ENVIRONMENTAL
QUARTERLY REPORT

MARCH 1, 1981 THROUGH MAY 31, 1981

EQUITY OIL COMPANY
BX IN-SITU OIL-SHALE PROJECT
PICEANCE BASIN, COLORADO
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Prepared By
VTN Consolidated, Inc.

MASTER

June 12, 1981

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DOE/LC/10747--T6

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PREFACE

The following report has been organized into three sections for ease of review. Section A - Air Resources covers data collected by the 100-foot tower between September and December, 1980. Section B - Water Resources covers data collected since the last Quarterly Report. Section C - Aquatic Biology covers data collected since January 1981.

SECTION A
AIR RESOURCES

QUARTERLY REPORT ON THE AIR RESOURCES
ON THE BLACK SULPHUR CREEK DRAINAGE
BX IN SITU OIL SHALE PROJECT
JUNE 1981

Introduction

This report provides a summary of the meteorological data collected by the 100-foot tower located in Black Sulphur Gulch during the months of September, October, November and December 1980. Data recovery during the period was 81% for all parameters. Table 1 lists the monthly data recovery.

TABLE 1
DATA RECOVERY BY THE MONTH

<u>Month</u>	<u>Possible Observations</u>	<u>Number of Observations Recorded</u>	<u>% Recovery</u>
September	456	412	90.4
October	744	550	73.9
November	720	649	90.1
December	710	527	74.2
Total	2,630	2,138	81.3

Site Meteorology

Winds

Tables 2 through 5 present the analyzed data for the period from September through December 1980. A review of this data indicates that the primary winds are from the south-southeast and south and that a secondary maximum exists for winds from the north-northwest and north. The directions account for 46% and 23%, respectively, of all winds

Table 2.

EQUITY SEPTEMBER THRU DECEMBER TOTAL OBSERVATIONS

VELOCITY (MPH)

DIR.	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
N	33.	175.	41.	1.	0.	0.	250.	5.3
NNE	3.	16.	0.	0.	0.	0.	19.	4.4
NE	2.	2.	0.	0.	0.	0.	4.	2.3
ENE	2.	4.	0.	0.	0.	0.	6.	3.6
E	0.	0.	1.	0.	0.	0.	1.	7.3
ESE	2.	0.	0.	0.	0.	0.	2.	1.0
SE	4.	7.	4.	3.	0.	0.	18.	6.5
SSE	30.	79.	156.	195.	55.	32.	547.	12.2
S	37.	160.	156.	62.	9.	7.	431.	8.1
SSW	30.	58.	25.	2.	0.	0.	115.	5.0
SW	35.	53.	19.	3.	0.	0.	110.	4.6
WSW	49.	51.	8.	0.	0.	0.	108.	3.7
W	31.	43.	4.	0.	0.	0.	78.	3.7
WNW	33.	37.	0.	0.	0.	0.	70.	3.2
NW	53.	57.	4.	0.	0.	0.	114.	3.4
NNW	59.	130.	51.	2.	0.	0.	242.	5.1
TOT.	403.	872.	469.	268.	64.	39.		

TOTAL OBSERVATIONS = 2115

TOTAL CALM WINDS REPORTED = 2

TOTAL AVERAGE WIND SPEED = 7.3

Table 3. FREQUENCY DISTRIBUTION

VELOCITY (MPH)

DIR.	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
N	0.0156	0.0827	0.0194	0.0005	0.0000	0.0000	0.1182	
NNE	0.0014	0.0076	0.0000	0.0000	0.0000	0.0000	0.0090	
NE	0.0009	0.0009	0.0000	0.0000	0.0000	0.0000	0.0019	
ENE	0.0009	0.0019	0.0000	0.0000	0.0000	0.0000	0.0028	
E	0.0000	0.0000	0.0005	0.0000	0.0000	0.0000	0.0005	
ESE	0.0009	0.0000	0.0000	0.0000	0.0000	0.0000	0.0009	
SE	0.0019	0.0033	0.0019	0.0014	0.0000	0.0000	0.0085	
SSE	0.0142	0.0374	0.0738	0.0922	0.0260	0.0151	0.2586	
S	0.0175	0.0757	0.0738	0.0293	0.0043	0.0033	0.2038	
SSW	0.0142	0.0274	0.0118	0.0009	0.0000	0.0000	0.0544	
SW	0.0165	0.0251	0.0090	0.0014	0.0000	0.0000	0.0520	
WSW	0.0232	0.0241	0.0038	0.0000	0.0000	0.0000	0.0511	
W	0.0147	0.0203	0.0019	0.0000	0.0000	0.0000	0.0369	
WNW	0.0156	0.0175	0.0000	0.0000	0.0000	0.0000	0.0331	
NW	0.0251	0.0270	0.0019	0.0000	0.0000	0.0000	0.0539	
NNW	0.0279	0.0615	0.0241	0.0009	0.0000	0.0000	0.1144	
TOT.	0.1905	0.4123	0.2217	0.1267	0.0303	0.0184	1.0000	

FREQUENCY OF ALL CALM WINDS = 0.0009

Table 4. ERVATIONS

HOUR	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
0100	17.	36.	16.	7.	2.	0.	78.	
0200	17.	31.	11.	9.	1.	2.	71.	
0300	27.	35.	23.	2.	3.	2.	92.	
0400	37.	36.	9.	8.	0.	2.	92.	
0500	38.	27.	13.	9.	2.	1.	90.	
0600	41.	23.	13.	11.	1.	1.	90.	
0700	32.	37.	13.	7.	2.	1.	92.	
0800	37.	30.	12.	10.	2.	1.	92.	
0900	33.	33.	15.	8.	1.	1.	91.	
1000	31.	41.	4.	11.	3.	0.	90.	
1100	15.	53.	8.	8.	5.	1.	90.	
1200	8.	52.	12.	12.	4.	4.	92.	
1300	1.	46.	20.	12.	6.	2.	87.	
1400	1.	44.	21.	9.	6.	5.	86.	
1500	1.	40.	28.	11.	5.	5.	90.	
1600	0.	29.	35.	16.	5.	3.	88.	
1700	1.	32.	26.	10.	3.	3.	75.	
1800	7.	32.	25.	8.	2.	1.	75.	
1900	3.	33.	41.	9.	3.	1.	90.	
2000	6.	43.	25.	17.	2.	1.	94.	
2100	6.	37.	30.	14.	2.	1.	90.	
2200	10.	32.	27.	19.	2.	0.	90.	
2300	14.	37.	19.	23.	1.	1.	95.	
2400	20.	33.	23.	18.	1.	0.	95.	
TOT.	403.	872.	469.	268.	64.	39.		

Table 5. FREQUENCY DISTRIBUTION

VELOCITY (MPH)

HOUR	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
0100	0.0080	0.0170	0.0076	0.0033	0.0009	0.0000	0.0369	
0200	0.0080	0.0147	0.0052	0.0043	0.0005	0.0009	0.0336	
0300	0.0126	0.0165	0.0109	0.0009	0.0014	0.0009	0.0435	
0400	0.0175	0.0170	0.0043	0.0038	0.0000	0.0009	0.0435	
0500	0.0180	0.0128	0.0061	0.0043	0.0009	0.0005	0.0426	
0600	0.0194	0.0109	0.0061	0.0052	0.0005	0.0005	0.0426	
0700	0.0151	0.0175	0.0061	0.0033	0.0009	0.0005	0.0435	
0800	0.0175	0.0142	0.0057	0.0047	0.0009	0.0005	0.0435	
0900	0.0156	0.0156	0.0071	0.0038	0.0005	0.0005	0.0430	
1000	0.0147	0.0194	0.0019	0.0052	0.0014	0.0000	0.0426	
1100	0.0071	0.0251	0.0038	0.0038	0.0024	0.0005	0.0426	
1200	0.0038	0.0246	0.0057	0.0057	0.0019	0.0019	0.0435	
1300	0.0005	0.0217	0.0095	0.0057	0.0028	0.0009	0.0411	
1400	0.0005	0.0208	0.0099	0.0043	0.0028	0.0024	0.0407	
1500	0.0005	0.0189	0.0132	0.0052	0.0024	0.0024	0.0426	
1600	0.0000	0.0137	0.0165	0.0076	0.0024	0.0014	0.0416	
1700	0.0005	0.0151	0.0123	0.0047	0.0014	0.0014	0.0355	
1800	0.0033	0.0151	0.0118	0.0038	0.0009	0.0005	0.0355	
1900	0.0014	0.0156	0.0194	0.0043	0.0014	0.0005	0.0426	
2000	0.0028	0.0203	0.0118	0.0080	0.0009	0.0005	0.0444	
2100	0.0028	0.0175	0.0142	0.0066	0.0009	0.0005	0.0426	
2200	0.0047	0.0151	0.0128	0.0090	0.0009	0.0000	0.0426	
2300	0.0066	0.0175	0.0090	0.0109	0.0005	0.0005	0.0449	
2400	0.0095	0.0156	0.0109	0.0085	0.0005	0.0000	0.0449	
TOT.	0.1905	0.4123	0.2217	0.1267	0.0303	0.0184	1.0000	

recorded. However, this wind pattern deviates significantly from the pattern the local topography would be expected to produce. Black Sulphur Gulch has a south-southwest/north-northeast alignment and winds would be expected to follow this pattern. The indications are that the wind sensor is misaligned by approximately 45°.

Figure 1 presents a frequency wind rose for the period from the data in Table 2. When compared with the data collected at the old Ridge Site location, Figure 2, the deviation in wind patterns becomes obvious. Figure 3 presents the data from Table 2 with a 45° correction factor. When this is compared to past data the similarities are striking, supporting the assumption of sensor misalignment.

During the August calibration trip, a check will be made on the direction sensor alignment. This problem will not cause a data loss since all data will be in error by the same factor and can be corrected. The wind speed data presented in Table 4 shows that winds were below 3 mph for 19.1% of the time, between 4 and 7 mph 41.2% of the time, and exceeded 18 mph 4.9% of the time.

The ridge site has recorded a much greater percentage of winds on the 0-3 mph range than the valley location. This can be attributed to the channeling effect created by the valley walls.

Atmospheric Stability

The tower monitors vertical atmospheric stability by DT/DZ or temperature lapse rate, and horizontal by sigma theta or wind direction deviation. Tables 6 and 7 present the stability data by month and class for the monitoring period. The stability parameter gives a measure of the ability of the air to disperse process emissions. Stability Class A corresponding to the most unstable air and Class F the most stable. The data indicates that Class A is dominant in the vertical structure and Class D is dominant in the horizontal, followed closely by Classes A and E.

TABLE 6

ATMOSPHERIC STABILITY BY PERCENT
OCCURRENCE BASED ON DT/DZ

<u>Stability</u>	<u>Class</u>	<u>Sept.</u>	<u>Oct.</u>	<u>Nov.</u>	<u>Dec.</u>	<u>Total</u>
Extremely Unstable	A	68.9	67.0	65.7	77.7	69.6
Moderately Unstable	B	1.2	1.5	2.5	1.3	1.7
Slightly Unstable	C	1.2	1.9	1.7	1.2	1.5
Neutral	D	8.6	14.4	17.5	14.2	14.2
Slightly Stable	E	20.0	14.4	12.6	5.4	12.7
Moderately Stable	F	0.0	0.9	0.0	0.2	0.3

TABLE 7

ATMOSPHERIC STABILITY BY PERCENT
OCCURRENCE BASED ON SIGMA-THETA

<u>Stability</u>	<u>Class</u>	<u>Sept.</u>	<u>Oct.</u>	<u>Nov.</u>	<u>Dec.</u>	<u>Total</u>
Extremely Unstable	A	28.0	23.6	18.1	18.9	21.8
Moderately Unstable	B	7.6	10.3	11.3	12.4	10.6
Slightly Unstable	C	15.1	18.5	16.4	18.5	17.2
Neutral	D	22.7	23.4	25.7	30.0	25.6
Slightly Stable	E	22.7	20.8	21.7	19.5	21.1
Moderately Stable	F	3.9	3.3	6.2	0.8	3.7

Temperature

A summary of the temperature data is presented in Table 8 with data for the individual months being given in Tables 9, 10 and 11. The maximum temperature was 81.0°F (27.2°C), which was recorded on September 9, 1980. The minimum temperature reached was 5.0°F (-15.0°C) on November 17, 1980. The average daily temperature fell below freezing on 35 occasions, starting in September. December data has not been included since data for the month is incomplete.

TABLE 8

MONTHLY TEMPERATURE DATA
EQUITY OIL RIDGE SITE
September-November, 1980
(°F)

<u>Month</u>	<u>Mean Monthly</u>	<u>Average Maximum</u>	<u>Average Minimum</u>	<u>Monthly Maximum</u>	<u>Monthly Minimum</u>
September	56.4	70.9	41.9	81	29
October	43.6	56.0	33.0	76	17
November	34.5	46.2	23.8	65	5
Seasonal	43.4	56.1	31.8	81	5

TABLE 9

TEMPERATURE DATA: EQUITY OIL RIDGE SITE
 September 1980
 (°F)

Maximum Temperature -- 81
 Minimum Temperature -- 29
 Average Maximum -- 70.9
 Average Minimum -- 41.9
 Mean Monthly Temperature -- 56.4

<u>Date</u>	<u>Maximum</u>	<u>Minimum</u>	<u>Mean</u>	<u>Range</u>
1	--	--	--	--
2	--	--	--	--
3	--	--	--	--
4	--	--	--	--
5	--	--	--	--
6	--	--	--	--
7	--	--	--	--
8	--	--	--	--
9	--	--	--	--
10	--	--	--	--
11	--	--	--	--
12	63	45	55	18
13	74	45	59	29
14	72	45	59	27
15	73	41	57	32
16	71	58	63	13
17	74	39	57	35
18	78	44	63	34
19	76	50	67	26
20	66	38	52	28
21	65	42	54	23
22	61	31	44	30
23	66	29	48	37
24	65	38	51	27
25	69	35	51	34
26	72	36	55	36
27	74	40	57	34
28	75	58	64	17
29	72	43	56	29
30	81	39	60	42
31				

TABLE 10

TEMPERATURE DATA: EQUITY OIL RIDGE SITE
 October 1980
 (°F)

Maximum Temperature -- 76
 Minimum Temperature -- 17
 Average Maximum -- 56.0
 Average Minimum -- 33.0
 Mean Monthly Temperature -- 43.6

<u>Date</u>	<u>Maximum</u>	<u>Minimum</u>	<u>Mean</u>	<u>Range</u>
1	76	52	66	24
2	65	37	51	28
3	72	35	53	37
4	--	--	--	--
5	71	42	56	29
6	73	41	53	32
7	76	41	57	34
8	--	--	--	--
9	70	40	51	30
10	64	35	48	29
11	72	34	54	38
12	63	46	54	17
13	57	47	51	10
14	57	37	45	20
15	--	--	--	--
16	36	28	32	8
17	40	30	34	10
18	45	31	37	14
19	52	28	39	24
20	56	28	39	18
21	56	28	40	18
22	56	31	45	25
23	38	23	29	15
24	--	--	--	--
25	38	34	36	4
26	47	33	39	14
27	33	24	30	9
28	34	17	25	17
29	47	17	32	30
30	58	24	40	34
31	60	29	41	31

TABLE 11

TEMPERATURE DATA: EQUITY OIL RIDGE SITE
November 1980
(°F)

Maximum Temperature -- 65
Minimum Temperature -- 5
Average Maximum -- 46.2
Average Minimum -- 23.8
Mean Monthly Temperature -- 34.5

<u>Date</u>	<u>Maximum</u>	<u>Minimum</u>	<u>Mean</u>	<u>Range</u>
1	60	27	43	33
2	60	33	44	27
3	53	29	41	24
4	58	35	43	23
5	65	31	43	34
6	62	37	50	25
7	--	--	--	--
8	60	37	51	23
9	63	30	49	33
10	63	37	48	26
11	62	36	49	26
12	54	37	46	17
13	38	26	29	12
14	26	20	23	6
15	27	10	18	17
16	23	9	16	14
17	33	5	17	28
18	38	7	22	31
19	40	13	24	27
20	41	15	25	26
21	45	14	30	31
22	39	27	34	12
23	40	24	32	16
24	31	23	28	8
25	32	8	22	24
26	--	--	--	--
27	35	9	23	24
28	49	20	32	29
29	48	24	40	24
30	49	42	45	7
31				

APPENDIX A

JOINT FREQUENCY DISTRIBUTION
WINDS AND STABILITY
SIGMA THETA

EQUITY SEPTEMBER THRU DECEMBER 1980

STABILITY CLASS A

VELOCITY (MPH)

DIR.	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
N	8.	12.	2.	0.	0.	0.	22.	4.6
NNE	0.	1.	0.	0.	0.	0.	1.	3.0
NE	0.	0.	0.	0.	0.	0.	0.	0.0
ENE	0.	1.	0.	0.	0.	0.	1.	3.1
E	0.	0.	0.	0.	0.	0.	0.	0.0
ESE	0.	0.	0.	0.	0.	0.	0.	0.0
SE	0.	2.	2.	0.	0.	0.	4.	7.4
SSE	3.	7.	4.	6.	0.	0.	20.	7.9
S	3.	26.	26.	6.	0.	0.	61.	7.3
SSW	11.	26.	17.	2.	0.	0.	56.	5.6
SW	15.	26.	12.	3.	0.	0.	56.	5.2
WSW	29.	25.	5.	0.	0.	0.	59.	3.7
W	16.	16.	2.	0.	0.	0.	34.	3.0
WNW	14.	14.	0.	0.	0.	0.	28.	3.0
NW	29.	28.	4.	0.	0.	0.	61.	3.6
NNW	18.	31.	12.	0.	0.	0.	61.	4.7
TOT.	146.	215.	86.	17.	0.	0.		

TOTAL OBSERVATIONS = 464

TOTAL CALM WINDS REPORTED = 0

TOTAL AVERAGE WIND SPEED = 4.9

FREQUENCY DISTRIBUTION

VELOCITY (MPH)

DIR.	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
N	0.0172	0.0259	0.0043	0.0000	0.0000	0.0000	0.0474	
NNE	0.0000	0.0022	0.0000	0.0000	0.0000	0.0000	0.0022	
NE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
ENE	0.0000	0.0022	0.0000	0.0000	0.0000	0.0000	0.0022	
E	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
ESE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
SE	0.0000	0.0043	0.0043	0.0000	0.0000	0.0000	0.0086	
SSE	0.0065	0.0151	0.0086	0.0129	0.0000	0.0000	0.0431	
S	0.0065	0.0560	0.0560	0.0129	0.0000	0.0000	0.1315	
SSW	0.0237	0.0560	0.0366	0.0043	0.0000	0.0000	0.1207	
SW	0.0323	0.0560	0.0259	0.0065	0.0000	0.0000	0.1207	
WSW	0.0625	0.0539	0.0108	0.0000	0.0000	0.0000	0.1272	
W	0.0345	0.0345	0.0043	0.0000	0.0000	0.0000	0.0733	
WNW	0.0302	0.0302	0.0000	0.0000	0.0000	0.0000	0.0603	
NW	0.0625	0.0603	0.0086	0.0000	0.0000	0.0000	0.1315	
NNW	0.0388	0.0668	0.0259	0.0000	0.0000	0.0000	0.1315	
TOT.	0.3147	0.4634	0.1853	0.0366	0.0000	0.0000	1.0000	

FREQUENCY OF ALL CALM WINDS = 0.0000

HOUR	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
0100	8.	10.	1.	0.	0.	0.	19.	
0200	4.	9.	2.	1.	0.	0.	16.	
0300	10.	12.	0.	0.	0.	0.	22.	
0400	14.	9.	1.	0.	0.	0.	24.	
0500	8.	8.	1.	0.	0.	0.	17.	
0600	14.	6.	1.	0.	0.	0.	21.	
0700	12.	5.	1.	0.	0.	0.	18.	
0800	12.	8.	0.	1.	0.	0.	21.	
0900	12.	4.	1.	1.	0.	0.	18.	
1000	12.	10.	1.	2.	0.	0.	25.	
1100	7.	9.	1.	1.	0.	0.	21.	
1200	2.	3.	3.	1.	0.	0.	9.	
1300	0.	6.	5.	2.	0.	0.	13.	
1400	1.	16.	7.	4.	0.	0.	28.	
1500	1.	15.	10.	0.	0.	0.	26.	
1600	0.	10.	14.	0.	0.	0.	24.	
1700	1.	9.	8.	1.	0.	0.	19.	
1800	2.	9.	9.	0.	0.	0.	20.	
1900	0.	14.	6.	0.	0.	0.	20.	
2000	3.	11.	2.	1.	0.	0.	17.	
2100	3.	14.	3.	0.	0.	0.	20.	
2200	6.	5.	2.	0.	0.	0.	13.	
2300	6.	8.	2.	1.	0.	0.	17.	
2400	8.	5.	2.	1.	0.	0.	16.	
TOT.	146.	215.	86.	17.	0.	0.		

