Appendix E

Wide Channel Pilot Study

E.1 INTRODUCTION

The purpose of the Wide Channel Pilot Study is to evaluate the accuracy of a single point water quality intake in representing the water quality in wide channels. The primary focus of this study was the comparison of a series of surface water grab samples collected across the width of a representative channel to investigate horizontal variations in water quality within wide channels. The secondary focus was to compare the surface grab samples with water samples collected near the bottom of the channel by an automated sampling station to evaluate the vertical variability in water quality.

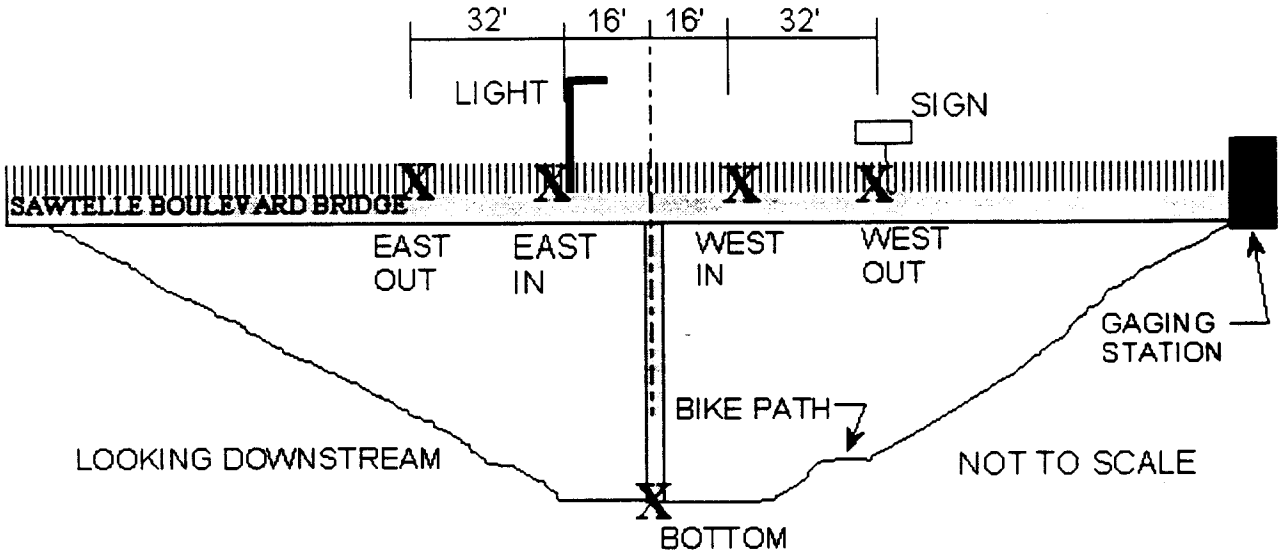
The pilot study was conducted at the Ballona Creek mass emission monitoring station, located between Sawtelle and Sepulveda Boulevards at LACDPW stream gage No. F38C-R. The Ballona Creek station was selected because it provided the most suitable conditions for conducting the pilot study.

E.2 EQUIPMENT AND METHODS

This section provides a summary of the Wide Channel Pilot Study methods. The complete methods for this pilot study are included in *Monitoring Plan for 1996-97 Wide Channel Pilot Study* (Woodward-Clyde, November 1996).

In order to characterize the lateral variability in water quality within Ballona Creek, water quality sampling was conducted at five stations across the channel. The sampling pattern included four sampling stations along the Sawtelle Boulevard bridge that were spaced equidistant from each other, and an automated sampling station at the existing monitoring station at the side of the channel. All samples obtained from the four bridge stations were taken from the water surface. Stations located along the bridge are identified as West-Out, West-In, East-In, and East-Out (the In/Out designation described whether the station was inside or outside of the low-flow channel). Grab samples were also collected from the automated monitoring station, which takes samples from the water at the bottom of the channel. These samples are identified as Bottom samples (Figure E-1).

Figure E-1
Cross Section of Ballona Creek
At Sawtelle Blvd. looking downstream



Each station was sampled three times during each of three events at a 2-3 hour recurrence interval. Therefore, for each event a maximum of fifteen samples were collected if channel conditions allowed. The Monitoring Plan included the sampling of at least three events sampled, thereby potentially resulting in 45 data points.

Grab samples from the four stations along the bridge were taken manually from the water surface using a clean, polyethylene bucket and rope. One bucket was used for each station. Water temperature in all samples was measured in the field along with observations of water color, odor, and presence of oil sheen. All samples were analyzed at the Department of Agricultural Commissioner/Weights and Measure's Environmental Toxicology Laboratory for the following constituents: pH, nitrate-nitrogen, specific conductivity, total dissolved solids (TDS), total suspended solids (TSS), total and dissolved copper, and total and dissolved zinc. Analytical methods for the constituents analyzed are listed in Table E-1.

E.3 SUMMARY OF RESULTS

Sampling for the pilot study was conducted during three storms of the 1996-97 storm season. These events were:

Event No.	Date	Precipitation (in)
2	Nov. 20-22, 1996	1.77
3	Dec. 9-11, 1996	3.09
6	Jan. 12-16, 1997	2.16

Hydrographs for the sampled events, including grab sample collection times, are shown in Attachment E-1. Grab samples were taken at the required 2-3 hour intervals during the rising and falling limb portions of the hydrographs.

Table E-1. Analytical Methods for Constituents Analyzed in Wide Channel Pilot Study

Class	Constituent	Sample Type	Method	DL	PQL	Units	Preservation	Holding Time
General								
	pH	Comp	A150.1	na	na		-	immed.
	Nitrate-N	Comp	C4110B	0.1	0.5	mg/l	-	48 hours
	Specific Conductance	Comp	A120.1	1	1	umhos/cm	-	immed.
	Total Dissolved Solids	Comp	A160.1	2.0	2.0	mg/l	-	7 days
	Suspended Solids	Comp	A160.2	2.0	2.0	mg/l	-	7 days
Metals								
	Dissolved Copper	Comp	A220.1	1	5	ug/l	HNO_3	6 months
	Total Copper	Comp	A220.1	1	5	ug/l	HNO_3	6 months
	Dissolved Zinc	Comp	A289.1	10	50	ug/l	HNO_3	6 months
	Total Zinc	Comp	A289.1	10	50	ug/l	HNO_3	6 months

DL = Detection limit
PQL = Practical quantitation limit
na = Not applicable
"-" = No preservation required other than cooling the sample to 4° C.

