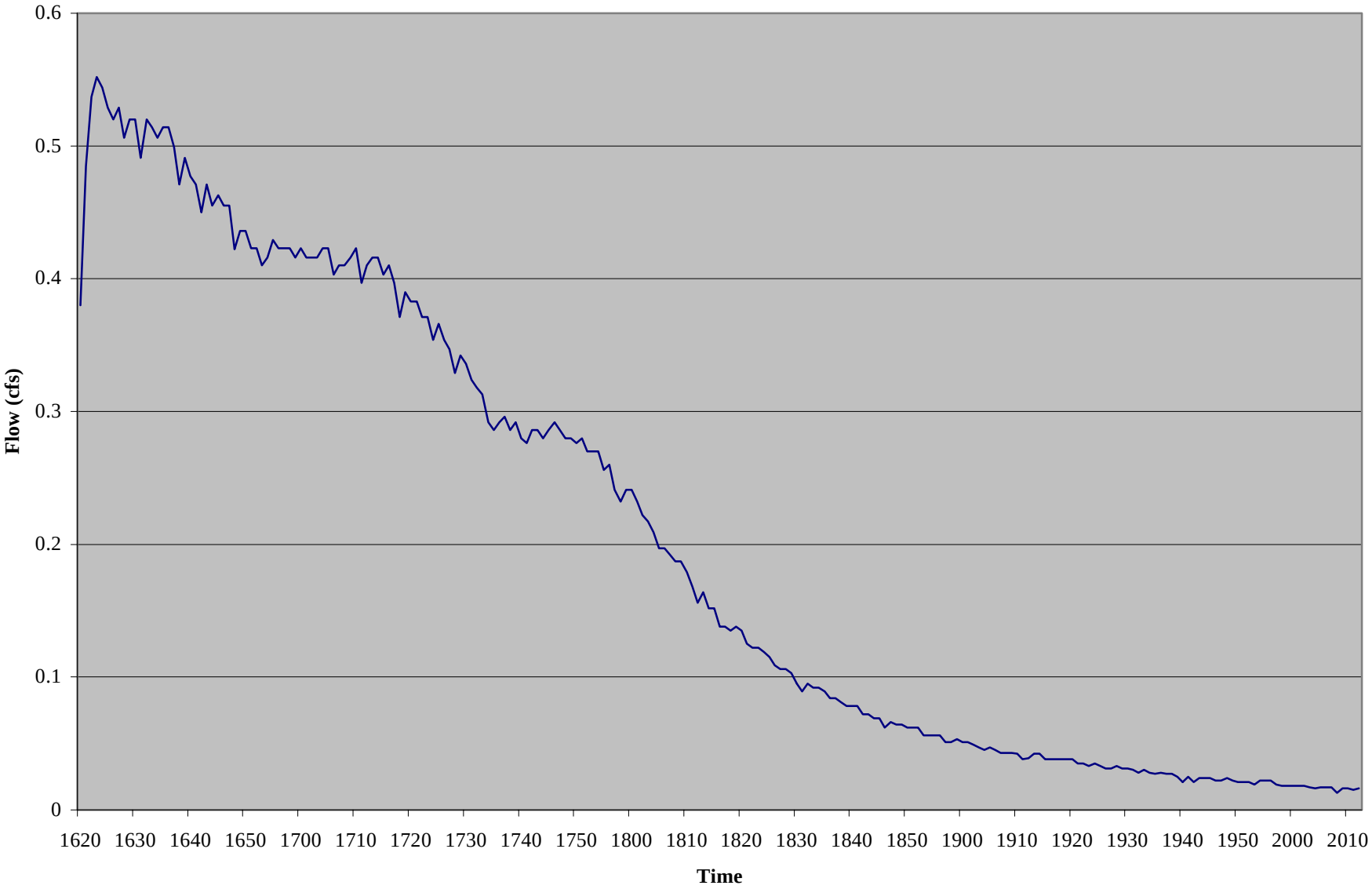


Figure 1-55d Palomar Hydraulic Residence Time Evaluation: Event Cumulative Rainfall

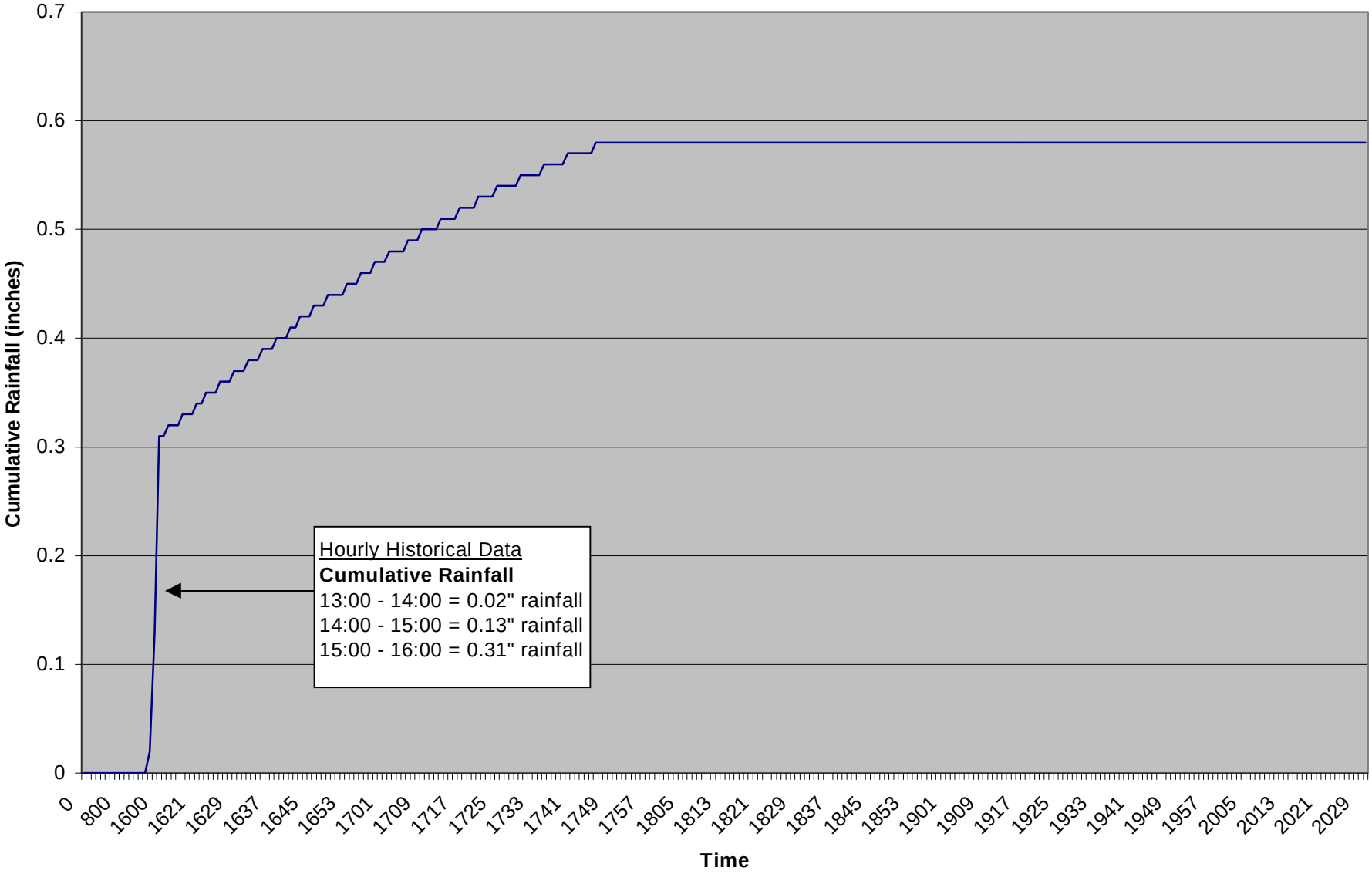
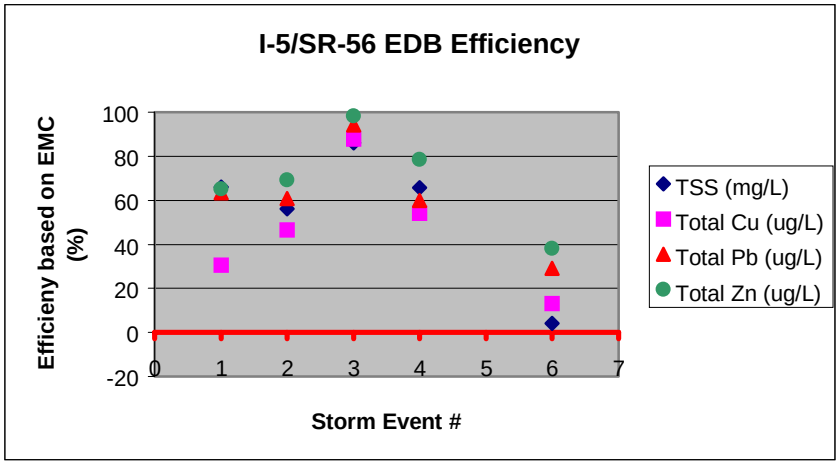
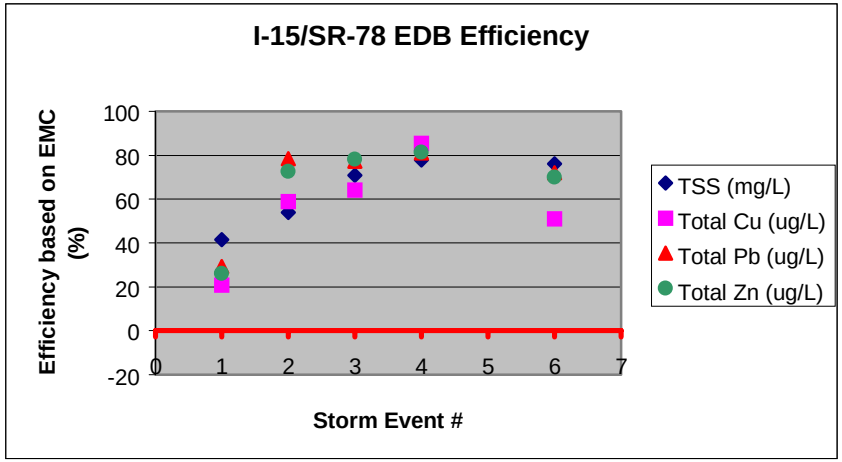


Figure 1-56a Extended Detention Basins Efficiencies





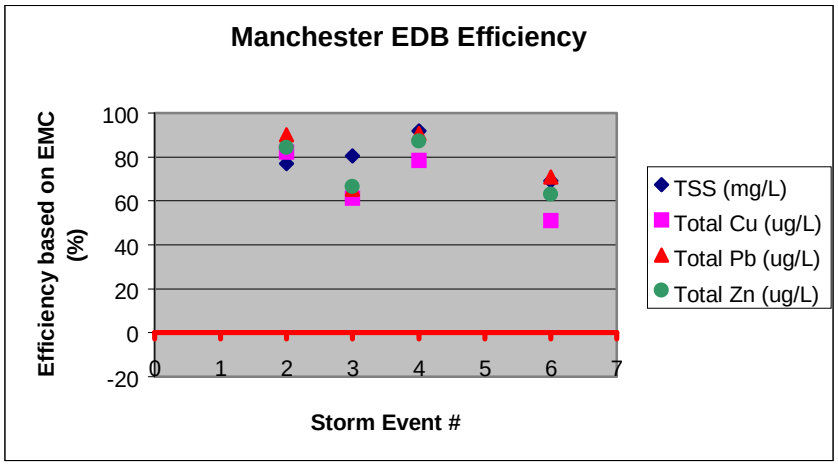


Figure 1-56b StormFilter™ Efficiencies

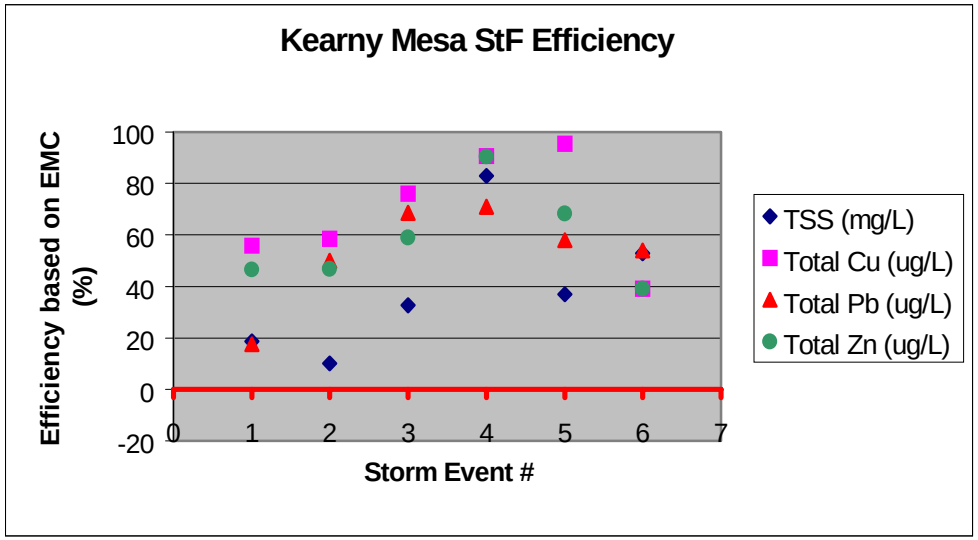
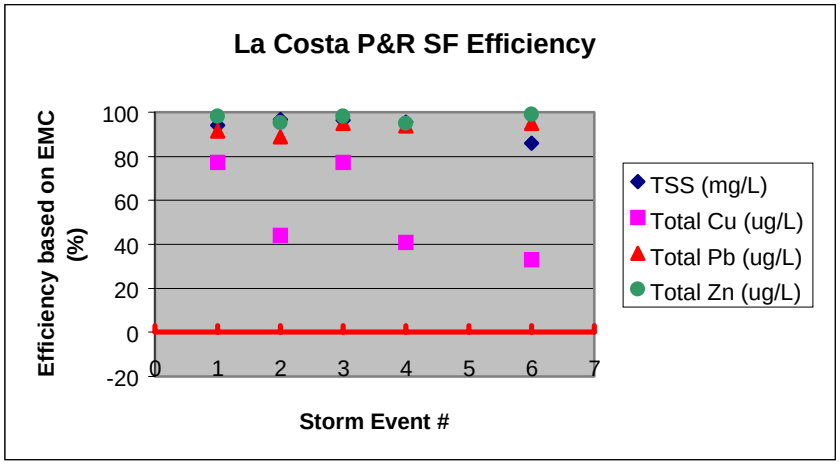
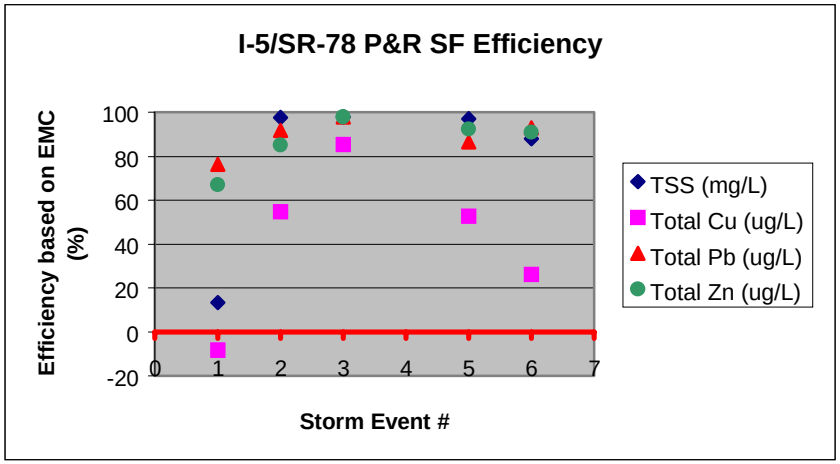


Figure 1-56c Sand Filter Efficiencies





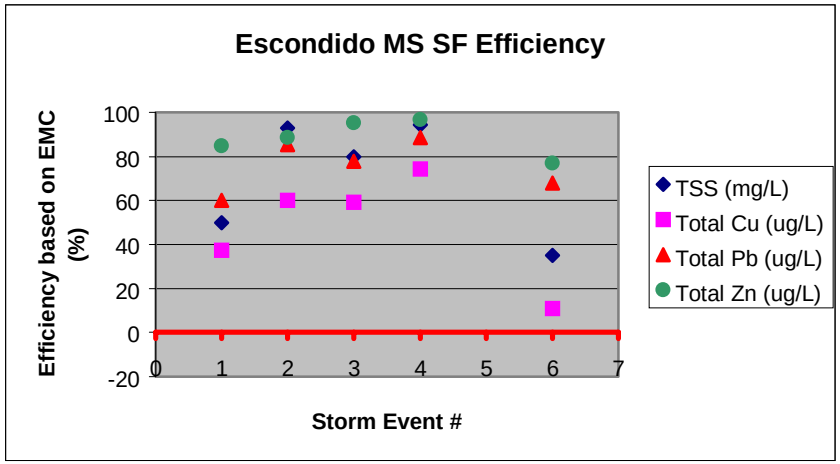
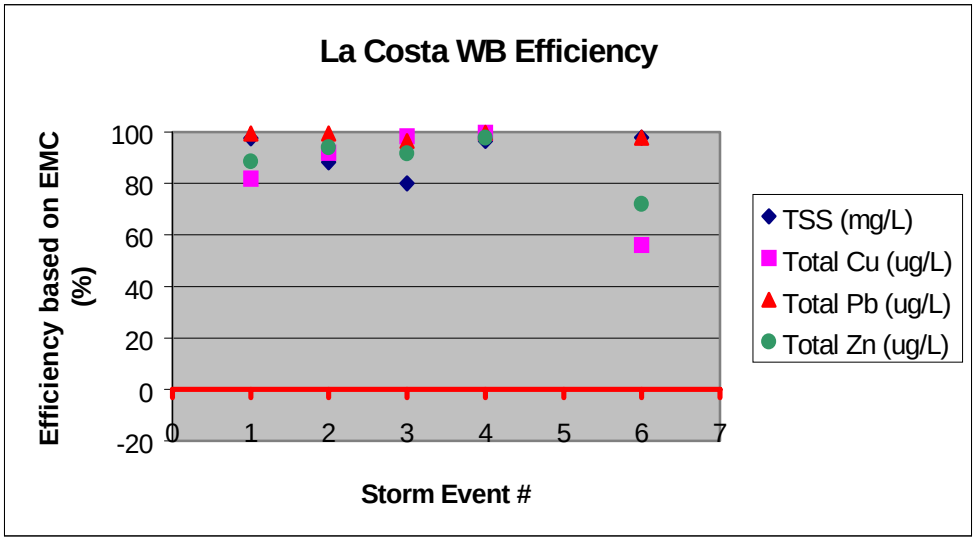


Figure 1-56d Wet Basin Efficiencies



2.0 BMP OPERATIONS

Performance assessments of BMP operations were determined using empirical observations (Form H of the OMM Volume II Field Guidance Notebooks). Empirical observations were taken at variable times during monitored events. Field crews attempted to assess BMP operations at the beginning, middle and end of a storm event. Traffic, weather and sufficient light sometimes limited these observations.

Observations generally provided information on the following:

- Present meteorological characteristics
- Rainfall (start times and intensity indication)
- Hydrologic and hydraulic characteristics (flowing and/or standing water, channelization)
- Water level
- Inlet conditions (problems affecting performance)
- Evidence of debris (organic or trash), scouring, resuspension or erosion
- Description of amount and location of sediment accumulation
- Water quality appearance (visual, olfactory)
- Vegetation condition
- Outlet conditions (problems affecting performance)
- Structural condition of facility

Other site-specific observations were taken according to the checklists present in Form H.

2.1 BMPs Evaluated

Tables 2-1a through 2-1h summarize empirical observation of BMP performance. Following each table, an overall review of each BMP is provided. More detail on BMP operations is available at the following web site: http://www.rbf.com/caltrans/

2.1.1 Biolfiltration Strip

Table 2-1a Comparison of Biofiltration Strips Operational Performance

Site No. & Name	No. of Observed Events	Hydrologic/Hydraulic Characteristics	Inlet Conditions	Water Quality	Solids Deposition/Resuspension	Erosion	Vegetation	Outlet Conditions	Comments
112207a Carlsbad MS (east)	6	Flow concentrated itself in the western half of the strip	Inlet channel caused water to enter at west end	No notable observations	Solid deposition occurred in inlet channel. Erosion and resuspension at strip/IT interface	Erosion occurred along the west interface with the IT	No notable observations	Erosion and deposition at IT interface	None
112207a Carlsbad MS (west)	6	There was higher flow where the pavement was lowest	Flow entered at low spots	No notable observations	No notable observations	No notable observations	No notable observations	Functioned as designed	None

Overall Review

The BMP at the Carlsbad Maintenance Station uses a treatment train approach with a biofiltration strip and an infiltration trench. There are two biofiltration strips at this site. The eastern strip collects runoff from the eastern half of the maintenance station and discharges into the infiltration trench. The western strip collects runoff from the western half of the maintenance station and discharges out of the maintenance station to the access road, Paseo Del Norte. Major observations noted that the eastern strip inlet channel concentrated flow at the western half of its strip. In addition, erosion and sediment deposition was noted at the discharge point of the eastern strip, the interface with the infiltration trench. Major observations for the western strip noted that minor amounts of flow concentrated itself at low spots in the pavement. However, this channelization did not affect the overall performance of the BMP.

2.1.2 Biolfiltration Swale

Table 2-1b Comparison of Biofiltration Swales Operational Performance

Site No. & Name	No. of Observed Events	Hydrologic/Hydraulic Characteristics	Inlet Conditions	Water Quality	Solids Deposition/Resuspension	Erosion	Vegetation	Outlet Conditions	Comments
112205 SR-78/Melrose	7	Flow was evenly distributed through swale, no channelization or ponding	Trash and sediment located at inlet spreader	No notable observations	Small amount evident at inlet spreader	No notable observations	North slope in good condition south slope mostly bare	Outlet pipe observed to be blocked on 2/16/00 event	Weeds present at inlet
112206 I-5/Palomar	6	Flow was evenly distributed through swale, no channelization or ponding	Some flow bypassed at inlet channel	No notable observations	No notable observations	Erosion 8-10" deep in several places on FWY side before the outlet	No notable observations	Functioned as designed	None

Overall Review

There are two biofiltration swales located in Caltrans District 11, Melrose and Palomar. The major observations noted at the Melrose swale were that on the February 16, 2000 event, the outlet pipe caused a backwater condition in the swale. Upon further investigation, it was discovered that the pipe was blocked. Flow measured at the outlet during the March 4-6 event was the result of this backwater condition and not from flow through the inlet (see Figure 1-41). Caltrans Maintenance Department was notified and the outlet pipe was cleaned out in early March. The major observations noted at the Palomar swale were that flow bypassed out of the swale near the inlet. Approximately 20 sandbags were placed near the inlet to alleviate the bypass. In addition, it was noted that during events with large rainfall intensities, water flowed outside of the inlet channel and entered the swale at the inlet swale transition. This water did not pass through the sampling point and was therefore not sampled. Excessive erosion was also noted along the eastern edge of the Palomar swale near the outlet. This side slope received direct sheet flow from I-5 and the velocity of the runoff caused erosive conditions. This direct sheet flow was also not sampled, as it did not pass through the inlet sampling point.

2.1.3 Extended Detention Basin

Table 2-1c Comparison of Extended Detention Basins Operational Performance

Site No. & Name	No. of Observed Events	Hydrologic/Hydraulic Characteristics	Inlet Conditions	Water Quality	Solids Deposition/ Resuspension	Erosion	Vegetation	Outlet Conditions	Comments
111101 I-5/SR-56	7	Water pools at inlet rip-rap and berm rip-rap, trash holds at berm.	Standing water present	No notable observations	No notable observations	No notable observations	Hydroseed began to sprout in late February, west side slope still bare	Flow over standpipe occurred on 3/5/00 event	Frogs common in rip-rap
111102 I-15/SR-78	7	Functioned as designed	Functioned as designed	Same inlet and outlet turbidity	No notable observations	No notable observations	No notable observations	No notable observations	Inlet concrete transition small breaks
111105 I-5/Manchester	6	Functioned as designed	Functioned as designed	No notable observations	Solid deposition at inlet concrete apron	Erosion around concrete wall at inlet	Hydroseed sprouted in basin floor, somewhat bare on slopes	Very slight leak in canal gate	None

Overall Review

There are three EDBs located in Caltrans District 11, I-5/SR-56, I-15/SR-78, and I-5/Manchester. The major observation at I-5/SR-56 was that water flowed over the outlet riser at approximately 10:30 on the March 5, 2000 event. Water continued to discharge through the outlet pipe and no flow was observed through the emergency weir. The I-15/SR-78 EDB functioned as designed with very small breaks in the inlet concrete transition to the basin. The I-5/Manchester EDB functioned as designed with minor amounts of erosion at the inlet and a very slight leak in the canal gate at the outlet. Suspected irrigation contributed runoff to the influent at Manchester EDB during the February 20, 2000 event (refer to Figure 1-23). This information was observed with the monitoring equipment. On a few other occasions, flow with no precipitation was observed at Manchester influent and effluent in the data logger files.

2.1.4 Infiltration Basin

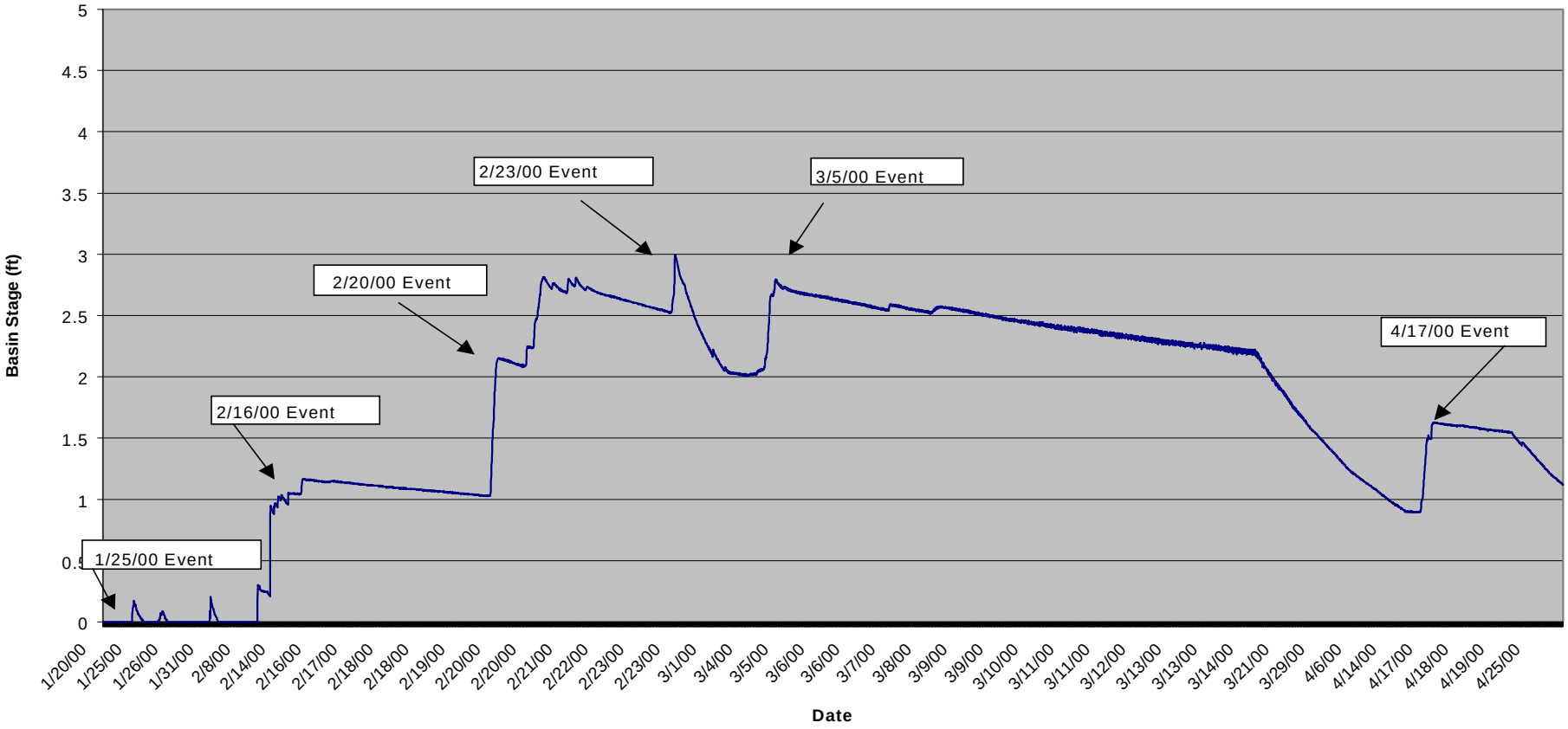
Table 2-1d Comparison of Infiltration Basins Operational Performance

Site No. & Name	No. of Observed Events	Hydrologic/Hydraulic Characteristics	Inlet Conditions	Water Quality	Solids Deposition/Resuspension	Erosion	Vegetation	Infiltration Conditions	Comments
111103 La Costa (w)	6	After 2/20/00 event basin overflowed onto access road	Functioned as designed	No notable observations	No notable observations	No notable observations	Woody wetland vegetation present	Site does not appear to infiltrate at design rate	None

Overall Review

The infiltration basin at I-5/La Costa (west) was re-instrumented with monitoring equipment in early January and empirical observations were first taken on January 25, 2000. The basin overflowed on the February 20, 2000 event, covering parts of the access road. At the end of the February 20 event the basin staff gauge read approximately 2.9'. Refer toFigure 2-1 on the following page for more detail on basin stage throughout the 1999/2000 wet season.