FREQUENCY DISTRIBUTION

VELOCITY (MPH)

HOUR	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
0100	0.0172	0.0216	0.0022	0.0000	0.0000	0.0000	0.0409	
0200	0.0086	0.0194	0.0043	0.0022	0.0000	0.0000	0.0345	
0300	0.0216	0.0259	0.0000	0.0000	0.0000	0.0000	0.0474	
0400	0.0302	0.0194	0.0022	0.0000	0.0000	0.0000	0.0517	
0500	0.0172	0.0172	0.0022	0.0000	0.0000	0.0000	0.0366	
0600	0.0302	0.0129	0.0022	0.0000	0.0000	0.0000	0.0453	
0700	0.0259	0.0108	0.0022	0.0000	0.0000	0.0000	0.0388	
0800	0.0259	0.0172	0.0000	0.0022	0.0000	0.0000	0.0453	
0900	0.0259	0.0086	0.0022	0.0022	0.0000	0.0000	0.0388	
1000	0.0259	0.0216	0.0022	0.0043	0.0000	0.0000	0.0539	
1100	0.0151	0.0194	0.0086	0.0022	0.0000	0.0000	0.0453	
1200	0.0043	0.0065	0.0065	0.0022	0.0000	0.0000	0.0194	
1300	0.0000	0.0129	0.0108	0.0043	0.0000	0.0000	0.0280	
1400	0.0022	0.0345	0.0151	0.0086	0.0000	0.0000	0.0603	
1500	0.0022	0.0323	0.0216	0.0000	0.0000	0.0000	0.0560	
1600	0.0000	0.0216	0.0302	0.0000	0.0000	0.0000	0.0517	
1700	0.0022	0.0194	0.0172	0.0022	0.0000	0.0000	0.0409	
1800	0.0043	0.0194	0.0194	0.0000	0.0000	0.0000	0.0431	
1900	0.0000	0.0302	0.0129	0.0000	0.0000	0.0000	0.0431	
2000	0.0065	0.0237	0.0043	0.0022	0.0000	0.0000	0.0366	
2100	0.0065	0.0302	0.0065	0.0000	0.0000	0.0000	0.0431	
2200	0.0129	0.0108	0.0043	0.0000	0.0000	0.0000	0.0280	
2300	0.0129	0.0172	0.0043	0.0022	0.0000	0.0000	0.0366	
2400	0.0172	0.0108	0.0043	0.0022	0.0000	0.0000	0.0345	
TOT.	0.3147	0.4634	0.1853	0.0366	0.0000	0.0000	1.0000	

EQUITY SEPTEMBER THRU DECEMBER 1980

STABILITY CLASS B

VELOCITY (MPH)

DIR.	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
N	4.	16.	7.	0.	0.	0.	27.	5.4
NNE	0.	3.	0.	0.	0.	0.	3.	3.7
NE	0.	0.	0.	0.	0.	0.	0.	0.0
ENE	0.	0.	0.	0.	0.	0.	0.	0.0
E	0.	0.	0.	0.	0.	0.	0.	0.0
ESE	0.	0.	0.	0.	0.	0.	0.	0.0
SE	0.	0.	0.	1.	0.	0.	1.	14.1
SSE	4.	7.	8.	8.	0.	0.	27.	8.4
S	6.	16.	9.	2.	0.	0.	33.	5.7
SSW	8.	10.	0.	0.	0.	0.	18.	3.6
SW	12.	6.	2.	0.	0.	0.	20.	3.6
WSW	10.	7.	0.	0.	0.	0.	17.	3.6
W	7.	8.	2.	0.	0.	0.	17.	3.8
WNW	9.	10.	0.	0.	0.	0.	19.	3.3
NW	8.	5.	0.	0.	0.	0.	13.	2.9
NNW	10.	11.	8.	1.	0.	0.	30.	5.4
TOT.	78.	99.	36.	12.	0.	0.		

TOTAL OBSERVATIONS = 225

TOTAL CALM WINDS REPORTED = 0

TOTAL AVERAGE WIND SPEED = 4.9

FREQUENCY DISTRIBUTION

VELOCITY (MPH)

DIR.	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
N	0.0178	0.0711	0.0311	0.0000	0.0000	0.0000	0.1200	
NNE	0.0000	0.0133	0.0000	0.0000	0.0000	0.0000	0.0133	
NE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
ENE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
E	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
ESE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
SE	0.0000	0.0000	0.0000	0.0044	0.0000	0.0000	0.0044	
SSE	0.0178	0.0311	0.0356	0.0356	0.0000	0.0000	0.1200	
S	0.0267	0.0711	0.0400	0.0089	0.0000	0.0000	0.1467	
SSW	0.0356	0.0444	0.0000	0.0000	0.0000	0.0000	0.0800	
SW	0.0533	0.0267	0.0089	0.0000	0.0000	0.0000	0.0889	
WSW	0.0444	0.0311	0.0000	0.0000	0.0000	0.0000	0.0756	
W	0.0311	0.0356	0.0089	0.0000	0.0000	0.0000	0.0756	
WNW	0.0400	0.0444	0.0000	0.0000	0.0000	0.0000	0.0844	
NW	0.0356	0.0222	0.0000	0.0000	0.0000	0.0000	0.0578	
NNW	0.0444	0.0489	0.0356	0.0044	0.0000	0.0000	0.1333	
TOT.	0.3467	0.4400	0.1600	0.0533	0.0000	0.0000	1.0000	

FREQUENCY OF ALL CALM WINDS = 0.0000

HOUR	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
0100	4.	6.	0.	0.	0.	0.	10.	
0200	3.	5.	0.	1.	0.	0.	9.	
0300	5.	6.	0.	0.	0.	0.	11.	
0400	9.	4.	1.	0.	0.	0.	14.	
0500	8.	5.	0.	1.	0.	0.	14.	
0600	9.	1.	0.	1.	0.	0.	11.	
0700	6.	6.	0.	0.	0.	0.	12.	
0800	8.	3.	0.	0.	0.	0.	11.	
0900	8.	3.	0.	0.	0.	0.	11.	
1000	4.	3.	0.	0.	0.	0.	7.	
1100	1.	4.	1.	0.	0.	0.	6.	
1200	1.	3.	3.	3.	0.	0.	10.	
1300	0.	4.	4.	1.	0.	0.	9.	
1400	0.	5.	4.	1.	0.	0.	10.	
1500	0.	7.	6.	1.	0.	0.	14.	
1600	0.	4.	3.	1.	0.	0.	8.	
1700	0.	1.	4.	0.	0.	0.	5.	
1800	1.	0.	3.	0.	0.	0.	4.	
1900	1.	2.	4.	1.	0.	0.	8.	
2000	2.	6.	0.	0.	0.	0.	8.	
2100	0.	2.	0.	1.	0.	0.	3.	
2200	0.	8.	2.	0.	0.	0.	10.	
2300	3.	5.	0.	0.	0.	0.	8.	
2400	5.	6.	1.	0.	0.	0.	12.	
TOT.	78.	99.	36.	12.	0.	0.		

FREQUENCY DISTRIBUTION

VELOCITY (MPH)

HOUR	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
0100	0.0178	0.0267	0.0000	0.0000	0.0000	0.0000	0.0444	
0200	0.0133	0.0222	0.0000	0.0044	0.0000	0.0000	0.0400	
0300	0.0222	0.0267	0.0000	0.0000	0.0000	0.0000	0.0489	
0400	0.0400	0.0178	0.0044	0.0000	0.0000	0.0000	0.0622	
0500	0.0356	0.0222	0.0000	0.0044	0.0000	0.0000	0.0622	
0600	0.0400	0.0044	0.0000	0.0044	0.0000	0.0000	0.0489	
0700	0.0267	0.0267	0.0000	0.0000	0.0000	0.0000	0.0533	
0800	0.0356	0.0133	0.0000	0.0000	0.0000	0.0000	0.0489	
0900	0.0356	0.0133	0.0000	0.0000	0.0000	0.0000	0.0489	
1000	0.0178	0.0133	0.0000	0.0000	0.0000	0.0000	0.0311	
1100	0.0044	0.0178	0.0044	0.0000	0.0000	0.0000	0.0267	
1200	0.0044	0.0133	0.0133	0.0133	0.0000	0.0000	0.0444	
1300	0.0000	0.0178	0.0178	0.0044	0.0000	0.0000	0.0400	
1400	0.0000	0.0222	0.0178	0.0044	0.0000	0.0000	0.0444	
1500	0.0000	0.0311	0.0267	0.0044	0.0000	0.0000	0.0622	
1600	0.0000	0.0178	0.0133	0.0044	0.0000	0.0000	0.0356	
1700	0.0000	0.0044	0.0178	0.0000	0.0000	0.0000	0.0222	
1800	0.0044	0.0000	0.0133	0.0000	0.0000	0.0000	0.0178	
1900	0.0044	0.0089	0.0178	0.0044	0.0000	0.0000	0.0356	
2000	0.0089	0.0267	0.0000	0.0000	0.0000	0.0000	0.0356	
2100	0.0000	0.0089	0.0000	0.0044	0.0000	0.0000	0.0133	
2200	0.0000	0.0356	0.0089	0.0000	0.0000	0.0000	0.0444	
2300	0.0133	0.0222	0.0000	0.0000	0.0000	0.0000	0.0356	
2400	0.0222	0.0267	0.0044	0.0000	0.0000	0.0000	0.0533	
TOT.	0.3467	0.4400	0.1600	0.0533	0.0000	0.0000	1.0000	

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STABILITY CLASS C

VELOCITY (MPH)

DIR.	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
N	6.	30.	9.	0.	0.	0.	45.	5.2
NNE	2.	6.	0.	0.	0.	0.	8.	4.5
NE	1.	1.	0.	0.	0.	0.	2.	2.7
ENE	1.	1.	0.	0.	0.	0.	2.	3.5
E	0.	0.	0.	0.	0.	0.	0.	0.0
ESE	2.	0.	0.	0.	0.	0.	2.	1.8
SE	3.	2.	2.	0.	0.	0.	7.	4.7
SSE	9.	12.	21.	13.	0.	0.	55.	8.4
S	13.	35.	12.	1.	0.	0.	61.	5.3
SSW	9.	14.	4.	0.	0.	0.	27.	4.4
SW	3.	16.	4.	0.	0.	0.	23.	4.5
WSW	5.	12.	2.	0.	0.	0.	19.	3.9
W	6.	15.	0.	0.	0.	0.	21.	3.7
WNW	8.	10.	0.	0.	0.	0.	18.	3.3
NW	5.	7.	0.	0.	0.	0.	12.	3.2
NNW	12.	28.	22.	1.	0.	0.	63.	6.1
TOT.	85.	189.	76.	15.	0.	0.		

TOTAL OBSERVATIONS = 365

TOTAL CALM WINDS REPORTED = 0

TOTAL AVERAGE WIND SPEED = 5.4

FREQUENCY DISTRIBUTION

VELOCITY (MPH)

DIR.	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
N	0.0164	0.0822	0.0247	0.0000	0.0000	0.0000	0.1233	
NNE	0.0055	0.0164	0.0000	0.0000	0.0000	0.0000	0.0219	
NE	0.0027	0.0027	0.0000	0.0000	0.0000	0.0000	0.0055	
ENE	0.0027	0.0027	0.0000	0.0000	0.0000	0.0000	0.0055	
E	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
ESE	0.0055	0.0000	0.0000	0.0000	0.0000	0.0000	0.0055	
SE	0.0082	0.0055	0.0055	0.0000	0.0000	0.0000	0.0192	
SSE	0.0247	0.0329	0.0575	0.0336	0.0000	0.0000	0.1487	
S	0.0356	0.0959	0.0329	0.0027	0.0000	0.0000	0.1671	
SSW	0.0247	0.0384	0.0110	0.0000	0.0000	0.0000	0.0740	
SW	0.0082	0.0438	0.0110	0.0000	0.0000	0.0000	0.0630	
WSW	0.0137	0.0329	0.0055	0.0000	0.0000	0.0000	0.0521	
W	0.0164	0.0411	0.0000	0.0000	0.0000	0.0000	0.0575	
WNW	0.0219	0.0274	0.0000	0.0000	0.0000	0.0000	0.0493	
NW	0.0137	0.0192	0.0000	0.0000	0.0000	0.0000	0.0329	
NNW	0.0329	0.0767	0.0603	0.0027	0.0000	0.0000	0.1726	
TOT.	0.2329	0.5178	0.2082	0.0411	0.0000	0.0000	1.0000	

FREQUENCY OF ALL CALM WINDS = 0.0000

HOUE	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
0100	4.	9.	0.	0.	0.	0.	13.	
0200	6.	6.	1.	0.	0.	0.	13.	
0300	6.	9.	4.	0.	0.	0.	19.	
0400	7.	7.	1.	0.	0.	0.	15.	
0500	7.	6.	1.	0.	0.	0.	14.	
0600	6.	3.	2.	0.	0.	0.	11.	
0700	6.	14.	2.	0.	0.	0.	22.	
0800	9.	10.	2.	0.	0.	0.	21.	
0900	7.	8.	3.	1.	0.	0.	19.	
1000	9.	7.	0.	1.	0.	0.	17.	
1100	1.	7.	1.	0.	0.	0.	9.	
1200	4.	8.	0.	1.	0.	0.	13.	
1300	0.	11.	7.	2.	0.	0.	20.	
1400	0.	7.	6.	0.	0.	0.	13.	
1500	0.	7.	6.	4.	0.	0.	17.	
1600	0.	6.	9.	4.	0.	0.	19.	
1700	0.	6.	8.	1.	0.	0.	15.	
1800	1.	7.	8.	0.	0.	0.	16.	
1900	1.	8.	1.	0.	0.	0.	10.	
2000	0.	12.	3.	0.	0.	0.	15.	
2100	1.	7.	5.	0.	0.	0.	13.	
2200	4.	8.	4.	0.	0.	0.	16.	
2300	2.	8.	0.	0.	0.	0.	10.	
2400	4.	8.	2.	1.	0.	0.	15.	
TOT.	85.	189.	76.	15.	0.	0.		

FREQUENCY DISTRIBUTION

VELOCITY (MPH)

HOUR	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
0100	0.0110	0.0247	0.0000	0.0000	0.0000	0.0000	0.0356	
0200	0.0164	0.0164	0.0027	0.0000	0.0000	0.0000	0.0356	
0300	0.0164	0.0247	0.0110	0.0000	0.0000	0.0000	0.0521	
0400	0.0192	0.0192	0.0027	0.0000	0.0000	0.0000	0.0411	
0500	0.0192	0.0164	0.0027	0.0000	0.0000	0.0000	0.0384	
0600	0.0164	0.0082	0.0055	0.0000	0.0000	0.0000	0.0301	
0700	0.0164	0.0384	0.0055	0.0000	0.0000	0.0000	0.0603	
0800	0.0247	0.0274	0.0055	0.0000	0.0000	0.0000	0.0575	
0900	0.0192	0.0219	0.0082	0.0027	0.0000	0.0000	0.0521	
1000	0.0247	0.0192	0.0000	0.0027	0.0000	0.0000	0.0466	
1100	0.0027	0.0192	0.0027	0.0000	0.0000	0.0000	0.0247	
1200	0.0110	0.0219	0.0000	0.0027	0.0000	0.0000	0.0356	
1300	0.0000	0.0301	0.0192	0.0055	0.0000	0.0000	0.0548	
1400	0.0000	0.0192	0.0164	0.0000	0.0000	0.0000	0.0356	
1500	0.0000	0.0192	0.0164	0.0110	0.0000	0.0000	0.0466	
1600	0.0000	0.0164	0.0247	0.0110	0.0000	0.0000	0.0521	
1700	0.0000	0.0164	0.0219	0.0027	0.0000	0.0000	0.0411	
1800	0.0027	0.0192	0.0219	0.0000	0.0000	0.0000	0.0438	
1900	0.0027	0.0219	0.0027	0.0000	0.0000	0.0000	0.0274	
2000	0.0000	0.0329	0.0082	0.0000	0.0000	0.0000	0.0411	
2100	0.0027	0.0192	0.0137	0.0000	0.0000	0.0000	0.0356	
2200	0.0110	0.0219	0.0110	0.0000	0.0000	0.0000	0.0438	
2300	0.0055	0.0219	0.0000	0.0000	0.0000	0.0000	0.0274	
2400	0.0110	0.0219	0.0055	0.0027	0.0000	0.0000	0.0411	
TOT.	0.2329	0.5178	0.2082	0.0411	0.0000	0.0000	1.0000	

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STABILITY CLASS D

VELOCITY (MPH)

DIR.	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
N	11.	60.	17.	1.	0.	0.	89.	5.3
NNE	1.	5.	0.	0.	0.	0.	6.	4.5
NE	0.	1.	0.	0.	0.	0.	1.	3.7
ENE	1.	0.	0.	0.	0.	0.	1.	2.0
E	0.	0.	0.	0.	0.	0.	0.	0.0
ESE	0.	0.	0.	0.	0.	0.	0.	0.0
SE	1.	2.	0.	2.	0.	0.	5.	7.1
SSE	10.	27.	40.	59.	39.	21.	196.	14.1
S	13.	59.	31.	9.	7.	4.	123.	7.7
SSW	2.	8.	4.	0.	0.	0.	14.	5.3
SW	5.	6.	1.	0.	0.	0.	12.	5.7
WSW	4.	7.	0.	0.	0.	0.	11.	3.5
W	1.	4.	0.	0.	0.	0.	5.	4.5
WNW	2.	4.	0.	0.	0.	0.	6.	3.6
NW	8.	7.	0.	0.	0.	0.	15.	3.1
NNW	15.	38.	6.	0.	0.	0.	59.	4.5
TOT.	74.	228.	99.	71.	46.	25.		