E.3.1 WATER QUALITY DATA SUMMARY

A total of 39 samples were taken for the pilot study during the three sampling events. There were potentially a maximum of 45 samples, however six samples could not be taken due to low stages in the creek at the time of sampling. Therefore all possible samples were collected, resulting in 100 percent completeness.

The field observations and measurements of water temperature, color, odor, and presence of oil sheen show little variability in both the horizontal and vertical direction (Table E-2). Water temperature did not vary by more than 2 degrees Fahrenheit, water color had little variability, and the presence of odors or oil films did not vary between the samples in each round.

The laboratory water quality results show little variability in the constituents analyzed (Table E-3). No sampling station, including the bottom sample, stands out as having consistently greater or lesser concentrations of any of the analytes.

E.3.2 CHANNEL CROSS-SECTIONAL TRENDS IN WATER QUALITY

Analysis of variance (ANOVA) is a statistical technique that is used to evaluate the relationship between one or more effects on a particular parameter and to determine if the different levels of the effects are significantly different from each other. For this pilot study the storm event (or date) and sample location are the effects and the constituents copper, zinc, TSS, and nitrate-N are the parameters of interest. A two-way ANOVA model was applied to the natural logs of the data. Natural logs were used since checks for normality indicated that the data follow a log normal distribution, with the exception of zinc.

There are two tests that must be checked prior to considering the results from the ANOVA valid. The tests serve to check major assumptions that are inherent in the ANOVA process. They are performed on the residuals from the ANOVA. The residuals are calculated from the dataset by the ANOVA and represent the part of the data that are not explained by the effects used in the model. The residuals are tested for normal distribution and homogeneity of variance. If these assumptions are not met, the ANOVA is invalid as

Table E-2. Field observations and measurements from the 1996/97 Wide Channel Pilot Study.

EVENT	ROUND	DATE	TIME	SAMPLE STATION	TEMP (F)	WATER COLOR	ODOR PRESENT?	OIL SHEEN?	NOTES
2	1	11/21/96	12:10	Bottom	64	Light Brown	No	NA	
2	1	11/21/96		West Out					Not enough flow to sample.
2	1	11/21/96	12:10	West In	64	Light Brown	No	No	
2	1	11/21/96	12:10	East In	64	Light Brown	No	No	
2	1	11/21/96		East Out					Not enough flow to sample.
2	2	11/21/96	14:20	Bottom	64	Light Brown	No	NA	
2	2	11/21/96	14:20	West Out	64	Light Brown	No	No	
2	2	11/21/96	14:20	West In	64	Light Brown	No	No	
2	2	11/21/96	14:20	East In	64	Light Brown	No	No	
2	2	11/21/96	14:20	East Out	64	Light Brown	No	No	
2	3	11/21/96	16:30	Bottom	62	Light Brown	No	NA	
2	3	11/21/96	16:30	West Out	62	Light Brown	No	No	
2	3	11/21/96	16:30	West In	62	Light Brown	No	No	
2	3	11/21/96	16:30	East In	62	Light Brown	No	No	
2	3	11/21/96	16:31	East Out	62	Light Brown	No	No	
3	1	12/09/96	15:30	Bottom	54	Clear/Tan	No	NA	
3	1	12/09/96	15:30	West Out	56	Tan	No	No	
3	1	12/09/96	15:30	West In	54	Tan	No	No	
3	1	12/09/96	15:30	East In	56	Tan	No	No	
3	1	12/09/96	15:30	East Out	54	Tan	No	No	
3	2	12/09/96	17:45	Bottom	58	Light Brown	No	NA	
3	2	12/09/96	17:45	West Out	58	Light Brown	No	No	
3	2	12/09/96	17:45	West In	58	Light Brown	No	No	
3	2	12/09/96	17:45	East In	58	Light Brown	No	No	
3	2	12/09/96	17:45	East Out	58	Light Brown	No	No	
3	3	12/09/96	19:45	Bottom	58	Light Brown	No	NA	
3	3	12/09/96	19:45	West Out	57	Light Brown	No	No	
3	3	12/09/96	19:45	West In	59	Light Brown	No	No	
3	3	12/09/96	19:45	East In	59	Light Brown	No	No	
3	3	12/09/96	19:45	East Out	58	Light Brown	No	No	
6	1	01/15/97	11:15	Bottom	48	Light Grey	Yes	NA	
6	1	01/15/97		West Out					Not enough flow to sample.
6	1	01/15/97	11:15	West In	48	Light Grey	Yes	No	
6	1	01/15/97	11:15	East In	48	Light Grey	Yes	No	
6	1	01/15/97		East Out					Not enough flow to sample.
6	2	01/15/97	13:15	Bottom	48	Light Brown	No	NA	
6	2	01/15/97	13:15	West Out	48	Light Grey	No	Yes	
6	2	01/15/97	13:15	West In	48	Light Brown	No	Yes	
6	2	01/15/97	13:15	East In	48	Light Grey	No	Yes	
6	2	01/15/97	13:15	East Out	48	Light Grey	No	Yes	
6	3	01/15/97	15:15	Bottom	50	Light Grey	No	NA	
6	3	01/15/97		West Out					Not enough flow to sample.
6	3	01/15/97	15:15	West In	50	Light Grey	No	No	
6	3	01/15/97	15:15	East In	50	Light Grey	No	No	
6	3	01/15/97		East Out					Not enough flow to sample.

Notes: NA = Not Applicable

Table E-3. Summary of Results from the 1996-1997 Wide Channel Pilot Study

Constituent	Method	DL	PQL	Units
pH	A150.1			
Nitrate-N	C4110B	0.1	0.5	mg/l
Conductivity	A120.1	1	1	umhos/cm
TDS	A160.1	2.0	2	mg/l
TSS	A160.2	2.0	2	mg/l
Copper, dissolved	A220.1	1.0	5	ug/l
Copper, total	A220.1	1.0	5	ug/l
Zinc, dissolved	A289.1	10	50	ug/l
Zinc, total	A289.1	10	50	ug/l

Storm Event 2 on 11/21/96

	Sample Location				
Time	West Out	West In	Bottom	East In	East Out
12:10		6.64	6.67	6.59	
14:20	6	6.6	6.59	6.6	6.56
16:30	6.6	6.54	6.57	6.53	6.55