Figure 2-1 La Costa Infiltration Basin Stage for the 1999/2000 Wet Season



2.1.5 Infiltration Trench

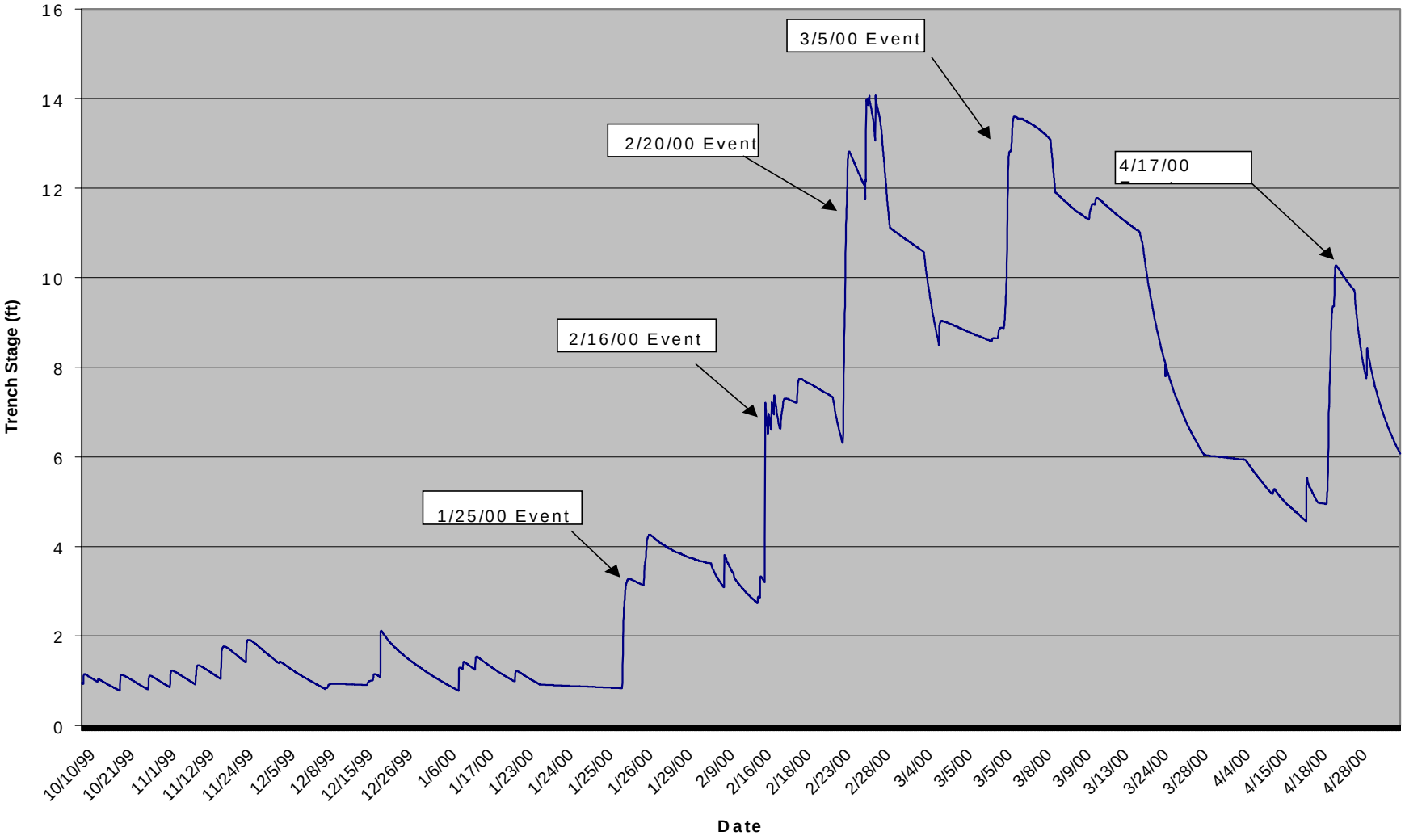
Table 2-1e Comparison of Infiltration Trenches Operational Performance

Site No. & Name	No. of Observed Events	Hydrologic/Hydraulic Characteristics	Inlet Conditions	Water Quality	Solids Deposition/Resuspension	Infiltration Medium	Overflow Conditions	Comments
112207b Carlsbad MS	6	Bypass was observed from the trench during the 2/20/2000 event	Erosion noted between strip/IT interface	No notable observations	Erosion and solid deposition noted between strip/IT interface	Infiltrates at rate slower than the designed rate	Bypass was observed from the trench during the 2/20/2000 event	None

Overall Review

The BMP at the Carlsbad Maintenance Station uses a treatment train approach with a biofiltration strip and an infiltration trench. For empirical observations regarding the biofiltration strips, refer to section 2.1.1 page 2-2. The major observation of the infiltration trench was that bypass occurred on the February 20, 2000 event. The field crews recorded a maximum stage on February 21 in the observation well of 13.977 ft. Figure 2-2 on the following page provides more detail on stage in the observation well throughout the 1999/2000 wet season. Erosion and solids deposition was also noted on the interface between the biofiltration strip and the infiltration trench. This erosion began at the last 8' of the strip interface and the top of the trench near the interface was covered with 1 to 2 inches of sediment.

Figure 2-2 Carlsbad MS Trench Observation Well Stage for the 1999/2000 Wet Season



2.1.6 Media Filter- Sand

Table 2-1f Comparison of Media Filter - Sand Operational Performance

Site No. & Name	No. of Observed Events	Hydrologic/Hydraulic Characteristics	Inlet Conditions	Water Quality	Solids Deposition/Resuspension	Erosion	Media Conditions	Outlet Conditions	Comments
112202 Escondido MS	7	Functioned as designed	Functioned as designed	No notable observations	No notable observations	NA	No notable observations	Functioned as designed	None
112203 La Costa P&R	6	Standing water remained in pre-sedimentation basin for >72 hours	Functioned as designed	No notable observations	Resuspension observed at inlet to pre-sedimentation chamber	No notable observations	Water pools at eastern end	Functioned as designed	None
112204 I5/SR78 P&R	7	Functioned as designed	Functioned as designed	No notable observations	Deposition evident at inlet pipe	Functioned as designed	No notable observations	Functioned as designed	Trash in pre-sed chamber

Overall Review

There are three sand filters located in Caltrans District 11, a Delaware type located at Escondido MS and two Austin types located at La Costa Park and Ride and I-5/SR-78 Park and Ride. The Delaware type sand filter at Escondido MS functioned as designed. The major observation at the La Costa P&R Austin type sand filter was that the pre-sedimentation chamber retained standing water for greater than 72 hours. Field crews were required to unplug drain holes after every storm event during the 1999/2000 wet season. The Austin type sand Filter at I-5/SR-78 P&R had sediment deposition at the inlet pipe and larger than normal trash and debris in the pre-sedimentation chamber.

2.1.7 StormFilter™

Table 2-1g Comparison of StormFilter™ Operational Performance

Site No. & Name	No. of Observed Events	Hydrologic/Hydraulic Characteristics	Inlet Conditions	Water Quality	Solids Deposition/Resuspension	Treatment Medium Condition	Outlet Conditions	Comments
112201 Kearny Mesa MS	7	All three media vaults observed to have water present during 3/5/00 event and 4/17/00 event.	Functioned as designed	No notable observations	Minor deposition evident in the inlet pipe and the media vaults	Functioned as designed	No bypassed observed, Functioned as designed	None

Overall Review

The StormFilter™ at the Kearny Mesa Maintenance Station functioned as designed throughout the 1999/2000 wet season. Minor observations at Kearny Mesa were that all three media vaults held water during the March 5, 2000 and April 17,2000 events. The first vault held 24 inches, the second 14 inches and the third 5 inches during the March 25, 2000 event. During the April 17, 2000 event, the first vault held 20 inches, the second 4 inches and the third 1-inch. No bypass through the system was ever observed. There was sediment deposition evident in the inlet pipe and the first media chamber where approximately 0 – 2 inches were deposited, less was noted in the second and third media chambers.

2.1.8 Wet Basin

Table 2-1h Comparison of Wet Basins Operational Performance

Site No. & Name	No. of Observed Events	Hydrologic/Hydraulic Characteristics	Inlet Conditions	Water Quality	Solids Deposition/Resuspension	Erosion	Vegetation	Outlet Conditions	Comments
111104 La Costa (se)	7	Canal gate did not seal on 1/25/00 to close pipe from trapezoidal channel	No notable observations	No notable observations	No notable observations	No notable observations	Good growth	Functioned as designed	None

Overall Review

The major observation at the La Costa wet basin was that the constructed canal gate, which closes the 6-inch pipe from the trapezoidal channel to the wet basin, did not seal properly on the January 25, 2000 event. Therefore, additional water from the trapezoidal channel leaked into the wet basin. This leakage can graphically be seen in the La Costa hydrograph for the January 25 event, Figure 1-10. During the February 16, 2000 event, field crews attempted to seal the pipe using plastic bags and sandbags and minor leakage was observed. A 6-inch plumber's test plug was installed to close the 6-inch pipe after the February 16 event.

3.0 BMP AND SITE MAINTENANCE

The primary objective of BMP maintenance is to ensure that each site is properly maintained to achieve optimum performance. Preventive and corrective maintenance measures were undertaken during the 1999/2000-year in accordance with the OMM Plan and the Maintenance Indicator Document (MID). These measures included:

- Removal of standing water.
- Sediment erosion control and removal.
- Structural integrity.
- Landscape management.
- Graffiti removal.
- Trash and debris removal.
- General facility maintenance.

Regularly scheduled maintenance inspections were conducted monthly, with weekly surveys being performed during extended periods of wet weather. Maintenance visits were also conducted after each large storm event (greater that 0.5 inches). During the visits, maintenance observations and needs were documented on the "BMP Site Inspection Checklist" (Form C of the OMM Volume II Field Guidance Notebooks). Based on this documentation, any immediate maintenance needs were arranged

3.1 Summary of Inspection and Maintenance Activities

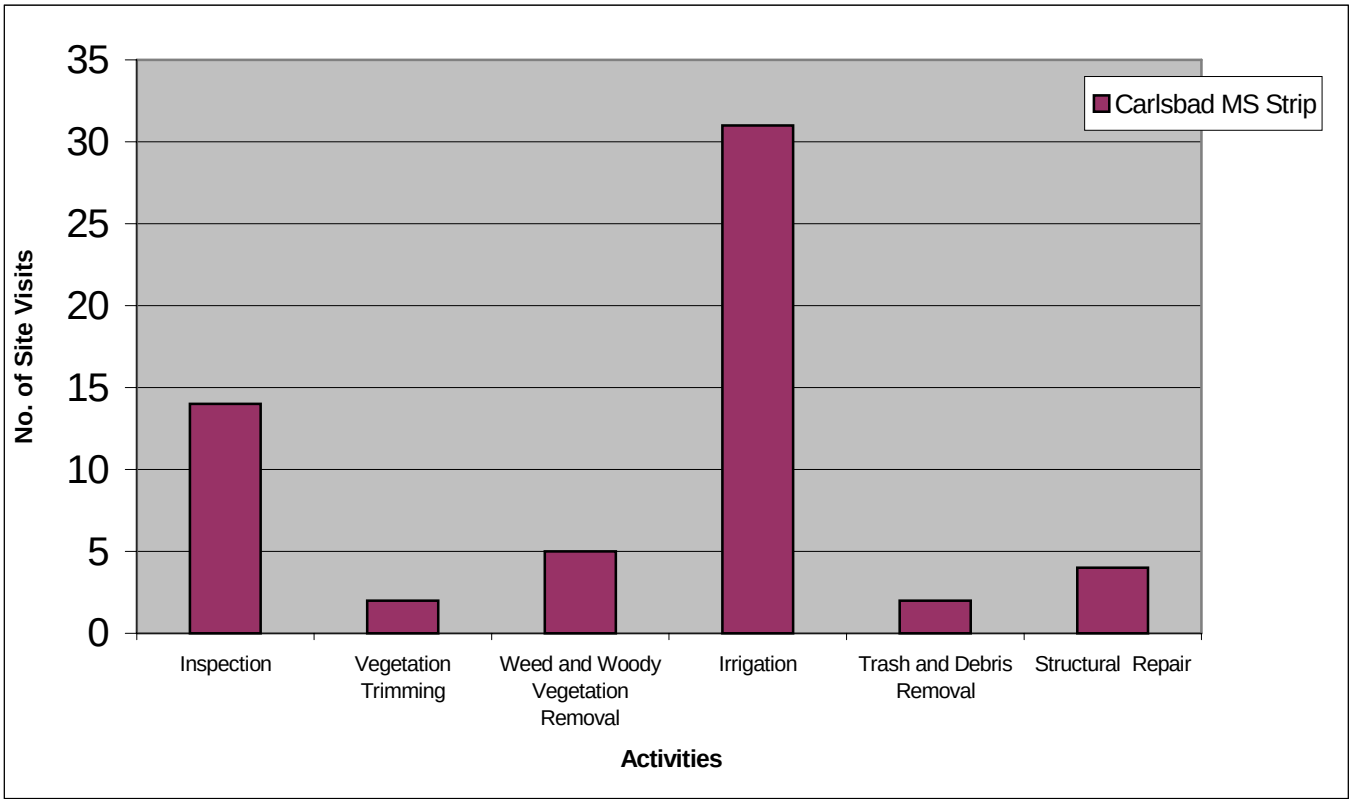
The following sections describe maintenance activities performed at each BMP site from June 1999 through April2000. A comparison of maintenance needs and frequencies required at each BMP is graphically shown in Figures 3-1a through 3-1g. More detail on BMP maintenance is available at the following web site: http://www.rbf.com/caltrans/. As maintenance frequency is sometimes a function of how long a BMP has been operational, Table 3-1 provides a list of the BMPs in District 11 and the date that each BMP became operational.

Table 3-1 District 11 BMP Operational Dates

Site ID.	BMP Location	BMP Type	Operation Date
111101	I-5/SR-56	Extended Detention Basin	1/24/99
111102	I-15/SR-78	Extended Detention Basin	1/24/99
111103	I-5/La Costa Ave (W)	Infiltration Basin	1/24/99
111104	I-5/La Costa Ave (SE)	Wet Basin	10/1/99
111105	I-5/Manchester Ave	Extended Detention Basin	10/1/99
112201	Kearny Mesa MS	Media Filter StormFilter™	10/1/99
112202	Escondido MS	Media Filter Sand Delaware	2/16/99
112203	I-5/La Costa Ave Park & Ride	Media Filter Sand Austin	2/16/99
112204	I-5/SR-78 Park & Ride	Media Filter Sand Austin	2/26/99
112205	SR-78/Melrose Dr	Biofiltration Swale	3/1/99
112206	I-5/Palomar Airport Rd	Biofiltration Swale	10/1/99
112207	Carlsbad MS	Bio-strip / Infiltration Trench	10/1/99

3.1.1 Biolfiltration Strip

Figure 3-1a Frequency of Maintenance Activities at a Biofiltration Strip

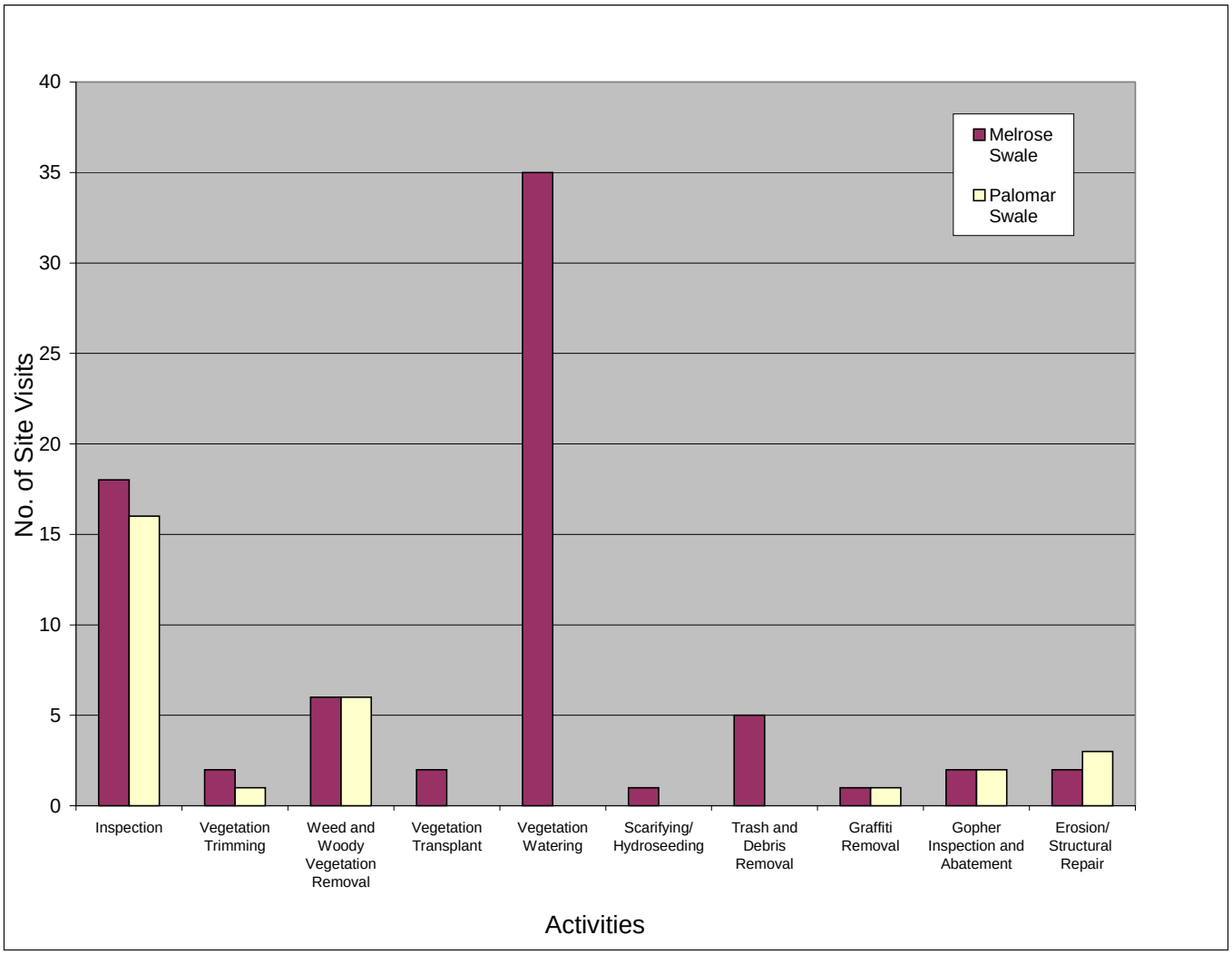


Overall Review

The most common maintenance activity at a biofiltration strip was irrigation. Irrigation of the Carlsbad MS strip usually required 1.5 man-hours per visit (refer to above graph). Weeding was the second most common maintenance activity at a biofiltration strip, which on average required 11.75 man-hours per visit. Structural repairs at this location included caulking the level spreader strip, constructing a rabbit fence, and creating a concrete diversion to eliminate bypass on the western strip.

3.1.2 Biolfiltration Swale

Figure 3-1b Frequency of Maintenance Activities at a Biofiltration Swale

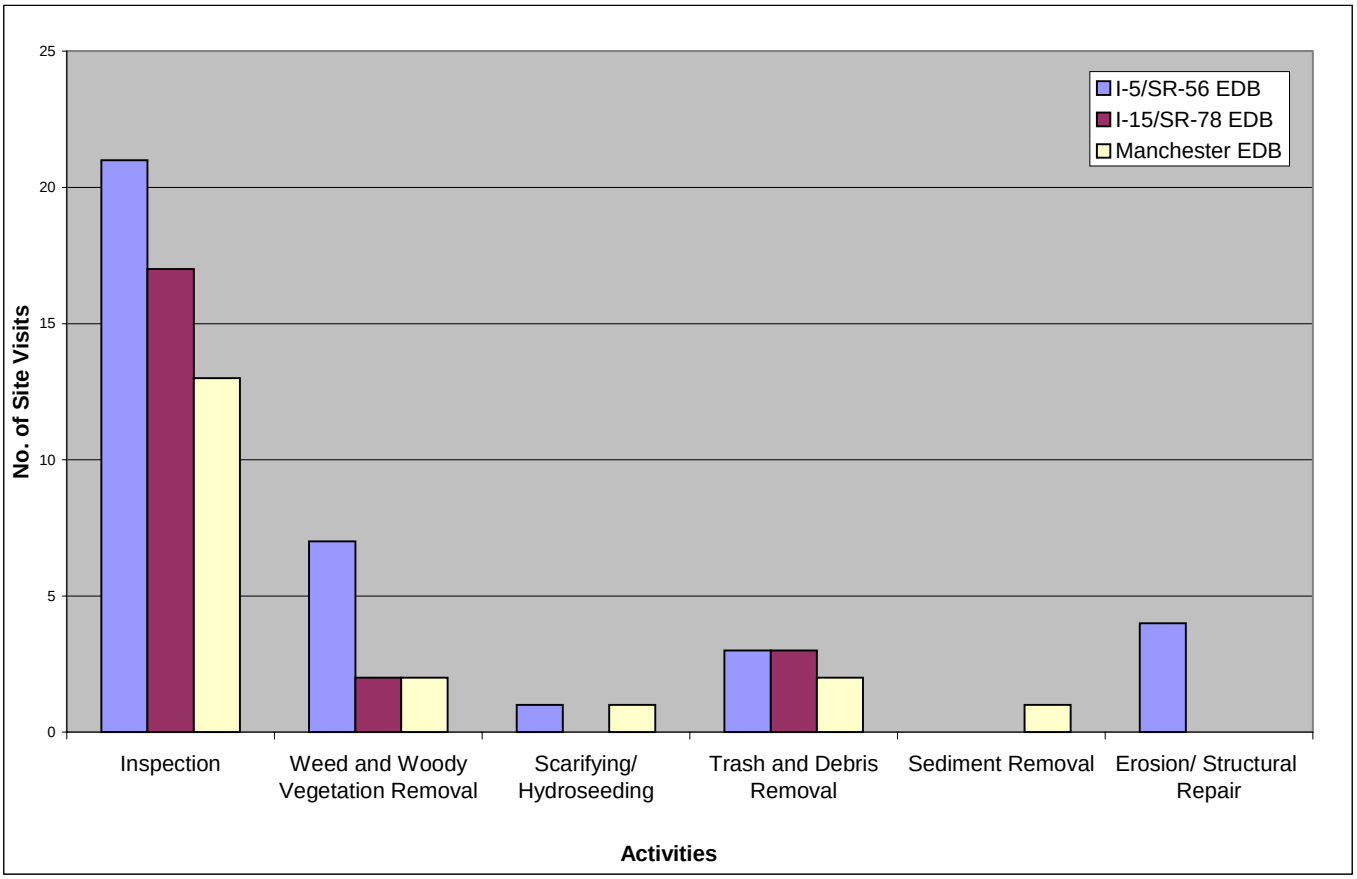


Overall Review

The most common maintenance activity at the Melrose biofiltration swale was irrigation, which usually required 2.5 man-hours per visit (refer to above graph). No irrigation site visits were made at the Palomar biofiltration swale because the swale was irrigated with an automatic irrigation system that was in place from an on-going plant establishment project near Cannon Road. Weeding was the second most common maintenance activity at the biofiltration swales, which on average required 7.25 man-hours per visit at Melrose and 9.25 man-hours per visit at Palomar. Structural repairs at Melrose included removal of the irrigation system and an old monitoring pad. Structural repairs at Palomar included sand bagging at the inlet to eliminate bypass and removal of the irrigation system.

3.1.3 Extended Detention Basin

Figure 3-1c Frequency of Maintenance Activities at an Extended Detention Basin

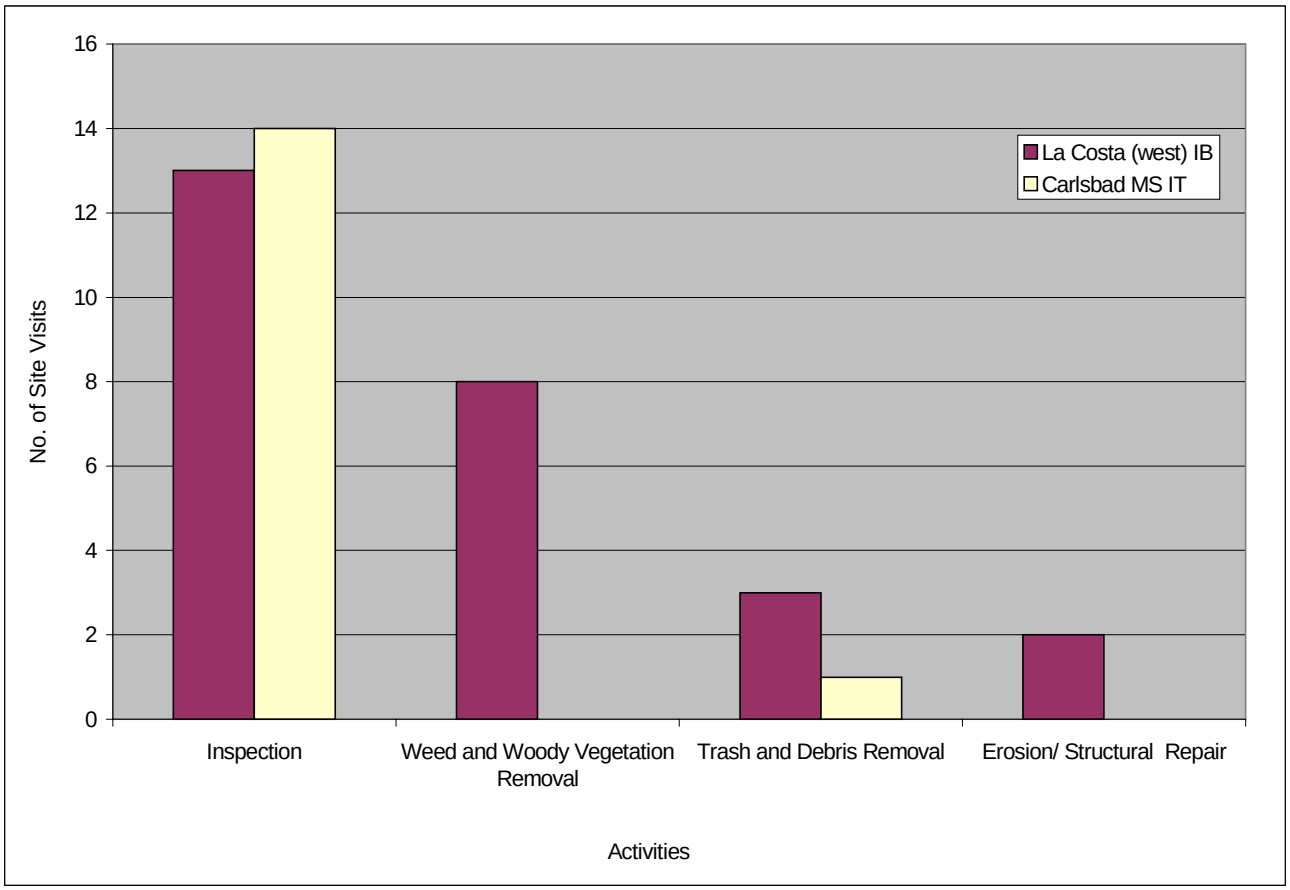


Overall Review

The most common maintenance activity at an extended detention basin (EDB) was pulling weeds and woody wetland vegetation. This activity was most common at the I-5/SR-56 EDB, where woody wetland vegetation often took residence in the inlet rip-rap. The pulling of weeds and woody vegetation typically took 1.5 man-hours per visit (refer to above graph). Trash and debris removal was also common at EDBs. The largest maintenance activity in terms of man-hours per visit at the EDBs was scarifying and hydroseeding at I-5/SR-56 and Manchester, which averaged 33.0 man-hours per visit. Structural repairs at I-5/SR-56 EDB included the installation of a rabbit fence.

3.1.4 Infiltration Basin / Infiltration Trench

Figure 3-1d Frequency of Maintenance Activities at an Infiltration Basin / Trench

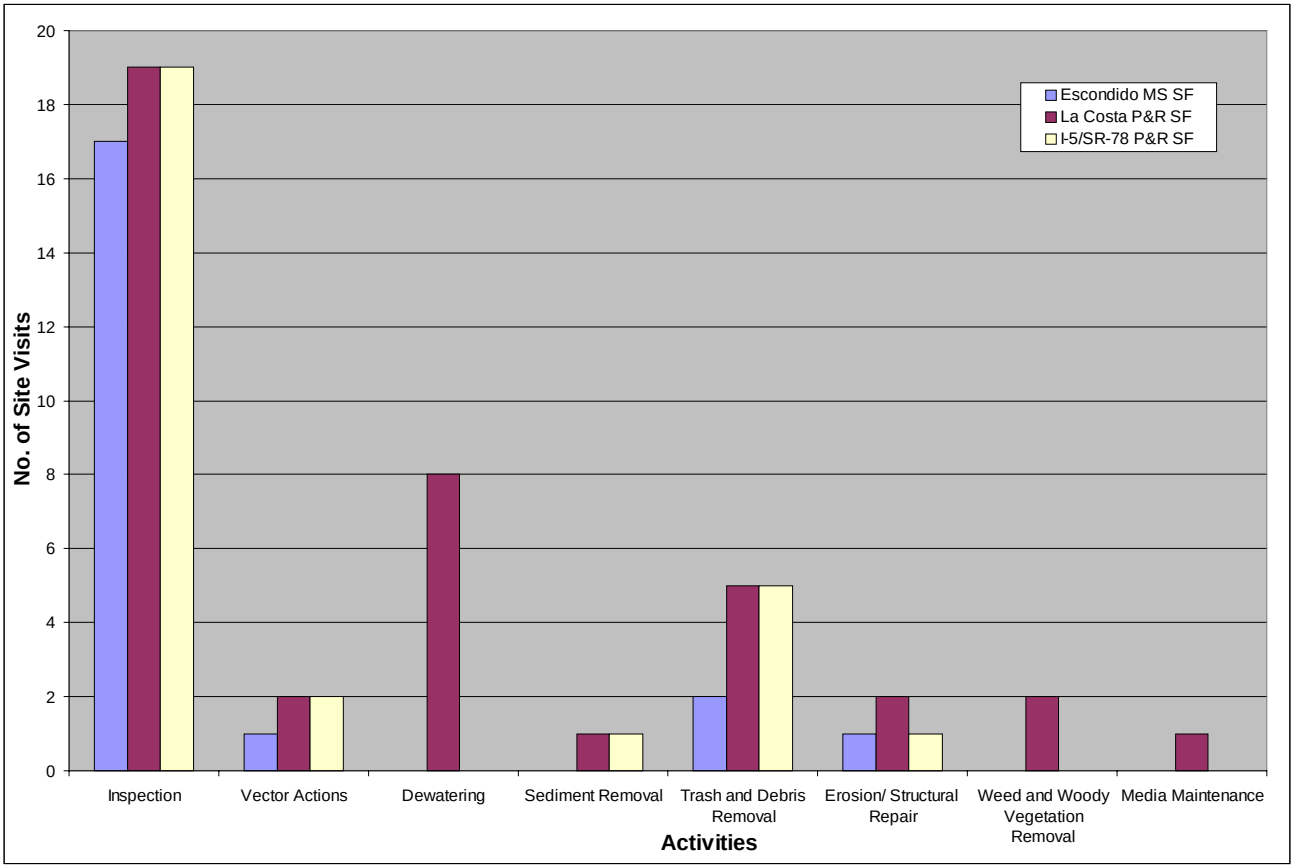


Overall Review

The most common maintenance activity at an infiltration basin was pulling woody wetland vegetation. This activity typically took 2.25 man-hours per visit (refer to above graph). The infiltration trench did not have woody wetland vegetation because of its gravel lining. Maintenance activities at the infiltration trench were minimal and consisted primarily of removing debris and trash.