TOTAL OBSERVATIONS = 543

TOTAL CALM WINDS REPORTED = 1

TOTAL AVERAGE WIND SPEED = 8.8

FREQUENCY DISTRIBUTION

VELOCITY (MPH)

DIR.	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
N	0.0203	0.1105	0.0313	0.0018	0.0000	0.0000	0.1639	
NNE	0.0018	0.0092	0.0000	0.0000	0.0000	0.0000	0.0110	
NE	0.0000	0.0018	0.0000	0.0000	0.0000	0.0000	0.0018	
ENE	0.0018	0.0000	0.0000	0.0000	0.0000	0.0000	0.0018	
E	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
ESE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
SE	0.0018	0.0037	0.0000	0.0037	0.0000	0.0000	0.0092	
SSE	0.0184	0.0497	0.0737	0.1087	0.0718	0.0387	0.3610	
S	0.0239	0.1087	0.0571	0.0166	0.0129	0.0074	0.2265	
SSW	0.0037	0.0147	0.0074	0.0000	0.0000	0.0000	0.0258	
SW	0.0092	0.0110	0.0018	0.0000	0.0000	0.0000	0.0221	
WSW	0.0074	0.0129	0.0000	0.0000	0.0000	0.0000	0.0203	
W	0.0018	0.0074	0.0000	0.0000	0.0000	0.0000	0.0092	
WNW	0.0037	0.0074	0.0000	0.0000	0.0000	0.0000	0.0110	
NW	0.0147	0.0129	0.0000	0.0000	0.0000	0.0000	0.0276	
NNW	0.0276	0.0700	0.0110	0.0000	0.0000	0.0000	0.1087	
TOT.	0.1363	0.4199	0.1823	0.1308	0.0847	0.0460	1.0000	

FREQUENCY OF ALL CALM WINDS = 0.0018

HOUR	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
0100	1.	6.	4.	0.	1.	0.	12.	
0200	3.	4.	0.	0.	1.	1.	9.	
0300	5.	4.	5.	0.	2.	0.	16.	
0400	6.	13.	1.	2.	0.	1.	23.	
0500	11.	6.	1.	0.	2.	0.	20.	
0600	10.	9.	2.	1.	0.	0.	22.	
0700	8.	9.	4.	1.	0.	0.	22.	
0800	6.	5.	7.	1.	1.	0.	20.	
0900	4.	13.	3.	1.	0.	0.	21.	
1000	5.	14.	1.	3.	0.	0.	23.	
1100	4.	16.	1.	5.	5.	1.	32.	
1200	1.	16.	5.	4.	4.	4.	34.	
1300	1.	16.	3.	7.	4.	2.	33.	
1400	0.	12.	2.	3.	5.	4.	26.	
1500	0.	6.	6.	4.	5.	5.	26.	
1600	0.	4.	8.	10.	5.	3.	30.	
1700	0.	10.	1.	7.	1.	2.	21.	
1800	2.	13.	2.	5.	2.	0.	24.	
1900	0.	8.	18.	4.	3.	0.	33.	
2000	1.	10.	3.	5.	0.	0.	19.	
2100	1.	8.	9.	1.	1.	1.	21.	
2200	0.	6.	4.	2.	2.	0.	14.	
2300	2.	10.	6.	3.	1.	1.	23.	
2400	3.	10.	3.	2.	1.	0.	19.	
TOT.	74.	228.	99.	71.	46.	25.		

FREQUENCY DISTRIBUTION

VELOCITY (MPH)

HOUR	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
0100	0.0018	0.0110	0.0074	0.0000	0.0018	0.0000	0.0221	
0200	0.0055	0.0074	0.0000	0.0000	0.0018	0.0018	0.0166	
0300	0.0092	0.0074	0.0092	0.0000	0.0037	0.0000	0.0295	
0400	0.0110	0.0239	0.0018	0.0037	0.0000	0.0018	0.0424	
0500	0.0203	0.0110	0.0018	0.0000	0.0037	0.0000	0.0368	
0600	0.0184	0.0166	0.0037	0.0018	0.0000	0.0000	0.0405	
0700	0.0147	0.0166	0.0074	0.0018	0.0000	0.0000	0.0405	
0800	0.0110	0.0092	0.0129	0.0018	0.0018	0.0000	0.0368	
0900	0.0074	0.0239	0.0055	0.0018	0.0000	0.0000	0.0387	
1000	0.0092	0.0258	0.0018	0.0055	0.0000	0.0000	0.0424	
1100	0.0074	0.0295	0.0018	0.0092	0.0092	0.0018	0.0589	
1200	0.0018	0.0295	0.0092	0.0074	0.0074	0.0074	0.0626	
1300	0.0018	0.0295	0.0055	0.0129	0.0074	0.0037	0.0608	
1400	0.0000	0.0221	0.0037	0.0055	0.0092	0.0074	0.0479	
1500	0.0000	0.0110	0.0110	0.0074	0.0092	0.0092	0.0479	
1600	0.0000	0.0074	0.0147	0.0184	0.0092	0.0055	0.0552	
1700	0.0000	0.0184	0.0018	0.0129	0.0018	0.0037	0.0387	
1800	0.0037	0.0239	0.0037	0.0092	0.0037	0.0000	0.0442	
1900	0.0000	0.0147	0.0331	0.0074	0.0055	0.0000	0.0608	
2000	0.0018	0.0184	0.0055	0.0092	0.0000	0.0000	0.0359	
2100	0.0018	0.0147	0.0166	0.0018	0.0018	0.0018	0.0587	
2200	0.0000	0.0110	0.0074	0.0037	0.0037	0.0000	0.0258	
2300	0.0037	0.0184	0.0110	0.0055	0.0018	0.0018	0.0424	
2400	0.0055	0.0184	0.0055	0.0037	0.0018	0.0000	0.0356	
TOT.	0.1363	0.4199	0.1823	0.1308	0.0847	0.0460	1.0000	

EQUITY SEPTEMBER THRU DECEMBER 1980

STABILITY CLASS E

VELOCITY (MPH)

DIR.	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
N	4.	52.	7.	0.	0.	0.	63.	5.5
NNE	0.	0.	0.	0.	0.	0.	0.	0.0
NE	0.	0.	0.	0.	0.	0.	0.	0.0
ENE	0.	0.	0.	0.	0.	0.	0.	0.0
E	0.	0.	0.	0.	0.	0.	0.	0.0
ESE	0.	0.	0.	0.	0.	0.	0.	0.0
SE	0.	1.	0.	0.	0.	0.	1.	0.7
SSE	1.	21.	73.	85.	15.	11.	206.	12.6
S	2.	25.	76.	39.	2.	3.	147.	10.4
SSW	0.	0.	0.	0.	0.	0.	0.	0.0
SW	0.	0.	0.	0.	0.	0.	0.	0.0
WSW	1.	0.	0.	0.	0.	0.	1.	1.7
W	0.	0.	0.	0.	0.	0.	0.	0.0
WNW	0.	0.	0.	0.	0.	0.	0.	0.0
NW	0.	1.	0.	0.	0.	0.	1.	4.1
NNW	4.	22.	5.	0.	0.	0.	29.	4.4
TOT.	12.	122.	159.	124.	17.	14.		

TOTAL OBSERVATIONS = 448

TOTAL CALM WINDS REPORTED = 0

TOTAL AVERAGE WIND SPEED = 10.3

FREQUENCY DISTRIBUTION

VELOCITY (MPH)

DIR.	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
N	0.0089	0.1161	0.0156	0.0000	0.0000	0.0000	0.1406	
NNE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
NE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
ENE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
E	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
ESE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
SE	0.0000	0.0022	0.0000	0.0000	0.0000	0.0000	0.0022	
SSE	0.0022	0.0469	0.1629	0.1897	0.0335	0.0246	0.4598	
S	0.0045	0.0558	0.1696	0.0871	0.0045	0.0067	0.3281	
SSW	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
SW	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
WSW	0.0022	0.0000	0.0000	0.0000	0.0000	0.0000	0.0022	
W	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
WNW	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
NW	0.0000	0.0022	0.0000	0.0000	0.0000	0.0000	0.0022	
NNW	0.0089	0.0491	0.0067	0.0000	0.0000	0.0000	0.0647	
TOT.	0.0268	0.2723	0.3549	0.2768	0.0379	0.0313	1.0000	

FREQUENCY OF ALL CALM WINDS = 0.0000

HOUR	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
0100	0.	4.	10.	6.	1.	0.	21.	
0200	1.	6.	7.	6.	0.	1.	21.	
0300	1.	3.	13.	1.	1.	2.	21.	
0400	1.	2.	5.	5.	0.	1.	14.	
0500	3.	2.	9.	7.	0.	1.	22.	
0600	2.	3.	8.	5.	1.	1.	20.	
0700	0.	1.	6.	3.	2.	1.	13.	
0800	0.	3.	3.	7.	1.	1.	15.	
0900	1.	4.	6.	4.	1.	1.	17.	
1000	0.	6.	1.	5.	3.	0.	15.	
1100	2.	14.	1.	2.	0.	0.	19.	
1200	0.	21.	2.	3.	0.	0.	26.	
1300	0.	8.	0.	0.	1.	0.	9.	
1400	0.	3.	1.	1.	0.	1.	6.	
1500	0.	5.	0.	2.	0.	0.	7.	
1600	0.	5.	2.	1.	0.	0.	8.	
1700	0.	5.	5.	0.	2.	1.	13.	
1800	0.	3.	3.	3.	0.	1.	10.	
1900	0.	1.	12.	4.	0.	1.	18.	
2000	0.	6.	17.	8.	2.	1.	34.	
2100	1.	5.	12.	9.	1.	0.	28.	
2200	0.	4.	13.	13.	0.	0.	30.	
2300	0.	8.	10.	17.	0.	0.	35.	
2400	0.	3.	13.	12.	1.	0.	29.	
TOT.	12.	122.	159.	124.	17.	14.		

FREQUENCY DISTRIBUTION

VELOCITY (MPH)

HOUR	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
0100	0.0000	0.0089	0.0223	0.0134	0.0022	0.0000	0.0469	
0200	0.0022	0.0134	0.0156	0.0134	0.0000	0.0022	0.0469	
0300	0.0022	0.0067	0.0290	0.0022	0.0022	0.0045	0.0469	
0400	0.0022	0.0045	0.0112	0.0112	0.0000	0.0022	0.0312	
0500	0.0067	0.0045	0.0201	0.0156	0.0000	0.0022	0.0491	
0600	0.0045	0.0067	0.0179	0.0112	0.0022	0.0022	0.0446	
0700	0.0000	0.0022	0.0134	0.0067	0.0045	0.0022	0.0290	
0800	0.0000	0.0067	0.0067	0.0156	0.0022	0.0022	0.0335	
0900	0.0022	0.0089	0.0134	0.0089	0.0022	0.0022	0.0379	
1000	0.0000	0.0134	0.0022	0.0112	0.0067	0.0000	0.0335	
1100	0.0045	0.0313	0.0022	0.0045	0.0000	0.0000	0.0424	
1200	0.0000	0.0469	0.0045	0.0067	0.0000	0.0000	0.0580	
1300	0.0000	0.0179	0.0000	0.0000	0.0022	0.0000	0.0201	
1400	0.0000	0.0067	0.0022	0.0022	0.0000	0.0022	0.0134	
1500	0.0000	0.0112	0.0000	0.0045	0.0000	0.0000	0.0156	
1600	0.0000	0.0112	0.0045	0.0022	0.0000	0.0000	0.0179	
1700	0.0000	0.0112	0.0112	0.0000	0.0045	0.0022	0.0290	
1800	0.0000	0.0067	0.0067	0.0067	0.0000	0.0022	0.0223	
1900	0.0000	0.0022	0.0268	0.0089	0.0000	0.0022	0.0402	
2000	0.0000	0.0134	0.0379	0.0179	0.0045	0.0022	0.0759	
2100	0.0022	0.0112	0.0268	0.0201	0.0022	0.0000	0.0625	
2200	0.0000	0.0089	0.0290	0.0290	0.0000	0.0000	0.0679	
2300	0.0000	0.0112	0.0223	0.0379	0.0000	0.0000	0.0714	
2400	0.0000	0.0067	0.0290	0.0268	0.0022	0.0000	0.0647	
TOT.	0.0268	0.2723	0.3549	0.2768	0.0379	0.0313	1.0000	

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STABILITY CLASS F

VELOCITY (MPH)

DIR.	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
N	0.	6.	0.	0.	0.	0.	6.	5.1
NNE	0.	1.	0.	0.	0.	0.	1.	6.1
NE	1.	0.	0.	0.	0.	0.	1.	0.1
ENE	0.	2.	0.	0.	0.	0.	2.	4.6
E	0.	0.	1.	0.	0.	0.	1.	7.3
ESE	0.	0.	0.	0.	0.	0.	0.	0.0
SE	0.	0.	0.	0.	0.	0.	0.	0.0
SSE	3.	5.	11.	24.	2.	0.	45.	11.3
S	0.	1.	3.	5.	0.	0.	9.	11.4
SSW	0.	0.	0.	0.	0.	0.	0.	0.0
SW	0.	0.	0.	0.	0.	0.	0.	0.0
WSW	0.	0.	1.	0.	0.	0.	1.	5.7
W	1.	0.	0.	0.	0.	0.	1.	2.7
WNW	0.	0.	0.	0.	0.	0.	0.	0.0
NW	3.	9.	0.	0.	0.	0.	12.	5.5
NNW	0.	0.	0.	0.	0.	0.	0.	0.0
TOT.	8.	24.	16.	29.	2.	0.		

TOTAL OBSERVATIONS = 79

TOTAL CALM WINDS REPORTED = 1

TOTAL AVERAGE WIND SPEED = 9.1

FREQUENCY DISTRIBUTION

VELOCITY (MPH)

DIR.	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
N	0.0000	0.0759	0.0000	0.0000	0.0000	0.0000	0.0759	
NNE	0.0000	0.0127	0.0000	0.0000	0.0000	0.0000	0.0127	
NE	0.0127	0.0000	0.0000	0.0000	0.0000	0.0000	0.0127	
ENE	0.0000	0.0253	0.0000	0.0000	0.0000	0.0000	0.0253	
E	0.0000	0.0000	0.0127	0.0000	0.0000	0.0000	0.0127	
ESE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
SE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
SSE	0.0380	0.0633	0.1392	0.3038	0.0253	0.0000	0.5696	
S	0.0000	0.0127	0.0380	0.0633	0.0000	0.0000	0.1139	
SSW	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
SW	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
WSW	0.0000	0.0000	0.0127	0.0000	0.0000	0.0000	0.0127	
W	0.0127	0.0000	0.0000	0.0000	0.0000	0.0000	0.0127	
WNW	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
NW	0.0380	0.1139	0.0000	0.0000	0.0000	0.0000	0.1519	
NNW	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
TOT.	0.1013	0.3038	0.2025	0.3671	0.0253	0.0000	1.0000	

FREQUENCY OF ALL CALM WINDS = 0.0127

HOUR	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
0100	0.	2.	1.	1.	0.	0.	4.	
0200	0.	1.	1.	1.	0.	0.	3.	
0300	0.	1.	1.	1.	0.	0.	3.	
0400	0.	1.	0.	1.	0.	0.	2.	
0500	1.	0.	1.	1.	0.	0.	3.	
0600	0.	1.	0.	4.	0.	0.	5.	
0700	0.	2.	0.	3.	0.	0.	5.	
0800	2.	1.	0.	1.	0.	0.	4.	
0900	1.	1.	2.	1.	0.	0.	5.	
1000	1.	1.	1.	0.	0.	0.	3.	
1100	0.	3.	0.	0.	0.	0.	3.	
1200	0.	2.	0.	0.	0.	0.	2.	
1300	0.	1.	1.	0.	1.	0.	3.	
1400	0.	1.	1.	0.	1.	0.	3.	
1500	0.	0.	0.	0.	0.	0.	0.	
1600	0.	0.	0.	0.	0.	0.	0.	
1700	0.	1.	0.	1.	0.	0.	2.	
1800	1.	0.	0.	0.	0.	0.	1.	
1900	1.	0.	0.	0.	0.	0.	1.	
2000	0.	0.	1.	3.	0.	0.	4.	
2100	0.	1.	1.	3.	0.	0.	5.	
2200	0.	1.	2.	4.	0.	0.	7.	
2300	1.	1.	1.	2.	0.	0.	5.	
2400	0.	2.	2.	2.	0.	0.	6.	
TOT.	8.	24.	16.	29.	2.	0.		

FREQUENCY DISTRIBUTION

VELOCITY (MPH)

HOUR	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
0100	0.0000	0.0253	0.0127	0.0127	0.0000	0.0000	0.0506	
0200	0.0000	0.0127	0.0127	0.0127	0.0000	0.0000	0.0380	
0300	0.0000	0.0127	0.0127	0.0127	0.0000	0.0000	0.0380	
0400	0.0000	0.0127	0.0000	0.0127	0.0000	0.0000	0.0253	
0500	0.0127	0.0000	0.0127	0.0127	0.0000	0.0000	0.0380	
0600	0.0000	0.0127	0.0000	0.0506	0.0000	0.0000	0.0733	
0700	0.0000	0.0253	0.0000	0.0380	0.0000	0.0000	0.0633	
0800	0.0253	0.0127	0.0000	0.0127	0.0000	0.0000	0.0506	
0900	0.0127	0.0127	0.0253	0.0127	0.0000	0.0000	0.0633	
1000	0.0127	0.0127	0.0127	0.0000	0.0000	0.0000	0.0380	
1100	0.0000	0.0380	0.0000	0.0000	0.0000	0.0000	0.0380	
1200	0.0000	0.0253	0.0000	0.0000	0.0000	0.0000	0.0253	
1300	0.0000	0.0127	0.0127	0.0000	0.0127	0.0000	0.0380	
1400	0.0000	0.0127	0.0127	0.0000	0.0127	0.0000	0.0380	
1500	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
1600	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
1700	0.0000	0.0127	0.0000	0.0127	0.0000	0.0000	0.0253	
1800	0.0127	0.0000	0.0000	0.0000	0.0000	0.0000	0.0127	
1900	0.0127	0.0000	0.0000	0.0000	0.0000	0.0000	0.0127	
2000	0.0000	0.0000	0.0127	0.0380	0.0000	0.0000	0.0506	
2100	0.0000	0.0127	0.0127	0.0380	0.0000	0.0000	0.0633	
2200	0.0000	0.0127	0.0253	0.0506	0.0000	0.0000	0.0886	
2300	0.0127	0.0127	0.0127	0.0253	0.0000	0.0000	0.0633	
2400	0.0000	0.0253	0.0253	0.0253	0.0000	0.0000	0.0755	
TOT.	0.1013	0.3038	0.2025	0.3671	0.0253	0.0000	1.0000	

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VELOCITY (MPH)

DIR.	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
N	33.	175.	41.	1.	0.	0.	250.	5.3
NNE	3.	16.	0.	0.	0.	0.	19.	4.4
NE	2.	2.	0.	0.	0.	0.	4.	2.3
ENE	2.	4.	0.	0.	0.	0.	6.	3.6
E	0.	0.	1.	0.	0.	0.	1.	7.3
ESE	2.	0.	0.	0.	0.	0.	2.	1.8
SE	4.	7.	4.	3.	0.	0.	18.	6.5
SSE	30.	79.	156.	195.	55.	32.	547.	12.2
S	37.	160.	156.	62.	9.	7.	431.	8.1
SSW	30.	58.	25.	2.	0.	0.	115.	5.0
SW	35.	53.	19.	3.	0.	0.	110.	4.6
WSW	49.	51.	8.	0.	0.	0.	108.	3.7
W	31.	43.	4.	0.	0.	0.	78.	3.7
WNW	35.	37.	0.	0.	0.	0.	70.	3.2
NW	53.	57.	4.	0.	0.	0.	114.	3.4
NNW	59.	130.	51.	2.	0.	0.	242.	5.1
TOT.	403.	872.	469.	268.	64.	39.		