	West Out	West In	Bottom	East In	East Out
12:10		3.85	2.19	2.33	
14:20	2.22	2.28	3.95	2.11	2.04
16:30	1.85	1.81	2.06	1.89	1.61

	West Out	West In	Bottom	East In	East Out
12:10		174	186	183	
14:20	82	85	84	95	98
16:30	87	87	87	88	101

	West Out	West In	Bottom	East In	East Out
12:10		134	140	150	
14:20	64	76	66	82	82
16:30	64	62	68	68	72

	West Out	West In	Bottom	East In	East Out
12:10		110	81	94	
14:20	117	117	89	99	107
16:30	65	66	95	68	64

	West Out	West In	Bottom	East In	East Out
12:10		21	24	21	
14:20	12	13	13	12	12
16:30	12	12	12	11	15

	West Out	West In	Bottom	East In	East Out
12:10		52	47	39	
14:20	30	24	35	22	33
16:30	33	31	29	21	26

	West Out	West In	Bottom	East In	East Out
12:10		90	100	90	
14:20	60	70	70	60	60
16:30	60	50	60	60	0

	West Out	West In	Bottom	East In	East Out
12:10		210	190	190	
14:20	150	120	160	120	180
16:30	160	140	140	120	140

Storm Event 3 on 12/9/96

	Sample Location				
Time	West Out	West In	Bottom	East In	East Out
15:30	6.92	6.89	7.21	6.79	7.17
17:45	6.97	7.05	7.07	6.95	6.96
19:45	7.07	6.99	7.1	6.98	7.02

	West Out	West In	Bottom	East In	East Out
15:30	1.7	2.36	2.66	2.75	2.45
17:45	1.92	1.82	1.92	1.94	1.9
19:45	2.38	2.27	2.68	2.16	2.23

	West Out	West In	Bottom	East In	East Out
15:30	44	66	85	66	67
17:45	59	62	72	59	58
19:45	85	81	87	80	98

	West Out	West In	Bottom	East In	East Out
15:30	30	42	52	44	42
17:45	40	42	46	40	38
19:45	56	50	58	54	66

	West Out	West In	Bottom	East In	East Out
15:30	192	143	133	106	144
17:45	168	255	290	173	188
19:45	127	131	161	127	155

	West Out	West In	Bottom	East In	East Out
15:30	0	1	2	1	0
17:45	0	0	0	0	0
19:45	0	0	0	3	0

	West Out	West In	Bottom	East In	East Out
15:30	16	18	11	17	16
17:45	11	19	20	18	17
19:45	16	11	14	11	10

	West Out	West In	Bottom	East In	East Out
15:30	120	140	130	110	140
17:45	130	120	130	110	100
19:45	110	80	120	110	80

	West Out	West In	Bottom	East In	East Out
15:30	130	150	130	110	140
17:45	150	180	220	130	130
19:45	110	80	170	110	80

Storm Event 6 on 1/15/97

	Sample Location				
Time	West Out	West In	Bottom	East In	East Out
11:15		6.91	6.79	7.07	
13:15	7.12	7.04	7.21	7.8	7.03
15:15		7.04	7.05	7.15	

	West Out	West In	Bottom	East In	East Out
11:15		1.29	1.37	1.33	
13:15	1.38	1.53	1.43	1.39	1.25
15:15		2.46	3.15	2.65	

	West Out	West In	Bottom	East In	East Out
11:15		71	73	74	
13:15	139	62	68	61	79
15:15		140	96	133	

	West Out	West In	Bottom	East In	East Out
11:15		48	50	50	
13:15	48	44	42	40	54
15:15		98	96	90	

	West Out	West In	Bottom	East In	East Out
11:15		92	88	97	
13:15	255	238	317	216	193
15:15		150	192	158	

	West Out	West In	Bottom	East In	East Out
11:15		0	0	0	
13:15	0	0	2	5	0
15:15		4	2	0	

	West Out	West In	Bottom	East In	East Out
11:15		22	23	19	
13:15	31	8	39	20	45
15:15		23	16	27	

	West Out	West In	Bottom	East In	East Out
11:15		40	40	40	
13:15	20	0	30	30	30
15:15		40	0	30	

	West Out	West In	Bottom	East In	East Out
11:15		110	140	150	
13:15	210	10	220	120	220
15:15		130	20	140	

DL - Detection limit
PQL - Practical quantitation limit

performed and must be performed on the ranked averages of the data rather than the natural logs. Both zinc and nitrate-N failed to meet these assumptions. While an ANOVA using a ranked average dataset does not need to meet any assumptions, it is generally less sensitive.

The results of the two-way ANOVAs are presented in Tables E-4 through E-7. Each table includes: the sum of squares for the whole model and for each effect examined; the probability that the null hypothesis is correct; and profile plots for both effects (date and location). In addition, the least square mean, the standard error, and the mean for each level of each effect is also given.

For example, Table E-4 reveals that the whole model explains 67 percent of the variability and is significant (Prob>F less than 0.05). The date explains 54 percent of the variability and is significant while the location is not significant. This means that the concentration differences due to sample location are much less than the concentration differences due to characteristics of individual storm events.

In the end the ANOVA model indicated that concentrations of all constituents analyzed (copper, zinc, TSS, and nitrate-N) were significantly related to the storm event (or date) and not to sample location (including the bottom sample). In some cases the data suggest that additional samples might reveal a significant difference. However, using the existing data to make a projection indicates that approximately 1300 samples would be required to determine if the observed difference is in fact significant.

E.4 CONCLUSIONS AND RECOMMENDATIONS

The ANOVA analysis revealed that the water quality data did not vary significantly with respect to sample station. This shows that the water quality appears to be homogeneous across the channel and that the single point sampler at the bottom of the channel represents the water in the channel as a whole. It is therefore recommended that no modifications be made to the wide channel monitoring stations.