3.1.5 Media Filter- Sand

Figure 3-1e Frequency of Maintenance Activities at a Sand Filter

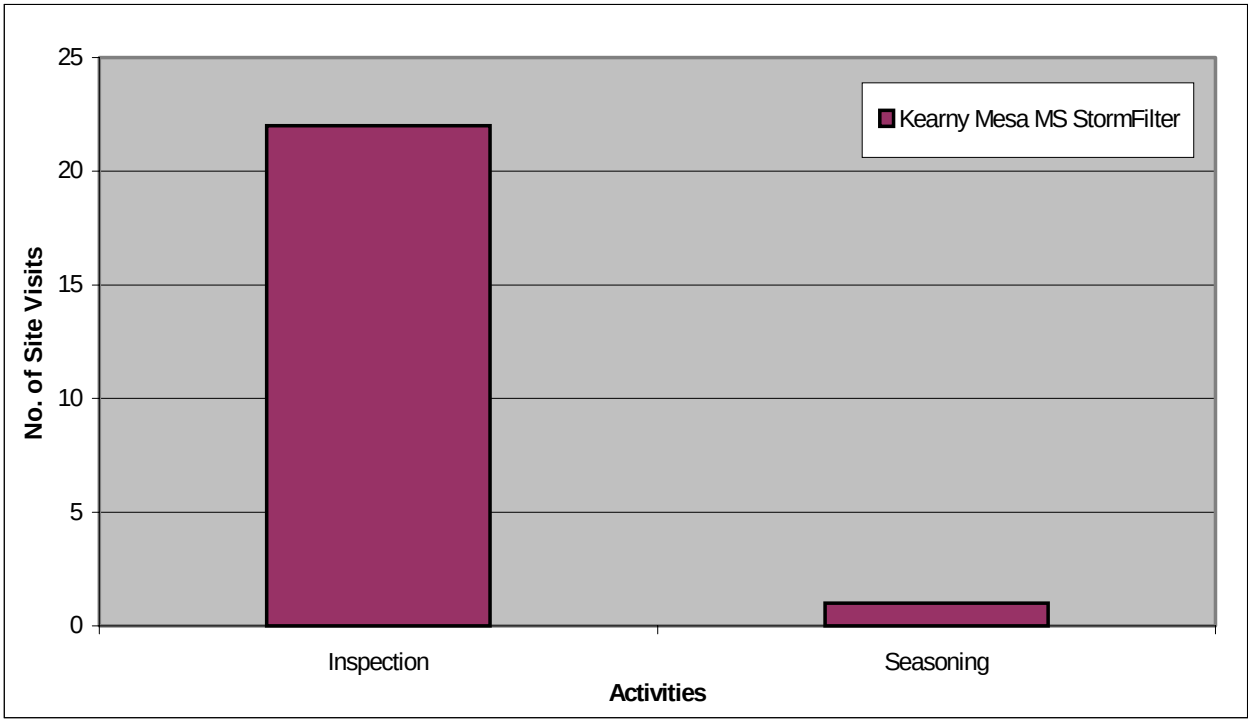


Overall Review

The most common maintenance activity at all the sand filters was trash and debris removal, which typically took 0.25 man-hours per visit or 15 minutes (refer to above graph). Maintenance crews at the La Costa P&R continually had to de-water the pre-sedimentation chamber after each storm event. Drain plugs were initially constructed and last year weep holes were drilled into these drain plugs to facilitate de-watering. However, these weep holes became blocked with organic debris during storm events and approximately 1.5 inches of standing water would remain in the pre-sedimentation chamber. Cleaning out the weep holes typically required 0.5 man-hours per visit. Media maintenance at the La Costa P&R included grading the sand, while structural repairs at the Escondido MS involved fixing a handle on one of the basin covers. In addition, a bird deterrent net was installed at La Costa P&R and at 78/5 P&R to prevent birds from nesting in the sand filters.

3.1.6 StormFilter™

Figure 3-1f Frequency of Maintenance Activities at a StormFilter™

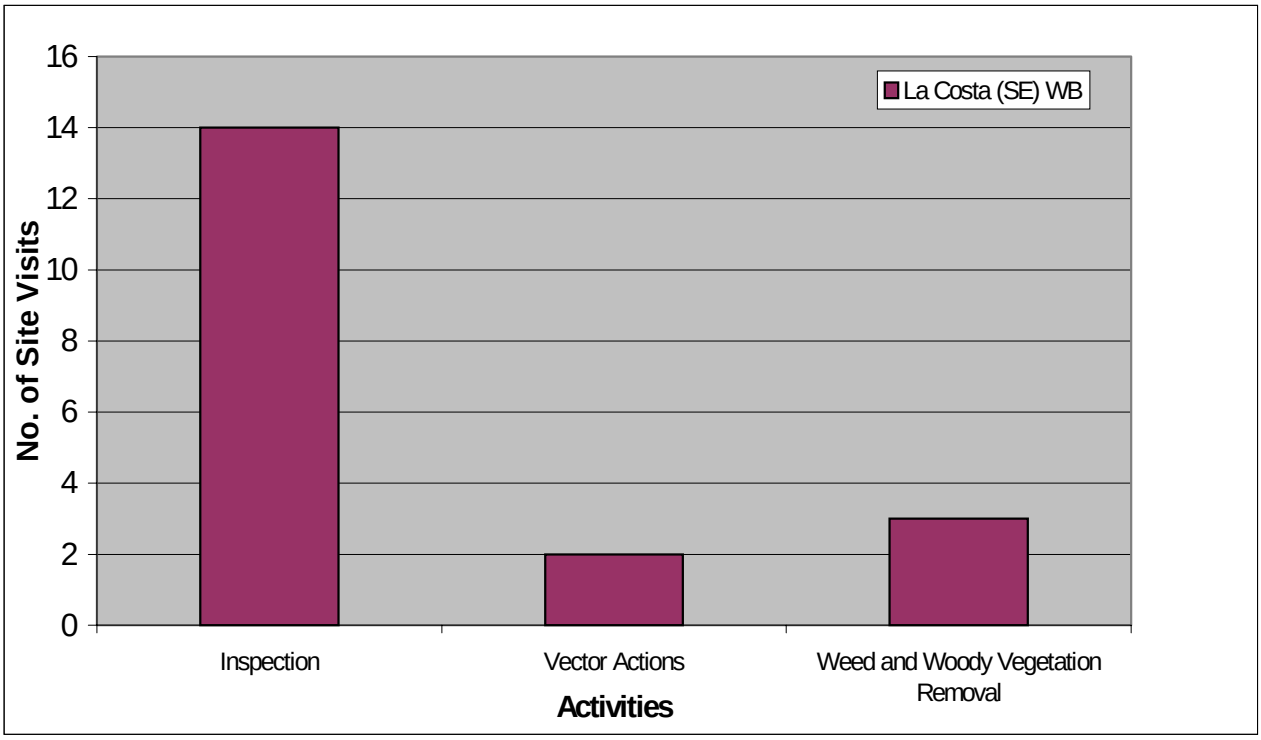


Overall Review

The major maintenance activity at a StormFilter™ unit was the "seasoning" of media vaults #2 and #3, which occurred on January 11. The vaults were filled with potable water until the canister ball valves engaged and the vaults began to discharge. The vaults were then allowed to completely drain. Each vault was filled and drained three times. The "seasoning" took approximately 16 man-hours per visit. Additional major and minor maintenance inspections were performed at the StormFilter™, per the MID and the manufacturer's suggestions.

3.1.7 Wet Basin

Figure 3-1g Frequency of Maintenance Activities at a Wet Basin



Overall Review

The most common maintenance activity at a wet basin involved weeding and woody vegetation removal, which on average took 10 man-hours per visit. Vector actions at the wet basin included deploying Mylar strips for bird deterrence, per the MID.

4.0 COST SUMMARY

Cost summaries for maintenance of the BMPs during the 1999/2000-year are provided in the following spreadsheets. Individual summaries are given for the 12 site locations in District 11 that were operational for the 1999/2000-year. These 12 sites represented 9 different BMP designs: extended detention basins, infiltration basins, wet basins, perlite/zeolite media filters, sand filters type I, sand filters type II, biofiltration swales, biofiltration strips, and infiltration trenches. Included in this spreadsheet are the man-hours and generic rates associated with 5 different maintenance tasks: administration, operation, maintenance, vectors control, and direct costs. It should be noted that these cost summaries are preliminary and are subject to future change.

BMP Retrofit Pilot Program
Maintenance Operation
Cost Accounting Summary, 1998-99

DISTRICT: 11	LOCATION: I-5/SR-56	SITE NO. 111101	BMP TYPE: Extended Detention Basin	CONSULTANT: KLI

	TASK	1999			2000									Total (hrs)	Avg. Rate	TOTAL $
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep			
Labor (hours)	***Administration***															
	General program support/Follow-up	3.0	7.8	1.5	1.0	1.0	2.0	1.4						17.7	$120	$ 2,118
	Encroachment Permits	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$87	$ -
	Travel	1.5	3.0	1.0	1.0	1.0	1.0	1.0						9.5	$87	$ 827
	Unscheduled events	0.0	0.0	0.0	1.0	0.0	0.0	0.0						1.0	$87	$ 87
	Monthly Subtotal (hours)	4.5	10.8	2.5	3.0	2.0	3.0	2.4	0.0	0.0	0.0	0.0	0.0	28.2		
	Monthly Subtotal ($)	$491	$1,191	$267	$294	$207	$327	$255	$0	$0	$0	$0	$0	$3,032		
														Task Subtotal =		$3,032
	Operation															
	Wet season inspections	1.0	1.0	1.0	1.0	2.0	1.0	1.0						8.0	$55	$ 440
	Dry season inspections	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	Unscheduled inspections/field calls	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$60	$ -
	Monthly Subtotal (hours)	1.0	1.0	1.0	1.0	2.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	8.0		
	Monthly Subtotal ($)	$55	$55	$55	$55	$110	$55	$55	$0	$0	$0	$0	$0	$440		
														Task Subtotal =		$440
	Maintenance															
	Scheduled maintenance	0.0	2.0	0.0	2.0	0.0	0.0	0.0						4.0	$55	$ 220
	Unscheduled maintenance	1.0	0.0	0.0	0.0	0.0	0.0	0.0						1.0	$55	$ 55
	Vandalism	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	Acts of God	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	Landscape Maintenance Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$23	$ -
	Sediment Removal Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Vegetation Consultant	0.0	0.8	0.0	0.0	0.0	0.0	0.0						0.8	$85	$ 71
	Native Landscape	0.0	33.0	0.0	0.0	0.0	0.0	0.0						33.0	$28	$ 924
	Other Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Monthly Subtotal (hours)	1.0	35.8	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	38.8		
	Monthly Subtotal ($)	$55	$1,105	$0	$110	$0	$0	$0	$0	$0	$0	$0	$0	$1,270		
														Task Subtotal =		$1,270
	Vector Control															
	Contract & General administration	0.5	0.1	0.1	0.1	0.1	0.1	0.1						1.1	$87	$ 96
	Vector prevention maint. (consultant)	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$65	$ -
	Response to VCD calls (consultant)	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	VCD efforts (contracted)	2.0	2.0	3.0	4.0	3.0	3.0	3.0						20.0	$55	$ 1,100
	Monthly Subtotal (hours)	2.5	2.1	3.1	4.1	3.1	3.1	3.1	0.0	0.0	0.0	0.0	0.0	21.1		
	Monthly Subtotal ($)	$154	$119	$174	$229	$174	$174	$174	$0	$0	$0	$0	$0	$1,196		
														Task Subtotal =		$1,196
Non-Recurring Equipment (hours)	***Equipment***															
	Piece of Equipment 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Monthly Subtotal (hours)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		
														Equipment Subtotal =		$0

	Direct Costs													Total $
Dollars ($)	VCD supplies (direct costs less labor)	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Reproduction	$ -	$ -	$ -	$ -	$ 10	$ -	$ -						$ 10
	Postage/FedEx	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Lodging	$ 15	$ -	$ -	$ -	$ -	$ -	$ -						$ 15
	Per Diem	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Incidentals	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Vehicle Rental/Lease	$ 40	$ 16	$ 11	$ 5	$ 9	$ 22	$ 13						$ 116
	Airfare	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Field Supp./Expendables	$ -	$ 1	$ -	$ -	$ -	$ -	$ -						$ 1
	Equipment Rental	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Sediment Analyses	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Sediment Disposal	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Fax	$ 0.50	$ -	$ -	$ -	$ -	$ -	$ -						$ 1
	Hydroseed	$ -	$ 673	$ -	$ -	$ -	$ -	$ -						$ 673
	Other Direct Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Monthly Subtotal	$ 55	$ 690	$ 11	$ 5	$ 19	$ 22	$ 13	$ -	$ -	$ -	$ -	$ -	$ 814

MONTHLY TOTAL	$809	$3,159	$507	$693	$509	$577	$497	$0	$0	$0	$0	$0	**1999/2000 TOTAL =**	**$6,751**

BMP Retrofit Pilot Program
Maintenance Operation
Cost Accounting Summary, 1998-99

DISTRICT: 11	LOCATION: I-15/SR-78	SITE NO. 111102	BMP TYPE: Extended Detention Basin	CONSULTANT: KLI

	TASK	1999			2000									Total (hrs)	Avg. Rate	TOTAL $
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep			
Labor (hours)	***Administration***															
	General program support/Follow-up	1.0	2.0	1.0	1.0	1.0	2.0	1.4						9.4	$120	$ 1,128
	Encroachment Permits	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$87	$ -
	Travel	1.5	1.5	1.5	1.0	1.0	1.0	1.0						8.5	$87	$ 740
	Unscheduled events	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$87	$ -
	Monthly Subtotal (hours)	2.5	3.5	2.5	2.0	2.0	3.0	2.4	0.0	0.0	0.0	0.0	0.0	17.9		
	Monthly Subtotal ($)	$251	$371	$251	$207	$207	$327	$255	$0	$0	$0	$0	$0	$1,868		
														Task Subtotal =		$1,868
	Operation															
	Wet season inspections	1.0	0.5	0.5	1.0	2.0	1.0	1.0						7.0	$55	$ 385
	Dry season inspections	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	Unscheduled inspections/field calls	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$60	$ -
	Monthly Subtotal (hours)	1.0	0.5	0.5	1.0	2.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	7.0		
	Monthly Subtotal ($)	$55	$28	$28	$55	$110	$55	$55	$0	$0	$0	$0	$0	$385		
														Task Subtotal =		$385
	Maintenance															
	Scheduled maintenance	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	Unscheduled maintenance	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	Vandalism	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	Acts of God	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	Landscape Maintenance Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$23	$ -
	Sediment Removal Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Vegetation Consultant	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$85	$ -
	Other Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Other Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Monthly Subtotal (hours)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		
														Task Subtotal =		$0
	Vector Control															
	Contract & General administration	0.5	0.1	0.1	0.1	0.1	0.1	0.1						1.1	$87	$ 96
	Vector prevention maint. (consultant)	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$65	$ -
	Response to VCD calls (consultant)	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	VCD efforts (contracted)	0.8	0.5	0.5	1.0	1.0	1.0	1.0						5.8	$55	$ 319
	Monthly Subtotal (hours)	1.3	0.6	0.6	1.1	1.1	1.1	1.1	0.0	0.0	0.0	0.0	0.0	6.9		
	Monthly Subtotal ($)	$88	$36	$36	$64	$64	$64	$64	$0	$0	$0	$0	$0	$415		
														Task Subtotal =		$415
Non-Recurring Equipment (hours)	***Equipment***															
	Piece of Equipment 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Monthly Subtotal (hours)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		
														Equipment Subtotal =		$0

	Direct Costs													Total $
Dollars ($)	VCD supplies (direct costs less labor)	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Reproduction	$ -	$ -	$ -	$ -	$ 10	$ -	$ -						$ 10
	Postage/FedEx	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Lodging	$ 15	$ -	$ -	$ -	$ -	$ -	$ -						$ 15
	Per Diem	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Incidentals	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Vehicle Rental/Lease	$ 40	$ 16	$ 11	$ 5	$ 9	$ 22	$ 13						$ 115
	Airfare	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Field Supp./Expendables	$ -	$ 1	$ -	$ -	$ -	$ -	$ -						$ 1
	Equipment Rental	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Sediment Analyses	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Sediment Disposal	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Fax	$ 0.50	$ -	$ -	$ -	$ -	$ -	$ -						$ 1
	Other Direct Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Other Direct Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Monthly Subtotal	$ 55	$ 17	$ 11	$ 5	$ 19	$ 22	$ 13	$ -	$ -	$ -	$ -	$ -	$ 141

MONTHLY TOTAL	$448	$451	$325	$331	$399	$467	$387	$0	$0	$0	$0	$0	**1999/2000 TOTAL =**	**$2,809**

BMP Retrofit Pilot Program
Maintenance Operation
Cost Accounting Summary, 1998-99

DISTRICT: 11	LOCATION: I-5/La Costa Avenue (west)	SITE NO. 111103	BMP TYPE: Infiltration Basin	CONSULTANT: KLI

	TASK	1999			2000									Total (hrs)	Avg. Rate	TOTAL $
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep			
Labor (hours)	***Administration***															
	General program support/Follow-up	0.5	0.0	0.0	1.0	1.0	6.0	1.4						9.9	$120	$ 1,188
	Encroachment Permits	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$87	$ -
	Travel	0.0	0.0	0.0	0.5	1.0	1.0	2.0						4.5	$87	$ 392
	Unscheduled events	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$87	$ -
	Monthly Subtotal (hours)	0.5	0.0	0.0	1.5	2.0	7.0	3.4	0.0	0.0	0.0	0.0	0.0	14.4		
	Monthly Subtotal ($)	$60	$0	$0	$164	$207	$807	$342	$0	$0	$0	$0	$0	$1,580		
														Task Subtotal =		$1,580
	Operation															
	Wet season inspections	0.0	0.0	0.0	1.0	2.0	1.0	1.0						5.0	$55	$ 275
	Dry season inspections	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	Unscheduled inspections/field calls	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$60	$ -
	Monthly Subtotal (hours)	0.0	0.0	0.0	1.0	2.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	5.0		
	Monthly Subtotal ($)	$0	$0	$0	$55	$110	$55	$55	$0	$0	$0	$0	$0	$275		
														Task Subtotal =		$275
	Maintenance															
	Scheduled maintenance	0.0	0.0	0.0	0.0	0.0	0.0	18.0						18.0	$55	$ 990
	Unscheduled maintenance	8.0	0.0	0.0	0.0	8.0	0.0	5.0						21.0	$55	$ 1,155
	Vandalism	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	Acts of God	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	Landscape Maintenance Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$24	$ -
	Sediment Removal Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Other Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Other Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Other Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Monthly Subtotal (hours)	8.0	0.0	0.0	0.0	8.0	0.0	23.0	0.0	0.0	0.0	0.0	0.0	39.0		
	Monthly Subtotal ($)	$440	$0	$0	$0	$440	$0	$1,265	$0	$0	$0	$0	$0	$2,145		
														Task Subtotal =		$2,145
	Vector Control															
	Contract & General administration	0.5	0.1	0.1	0.1	0.1	0.1	0.1						1.1	$87	$ 96
	Vector prevention maint. (consultant)	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$65	$ -
	Response to VCD calls (consultant)	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	VCD efforts (contracted)	2.0	1.0	1.0	2.0	2.0	2.0	2.0						12.0	$55	$ 660
	Monthly Subtotal (hours)	2.5	1.1	1.1	2.1	2.1	2.1	2.1	0.0	0.0	0.0	0.0	0.0	13.1		
	Monthly Subtotal ($)	$154	$64	$64	$119	$119	$119	$119	$0	$0	$0	$0	$0	$756		
														Task Subtotal =		$756
Non-Recurring Equipment (hours)	***Equipment***															
	Piece of Equipment 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Monthly Subtotal (hours)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		
														Equipment Subtotal =		$0
Dollars ($)	***Direct Costs***													**Total $**		
	VCD supplies (direct costs less labor)	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Reproduction	$ -	$ -	$ -	$ -	$ 10	$ -	$ -						$ 10		
	Postage/FedEx	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Lodging	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Per Diem	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Incidentals	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Vehicle Rental/Lease	$ -	$ -	$ -	$ 5	$ 9	$ 22	$ 13						$ 48		
	Airfare	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Field Supp./Expendables	$ -	$ -	$ -	$ -	$ -	$ -							$ -		
	Equipment Rental	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Sediment Analyses	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Sediment Disposal	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Fax	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Bird Deterrent Net Frame	$ -	$ -	$ -	$ -	$ -	$ -	$ 151						$ 151		
	Other Direct Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Monthly Subtotal	$ -	$ -	$ -	$ 5	$ 19	$ 22	$ 164	$ -	$ -	$ -	$ -	$ -	$ 209		
	MONTHLY TOTAL	$654	$64	$64	$342	$894	$1,002	$1,945	$0	$0	$0	$0	$0	**1999/2000 TOTAL =**		**$4,965**

BMP Retrofit Pilot Program
Maintenance Operation
Cost Accounting Summary, 1998-99

DISTRICT: 11	LOCATION: I-5/La Costa Avenue (southeast)	SITE NO. 111104	BMP TYPE: Wet Basin	CONSULTANT: KLI

	TASK	1999			2000									Total (hrs)	Avg. Rate	TOTAL $
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep			
Labor (hours)	***Administration***															
	General program support/Follow-up	10.0	4.0	1.0	1.0	1.0	2.0	1.4						20.4	$120	$ 2,448
	Encroachment Permits	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$87	$ -
	Travel	0.5	0.8	1.0	0.5	1.0	1.0	1.0						5.75	$87	$ 500
	Unscheduled events	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$87	$ -
	Monthly Subtotal (hours)	10.5	4.75	2	1.5	2	3	2.4	0	0	0	0	0	26.15		
	Monthly Subtotal ($)	$1,244	$545	$207	$164	$207	$327	$255	$0	$0	$0	$0	$0	$2,948		
														Task Subtotal =		$2,948
	Operation															
	Wet season inspections	0.5	0.5	0.5	1.0	2.0	1.0	1.0						6.5	$55	$ 358
	Dry season inspections	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$55	$ -
	Unscheduled inspections/field calls	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$60	$ -
	Monthly Subtotal (hours)	0.5	0.5	0.5	1	2	1	1	0	0	0	0	0	6.5		
	Monthly Subtotal ($)	$28	$28	$28	$55	$110	$55	$55	$0	$0	$0	$0	$0	$358		
														Task Subtotal =		$358
	Maintenance															
	Scheduled maintenance	0.0	0.0	6.0	4.0	0.0	10.0	0.0						20	$55	$ 1,100
	Unscheduled maintenance	0.0	0.0	0.0	0.0	8.0	2.0	1.5						11.5	$55	$ 633
	Vandalism	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$55	$ -
	Acts of God	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$55	$ -
	Landscape Maintenance Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$0	$ -
	Vegetation Consultant	0.0	5.0	3.5	3.0	0.0	2.0	2.0						15.5	$85	$ 1,318
	Native Landscape, Inc.	30.0	20.0	0.0	0.0	0.0	0.0	0.0						50	$28	$ 1,400
	Irrigation Tech	0.0	7.0	0.0	0.0	0.0	0.0	1.5						8.5	$53	$ 451
	Other Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$0	$ -
	Monthly Subtotal (hours)	30	32	9.5	7	8	14	5	0	0	0	0	0	105.5		
	Monthly Subtotal ($)	$840	$1,356	$628	$475	$440	$830	$332	$0	$0	$0	$0	$0	$4,901		
														Task Subtotal =		$4,901
	Vector Control															
	Contract & General administration	0.5	0.1	0.1	0.1	0.1	0.1	0.1						1.1	$87	$ 96
	Vector prevention maint. (consultant)	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$65	$ -
	Response to VCD calls (consultant)	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$55	$ -
	VCD efforts (contracted)	3.0	1.0	1.0	3.0	3.0	3.0	3.0						17	$55	$ 935
	Monthly Subtotal (hours)	3.5	1.1	1.1	3.1	3.1	3.1	3.1	0	0	0	0	0	18.1		
	Monthly Subtotal ($)	$209	$64	$64	$174	$174	$174	$174	$0	$0	$0	$0	$0	$1,031		
														Task Subtotal =		$1,031
Non-Recurring Equipment (hours)	***Equipment***															
	Piece of Equipment 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$0	$ -
	Piece of Equipment 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$0	$ -
	Piece of Equipment 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$0	$ -
	Piece of Equipment 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$0	$ -
	Piece of Equipment 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$0	$ -
	Piece of Equipment 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$0	$ -
	Monthly Subtotal (hours)	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		
														Equipment Subtotal =		$0
Dollars ($)	***Direct Costs***													**Total $**		
	VCD supplies (direct costs less labor)	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Reproduction	$ -	$ -	$ -	$ -	$ 10	$ -	$ -						$ 10		
	Postage/FedEx	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Lodging	$ 15	$ -	$ -	$ -	$ -	$ -	$ -						$ 15		
	Per Diem	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Incidentals	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Vehicle Rental/Lease	$ 40	$ 16	$ 11	$ 5	$ 9	$ 22	$ 13						$ 115		
	Airfare	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Field Supp./Expendables	$ -	$ 1	$ -	$ -	$ -	$ 45	$ 59						$ 105		
	Equipment Rental	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Sediment Analyses	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Sediment Disposal	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Fax	$ 0.50	$ -	$ -	$ -	$ -	$ -	$ -						$ 1		
	Irrigation Materials	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Other Direct Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Monthly Subtotal	$ 55	$ 17	$ 11	$ 5	$ 19	$ 67	$ 72	$ -	$ -	$ -	$ -	$ -	$ 246		
	MONTHLY TOTAL	$2,375	$2,009	$937	$872	$949	$1,453	$888	$0	$0	$0	$0	$0	**1999/2000 TOTAL =**		**$9,483**

BMP Retrofit Pilot Program
Maintenance Operation
Cost Accounting Summary, 1998-99

DISTRICT: 11	LOCATION: I-5/Manchester Avenue	SITE NO. 111105	BMP TYPE: Extended Detention Basin	CONSULTANT: KLI

	TASK	1999			2000									Total (hrs)	Avg. Rate	TOTAL $
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep			
Labor (hours)	***Administration***															
	General program support/Follow-up	6.0	7.8	1.0	1.0	1.0	2.0	1.4						20.15	$120	$ 2,418
	Encroachment Permits	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$87	$ -
	Travel	0.8	1.0	0.5	0.5	1.0	1.0	1.0						5.75	$87	$ 500
	Unscheduled events	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$87	$ -
	Monthly Subtotal (hours)	6.75	8.75	1.5	1.5	2	3	2.4	0	0	0	0	0	25.9		
	Monthly Subtotal ($)	$785	$1,017	$164	$164	$207	$327	$255	$0	$0	$0	$0	$0	$2,918		
														Task Subtotal =		$2,918
	Operation															
	Wet season inspections	0.5	0.5	0.5	1.0	2.0	1.0	1.0						6.5	$55	$ 358
	Dry season inspections	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$55	$ -
	Unscheduled inspections/field calls	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$60	$ -
	Monthly Subtotal (hours)	0.5	0.5	0.5	1	2	1	1	0	0	0	0	0	6.5		
	Monthly Subtotal ($)	$28	$28	$28	$55	$110	$55	$55	$0	$0	$0	$0	$0	$358		
														Task Subtotal =		$358
	Maintenance															
	Scheduled maintenance	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$55	$ -
	Unscheduled maintenance	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$55	$ -
	Vandalism	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$55	$ -
	Acts of God	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$55	$ -
	Landscape Maintenance Contractor	2.0	0.0	0.0	0.0	0.0	0.0	0.0						2	$24	$ 49
	Sediment Removal Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$0	$ -
	Native Landscape	0.0	8.0	0.0	0.0	0.0	0.0	0.0						8	$28	$ 224
	Vegetation Consultant	0.0	0.8	0.0	0.0	0.0	0.0	0.0						0.83	$85	$ 71
	Other Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$0	$ -
	Monthly Subtotal (hours)	2	8.83	0	0	0	0	0	0	0	0	0	0	10.83		
	Monthly Subtotal ($)	$49	$295	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$343		
														Task Subtotal =		$343
	Vector Control															
	Contract & General administration	0.5	0.1	0.1	0.1	0.1	0.1	0.1						1.1	$87	$ 96
	Vector prevention maint. (consultant)	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$65	$ -
	Response to VCD calls (consultant)	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$55	$ -
	VCD efforts (contracted)	1.0	0.5	0.5	1.0	1.0	1.0	1.0						6	$55	$ 330
	Monthly Subtotal (hours)	1.5	0.6	0.6	1.1	1.1	1.1	1.1	0	0	0	0	0	7.1		
	Monthly Subtotal ($)	$99	$36	$36	$64	$64	$64	$64	$0	$0	$0	$0	$0	$426		
														Task Subtotal =		$426
Non-Recurring Equipment (hours)	***Equipment***															
	Piece of Equipment 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$0	$ -
	Piece of Equipment 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$0	$ -
	Piece of Equipment 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$0	$ -
	Piece of Equipment 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$0	$ -
	Piece of Equipment 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$0	$ -
	Piece of Equipment 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$0	$ -
	Monthly Subtotal (hours)	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		
														Equipment Subtotal =		$0
Dollars ($)	***Direct Costs***													**Total $**		
	VCD supplies (direct costs less labor)	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Reproduction	$ -	$ -	$ -	$ -	$ 10	$ -	$ -						$ 10		
	Postage/FedEx	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Lodging	$ 15	$ -	$ -	$ -	$ -	$ -	$ -						$ 15		
	Per Diem	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Incidentals	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Vehicle Rental/Lease	$ 40	$ 16	$ 11	$ 5	$ 9	$ 22	$ 13						$ 115		
	Airfare	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Field Supp./Expendables	$ -	$ 1	$ -	$ -	$ -	$ -	$ -						$ 1		
	Equipment Rental	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Sediment Analyses	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Sediment Disposal	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Fax	$ 0.50	$ -	$ -	$ -	$ -	$ -	$ -						$ 1		
	Hydroseed	$ -	$ 449	$ -	$ -	$ -	$ -	$ -						$ 449		
	Other Direct Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Monthly Subtotal	$ 55	$ 466	$ 11	$ 5	$ 19	$ 22	$ 13	$ -	$ -	$ -	$ -	$ -	$ 590		
	MONTHLY TOTAL	$1,015	$1,841	$238	$287	$399	$467	$387	$0	$0	$0	$0	$0	**1999/2000 TOTAL =**		**$4,635**

BMP Retrofit Pilot Program
Maintenance Operation
Cost Accounting Summary, 1998-99

DISTRICT: 11	LOCATION: Kearny Mesa Maintenance Station	SITE NO. 112201	BMP TYPE: StormFilter (Perlite/Zeolite)	CONSULTANT: KLI