TOTAL OBSERVATIONS = 2115

TOTAL CALM WINDS REPORTED = 2

TOTAL AVERAGE WIND SPEED = 7.3

FREQUENCY DISTRIBUTION

VELOCITY (MPH)

DIR.	0-3	4-7	8-12	13-18	19-24	25-	TOTAL	AVG. SPEED
N	0.0156	0.0827	0.0194	0.0005	0.0000	0.0000	0.1182	
NNE	0.0014	0.0076	0.0000	0.0000	0.0000	0.0000	0.0090	
NE	0.0009	0.0009	0.0000	0.0000	0.0000	0.0000	0.0019	
ENE	0.0009	0.0019	0.0000	0.0000	0.0000	0.0000	0.0028	
E	0.0000	0.0000	0.0005	0.0000	0.0000	0.0000	0.0005	
ESE	0.0009	0.0000	0.0000	0.0000	0.0000	0.0000	0.0009	
SE	0.0019	0.0033	0.0019	0.0014	0.0000	0.0000	0.0085	
SSE	0.0142	0.0374	0.0738	0.0922	0.0260	0.0151	0.2586	
S	0.0175	0.0757	0.0738	0.0293	0.0043	0.0033	0.2038	
SSW	0.0142	0.0274	0.0118	0.0009	0.0000	0.0000	0.0544	
SW	0.0165	0.0251	0.0090	0.0014	0.0000	0.0000	0.0520	
WSW	0.0232	0.0241	0.0038	0.0000	0.0000	0.0000	0.0511	
W	0.0147	0.0203	0.0019	0.0000	0.0000	0.0000	0.0369	
WNW	0.0156	0.0175	0.0000	0.0000	0.0000	0.0000	0.0331	
NW	0.0251	0.0270	0.0019	0.0000	0.0000	0.0000	0.0549	
NNW	0.0279	0.0615	0.0241	0.0009	0.0000	0.0000	0.1144	
TOT.	0.1905	0.4123	0.2217	0.1267	0.0303	0.0184	1.0000	

FREQUENCY OF ALL CALM WINDS = 0.0009

HOUR	0-3	4-7	8-12	13-16	19-24	24-	TOTAL	AVG. SPEED
0100	17.	36.	16.	7.	2.	0.	78.	
0200	17.	31.	11.	9.	1.	2.	71.	
0300	27.	35.	23.	2.	3.	2.	92.	
0400	37.	36.	9.	8.	0.	2.	92.	
0500	38.	27.	13.	9.	2.	1.	90.	
0600	41.	23.	13.	11.	1.	1.	90.	
0700	32.	37.	13.	7.	2.	1.	92.	
0800	37.	30.	12.	10.	2.	1.	92.	
0900	33.	33.	15.	8.	1.	1.	91.	
1000	31.	41.	4.	11.	3.	0.	90.	
1100	15.	53.	8.	3.	6.	1.	90.	
1200	8.	52.	12.	12.	4.	4.	92.	
1300	1.	46.	20.	12.	6.	2.	87.	
1400	1.	44.	21.	9.	6.	5.	86.	
1500	1.	40.	28.	11.	5.	5.	90.	
1600	0.	29.	35.	16.	5.	3.	88.	
1700	1.	32.	26.	10.	3.	3.	75.	
1800	7.	32.	25.	8.	2.	1.	75.	
1900	3.	33.	41.	9.	3.	1.	90.	
2000	6.	43.	25.	17.	2.	1.	94.	
2100	6.	37.	30.	14.	2.	1.	90.	
2200	10.	32.	27.	19.	2.	0.	90.	
2300	14.	37.	19.	23.	1.	1.	95.	
2400	20.	33.	23.	18.	1.	0.	95.	
TOT.	403.	872.	469.	268.	64.	39.		

FREQUENCY DISTRIBUTION

VELOCITY (MPH)

HOUR	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
0100	0.0080	0.0170	0.0076	0.0033	0.0009	0.0000	0.0369	
0200	0.0080	0.0147	0.0052	0.0043	0.0005	0.0009	0.0336	
0300	0.0128	0.0165	0.0109	0.0009	0.0014	0.0009	0.0435	
0400	0.0175	0.0170	0.0043	0.0038	0.0000	0.0009	0.0435	
0500	0.0180	0.0128	0.0061	0.0043	0.0009	0.0005	0.0426	
0600	0.0194	0.0109	0.0061	0.0052	0.0005	0.0005	0.0426	
0700	0.0151	0.0175	0.0061	0.0033	0.0009	0.0005	0.0435	
0800	0.0175	0.0142	0.0057	0.0047	0.0009	0.0005	0.0435	
0900	0.0156	0.0156	0.0071	0.0038	0.0005	0.0005	0.0430	
1000	0.0147	0.0194	0.0019	0.0052	0.0014	0.0000	0.0426	
1100	0.0071	0.0251	0.0038	0.0038	0.0024	0.0005	0.0426	
1200	0.0038	0.0246	0.0057	0.0057	0.0019	0.0019	0.0435	
1300	0.0005	0.0217	0.0095	0.0057	0.0028	0.0009	0.0411	
1400	0.0005	0.0208	0.0099	0.0043	0.0028	0.0024	0.0407	
1500	0.0005	0.0189	0.0132	0.0052	0.0024	0.0024	0.0426	
1600	0.0000	0.0137	0.0165	0.0076	0.0024	0.0014	0.0416	
1700	0.0005	0.0151	0.0123	0.0047	0.0014	0.0014	0.0355	
1800	0.0033	0.0151	0.0118	0.0038	0.0009	0.0005	0.0355	
1900	0.0014	0.0156	0.0194	0.0043	0.0014	0.0005	0.0426	
2000	0.0028	0.0203	0.0118	0.0080	0.0009	0.0005	0.0444	
2100	0.0028	0.0175	0.0142	0.0066	0.0009	0.0005	0.0426	
2200	0.0047	0.0151	0.0128	0.0090	0.0009	0.0000	0.0426	
2300	0.0066	0.0175	0.0090	0.0109	0.0005	0.0005	0.0449	
2400	0.0095	0.0136	0.0109	0.0085	0.0005	0.0000	0.0449	
TOT.	0.1905	0.4123	0.2217	0.1267	0.0303	0.0184	1.0000	

JOINT FREQUENCY DISTRIBUTION
WINDS AND STABILITY
DT/DZ

EQUITY SEPTEMBER THRU DECEMBER 1980

STABILITY CLASS A

VELOCITY (MPH)

DIR.	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
N	29.	61.	5.	0.	0.	0.	95.	4.1
NNE	2.	2.	0.	0.	0.	0.	4.	3.6
NE	2.	1.	0.	0.	0.	0.	3.	2.1
ENE	1.	4.	0.	0.	0.	0.	5.	3.8
E	0.	0.	1.	0.	0.	0.	1.	7.3
ESE	2.	0.	0.	0.	0.	0.	2.	1.8
SE	2.	7.	2.	1.	0.	0.	12.	2.8
SSE	27.	64.	125.	130.	20.	14.	380.	18.9
S	37.	148.	128.	53.	9.	5.	380.	7.9
SSW	29.	49.	10.	2.	0.	0.	90.	4.5
SW	33.	42.	6.	3.	0.	0.	84.	4.0
WSW	48.	41.	5.	0.	0.	0.	94.	3.4
W	31.	34.	1.	0.	0.	0.	66.	3.4
WNW	30.	32.	0.	0.	0.	0.	62.	3.1
NW	43.	27.	1.	0.	0.	0.	71.	2.5
NNW	53.	65.	7.	0.	0.	0.	125.	3.6
TOT.	369.	577.	291.	189.	29.	19.		

TOTAL OBSERVATIONS = 1474

TOTAL CALM WINDS REPORTED = 2

TOTAL AVERAGE WIND SPEED = 6.6

FREQUENCY DISTRIBUTION

VELOCITY (MPH)

DIR.	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
N	0.0197	0.0414	0.0034	0.0000	0.0000	0.0000	0.0645	
NNE	0.0014	0.0014	0.0000	0.0000	0.0000	0.0000	0.0027	
NE	0.0014	0.0007	0.0000	0.0000	0.0000	0.0000	0.0020	
ENE	0.0007	0.0027	0.0000	0.0000	0.0000	0.0000	0.0034	
E	0.0000	0.0000	0.0007	0.0000	0.0000	0.0000	0.0007	
ESE	0.0014	0.0000	0.0000	0.0000	0.0000	0.0000	0.0014	
SE	0.0014	0.0047	0.0014	0.0007	0.0000	0.0000	0.0081	
SSE	0.0183	0.0434	0.0848	0.0882	0.0136	0.0095	0.2578	
S	0.0251	0.1004	0.0868	0.0360	0.0061	0.0034	0.2578	
SSW	0.0197	0.0332	0.0068	0.0014	0.0000	0.0000	0.0611	
SW	0.0224	0.0285	0.0041	0.0020	0.0000	0.0000	0.0570	
WSW	0.0326	0.0278	0.0034	0.0000	0.0000	0.0000	0.0638	
W	0.0210	0.0231	0.0007	0.0000	0.0000	0.0000	0.0448	
WNW	0.0204	0.0217	0.0000	0.0000	0.0000	0.0000	0.0421	
NW	0.0292	0.0183	0.0007	0.0000	0.0000	0.0000	0.0482	
NNW	0.0360	0.0441	0.0047	0.0000	0.0000	0.0000	0.0848	
TOT.	0.2503	0.3915	0.1974	0.1282	0.0197	0.0129	1.0000	

FREQUENCY OF ALL CALM WINDS = 0.0014

HOUR	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
0100	16.	32.	16.	7.	2.	0.	73.	
0200	17.	26.	11.	9.	1.	2.	66.	
0300	26.	31.	23.	2.	3.	2.	87.	
0400	33.	34.	9.	8.	0.	2.	86.	
0500	35.	27.	12.	5.	2.	1.	85.	
0600	39.	21.	12.	11.	1.	1.	85.	
0700	31.	33.	13.	7.	2.	1.	87.	
0800	34.	28.	12.	9.	2.	1.	86.	
0900	30.	26.	15.	7.	1.	1.	80.	
1000	30.	33.	3.	9.	3.	0.	78.	
1100	13.	39.	3.	2.	1.	0.	58.	
1200	5.	17.	0.	2.	0.	0.	24.	
1300	0.	10.	2.	1.	0.	0.	13.	
1400	0.	1.	2.	0.	1.	0.	4.	
1500	0.	1.	0.	0.	1.	0.	2.	
1600	0.	6.	0.	1.	0.	0.	7.	
1700	1.	12.	3.	1.	1.	3.	21.	
1800	6.	22.	7.	5.	0.	1.	41.	
1900	3.	20.	30.	9.	0.	1.	63.	
2000	5.	39.	21.	17.	2.	1.	85.	
2100	5.	33.	28.	14.	2.	1.	83.	
2200	9.	26.	27.	13.	2.	0.	82.	
2300	12.	32.	19.	23.	1.	1.	88.	
2400	19.	28.	23.	18.	1.	0.	89.	
TOT.	369.	577.	291.	189.	29.	19.		

FREQUENCY DISTRIBUTION

VELOCITY (MPH)

HOUR	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
0100	0.0109	0.0217	0.0109	0.0047	0.0014	0.0000	0.0495	
0200	0.0115	0.0176	0.0075	0.0061	0.0007	0.0014	0.0448	
0300	0.0176	0.0210	0.0156	0.0014	0.0020	0.0014	0.0590	
0400	0.0224	0.0231	0.0061	0.0054	0.0000	0.0014	0.0583	
0500	0.0237	0.0183	0.0081	0.0061	0.0014	0.0007	0.0593	
0600	0.0265	0.0142	0.0081	0.0075	0.0007	0.0007	0.0577	
0700	0.0210	0.0224	0.0088	0.0047	0.0014	0.0007	0.0590	
0800	0.0231	0.0190	0.0081	0.0061	0.0014	0.0007	0.0583	
0900	0.0204	0.0176	0.0102	0.0047	0.0007	0.0007	0.0543	
1000	0.0204	0.0224	0.0020	0.0061	0.0020	0.0000	0.0529	
1100	0.0088	0.0265	0.0020	0.0014	0.0007	0.0000	0.0593	
1200	0.0034	0.0115	0.0000	0.0014	0.0000	0.0000	0.0563	
1300	0.0000	0.0068	0.0014	0.0067	0.0000	0.0000	0.0688	
1400	0.0000	0.0007	0.0014	0.0000	0.0007	0.0000	0.0027	
1500	0.0000	0.0007	0.0000	0.0000	0.0007	0.0000	0.0014	
1600	0.0000	0.0041	0.0000	0.0007	0.0000	0.0000	0.0047	
1700	0.0007	0.0081	0.0020	0.0007	0.0007	0.0020	0.0142	
1800	0.0041	0.0149	0.0047	0.0034	0.0000	0.0007	0.0278	
1900	0.0020	0.0136	0.0204	0.0061	0.0000	0.0007	0.0427	
2000	0.0034	0.0265	0.0142	0.0115	0.0014	0.0007	0.0577	
2100	0.0034	0.0224	0.0190	0.0055	0.0014	0.0007	0.0563	
2200	0.0061	0.0176	0.0183	0.0122	0.0014	0.0000	0.0556	
2300	0.0081	0.0217	0.0129	0.0156	0.0007	0.0007	0.0597	
2400	0.0129	0.0190	0.0156	0.0122	0.0007	0.0000	0.0694	
TOT.	0.2503	0.3915	0.1974	0.1282	0.0197	0.0129	1.0000	

EQUITY SEPTEMBER THRU DECEMBER 1980

STABILITY CLASS B

VELOCITY (MPH)

DIR.	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
N	1.	9.	0.	0.	0.	0.	10.	4.9
NNE	0.	1.	0.	0.	0.	0.	1.	3.1
NE	0.	1.	0.	0.	0.	0.	1.	3.1
ENE	0.	0.	0.	0.	0.	0.	0.	0.0
E	0.	0.	0.	0.	0.	0.	0.	0.0
ESE	0.	0.	0.	0.	0.	0.	0.	0.0
SE	0.	0.	0.	1.	0.	0.	1.	14.5
SSE	0.	3.	0.	3.	3.	1.	10.	14.5
S	0.	0.	0.	0.	0.	0.	0.	0.0
SSW	0.	0.	1.	0.	0.	0.	1.	7.0
SW	1.	1.	2.	0.	0.	0.	4.	5.6
WSW	0.	1.	0.	0.	0.	0.	1.	6.5
W	0.	1.	0.	0.	0.	0.	1.	4.3
WNW	0.	1.	0.	0.	0.	0.	1.	5.0
NW	1.	1.	0.	0.	0.	0.	2.	2.0
NNW	2.	1.	0.	0.	0.	0.	3.	2.8
TOT.	5.	20.	3.	4.	3.	1.		

TOTAL OBSERVATIONS = 36

TOTAL CALM WINDS REPORTED = 0

TOTAL AVERAGE WIND SPEED = 7.7

FREQUENCY DISTRIBUTION

VELOCITY (MPH)

DIR.	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
N	0.0278	0.2500	0.0000	0.0000	0.0000	0.0000	0.2778	
NNE	0.0000	0.0278	0.0000	0.0000	0.0000	0.0000	0.0278	
NE	0.0000	0.0278	0.0000	0.0000	0.0000	0.0000	0.0278	
ENE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
E	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
ESE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
SE	0.0000	0.0000	0.0000	0.0278	0.0000	0.0000	0.0278	
SSE	0.0000	0.0833	0.0000	0.0833	0.0833	0.0278	0.2778	
S	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
SSW	0.0000	0.0000	0.0278	0.0000	0.0000	0.0000	0.0278	
SW	0.0278	0.0278	0.0556	0.0000	0.0000	0.0000	0.1111	
WSW	0.0000	0.0278	0.0000	0.0000	0.0000	0.0000	0.0278	
W	0.0000	0.0278	0.0000	0.0000	0.0000	0.0000	0.0278	
WNW	0.0000	0.0278	0.0000	0.0000	0.0000	0.0000	0.0278	
NW	0.0278	0.0278	0.0000	0.0000	0.0000	0.0000	0.0556	
NNW	0.0556	0.0278	0.0000	0.0000	0.0000	0.0000	0.0833	
TOT.	0.1389	0.5556	0.0833	0.1111	0.0833	0.0278	1.0000	

FREQUENCY OF ALL CALM WINDS = 0.0000

HOUR	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SLEED
0100	0.	0.	0.	0.	0.	0.	0.	
0200	0.	0.	0.	0.	0.	0.	0.	
0300	0.	0.	0.	0.	0.	0.	0.	
0400	1.	0.	0.	0.	0.	0.	1.	
0500	0.	0.	0.	0.	0.	0.	0.	
0600	1.	0.	0.	0.	0.	0.	1.	
0700	1.	0.	0.	0.	0.	0.	1.	
0800	1.	1.	0.	1.	0.	0.	3.	
0900	0.	3.	0.	0.	0.	0.	3.	
1000	0.	2.	0.	0.	0.	0.	2.	
1100	0.	0.	0.	0.	0.	0.	0.	
1200	1.	4.	0.	0.	0.	0.	5.	
1300	0.	1.	0.	0.	0.	0.	1.	
1400	0.	1.	0.	0.	0.	0.	1.	
1500	0.	1.	0.	0.	0.	0.	1.	
1600	0.	0.	0.	0.	1.	1.	2.	
1700	0.	2.	2.	0.	0.	0.	4.	
1800	0.	0.	0.	2.	0.	0.	2.	
1900	0.	2.	0.	0.	2.	0.	4.	
2000	0.	1.	1.	0.	0.	0.	2.	
2100	0.	0.	0.	0.	0.	0.	0.	
2200	0.	1.	0.	1.	0.	0.	2.	
2300	0.	0.	0.	0.	0.	0.	0.	
2400	0.	1.	0.	0.	0.	0.	1.	
TOT.	5.	20.	3.	4.	3.	1.		

FREQUENCY DISTRIBUTION

VELOCITY (MPH)

HOUR	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
0100	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
0200	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
0300	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
0400	0.0278	0.0000	0.0000	0.0000	0.0000	0.0000	0.0278	
0500	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
0600	0.0278	0.0000	0.0000	0.0000	0.0000	0.0000	0.0278	
0700	0.0278	0.0000	0.0000	0.0000	0.0000	0.0000	0.0278	
0800	0.0278	0.0278	0.0000	0.0278	0.0000	0.0000	0.0833	
0900	0.0000	0.0833	0.0000	0.0000	0.0000	0.0000	0.0833	
1000	0.0000	0.0556	0.0000	0.0000	0.0000	0.0000	0.0556	
1100	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
1200	0.0278	0.1111	0.0000	0.0000	0.0000	0.0000	0.1389	
1300	0.0000	0.0278	0.0000	0.0000	0.0000	0.0000	0.0278	
1400	0.0000	0.0278	0.0000	0.0000	0.0000	0.0000	0.0278	
1500	0.0000	0.0278	0.0000	0.0000	0.0000	0.0000	0.0278	
1600	0.0000	0.0000	0.0000	0.0000	0.0278	0.0278	0.0556	
1700	0.0000	0.0556	0.0556	0.0000	0.0000	0.0000	0.1111	
1800	0.0000	0.0000	0.0000	0.0556	0.0000	0.0000	0.0556	
1900	0.0000	0.0556	0.0000	0.0000	0.0556	0.0000	0.1111	
2000	0.0000	0.0278	0.0278	0.0000	0.0000	0.0000	0.0556	
2100	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
2200	0.0000	0.0278	0.0000	0.0278	0.0000	0.0000	0.0556	
2300	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
2400	0.0000	0.0278	0.0000	0.0000	0.0000	0.0000	0.0278	
TOT.	0.1389	0.5556	0.0833	0.1111	0.0833	0.0278	1.0000	

EQUITY SEPTEMBER THRU DECEMBER 1980

STABILITY CLASS C

VELOCITY (MPH)

DIR.	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
N	0.	6.	2.	0.	0.	0.	8.	5.4
NNE	0.	0.	0.	0.	0.	0.	0.	0.0
NE	0.	0.	0.	0.	0.	0.	0.	0.0
ENE	0.	0.	0.	0.	0.	0.	0.	0.0
E	0.	0.	0.	0.	0.	0.	0.	0.0
ESE	0.	0.	0.	0.	0.	0.	0.	0.0
SE	1.	0.	0.	0.	0.	0.	1.	1.5
SSE	0.	0.	1.	5.	2.	0.	8.	15.5
S	0.	0.	0.	0.	0.	0.	0.	0.0
SSW	1.	1.	0.	0.	0.	0.	2.	3.4
SW	0.	2.	1.	0.	0.	0.	3.	5.2
WSW	0.	1.	0.	0.	0.	0.	1.	4.1
W	0.	0.	1.	0.	0.	0.	1.	7.7
WNW	0.	1.	0.	0.	0.	0.	0.	0.0
NW	1.	2.	0.	0.	0.	0.	3.	4.0
NNW	0.	1.	4.	0.	0.	0.	5.	7.5
TOT.	3.	13.	9.	5.	2.	0.		