Table E-4. Results of Two-Way ANOVA for Total Copper by Date and Location

Analysis of Variance

Source	DF[a]	Sum of Squares[b]	Mean Square	F Ratio
Model	14	5.28	0.377	3.41
Error	24	2.66	0.111	Prob>F
C Total	38	7.94		0.0041

Effect Test

Source	Nparm	DF	Sum of Squares	F Ratio	Prob>F
Date[d]	2	2	4.25	19.22	<0.0001
Location[e]	4	4	0.33	0.75	0.566
Date*Location[f]	8	8	1.00	1.13	0.3777

[a] DF = Degrees of Freedom

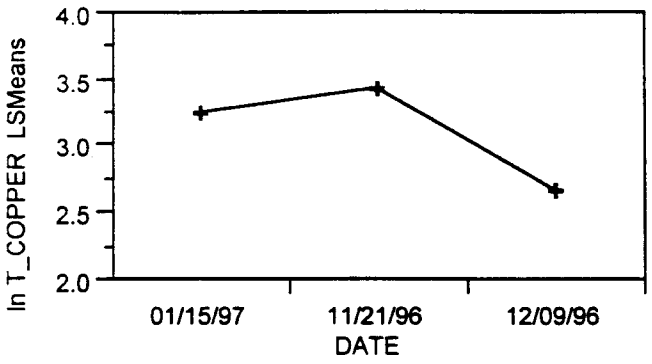
[b] Model explains 67% of total variability = (Model Sum of Squares)/(Total Sum of Squares)

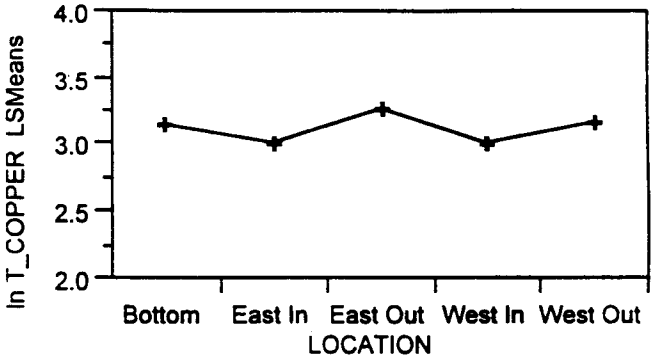
[c] Model significant (Prob>F less than 0.05)

[d] Date explains 54% of variability and is significant.

[e] Location is not significant.

[f] Date*Location is not significant.





Least Squares Means

Level	Least Sq Mean	Std Error	Mean
1/15/97	3.26	0.115	3.12
11/21/96	3.44	0.094	3.44
12/9/96	2.68	0.086	2.68

Least Squares Means

Level	Least Sq Mean	Std Error	Mean
Bottom	3.15	0.111	3.15
East In	3.01	0.111	3.02
East Out	3.27	0.150	3.08
West In	3.01	0.111	3.01
West Out	3.18	0.150	3.05

Table E-5. Results of Two-Way ANOVA for Total Zinc by Date and Location

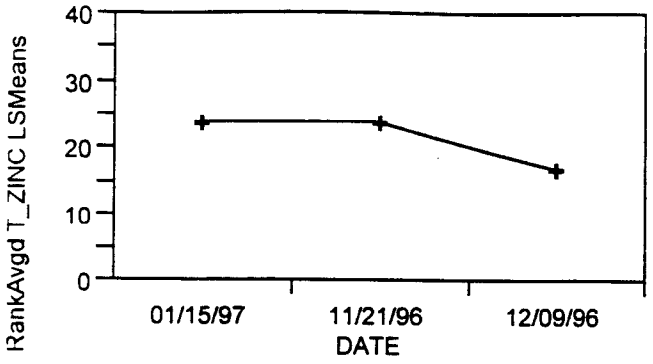
Analysis of Variance

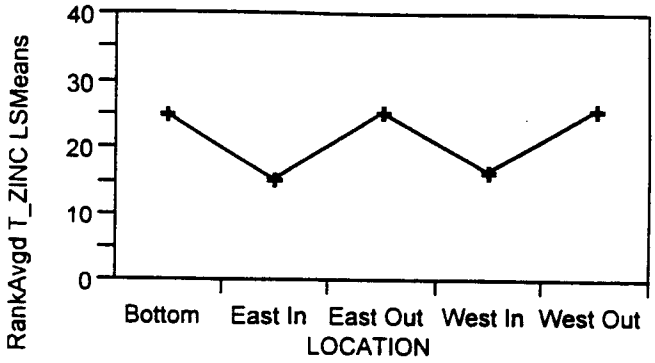
Source	DF[a]	Sum of Squares[b]	Mean Square	F Ratio
Model	14	2121.2	151.5	1.31
Error	24	2771.8	115.5	Prob>F
C Total	38	4893.0		0.2706

Effect Test

Source	Nparm	DF	Sum of Squares	F Ratio	Prob>F
Date[d]	2	2	419.36	1.82	0.1844
Location[e]	4	4	835.01	1.81	0.1603
Date*Location[f]	8	8	1200.20	1.30	0.2906

[a] DF = Degrees of Freedom
[b] Model explains 43% of total variability = (Model Sum of Squares)/(Total Sum of Squares)
[c] Model is not significant.
[d] Date is not significant.
[e] Location is not significant.
[f] Date*Location is not significant.





Least Squares Means

Level	Least Sq Mean	Std Error	Mean
1/15/97	24.00	3.72	19.36
11/21/96	24.17	3.04	23.81
12/9/96	17.17	2.77	17.17

Least Squares Means

Level	Least Sq Mean	Std Error	Mean
Bottom	25.11	3.58	25.11
East In	15.44	3.58	15.44
East Out	25.67	4.85	21.50
West In	16.61	3.58	16.61
West Out	26.06	4.85	22.75

Table E-6. Results of Two-Way ANOVA for TSS by Date and Location

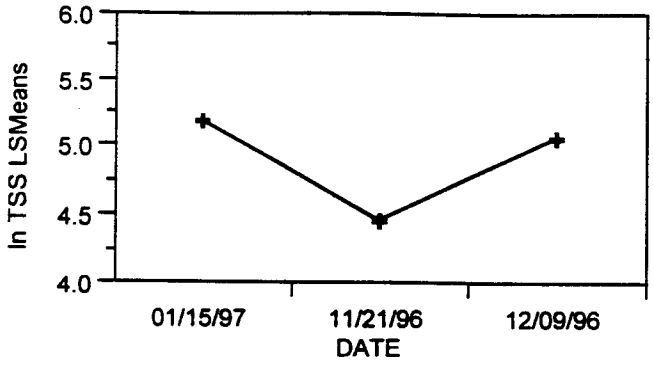
Analysis of Variance

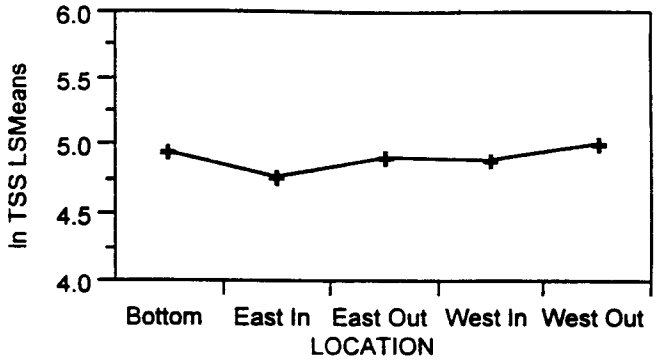
Source	DF[a]	Sum of Squares[b]	Mean Square	F Ratio
Model	14	3.79	0.271	2.13
Error	24	3.05	0.127	Prob>F
C Total	38	6.85		0.0498