	TASK	1999			2000									Total (hrs)	Avg. Rate	TOTAL $
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep			
Labor (hours)	***Administration***															
	General program support/Follow-up	1.0	1.5	1.0	1.0	1.0	2.0	1.4						8.9	$120	$ 1,068
	Encroachment Permits	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$87	$ -
	Travel	1.5	1.5	1.5	0.5	1.0	1.0	1.0						8.0	$87	$ 696
	Unscheduled events	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$87	$ -
	Monthly Subtotal (hours)	2.5	3.0	2.5	1.5	2.0	3.0	2.4	0.0	0.0	0.0	0.0	0.0	16.9		
	Monthly Subtotal ($)	$251	$311	$251	$164	$207	$327	$255	$0	$0	$0	$0	$0	$1,764		
														Task Subtotal =		$1,764
	Operation															
	Wet season inspections	1.0	1.0	1.0	1.0	2.0	1.0	1.0						8.0	$55	$ 440
	Dry season inspections	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	Unscheduled inspections/field calls	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$60	$ -
	Monthly Subtotal (hours)	1.0	1.0	1.0	1.0	2.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	8.0		
	Monthly Subtotal ($)	$55	$55	$55	$55	$110	$55	$55	$0	$0	$0	$0	$0	$440		
														Task Subtotal =		$440
	Maintenance															
	Scheduled maintenance	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	Unscheduled maintenance	0.0	0.0	0.0	16.0	0.0	0.0	0.0						16.0	$55	$ 880
	Vandalism	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	Acts of God	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	Landscape Maintenance Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Sediment Removal Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Other Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Other Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Other Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Monthly Subtotal (hours)	0.0	0.0	0.0	16.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.0		
	Monthly Subtotal ($)	$0	$0	$0	$880	$0	$0	$0	$0	$0	$0	$0	$0	$880		
														Task Subtotal =		$880
	Vector Control															
	Contract & General administration	0.5	0.1	0.1	0.1	0.1	0.1	0.1						1.1	$87	$ 96
	Vector prevention maint. (consultant)	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$65	$ -
	Response to VCD calls (consultant)	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	VCD efforts (contracted)	2.0	1.0	1.0	2.0	2.0	2.0	2.0						12.0	$55	$ 660
	Monthly Subtotal (hours)	2.5	1.1	1.1	2.1	2.1	2.1	2.1	0.0	0.0	0.0	0.0	0.0	13.1		
	Monthly Subtotal ($)	$154	$64	$64	$119	$119	$119	$119	$0	$0	$0	$0	$0	$756		
														Task Subtotal =		$756
Non-Recurring Equipment (hours)	***Equipment***															
	Piece of Equipment 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Monthly Subtotal (hours)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		
														Equipment Subtotal =		$0

Dollars ($)	***Direct Costs***													Total $	
	VCD supplies (direct costs less labor)	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -	
	Reproduction	$ -	$ -	$ -	$ -	$ 10	$ -	$ -						$ 10	
	Postage/FedEx	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -	
	Lodging	$ 15	$ -	$ -	$ -	$ -	$ -	$ -						$ 15	
	Per Diem	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -	
	Incidentals	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -	
	Vehicle Rental/Lease	$ 40	$ 16	$ 11	$ 5	$ 9	$ 22	$ 13						$ 115	
	Airfare	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -	
	Field Supp./Expendables	$ -	$ 1	$ -	$ -	$ -	$ -	$ -						$ 1	
	Equipment Rental	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -	
	Sediment Analyses	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -	
	Sediment Disposal	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -	
	Fax	$ 0.50	$ -	$ -	$ -	$ -	$ -	$ -						$ 1	
	Other Direct Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -	
	Other Direct Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -	
	Monthly Subtotal	$ 55	$ 17	$ 11	$ 5	$ 19	$ 22	$ 13	$ -	$ -	$ -	$ -	$ -	$ 141	

MONTHLY TOTAL	$514	$446	$380	$1,222	$454	$522	$442	$0	$0	$0	$0	$0	**1999/2000 TOTAL =**	**$3,981**

BMP Retrofit Pilot Program
Maintenance Operation
Cost Accounting Summary, 1998-99

DISTRICT: 11	LOCATION: Escondido Maintenance Station	SITE NO. 112202	BMP TYPE: Media Filter (Sand Filter Type II)	CONSULTANT: KLI

Labor (hours)

TASK	1999 Oct	1999 Nov	1999 Dec	2000 Jan	2000 Feb	2000 Mar	2000 Apr	2000 May	2000 Jun	2000 Jul	2000 Aug	2000 Sep	Total (hrs)	Avg. Rate	TOTAL $
Administration															
General program support/Follow-up	2.0	1.5	1.0	1.0	1.0	2.0	1.4						9.9	$120	$ 1,188
Encroachment Permits	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$87	$ -
Travel	1.0	1.0	1.0	0.5	1.0	1.0	1.0						6.5	$87	$ 566
Unscheduled events	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$87	$ -
Monthly Subtotal (hours)	3.0	2.5	2.0	1.5	2.0	3.0	2.4	0.0	0.0	0.0	0.0	0.0	16.4		
Monthly Subtotal ($)	$327	$267	$207	$164	$207	$327	$255	$0	$0	$0	$0	$0	$1,754		
													Task Subtotal =		$1,754
Operation															
Wet season inspections	0.8	1.0	0.5	1.0	2.0	1.0	1.0						7.3	$55	$ 399
Dry season inspections	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
Unscheduled inspections/field calls	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$60	$ -
Monthly Subtotal (hours)	0.8	1.0	0.5	1.0	2.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	7.3		
Monthly Subtotal ($)	$41	$55	$28	$55	$110	$55	$55	$0	$0	$0	$0	$0	$399		
													Task Subtotal =		$399
Maintenance															
Scheduled maintenance	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
Unscheduled maintenance	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
Vandalism	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
Acts of God	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
Landscape Maintenance Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
Sediment Removal Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
Other Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
Other Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
Other Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
Monthly Subtotal (hours)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		
													Task Subtotal =		$0
Vector Control															
Contract & General administration	0.5	0.1	0.1	0.1	0.1	0.1	0.1						1.1	$87	$ 96
Vector prevention maint. (consultant)	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$65	$ -
Response to VCD calls (consultant)	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
VCD efforts (contracted)	2.0	1.0	1.0	2.0	2.0	2.0	2.0						12.0	$55	$ 660
Monthly Subtotal (hours)	2.5	1.1	1.1	2.1	2.1	2.1	2.1	0.0	0.0	0.0	0.0	0.0	13.1		
Monthly Subtotal ($)	$154	$64	$64	$119	$119	$119	$119	$0	$0	$0	$0	$0	$756		
													Task Subtotal =		$756

Non-Recurring Equipment (hours)

Equipment															
Piece of Equipment 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
Piece of Equipment 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
Piece of Equipment 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
Piece of Equipment 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
Piece of Equipment 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
Piece of Equipment 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
Monthly Subtotal (hours)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		
													Equipment Subtotal =		$0

Dollars ($)

Direct Costs													Total $
VCD supplies (direct costs less labor)	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
Reproduction	$ -	$ -	$ -	$ -	$ 10	$ -	$ -						$ 10
Postage/FedEx	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
Lodging	$ 15	$ -	$ -	$ -	$ -	$ -	$ -						$ 15
Per Diem	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
Incidentals	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
Vehicle Rental/Lease	$ 40	$ 16	$ 11	$ 5	$ 9	$ 22	$ 13						$ 115
Airfare	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
Field Supp./Expendables	$ -	$ 1	$ -	$ -	$ -	$ -	$ -						$ 1
Equipment Rental	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
Sediment Analyses	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
Sediment Disposal	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
Fax	$ 0.50	$ -	$ -	$ -	$ -	$ -	$ -						$ 1
Other Direct Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
Other Direct Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
Monthly Subtotal	$ 55	$ 17	$ 11	$ 5	$ 19	$ 22	$ 13	$ -	$ -	$ -	$ -	$ -	$ 141

MONTHLY TOTAL	$577	$403	$309	$342	$454	$522	$442	$0	$0	$0	$0	$0	**1999/2000 TOTAL = $3,049**

BMP Retrofit Pilot Program
Maintenance Operation
Cost Accounting Summary, 1998-99

DISTRICT: 11	LOCATION: I-5/La Costa Avenue Park & Ride	SITE NO. 112203	BMP TYPE: Media Filter (Sand Filter Type I)	CONSULTANT: KLI

	TASK	1999			2000									Total (hrs)	Avg. Rate	TOTAL $
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep			
Labor (hours)	***Administration***															
	General program support/Follow-up	2.0	1.5	1.0	1.0	1.0	2.0	1.4						9.9	$120	$ 1,188
	Encroachment Permits	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$87	$ -
	Travel	0.5	0.5	0.5	0.3	0.8	0.8	1.0						4.3	$87	$ 370
	Unscheduled events	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$87	$ -
	Monthly Subtotal (hours)	2.5	2.0	1.5	1.3	1.8	2.8	2.4	0.0	0.0	0.0	0.0	0.0	14.2		
	Monthly Subtotal ($)	$284	$224	$164	$142	$185	$305	$255	$0	$0	$0	$0	$0	$1,558		
														Task Subtotal =		$1,558
	Operation															
	Wet season inspections	0.5	0.5	0.5	1.0	2.0	1.0	1.0						6.5	$55	$ 358
	Dry season inspections	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	Unscheduled inspections/field calls	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$60	$ -
	Monthly Subtotal (hours)	0.5	0.5	0.5	1.0	2.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	6.5		
	Monthly Subtotal ($)	$28	$28	$28	$55	$110	$55	$55	$0	$0	$0	$0	$0	$358		
														Task Subtotal =		$358
	Maintenance															
	Scheduled maintenance	0.0	0.0	0.0	0.0	0.0	0.0	3.0						3.0	$55	$ 165
	Unscheduled maintenance	0.0	0.0	0.0	2.0	4.0	1.0	1.3						8.3	$55	$ 454
	Vandalism	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	Acts of God	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	Landscape Maintenance Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Sediment Removal Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Other Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Other Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Other Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Monthly Subtotal (hours)	0.0	0.0	0.0	2.0	4.0	1.0	4.3	0.0	0.0	0.0	0.0	0.0	11.3		
	Monthly Subtotal ($)	$0	$0	$0	$110	$220	$55	$234	$0	$0	$0	$0	$0	$619		
														Task Subtotal =		$619
	Vector Control															
	Contract & General administration	0.5	0.1	0.1	0.1	0.1	0.1	0.1						1.1	$87	$ 96
	Vector prevention maint. (consultant)	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$65	$ -
	Response to VCD calls (consultant)	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	VCD efforts (contracted)	2.0	1.0	1.0	3.0	3.0	3.0	3.0						16.0	$55	$ 880
	Monthly Subtotal (hours)	2.5	1.1	1.1	3.1	3.1	3.1	3.1	0.0	0.0	0.0	0.0	0.0	17.1		
	Monthly Subtotal ($)	$154	$64	$64	$174	$174	$174	$174	$0	$0	$0	$0	$0	$976		
														Task Subtotal =		$976
Non-Recurring Equipment (hours)	***Equipment***															
	Piece of Equipment 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Monthly Subtotal (hours)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		
														Equipment Subtotal =		$0
Dollars ($)	***Direct Costs***													Total $		
	VCD supplies (direct costs less labor)	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Reproduction	$ -	$ -	$ -	$ -	$ 10	$ -	$ -						$ 10		
	Postage/FedEx	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Lodging	$ 15	$ -	$ -	$ -	$ -	$ -	$ -						$ 15		
	Per Diem	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Incidentals	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Vehicle Rental/Lease	$ 40	$ 16	$ 11	$ 5	$ 9	$ 22	$ 13						$ 115		
	Airfare	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Field Supp./Expendables	$ -	$ 1	$ -	$ -	$ -	$ -	$ -						$ 1		
	Equipment Rental	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Sediment Analyses	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Sediment Disposal	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Fax	$ 0.50	$ -	$ -	$ -	$ -	$ -	$ -						$ 1		
	Other Direct Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Other Direct Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -		
	Monthly Subtotal	$ 55	$ 17	$ 11	$ 5	$ 19	$ 22	$ 13	$ -	$ -	$ -	$ -	$ -	$ 141		
	MONTHLY TOTAL	$520	$332	$266	$486	$707	$611	$730	$0	$0	$0	$0	$0	**1999/2000 TOTAL =**		**$3,651**

BMP Retrofit Pilot Program
Maintenance Operation
Cost Accounting Summary, 1998-99

DISTRICT: 11	LOCATION: SR-78/I-5 Park & Ride	SITE NO. 112204	BMP TYPE: Media Filter (Sand Filter Type I)	CONSULTANT: KLI

	TASK	1999			2000									Total (hrs)	Avg. Rate	TOTAL $
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep			
Labor (hours)	***Administration***															
	General program support/Follow-up	3.0	1.5	1.0	1.0	1.0	2.0	1.4						10.9	$120	$ 1,308
	Encroachment Permits	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$87	$ -
	Travel	0.5	0.5	0.5	0.3	0.8	0.8	1.0						4.3	$87	$ 370
	Unscheduled events	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$87	$ -
	Monthly Subtotal (hours)	3.5	2.0	1.5	1.3	1.8	2.8	2.4	0.0	0.0	0.0	0.0	0.0	15.2		
	Monthly Subtotal ($)	$404	$224	$164	$142	$185	$305	$255	$0	$0	$0	$0	$0	$1,678		
														Task Subtotal =		$1,678
	Operation															
	Wet season inspections	0.5	0.5	0.5	1.0	2.0	1.0	1.0						6.5	$55	$ 358
	Dry season inspections	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	Unscheduled inspections/field calls	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$60	$ -
	Monthly Subtotal (hours)	0.5	0.5	0.5	1.0	2.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	6.5		
	Monthly Subtotal ($)	$28	$28	$28	$55	$110	$55	$55	$0	$0	$0	$0	$0	$358		
														Task Subtotal =		$358
	Maintenance															
	Scheduled maintenance	0.0	0.0	0.0	0.0	0.0	0.0	3.0						3.0	$55	$ 165
	Unscheduled maintenance	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	Vandalism	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	Acts of God	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	Landscape Maintenance Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Sediment Removal Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Other Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Other Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Other Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Monthly Subtotal (hours)	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	3.0		
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$165	$0	$0	$0	$0	$0	$165		
														Task Subtotal =		$165
	Vector Control															
	Contract & General administration	0.5	0.1	0.1	0.1	0.1	0.1	0.1						1.1	$87	$ 96
	Vector prevention maint. (consultant)	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$65	$ -
	Response to VCD calls (consultant)	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	VCD efforts (contracted)	3.0	1.0	1.0	2.0	2.0	2.0	2.0						13.0	$55	$ 715
	Monthly Subtotal (hours)	3.5	1.1	1.1	2.1	2.1	2.1	2.1	0.0	0.0	0.0	0.0	0.0	14.1		
	Monthly Subtotal ($)	$209	$64	$64	$119	$119	$119	$119	$0	$0	$0	$0	$0	$811		
														Task Subtotal =		$811
Non-Recurring Equipment (hours)	***Equipment***															
	Piece of Equipment 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Monthly Subtotal (hours)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		
														Equipment Subtotal =		$0

	Direct Costs													Total $
Dollars ($)	VCD supplies (direct costs less labor)	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Reproduction	$ -	$ -	$ -	$ -	$ 10	$ -	$ -						$ 10
	Postage/FedEx	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Lodging	$ 15	$ -	$ -	$ -	$ -	$ -	$ -						$ 15
	Per Diem	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Incidentals	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Vehicle Rental/Lease	$ 40	$ 16	$ 11	$ 5	$ 9	$ 22	$ 13						$ 115
	Airfare	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Field Supp./Expendables	$ -	$ 1	$ -	$ -	$ -	$ -	$ -						$ 1
	Equipment Rental	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Sediment Analyses	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Sediment Disposal	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Fax	$ 0.50	$ -	$ -	$ -	$ -	$ -	$ -						$ 1
	Other Direct Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Other Direct Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Monthly Subtotal	$ 55	$ 17	$ 11	$ 5	$ 19	$ 22	$ 13	$ -	$ -	$ -	$ -	$ -	$ 141

MONTHLY TOTAL	$695	$332	$266	$321	$432	$501	$607	$0	$0	$0	$0	$0	**199/2000 TOTAL =**	**$3,152**

BMP Retrofit Pilot Program
Maintenance Operation
Cost Accounting Summary, 1998-99

DISTRICT: 11	LOCATION: SR-78/Melrose Drive	SITE NO. 112205	BMP TYPE: Biofiltration Swale	CONSULTANT: KLI

	TASK	1999			2000									Total (hrs)	Avg. Rate	TOTAL $
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep			
Labor (hours)	***Administration***															
	General program support/Follow-up	7.0	7.8	1.5	1.0	1.0	2.0	1.4						21.7	$120	$ 2,598
	Encroachment Permits	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$87	$ -
	Travel	0.5	1.0	0.8	0.5	1.0	1.0	1.0						5.8	$87	$ 500
	Unscheduled events	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$87	$ -
	Monthly Subtotal (hours)	7.5	8.8	2.3	1.5	2.0	3.0	2.4	0.0	0.0	0.0	0.0	0.0	27.4		
	Monthly Subtotal ($)	$884	$1,017	$245	$164	$207	$327	$255	$0	$0	$0	$0	$0	$3,098		
														Task Subtotal =		$3,098
	Operation															
	Wet season inspections	0.5	0.5	0.5	1.0	2.0	1.0	1.0						6.5	$55	$ 358
	Dry season inspections	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	Unscheduled inspections/field calls	0.5	0.0	0.0	0.0	0.0	0.0	0.0						0.5	$60	$ 30
	Monthly Subtotal (hours)	1.0	0.5	0.5	1.0	2.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	7.0		
	Monthly Subtotal ($)	$58	$28	$28	$55	$110	$55	$55	$0	$0	$0	$0	$0	$388		
														Task Subtotal =		$388
	Maintenance															
	Scheduled maintenance	8.0	0.0	0.0	0.0	4.0	0.0	1.3						13.3	$55	$ 729
	Unscheduled maintenance	0.0	0.0	0.0	0.0	0.0	16.0	0.0						16.0	$55	$ 880
	Vandalism	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	Acts of God	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	Landscape Maintenance Contractor	10.0	0.0	0.0	0.0	0.0	0.0	13.4						23.4	$23	$ 538
	Sediment Removal Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Vegetation Consultant	0.0	0.8	0.0	0.0	0.0	1.5	1.5						3.8	$85	$ 326
	Habitat West Landscape Inc.	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$27	$ -
	Native Landscape	0.0	8.0	0.0	0.0	0.0	0.0	0.0						8.0	$28	$ 224
	Monthly Subtotal (hours)	18.0	8.8	0.0	0.0	4.0	17.5	16.2	0.0	0.0	0.0	0.0	0.0	64.5		
	Monthly Subtotal ($)	$670	$295	$0	$0	$220	$1,008	$504	$0	$0	$0	$0	$0	$2,697		
														Task Subtotal =		$2,697
	Vector Control															
	Contract & General administration	0.5	0.1	0.1	0.1	0.1	0.1	0.1						1.1	$87	$ 96
	Vector prevention maint. (consultant)	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$65	$ -
	Response to VCD calls (consultant)	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	VCD efforts (contracted)	1.0	1.0	0.5	2.0	2.0	2.0	2.0						10.5	$55	$ 578
	Monthly Subtotal (hours)	1.5	1.1	0.6	2.1	2.1	2.1	2.1	0.0	0.0	0.0	0.0	0.0	11.6		
	Monthly Subtotal ($)	$99	$64	$36	$119	$119	$119	$119	$0	$0	$0	$0	$0	$673		
														Task Subtotal =		$673
Non-Recurring Equipment (hours)	***Equipment***															
	Jackhammer	0.0	0.0	0.0	0.0	0.0	1.0	0.0						1.0	$50	$ 50
	Piece of Equipment 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Monthly Subtotal (hours)	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0		
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$50	$0	$0	$0	$0	$0	$0	$50		
														Equipment Subtotal =		$50

Dollars ($)	***Direct Costs***													Total $	
	VCD supplies (direct costs less labor)	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -	
	Reproduction	$ -	$ -	$ -	$ -	$ 10	$ -	$ -						$ 10	
	Postage/FedEx	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -	
	Lodging	$ 15	$ -	$ -	$ -	$ -	$ -	$ -						$ 15	
	Per Diem	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -	
	Incidentals	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -	
	Vehicle Rental/Lease	$ 40	$ 16	$ 11	$ 5	$ 9	$ 22	$ 13						$ 115	
	Airfare	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -	
	Field Supp./Expendables	$ -	$ 1	$ -	$ -	$ -	$ -	$ -						$ 1	
	Equipment Rental	$ -	$ 250	$ -	$ -	$ -	$ -	$ -						$ 250	
	Sediment Analyses	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -	
	Sediment Disposal	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -	
	Fax	$ 0.50	$ -	$ -	$ -	$ -	$ -	$ -						$ 1	
	Salt Grass Reserve	$ 747	$ -	$ -	$ -	$ -	$ -	$ -						$ 747	
	Hydroseed	$ -	$ 449	$ -	$ -	$ -	$ -	$ -						$ 449	
	Monthly Subtotal	$ 802	$ 716	$ 11	$ 5	$ 19	$ 22	$ 13	$ -	$ -	$ -	$ -	$ -	$ 1,587	

MONTHLY TOTAL	$2,512	$2,119	$320	$342	$674	$1,579	$946	$0	$0	$0	$0	$0	**1999/2000 TOTAL =**	**$8,492**

BMP Retrofit Pilot Program
Maintenance Operation
Cost Accounting Summary, 1998-99

DISTRICT: 11	LOCATION: I-5/Palomar Airport Road	SITE NO. 112206	BMP TYPE: Biofiltration Swale	CONSULTANT: KLI

	TASK	1999			2000									Total (hrs)	Avg. Rate	TOTAL $
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep			
Labor (hours)	***Administration***															
	General program support/Follow-up	7.0	2.5	1.0	1.0	1.0	2.0	1.4						15.9	$120	$ 1,908
	Encroachment Permits	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$87	$ -
	Travel	0.5	0.5	0.5	0.5	1.0	1.0	1.0						5	$87	$ 435
	Unscheduled events	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$87	$ -
	Monthly Subtotal (hours)	7.5	3	1.5	1.5	2	3	2.4	0	0	0	0	0	20.9		
	Monthly Subtotal ($)	$884	$344	$164	$164	$207	$327	$255	$0	$0	$0	$0	$0	$2,343		
														Task Subtotal =		$2,343
	Operation															
	Wet season inspections	0.5	0.5	0.5	1.0	2.0	1.0	1.0						6.5	$55	$ 358
	Dry season inspections	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$55	$ -
	Unscheduled inspections/field calls	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$60	$ -
	Monthly Subtotal (hours)	0.5	0.5	0.5	1	2	1	1	0	0	0	0	0	6.5		
	Monthly Subtotal ($)	$28	$28	$28	$55	$110	$55	$55	$0	$0	$0	$0	$0	$358		
														Task Subtotal =		$358
	Maintenance															
	Scheduled maintenance	0.0	0.0	0.0	0.0	4.0	0.0	4.5						8.5	$55	$ 468
	Unscheduled maintenance	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$55	$ -
	Vandalism	0.0	0.0	0.0	0.0	0.0	2.0	0.3						2.25	$55	$ 124
	Acts of God	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$55	$ -
	Landscape Maintenance Contractor	8.0	0.0	0.0	13.0	0.0	6.0	0.0						27	$24	$ 648
	Sediment Removal Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$0	$ -
	Vegetation Consultant	1.5	0.0	0.0	0.0	0.0	0.0	0.0						1.5	$85	$ 128
	Native Landscape, Inc.	0.0	0.0	0.0	0.0	0.0	0.0	6.0						6	$25	$ 150
	Irrigation Tech	0.0	0.0	0.0	0.0	0.0	3.0	4.0						7	$53	$ 371
	Monthly Subtotal (hours)	9.5	0	0	13	4	11	14.75	0	0	0	0	0	52.25		
	Monthly Subtotal ($)	$320	$0	$0	$312	$220	$413	$623	$0	$0	$0	$0	$0	$1,888		
														Task Subtotal =		$1,888
	Vector Control															
	Contract & General administration	0.5	0.1	0.1	0.1	0.1	0.1	0.1						1.1	$87	$ 96
	Vector prevention maint. (consultant)	0.0	0.0	0.0	0.0	0.0	8.0	0.0						8	$65	$ 520
	Response to VCD calls (consultant)	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$55	$ -
	VCD efforts (contracted)	1.0	1.0	0.5	2.0	2.0	2.0	2.0						10.5	$55	$ 578
	Monthly Subtotal (hours)	1.5	1.1	0.6	2.1	2.1	10.1	2.1	0	0	0	0	0	19.6		
	Monthly Subtotal ($)	$99	$64	$36	$119	$119	$639	$119	$0	$0	$0	$0	$0	$1,193		
														Task Subtotal =		$1,193
Non-Recurring Equipment (hours)	***Equipment***															
	Truck	0.0	0.0	0.0	0.0	0.0	1.0	1.0						2	$53	$ 106
	Piece of Equipment 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$0	$ -
	Piece of Equipment 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$0	$ -
	Piece of Equipment 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$0	$ -
	Piece of Equipment 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$0	$ -
	Piece of Equipment 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0	$0	$ -
	Monthly Subtotal (hours)	0	0	0	0	0	1	1	0	0	0	0	0	2		
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$53	$53	$0	$0	$0	$0	$0	$106		
														Equipment Subtotal =		$106
Dollars ($)	***Direct Costs***														**Total $**	
	VCD supplies (direct costs less labor)	$ -	$ -	$ -	$ -	$ -	$ -	$ -							$ -	
	Reproduction	$ -	$ -	$ -	$ -	$ 10	$ -	$ -							$ 10	
	Postage/FedEx	$ -	$ -	$ -	$ -	$ -	$ -	$ -							$ -	
	Lodging	$ 15	$ -	$ -	$ -	$ -	$ -	$ -							$ 15	
	Per Diem	$ -	$ -	$ -	$ -	$ -	$ -	$ -							$ -	
	Incidentals	$ -	$ -	$ -	$ -	$ -	$ -	$ -							$ -	
	Vehicle Rental/Lease	$ 40	$ 16	$ 11	$ 5	$ 9	$ 22	$ 13							$ 115	
	Airfare	$ -	$ -	$ -	$ -	$ -	$ -	$ -							$ -	
	Field Supp./Expendables	$ -	$ -	$ -	$ -	$ -	$ 15	$ 15							$ 30	
	Equipment Rental	$ -	$ -	$ -	$ -	$ -	$ -	$ -							$ -	
	Sediment Analyses	$ -	$ -	$ -	$ -	$ -	$ -	$ -							$ -	
	Sediment Disposal	$ -	$ -	$ -	$ -	$ -	$ -	$ -							$ -	
	Fax	$ 0.50	$ -	$ -	$ -	$ -	$ -	$ -							$ 1	
	Irrigation Materials	$ 735	$ -	$ -	$ -	$ -	$ -	$ -							$ 735	
	Salt Grass Reserve	$ 747	$ -	$ -	$ -	$ -	$ -	$ -							$ 747	
	Monthly Subtotal	$ 1,537	$ 16	$ 11	$ 5	$ 19	$ 37	$ 28	$ -	$ -	$ -	$ -	$ -		$ 1,653	
	MONTHLY TOTAL	$2,866	$451	$238	$654	$674	$1,524	$1,133	$0	$0	$0	$0	$0		**1999/2000 TOTAL =**	**$7,540**

BMP Retrofit Pilot Program
Maintenance Operation
Cost Accounting Summary, 1998-99

DISTRICT: 11	LOCATION: Carlsbad Maintenance Station	SITE NO. 112207a	BMP TYPE: Biofiltration Strip	CONSULTANT: KLI

	TASK	1999			2000									Total (hrs)	Avg. Rate	TOTAL $
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep			
Labor (hours)	***Administration***															
	General program support/Follow-up	7.0	1.5	0.5	1.0	0.5	2.0	1.4						13.9	$120	$ 1,668
	Encroachment Permits	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$87	$ -
	Travel	0.5	0.5	0.3	0.3	0.5	0.5	0.5						3.1	$87	$ 265
	Unscheduled events	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$87	$ -
	Monthly Subtotal (hours)	7.5	2.0	0.8	1.3	1.0	2.5	1.9	0.0	0.0	0.0	0.0	0.0	17.0		
	Monthly Subtotal ($)	$884	$224	$82	$146	$104	$284	$212	$0	$0	$0	$0	$0	$1,933		
														Task Subtotal =		$1,933
	Operation															
	Wet season inspections	0.5	0.5	0.3	0.5	1.0	0.5	0.5						3.8	$55	$ 206
	Dry season inspections	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	Unscheduled inspections/field calls	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$60	$ -
	Monthly Subtotal (hours)	0.5	0.5	0.3	0.5	1.0	0.5	0.5	0.0	0.0	0.0	0.0	0.0	3.8		
	Monthly Subtotal ($)	$28	$28	$14	$28	$55	$28	$28	$0	$0	$0	$0	$0	$206		
														Task Subtotal =		$206
	Maintenance															
	Scheduled maintenance	6.0	0.0	0.0	0.0	0.0	0.0	0.8						6.8	$55	$ 371
	Unscheduled maintenance	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	Vandalism	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	Acts of God	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	Landscape Maintenance Contractor	10.3	0.0	0.0	13.5	0.0	0.0	6.2						30.0	$24	$ 719
	Sediment Removal Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Vegetation Consultant	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$85	$ -
	Other Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Other Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Monthly Subtotal (hours)	16.3	0.0	0.0	13.5	0.0	0.0	7.0	0.0	0.0	0.0	0.0	0.0	36.7		
	Monthly Subtotal ($)	$576	$0	$0	$324	$0	$0	$190	$0	$0	$0	$0	$0	$1,090		
														Task Subtotal =		$1,090
	Vector Control															
	Contract & General administration	0.3	0.1	0.1	0.1	0.1	0.1	0.1						0.9	$87	$ 74
	Vector prevention maint. (consultant)	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$65	$ -
	Response to VCD calls (consultant)	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	VCD efforts (contracted)	0.5	0.5	0.3	0.5	0.5	0.5	0.5						3.3	$55	$ 179
	Monthly Subtotal (hours)	0.8	0.6	0.4	0.6	0.6	0.6	0.6	0.0	0.0	0.0	0.0	0.0	4.1		
	Monthly Subtotal ($)	$49	$36	$22	$36	$36	$36	$36	$0	$0	$0	$0	$0	$253		
														Task Subtotal =		$253
Non-Recurring Equipment (hours)	***Equipment***															
	Piece of Equipment 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Monthly Subtotal (hours)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		
														Equipment Subtotal =		$0

Dollars ($)	***Direct Costs***													Total $	
	VCD supplies (direct costs less labor)	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -	
	Reproduction	$ -	$ -	$ -	$ -	$ 10	$ -	$ -						$ 10	
	Postage/FedEx	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -	
	Lodging	$ 15	$ -	$ -	$ -	$ -	$ -	$ -						$ 15	
	Per Diem	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -	
	Incidentals	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -	
	Vehicle Rental/Lease	$ 40	$ 16	$ 11	$ 5	$ 9	$ 22	$ 13						$ 115	
	Airfare	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -	
	Field Supp./Expendables	$ -	$ 5	$ -	$ -	$ -	$ -	$ -						$ 5	
	Equipment Rental	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -	
	Sediment Analyses	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -	
	Sediment Disposal	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -	
	Fax	$ 0.50	$ -	$ -	$ -	$ -	$ -	$ -						$ 1	
	Salt Grass Reserve	$ 747	$ -	$ -	$ -	$ -	$ -	$ -						$ 747	
	Other Direct Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -	
	Monthly Subtotal	$ 802	$ 21	$ 11	$ 5	$ 19	$ 22	$ 13	$ -	$ -	$ -	$ -	$ -	$ 892	

MONTHLY TOTAL	$2,338	$308	$129	$539	$213	$369	$478	$0	$0	$0	$0	$0	**1999/2000 TOTAL =**	**$4,375**

BMP Retrofit Pilot Program
Maintenance Operation
Cost Accounting Summary, 1998-99

DISTRICT: 11	LOCATION: Carlsbad Maintenance Station	SITE NO. 112207b	BMP TYPE: Infiltration Trench	CONSULTANT: KLI

	TASK	1999			2000									Total (hrs)	Avg. Rate	TOTAL $
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep			
Labor (hours)	***Administration***															
	General program support/Follow-up	2.0	1.5	0.5	1.0	0.5	2.0	1.4						8.9	$120	$ 1,068
	Encroachment Permits	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$87	$ -
	Travel	0.5	0.5	0.3	0.3	0.5	0.5	0.5						3.1	$87	$ 265
	Unscheduled events	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$87	$ -
	Monthly Subtotal (hours)	2.5	2.0	0.8	1.3	1.0	2.5	1.9	0.0	0.0	0.0	0.0	0.0	12.0		
	Monthly Subtotal ($)	$284	$224	$82	$146	$104	$284	$212	$0	$0	$0	$0	$0	$1,333		
															Task Subtotal =	$1,333
	Operation															
	Wet season inspections	0.5	0.5	0.5	0.5	1.0	0.5	0.5						4.0	$55	$ 220
	Dry season inspections	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	Unscheduled inspections/field calls	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$60	$ -
	Monthly Subtotal (hours)	0.5	0.5	0.5	0.5	1.0	0.5	0.5	0.0	0.0	0.0	0.0	0.0	4.0		
	Monthly Subtotal ($)	$28	$28	$28	$28	$55	$28	$28	$0	$0	$0	$0	$0	$220		
															Task Subtotal =	$220
	Maintenance															
	Scheduled maintenance	0.0	0.0	0.0	0.0	0.0	0.0	0.8						0.8	$55	$ 41
	Unscheduled maintenance	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	Vandalism	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	Acts of God	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	Landscape Maintenance Contractor	0.0	0.0	0.0	0.0	0.0	0.0	6.2						6.2	$0	$ -
	Sediment Removal Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Other Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Other Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Other Contractor	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Monthly Subtotal (hours)	0.0	0.0	0.0	0.0	0.0	0.0	7.0	0.0	0.0	0.0	0.0	0.0	7.0		
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$41	$0	$0	$0	$0	$0	$41		
															Task Subtotal =	$41
	Vector Control															
	Contract & General administration	0.3	0.1	0.1	0.1	0.1	0.1	0.1						0.9	$87	$ 74
	Vector prevention maint. (consultant)	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$65	$ -
	Response to VCD calls (consultant)	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$55	$ -
	VCD efforts (contracted)	0.5	0.5	0.3	0.3	0.5	0.5	0.5						3.1	$55	$ 168
	Monthly Subtotal (hours)	0.8	0.6	0.4	0.4	0.6	0.6	0.6	0.0	0.0	0.0	0.0	0.0	3.9		
	Monthly Subtotal ($)	$49	$36	$22	$25	$36	$36	$36	$0	$0	$0	$0	$0	$242		
															Task Subtotal =	$242
Non-Recurring Equipment (hours)	***Equipment***															
	Piece of Equipment 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 5	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Piece of Equipment 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	$0	$ -
	Monthly Subtotal (hours)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		
															Equipment Subtotal =	$0

	Direct Costs													Total $
Dollars ($)	VCD supplies (direct costs less labor)	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Reproduction	$ -	$ -	$ -	$ -	$ 10	$ -	$ -						$ 10
	Postage/FedEx	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Lodging	$ 15	$ -	$ -	$ -	$ -	$ -	$ -						$ 15
	Per Diem	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Incidentals	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Vehicle Rental/Lease	$ 40	$ 16	$ 11	$ 5	$ 9	$ 22	$ 13						$ 115
	Airfare	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Field Supp./Expendables	$ -	$ 5	$ -	$ -	$ -	$ -	$ -						$ 5
	Equipment Rental	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Sediment Analyses	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Sediment Disposal	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Fax	$ 0.50	$ -	$ -	$ -	$ -	$ -	$ -						$ 1
	Other Direct Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Other Direct Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -						$ -
	Monthly Subtotal	$ 55	$ 21	$ 11	$ 5	$ 19	$ 22	$ 13	$ -	$ -	$ -	$ -	$ -	$ 145

MONTHLY TOTAL	$415	$308	$143	$204	$213	$369	$329	$0	$0	$0	$0	$0	**1999/2000 TOTAL =**	**$1,982**

CALTRANS
BMP RETROFIT PILOT PROGRAM

DISTRICT 11, SAN DIEGO

SECOND YEAR 1999-2000 REPORT

APPENDIX A

DATA QUALITY ASSESSMENT

OPERATIONS, MONITORING & MAINTENANCE

KINNETIC LABORATORIES, INC.