TOTAL OBSERVATIONS = 32

TOTAL CALM WINDS REPORTED = 0

TOTAL AVERAGE WIND SPEED = 7.9

FREQUENCY DISTRIBUTION

VELOCITY (MPH)

DIR.	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
N	0.0000	0.1875	0.0625	0.0000	0.0000	0.0000	0.2500	
NNE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
NE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
ENE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
E	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
ESE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
SE	0.0313	0.0000	0.0000	0.0000	0.0000	0.0000	0.0313	
SSE	0.0000	0.0000	0.0313	0.1563	0.0625	0.0000	0.2500	
S	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
SSW	0.0313	0.0313	0.0000	0.0000	0.0000	0.0000	0.0625	
SW	0.0000	0.0625	0.0313	0.0000	0.0000	0.0000	0.0938	
WSW	0.0000	0.0313	0.0000	0.0000	0.0000	0.0000	0.0313	
W	0.0000	0.0000	0.0313	0.0000	0.0000	0.0000	0.0313	
WNW	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
NW	0.0313	0.0625	0.0000	0.0000	0.0000	0.0000	0.0938	
NNW	0.0000	0.0313	0.1250	0.0000	0.0000	0.0000	0.1563	
TOT.	0.0938	0.4063	0.2813	0.1563	0.0625	0.0000	1.0000	

FREQUENCY OF ALL CALM WINDS = 0.0000

HOUR	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
0100	0.	0.	0.	0.	0.	0.	0.	
0200	0.	0.	0.	0.	0.	0.	0.	
0300	0.	0.	0.	0.	0.	0.	0.	
0400	0.	0.	0.	0.	0.	0.	0.	
0500	0.	0.	0.	0.	0.	0.	0.	
0600	0.	0.	0.	0.	0.	0.	0.	
0700	0.	0.	0.	0.	0.	0.	0.	
0800	0.	0.	0.	0.	0.	0.	0.	
0900	1.	0.	0.	1.	0.	0.	2.	
1000	0.	0.	0.	1.	0.	0.	1.	
1100	1.	2.	0.	1.	2.	0.	6.	
1200	1.	2.	0.	0.	0.	0.	3.	
1300	0.	0.	0.	0.	0.	0.	0.	
1400	0.	1.	0.	0.	0.	0.	1.	
1500	0.	1.	0.	0.	0.	0.	1.	
1600	0.	1.	2.	1.	0.	0.	4.	
1700	0.	1.	0.	1.	0.	0.	2.	
1800	0.	1.	0.	0.	0.	0.	1.	
1900	0.	3.	5.	0.	0.	0.	8.	
2000	0.	0.	0.	0.	0.	0.	0.	
2100	0.	0.	2.	0.	0.	0.	2.	
2200	0.	0.	0.	0.	0.	0.	0.	
2300	0.	1.	0.	0.	0.	0.	1.	
2400	0.	0.	0.	0.	0.	0.	0.	
TOT.	3.	13.	9.	5.	2.	0.		

FREQUENCY DISTRIBUTION

VELOCITY (MPH)

HOUP	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
0100	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
0200	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
0300	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
0400	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
0500	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
0600	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
0700	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
0800	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
0900	0.0313	0.0000	0.0000	0.0313	0.0000	0.0000	0.0625	
1000	0.0000	0.0000	0.0000	0.0313	0.0000	0.0000	0.0313	
1100	0.0313	0.0625	0.0000	0.0313	0.0625	0.0000	0.1875	
1200	0.0313	0.0625	0.0000	0.0000	0.0000	0.0000	0.0938	
1300	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
1400	0.0000	0.0313	0.0000	0.0000	0.0000	0.0000	0.0313	
1500	0.0000	0.0313	0.0000	0.0000	0.0000	0.0000	0.0313	
1600	0.0000	0.0313	0.0625	0.0313	0.0000	0.0000	0.1250	
1700	0.0000	0.0313	0.0000	0.0313	0.0000	0.0000	0.0625	
1800	0.0000	0.0313	0.0000	0.0000	0.0000	0.0000	0.0313	
1900	0.0000	0.0938	0.1563	0.0000	0.0000	0.0000	0.2500	
2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
2100	0.0000	0.0000	0.0625	0.0000	0.0000	0.0000	0.0625	
2200	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
2300	0.0000	0.0313	0.0000	0.0000	0.0000	0.0000	0.0313	
2400	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
TOT.	0.0938	0.4063	0.2813	0.1563	0.0625	0.0000	1.0000	

EQUITY SEPTEMBER THRU DECEMBER 1980

STABILITY CLASS D

VELOCITY (MPH)

DIR.	0-3	4-7	8-12	13-16	17-24	24-	TOTAL	AVG. SPEED
N	1.	47.	11.	1.	0.	0.	60.	5.9
NNE	1.	5.	0.	0.	0.	0.	6.	4.9
NE	0.	0.	0.	0.	0.	0.	0.	0.0
ENE	1.	0.	0.	0.	0.	0.	1.	2.5
E	0.	0.	0.	0.	0.	0.	0.	0.0
ESE	0.	0.	0.	0.	0.	0.	0.	0.0
SE	1.	0.	2.	1.	0.	0.	4.	2.1
SSE	2.	7.	19.	26.	18.	13.	85.	15.6
S	0.	7.	11.	5.	0.	2.	25.	10.4
SSW	0.	4.	4.	0.	0.	0.	8.	6.5
SW	0.	6.	2.	0.	0.	0.	8.	3.6
WSW	1.	5.	2.	0.	0.	0.	8.	5.4
W	0.	4.	1.	0.	0.	0.	5.	5.7
WNW	2.	1.	0.	0.	0.	0.	3.	3.3
NW	5.	12.	0.	0.	0.	0.	17.	4.0
NNW	3.	39.	27.	1.	0.	0.	70.	6.7
TOT.	17.	137.	79.	34.	18.	15.		

TOTAL OBSERVATIONS = 300

TOTAL CALM WINDS REPORTED = 0

TOTAL AVERAGE WIND SPEED = 5.1

FREQUENCY DISTRIBUTION

VELOCITY (MPH)

DIR.	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
N	0.0033	0.1567	0.0367	0.0033	0.0000	0.0000	0.2000	
NNE	0.0033	0.0167	0.0000	0.0000	0.0000	0.0000	0.0200	
NE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
ENE	0.0033	0.0000	0.0000	0.0000	0.0000	0.0000	0.0033	
E	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
ESE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
SE	0.0033	0.0000	0.0067	0.0033	0.0000	0.0000	0.0133	
SSE	0.0067	0.0233	0.0633	0.0267	0.0600	0.0433	0.2833	
S	0.0000	0.0233	0.0367	0.0167	0.0000	0.0067	0.0833	
SSW	0.0000	0.0133	0.0133	0.0000	0.0000	0.0000	0.0267	
SW	0.0000	0.0200	0.0667	0.0000	0.0000	0.0000	0.0867	
WSW	0.0033	0.0167	0.0067	0.0000	0.0000	0.0000	0.0267	
W	0.0000	0.0133	0.0033	0.0000	0.0000	0.0000	0.0167	
WNW	0.0067	0.0033	0.0000	0.0000	0.0000	0.0000	0.0100	
NW	0.0167	0.0400	0.0000	0.0000	0.0000	0.0000	0.0567	
NNW	0.0100	0.1300	0.0900	0.0033	0.0000	0.0000	0.2333	
TOT.	0.0567	0.4567	0.2633	0.1133	0.0600	0.0500	1.0000	

FREQUENCY OF ALL CALM WINDS = 0.0000

HOUR	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
0100	0.	2.	0.	0.	0.	0.	2.	
0200	0.	3.	0.	0.	0.	0.	3.	
0300	1.	2.	0.	0.	0.	0.	3.	
0400	2.	0.	0.	0.	0.	0.	2.	
0500	1.	0.	0.	0.	0.	0.	1.	
0600	1.	0.	0.	0.	0.	0.	1.	
0700	0.	1.	0.	0.	0.	0.	1.	
0800	1.	0.	0.	0.	0.	0.	1.	
0900	2.	2.	0.	0.	0.	0.	4.	
1000	0.	4.	0.	1.	0.	0.	5.	
1100	0.	7.	5.	3.	2.	1.	18.	
1200	0.	15.	7.	6.	3.	4.	35.	
1300	1.	16.	4.	5.	2.	2.	30.	
1400	0.	19.	6.	7.	3.	4.	39.	
1500	1.	13.	6.	5.	2.	3.	29.	
1600	0.	10.	17.	6.	2.	1.	36.	
1700	0.	13.	12.	6.	1.	0.	32.	
1800	1.	8.	13.	1.	2.	0.	25.	
1900	0.	7.	6.	0.	1.	0.	14.	
2000	1.	2.	3.	0.	0.	0.	6.	
2100	1.	3.	0.	0.	0.	0.	4.	
2200	1.	4.	0.	0.	0.	0.	5.	
2300	2.	3.	0.	0.	0.	0.	5.	
2400	1.	3.	0.	0.	0.	0.	4.	
TOT.	17.	137.	79.	34.	18.	15.		

FREQUENCY DISTRIBUTION

VELOCITY (MPH)

HOUR	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
0100	0.0000	0.0067	0.0000	0.0000	0.0000	0.0000	0.0067	
0200	0.0000	0.0100	0.0000	0.0000	0.0000	0.0000	0.0100	
0300	0.0033	0.0067	0.0000	0.0000	0.0000	0.0000	0.0100	
0400	0.0067	0.0000	0.0000	0.0000	0.0000	0.0000	0.0067	
0500	0.0033	0.0000	0.0000	0.0000	0.0000	0.0000	0.0033	
0600	0.0033	0.0000	0.0000	0.0000	0.0000	0.0000	0.0033	
0700	0.0000	0.0033	0.0000	0.0000	0.0000	0.0000	0.0033	
0800	0.0033	0.0000	0.0000	0.0000	0.0000	0.0000	0.0033	
0900	0.0067	0.0067	0.0000	0.0000	0.0000	0.0000	0.0133	
1000	0.0000	0.0133	0.0000	0.0033	0.0000	0.0000	0.0167	
1100	0.0000	0.0233	0.0167	0.0100	0.0067	0.0033	0.0700	
1200	0.0000	0.0500	0.0233	0.0200	0.0100	0.0133	0.1167	
1300	0.0033	0.0533	0.0133	0.0167	0.0067	0.0067	0.1600	
1400	0.0000	0.0633	0.0200	0.0100	0.0100	0.0133	0.1167	
1500	0.0033	0.0433	0.0200	0.0100	0.0067	0.0100	0.0933	
1600	0.0000	0.0333	0.0567	0.0200	0.0067	0.0033	0.1200	
1700	0.0000	0.0433	0.0400	0.0200	0.0033	0.0000	0.1067	
1800	0.0033	0.0267	0.0433	0.0033	0.0067	0.0000	0.0833	
1900	0.0000	0.0233	0.0200	0.0000	0.0033	0.0000	0.0467	
2000	0.0033	0.0067	0.0100	0.0000	0.0000	0.0000	0.0200	
2100	0.0033	0.0100	0.0000	0.0000	0.0000	0.0000	0.0133	
2200	0.0033	0.0133	0.0000	0.0000	0.0000	0.0000	0.0167	
2300	0.0067	0.0100	0.0000	0.0000	0.0000	0.0000	0.0167	
2400	0.0033	0.0100	0.0000	0.0000	0.0000	0.0000	0.0133	
TOT.	0.0567	0.4567	0.2633	0.1133	0.0600	0.0500	1.0000	

EQUITY SEPTEMBER THRU DECEMBER 1980

STABILITY CLASS E

VELOCITY (MPH)

DIR.	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
N	2.	52.	23.	0.	0.	0.	77.	6.2
NNE	0.	8.	0.	0.	0.	0.	8.	4.5
NE	0.	0.	0.	0.	0.	0.	0.	0.0
ENE	0.	0.	0.	0.	0.	0.	0.	0.0
E	0.	0.	0.	0.	0.	0.	0.	0.0
ESE	0.	0.	0.	0.	0.	0.	0.	0.0
SE	0.	0.	0.	0.	0.	0.	0.	0.0
SSE	1.	5.	12.	31.	11.	4.	64.	14.5
S	0.	5.	17.	4.	0.	0.	26.	9.1
SSW	0.	4.	10.	0.	0.	0.	14.	7.2
SW	1.	3.	8.	0.	0.	0.	12.	7.7
WSW	0.	2.	1.	0.	0.	0.	3.	5.6
W	0.	4.	1.	0.	0.	0.	5.	5.3
WNW	1.	3.	0.	0.	0.	0.	4.	4.7
NW	3.	15.	3.	0.	0.	0.	21.	4.4
NNW	1.	21.	11.	1.	0.	0.	34.	6.6
TOT.	9.	122.	86.	36.	11.	4.		

TOTAL OBSERVATIONS = 268

TOTAL CALM WINDS REPORTED = 0

TOTAL AVERAGE WIND SPEED = 8.4

FREQUENCY DISTRIBUTION

VELOCITY (MPH)

DIR.	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
N	0.0075	0.1940	0.0858	0.0000	0.0000	0.0000	0.2873	
NNE	0.0000	0.0299	0.0000	0.0000	0.0000	0.0000	0.0299	
NE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
ENE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
E	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
ESE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
SE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
SSE	0.0037	0.0187	0.0448	0.1157	0.0410	0.0149	0.2388	
S	0.0000	0.0187	0.0634	0.0149	0.0000	0.0000	0.0970	
SSW	0.0000	0.0149	0.0373	0.0000	0.0000	0.0000	0.0522	
SW	0.0037	0.0112	0.0299	0.0000	0.0000	0.0000	0.0448	
WSW	0.0000	0.0075	0.0037	0.0000	0.0000	0.0000	0.0112	
W	0.0000	0.0149	0.0037	0.0000	0.0000	0.0000	0.0187	
WNW	0.0037	0.0112	0.0000	0.0000	0.0000	0.0000	0.0149	
NW	0.0112	0.0560	0.0112	0.0000	0.0000	0.0000	0.0784	
NNW	0.0037	0.0784	0.0410	0.0037	0.0000	0.0000	0.1269	
TOT.	0.0336	0.4552	0.3209	0.1343	0.0410	0.0149	1.0000	

FREQUENCY OF ALL CALM WINDS = 0.0000

HOUR	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
0100	1.	2.	0.	0.	0.	0.	3.	
0200	0.	2.	0.	0.	0.	0.	2.	
0300	0.	2.	0.	0.	0.	0.	2.	
0400	1.	2.	0.	0.	0.	0.	3.	
0500	2.	0.	1.	0.	0.	0.	3.	
0600	0.	2.	1.	0.	0.	0.	3.	
0700	0.	3.	0.	0.	0.	0.	3.	
0800	1.	1.	0.	0.	0.	0.	2.	
0900	0.	1.	0.	0.	0.	0.	1.	
1000	1.	2.	0.	0.	0.	0.	3.	
1100	1.	4.	0.	2.	0.	0.	7.	
1200	1.	13.	5.	4.	1.	0.	24.	
1300	0.	19.	13.	6.	3.	0.	41.	
1400	1.	22.	13.	6.	2.	1.	45.	
1500	0.	23.	22.	8.	2.	2.	57.	
1600	0.	13.	17.	8.	2.	1.	41.	
1700	0.	4.	9.	2.	1.	0.	16.	
1800	0.	1.	5.	0.	0.	0.	6.	
1900	0.	1.	0.	0.	0.	0.	1.	
2000	0.	1.	0.	0.	0.	0.	1.	
2100	0.	1.	0.	0.	0.	0.	1.	
2200	0.	1.	0.	0.	0.	0.	1.	
2300	0.	1.	0.	0.	0.	0.	1.	
2400	0.	1.	0.	0.	0.	0.	1.	
TOT.	9.	122.	86.	36.	11.	4.		

FREQUENCY DISTRIBUTION

VELOCITY (MPH)

HOUR	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
0100	0.0037	0.0075	0.0000	0.0000	0.0000	0.0000	0.0112	
0200	0.0000	0.0075	0.0000	0.0000	0.0000	0.0000	0.0075	
0300	0.0000	0.0075	0.0000	0.0000	0.0000	0.0000	0.0075	
0400	0.0037	0.0075	0.0000	0.0000	0.0000	0.0000	0.0112	
0500	0.0075	0.0000	0.0037	0.0000	0.0000	0.0000	0.0112	
0600	0.0000	0.0075	0.0037	0.0000	0.0000	0.0000	0.0112	
0700	0.0000	0.0112	0.0000	0.0000	0.0000	0.0000	0.0112	
0800	0.0037	0.0037	0.0000	0.0000	0.0000	0.0000	0.0075	
0900	0.0000	0.0037	0.0000	0.0000	0.0000	0.0000	0.0037	
1000	0.0037	0.0075	0.0000	0.0000	0.0000	0.0000	0.0112	
1100	0.0037	0.0149	0.0000	0.0075	0.0000	0.0000	0.0261	
1200	0.0037	0.0485	0.0187	0.0149	0.0037	0.0000	0.0896	
1300	0.0000	0.0709	0.0485	0.0224	0.0112	0.0000	0.1530	
1400	0.0037	0.0821	0.0485	0.0224	0.0075	0.0037	0.1679	
1500	0.0000	0.0858	0.0821	0.0299	0.0075	0.0075	0.2127	
1600	0.0000	0.0485	0.0634	0.0299	0.0075	0.0037	0.1530	
1700	0.0000	0.0149	0.0336	0.0075	0.0037	0.0000	0.0597	
1800	0.0000	0.0037	0.0187	0.0000	0.0000	0.0000	0.0224	
1900	0.0000	0.0037	0.0000	0.0000	0.0000	0.0000	0.0037	
2000	0.0000	0.0037	0.0000	0.0000	0.0000	0.0000	0.0037	
2100	0.0000	0.0037	0.0000	0.0000	0.0000	0.0000	0.0037	
2200	0.0000	0.0037	0.0000	0.0000	0.0000	0.0000	0.0037	
2300	0.0000	0.0037	0.0000	0.0000	0.0000	0.0000	0.0037	
2400	0.0000	0.0037	0.0000	0.0000	0.0000	0.0000	0.0037	
TOT.	0.0336	0.4552	0.3209	0.1343	0.0410	0.0149	1.0000	

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STABILITY CLASS F

VELOCITY (MPH)

DIR.	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
N	0.	0.	0.	0.	0.	0.	0.	0.0
NNE	0.	0.	0.	0.	0.	0.	0.	0.0
NE	0.	0.	0.	0.	0.	0.	0.	0.0
ENE	0.	0.	0.	0.	0.	0.	0.	0.0
E	0.	0.	0.	0.	0.	0.	0.	0.0
ESE	0.	0.	0.	0.	0.	0.	0.	0.0
SE	0.	0.	0.	0.	0.	0.	0.	0.0
SSE	0.	0.	0.	0.	0.	0.	0.	0.0
S	0.	0.	0.	0.	0.	0.	0.	0.0
SSW	0.	0.	0.	0.	0.	0.	0.	0.0
SW	0.	0.	0.	0.	0.	0.	0.	0.0
WSW	0.	1.	0.	0.	0.	0.	1.	5.1
W	0.	0.	0.	0.	0.	0.	0.	0.0
WNW	0.	0.	0.	0.	0.	0.	0.	0.0
NW	0.	0.	0.	0.	0.	0.	0.	0.0
NNW	0.	3.	2.	0.	0.	0.	5.	7.6
TOT.	0.	4.	2.	0.	0.	0.		