Effect Test

Source	Nparm	DF	Sum of Squares	F Ratio	Prob>F
Date[d]	2	2	3.47	13.65	0.0001
Location[e]	4	4	0.23	0.46	0.7631
Date*Location[f]	8	8	0.31	0.31	0.9554

[a] DF = Degrees of Freedom
[b] Model explains 55% of total variability = (Model Sum of Squares)/(Total Sum of Squares)
[c] Model significant (Prob>F less than 0.05)
[d] Date explains 51% of variability and is significant.
[e] Location is not significant.
[f] Date*Location is not significant.





Least Squares Means

Level	Least Sq Mean	Std Error	Mean
1/15/97	5.19	0.124	5.12
11/21/96	4.47	0.101	4.48
12/9/96	5.08	0.092	5.08

Least Squares Means

Level	Least Sq Mean	Std Error	Mean
Bottom	4.95	0.119	4.95
East In	4.78	0.119	4.78
East Out	4.92	0.161	4.89
West In	4.89	0.119	4.89
West Out	5.03	0.161	4.91

Table E-7. Results of Two-Way ANOVA for Nitrate-N by Date and Location

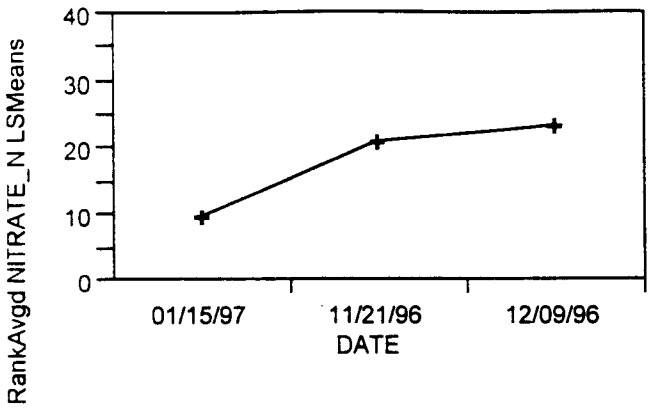
Analysis of Variance

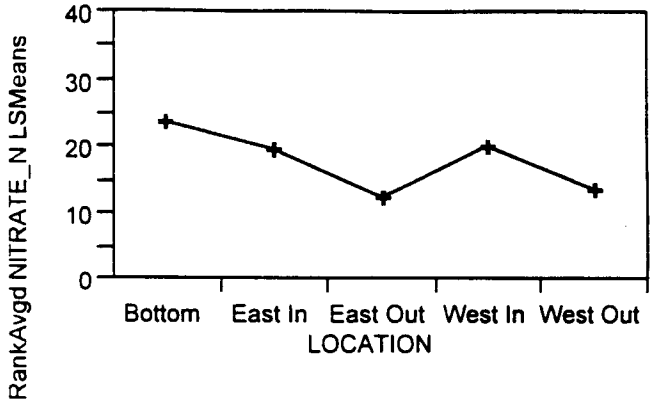
Source	DF[a]	Sum of Squares[b]	Mean Square	F Ratio
Model	14	1539.0	109.9	0.78
Error	24	3400.5	141.7	Prob>F
C Total	38	4939.5		0.6837

Effect Test

Source	Nparm	DF	Sum of Squares	F Ratio	Prob>F
Date[d]	2	2	1057.5	3.73	0.0388
Location[e]	4	4	547.9	0.97	0.4438
Date*Location[f]	8	8	181.6	0.16	0.9943

[a] DF = Degrees of Freedom
[b] Model explains 31% of total variability = (Model Sum of Squares)/(Total Sum of Squares)
[c] Model is not significant.
[d] Date explains 21% of variability and is significant.
[e] Location is not significant.
[f] Date*Location is not significant.





Least Squares Means

Level	Least Sq Mean	Std Error	Mean
1/15/97	10.00	4.12	12.5
11/21/96	21.23	3.37	22.0
12/9/96	23.73	3.07	23.7

Least Squares Means

Level	Least Sq Mean	Std Error	Mean
Bottom	23.94	3.97	23.9
East In	20.11	3.97	20.1
East Out	12.89	5.37	16.7
West In	20.56	3.97	20.6
West Out	14.11	5.37	16.4