August 2000

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1.0 INTRODUCTION

The Caltrans BMP Retrofit Pilot Program serves to measure the effectiveness of several Best Management Practices (BMP) pilot installations throughout Los Angeles and San Diego counties. The overall objectives of this portion of the program are to document BMP contaminant removal efficiency, and technical feasibility of retrofitting Caltrans facilities with storm water quality controls.

As part of this effort, a Quality Assurance and Quality Control (QA/QC) Plan was developed as an integrated component of the overall Operations, Maintenance, and Monitoring (OMM) Plan[1]. This plan was developed to establish a consistent system of activities to assure that both chemical and physical measurements meet the standard of quality needed to evaluate BMP performance. Analytical data are qualified using the protocols listed in the *National Functional Guidelines for Organic Data Review (EPA/540/R/090)* and the *Guidance on the Documentation and Evaluation of Trace Metals Data Collected for Clean Water Act Compliance Monitoring (EPA/821/B/95/002)*.

The sections that follow address activities associated with both the field sampling and laboratory analyses for this BMP retrofit program. Quality assurance activities started with procedures designed to assure that the composite included measures to assure that the hydrological measurements were accurate and field QA/QC samples are collected and used to evaluate potential contamination and sampling error introduced into a sample prior to its submittal to the analytical laboratory. Laboratory QA/QC activities provide information needed to assess potential laboratory contamination, analytical precision and accuracy, and representativeness. Data Quality Objectives established for measurements taken in this program were established in the Project QA/QC Plan. These are summarized in Table A1-1. Application of various QA procedures specified in the Plan are summarized in Table A1-2.

The primary indicators used to evaluate the quality of the data are precision, accuracy, representativeness, comparability and completeness. The following sections define each of these indicators and how they are used to assess and validate data from the BMP retrofit program.

1.1 Precision

Precision provides an assessment of mutual agreement between repeated measures. These measures may apply to field and laboratory duplicate analyses of sediment contaminants as well as any of the biological or physical measurements being applied in this study. Monitoring of precision throughout the process allows evaluation of the consistency of sampling and sample processing.

The Relative Percent Difference (RPD) will be used to evaluate precision based upon duplicate samples. The RPD is calculated for each pair of data is calculated as:

[1] BMP Retrofit Pilot Program: Operation, Monitoring and Maintenance Plan, Volume II, Caltrans District 11, Appendix III Quality Assurance/Quality Control Plan, August 1999

$$RPD=[(x1-x2)*100]/[(x1+x2)/2)$$

Where:

x1=concentration or value of sample 1 of the pair
x2=concentration or value of sample 2 of the pair

1.1.1 Accuracy

Assessment of the accuracy of measurements is based upon determining the difference between measured values and the true value. In the case of sediment chemistry, this is assessed primarily through analysis of spike recoveries. Spike recoveries are calculated as Percent Recovery according to the following formula:

$$\text{Percent Recovery}= [(t-x)/\alpha]*100\%$$

Where:

t=total concentration found in the spiked sample
x=original concentration in sample prior to spiking, and
α=actual spike concentration added to the sample

Accuracy of sediment chemistry is also evaluated by use of Standard Reference Materials (SRMs). In the case of sediment SRMs, percent recovery of the specific compound is compared against certified values and laboratory control data for the SRM.

1.1.2 Representativeness

Representativeness is the degree to which data accurately and precisely represent the natural variability and characteristics of the biological community, environmental conditions or other physical features.

1.1.3 Comparability

Comparability is the measure of confidence with which one data set can be compared to another. The use of standardized methods of chemical analysis, biological sampling and processing, and other physical measurements is one way of insuring comparability. The implementation of thorough QA/QC methods also helps assure comparability.

1.1.4 Completeness

Completeness is a measure of the percentage of the data judged to be valid after comparison with specific validation criteria. This includes data that are lost through accidental breakage of sample containers or other activities that result in irreparable loss of samples. Utilization of chain-of-custody procedures whenever the samples are transferred to a new custodian is one method of maintaining a high level of completeness. Close adherence to SOPs is another way to help assure that a high degree of completeness is obtained.

A high level of completeness is essential in all phases of this study due to the limited number of samples and sampling effort. The overall goal is to obtain completeness of 100 percent however, the data quality objective is established at 95% to ensure an adequate level of data return.

Table A1-1 Data Quality Objectives

Analyte	Project Detection Limit	Holding Times	Accuracy		Precision		Completeness
			Spike Recovery	SRM[2] Recovery	Matrix Spike RPDs	Laboratory Duplicate RPDs	
Conventionals							
pH	0.1 units	Immediately[1]	—	80-120%	—	±20%	95%
Specific Conductance	1.0 µmhos/cm	Immediately[1]	—	80-120%	—	±20%	95%
Hardness	2 mg/L	6 months	—	80-120%	—	±20%	95%
TSS	1 mg/L	7 days[3]	—	80-115%	—	±20%	95%
Nutrients							
Nitrate-N	0.01 mg/L	48 hours	80-120%	80-115%	—	±20%	95%
TKN	0.1 mg/L	28 days	80-120%	80-115%	—	±20%	95%
Total Phosphorus	0.002 mg/L	28 days	80-120%	80-115%	—	±20%	95%
Metals							
Copper	1 µg/L	6 months	75-125%	80-120%	±25%	±20%	95%
Lead	1 µg/L	6 months	75-125%	80-120%	±25%	±20%	95%
Zinc	1 µg/L	6 months	75-125%	80-120%	±25%	±20%	95%
Organics							
TPH as Diesel	250 µg/L	Extract 7 days Analyze 40 days	50-150%	50-150%	±50%	±50%	95%
TPH as Motor Oil	200 µg/L	Extract 7 days Analyze 40 days	50-150%	50-150%	±50%	±50%	95%
TPH as Gasoline	50 µg/L	Extract 7 days Analyze 40 days	50-150%	50-150%	±50%	±50%	95%
Bacteria*							
Fecal Coliform	200 MPN/100 mL	6 hours[4]	—	—	—	—	95%

1. Performed in field if possible
2. SRM recovery values based upon values provided with each specific SRM
3. 7 days based upon limit for measuring TSS/no regulatory limit.
4. Attempts will be made to maintain the 6-hour holding time for bacteria samples to the extent possible. When not possible, a maximum holding time of 24 hours will be followed in accordance with "Standard Methods for the Examination of Water and Wastewater", 18th Edition.

Table A1-2 Laboratory Quality Control Samples by Analyte

Analyte	Blanks	Duplicates	MS/MSDs	LCS	Surrogates	SRMs
Water Matrices						
pH	—	✓	—	—	—	✓
Specific Conductance	—	✓	—	—	—	✓
Hardness	✓	✓	—	—	—	✓
TSS	✓	✓	—	—	—	✓
Nitrate-N	✓	✓	—	—	—	✓
TKN	✓	✓	—	—	—	✓
Total Phosphorus	✓	✓	—	—	—	✓
Metals	✓	✓	✓	✓	—	✓
TPH	✓	✓	✓	✓	✓	✓
Bacteria	✓	✓	—	—	—	—

2.0 SAMPLE COLLECTION QA/QC

2.1 Flow Calibration

Volumetric field flow tests were performed during the last two weeks of September 1999 on all flow monitoring equipment in District 11 to the extent possible. Tests were conducted to verify performance of the flow monitoring equipment and primary control device installations. These field flow tests consisted of initiating artificial flow through a conveyance with a 500 gallon water tank. Total volume from the tank was measured using a Neptune 1.5-inch Trident 10 water meter. Approximately 500 gallons was poured into each conveyance using three different flow regimes (low, medium and high). Final total volume as read from the flow monitoring equipment was compared with the total volume from the water meter. Only percent recoveries within ± 10% were accepted. If percent recoveries were out of this acceptable range, flow monitoring equipment was either moved within the conveyance to provide better sub-critical flow or the level was adjusted to account for the lost volume. Percent recoveries from inlet and outlet conveyances at all District 11 sites are provided in Table A2-1.

Table A2-1Final Field Flow Tests 1999 District 11 BMP Pilot Study

500 Gallon Volumetric Flow Tests

Site	Inlet Percent Recovery	Outlet Percent Recovery
I-5 / SR-56 EDB	103%	102%
I-15 / SR-78 EDB	91%	98%
Manchester EDB	101%	100%
La Costa Wet Basin	95%	Flow Rated
La Costa P&R Sand Filter[1]	96%	108%
I-5 / SR-78 Sand Filter[1]	100%	Level Calibrated LF Palmer Bowlus[2]
Escondido MS Sand Filter[1]	98%	98%
Melrose Bio-swale	100%	103%
Palomar Airport Bio-swale	97%	98%
Kearny Mesa MS Media Filter[1]	99%	100%
Carlsbad MS Bio-strip	98%	95%

[1]Percent Recovery of Primary Flow Meter shown where back up flow meters present.
[2]Volumetric Flow Calibrations are not possible at the outlet of I-5/SR-78 P&R Sand Filter because it is not possible to place a hose in the conveyance upstream of the monitoring manhole.

3.0 FIELD QA/QC

3.1 Blanks

The results of field-related blanking activities are summarized in Table A3-1. Blanks were analyzed to assess potential contamination from monitoring site intake hose, the subsampling process, composite bottles and laboratory containers.

3.1.1 Intake Hose Blanks

One intake hose was analyzed after the hose was cleaned and before it was installed at the various sampling sites. No contaminants were detected in the hose blank.

3.1.2 Subsampling Hose Blanks

Twenty subsampling hoses consisting of a section of peristaltic hose and four to five foot length of Teflon hose. In one case, additional trace metals analyzed to support other Caltrans work efforts were also analyzed. The only constituent detected was zinc. Zinc was detected in one of 20 hoses. The measured concentration of this blank was 2.7 ug/L. The hose was cleaned and tested on 3/13/00. None of these hoses from this batch were utilized for samples presented in this report.

3.1.3 Composite Bottle Blanks

A total of 29 composite bottles were checked for contamination during the past season. Two constituents were each detected in one of the 29 bottles. Nitrate was detected at 0.014 mg/L in Bottle 20L-18 on 3/13/2000. The reporting limit for nitrate was 0.010 mg/L. The other constituent found in a composite bottle was zinc at a concentration of 2.0 ug/L in Bottle 20L-11 on 10/11/1999.

3.1.4 Laboratory Container Blanks

Laboratory container blanks are included with field QA/QC since subsampling into the laboratory containers is conducted before samples are sent to the analytical laboratory. Three sets of blanks were run on container lots purchased for this project. None of the analytes were detected above reporting limits in the container blanks.

3.2 Field Duplicates

Strict criteria are not established for evaluation of field duplicates. Instead, these samples are evaluated based upon best professional judgment. As a general guideline, RPDs greater than 50% were considered to be of potential concern. In cases where one or both samples were less than five times the reporting limit an alternative reference level was used. In these cases replication was considered to be of potential concern if the differences between the two samples were more than twice the reporting limit.

3.3 Grabs

Total Petroleum Hydrocarbons (diesel range, motor oil range and gasoline range) and bacteria were collected manually as grab samples. True field duplicates were collected for each of these constituents. All sampling was performed sequentially maintaining a minimum period of time between each sample.

Grab samples were taken during the first four events (Table A3-2). TPH-gasoline was not detected in any of the duplicated samples. TPH-diesel and TPH-motor oil field duplicates were found to be very reproducible with RPDs ranging from 5-34 percent. Fecal coliform results, however, were extremely variable with RPDs ranging from 67 to 191 percent.

3.4 Composites-Subsampling Splits

Subsampling splits of the composites samples were obtained from one site during each event. Although not true field duplicates, these samples are assessed as field duplicates.

In general, subsampling splits indicated that the subsampling process was able to effectively obtain representative samples from the composite container. High variability was experienced for only a few constituents associated with one of the six events. Subsampling splits for TKN, total phosphorus, and dissolved zinc exhibited high RPD values during the third storm event. Both TKN and total phosphorus are often a function of particulate material in the storm water. The high variability of these two constituents during this event is probably a reflection of lack of sufficient suspension of the particulate fraction during the subsampling process. Values for subsampling replicates of dissolved zinc were both relatively low, 3.1 and 6.2 ug/L. These levels are in the same range or slightly higher than contamination that was occasionally encountered for zinc in the field blanks.

Table A3-1
Summary of Blanking Results associated with Field Activities

		Installed Intake hose		Subsampling Hose		Composite Bottles		Sample Container Blanks	
Constituent	**Reporting Limit**	Number of Detections	Number of Analyses	Number of Detections	Number of Analyses	Number of Detections	Number of Analyses	Number of Detections	Number of Analyses
Nutrients									
Nitrate -N	**0.010**	0	1	0	20	1[3]	29	0	3
Total P	**0.002**	0	1	0	20	0	29	0	3
Total Metals									
Cadmium	**0.20**	0	1	0	1			0	3
Chromium	**1.0**	0	1	0	1			0	3
Copper	**1.0**	0	1	0	20	0	29	0	3
Lead	**1.0**	0	1	0	20	0	29	0	3
Nickel	**2.0**	0	1	0	1			0	3
Silver	**0.20**	0	1	0	1			0	3
Zinc	**1.0**		1	1[1]	20	1[2]	29	0	3

1. Zinc detected at 2.7 ug/L in subsampling hoses checked on 3/13/1999. No samples reported with this round were impacted.
2. Zinc detected at 2.0 ug/L in Bottle 20L-11 on 10/11/1999.
3. Nitrate detected at 0.014 mg/L in Bottle 20L-18 on 3/13/2000.

Table A3-2
Summary of Results and Relative Percent Differences (RPDs) of Subsampling and Field Duplicates

	Storm 1			Storm 2			Storm 3			Storm 4			Storm 5			Storm 6		
			25-Jan-00			2/17/00			2/20/00			3/5/00			3/8/00			
			T-18109			T-18184			T-18209			T-18262			T-18280			T-18423
			T-18099			T-18186						T-18249						
	Orig	Dup	RPD	Orig	Dup	RPD	Orig	Dup	RPD	Orig	Dup	RPD	Orig	Dup	RPD	Orig	Dup	RPD
Conventionals																		
Conductivity (umhos/cm)	130	130	0	110	100	10	43	44	2	150	150	0	95	96	1	160	160	0
Hardness (mg/L)	40	40	0	22	21	5	12	13	8	60	53	12	30	28	7	56	60	7
TSS (mg/L)	68	70	3	30	36	18	8	6	29	22	26	17	170	160	6	59	60	2
pH	7	7	1	7	7	4	7.3	7.4	1	7.6	7.5	1	7	7	0	7	7	1
Nutrients (mg/L)																		
Nitrate	1	1	10	1	1	0	0.21	0.21	0	0.68	0.68	0	0.5	0.5	0	1	1	1
TKN	4	4	13	3	3	3	0.6	1.3	**74**[2]	0.86	0.89	3	1.8	1.4	25	4	3	25
Total Phosphorus	1	1	17	0	0	9	0.91	0.2	**128**	0.25	0.22	13	0	0	5	0	0	0
Dissolved Metals (ug/L)																		
Copper	22	23	4	9	8	21	2.7	1.9	35	7	6.8	3	23	22	4	29	28	4
Lead	2	2	4	3	2	29	ND	ND	NA	1.8	1.7	6	5.4	7.4	31	2	2	32
Zinc	210	210	0	64	59	8	6.2	3.1	**67**	32	29	10	160	160	0	91	99	8
Total Metals (ug/L)																		
Copper	32	32	0	12	12	0	3.7	3.4	8	10	9.8	2	64	56	13	42	40	5
Lead	12	13	8	9	9	2	1.6	1.7	6	7.9	8	1	59	55	7	27	26	4
Zinc	310	330	6	110	100	10	11	12	9	52	52	0	410	380	8	170	170	0
TPH[1]																		
Gasoline **(ug/L)**	ND	ND	NA_1			ND	ND_1	NA_1	NA_1	ND	ND_1	NA_1				NA_1	50	NA_1
Diesel (mg/L)	8	7	19	2	2	10	1.2	1.7	34	1.4	1.3	7				NA_1	NA_1	NA_1
Motor Oil (mg/L)				3	3	25				1.9	1.8	5				9700	9100	6
Bacteria[1] **(MPN/100 mL)**																		
Fecal Coliform	700	1400	**67**	50000	1100	**191**	170	50	**109**	90000	30000	**100**				24000	11000	**74**

1. Field Duplicate, All other duplicates are subsampling duplicates. 2. Boxed and bolded values indicate RPDs greater than 50 and with values differing by more than 2 RLs.

4.0 LABORATORY QA/QC

In most cases, QA/QC data have been summarized in this analysis to provide easier review of the information. For more routine issues such as method blanks, the reader is referred to data packs included with this report.

4.1 Holding Times

A review of holding times for all analyses indicated that analyses for three different constituents exceeded holding times on at least one occasion.

The holding time for nitrate was 48 hours. Minor excursions were reported for four samples. In three cases samples were analyzed three hours past this holding time and one occasion, a sample was analyzed five hours past holding times.

The holding time for TSS is 7 days. Two samples were analyzed out of holding times. TSS in water sampled from the Manchester effluent site on March 5th was analyzed five days past holding time. Another sample collected from the inlet to SR56/I5 on February 20th was analyzed 11 weeks out of holding time. The original sample was analyzed within holding times but a thorough review of the data indicated that the original sample was incorrect and required rejection. The second analyses was requested to provide an estimate of the value. Since the sample was run from the total metals container that had been acidified, it was considered to potentially underestimate the true value.

The holding time for fecal coliform is 6 hours although up to 24-hours was allowed due to the extreme circumstances associated with collection from storm water runoff. None of the samples were analyzed within the 6-hour limit. Most were analyzed within 12-15 hours of collection. Two samples collected on March 5th from the inlet and outlet of the Carlsbad Maintenance Station exceeded the 24-hour limit by approximately 3 hours.

4.2 Method Blanks

Method blanks were analyzed for all constituents with each laboratory batch. In all cases, method blanks were below reporting limits.

4.3 Filter Blanks

Filter blanks were analyzed to assess potential contamination of the dissolved metal measurements. One set of filter blanks was analyzed in association with each laboratory batch. No metals exceeded the reporting limits in any of the filter blanks.

4.4 Laboratory Control Samples (LCS)/Standard Reference Material (SRM)

LCSs were to be analyzed for trace metals and TPH with each analytical batch. SRMs were to be analyzed at least once quarterly. In most cases, SRMs were analyzed in association with each analytical batch in lieu of LCS samples in accordance with the most recent Caltrans Storm Water Monitoring Guidance Manual (LWA 2000). SRMs were

analyzed for hardness, TSS, nitrate, TKN, total phosphorus and total metals (copper, lead and zinc) in association with each of 13 analytical batches (Table A4-1). In all but one case, the measured values were within 20% of the certified values. Recovery of TSS from the SRM during the fifth storm event was 69 percent of the certified value.

4.5 Laboratory Duplicates

With the exception of bacteria, laboratory duplicates were analyzed for all parameters (Table A4-2). All duplicates should have been analyzed for each of the four surveys where bacteria were sampled, laboratory duplicates were limited to the first event. The calculated RPD for the bacteria duplicates exceeded data quality objectives. All other laboratory duplicates met project data quality objectives for all analytical batches.

4.6 Matrix Spike/Matrix Spike Duplicates (MS/MSD)

Matrix Spike/Spike Duplicates were required to be analyzed for metals and TPH analyses. MS/MSDs were also analyzed for the nutrients in order to provide additional accuracy and precision data (Table A4-3).

Recovery of all matrix spikes and spike duplicates were with the data quality objectives for nutrients and metals analyzed during each event. Significant problems, however, were encountered with recovery of TPH-diesel spikes in the stormwater matrices throughout the program. Six out of nine diesel spikes were outside data quality objectives. No recovery problems were reported for TPH-gasoline and only one spike was outside objectives for TPH-motor oil.

The RPDs for the MS/MSDs indicated that precision objectives were consistently met for all analytes except TPH-motor oil on event 1.

4.7 Surrogates

Surrogates were limited to analysis of Total Petroleum Hydrocarbons. All surrogates were within laboratory QA/QC limits except for one sample where sample dilution was required to address matrix interferences. The surrogate was diluted below reporting limits.

Table A4-1 Summary of SRM Recovery in association with each Storm Event and Laboratory Batch

	Storm1				Storm 2		Storm 3			Storm 4			Storm 5	Storm 6	
	1/25/00	1/25/00	1/25/00	1/25/00	2/16/00	2/16/00	2/20/00	2/20/00	2/20/00	3/5/00	3/5/00	3/5/00	3/8/00	4/17/00	4/17/00
	T-18099	T-18114	T-18109	T-18103	T-18184	T-18186	T-18216	T-18209	T-18202	T-18265	T-18262	T-18253	T-18280	T-18451	T-18439
	% Rec	% Rec	% Rec	% Rec	% Rec	% Rec	% Rec	% Rec	% Rec	% Rec	% Rec	% Rec	% Rec	% Rec	% Rec
Conventionals															
Hardness	98	95	98	98	99	99	97	97	99	102	102	102	102	99	99
TSS	86	93	93	86	86	86	110	110	110	97	83	83	**69**[1]	83	97
Nutrients															
Nitrate	99		95	99	97	97	101	96	98	97	91	102	94	107	106
TKN	116	101	101	116	102	102	98	97	97	102	90	90	102	98	101
Total Phosphorus	96	96	96	96	102	102	103	102	102	100	101	102	100	101	112
Total Metals															
Copper	99	99	99	99	89	88	101	100	100	93	93	87	94	97	90
Lead	111	111	111	111	93	85	104	104	104	102	109	99	99	97	101
Zinc	109	109	109	109	96	92	106	105	107	91	91	100	91	94	97

1. Boxed and Bolded Values indicate analyses that were outside the Data Quality Objectives.

Table A4-2 Summary of Relative Percent Differences for Laboratory Duplicates

	Storm 1				Storm 2		Storm 3		Storm 4			Storm 5	Storm 6	
	1/25/00	1/25/00	1/25/00	1/25/00	2/16/00	2/16/00	2/20/00	2/20/00	3/5/00	3/5/00	3/5/00	3/8/00	4/17/00	4/17/00
	T-18099	T-18114	T-18109	T-18103	T-18184	T-18186	T-18209	T-18216	T-18262	T-18265	T-18253	T-18280	T-18451	T-18439
	RPD	RPD	RPD	RPD	RPD	RPD	RPD	RPD	RPD	RPD	RPD	RPD	RPD	RPD
Conventionals														
Conductivity	1		1	3	6	6	5	5	1	2	0	2	0	1
pH (units difference)	0.0	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0
Hardness	0	5	0	0	1	1	0	0	15	15	2	15	7	7
TSS	0	12	12	3	0	0	0	0	15	0	2	0	5	0
Nutrients														
Nitrate	0		1	0	0	0	1	1	2	0	4	0	20	2
TKN	4	8	8	4	3	3	2	4	9	1	9	1	6	8
Total Phosphorus	17	14	14	17	5	5	10	4	4	15	5	15	0	1
Total Metals														
Copper	1	3	NA	NA	1	7	7	9	2	2	5	3	4	6
Lead	4	1	NA	NA	1	2	1	NA[1]	1	1	2	NA[1]	5	1
Zinc	0	2	NA	NA	4	1	5	2	5	5	4	8	6	1
Bacteria														
Fecal Coliform	**67[1]**													

1. Boxed and Bolded Values indicate analyses that were outside the Data Quality Objectives.

Table A4-3 Summary of Matrix Spike/Spike Duplicate Recoveries

	T-18099		T-18114		T-18109		T-18103		T-18181		T-18184		T-18186		T-18203	
	MS %Rec	MSD %Rec	MS %Rec	MSD %Rec	MS %Rec	MSD %Rec	MS %Rec	MSD %Rec	MS %Rec	MSD %Rec	MS %Rec	MSD %Rec	MS %Rec	MSD %Rec	MS %Rec	MSD %Rec
Nutrients																
Nitrate	103	103	98	97			103	103	NA	NA	101	101	101	101	NA	NA
TKN	100	98	108	111	108	111	100	98	NA	NA	111	107	111	107	NA	NA
Total Phosphorus	92	90	90	92	90	92	92	90	NA	NA	105	101	105	101	NA	NA
Total Metals																
Copper	NA1	NA1	NA1	NA1	NA1	NA1	NA1	NA1	NA	NA	91	99	84	87	NA	NA
Lead	NA1	NA1	103	105	103	105	NA1	NA1	NA	NA	105	109	99	102	NA	NA
Zinc	NA1	NA1	NA1	NA1	NA1	NA1	NA1	NA1	NA	NA	98	102	92	94	NA	NA
TPH																
Gasoline	106	100	NA	NA	NA	NA	96	96	96	99	NA	NA	NA	NA	75	81
Diesel	**14**	**10**	NA	NA	NA	NA	NA	NA	**-4**	**1**	NA	NA	NA	NA	72 / **224**	80 / 144
Motor Oil		**44**	NA	NA	NA	NA	NA	NA	126	114	NA	NA	NA	NA	85 / 87	97 / 95

Table A4-3 Summary of Matrix Spike/Spike Duplicate Recoveries (continued)

	T-18216		T-18209		T-18262		T-18249		T-18265		T-18253		T-18280		T-18451		T-18439
	MSD %Rec	MS %Rec	MSD %Rec	MS %Rec	MSD %Rec	MS %Rec	MSD %Rec	MS %Rec	MSD %Rec	MS %Rec	MSD %Rec	MS %Rec	MSD % Rec	MS %Rec	MSD % Rec	MS %Rec	MSD % Rec
Nutrients																	
Nitrate	102	97	96	89	86	NA	NA	94	93	98	99	95	94	112	113	113	113
TKN	105	112	118	119	113	NA	NA	97	99	119	113	97	99	112	104	108	110
Total Phosphorus	92	105	104	98	98	NA	NA	100	101	101	97	100	101	101	104	106	106
Total Metals																	
Copper	102	96	95	98	95	NA	NA	98	95	93	95	90	89	97	93	105	112
Lead	102	100	101	106	103	NA	NA	106	103	94	93	99	99	96	91	102	103
Zinc	97	98	101	97	94	NA	NA	97	94	90	93	91	90	85	80	102	103
TPH																	
Gasoline	NA	NA	NA	NA	NA	100	92	NA	NA	NA	NA	NA	NA	110	107	NA	NA
Diesel	NA	NA	NA	NA	101	31	45	NA	NA	NA	NA	NA	NA	80	80	NA	NA
Motor Oil	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA			NA	NA

Table A4-4 Summary of Matrix Spike/Spike Duplicate Relative Percent Differences

	Storm 1				Storm 2			Storm 3			Storm 4				Storm 5	Storm 6	
	25-Jan-00	25-Jan-00	25-Jan-00	25-Jan-00	16-Feb-00	16-Feb-00	16-Feb-00	20-Feb-00	20-Feb-00	20-Feb-00	5-Mar-00	5-Mar-00	5-Mar-00	5-Mar-00	8-Mar-00	17-Apr-00	17-Apr-00
	T-18099	T-18114	T-18109	T-18103	T-18181	T-18184	T-18186	T-18203	T-18216	T-18209	T-18262	T-18249	T-18265	T-18253	T-18280	T-18451	T-18439
Nutrients																	
Nitrate	0	1		0	NA	0	0	NA	0	1	4	NA	1	1	1	1	0
TKN	2	3	3	2	NA	4	4	NA	3	5	5	NA	2	5	2	3	2
Total Phosphorus	2	2	2	2	NA	4	4	NA	1	1	0	NA	1	4	1	3	0
Total Metals																	
Copper	NA[1]	NA[1]	NA[1]	NA[1]	NA	8	4	NA	0	1	3	NA	3	2	1	4	6
Lead	NA[1]	2	2	NA[1]	NA	4	3	NA	0	1	3	NA	3	1	0	5	1
Zinc	NA[1]	NA[1]	NA[1]	NA[1]	NA	4	2	NA	5	3	3	NA	3	3	1	6	1
TPH																	
Gasoline	6	NA	NA	0	3	NA	NA	8	NA	NA	NA	8	NA	NA	NA	3	NA
Diesel	33	NA	NA	NA	143	NA	NA	11 / 43	NA	NA	NA	37	NA	NA	NA	0	NA
Motor Oil	**67**	NA	NA	NA	10	NA	NA	13 / 9	NA	NA	NA	NA	NA	NA	NA		NA

1 - Sample value greater than three times the spike

5.0 DATA QUALITY ASSESSMENT PROCESS

5.1 Verification

Data verification was the first step in the data quality assessment process. The verification process generally included checks to verify compliance with the Quality Assurance/Quality Control Plan, information contained in the laboratory data reports was correct and free of typographical errors or other obvious inconsistencies, and that information presented in the laboratory data reports was complete.