TOTAL OBSERVATIONS = 6

TOTAL CALM WINDS REPORTED = 0

TOTAL AVERAGE WIND SPEED = 7.2

FREQUENCY DISTRIBUTION

VELOCITY (MPH)

DIR.	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
NNE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
NE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
ENE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
E	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
ESE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
SE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
SSE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
S	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
SSW	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
SW	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
WSW	0.0000	0.1667	0.0000	0.0000	0.0000	0.0000	0.1667	
W	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
WNW	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
NW	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
NNW	0.0000	0.5000	0.3333	0.0000	0.0000	0.0000	0.8333	
TOT.	0.0000	0.6667	0.3333	0.0000	0.0000	0.0000	1.0000	

FREQUENCY OF ALL CALM WINDS = 0.0000

HOUR	D-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
0100	0.	0.	0.	0.	0.	0.	0.	
0200	0.	0.	0.	0.	0.	0.	0.	
0300	0.	0.	0.	0.	0.	0.	0.	
0400	0.	0.	0.	0.	0.	0.	0.	
0500	0.	0.	0.	0.	0.	0.	0.	
0600	0.	0.	0.	0.	0.	0.	0.	
0700	0.	0.	0.	0.	0.	0.	0.	
0800	0.	0.	0.	0.	0.	0.	0.	
0900	0.	1.	0.	0.	0.	0.	1.	
1000	0.	0.	1.	0.	0.	0.	1.	
1100	0.	1.	0.	0.	0.	0.	1.	
1200	0.	1.	0.	0.	0.	0.	1.	
1300	0.	0.	1.	0.	0.	0.	1.	
1400	0.	0.	0.	0.	0.	0.	0.	
1500	0.	1.	0.	0.	0.	0.	1.	
1600	0.	0.	0.	0.	0.	0.	0.	
1700	0.	0.	0.	0.	0.	0.	0.	
1800	0.	0.	0.	0.	0.	0.	0.	
1900	0.	0.	0.	0.	0.	0.	0.	
2000	0.	0.	0.	0.	0.	0.	0.	
2100	0.	0.	0.	0.	0.	0.	0.	
2200	0.	0.	0.	0.	0.	0.	0.	
2300	0.	0.	0.	0.	0.	0.	0.	
2400	0.	0.	0.	0.	0.	0.	0.	
TOT.	0.	4.	2.	0.	0.	0.		

FREQUENCY DISTRIBUTION

VELOCITY (MPH)

HOUR	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
0100	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
0200	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
0300	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
0400	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
0500	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
0600	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
0700	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
0800	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
0900	0.0000	0.1667	0.0000	0.0000	0.0000	0.0000	0.1667	
1000	0.0000	0.0000	0.1667	0.0000	0.0000	0.0000	0.1667	
1100	0.0000	0.1667	0.0000	0.0000	0.0000	0.0000	0.1667	
1200	0.0000	0.1667	0.0000	0.0000	0.0000	0.0000	0.1667	
1300	0.0000	0.0000	0.1667	0.0000	0.0000	0.0000	0.1667	
1400	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
1500	0.0000	0.1667	0.0000	0.0000	0.0000	0.0000	0.1667	
1600	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
1700	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
1800	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
1900	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
2100	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
2200	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
2300	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
2400	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
TOT.	0.0000	0.6667	0.3333	0.0000	0.0000	0.0000	1.0000	

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VELOCITY (MPH)

DIR.	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
N	33.	175.	41.	1.	0.	0.	250.	5.3
NNE	3.	16.	0.	0.	0.	0.	19.	4.4
NE	2.	2.	0.	0.	0.	0.	4.	2.3
ENE	2.	4.	0.	0.	0.	0.	6.	3.6
E	0.	0.	1.	0.	0.	0.	1.	7.3
ESE	2.	0.	0.	0.	0.	0.	2.	1.8
SE	4.	7.	4.	3.	0.	0.	18.	6.5
SSE	30.	79.	156.	195.	55.	32.	547.	12.2
S	37.	160.	156.	62.	9.	7.	431.	6.1
SSW	30.	58.	25.	2.	0.	0.	115.	5.0
SW	35.	53.	19.	3.	0.	0.	110.	4.6
WSW	49.	51.	8.	0.	0.	0.	108.	3.7
W	31.	43.	4.	0.	0.	0.	78.	3.7
WNW	33.	37.	0.	0.	0.	0.	70.	3.2
NW	53.	57.	4.	0.	0.	0.	114.	3.4
NNW	59.	130.	51.	2.	0.	0.	242.	5.1
TOT.	403.	872.	469.	268.	64.	39.		

TOTAL OBSERVATIONS = 2115

TOTAL CALM WINDS REPORTED = 2

TOTAL AVERAGE WIND SPEED = 7.3

FREQUENCY DISTRIBUTION

VELOCITY (MPH)

DIR.	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
N	0.0156	0.0827	0.0194	0.0005	0.0000	0.0000	0.1182	
NNE	0.0014	0.0076	0.0000	0.0000	0.0000	0.0000	0.0090	
NE	0.0009	0.0009	0.0000	0.0000	0.0000	0.0000	0.0019	
ENE	0.0009	0.0019	0.0000	0.0000	0.0000	0.0000	0.0028	
E	0.0000	0.0000	0.0005	0.0000	0.0000	0.0000	0.0005	
ESE	0.0009	0.0000	0.0000	0.0000	0.0000	0.0000	0.0009	
SE	0.0019	0.0033	0.0019	0.0014	0.0000	0.0000	0.0085	
SSE	0.0142	0.0374	0.0738	0.0922	0.0260	0.0151	0.2586	
S	0.0175	0.0757	0.0738	0.0293	0.0043	0.0033	0.2038	
SSW	0.0142	0.0274	0.0118	0.0009	0.0000	0.0000	0.0544	
SW	0.0165	0.0251	0.0090	0.0014	0.0000	0.0000	0.0520	
WSW	0.0232	0.0241	0.0038	0.0000	0.0000	0.0000	0.0511	
W	0.0147	0.0203	0.0019	0.0000	0.0000	0.0000	0.0369	
WNW	0.0156	0.0175	0.0000	0.0000	0.0000	0.0000	0.0331	
NW	0.0251	0.0270	0.0019	0.0000	0.0000	0.0000	0.0539	
NNW	0.0279	0.0615	0.0241	0.0009	0.0000	0.0000	0.1144	
TOT.	0.1905	0.4123	0.2217	0.1267	0.0303	0.0184	1.0000	

FREQUENCY OF ALL CALM WINDS = 0.0009

HOUR	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
0100	17.	36.	16.	7.	2.	0.	78.	
0200	17.	31.	11.	9.	1.	2.	71.	
0300	27.	35.	23.	2.	3.	2.	92.	
0400	37.	36.	9.	8.	0.	2.	92.	
0500	38.	27.	13.	9.	2.	1.	90.	
0600	41.	23.	13.	11.	1.	1.	90.	
0700	32.	37.	13.	7.	2.	1.	92.	
0800	37.	30.	12.	10.	2.	1.	92.	
0900	33.	33.	15.	8.	1.	1.	91.	
1000	31.	41.	4.	11.	3.	0.	90.	
1100	15.	53.	8.	8.	5.	1.	90.	
1200	8.	52.	12.	12.	4.	4.	92.	
1300	1.	46.	20.	12.	6.	2.	87.	
1400	1.	44.	21.	9.	6.	5.	87.	
1500	1.	40.	28.	11.	5.	5.	86.	
1600	0.	29.	35.	16.	5.	3.	78.	
1700	1.	32.	26.	10.	3.	3.	75.	
1800	7.	32.	25.	8.	2.	1.	75.	
1900	3.	33.	41.	9.	3.	1.	90.	
2000	6.	43.	25.	17.	2.	1.	94.	
2100	6.	37.	30.	14.	2.	1.	90.	
2200	10.	32.	27.	19.	2.	0.	90.	
2300	14.	37.	19.	23.	1.	1.	95.	
2400	20.	33.	23.	13.	1.	0.	95.	
TOT.	403.	872.	469.	268.	64.	39.		

FREQUENCY DISTRIBUTION

VELOCITY (MPH)

HOUR	0-3	4-7	8-12	13-18	19-24	24-	TOTAL	AVG. SPEED
0100	0.0080	0.0170	0.0076	0.0033	0.0009	0.0000	0.0369	
0200	0.0080	0.0147	0.0052	0.0043	0.0005	0.0009	0.0336	
0300	0.0128	0.0165	0.0109	0.0009	0.0014	0.0009	0.0435	
0400	0.0175	0.0170	0.0043	0.0038	0.0000	0.0009	0.0435	
0500	0.0180	0.0128	0.0061	0.0043	0.0009	0.0005	0.0426	
0600	0.0194	0.0109	0.0061	0.0052	0.0005	0.0005	0.0426	
0700	0.0151	0.0175	0.0061	0.0033	0.0009	0.0005	0.0435	
0800	0.0175	0.0142	0.0057	0.0047	0.0009	0.0005	0.0435	
0900	0.0156	0.0156	0.0071	0.0038	0.0005	0.0005	0.0430	
1000	0.0147	0.0194	0.0019	0.0052	0.0014	0.0000	0.0426	
1100	0.0071	0.0251	0.0038	0.0038	0.0024	0.0005	0.0426	
1200	0.0038	0.0246	0.0057	0.0057	0.0019	0.0019	0.0435	
1300	0.0005	0.0217	0.0095	0.0057	0.0028	0.0009	0.0411	
1400	0.0005	0.0208	0.0099	0.0043	0.0028	0.0024	0.0407	
1500	0.0005	0.0189	0.0132	0.0052	0.0024	0.0024	0.0426	
1600	0.0000	0.0137	0.0165	0.0076	0.0024	0.0014	0.0416	
1700	0.0005	0.0151	0.0123	0.0047	0.0014	0.0014	0.0355	
1800	0.0033	0.0151	0.0118	0.0038	0.0009	0.0005	0.0355	
1900	0.0014	0.0156	0.0194	0.0043	0.0014	0.0005	0.0426	
2000	0.0028	0.0203	0.0118	0.0080	0.0009	0.0005	0.0444	
2100	0.0028	0.0175	0.0142	0.0066	0.0009	0.0005	0.0426	
2200	0.0047	0.0151	0.0128	0.0090	0.0009	0.0000	0.0426	
2300	0.0066	0.0175	0.0090	0.0109	0.0005	0.0005	0.0440	
2400	0.0095	0.0156	0.0109	0.0085	0.0005	0.0000	0.0449	
TOT.	0.1905	0.4123	0.2217	0.1267	0.0303	0.0184	1.0000	

SECTION B
WATER RESOURCES

QUARTERLY REPORT ON THE WATER RESOURCES
ON THE BLACK SULPHUR CREEK DRAINAGE
BX IN SITU OIL SHALE PROJECT
JUNE 1981

Water quality monitoring during the past quarter involved the collection of water quality samples at ES-2, ES-3, BX-13, BX-36 and the storage pond intake line. The collection of water quality samples at alluvial wells A-1A, 2, 3 and 4 was initiated with the March field trip. The laboratory analysis of all sampling locations are presented in Appendix B.

The laboratory analysis results of all constituents indicate no significant changes from previous samples have occurred. The alluvial wells did exhibit slightly higher concentrations of phenols. Presently no baseline record exists for these wells to establish the normal levels of phenols in the alluvial ground water.

During the March sampling trip, streamflow measurements were taken at each surface water station to measure the accuracy of the flumes. The flume at ES-2 was reporting 30% more streamflow than was actually passing through the flume. The flume at ES-3 was completely inoperable due to the backwater effect occurring at this station. The flume on ES-3 should be repositioned for accurate calibration of discharge.

A water quality sampling trip is scheduled for the first week in June to determine water quality characteristics of the project area during spring high flow.

A second water quality sampling trip is scheduled in August to collect samples concurrently with the aquatic biota monitoring program.

APPENDIX B

WELL A-1

Date	Spec. Cond. at 25° C Field (umhos/cm)	Water Temp. (°C)	pH Field (units)	Diss. Oxygen (mg/l)	Static Water Level (inches)
7/19/79	450	13.1	7.5	6.5	91
9/27/79	790	15.0	7.0	4.1	141
12/3/79	1490(a)	7.5	7.15	3.1	114
12/27/79	950(a)	3.3	7.4	4.1	150
1/24/80	850(a)	1.1	8.0	1.0	169.5
3/9/80	980(a)	2.7	7.5	4.7	144
9/30/80	610	11.5	7.1	7.5	136
2/3/81	860	6.0	7.5	2.9	154
3/27/81	884	4.7	7.8	2.3	167

(a) Value has been corrected for systematic instrument error.

WELL A-1A

Date	Spec. Cond. at 25° C Field (umhos/cm)	Water Temp. (°C)	pH Field (units)	Diss. Oxygen (mg/l)	Static Water Level (inches)
7/19/79	210	19.1	7.0	5.5	125
9/27/79	640	12.9	7.6	8.3	108
12/3/79	980(a)	1.7	7.75	6.8	90
12/27/79	700(a)	1.3	7.9	7.2	124
1/25/80	740(a)	0.9	8.1	2.7	124
3/9/80	840(a)	2.7	7.5	6.3	122
9/30/80	629	8.7	7.5	4.0	100
2/3/81	907	6.0	8.0	3.0	118
3/27/81	786	6.8	8.0	4.3	125

(a) Value has been corrected for systematic instrument error.

WELL A-2

Date	Spec. Cond. at 25° C Field (umhos/cm)	Water Temp. (°C)	pH Field (units)	Diss. Oxygen (mg/l)	Static Water Level (inches)
7/19/79	540	13.9	7.5	3.2	20
9/27/79	850	13.5	7.8	3.3	37
12/3/79	940(a)	0.6	7.7	7.3	42
12/27/79	710(a)	1.6	7.7	7.0	52
1/25/80	710(a)	1.6	8.1	6.1	57
3/9/80	880(a)	3.2	7.5	7.9	50
9/30/80	-	-	-	-	*
2/3/81	-	-	-	-	*
3/27/81	760	6.3	8.1	5.5	93

(a) Value has been corrected for systematic instrument error.

* Stream water level was above top of well casing.

WELL A-3

Date	Spec. Cond. at 25° C Field (umhos/cm)	Water Temp. (°C)	pH Field (units)	Diss. Oxygen (mg/l)	Static Water Level (inches)
7/19/79	550	14.4	7.7	5.2	28
9/27/79	810	14.8	7.7	3.6	55
12/3/79	820(a)	0.1	7.8	8.5	48
12/27/79	710(a)	1.3	7.9	7.1	61.5
1/25/80	670(a)	0.6	8.2	6.1	66
3/9/80	790(a)	2.3	7.6	6.9	65
9/30/80	675	10.1	7.5	5.5	46
2/3/81	889	8.0	7.7	4.2	62
3/27/81	834	5.3	7.8	5.6	90

(a) Value has been corrected for systematic instrument error.

WELL A-4

Date	Spec. Cond. at 25° C Field (umhos/cm)	Water Temp. (°C)	pH Field (units)	Diss. Oxygen (mg/l)	Static Water Level (inches)
7/19/79	590	13.5	7.4	2.2	56
9/27/79	900	15.3	7.7	9.1	67
12/3/79	970(a)	4.3	7.6	2.9	78
12/27/79	840(a)	0.3	7.7	4.5	91.5
1/25/80	780(a)	2.2	7.8	0.6	92
3/9/80	850(a)	2.3	7.1	4.6	90
9/30/80	769	11.0	7.3	4.6	64
2/3/81	904	7.3	7.8	3.8	90
3/27/81	897	5.9	7.8	6.8	93

(a) Value has been corrected for systematic instrument error.

WELL A-1A

Lab	Date	Spec. Cond. at 25°C Field (umhos/cm)	Spec. Cond. at 25°C Lab (umhos/cm)	Water Temp. (°C)	pH Field (units)	pH Lab (units)	Turb. Lab (NTU)	Diss. Oxygen (mg/l)	Susp. Solids (mg/l)	Diss. Solids, Calc. Sum. (mg/l)	Diss. Solids, FR 180C (mg/l)	Alka- linity as CaCO ₃ (mg/l)
(CSMR1)	3/27/81	786	808	6.8	8.0	7.7	4300	4.3	13900	595	593	329

WELL A-1A (continued)

Lab	Date	Hardness as CaCO ₃ (mg/l)	Sodium Adsorption Ratio	Oil & Grease (mg/l)	Bicar- bonate (mg/l)	Carbonate (mg/l)	Chloride (mg/l)	Sulfate (mg/l)	Sulfide as S (mg/l)	Fluoride (mg/l)	Calcium (mg/l)	Magne- sium (mg/l)	Sodium (mg/l)
(CSMR1)	3/27/81	365	1.56	<2	401	<0.5	4.5	173	<0.2	0.40	75.0	42.8	68.5

WELL A-1A (continued)

Lab	Date	Potas- sium (mg/l)	Ammonia as N (mg/l)	Total Kjeldahl Nitrogen as N (mg/l)	Nitrite as N (mg/l)	Nitrate as N (mg/l)	Total Phosphorus as P (mg/l)	Diss. Ortho Phosph. as P (mg/l)	COD (mg/l)	TOC (mg/l)	DOC (mg/l)	Arsenic (mg/l)	Barium (mg/l)
(CSMRI)	3/27/81	0.72	0.2	9.1	<0.01	<0.01	3.0	0.03	224	48	4	<0.003	0.1

WELL A-1A (continued)

Lab	Date	Boron (mg/l)	Diss. Cadmium (mg/l)	Diss. Chromium (mg/l)	Diss. Cobalt (mg/l)	Diss. Copper (mg/l)	Cyanide (mg/l)	Diss. Iron (mg/l)	Diss. Lead (mg/l)
(CSMRI)	3/27/81	<0.1	<0.01	<0.01	<0.01	<0.01	<0.004	0.14	<0.05

WELL A-1A (continued)

Lab	Date	Lithium (mg/l)	Diss. Manga- nese (mg/l)	Diss. Mer- cury (mg/l)	Diss. Molby- denum (mg/l)	Diss. Nickel (mg/l)	Diss. Sele- nium (mg/l)	Silica as SiO ₂ (mg/l)	Diss. Zinc (mg/l)
(CSMRI)	3/27/81	<0.01	0.81	<0.0005	<0.05	<0.02	<0.003	17.5	<0.01

WELL A1-A (continued)

Lab	Date	Phenols (mg/l)	Thiocyanate (mg/l)
(CSMRI)	3/27/81	0.18	<0.1

WELL A-2

Lab	Date	Spec. Cond. at 25°C Field (umhos/cm)	Spec. Cond. at 25°C Lab (umhos/cm)	Water Temp. (°C)	pH Field (units)	pH Lab (units)	Turb. Lab (NTU)	Diss. Oxygen (mg/l)	Susp. Solids (mg/l)	Diss. Solids, Calc. Sum. (mg/l)	Diss. Solids, FR 180C (mg/l)	Alka- linity as CaCO ₃ (mg/l)
(CSMR1)	3/27/81	760	807	6.3	8.1	7.9	600	5.5	2910	580	594	321

WELL A-2 (continued)

Lab	Date	Hardness as CaCO ₃ (mg/l)	Sodium Adsorption Ratio	Oil & Grease (mg/l)	Bicar- bonate (mg/l)	Carbonate (mg/l)	Chloride (mg/l)	Sulfate (mg/l)	Sulfide as S (mg/l)	Fluoride (mg/l)	Calcium (mg/l)	Magne- sium (mg/l)	Sodium (mg/l)
(CSMR1)	3/27/81	356	1.53	<2	391	<0.5	4.2	176	<0.2	0.37	71.0	43.5	66.5

WELL A-2 (continued)