REFERENCES

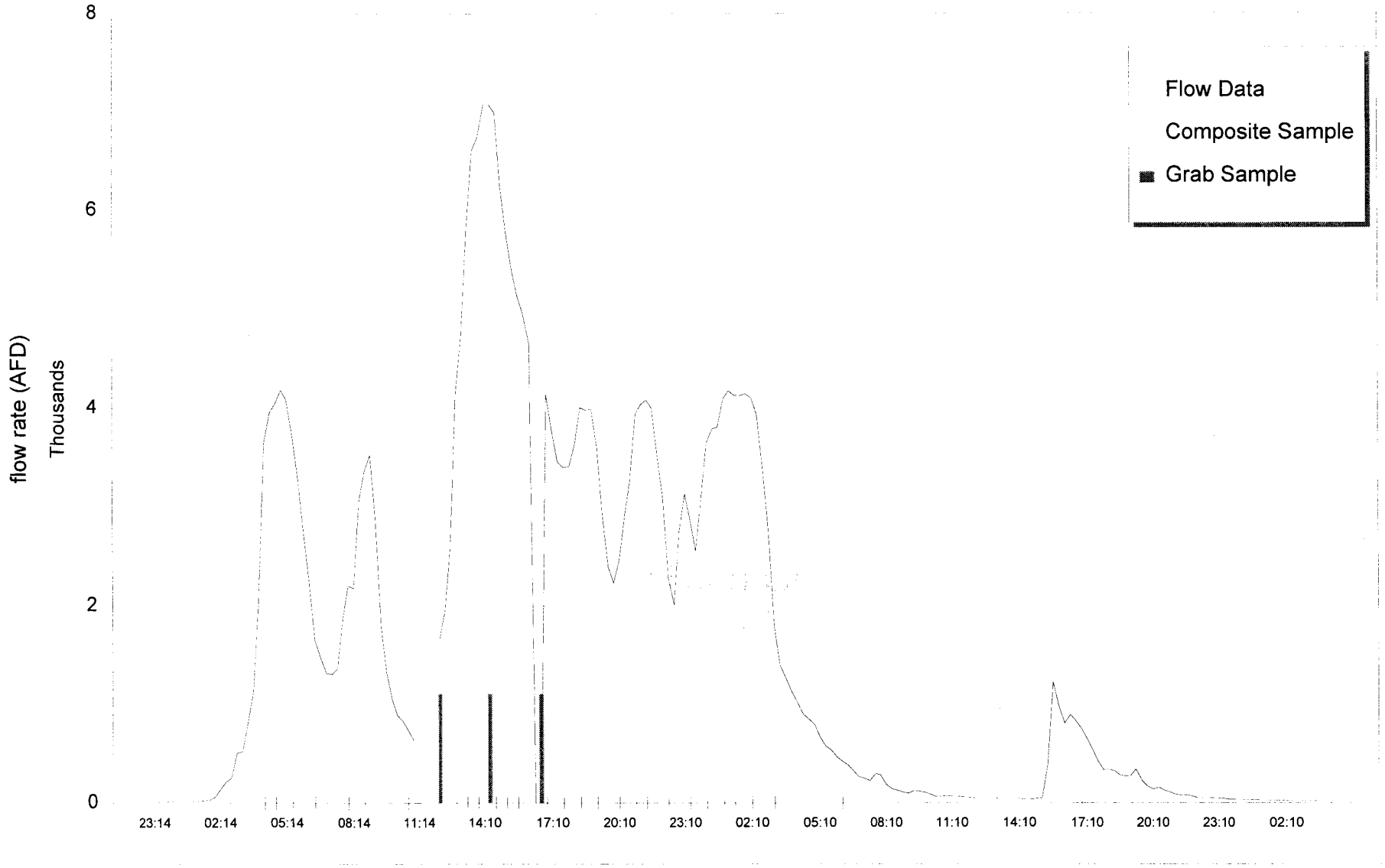
Woodward Clyde Consultants, 1996. Evaluation of analytes and QA/QC specifications for monitoring program. Report prepared for Los Angeles County Department of Public Works, Alhambra, CA, December 1996.

Woodward Clyde Consultants and Camp Dresser & McKee. 1996. Monitoring plan for 1996-97 wide channel pilot study. Prepared for Los Angeles County Department of Public Works, Alhambra, CA, November 1996.

Attachment E-1 Hydrographs of the events

Ballona Creek

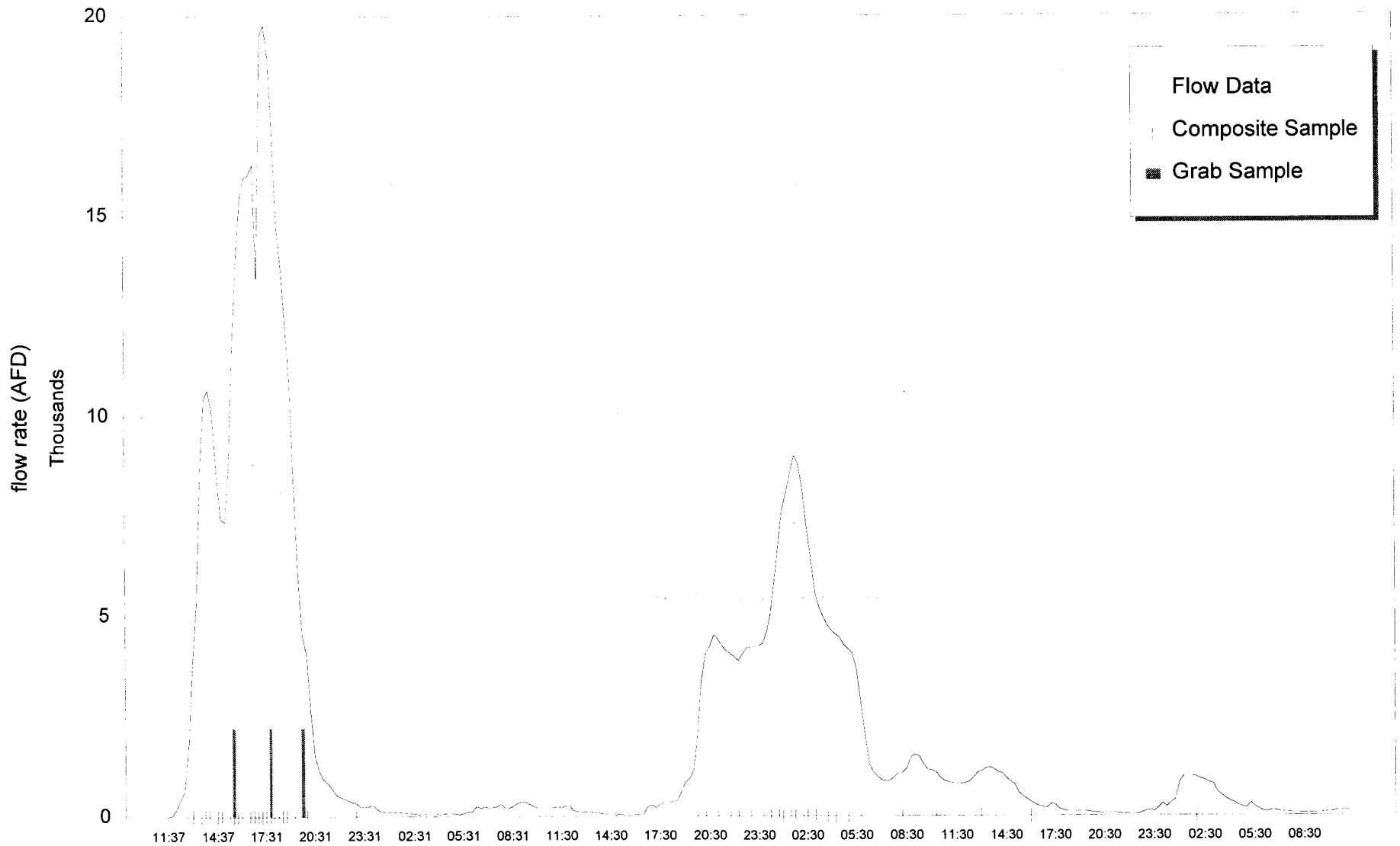
Wide Channel Study (Nov 20-22, 1996)