When the verification process identified possible problems, the laboratory was contacted to review the laboratory bench data and calculations. If this process did not result in resolution of the suspected problem, the laboratory was requested to rerun the samples to verify the validity of the results. Reruns were conducted in all cases where values were noted to be out of the typical range of values encountered in samples of this nature.

Data verification resulted in the discovery of the lack of laboratory duplicates for bacteria for three events. No corrective action was possible due to the short holding times for bacteria.

In addition, laboratory duplicates were not run for Total Petroleum Hydrocarbon analyses due to insufficient sample volumes. This was also discovered after all grab sampling was complete and corrective action could not be taken

5.2 Validation

Data validation was performed in accordance with the National Functional Guidelines for Organic and Inorganic Data Review (EPA/540/R/94/090) and Guidance on the Documentation and Evaluation of Trace Metals Data Collected for the Clean Water Act Compliance Monitoring (EPA/821/B/95/002). All laboratory and field data generated under this program were reviewed for accuracy, precision and completeness. The review included:

- Data package completeness;
- Chain-of-custody;
- Use of specified analytical methods;
- Holding times for extraction and analysis;
- Blank results (e.g., equipment blank, bottle blanks, filter blanks, and method blanks) relative to reporting limits and sample concentrations;
- Field duplicate frequency and precision;
- Laboratory duplicates frequency and precision;
- LCS frequency, compounds, and recoveries;

- Surrogate standard frequency, compounds, and recoveries;
- Matrix spike frequency, compounds, and recoveries;
- Matrix spike duplicate frequency and relative differences;
- Reporting limits and dilution factors consistency; and
- Appropriate identification of analytical problems and exceedance of data quality objective in the case narrative.

Completeness of the data was assessed by comparing the amount of valid data to the project objectives to see that these objectives were met.

5.3 Data Qualifiers

Where appropriate, data qualifiers were associated with the data using the following standard notations from the EPA guidance documents:

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample reporting limit.

J – The associated value is an estimated quantity.

R – The data are unusable (The analyte may or may not be present)

UJ – The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

6.0 DATA VALIDATION RESULTS

6.1 ph and Specific Conductance

No pH or specific conductance data required qualification.

6.2 Hardness

None of the hardness data required qualification.

6.3 TSS

Two TSS data points were qualified as estimates due exceedance of holding times. TSS data from the March 5th event were qualified as estimates based upon a reported recovery of 69% in the TSS Standard Reference Material.

6.4 Nitrate-N

The only problems encountered for nitrate measurements were some minor excursions on holding time limits and one measurement near the detection limit in a composite bottle blank. The minor excursions on holding time limits were not considered serious enough to require data qualification. The low level hit on the one composite container blank did not impact any samples since all samples associated with this set far exceeded 10 times the value of this single hit.

6.5 TKN

All TKN measurements associated with the February 20, 2000 storm event were qualified as estimates based upon high variability in the composite bottle subsampling process.

6.6 Total Phosphorus

Similarly, all total phosphorus measurements associated with the February 20, 2000 storm event were qualified as estimates based upon high variability in the composite bottle subsampling process.

6.7 Total/Dissolved Metals

Zinc was the only metal that was detected in blanks. Two out of 51 field blanks had measurable zinc levels at two to three times the reporting limit. One of these blanks did not impact samples reported in this data set. The second of these blanks resulted in qualification of two dissolved zinc values from the first and second events with “U” values.

6.8 TPH

Although field replicates of TPH measurements showed relatively good precision for the field duplicates, substantial matrix problems were encountered for TPH-diesel range measurements. Spike recoveries were frequently very low although LCS recoveries were within acceptable ranges. Low matrix recoveries for diesel range TPH resulted in qualification of field measurements from all four events as estimates. High variability of matrix spike/spike duplicate recoveries resulted in qualification of TPH-motor oil as estimates during the first event.

6.9 Bacteria

All bacteria data were qualified as estimates based upon the high variability in field duplicates and in the one laboratory duplicate as well as holding time issues. Two data points from the March 5th storm event were rejected due to holding times exceeding 24 hours.

CALTRANS
BMP RETROFIT PILOT PROGRAM

DISTRICT 11, SAN DIEGO

SECOND YEAR 1999-2000 REPORT

APPENDIX B

PHOTO LOG

OPERATIONS, MONITORING & MAINTENANCE

KINNETIC LABORATORIES, INC.

August 2000

Picture 1 - La Costa infiltration basin sediment sampling with a powered vibracore, February 8, 2000.

Picture 2 – La Costa infiltration basin sediment samples after recovery and compositing. From left to right: bottom layer, mid layer, top layer.

Picture 3 – Well sampling at the Carlsbad MS on February 24, 2000.

Picture 4 – La Costa wet basin monthly baseline sampling, March 30, 2000.

Picture 5 – Hydraulic residence time evaluation at the Palomar swale, February 23, 2000.

Picture 6 – Sandbag bypass fix at the Palomar swale inlet, February 23, 2000.

Picture 7 – La Costa infiltration basin at maximum capacity on February 24, 2000.

Picture 8 – Carlsbad MS infiltration trench at near maximum capacity February 24, 2000.

Picture 9 – Melrose swale backwater condition at effluent March 5, 2000.

Picture 10 – La Costa wet basin 84" RCP in trapezoidal channel at high flow on February 20, 2000.

Picture 11 – Kearny Mesa MS StormFilter™ "seasoning" looking at discharge point of media containers in media vault #2, January 11, 2000.

Picture 12 – After re-hydroseeding was done at the Manchester EDB on November 9, 1999

APPENDIX E

WILDLIFE ISSUES LETTER

PLAINTIFF/CALTRANS RESPONSE LETTERS

FM: Christopher W. May, NRDC Technical Advisor
TO: Brian Currier, CALTRANS BMP Pilot Study Coordinator
RE: Wildlife Issues Related to BMP O&M

On behalf of the Natural Resources Defense Council (NRC), Santa Monica Baykeeper, and San Diego Bay-Keeper, I would like to address the issue of gopher damage to pilot BMP facilities. Our policy with regard to the operation and maintenance (O&M) of pilot study BMPs is that currently accepted, "state of the art" procedures should be utilized. In Addition, we have also made it clear that the level of effort required to perform "standard" O&M activities should not be extraordinary. While this may be well understood as applied to conventional O&M practices such as monitoring and routine repairs of structural BMP components, we also feel that this approach applies equally in any interactions with native flora and fauna. In any case, operation and maintenance of BMPs should not be driven too strongly by efforts to eliminate "nuisance" wildlife, sensitive species, or invasive/exotic vegetation. In short, BMPs should not be maintained based on a goal of preventing species utilization.

As an example, weeding of BMPs should be conducted only if the vegetation present is having a detrimental effect on BMP performance (such as in a bio-filtration unit) or because the plants have been classified as noxious or invasive, and as such have been targeted for removal by regional agencies. Using herbicide to prevent weed growth would not be appropriate. In the case of the gophers that have been damaging several of the vegetated BMPs, we feel that periodic repair to the BMPs, per the Maintenance Indicator Document (MID) is adequate and appropriate. It is our position, that the efforts that have taken place thus far (e.g. trapping) in order to eliminate all gopher activity in the BMPs have been ineffective and are not necessary to ensure proper BMP function. We are of the opinion that trapping should be discontinued. We also do not approve of the use of pepper spray or other wildlife inhibitors at BMP sites. Routine MID activities such as filling gopher holes, compacting gopher mounds, and reseeding bare patches within the BMPs should be adequate to ensure proper BMP operation. In special cases (i.e. the Cerritos bioswale) more extensive repairs may be necessary to maintain the structural integrity of the BMP, but this appears to be the exception rather than the rule.

The presence of relatively lush vegetation, uncompacted soils, and irrigation water in the bio-filtration BMPs has created desirable habitat for gophers and other native fauna, such as reptiles and some insects such as native butterfly species. Based on our basic knowledge of gopher ecology, it is highly unlikely that we could eliminate all gophers from these BMP sites using any known methods, nor is it, in our opinion, necessary to the proper operation of the BMPs. The wetland vegetation found in the constructed wet-basin and some of the other BMPs is another example of the relatively good habitat that can become established within CALTRANS right-of-ways (ROWs) due to the construction and operation of stormwater BMPs. As we have stated on several occasions, this is something that must be accepted and should be viewed as a benefit rather than a liability. By the same token, efforts to actively preclude gophers or any other wildlife from BMP sites is neither feasible nor desirable from our perspective, and should not be pursued. It is obvious that these BMP sites may offer suitable habitat for a variety of native flora and fauna. In the long-term, a reasonable O&M strategy would be to "coexist" rather than "conflict" with nature. Whether the species of concern is considered a "pest" like gophers or "threatened/endangered" (gnatcatchers, burrowing owls, etc.) should not be the deciding factor. CALTRANS should work closely with state and federal wildlife agencies to inform them of

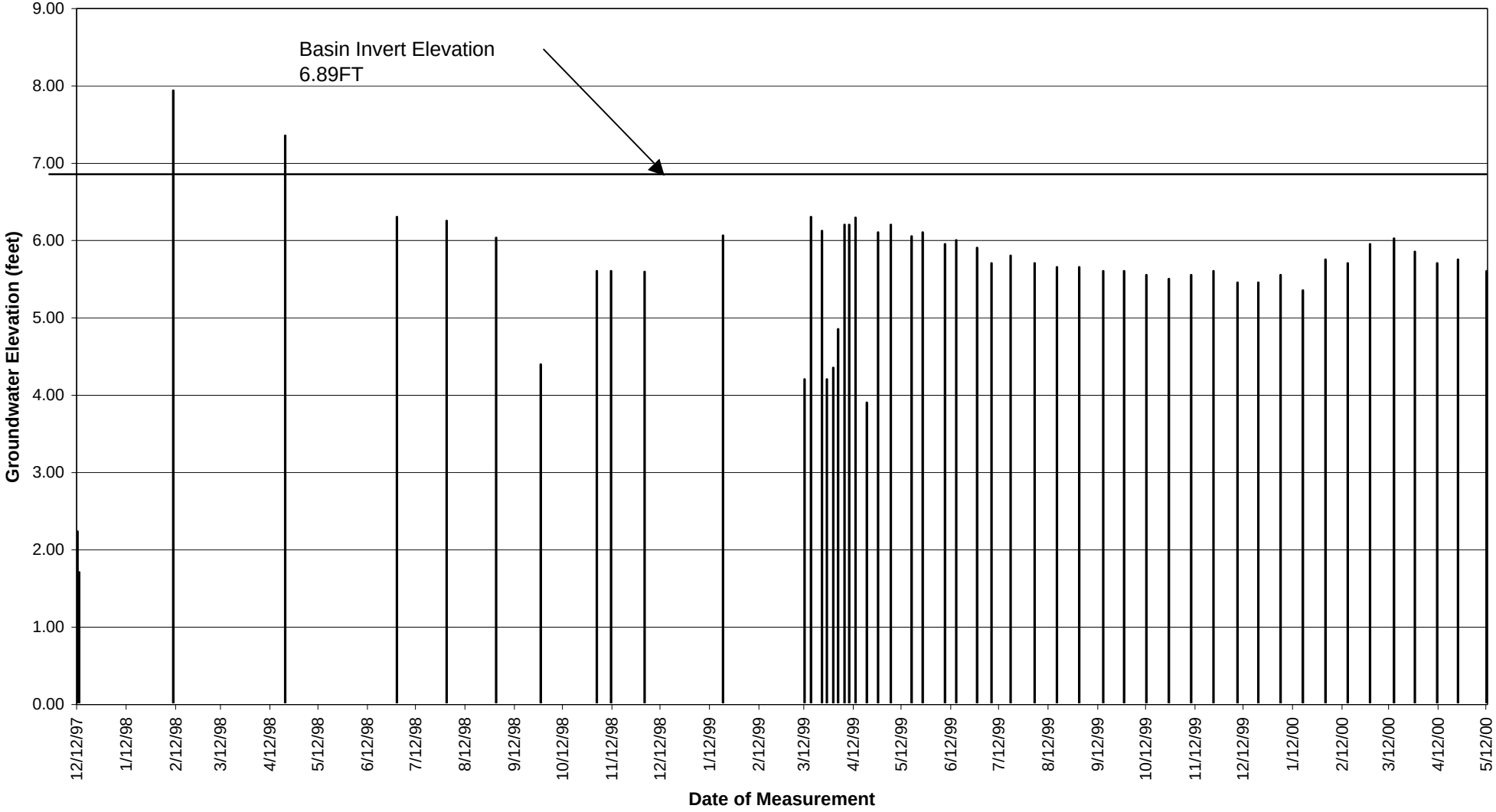
BMP operations and potential habitat related issues. In the event that a conflict develops the goal should be to protect sensitive species while maintaining BMP function.

Christopher W. May
NRDC Technical Advisor

APPENDIX F

LA COSTA INFILTRATION BASIN GROUNDWATER LOG

Groundwater Level Monitoring at I-5/La Costa Infiltration Basin Site



BMP RETROFIT PILOT PROGRAM
PS&E LOCATION 3
I-5/LA COSTA AVE INFILTRATION BASIN

TABLE 1
WATER SURFACE ELEVATION SUMMARY SHEET

Date	Time	Field Reading		Pond Depth*	Groundwater Elev (FT)*	Delta	By
		Headwall (FT)	Monitoring Well (FT)	(FT)		(FT)	
12/12/97	---	---	BORING WW-1	---	2.22	4.67	GDC
12/13/97	---	---	BORING WW-2	---	1.69	5.20	GDC
12/23/97	---	---	---	---	No groundwater encountered.	---	GDC
2/10/98	---	---	3.00	---	7.92	-1.03	GDC
4/21/98	---	---	5.85	---	7.34	-0.45	GDC
6/30/98	10:00am	---	6.90	---	6.29	0.60	KLI
7/31/98	4:15pm	---	6.95	---	6.24	0.65	KLI
8/31/98	11:57am	---	7.17	---	6.02	0.87	KLI
9/28/98	---	---	---	---	4.38	---	RBF
11/2/98	4:04pm	---	7.60	---	5.59	1.30	KLI
11/11/98	4:55pm	---	7.60	---	5.59	1.30	KLI
12/2/98	---	---	7.61	---	5.58	1.31	KLI
12/17/98	---	---	---	---	0.00	---	CT RE
1/20/99	7:05am	---	7.14	---	6.05	0.84	GDC
2/24/99	10:15am	2.08	---	---	---	---	GC
3/2/99	2:00pm	1.88	---	---	---	---	AW
3/9/99	11:00am	1.73	---	---	---	---	GC
3/12/99	1:00pm	1.86	9.00	1.45	4.19	2.70	AW
3/16/99	4:55pm	1.98	6.90	1.57	6.29	0.60	AW
3/23/99	10:00am	1.76	7.08	1.35	6.11	0.78	AW
3/26/99	10:20am	2.48	9.00	2.07	4.19	2.70	AW
3/30/99	9:05am	2.28	8.85	1.87	4.34	2.55	AW
4/2/99	8:15am	2.89	8.35	2.48	4.84	2.05	AW
4/6/99	2:00pm	2.69	7.00	2.28	6.19	0.70	AW
4/9/99	10:00am	2.67	7.00	2.26	6.19	0.70	AW
4/13/99	10:00am	2.89	6.91	2.48	6.28	0.61	AW
4/20/99	9:50am	2.52	9.30	2.11	3.89	3.00	AW
4/27/99	2:25pm	2.50	7.10	2.09	6.09	0.80	AW
5/5/99	1:10pm	2.06	7.00	1.65	6.19	0.70	AW
5/18/99	5:55pm	1.66	7.15	1.25	6.04	0.85	AW

BMP RETROFIT PILOT PROGRAM
PS&E LOCATION 3
I-5/LA COSTA AVE INFILTRATION BASIN

TABLE 1
WATER SURFACE ELEVATION SUMMARY SHEET

Date	Time	Field Reading		Pond Depth*	Groundwater Elev (FT)*	Delta	By
		Headwall (FT)	Monitoring Well (FT)	(FT)		(FT)	
5/25/99	5:40pm	1.50	7.10	1.09	6.09	0.80	AW
6/8/99	5:40pm	1.30	7.25	0.89	5.94	0.95	AW
6/15/99	1:45pm	1.10	7.20	0.69	5.99	0.90	AW
6/28/99	1:50pm	0.82	7.30	0.41	5.89	1.00	AW
7/7/99	12:45pm	0.62	7.50	0.21	5.69	1.20	AW
7/19/99	10:30am	0.43	7.40	0.02	5.79	1.10	AW
8/3/99	11:45am	0.22	7.50	-0.19	5.69	1.20	AW
8/17/99	10:50am	0.12	7.55	-0.29	5.64	1.25	AW
8/31/99	9:50am	0.12	7.55	-0.29	5.64	1.25	AW
9/15/99	11:45am	-0.26	7.60	-0.67	5.59	1.30	AW
9/28/99	11:55am	0.08	7.60	-0.33	5.59	1.30	AW
10/12/99	10:05am	0.08	7.65	-0.33	5.54	1.35	AW
10/26/99	3:00pm	0.08	7.70	-0.33	5.49	1.40	AW
11/9/99	2:35pm	0.08	7.65	-0.33	5.54	1.35	AW
11/23/99	4:05pm	No standing water.	7.60	No standing water.	5.59	1.30	FP
12/8/99	10:15am	No standing water.	7.75	No standing water.	5.44	1.45	AW
12/21/99	3:30pm	No standing water.	7.75	No standing water.	5.44	1.45	AW
1/4/00	12:20pm	No standing water.	7.65	No standing water.	5.54	1.35	AW

BMP RETROFIT PILOT PROGRAM
PS&E LOCATION 3
I-5/LA COSTA AVE INFILTRATION BASIN

TABLE 1
WATER SURFACE ELEVATION SUMMARY SHEET

Date	Time	Field Reading		Pond Depth*	Groundwater Elev (FT)*	Delta	By
		Headwall (FT)	Monitoring Well (FT)	(FT)		(FT)	
1/18/00	8:50am	No standing water.	7.85	No standing water.	5.34	1.55	AW
2/1/00	10:15am	Small Pools.	7.45	No standing water.	5.74	1.15	CW
2/15/00	4:45pm	1.60	7.50	1.19	5.69	1.20	MZ
2/29/00	12:30pm	2.90	7.25	2.49	5.94	0.95	MZ
3/15/00	2:30pm	2.90	7.18	2.49	6.01	0.88	CW
3/28/00	11:15am	1.51	7.35	1.10	5.84	1.05	CW
4/11/00	10:00am	1.20	7.50	0.79	5.69	1.20	BJ
4/24/00	9:30am	1.60	7.45	1.19	5.74	1.15	MZ
5/12/00	10:00am	0.78	7.60	0.37	5.59	1.30	CW

*
Temporary Well: Well Cover elevation 10.99 ft (3.35m). Well rim elevation 10.92 ft.

WSE at monitoring well = Well cover elevation (FT) - Monitoring Well Reading (FT)

*
Permanent Well: Monitoring well notch at elevation 13.186 ft (4.02m)

WSE at monitoring well = Notch elevation (FT) - Monitoring Well Reading (FT)
Monitoring Well reading = Distance to groundwater surface

*
Pond Depth = Headwall Field Reading (FT) - Pipe Invert Location on the Headwall Gauge (FT)

Pipe Invert Location on the Headwall Gauge (FT) = 0.41 ft
Note: Negative Pond Depths indicate ponded water is below invert.
This is due to scour and settlement of the invert material.

Delta = Basin Invert - Groundwater elevation
Basin Invert = 6.89 FT (2.1m)

AW- RBF
FP- RBF
GC- RBF
GDC-Group Delta Consultants (Formerly LKR- The LKR Group, Consulting Geotechnical Engineers)

BMP RETROFIT PILOT PROGRAM
PS&E LOCATION 3
I-5/LA COSTA AVE INFILTRATION BASIN

TABLE 1
WATER SURFACE ELEVATION SUMMARY SHEET

Date	Time	Field Reading		Pond Depth*	Groundwater Elev (FT)*	Delta	By
		Headwall (FT)	Monitoring Well (FT)	(FT)		(FT)	

KLI- Kinnetic Laboratories, Inc.
CT RE- Caltrans Resident Engineer

APPENDIX G

BIOLOGICAL MONITORING REPORTS

FEBRUARY, MARCH, APRIL 2000

CALTRANS BMP Retrofit Pilot Program
Districts 7 and 11

BIOLOGICAL MONITORING REPORT
for
February 2000

Prepared for:

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INTRODUCTION

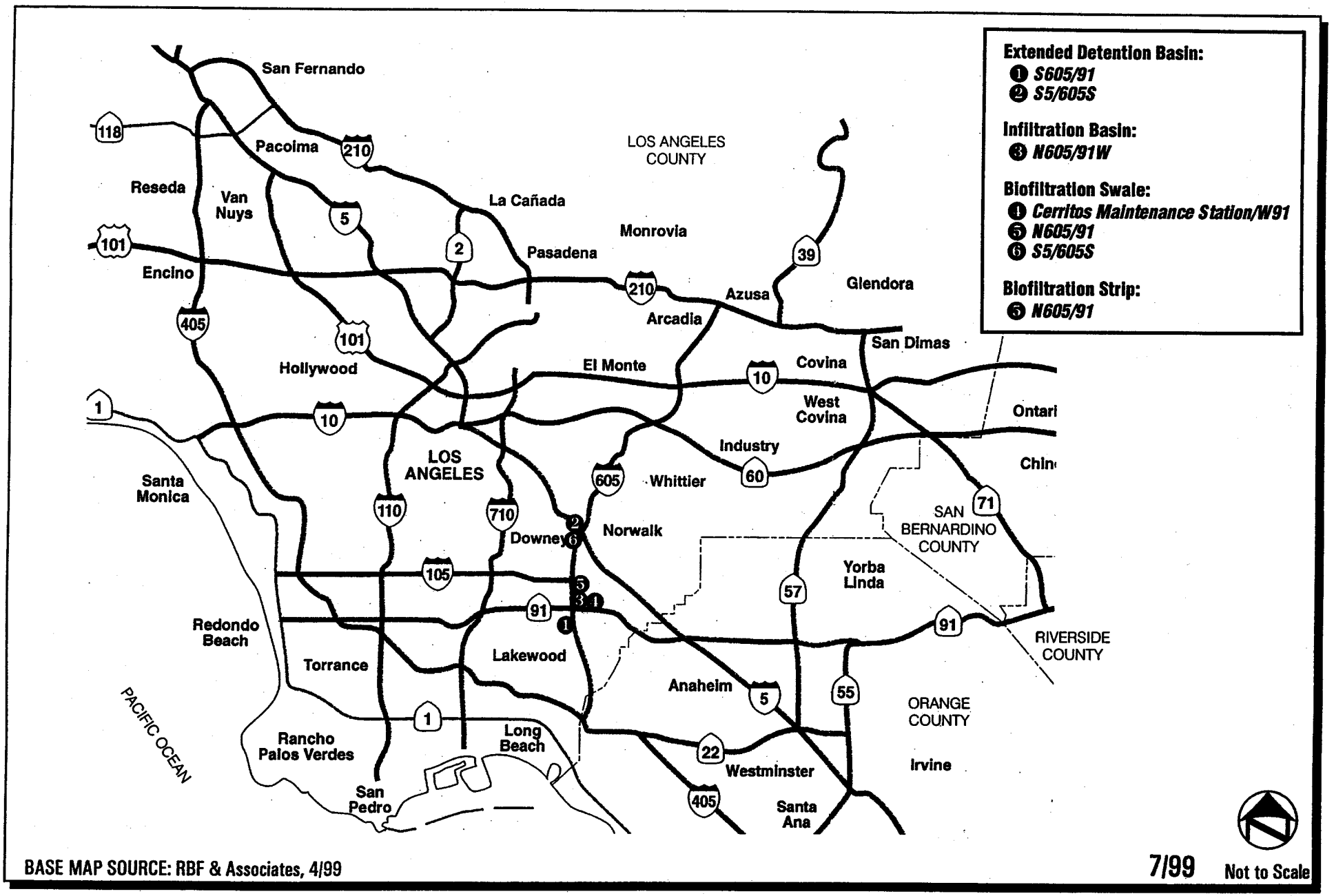
This report is intended to describe biological monitoring efforts in regards to the California Department of Transportation (Caltrans) Best Management Practices facilities (BMP) pilot study occurring in Districts 7 and 11 (Los Angeles and San Diego respectively). The pilot study, BMP locations, and BMP descriptions have been well described previously by Robert Bein, William Frost and Associates (RBF 1999).

Six District 7 BMP sites (*Figure 1*) and nine District 11 BMP sites (*Figure 2*) are monitored monthly by Dudek and Associates, Inc. (DUDEK). DUDEK previously determined that the 15 sites may have the potential to become significant from a wildlife perspective. DUDEK wildlife biologist Brock A. Ortega visited the District 11 BMPs and District 7 BMP's on 23 February 2000. Survey conditions were appropriate for detection of wildlife issues, though it was raining.

Table 1 presents a synopsis of potential issues related to each BMP site. A discussion of each BMP site follows the table.

TABLE 1
BMP LOCATIONS, TYPE, POTENTIAL BIOLOGICAL ISSUES AND SUMMARY OF FINDINGS

Location; BMP Type	Sensitive Species Activity/Type	Action	Gopher Mounds/ Action*	Ground Squirrel Holes/ Action*	Nesting Birds	Standing Water*	Species Observed
I-605/SR-91; InfBa	No	N/A	Yes/None	No	No	No	None
I-5/I-605; ExtDB	No	N/A	Yes/None	No	No	No	None
I-605/SR-91; BiofSt	No	N/A	Yes/trap	No	No	No	None
Cerritos MS; BiofSw	No	N/A	Yes/trap	?/watch	No	No	American crow
I-5/I605; BiofSw	No	N/A	Yes/trap	No	No	Yes	None
I-605/SR-91; BiofSw	No	N/A	Yes/trap	No	No	No	None
I-5/Manchester; ExtDB	No	N/A	No	No	No	No	Mourning dove, Nuttall's woodpecker
I-5/SR-56; ExtDB	No	N/A	No	No	No	Yes	black phoebe
I-15/SR-78; ExtDB	No	N/A	Yes/trap	No	No	No	Mourning dove
I-5/La Costa W; InfBa	No	N/A	No	No	No		House finch, bushtit
I-5/La Costa SE; WetBa	No	N/A	No	No	No		Black phoebe, common moorhen, song sparrow, green-backed heron, gadwell, common yellow-throat, Anna's hummingbird, marsh wren, raccoon, European starling, belted kingfisher, mallard, American coot



BASE MAP SOURCE: RBF & Associates, 4/99

7/99

Caltrans BMP Retrofit Pilot Program, LA & SD Counties - Biological Monitoring Report

Regional Location Map - District 7, Los Angeles

FIGURE 1

605/91 Interchange Infiltration Basin

There is abundant gopher activity present within the basin. An increase in pocket gopher burrows are evident around the perimeter of the BMP adjacent to the access road. No sensitive species were detected or expected.

There are no maintenance recommendations at this time. However, it is recommended that the surrounding pocket gopher activity be closely watched and burrows closed as encountered. If the problem gets worse, then control methods will be recommended.

5/605 Interchange Extended Detention Basin

Gopher activity was evident around the BMP on slopes. No ground squirrels were detected. No sensitive species were detected or expected.

There are no recommendations at this time.

5/605 Interchange Biofiltration Swale

No ground squirrel burrows were present. Pocket gopher burrows were distributed throughout the BMP. No sensitive species were detected or expected.

Trapping may be required in order to maintain the target % coverage of salt grass.

Cerritos Maintenance Station/91 Biofiltration Swale

There still are lots of gopher mounds distributed throughout the BMP. Possible ground squirrel burrows also occur within the BMP. No sensitive species were detected or expected.

Gopher trapping should occur/continue to minimize the amount of herbivory on the grass filter and to maintain the target coverage of salt grass. However, gopher mounds are not expected to create sensitive species habitat.

DISTRICT 11 (SAN DIEGO) BMP SITES

TABLE 1 (*Continued*)
BMP LOCATIONS, TYPE AND POTENTIAL BIOLOGICAL ISSUES

Location; BMP Type	Sensitive Species Activity/Type	Action	Gopher Mounds/ Action*	Ground Squirrel Holes/ Action*	Nesting Birds	Standing Water	Species Observed
SR-78/Melrose; BiofSw	No	N/A	Yes/trap	No	No		None
I-5/Palomar Airport; BiofSw	No	N/A	Yes/trap	Yes/bait	No		None
I-5/LaCosta P&R; MedFi	No	N/A	No	No	No		Black phoebe, Anna's hummingbird
I-5/SR-78 P&R; MedFi	No	N/A	No	No	No	No	None

* information not taken due to inclement weather.

InfBa - Infiltration Basin
ExtDB - Extended Detention Basin
BiofSw - Biofiltration Swale
BiofSt - Biofiltration Strip
WetBa - Wet Basin
MedFi - Media Filter

* Action needed to protect against potential sensitive species occupation – does not account for any actions required to protect site from herbivory, erosion, or other problems caused by fossorial mammals.

DISTRICT 7 (LOS ANGELES) BMP SITES

605/91 Interchange Biofiltration Swale

Gopher burrows were abundant within the BMP. Additionally, an abundant amount of gopher activity was evident surrounding the BMP. No ground squirrel burrows were present. No sensitive species were present or expected.