Lab	Date	Potas- sium (mg/l)	Ammonia as N (mg/l)	Total Kjeldahl Nitrogen as N (mg/l)	Nitrite as N (mg/l)	Nitrate as N (mg/l)	Total Phosphorus as P (mg/l)	Diss. Ortho Phosph. as P (mg/l)	COD (mg/l)	TOC (mg/l)	DOC (mg/l)	Arsenic (mg/l)	Barium (mg/l)
(CSMRI)	3/27/81	0.55	<0.1	4.6	<0.01	0.20	1.2	0.03	111	27	4	<0.003	<0.1

WELL A-2 (continued)

Lab	Date	Boron (mg/l)	Diss. Cadmium (mg/l)	Diss. Chromium (mg/l)	Diss. Cobalt (mg/l)	Diss. Copper (mg/l)	Diss. Iron (mg/l)	Diss. Lead (mg/l)
(CSMRI)	3/27/81	0.1	<0.01	<0.01	<0.01	<0.01	0.02	<0.05

WELL A-2 (continued)

Lab	Date	Lithium (mg/l)	Diss. Manga- nese (mg/l)	Diss. Mer- cury (mg/l)	Diss. Molby- denum (mg/l)	Diss. Nickel (mg/l)	Diss. Sele- nium (mg/l)	Silica as SiO ₂ (mg/l)	Diss. Zinc (mg/l)
(CSMR1)	3/27/81	<0.01	<0.01	<0.0005	<0.05	<0.02	<0.003	21.5	<0.01

WELL A-2 (continued)

<u>Lab</u>	<u>Date</u>	<u>Phenols (mg/l)</u>	<u>Thiocyanate (mg/l)</u>
(CSMRI)	3/27/81	<0.005	<0.1

WELL A-3

Lab	Date	Spec. Cond. at 25°C Field (umhos/cm)	Spec. Cond. at 25°C Lab (umhos/cm)	Water Temp. (°C)	pH Field (units)	pH Lab (units)	Turb. Lab (NTU)	Diss. Oxygen (mg/l)	Susp. Solids (mg/l)	Diss. Solids, Calc. Sum. (mg/l)	Diss. Solids, FR 180C (mg/l)	Alka- linity as CaCO ₃ (mg/l)
(CSMRI)	3/27/81	834	803	5.3	7.8	7.7	850	5.6	4640	598	589	324

WELL A-3 (continued)

Lab	Date	Hardness as CaCO ₃ (mg/l)	Sodium Adsorption Ratio	Oil & Grease (mg/l)	Bicar- bonate (mg/l)	Carbonate (mg/l)	Chloride (mg/l)	Sulfate (mg/l)	Sulfide as S (mg/l)	Fluoride (mg/l)	Calcium (mg/l)	Magne- sium (mg/l)	Sodium (mg/l)
(CSMRI)	3/27/81	363	1.56	<2	395	<0.6	4.2	179	<0.2	0.31	77.5	41.2	60.3

WELL A-3 (continued)

Lab	Date	Potas- sium (mg/l)	Ammonia as N (mg/l)	Total Kjeldahl Nitrogen as N (mg/l)	Nitrite as N (mg/l)	Nitrate as N (mg/l)	Total Phosphorus as P (mg/l)	Diss. Ortho Phosph. as P (mg/l)	COD (mg/l)	TOC (mg/l)	DOC (mg/l)	Arsenic (mg/l)	Barium (mg/l)
(CSMRI)	3/27/81	0.66	<0.1	4.2	<0.01	0.10	0.40	0.05	134	56	4	<0.003	<0.1

WELL A-3 (continued)

Lab	Date	Boron (mg/l)	Diss. Cadmium (mg/l)	Diss. Chromium (mg/l)	Diss. Cobalt (mg/l)	Diss. Copper (mg/l)	Cyanide (mg/l)	Diss. Iron (mg/l)	Diss. Lead (mg/l)
(CSMRI)	3/27/81	<0.1	<0.01	<0.01	<0.01	<0.01	<0.004	0.05	<0.05

WELL A-3 (continued)

Lab	Date	Lithium (mg/l)	Diss. Manga- nese (mg/l)	Diss. Mer- cury (mg/l)	Diss. Molby- denum (mg/l)	Diss. Nickel (mg/l)	Diss. Sele- nium (mg/l)	'Silica as SiO ₂ (mg/l)	Diss. Zinc (mg/l)
(CSMR1)	3/27/81	<0.01	<0.01	<0.0005	<0.05	<0.02	<0.003	29.2	<0.01

WELL A-3 (continued)

<u>Lab</u>	<u>Date</u>	<u>Phenols (mg/l)</u>	<u>Thiocyanate (mg/l)</u>
(CSMRI)	3/27/81	0.28	<0.1

WELL A-4

Lab	Date	Spec. Cond. at 25°C Field (umhos/cm)	Spec. Cond. at 25°C Lab (umhos/cm)	Water Temp. (°C)	pH Field (units)	pH Lab (units)	Turb. Lab (NTU)	Diss. Oxygen (mg/l)	Susp. Solids (mg/l)	Diss. Solids, Calc. Sum. (mg/l)	Diss. Solids, FR 180C (mg/l)	Alka- linity as CaCO ₃ (mg/l)
(CSMRI)	3/27/81	897	812	5.9	7.8	7.6	400	6.8	3350	604	616	329

WELL A-4 (continued)

Lab	Date	Hardness as CaCO ₃ (mg/l)	Sodium Adsorption Ratio	Oil & Grease (mg/l)	Bicar- bonate (mg/l)	Carbonate (mg/l)	Chloride (mg/l)	Sulfate (mg/l)	Sulfide as S (mg/l)	Fluoride (mg/l)	Calcium (mg/l)	Magne- sium (mg/l)	Sodium (mg/l)
(CSMRI)	3/27/81	369	1.68	<2	401	<0.5	6.5	181	<0.2	0.34	82.0	39.8	74.0

WELL A-4 (continued)

Lab	Date	Potas- sium (mg/l)	Ammonia as N (mg/l)	Total Kjeldahl Nitrogen as N (mg/l)	Nitrite as N (mg/l)	Nitrate as N (mg/l)	Total Phosphorus as P (mg/l)	Diss. Ortho Phosph. as P (mg/l)	COD (mg/l)	TOC (mg/l)	DOC (mg/l)	Arsenic (mg/l)	Barium (mg/l)
(CSMRI)	3/27/81	2.38	0.2	3.7	0.01	0.06	1.2	0.03	89	44	6	<0.003	0.1

WELL A-4 (continued)

<u>Lab</u>	<u>Date</u>	<u>Baron</u> (mg/l)	<u>Diss.</u> <u>Cadmium</u> (mg/l)	<u>Diss.</u> <u>Chromium</u> (mg/l)	<u>Diss.</u> <u>Cobalt</u> (mg/l)	<u>Diss.</u> <u>Copper</u> (mg/l)	<u>Cyanide</u> (mg/l)	<u>Diss.</u> <u>Iron</u> (mg/l)	<u>Diss.</u> <u>Lead</u> (mg/l)
(CSMRI)	3/27/81	0.1	<0.01	<0.01	<0.01	<0.01	<0.004	0.07	<0.05

WELL A-4 (continued)

Lab	Date	Lithium (mg/l)	Diss. Manga- nese (mg/l)	Diss. Mer- cury (mg/l)	Diss. Molby- denum (mg/l)	Diss. Nickel (mg/l)	Diss. Sele- nium (mg/l)	Silica as SiO ₂ (mg/l)	Diss. Zinc (mg/l)
(CSMRI)	3/27/81	<0.01	0.18	<0.0005	<0.05	<0.02	<0.003	16.5	<0.01

WELL A-4 (continued)

<u>Lab</u>	<u>Date</u>	<u>Phenols (mg/l)</u>	<u>Thiocyanate (mg/l)</u>
(CSMRI)	3/27/81	0.12	<0.1

WELL BX-13

Lab	Date	Spec. Cond. at 25°C Field (umhos/cm)	Spec. Cond. at 25°C Lab (umhcs/cm)	Water Temp. (°C)	pH Field (units)	pH Lab (units)	Turb. Lab (NTU)	Diss. Oxygen (mg/l)	Susp. Solids (mg/l)	Diss. Solids, Calc. Sum. (mg/l)	Diss. Solids, FR 180C (mg/l)	Alka- linity as CaCO ₃ (mg/l)
(CAL)	7/5/79	5910	4770	12.7	7.1	7.1	15	1.5	<5	3088	2830	2250
(CAL)	7/19/79	5810	4400	12.6	7.0	7.1	14	1.5	<5	3471	4355	2231
(CAL)	9/27/79	4970	3200	13.8	7.0	7.7	6	1.9	23	3047	5127	1936
(CAL)	10/11/79	6130	5650	11.5	6.8	6.8	86	0.3	<5		3641	
(CAL)	11/22/79	5320	4660	12.6	7.6	7.1	47	0.8	<5	3255	4256	2287
(CAL)	12/3/79	4910	4300	13.1		7.8	69	1.2	<5	3407	4433	2464
(CAL)	12/6/79	5420	4850	11.1	7.1	7.7	40	0.5	<5	3255	3267	2623
(CAL)	12/20/79	5490	4850	7.1	7.1	7.2	3	0.4	12	3400	3589	2688
(CAL)	12/27/79	4910	3860	4.2	7.0	7.8	347	2.0	64	3295	3080	2578
	1/3/80	5190		0.7	7.8			2.5				
	3/9/80	4630		5.9	8.1			5.0				
(CAL)	3/13/80	2930	2950	3.4	8.2	8.8	15	4.3	10	3072	2692	2318
(CSMRI)	3/13/80	5560	4760	8.2	6.9	7.3	28	1.8	3	3470	3580	2060
(CSMRI)	2/3/81	5770	5040	14.8	6.5	7.0	--	2.2	--	3910	3770	2920
(CSMRI)	3/26/81	5800	4120	17.6	6.9	7.0	17	0.6	--	3930	3990	3050

WELL BX-13 (continued)

Lab	Date	Hardness as CaCO ₃ (mg/l)	Sodium Adsorption Ratio	Oil & Grease (mg/l)	Bicar- bonate (mg/l)	Carbonate (mg/l)	Chloride (mg/l)	Sulfate (mg/l)	Sulfide as S (mg/l)	Fluoride (mg/l)	Bromide (mg/l)	Calcium (mg/l)	Magne- sium (mg/l)	Sodium (mg/l)
(CAL)	7/5/79	288	24.9	<5	2748	0	451	48	69	14.5		55	42	1020
(CAL)	7/19/79	330	28.3	<5	2678	0	409	45	354	14.5	<0.1	57	45	1183
(CAL)	9/27/79	203	35.7	<5	2360	0	555	30	12	32	<0.1	33	29	1169
(CAL)	10/11/79	933	18	<5		0	753	30	631	9.6	<0.1	118	153	1230
(CAL)	11/22/79	342	26.4	<5	2790	0	506	24	75	17	<0.1	60	46	1120
(CAL)	12/3/79	308	24.7	<5	3006	0	433	48	227	9.1	<0.1	53	42	996
(CAL)	12/6/79	258	25.6	<5	3200	0	299	48	220	19	<0.1	45	35	975
(CAL)	12/20/79	151	47.9	<5	3254	0	281	33	32	15	<0.1	27	20	1352
(CAL)	12/27/79	214	37.2	<5	2957	0	325	60	77.4	16	<0.1	39	28	1250
	1/3/80													
	3/9/80													
(CAL)	3/13/80	60	71.9	<5	2662	81	238	60	24.4	17.2	<0.1	4	12	1280
(CSMRI)	3/18/80	194	41.2	34	3490	0	280	11	3.5	15.0	10.3	30	29	1320
(CSMRI)	2/3/81	345	35.84	<5	3560	<0.5	415	10	8.0	14.0	<0.1	66.9	43.2	1530
(CSMRI)	3/26/81	371	34.1	4	3720	<0.5	365	6	6.5	12.5	--	77	43.5	1510

WELL BX-13 (continued)

Lab	Date	Potas- sium (mg/l)	Ammonia as N (mg/l)	Total Kjeldahl Nitrogen as N (mg/l)	Nitrite as N (mg/l)	Nitrate as N (mg/l)	Total Phosphorus as P (mg/l)	Diss. Ortho Phosph. as P (mg/l)	COD (mg/l)	TOC (mg/l)	DOC (mg/l)	Arsenic (mg/l)	Alumi- num (mg/l)	Barium (mg/l)
(CAL)	7/5/79	6	3.5	5.9	0.01	1.7	0.86	0.13						
(CAL)	7/19/79	9	4.47	6.23	<0.01	1.3	1.56	1.31	90	30.0	29.0	<0.002	<0.1	<0.03
(CAL)	9/27/79	5	3.8	8.7	0.01	3.2	0.98	0.68	18	18.0	16	<0.002	<0.1	<0.03
(CAL)	10/11/79	11	0.93	10	0.07	3.2	0.42	0.42	462	146	28	<0.002	<0.1	<0.03
(CAL)	11/22/79	6	5.3	6.1	0.03	4.2	1.59	0.36	188	55	38	<0.002	<0.1	<0.03
(CAL)	12/3/79	8	4.1	6.3	0.01	2.2	1.06	0.58	141	51	37	<0.002	<0.1	<0.03
(CAL)	12/6/79	8	3.3	9.6	<0.01	4.3	3.12	2.78	121	45	39	<0.002	<0.1	<0.03
(CAL)	12/20/79	6	4.5	5.6	<0.01	5.1	0.53	0.47	123	46	38	<0.002	<0.1	<0.03
(CAL)	12/27/79	10	2.7	6.3	<0.01	5.8	1.62	0.48	85.8	31	27	<0.002	<0.1	<0.03
	1/3/80													
	3/9/80													
(CAL)	3/13/80	23	3.6	7.8	0.01	1.5	0.14	<0.01	38	15	13	<0.002	<0.1	<0.03
(CSMRI)	3/18/80	7.4	4.7	5.3	<0.01	0.10	0.03	0.02	31	10	10	0.002	0.4	2.3
(CSMRI)	2/3/81	7.60	8.0	2.8	<0.01	<0.01	0.09	0.02	85	26	26	<0.003	<0.2	2.5
(CSMRI)	3/26/81	7.30	6.8	6.8	<0.01	<0.01	0.14	0.02	77	32	32	<0.003	--	2.8

WELL BX-13 (continued)

Lab	Date	Boron (mg/l)	Diss. Cadmium (mg/l)	Total Cadmium (mg/l)	Diss. Chromium (mg/l)	Total Chromium (mg/l)	Diss. Cobalt (mg/l)	Total Cobalt (mg/l)	Diss. Copper (mg/l)	Total Copper (mg/l)	Cyanide (mg/l)	Diss. Iron (mg/l)	Total Iron (mg/l)	Diss. Lead (mg/l)	Total Lead (mg/l)
(CAL)	7/5/79	2.6										0.03	0.11		
(CAL)	7/19/79	2.44	<0.002	<0.002	<0.02	<0.02	<0.03	<0.03	<0.01	<0.01	<0.02	0.90	2.44	<0.05	<0.05
(CAL)	9/27/79	1.8	<0.002	<0.002	<0.02	<0.02	<0.03	<0.03	<0.01	<0.01	<0.02	<0.02	1.97	<0.05	<0.05
(CAL)	10/11/79	1.7	<0.002	<0.002	<0.02	<0.02	<0.03	<0.03	<0.01	<0.01	<0.02	0.13	1.4	<0.05	<0.05
(CAL)	11/22/79	4.7	<0.002	<0.002	<0.02	<0.02	<0.03	<0.03	<0.01	<0.01	<0.02	0.09	1.2	<0.05	<0.05
(CAL)	12/3/79	4.6	<0.002	<0.002	<0.02	<0.02	<0.03	<0.03	<0.01	<0.01	<0.02	0.54	0.72	<0.05	<0.05
(CAL)	12/6/79	2.5	<0.002	<0.002	<0.02	<0.02	<0.03	<0.03	<0.01	<0.01	<0.02	0.39	1.33	<0.05	<0.05
(CAL)	12/20/79	2.3	<0.002	<0.002	<0.02	<0.02	<0.03	<0.03	<0.01	<0.01	<0.02	0.30	3.0	<0.05	<0.05
(CAL)	12/27/79	1.5	<0.002	<0.002	<0.02	<0.02	<0.03	<0.03	<0.01	0.02	<0.02	0.06	0.35	<0.05	<0.05
	1/3/80														
	3/9/80														
(CAL)	3/13/80	0.99	<0.002	<0.002	<0.02	<0.02	<0.03	<0.03	<0.01	0.01	<0.02	0.73	1.8	<0.05	<0.05
(CSMRI)	3/18/80	4.1	<0.01	0.02	0.01	<0.01	0.03	0.03	0.01	0.01	<0.01	0.62	5.2	0.08	0.09
(CSMRI)	2/3/81	4.8	<0.01	--	<0.02	--	<0.02	--	<0.02	--	<0.01	0.12	--	0.05	--
(CSMRI)	3/26/81	4.6	<0.01	--	<0.01	--	<0.01	--	<0.01	--	<0.004	0.02	--	<0.05	--

WELL BX-13 (continued)

Lab	Date	Lithium (mg/l)	Diss. Manga- nese (mg/l)	Total Manga- nese (mg/l)	Diss. Mer- cury (mg/l)	Total Mer- cury (mg/l)	Diss. Molyb- denum (mg/l)	Total Molyb- denum (mg/l)	Diss. Nickel (mg/l)	Total Nickel (mg/l)	Sele- nium (mg/l)	Silica as SiO2 (mg/l)	Diss. Vana- dium (mg/l)	Total Vana- dium (mg/l)	Diss. Zinc (mg/l)	Total Zinc (mg/l)
(CAL)	7/5/79		0.14	0.15								21				
(CAL)	7/19/79	0.14	0.05	0.15		0.0002	<0.1	<0.1	<0.02	<0.02	0.004	20	<0.2	<0.2	0.02	0.07
(CAL)	9/27/79	0.37	0.45	0.47		0.0003	<0.1	<0.1	<0.02	<0.02	0.003	10	<0.2	<0.2	0.18	0.18
(CAL)	10/11/79	0.58	0.08	1.1		<0.0002	<0.1	<0.1	<0.02	<0.02	0.004	15	<0.2	<0.2	0.02	0.07
(CAL)	11/22/79	0.15	0.08	0.13		0.0003	<0.1	<0.1	<0.02	<0.02	0.004	18	<0.2	<0.2	0.06	0.24
(CAL)	12/3/79	0.12	0.08	0.18		0.0003	<0.1	<0.1	<0.02	<0.02	0.003	21	<0.2	<0.2	0.03	0.07
(CAL)	12/6/79	0.11	0.09	0.25		0.0002	<0.1	<0.1	<0.02	<0.02	<0.002	22	<0.2	<0.2	<0.005	<0.005
(CAL)	12/20/79	0.13	0.11	0.11	<0.0002	<0.0002	<0.1	<0.1	<0.02	<0.02	0.002	18	<0.2	<0.2	<0.005	<0.005
(CAL)	12/27/79	0.10	0.09	0.68		<0.0002	<0.1	<0.1	<0.02	<0.02	0.004	22	<0.2	<0.2	0.05	0.11
	1/3/80															
	3/9/80															
(CAL)	3/13/80	0.05	0.03	0.08	<0.0002	<0.0002	<0.1	<0.1	<0.02	<0.02	<0.002	14	<0.2	<0.2	0.009	0.03
(CSMRI)	3/18/80	0.12	0.09	0.10	<0.0005	<0.0005	<0.1	<0.1	0.02	0.06	<0.002	18.0	<0.1	<0.1	<0.01	0.44
(CSMRI)	2/3/81	0.15	0.06	--	<0.0005	--	<0.1	--	<0.03	--	<0.003	25.0	<0.3	--	0.02	--
(CSMRI)	3/26/81	0.14	0.09	--	<0.0005	--	<0.05	--	<0.02	--	<0.003	26.0	--	--	<0.01	--