07/19/2000 P:\EPPUB\WATER\MONITOR\SAMPLE\FLOWDATA\01\01WCFLOW.WK4 [laptop]

Ballona Creek

Wide Channel Study (Dec 9-11, 1997)



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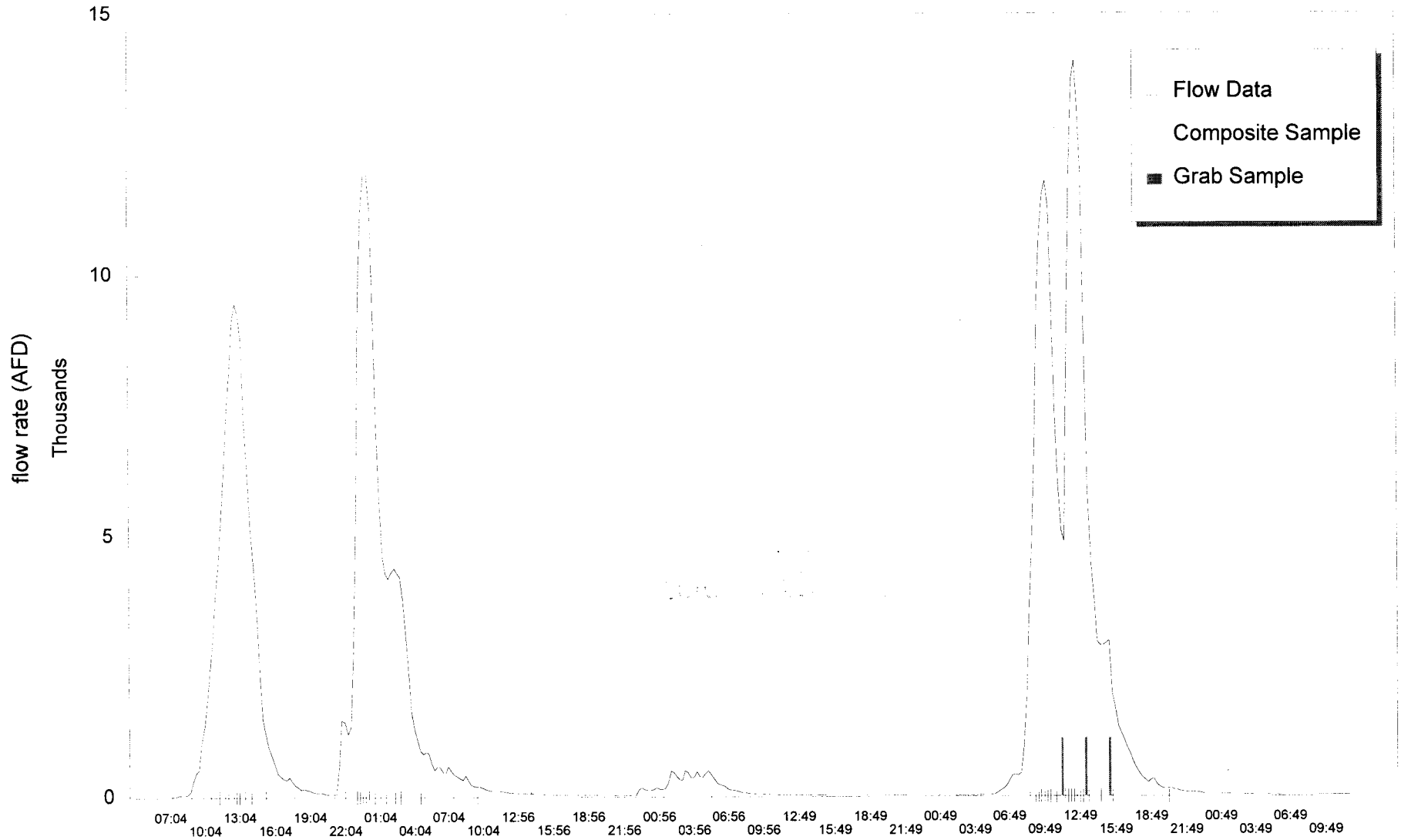
Ballona Creek

Wide Channel Study (Jan 12-16, 1997)



07/19/2000 P:\EPPUB\WATER\MONITOR\SAMPLE\FLOWDATA\01\01WCFLOW.WK4 [laptop]

Attachment E-2 Field Data Sheets.

BALLONA CREEK WIDE CHANNEL MONITORING PROGRAM DATA SHEET

Date 11-21-96

WEST IN & OUT SAMLE NOT COLLECTED

Grab Sample # 1

Current Weather: ☐ Sunny ☐ Partly Cloudy ☒ Cloudy
Current Precipitation: ☐ None ☐ Drizzle ☒ Light Rain ☐ Moderate Rain ☐ Heavy Rain
Current Wind: ☒ Light ☐ Moderate ☐ Strong

	WEST IN	EAST IN	WEST OUT	EAST OUT	BOTTOM
TIME	12:10 PM				
WATER TEMP.	64°	64°	64°	64°	64°
WATER COLOR**	Light Brown				
WATER ODOR	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO
OIL SHEEN	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO
LAB SAMPLE	58969	58972	NOT COLLECTED		58963

)PW → #

Grab Sample #2

Current Weather: ☐ Sunny ☐ Partly Cloudy ☒ Cloudy
Current Precipitation: ☐ None ☐ Drizzle ☐ Light Rain ☒ Moderate Rain ☐ Heavy Rain
Current Wind: ☒ Light ☐ Moderate ☐ Strong

	WEST IN	EAST IN	WEST OUT	EAST OUT	BOTTOM
TIME	2:20PM	2:20PM			
WATER TEMP.	64°	64°	64°	64°	64°
WATER COLOR**	Light Brown				
WATER ODOR	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO
OIL SHEEN	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO
LAB SAMPLE	58970	58973	58967	58976	58964

Grab Sample #3

Current Weather: ☐ Sunny ☐ Partly Cloudy ☒ Cloudy
Current Precipitation: ☐ None ☐ Drizzle ☒ Light Rain ☐ Moderate Rain ☐ Heavy Rain
Current Wind: ☒ Light ☐ Moderate ☐ Strong