The only recommendation at this time is to trap the gophers so that the amount of soil disturbance caused by them does not compromise the target cover of salt grass.

605/91 Interchange Biofiltration Strip

Gophers continue to invade site, causing lots of damage, particularly at the recovery area. The grass continues to look in good shape with the exception of the newly planted area. No ground squirrels were present. No sensitive species were detected or expected.

It is recommended that trapping be implemented for gophers so that the amount of soil disturbance caused by them does not compromise the target coverage of salt grass.

5/Palomar Airport Road Biofiltration Swale

Gopher mounds are distributed along the western edge of the BMP. Ground squirrel burrows were present adjacent to the right-of-way fence. There were no sensitive species issues.

It is recommended that trapping occur for gophers and baiting for ground squirrels.

78/Melrose Drive Biofiltration Swale

A few gopher mounds were detected primarily along the north bank. No ground squirrel burrows were present. No sensitive species were present.

It is recommended that the gophers are trapped.

78/15 Extended Detention Basin

Ground squirrel and/or pocket gopher activity still is increasing adjacent to the blacktop access road which leads into the basin. Abundant ground squirrel and gopher activity is present adjacent to the BMP on slopes. No sensitive species were detected.

It is recommended that gophers are trapped.

5/78 Media Filter

There were no issues at the media filter. There are no recommendations.

COMMENTS

Gopher and ground squirrel activity is still more prevalent in District 7; however, the District 11 – 5/Palomar, 78/Melrose, and 78/15 BMPs are still a concern. Gopher activity should not create habitat for sensitive species; however, on the District 7 sites, they are having a deleterious effect on the grass BMP's. If they continue, they may reduce the cover of the salt grass to a level below that which is recommended. Trapping should occur on the 605/91 biofiltration strip, Cerritos maintenance station biofiltration swale, 5/605 biofiltration swale, 605/91 biofiltration swale, 15/78 extended detention basin, 78/Melrose biofiltration swale, and 5/Palomar Airport Road biolfiltation swale.

California ground squirrel burrows should be collapsed as they are found and persistent or increasing populations at the 5/Palomar Airport Road biofiltration swale should be poisoned via bait stations.

Presently, nesting birds will not constrain maintenance activities, nor will sensitive species.

Finally, it is recommended that a net exclusion device is employed around the La Costa infiltration basin so that the basin does not become a fairy shrimp sink.

LITERATURE CITED

Robert Bein, William Frost and Associates. 1999. Project Information for Selected Best Management Practice (BMP) Sites in Caltrans Districts 7 and 11. 27pp.

CALTRANS BMP Retrofit Pilot Program
Districts 7 and 11

BIOLOGICAL MONITORING REPORT
for
March 2000

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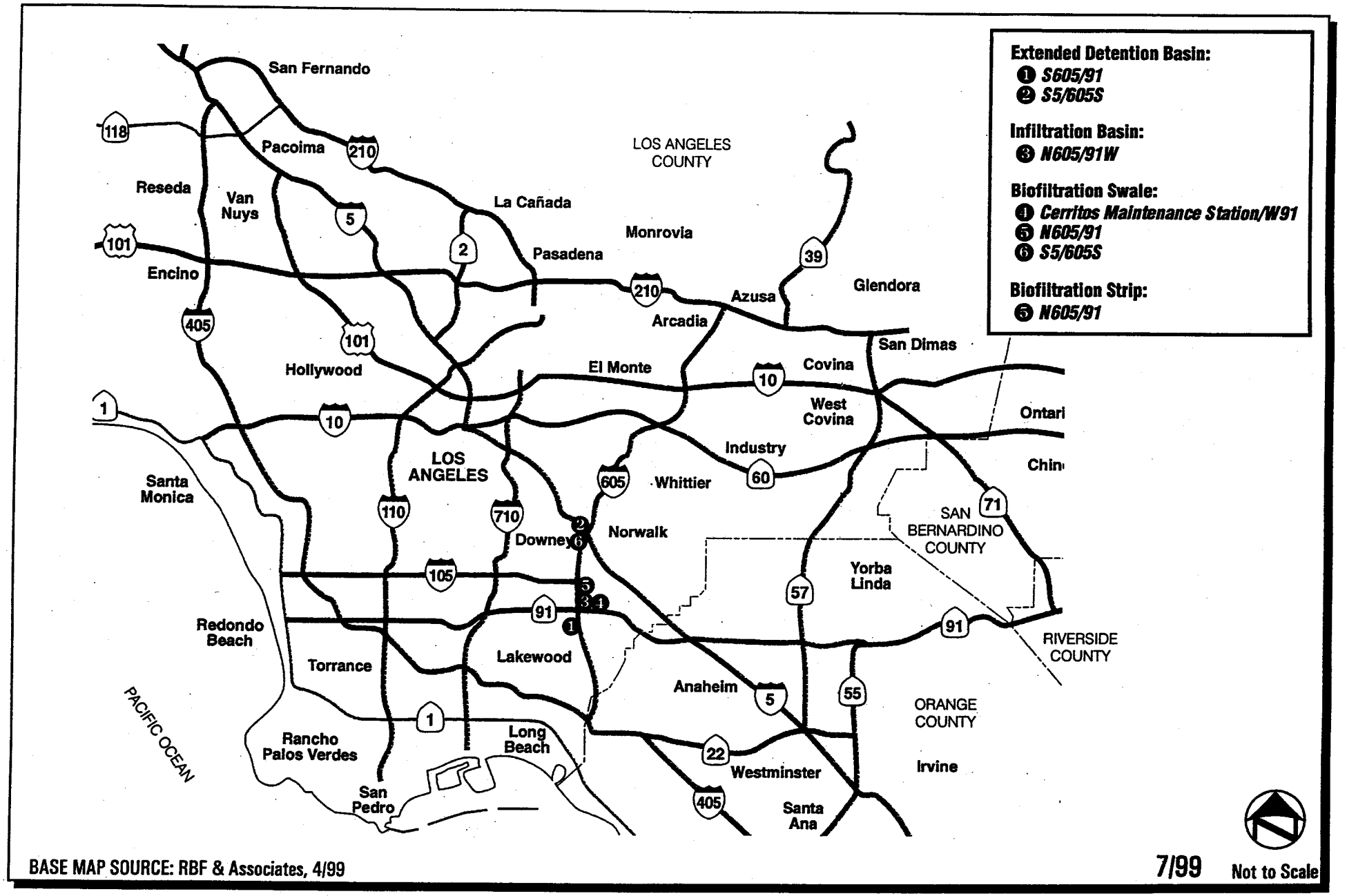
Six District 7 BMP sites (*Figure 1*) and nine District 11 BMP sites (*Figure 2*) are monitored monthly by Dudek and Associates, Inc. (DUDEK). DUDEK previously determined that the 15 sites may have the potential to become significant from a wildlife perspective. DUDEK wildlife biologist Brock A. Ortega visited the District 11 BMPs and District 7 BMP's on 28 March 2000. Survey conditions were appropriate for detection of wildlife (i.e., partly cloudy skies, cool temperatures, light breezes).

Table 1 presents a synopsis of potential issues related to each BMP site. A discussion of each BMP site follows the table.

TABLE 1
BMP LOCATIONS, TYPE, POTENTIAL BIOLOGICAL ISSUES AND SUMMARY OF FINDINGS

Location; BMP Type	Sensitive Species Activity/Type	Action	Gopher Mounds/ Action*	Ground Squirrel Holes/ Action*	Nesting Birds	Standing Water	Species Observed
I-605/SR-91; InfBa	No	N/A	Yes/None	No	No	No	Mourning dove
I-5/I-605; ExtDB	No	N/A	Yes/None	No	No	No	killdeer
I-605/SR-91; BiofSt	No	N/A	Yes/trap	No	No	No	None
Cerritos MS; BiofSw	No	N/A	Yes/trap	?/watch	No	No	black phoebe
I-5/I605; BiofSw	No	N/A	Yes/trap	No	No	Yes	None
I-605/SR-91; BiofSw	No	N/A	Yes/trap	No	No	No	mourning dove
I-5/Manchester; ExtDB	No	N/A	No	No	No	No	None
I-5/SR-56; ExtDB	No	N/A	No	No	No	Yes	black phoebe, house finch
I-15/SR-78; ExtDB	No	N/A	Yes/trap	No	No	No	Red-tailed hawk
I-5/La Costa W; InfBa	No	N/A	No	No	No	No	black phoebe, house finch
I-5/La Costa SE; WetBa	No	N/A	No	No	No	No	Mourning dove, mallard, black phoebe, house finch, gadwall, common yellow-throat, raccoon, song sparrow, redwing blackbird



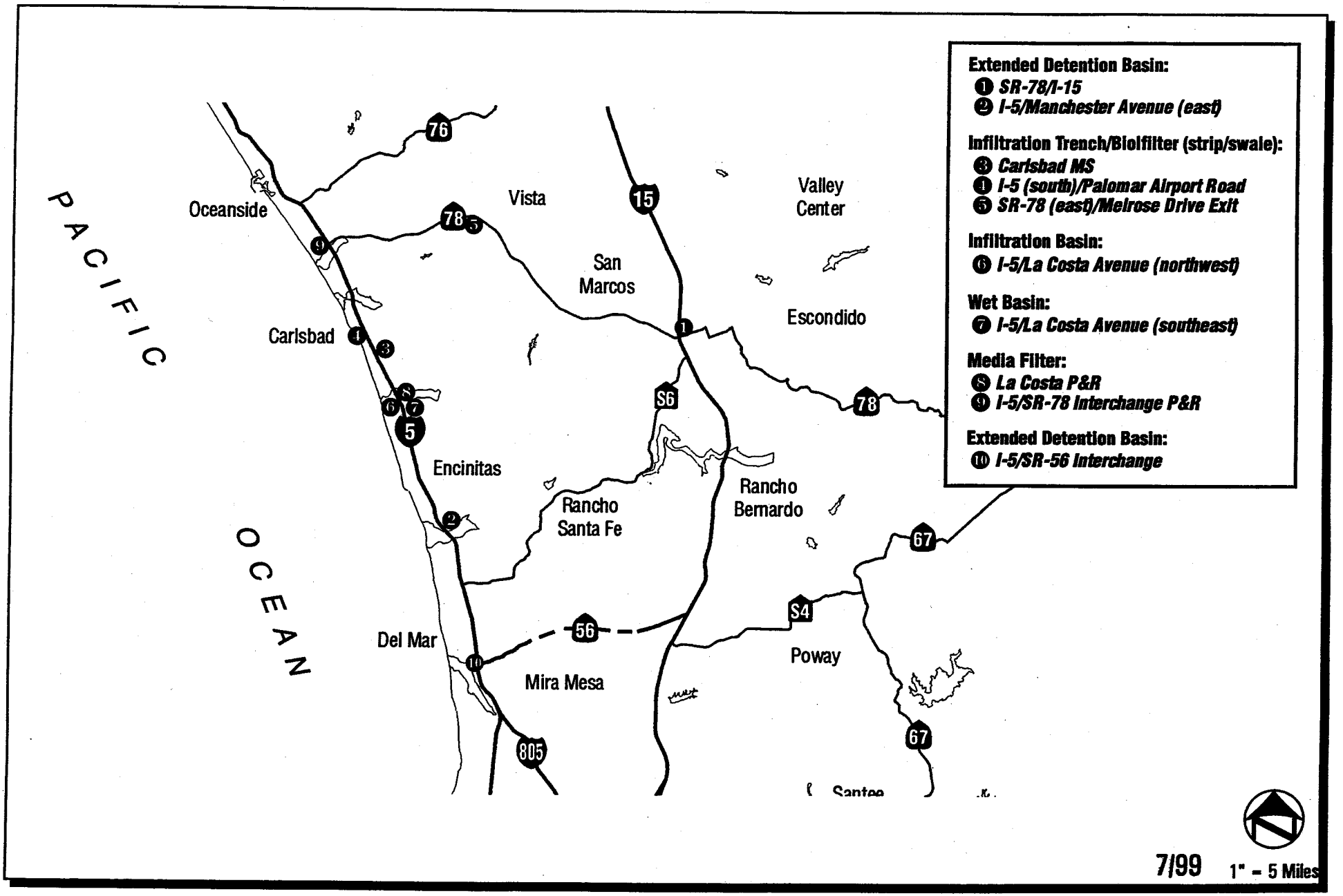
BASE MAP SOURCE: RBF & Associates, 4/99

7/99

Caltrans BMP Retrofit Pilot Program, LA & SD Counties - Biological Monitoring Report

Regional Location Map - District 7, Los Angeles

FIGURE 1



Caltrans BMP Retrofit Pilot Program, LA & SD Counties - Biological Monitoring Report

Regional Location Map - District 11, San Diego

FIGURE 2

TABLE 1 (*Continued*)
BMP LOCATIONS, TYPE AND POTENTIAL BIOLOGICAL ISSUES

Location; BMP Type	Sensitive Species Activity/Type	Action	Gopher Mounds/ Action*	Ground Squirrel Holes/ Action*	Nesting Birds	Standing Water	Species Observed
SR-78/Melrose; BiofSw	No	N/A	Yes/trap	No	No	No	None
I-5/Palomar Airport; BiofSw	No	N/A	Yes/trap	Yes/bait	No	No	None
I-5/LaCosta P&R; MedFi	No	N/A	No	No	No	No	Black phoebe, Anna's hummingbird
I-5/SR-78 P&R; MedFi	No	N/A	No	No	No	No	None

InfBa - Infiltration Basin
ExtDB - Extended Detention Basin
BiofSw - Biofiltration Swale
BiofSt - Biofiltration Strip
WetBa - Wet Basin
MedFi - Media Filter

* Action needed to protect against potential sensitive species occupation – does not account for any actions required to protect site from herbivory, erosion, or other problems caused by fossorial mammals.

DISTRICT 7 (LOS ANGELES) BMP SITES

605/91 Interchange Biofiltration Swale

Gopher burrows were abundant within the BMP. Additionally, an abundant amount of gopher activity was evident surrounding the BMP. No ground squirrel burrows were present. No sensitive species were present or expected.

The only recommendation at this time is to trap the gophers so that the amount of soil disturbance caused by them does not compromise the target cover of salt grass.

605/91 Interchange Biofiltration Strip

Gophers continue to invade site. The grass continues to look in good shape with the exception of the newly planted area. No ground squirrels were present. No sensitive species were detected or expected.

It is recommended that trapping be implemented for gophers so that the amount of soil disturbance caused by them does not compromise the target coverage of salt grass.

605/91 Interchange Infiltration Basin

There is abundant gopher activity present within the basin. Pocket gopher burrows are evident around the perimeter of the BMP adjacent to the access road. No sensitive species were detected or expected.

There are no maintenance recommendations at this time. However, it is recommended that the surrounding pocket gopher activity be closely watched and burrows closed as encountered. If the problem gets worse, then control methods will be recommended.

5/605 Interchange Extended Detention Basin

Gopher activity was evident around the BMP on slopes. No ground squirrels were detected. No sensitive species were detected or expected.

There are no recommendations at this time.

5/605 Interchange Biofiltration Swale

No ground squirrel burrows were present. Pocket gopher burrows were distributed throughout the BMP. No sensitive species were detected or expected. Standing water was present at the inlet; however, there were no biological issues associated with this.

Trapping may be required in order to maintain the target % coverage of salt grass.

Cerritos Maintenance Station/91 Biofiltration Swale

There still are lots of gopher mounds distributed throughout the BMP. Possible ground squirrel burrows also occur within the BMP. No sensitive species were detected or expected.

Gopher trapping should occur/continue to minimize the amount of herbivory on the grass filter and to maintain the target coverage of salt grass. However, gopher mounds are not expected to create sensitive species habitat.

DISTRICT 11 (SAN DIEGO) BMP SITES

5/56 Interchange Extended Detention Basin

No gopher mounds or ground squirrel burrows were detected. No sensitive species were detected or expected.

There are no recommendations at this time.

5/Manchester Avenue Extended Detention Basin

No ground squirrel or pocket gopher activity was evident. There are no sensitive species issues at this time.

There are no recommendations at this time.

5/La Costa Avenue Wet Basin

There were no gopher mounds or ground squirrel burrows in or in the vicinity of the BMP. There are no sensitive species issues at this time. Two visual surveys for light-footed clapper rail were negative. Many wetland wildlife species are now utilizing the site. Emergent wetland vegetation now approximates 10% to 15% of the total basin surface area.

There are no recommendations at this time.

La Costa Avenue Media Filter

There are no issues at the media filter at this time. There are no recommendations.

5/La Costa Avenue Infiltration Basin

There were no gopher mounds or ground squirrel burrows detected. No sensitive species were detected or expected at this time. Water was present in the basin.

5/Palomar Airport Road Biofiltration Swale

Gopher mounds are distributed along the western edge of the BMP. Ground squirrel burrows were present adjacent to the right-of-way fence. There were no sensitive species issues.

It is recommended that trapping occur for gophers and baiting for ground squirrels.

78/Melrose Drive Biofiltration Swale

A few gopher mounds were detected primarily along the north bank. No ground squirrel burrows were present. No sensitive species were present.

It is recommended that the gophers are trapped.

78/15 Extended Detention Basin

Pocket gopher activity still is increasing adjacent to the blacktop access road which leads into the basin. Abundant gopher activity is present adjacent to the BMP on slopes. No sensitive species were detected.

It is recommended that gophers are trapped.

5/78 Media Filter

There were no issues at the media filter. There are no recommendations.

COMMENTS

Gopher and ground squirrel activity is still more prevalent in District 7; however, the District 11 – 5/Palomar, 78/Melrose, and 78/15 BMPs are still a concern. Gopher activity should not create habitat for sensitive species; however, on the District 7 sites, they are having a deleterious effect on the grass BMP's. If they continue, they may reduce the cover of the salt grass to a level below that which is recommended. Trapping should occur on the 605/91 biofiltration strip, Cerritos maintenance station biofiltration swale, 5/605 biofiltration swale, 605/91 biofiltration swale, 15/78 extended detention basin, 78/Melrose biofiltration swale, and 5/Palomar Airport Road biolfiltation swale.

California ground squirrel burrows should be collapsed as they are found and persistent or increasing populations at the 5/Palomar Airport Road biofiltration swale should be poisoned via bait stations.

Presently, nesting birds will not constrain maintenance activities, nor will sensitive species.

LITERATURE CITED

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CALTRANS BMP Retrofit Pilot Program
Districts 7 and 11

BIOLOGICAL MONITORING REPORT
for
April 2000

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INTRODUCTION

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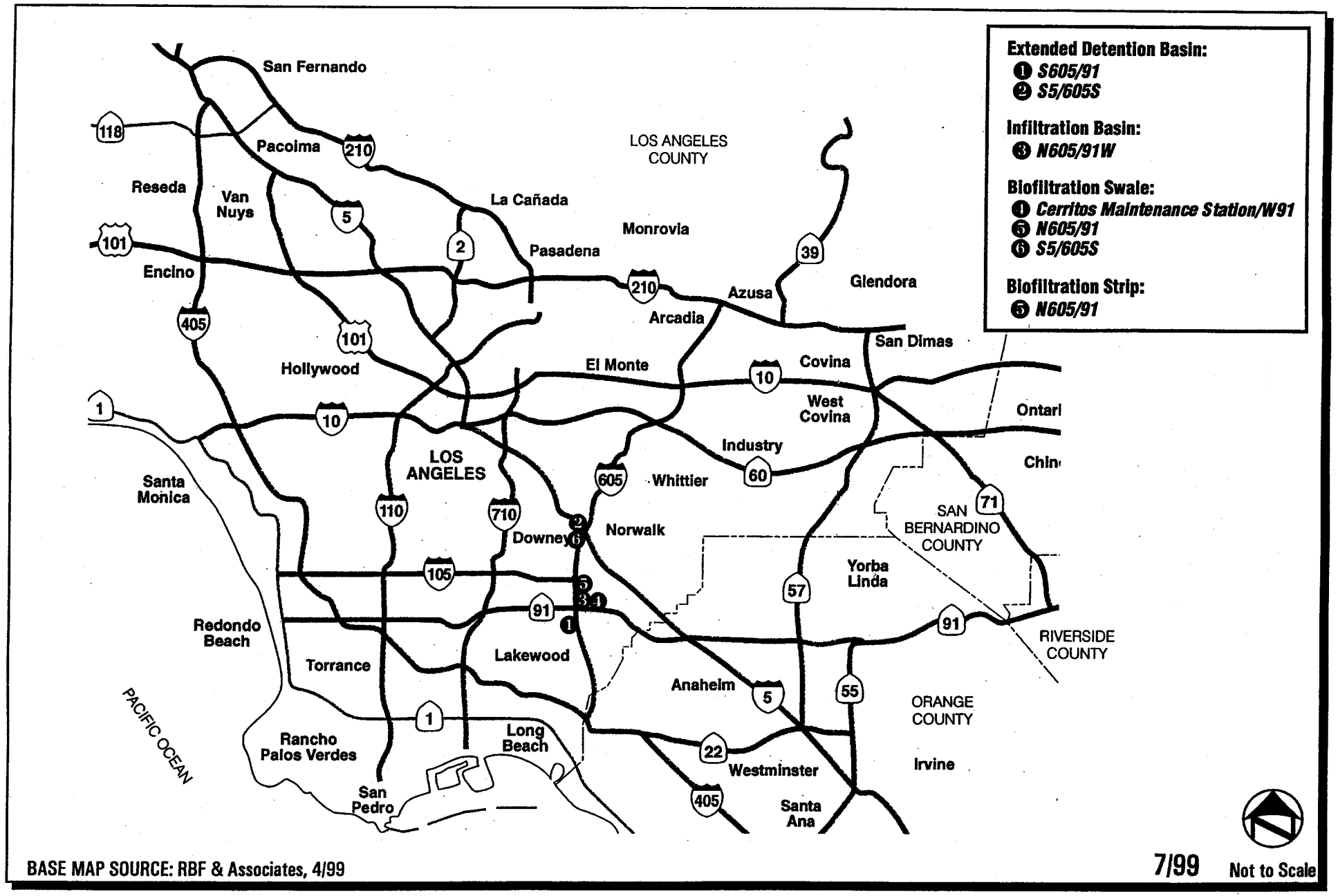
Six District 7 BMP sites (*Figure 1*) and nine District 11 BMP sites (*Figure 2*) are monitored monthly by Dudek and Associates, Inc. (DUDEK). DUDEK previously determined that the 15 sites may have the potential to become significant from a wildlife perspective. DUDEK wildlife biologist Brock A. Ortega conducted the April visit for the District 11 BMPs and District 7 BMP's on 2 May 2000. Survey conditions were appropriate for detection of wildlife (i.e., partly cloudy to clear skies, mild temperatures, light breezes).

Table 1 presents a synopsis of potential issues related to each BMP site. A discussion of each BMP site follows the table.

TABLE 1
BMP LOCATIONS, TYPE, POTENTIAL BIOLOGICAL ISSUES AND SUMMARY OF FINDINGS

Location; BMP Type	Sensitive Species Activity/Type	Action	Gopher Mounds/ Action*	Ground Squirrel Holes/ Action*	Nesting Birds	Standing Water	Species Observed
I-605/SR-91; InfBa	No	N/A	Yes/None	No	No	No	Say's phoebe, west coast lady, common white
I-5/I-605; ExtDB	No	N/A	Yes/None	No	No	No	killdeer
I-605/SR-91; BiofSt	No	N/A	Yes/None	No	No	No	None
Cerritos MS; BiofSw	No	N/A	Yes/trap	Yes/bait	No	No	fence lizard
I-5/I605; BiofSw	No	N/A	Yes/None	No	No	No	cabbage white
I-605/SR-91; BiofSw	No	N/A	Yes/trap	No	No	No	west coast lady, cabbage white
I-5/Manchester; ExtDB	No	N/A	No	No	No	No	house finch
I-5/SR-56; ExtDB	No	N/A	No	No	No	No	black phoebe, song sparrow
I-15/SR-78; ExtDB	No	N/A	Yes/trap	Yes/None	No	No	Mourning dove
I-5/La Costa W; InfBa	No	N/A	No	No	No	Yes	black phoebe, house finch, fence lizard, raccoon
I-5/La Costa SE; WetBa	No	N/A	No	No	Yes	No	Mourning dove, mallard, black phoebe, killdeer, common yellow-throat, redwing blackbird



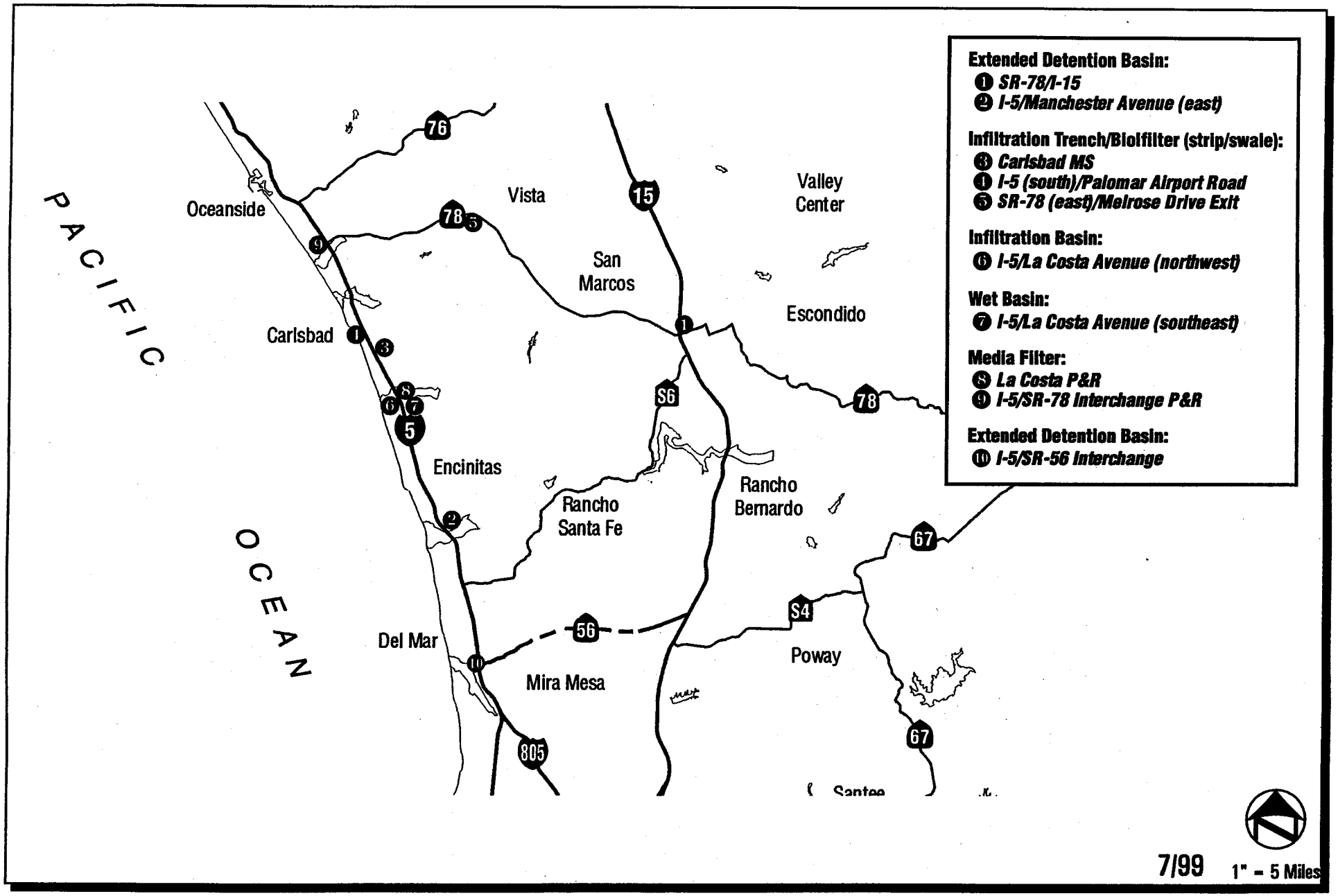
BASE MAP SOURCE: RBF & Associates, 4/99

7/99

Caltrans BMP Retrofit Pilot Program, LA & SD Counties - Biological Monitoring Report

Regional Location Map - District 7, Los Angeles

FIGURE 1



Caltrans BMP Retrofit Pilot Program, LA & SD Counties - Biological Monitoring Report

Regional Location Map - District 11, San Diego

FIGURE 2

TABLE 1 (*Continued*)
BMP LOCATIONS, TYPE AND POTENTIAL BIOLOGICAL ISSUES

Location; BMP Type	Sensitive Species Activity/Type	Action	Gopher Mounds/ Action*	Ground Squirrel Holes/ Action*	Nesting Birds	Standing Water	Species Observed
SR-78/Melrose; BiofSw	No	N/A	Yes/trap	Yes/None	No	No	None
I-5/Palomar Airport; BiofSw	No	N/A	Yes/trap	Yes/None	No	No	None
I-5/LaCosta P&R; MedFi	No	N/A	Yes/None	No	No	No	None
I-5/SR-78 P&R; MedFi	No	N/A	No	No	No	No	None

InfBa - Infiltration Basin
ExtDB - Extended Detention Basin
BiofSw - Biofiltration Swale
BiofSt - Biofiltration Strip
WetBa - Wet Basin
MedFi - Media Filter

* Action needed to protect against potential sensitive species occupation – does not account for any actions required to protect site from herbivory, erosion, or other problems caused by fossorial mammals.

DISTRICT 7 (LOS ANGELES) BMP SITES

605/91 Interchange Biofiltration Swale

Gopher burrows were abundant within the BMP but do not meet the March 30,2000 pocket gopher letter. Additionally, an abundant amount of gopher activity was evident surrounding the BMP. No ground squirrel burrows were present. No sensitive species were present or expected. Vegetation is tall.

There are no recommendations at this time.

605/91 Interchange Biofiltration Strip

Gophers continue to invade site, causing lots of damage; however, they do not meet trapping criteria. The grass continues to look in good shape. No ground squirrels were present. No sensitive species were detected or expected.

No recommendations are required at this time.

605/91 Interchange Infiltration Basin

There is abundant gopher activity present within the basin and around the perimeter of the BMP adjacent to the access road; however, they not meet trapping criteria. No sensitive species were detected or expected. Vegetation is tall.

There are no maintenance recommendations at this time. However, it is recommended that surrounding pocket gopher or ground squirrel burrows are closed as encountered.

5/605 Interchange Extended Detention Basin

No ground squirrel or ground gopher activity was detected. No sensitive species were detected or expected. Vegetation was tall.

There are no recommendations at this time.

5/605 Interchange Biofiltration Swale

No ground squirrel burrows were present. Pocket gopher burrows were distributed throughout the BMP but do not meet trapping criteria. No sensitive species were detected or expected. Tall vegetation was present.

There are no recommendations at this time.

Cerritos Maintenance Station/91 Biofiltration Swale

There still are lots of gopher mounds distributed throughout the BMP which meet trapping criteria. Ground squirrel burrows also occur within the BMP. No sensitive species were detected or expected. Vegetation is tall.

Gopher trapping should occur/continue to minimize the amount of herbivory on the grass filter and to maintain the target coverage of salt grass. However, gopher mounds are not expected to create sensitive species habitat. Bait stations should be implemented for ground squirrel control.