	WEST IN	EAST IN	WEST OUT	EAST OUT	BOTTOM
TIME	4:30	PM			
WATER TEMP.	62°	62°	62°	62°	62°
WATER COLOR**	Light Brown				
WATER ODOR	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO
OIL SHEEN	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO
LAB SAMPLE	58971	58974	58968	58977	58965

** Water Color may include : Clear / Tan / Light Brown / Brown / Dark Brown / Black / or, other

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BALLONA CREEK WIDE CHANNEL MONITORING PROGRAM DATA SHEET

Date 12/9/91

Grab Sample # 1

Current Weather: ☐ Sunny ☐ Partly Cloudy ☐ Cloudy
Current Precipitation: ☐ None ☐ Drizzle ☐ Light Rain ☑ Moderate Rain ☐ Heavy Rain
Current Wind: ☑ Light ☐ Moderate ☐ Strong

	WEST IN	EAST IN	WEST OUT	EAST OUT	BOTTOM
TIME	3:30	3:30	3:30	3:30	3:30
WATER TEMP.	54°	56°	56°	54°	54°
WATER COLOR**	TAN	TAN	TAN	TAN	CLEAR/TAN
WATER ODOR	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO
OIL SHEEN	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO
LAB SAMPLE	59052	59055	59049	59058	59046

Grab Sample #2

Current Weather: ☐ Sunny ☐ Partly Cloudy ☐ Cloudy
Current Precipitation: ☐ None ☐ Drizzle ☐ Light Rain ☐ Moderate Rain ☐ Heavy Rain
Current Wind: ☐ Light ☐ Moderate ☐ Strong

	WEST IN	EAST IN	WEST OUT	EAST OUT	BOTTOM
TIME	5:45	5:45	5:45	5:45	5:45
WATER TEMP.	55°	58°	58°	58°	58°
WATER COLOR**	LIGHT BROWN	LIGHT BROWN	LIGHT BROWN	LIGHT BROWN	LIGHT BROWN
WATER ODOR	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO
OIL SHEEN	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO *
LAB SAMPLE	59053	59056	59050	59057	59047

* ALSO TAKEN FROM BANK TO SE

Grab Sample #3

Current Weather: ☐ Sunny ☐ Partly Cloudy ☐ Cloudy
Current Precipitation: ☐ None ☐ Drizzle ☐ Light Rain ☐ Moderate Rain ☐ Heavy Rain
Current Wind: ☐ Light ☐ Moderate ☐ Strong

	WEST IN	EAST IN	WEST OUT	EAST OUT	BOTTOM
TIME	7:45	7:45	7:45	7:45	7:45
WATER TEMP.	59°	59°	57°	58°	58°
WATER COLOR**	LIGHT BROWN	LIGHT BROWN	LIGHT BROWN	LIGHT BROWN	LIGHT BROWN
WATER ODOR	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO
OIL SHEEN	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO	☐ YES ☒ NO
LAB SAMPLE	59054	59057	59051	59060	59045

** Water Color may include : Clear / Tan / Light Brown / Brown / Dark Brown / Black / or, other

BALLONA CREEK WIDE CHANNEL MONITORING PROGRAM DATA SHEET

Date 1-15-97

Grab Sample # 1

Current Weather: ❑ Sunny ❑ Partly Cloudy ☒ Cloudy
Current Precipitation: ❑ None ❑ Drizzle ☒ Light Rain ❑ Moderate Rain ❑ Heavy Rain
Current Wind: ☒ Light ❑ Moderate ❑ Strong

	WEST IN	EAST IN	WEST OUT	EAST OUT	BOTTOM
TIME	11:15 AM	11:15 AM			11:15 AM
WATER TEMP.	48° F Grey	48° F			48° F
WATER COLOR**	Light ~~Brown~~	Light ~~Brown~~ Grey			Light Grey
WATER ODOR	☒ YES ❑ NO	☒ YES ❑ NO	❑ YES ❑ NO	❑ YES ❑ NO	☒ YES ❑ NO
OIL SHEEN	❑ YES ☒ NO	❑ YES ☒ NO	❑ YES ❑ NO	❑ YES ❑ NO	❑ YES ☒ NO
LAB SAMPLE #	59110	59113	Not taken	Not taken	59104

Grab Sample #2

Current Weather: ❑ Sunny ❑ Partly Cloudy ☒ Cloudy
Current Precipitation: ❑ None ☒ Drizzle ❑ Light Rain ❑ Moderate Rain ❑ Heavy Rain
Current Wind: ☒ Light ❑ Moderate ❑ Strong

	WEST IN	EAST IN	WEST OUT	EAST OUT	BOTTOM
TIME	1:15 PM	1:15 PM	1:15 PM	1:15 PM	1:15
WATER TEMP.	49°F	49° F	49° F	49° F	48° F
WATER COLOR**	Light Brown	Light Grey	Light Grey	Light Grey	Dk Brown
WATER ODOR	❑ YES ☒ NO	❑ YES ☒ NO	❑ YES ☒ NO	❑ YES ☒ NO	❑ YES ☒ NO
OIL SHEEN	☒ YES ❑ NO	☒ YES ❑ NO	☒ YES ❑ NO	☒ YES ❑ NO	❑ YES ☒ NO
LAB SAMPLE #	59111	59114	59108	59117	59105

Grab Sample #3

Current Weather: ❑ Sunny ☒ Partly Cloudy ❑ Cloudy
Current Precipitation: ☒ None ❑ Drizzle ❑ Light Rain ❑ Moderate Rain ❑ Heavy Rain
Current Wind: ❑ Light ❑ Moderate ❑ Strong

	WEST IN	EAST IN	WEST OUT	EAST OUT	BOTTOM
TIME	3:15	3:15			3:15
WATER TEMP.	50°	50°			50°
WATER COLOR**	LIGHT ~~Brown~~	LIGHT GRAY			LIGHT GRAY
WATER ODOR	❑ YES ☒ NO	❑ YES ☒ NO	❑ YES ❑ NO	❑ YES ❑ NO	❑ YES ☒ NO
OIL SHEEN	❑ YES ☒ NO	❑ YES ☒ NO	❑ YES ❑ NO	❑ YES ❑ NO	❑ YES ☒ NO
LAB SAMPLE	59112	59115			59106

** Water Color may include : Clear / Tan / Light Brown / Brown / Dark Brown / Black / or, other