DISTRICT 11 (SAN DIEGO) BMP SITES

5/56 Interchange Extended Detention Basin

No gopher mounds or ground squirrel burrows were detected. Vegetation is tall. No sensitive species were detected or expected.

Vegetation should be trimmed according to the MID.

5/Manchester Avenue Extended Detention Basin

No ground squirrel or pocket gopher activity was evident. There are no sensitive species issues at this time.

There are no recommendations at this time.

5/La Costa Avenue Wet Basin

There were no gopher mounds or ground squirrel burrows in or in the vicinity of the BMP. There are no sensitive species issues at this time. Two visual surveys for light-footed clapper rail were negative. Many wetland wildlife species are now utilizing the site. Emergent wetland vegetation now approximates 30% of the total basin surface area. Red-wing blackbirds are nesting in the cattails onsite.

There are no recommendations at this time.

La Costa Avenue Media Filter

California ground squirrel is present at the northern rock rip-rap cluster. There are no recommendations.

5/La Costa Avenue Infiltration Basin

There were no gopher mounds or ground squirrel burrows detected. Water depth was 1 to 2 feet. No sensitive species were detected or expected at this time. Water was present in the basin.

The net exclusion device is nearly complete.

5/Palomar Airport Road Biofiltration Swale

Gopher mounds are distributed along the western edge of the BMP and meet trapping criteria. Ground squirrel burrows were present adjacent to the right-of-way fence. There were no sensitive species issues.

It is recommended that trapping occur for gophers.

78/Melrose Drive Biofiltration Swale

Gopher mounds were detected primarily along the northern bank and meet the trapping protocol. The filter grass was thick. A few ground squirrel burrows were present. No sensitive species were present.

It would normally be recommended that the gophers are trapped; however, this is a recommended test site, therefore, trapping is not allowed.

78/15 Extended Detention Basin

Ground squirrel and pocket gopher activity still is increasing adjacent to the blacktop access road which leads into the basin and at isolated locations adjacent to perimeter road. Abundant gopher activity is present adjacent to the BMP on slopes. This site meets trapping criteria. No sensitive species were detected.

It is recommended that gophers are trapped.

5/78 Media Filter

There were no issues at the media filter. There are no recommendations.

COMMENTS

During this period, DUDEK conducted a site visit to all BMP's. DUDEK found that seven sites had pocket gopher present and four sites had California ground squirrel present. Of the seven sites, only four met the trapping criteria as proposed within the pocket gopher letter (dated March 30, 2000) including: I-5/Palomar Airport Road swale, SR-78/Melrose Avenue swale, SR-78/I-15 Interchange infiltration basin, and the Cerritos maintenance station swale.

Of these, the Melrose site was proposed to be left untrapped according to the previously mentioned letter. Trapping should stop at other locations; however, compaction of open burrows should continue. California ground squirrel and open burrows were detected at the La Costa park and ride media filter, sR-78/Melrose Avenue swale, SR-78/I-15 extended detention basin, and the I-605/I-5 swale. Baiting stations are not recommended at this time, but should be watched closely and burrow openings closed and compacted. Lastly, as soon as the MID allows, vegetation should be trimmed at the S-56/I-5 extended detention basin, I-605/I-5 swale and infiltration basin, and SR-91/I-605 swale and infiltration basin.

Presently, nesting birds will not constrain maintenance activities, nor will sensitive species, unless vegetation removal is necessary at the La Costa wet basin.

LITERATURE CITED

Robert Bein, William Frost and Associates. 1999. Project Information for Selected Best Management Practice (BMP) Sites in Caltrans Districts 7 and 11. 27pp.

APPENDIX H

COST SUMMARY

BMP Retrofit Pilot Program
Maintenance Operation
Cost Accounting Summary, 1999-00

DISTRICT: 11	LOCATION: I-5/La Costa Avenue (southeast)	SITE NO. 111104	BMP TYPE: Wet Basin	CONSULTANT: KLI

	TASK	1999			2000									Total (hrs)	Avg. Rate	TOTAL $
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep			
Labor (hours)	***Administration***															
	General program support/Follow-up	10.0	4.0	1.0	1.0	1.0	2.0							19	$120	$ 2,280
	Encroachment Permits	0.0	0.0	0.0	0.0	0.0	0.0							0	$87	$ -
	Travel	0.5	0.8	1.0	0.5	1.0	1.0							4.75	$87	$ 413
	Unscheduled events	0.0	0.0	0.0	0.0	0.0	0.0							0	$87	$ -
	Monthly Subtotal (hours)	10.5	4.75	2	1.5	2	3	0	0	0	0	0	0	23.75		
	Monthly Subtotal ($)	$1,244	$545	$207	$164	$207	$327	$0	$0	$0	$0	$0	$0	$2,693		
														Task Subtotal =		$2,693
	Operation															
	Wet season inspections	0.5	0.5	0.5	1.0	2.0	1.0							5.5	$55	$ 303
	Dry season inspections	0.0	0.0	0.0	0.0	0.0	0.0							0	$55	$ -
	Unscheduled inspections/field calls	0.0	0.0	0.0	0.0	0.0	0.0							0	$60	$ -
	Monthly Subtotal (hours)	0.5	0.5	0.5	1	2	1	0	0	0	0	0	0	5.5		
	Monthly Subtotal ($)	$28	$28	$28	$55	$110	$55	$0	$0	$0	$0	$0	$0	$303		
														Task Subtotal =		$303
	Maintenance															
	Scheduled maintenance	0.0	0.0	6.0	4.0	0.0	10.0							20	$55	$ 1,100
	Unscheduled maintenance	0.0	0.0	0.0	0.0	0.0	0.0							0	$55	$ -
	Vandalism	0.0	0.0	0.0	0.0	0.0	0.0							0	$55	$ -
	Acts of God	0.0	0.0	0.0	0.0	0.0	0.0							0	$55	$ -
	Landscape Maintenance Contractor	0.0	0.0	0.0	0.0	0.0	0.0							0	$0	$ -
	Vegetation Consultant	0.0	5.0	3.5	3.0	0.0	2.0							13.5	$85	$ 1,148
	Native Landscape, Inc.	30.0	20.0	0.0	0.0	0.0	0.0							50	$28	$ 1,400
	Irrigation Tech	0.0	7.0	0.0	0.0	0.0	0.0							7	$53	$ 371
	Other Contractor	0.0	0.0	0.0	0.0	0.0	0.0							0	$0	$ -
	Monthly Subtotal (hours)	30	32	9.5	7	0	12	0	0	0	0	0	0	90.5		
	Monthly Subtotal ($)	$840	$1,356	$628	$475	$0	$720	$0	$0	$0	$0	$0	$0	$4,019		
														Task Subtotal =		$4,019
	Vector Control															
	Contract & General administration	0.5	0.1	0.1	0.1	0.1	0.1							1	$87	$ 87
	Vector prevention maint. (consultant)	0.0	0.0	0.0	0.0	0.0	0.0							0	$65	$ -
	Response to VCD calls (consultant)	0.0	0.0	0.0	0.0	0.0	0.0							0	$55	$ -
	VCD efforts (contracted)	3.0	1.0	1.0	3.0	3.0	3.0							14	$55	$ 770
	Monthly Subtotal (hours)	3.5	1.1	1.1	3.1	3.1	3.1	0	0	0	0	0	0	15		
	Monthly Subtotal ($)	$209	$64	$64	$174	$174	$174	$0	$0	$0	$0	$0	$0	$857		
														Task Subtotal =		$857
Non-Recurring Equipment (hours)	***Equipment***															
	Piece of Equipment 1	0.0	0.0	0.0	0.0	0.0	0.0							0	$0	$ -
	Piece of Equipment 2	0.0	0.0	0.0	0.0	0.0	0.0							0	$0	$ -
	Piece of Equipment 3	0.0	0.0	0.0	0.0	0.0	0.0							0	$0	$ -
	Piece of Equipment 4	0.0	0.0	0.0	0.0	0.0	0.0							0	$0	$ -
	Piece of Equipment 5	0.0	0.0	0.0	0.0	0.0	0.0							0	$0	$ -
	Piece of Equipment 6	0.0	0.0	0.0	0.0	0.0	0.0							0	$0	$ -
	Monthly Subtotal (hours)	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Monthly Subtotal ($)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		
														Equipment Subtotal =		$0
Dollars ($)	***Direct Costs***													**Total $**		
	VCD supplies (direct costs less labor)	$ -	$ -	$ -	$ -	$ -	$ -							$ -		
	Reproduction	$ -	$ -	$ -	$ -	$ 10	$ -							$ 10		
	Postage/FedEx	$ -	$ -	$ -	$ -	$ -	$ -							$ -		
	Lodging	$ 15	$ -	$ -	$ -	$ -	$ -							$ 15		
	Per Diem	$ -	$ -	$ -	$ -	$ -	$ -							$ -		
	Incidentals	$ -	$ -	$ -	$ -	$ -	$ -							$ -		
	Vehicle Rental/Lease	$ 40	$ 16	$ 11	$ 5	$ 9	$ 22							$ 102		
	Airfare	$ -	$ -	$ -	$ -	$ -	$ -							$ -		
	Field Supp./Expendables	$ -	$ 1	$ -	$ -	$ -	$ 45							$ 46		
	Equipment Rental	$ -	$ -	$ -	$ -	$ -	$ -							$ -		
	Sediment Analyses	$ -	$ -	$ -	$ -	$ -	$ -							$ -		
	Sediment Disposal	$ -	$ -	$ -	$ -	$ -	$ -							$ -		
	Fax	$ 0.50	$ -	$ -	$ -	$ -	$ -							$ 1		
	Irrigation Materials	$ -	$ -	$ -	$ -	$ -	$ -							$ -		
	Other Direct Costs	$ -	$ -	$ -	$ -	$ -	$ -							$ -		
	Monthly Subtotal	$ 55	$ 17	$ 11	$ 5	$ 19	$ 67	$ -	$ -	$ -	$ -	$ -	$ -	$ 174		
	MONTHLY TOTAL	$2,375	$2,009	$937	$872	$509	$1,343	$0	$0	$0	$0	$0	$0	**1999/2000 TOTAL =**		**$8,045**

APPENDIX I

VECTOR ISSUES

QUARTERLY REPORT ON ADULT MOSQUITO AND MIDGE MONITORING

MCTT MEMO, DHS MEMO

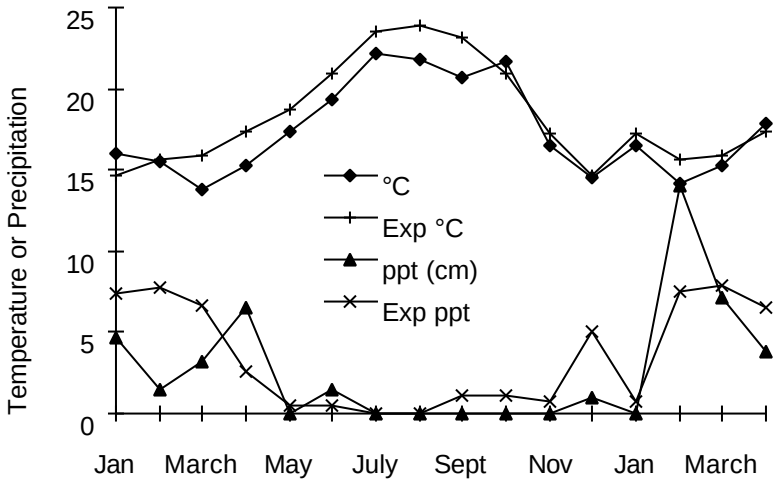
QUARTERLY REPORT ON ADULT MOSQUITO AND MIDGE MONITORING AT CALTRANS DISTRICT 7 AND 11 STORMWATER BMP RETROFIT SITES: 2ND QUARTER 2000 (24 FEB. 2000-22 MAY 2000)

Prepared by: William Walton
Department of Entomology, University of California, Riverside, CA 92521

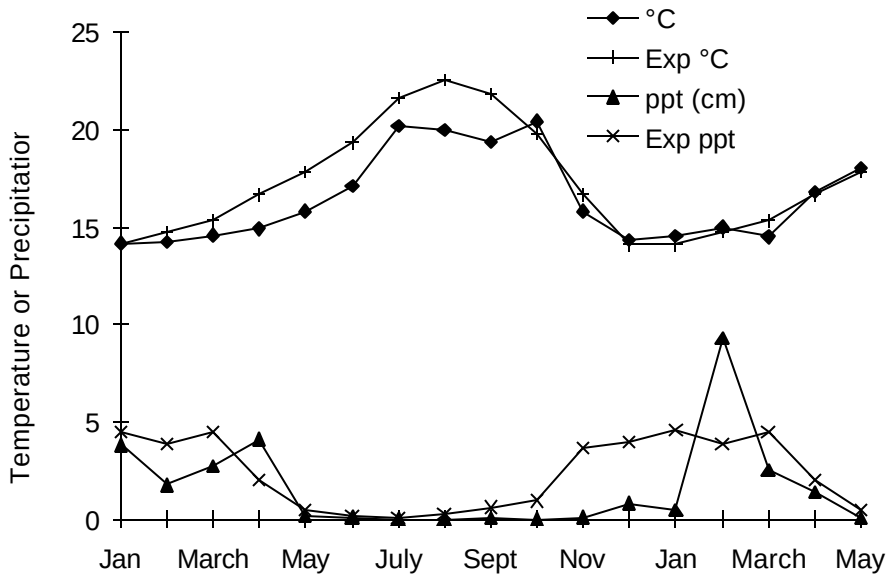
Temperature and Rainfall

The weather in Los Angeles during the second quarter of 2000 was slightly cooler than average during February and March (1.4°C and 0.7°C below the monthly mean temperature, respectively) and slightly above average (0.4°C) for April. Rainfall was 6.6 cm above normal during February. Mean monthly rainfall at USC in Los Angeles was 0.8 cm and 2.8 cm below normal during March and April 2000.

Monthly mean air temperatures in San Diego from February through April 2000 were very close to normal with the exception of March which was 0.8°C cooler than normal. Monthly total precipitation in San Diego was 5.5 cm above normal during February and below normal for all other months during the quarter through 21 May 2000.



Air temperature (°C) and precipitation (cm) at downtown Los Angeles plotted as monthly means for January 1999 through January 2000 and long-term averages (Exp °C or Exp ppt) compiled by the National Weather Service.



Air temperature (°C) and precipitation (cm) at Lindbergh Field, San Diego plotted as monthly means for January 1999 through January 2000 and long-term averages (Exp °C or Exp ppt) compiled by the National Weather Service.

Host-seeking Mosquitoes

Host-seeking mosquito activity was low (< 0.5 females per trap night) at District 7 sites during late February and March. In April, mosquito activity increased at several sites along the I-605 near Cerritos (73101, 73222, 73225). Sporadic activity occurred at the Cerritos sites during May; however, trap counts were < 5 individual per trap night. Overall, host-seeking mosquito remained low (mean number of females collected per night was > 2). Host-seeking mosquito activity at paired stormwater BMP and control sites did not differ appreciably during the second quarter 2000.

Host-seeking mosquito activity was low (< 0.5 females per trap night) at sites in District 11 during late February and March. Mosquito activity increased markedly at three sites (two EDBs [111105 and 111101] and the wet basin site [111104]) during late April and May. A fourth site (MF at Kearny Mesa MS, 112201) exhibited an increase in host-seeking mosquito catches during mid and late May. During the first half of the second quarter 2000, host-seeking mosquito activity at the paired control-stormwater BMP locations did not differ appreciably; however, mosquito activity at paired stormwater BMPs was on average greater than at control sites from late April until late May.

Gravid Mosquitoes

Gravid mosquito activity in District 7 increased from an average of 1.6 individuals per trap night in late March to > 3 individuals per trap night during April and then to between 10 and 20 individuals per trap night for much of April and May. On 20 April, gravid mosquito activity at many of the Cerritos sites (IB, 73101; Bio. swale, 73224, 73225), the Termination P&R (MF, 74204 and control), Alameda MS (Oil-water separator, 74201), Metro MS (MCTT, 74208) and at the Rosemead MS (DII, 73218) was comparatively higher than at other sites in District 7. Gravid mosquito activity

occurred at all sites in District 7 on 27 April and declined by approximately 50-75% during the next two weeks. Gravid mosquito activity increased again (mean = 16 females per trap night) on 18 May with enhanced activity occurring at the Pacoima sites, Rosemead MS, Altadena MS, Foothill MS, three Cerritos sites (EDB, 74101; IB, 73101; Bio. swale, 73223), Termination P&R (MF, 74204), the MCTTs at the Metro MS and Lakewood P&R, and the Alameda MS. Catches of gravid mosquitoes were predominantly *Culex quinquefasciatus.* As compared to paired control sites, stormwater BMPs in District 7 did not exhibit markedly greater gravid mosquito activity

The abundance of gravid mosquitoes at District 11 sites during the second quarter 2000 was lower than at sites in District 7. Fewer than one female per trap night was collected during March. Mean trap catches ranged between one and four females per trap night during April. Catches during most of May were similar to those during April, late May being an exception with a relatively larger mean of 7 females per trap night. However, host-seeking and gravid mosquito activity was correlated; the four aforementioned sites that had comparatively greater host-seeking activity also had gravid mosquito activity that was greater than at other sites in District 11. Activity at paired control sites was lower than at one half of the BMP stormwater sites on about 50% of the sampling dates.

Midges

The abundance of midges at the stormwater BMP retrofit sites during the 2nd quarter 2000 remained low ($\leq$2 individuals per trap night) suggesting that the operational BMP sites were not producing chironomid midges in significant quantities.

M e m o r a n d u m

Date: May 15, 2000

To: Dean Messer, Ph.D.
Larry Walker Associates
509 4th Street
Davis, California 95616

From: J. Wakoli Wekesa, Ph.D.
Public Health Biologist
Department of Health Services
Vector-Borne Disease Section
Ontario, CA 91764

Subject: Potential Vectors at Underground Best Management Practice Structures

Introduction

The proposal for developing underground structures to improve the quality of storm water runoffs may be novel to water management practices, however health concerns associated with such structures in urban environments are not. The concerns of local and state vector control agencies towards the proposed underground structures are similar to those raised in regard to existing underground storm drain and sewer networks. In urban environments these networks, in addition to above ground water detention and catch basins, sustain urban vector populations that would amplify urban cycles of various pathogens were they to occur.

The intention of this memo is to provide background information on the urban underground drainage systems with regard to vectors and vector-borne diseases, and provide an assessment on the viability of such storm water devices in the context of contemporary knowledge on dynamics of vector populations. In addition, this memo will provide a synopsis on vectors that colonize the storm water and sewer systems in Los Angeles and Orange counties, and a general overview of potential vectors that may utilize the underground best management practices (BMP) if they ever were deployed.

Vectors and underground habitats

The existing underground drainage systems that provide habitats for mosquitoes and other vectors are a complex network of catch basins, manhole chambers, various sizes of drains and tributaries. Several factors including improper design and construction, as well as debris accumulation obstructs water flow resulting in water impoundment that provides habitat for mosquito production. In the early to mid 1980s, the underground habitats in Los Angeles and Orange counties were investigated for mosquito production.

These studies provided a glimpse into the underground world inhabited by vectors important in urban disease cycles. Currently, two studies are underway to document the dynamics of mosquito populations in these habitats in Orange and Los Angeles counties. We presume that the proposed underground BMPs, once built, will be infested with similar vector species occurring in sewer and storm drain systems. The most likely mosquito species to infest the underground BMPs in large numbers will be *Culex quinquefasciatu*s. This mosquito generally breeds in permanent or semi-permanent, foul or polluted waters. The importance of *Cx. quinquefasciatus* will be immediately appreciated especially with its pestiferous activity. This mosquito species is thought to be a vector of encephalitis viruses primarily St Louis encephalitis (SLE) in California, however, there is evidence that it does play a more pivotal role in the transmission of SLE virus in the urbanized areas of southern California. In addition, *Cx. quinquefasciatus* can transmit dog heartworm; a filarial infection of dogs that is also incidentally transmitted to man.

Diseases that are transmitted similarly by *Cx. quinquefasciastus* include viruses of avian pox. *Culex pipiens*, a closely related species of *Cx. quinquefasciatus* occurs in the cooler areas of northern California, while the latter occurs mostly in the warmer southern areas of the state. The major role of *Cx. pipiens* in the transmission of West Nile Virus (WNV) in New York City, a year ago, predisposes the importance of *Cx. quinquefasciatus* in Southern California were WNV to occur in the region.

In previous studies, *Cx. quinquefasciatus* comprised over 90 percent of all mosquito catches in the underground habitats of Los Angeles and Orange counties (Dhillon and Mulla 1982, 1983, Dhillon et. al 1984, 1985). Other mosquitoes collected included *Cx. tarsalis*, *Cx. stigmatosoma* and *Culiseta incidens*, with four percent of the catches being *Cx. stigmatosoma* and the remaining species taking less than one percent. In contrast with mosquito species collected in our current study of above ground BMP types where *Cx. tarsalis*, Cx. *quinquefasciatus*, *Cx. stigmatosoma* are evenly distributed, in the underground habitats, *Cx. quinquefasciatus* was the most predominant. *Culex tarsalis* is a known vector of SLE and WEE, (Western Equine encepholom yelitis) and *Cx. stigmatosoma* may play a prominent role in the maintenance cycle of both viruses. Although *Cu. incidens* is a known pest, its not currently considered a vector of human diseases. In addition to the diseases that may be transmitted, mosquito populations may become numerous enough in the summer months to be considered local pests and fall under the definition of vectors in the Health & Safety Code.

Other potential disease vectors and pest species that may thrive in the underground habitats include chironomids (midges), psychodids (sand flies), cockroaches and rodents. The most common cockroaches that may invade the underground habitats are the American and Oriental cockroaches, *Periplaneta americana* and *Blatta orientalis*, respectively. The most likely rodents to occur in the underground habitats include field mice, norway and roof rats. Special procedures for surveillance and monitoring will be required to provide effective sampling of the underground BMPs for mosquitoes, midges, cockroaches and rodent populations. In addition, abating vectors in the underground

environment will pose a serious challenge to vector control agencies in terms of logistics, technical expertise, and outlay of community monetary resources.

Conclusion

If the underground BMPs should be built there must be specific guidelines and safeguards put in place to direct the design, deployment and maintenance of these devices limiting their potential for vector production. The underground BMPs, like the above ground ones, should be designed to hold storm water for no more than 72 hours. However, our experiences with the current Retrofit Pilot studies reveal that such designs have not worked as intended. It will be a tragedy if the underground structures were built without safeguards to limit the amount and duration of impounded water, and restrict access to vectors. Vector restrictions require both the inlet and outlet vents to be sealed, preferably with pressure flaps that would open under water flow pressure. Such a mechanism should restrict the invasion of ovipositing mosquito females from laying their eggs and impede the exit of emerging adults. A major challenge to the underground BMPs will obviously be dependent on the maintenance required to keep them operational.

We encourage continued dialogue on this issue, and recommend that underground structures not be built, however if they must be, strict guidelines must be followed to limit standing water.

References:

Dhillon MS, Mulla MS. 1982. Urban underground mosquitoes: development of integrated pest management strategies. Mosquito Control Research, Annual report, University of California, CAER.

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Dhillon MS, Mulla MS, Chaney JD. 1984. Urban underground mosquitoes: development of integrated pest management strategies. Mosquito Control Research, Annual report, University of California, AER.

---------- 1985. Ecology of urban underground mosquitoes. Mosquito Control Research, Annual report, University of California, AER.

MEMORANDUM 12-18064-001.5

May 8, 2000

D R A F T

TO: BRIAN CURRIER, DEAN MESSER

FROM: DOUG ROBISON, BROWN AND CALDWELL

SUBJECT: STORM WATER PILOT PROGRAM, POSSIBLE MCTT MODIFICATIONS

This memorandum discusses two possible improvements to the MCTT units to facilitate or alleviate vector control – specifically concerning mosquito breeding. These two possible modifications are a) physical changes to the MCTT catch basin, and b) installing solid covers over the settling portion of the MCTT.

CATCH BASIN MODIFICATIONS

Vector control has voiced concern over not being able to inspect the standing water in the bottom of the catch basin located upstream of the settling chamber. MCTT design calls for the invert of the outgoing pipe to be about 3 feet above the invert of the structure to provide a volume of water in which heavy particles such as grit, sand and rocks can settle out of the flow stream. However, this causes water to remain in the catch basin at all times, creating the potential for mosquito breeding.

The incoming pipe to the catch basin in several feet above the catch basin bottom. The flow travels over bags of plastic aeration media which rest on fiberglass grating. This media assists in removing organic solvents from the water through vaporization, and acts as a screen to remove leaves and debris from the flow stream. Presently, to inspect the standing water, personnel must remove the bags of media and lift out the fiberglass grating (as large as 3 feet square). This is difficult to do because the grating and media is located six feet or more below the top of the catch basin.

To allow for easier monitoring of this part of the process, we propose the following:

- Discontinue the use of the bags of aeration media. I have discussed this with Dr. Robert Pitt and he has agreed that this will have very little impact on the performance of the MCTT. The most important action the bags are doing is to remove the debris.
- Place plastic netting (1/4” openings) on top of the existing grating to perform the desired screening function. Tie nylon cord to the corners (and perhaps sides) of the netting to allow removal of the netting from above for cleaning and quantifying debris.

- Attach hinges to the grating and wall so that the grating can be pivoted up to allow inspection of the standing water without removing the grating from the catch basin.

Attached is a quick sketch of the concept (*MCTT Catch Basin*). Materials for this modification are minimal, costing perhaps $75. Labor could be done by OMM personnel. I estimate it would take 24 hours to make the modifications (two people for 1.5 days). Total cost about $1,750 for each of two sites.

SOLID COVERS

Vector control personnel have indicated that pool-type covers will not be tight enough to keep out breeding mosquitoes. For this reason we have investigated the use of two different types of covers, gasketed aluminum and structural-fabric, both used to contain odors in industrial and municipal wastewater treatment plants. Attached is information on each type of cover (*Aluminum Cover* and *Fabric Cover*). Estimated construction costs for each type of cover is presented in the following table based on conversations with the cover manufacturers. Cost includes an inspection hatch every six feet about the perimeter. Costs include 25% contingency.

Cover Type	**Via Verde**	**Lakewood**
Aluminum	$14,000	$33,000
Structural-fabric	$17,000	$27,000
Average	***$15,500***	***$30,000***

Disadvantages of enclosing the settling area include the following:

- Entering the settling basin may require special entrance procedures and equipment due to it being a covered confined space. This will complicate pump maintenance, solids monitoring and vector monitoring.
- Visual observations will be difficult due to lack of lighting and limited openings.

Advantages of enclosing the settling area include:

- Limiting vectors.
- Elimination of blown trash from the settling tank.

APPENDIX J

PROJECT CALENDAR

May 2000

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1	2	3	4	5	6
7	8 Biweekly Report Due	9	10 10 AM-Biweekly Conference Call-Rich Horner, Chris May, Rick Graff, Jeremy Johnstone, Bob Wu, Pete Van Riper, Steve Borroum, Brian	11 1:30 PM Cost Work Group Meeting-Bill Evans, Pete 10:30 am-Vector Meeting at Wet Basin-La	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31 Quarterly Report Due			

Apr 2000

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

Jun 2000

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

May

8 Biweekly Report Due

10 10 AM-Biweekly Conference Call-Rich Horner, Chris May, Rick Graff, Jeremy Johnstone, Bob Wu, Pete Van Riper, Steve Borroum, Brian Currier, Cid Tesoro, Syra Ramos, RBF, BC, KLI, MWC, Law Crandall, Dudek.

11 1:30 PM Cost Work Group Meeting-Bill Evans, Pete Van Riper, Bob Wu, Everett Delano, Chris May, Rich Graff, Bill Whittenberg, Marcelo Peinado

10:30 am-Vector Meeting at Wet Basin-La Costa/I-5 Wet Basin Site. Participants Dean Messer, D11, RBF, KLI, R. Graff, C. May.

31 Quarterly Report Due

June 2000

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1	2	3
4	5	6	7	8	9	10
11	12	13	14 9 AM3 PM-Quarterly Meeting No 9 at RBF, Irvine Office. Participants-NRDC EPA, Baykeepers, Consultants, Caltrans.	15	16	17
18	19	20	21	22	23	24
25	26	27 Biweekly Report Due	28	29 10 AM-Biweekly Conference Call-Rich Horner, Chris May, Rick Graff, Jeremy Johnstone, Bob Wu, Pete	30	

May 2000

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

Jul 2000

S	M	T	W	T	F	S
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2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

June

14 9 AM3 PM-Quarterly Meeting No 9 at RBF, Irvine Office. Participants-NRDC, EPA, Baykeepers, Consultants, Caltrans.

27 Biweekly Report Due

29 10 AM-Biweekly Conference Call-Rich Horner, Chris May, Rick Graff, Jeremy Johnstone, Bob Wu, Pete Van Riper, Steve Borroum, Brian Currier, Cid Tesoro, Syra Ramos, RBF, BC, KLI, MWC, Law Crandall, Dudek.

July 2000

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
2	3	4	5	6	7	8
9	10	11	12	13 10 AM-Biweekly Conference Call-Rich Horner, Chris May, Rick Graff, Jeremy	14	15
16	17	18	19	20	21	22
23	24	25 Biweekly Report Due	26	27 10 AM-Biweekly Conference Call-Rich Horner, Chris May, Rick Graff, Jeremy	28	29
30	31					

Jun 2000

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

Aug 2000

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

August 2000

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Jul 2000 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31		1	2	3	4	5
6	7	8 Biweekly Report Due	9	10 10 AM-Biweekly Conference Call-Rich Horner, Chris May, Rick Graff, Jeremy Johnstone, Bob Wu, Pete	11	12
13	14	15	16	17	18	19
20	21	22 Biweekly Report Due	23	24 10 AM-Biweekly Conference Call-Rich Horner, Chris May, Rick Graff, Jeremy Johnstone, Bob Wu, Pete	25	26
27	28	29	30	31	Sep 2000 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	

August

8	Biweekly Report Due
10	10 AM-Biweekly Conference Call-Rich Horner, Chris May, Rick Graff, Jeremy Johnstone, Bob Wu, Pete Van Riper, Steve Borroum, Brian Currier, Cid Tesoro, Syra Ramos, RBF, BC, KLI, MWC, Law Crandall, Dudek.
22	Biweekly Report Due
24	10 AM-Biweekly Conference Call-Rich Horner, Chris May, Rick Graff, Jeremy Johnstone, Bob Wu, Pete Van Riper, Steve Borroum, Brian Currier, Cid Tesoro, Syra Ramos, RBF, BC, KLI, MWC, Law Crandall, Dudek.

September 2000

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20 9 AM3 PM-Quarterly Meeting No 9 at RBF, Irvine Office. Participants-NRDC EPA, Baykeepers, Consultants, Caltrans.	21 BMP Workshop	22	23
24	25	26	27	28	29	30

Aug 2000

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

Oct 2000

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

September

20 9 AM3 PM-Quarterly Meeting No 9 at RBF, Irvine Office. Participants-NRDC, EPA, Baykeepers, Consultants, Caltrans.

21 BMP Workshop