WELL BX-13 (continued)

Lab	Date	Phe- nols (mg/l)	Thiocy- anate (mg/l)
(CAL)	7/5/79		
(CAL)	7/19/79	<0.1	
(CAL)	9/27/79		
(CAL)	10/11/79		
(CAL)	11/22/79	<0.1	
(CAL)	12/3/79	<0.1	
(CAL)	12/6/79		
(CAL)	12/20/79		
(CAL)	12/27/79	<0.1	
	1/3/80		
	3/9/80		
(CAL)	3/13/80		
(CSMRI)	3/18/80		
(CSMRI)	2/3/81	0.024	0.2
(CSMRI)	3/26/81	0.053	0.3

WELL BX-36

Lab	Date	Spec. Cond. at 25°C Field (umhos/cm)	Spec. Cond. at 25°C Lab (umhos/cm)	Water Temp. (°C)	pH Field (units)	pH Lab (units)	Turb. Lab (NTU)	Diss. Oxygen (mg/l)	Susp. Solids (mg/l)	Diss. Solids, Calc. Sum. (mg/l)	Diss. Solids, FR 180C (mg/l)	Alka- linity as CaCO ₃ (mg/l)
(CAL)	8/17/79	1480	1370	11.4		9.1	65	2.1	21	1242	939	1085
(CAL)	9/7/79	1490	1520	12.9	9.6	9.2	21	0.7	13	943	1091	813
(CAL)	9/27/79	1630	1070	13.3	9.1	8.9	11	2.7	9	862	1256	868
(CAL)	10/11/79	1700	1650	12.8	8.7	8.8	14	0.7	<5	1067	1033	866
(CAL)	12/6/79	1320	1450	7.5	8.7	9.0	6	0.7	<5	1095	959	888
(CAL)	12/20/79	1330	1480	6.7	8.9	8.6	2	1.1	7	1067	1044	901
(CAL)	1/3/80	1220	1020	4.6	8.7	8.8	24	1.7	8	1016	700	838
(CAL)	1/10/80	1300	1170	7.2	8.3	8.4	11	2.5	5	1011	441	850
(CAL)	1/24/80	1070	1420	0.3	8.6	8.7	20	1.1	13	965	1016	861
(CAL)	1/31/80	1260	980	6.5	8.8	8.3	26	0.1	<5	1011	529	868
(CAL)	2/7/80	1290	1610	4.5	8.2	8.4	19	0.7	10	1025	883	866
(CAL)	2/14/80	1330	1120	5.6	8.3	8.5	30	1.6	<5	1051	808	878
(CAL)	2/21/80	1330	1510	1.7	8.2	8.4	21	2.3	12	1079	824	858
(CAL)	3/9/80	1260	940	7.8	8.2	8.3	5	2.3	<5	970	917	844
(CAL)	3/13/80	550	950	4.7	8.2	8.4	11	4.4	<5	979	927	863
(CAL)	3/18/80	1320		6.6	8.3			3.7				
(CAL)	5/8/80	1520	1230	14.9	8.1	8.6	90		65	1102	916	938
(CAL)	6/12/80	1490	1140	9.1	8.1	8.5	14		20	1106	633	886
(CSMRI)	6/12/80	1490	1600	9.1	8.1	8.1	21.9		16	1050	1020	884
(CAL)	9/30/80	1455	1590	6.6	8.3	8.4	38	0.6	19	885	876	673
(CSMRI)	9/30/80	1455	1570	6.6	8.3	8.3	30	0.6	16	990	1020	872
(CSMRI)	2/3/81	1630	1590	8.0	8.0	7.6	--	2.7	--	1010	976	859
(CSMRI)	3/26/81	1683	1400	15.5	8.7	8.5	29	3.0	24	1050	1080	909

WELL BX-36 (continued)

Lab	Date	Hardness as CaCO ₃ (mg/l)	Sodium Adsorption Ratio	Oil & Grease (mg/l)	Bicar- bonate (mg/l)	Carbonate (mg/l)	Chloride (mg/l)	Sulfate (mg/l)	Sulfide as S (mg/l)	Fluoride (mg/l)	Bromide (mg/l)	Calcium (mg/l)	Magne- sium (mg/l)	Sodium (mg/l)
(CAL)	8/17/79	125	17.7	<5	979	181	16	27	<0.1	8.3	<0.1	30	12	456
(CAL)	9/7/79	54	21.8	<5	875	57	14	27	<0.1	15.1	<0.1	12	6	368
(CAL)	9/27/79	47	20.3	<5	813	24	14	18	24	29	<0.1	7	7	319
(CAL)	10/11/79	149	13	<5	994	31	20	18	47	11	<0.1	46	8	377
(CAL)	12/6/79	61	23.4	<5	1015	34	15	51	24	11	<0.1	6	11	420
(CAL)	12/20/79	75	21.1	<5	1036	31	16	45	21	10	<0.1	15	9	420
(CAL)	1/3/80	172	11.2	<5	958	31	13	45	22.3	17	<0.1	52	10	336
(CAL)	1/10/80	51	24.2	<5	1022	8	16	39	12.5	8.9	<0.1	7	8	397
(CAL)	1/24/80	83	17.4	<5	969	25	14	24	8.6	5.9	<0.1	12	13	366
(CAL)	1/31/80	60	21.9	<5	1058	0	15	12	12	6.9	<0.1	9	9	390
(CAL)	2/7/80	55	23.5	7	1042	8	14	30	11.9	16.6	<0.1	7	9	400
(CAL)	2/14/80	51	25.2	<5	1031	20	17	48	7.6	9.6	<0.1	7	8	413
(CAL)	2/21/80	48	28.2	<5	1036	5	16	60	2.8	7.7	<0.1	6	8	450
(CAL)	3/9/80	53	22.7	<5	1029	0	16	15	18.1	7.5	<0.1	8	8	381
(CAL)	3/13/80	53	23.1	<5	1028	12	16	12	12.5	8.1	<0.1	8	8	388
(CAL)	3/18/80													
(CAL)	5/8/80	53	26.1	<5	1076	34	20	39	6.1	7.7	<0.1	8	8	437
(CAL)	6/12/80	98	18.0	<5	1032	11	17	64	0.4	4.14	<0.1	16	14	410
(CSMRI)	6/12/80	82	20.1	<2	1080	0	18.0	34	<0.1	7.1	0.7	12.5	12.3	418
(CAL)	9/30/80	48	21.3	<5	809	0	20	93	<0.1	5.24	<0.1	6	8	340
(CSMRI)	9/30/80	54	22.99	<4	1020	22	20.2	18	<0.1	8.6	<0.1	6.97	8.93	390
(CSMRI)	2/3/81	83	24.98	5	1050	<0.5	22.5	8	<0.1	8.6	<0.1	7.29	8.67	420
(CSMRI)	3/26/81	52	26.2	<2	1020	44	29	<5	<0.2	8.2	--	5.65	9.23	435

WELL BX-36 (continued)

Lab	Date	Potas- sium (mg/l)	Ammonia as N (mg/l)	Total Kjeldahl Nitrogen as N (mg/l)	Nitrite as N (mg/l)	Nitrate as N (mg/l)	Total Phosphorus as P (mg/l)	Diss. Ortho Phosph. as P (mg/l)	COD (mg/l)	TOC (mg/l)	DOC (mg/l)	Arsenic (mg/l)	Alumi- num (mg/l)	Barium (mg/l)
(CAL)	8/17/79	12	0.08	0.31	0.03	2.4	0.62	0.25	55.7	30	18	<0.002	<0.1	<0.03
(CAL)	9/7/79	<1	2.2	2.6	0.01	1.8	0.26	0.22	53	29	16	<0.003	<0.1	<0.03
(CAL)	9/27/79	3	0.66	2.8	<0.01	1.9	0.49	0.42	16	5.0	5.0	<0.002	<0.1	<0.03
(CAL)	10/11/79	3	0.93	2.0	<0.01	1.3	0.48	0.12	20	8	7	<0.002	<0.1	<0.03
(CAL)	12/6/79	3	0.93	3.4	<0.01	2.4	0.54	0.34	17	6.0	5.8	<0.002	<0.1	<0.03
(CAL)	12/20/79	3	0.81	1.3	<0.01	1.4	0.36	0.25	17	5.1	5.1	<0.002	<0.1	<0.03
(CAL)	1/3/80	<1	0.22	0.43	<0.01	3.7	0.71	0.45	15.8	4.8	4.7	<0.002	<0.1	<0.03
(CAL)	1/10/80	<1	1.04	2.3	0.01	1.7	0.12	0.10	12	4.0	3.1	<0.002	<0.1	<0.03
(CAL)	1/24/80	3	0.84	1.8	0.05	0.83	0.51	0.38	15	5.3	4.6	<0.002	<0.1	<0.03
(CAL)	1/31/80	13	0.86	2.4	0.01	1.2	0.52	0.34	30	9	4.3	<0.002	<0.1	<0.03
(CAL)	2/7/80	5	0.58	3.7	0.02	0.50	0.31	0.18	22	8	6	<0.002	<0.1	<0.03
(CAL)	2/14/80	2	0.84	4.2	0.01	0.7	0.14	0.09	17	6	5	<0.002	<0.1	<0.03
(CAL)	2/21/80	2	1.26	4.23	0.01	1.2	0.16	0.14	17	6	5	<0.002	<0.1	<0.03
(CAL)	3/9/80	<1	0.58	3.9	0.04	0.6	0.04	<0.01	15	5	4	<0.002	<0.1	<0.03
(CAL)	3/13/80	<1	0.61	3.7	0.04	0.6	0.05	0.01	20	8	7	<0.002	<0.1	<0.03
(CAL)	3/18/80													
(CAL)	5/8/80	1	0.37	1.9	0.02	2.4	0.14	0.04	23	9	7	<0.002	<0.1	<0.03
(CAL)	6/12/80	2	0.61	0.93	0.02	1.3	0.17	<0.01	5	3	3	<0.002	<0.1	<0.03
(CSMRI)	6/12/80	1.03	0.23	0.3	<0.01	0.16	0.08	0.01	<5	5	5	<0.005	<0.2	0.2
(CAL)	9/30/80	<1	0.40	0.5	0.08	0.01	0.01	0.11	6	4	4	<0.002	<0.1	<0.03
(CSMRI)	9/30/80	0.90	0.60	0.7	0.01	<0.01	0.04	<0.01	<5	3	3	<0.005	<0.1	0.3
(CSMRI)	2/3/81	0.82	0.62	0.4	<0.01	<0.01	0.04	<0.01	11	5	3	<0.003	<0.2	0.3
(CSMRI)	3/26/81	0.92	<0.1	<0.1	<0.01	<0.01	0.02	<0.01	26	5	3	<0.003	--	0.2

WELL BX-36 (continued)

Lab	Date	Boron (mg/l)	Diss. Cadmium (mg/l)	Total Cadmium (mg/l)	Diss. Chromium (mg/l)	Total Chromium (mg/l)	Diss. Cobalt (mg/l)	Total Cobalt (mg/l)	Diss. Copper (mg/l)	Total Copper (mg/l)	Cyanide (mg/l)	Diss. Iron (mg/l)	Total Iron (mg/l)	Diss. Lead (mg/l)	Total Lead (mg/l)
(CAL)	8/17/79	0.35	<0.002	<0.002	<0.02	<0.02	<0.03	<0.03	<0.01	<0.01	<0.02	0.64	1.2	<0.05	<0.05
(CAL)	9/7/79	0.23	<0.002	<0.002	<0.02	<0.02	<0.03	<0.03	<0.01	0.06	<0.02	<0.02	0.90	<0.05	<0.05
(CAL)	9/27/79	0.60	<0.002	<0.002	<0.02	<0.02	<0.03	<0.03	<0.01	<0.01	<0.02	<0.02	0.60	<0.05	<0.05
(CAL)	10/11/79	0.30	<0.002	<0.002	<0.02	<0.02	<0.03	<0.03	<0.01	<0.01	<0.02	<0.02	2.7	<0.05	<0.05
(CAL)	12/6/79	0.47	<0.002	<0.002	<0.02	<0.02	<0.03	<0.03	<0.01	<0.01	<0.02	0.09	0.61	<0.05	<0.05
(CAL)	12/20/79	0.31	<0.002	<0.002	<0.02	<0.02	<0.03	<0.03	<0.01	<0.01	<0.02	<0.02	3.0	<0.05	<0.05
(CAL)	1/3/80	0.12	<0.002	<0.002	<0.02	<0.02	<0.03	<0.03	<0.01	<0.01	<0.02	0.10	0.56	<0.05	<0.05
(CAL)	1/10/80	0.10	<0.002	<0.002	<0.02	<0.02	<0.03	<0.03	<0.01	<0.01	<0.02	0.43	0.68	<0.05	<0.05
(CAL)	1/24/80	0.06	<0.002	<0.002	<0.02	<0.02	<0.03	<0.03	<0.01	<0.01	<0.02	0.41	0.70	<0.05	<0.05
(CAL)	1/31/80	0.46	<0.002	<0.002	<0.02	<0.02	<0.03	<0.03	<0.01	<0.01	<0.02	0.05	0.98	<0.05	<0.05
(CAL)	2/7/80	0.08	<0.002	<0.002	<0.02	<0.02	<0.03	<0.03	<0.01	<0.01	<0.02	0.35	2.4	<0.05	<0.05
(CAL)	2/14/80	0.08	<0.002	<0.002	<0.02	<0.02	<0.03	<0.03	<0.01	<0.01	<0.02	0.25	2.17	<0.05	<0.05
(CAL)	2/21/80	0.10	<0.002	<0.002	<0.02	<0.02	<0.03	<0.03	<0.01	0.02	<0.02	0.85	6.0	<0.05	<0.05
(CAL)	3/9/80	0.13	<0.002	<0.002	<0.02	<0.02	<0.03	<0.03	0.02	0.04	<0.02	0.13	2.1	<0.05	<0.05
(CAL)	3/13/80	0.12	<0.002	<0.002	<0.02	<0.02	<0.03	<0.03	0.02	0.04	<0.02	0.08	3.2	<0.05	<0.05
(CAL)	3/18/80														
(CAL)	5/8/80	0.07	<0.002	<0.002	<0.02	<0.02	<0.03	<0.03	<0.02	<0.02	<0.02	<0.01	0.23	<0.05	<0.05
(CAL)	6/12/80	0.07	<0.002	<0.002	<0.02	<0.02	<0.03	<0.03	<0.01	0.04	<0.02	<0.02	2.7	<0.05	<0.05
(CSMRI)	6/12/80	0.4	<0.01	<0.01	<0.02	0.03	<0.02	<0.02	<0.01	0.01	0.006	0.03	4.35	<0.05	<0.05
(CAL)	9/30/80	0.11	<0.002	<0.002	<0.02	<0.02	<0.03	<0.03	<0.01	0.02	<0.02	<0.02	6.7	<0.05	<0.05
(CSMRI)	9/30/80	0.8	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.03	0.03	<0.01	0.24	8.4	0.03	0.05
(CSMRI)	2/3/81	0.4	<0.01	--	<0.02	--	<0.02	--	<0.02	--	<0.01	10.9	--	<0.05	--
(CSMRI)	3/26/81	0.6	<0.01	--	<0.01	--	<0.01	--	<0.01	--	0.006	0.06	--	<0.05	--

WELL BX-36 (continued)

Lab	Date	Lithium (mg/l)	Diss. Manga- nese (mg/l)	Total Manga- nese (mg/l)	Diss. Mercury (mg/l)	Total Mercury (mg/l)	Diss. Molyb- denum (mg/l)	Total Molyb- denum (mg/l)	Diss. Nickel (mg/l)	Total Nickel (mg/l)	Selen- ium (mg/l)	Silica as SiO2 (mg/l)	Diss. Vana- dium (mg/l)	Total Vana- dium (mg/l)	Diss. Zinc (mg/l)	Total Zinc (mg/l)
(CAL)	8/17/79	0.21	0.04	0.08		0.0003	<0.1	<0.1	<0.02	<0.02	0.003	13	<0.2	<0.2	0.23	0.31
(CAL)	9/7/79	0.20	0.03	0.07		0.0004	<0.1	<0.1	<0.02	<0.02	0.003	11	<0.2	<0.2	0.29	0.36
(CAL)	9/27/79	0.19	0.08	0.08			<0.1	<0.1	<0.02	<0.02	<0.002	12	<0.2	<0.2	0.27	0.27
(CAL)	10/11/79	0.16	0.06	0.06		<0.0002	<0.1	<0.1	<0.02	<0.02	0.005	14	<0.2	<0.2	0.15	0.19
(CAL)	12/6/79	0.16	<0.01	<0.01		0.0003	<0.1	<0.1	<0.02	<0.02	0.003	17	<0.2	<0.2	0.18	0.22
(CAL)	12/20/79	0.22	0.03	0.04	<0.0002	<0.0002	<0.1	<0.1	<0.02	<0.02	0.003	14	<0.2	<0.2	0.38	0.46
(CAL)	1/3/80	0.13	0.07	0.09	<0.0002	<0.0002	<0.1	<0.1	<0.02	<0.02	<0.002	13	<0.2	<0.2	0.24	0.32
(CAL)	1/10/80	0.14	0.06	0.06	<0.0002	<0.0002	<0.1	<0.1	<0.02	<0.02	<0.002	15	<0.2	<0.2	0.24	0.30
(CAL)	1/24/80	0.11	0.06	0.07	<0.0002	<0.0002	<0.1	<0.1	<0.02	<0.02	<0.002	13	<0.2	<0.2	0.28	0.33
(CAL)	1/31/80	0.18	<0.01	0.05	<0.0002	<0.0002	<0.1	<0.1	<0.02	<0.02	0.003	14	<0.2	<0.2	0.22	0.27
(CAL)	2/7/80	0.10	0.04	0.06	<0.0002	<0.0002	<0.1	<0.1	<0.02	<0.02	<0.002	8	<0.2	<0.2	0.12	0.18
(CAL)	2/14/80	0.16	<0.01	0.04	<0.0002	<0.0002	<0.1	<0.1	<0.02	<0.02	<0.002	9	<0.2	<0.2	0.08	0.13
(CAL)	2/21/80	0.15	0.05	0.08	<0.0002	<0.0002	<0.1	<0.1	<0.02	<0.02	<0.002	7	<0.2	<0.2	0.08	0.22
(CAL)	3/9/80	0.14	<0.01	0.02	<0.0002	<0.0002	<0.1	<0.1	<0.02	<0.02	<0.002	8	<0.2	<0.2	0.012	0.11
(CAL)	3/13/80	0.13	0.02	0.06	<0.0002	<0.0002	<0.1	<0.1	<0.02	<0.02	<0.002	6	<0.2	<0.2	0.018	0.19
	3/18/80															
(CAL)	5/8/80	0.11	<0.01	0.01	<0.0002	<0.0002	<0.1	<0.1	<0.02	<0.02	<0.002	8	<0.2	<0.2	0.04	0.09
(CAL)	6/12/80	0.04	0.01	0.12	<0.0002	<0.0002	<0.1	<0.1	<0.02	<0.02	<0.002	13	<0.2	<0.2	0.02	0.18
(CSMRI)	6/12/80	<0.01	0.07	0.12	<0.0005	<0.0005	<0.1	<0.1	<0.02	0.03	<0.005	3.4	<0.1	<0.1	<0.01	0.50
(CAL)	9/30/80	0.02	0.02	0.02	<0.0002	<0.0002	<0.1	<0.1	<0.02	<0.02	<0.002	14	<0.2	<0.2	0.034	0.561
(CSMRI)	9/30/80	0.20	0.03	0.08	<0.0005	<0.0005	<0.1	<0.1	<0.02	0.02	<0.005	3.2	<0.1	<0.1	<0.01	0.61
(CSMRI)	2/3/81	0.16	0.06	--	<0.0005	--	<0.1	--	0.03	--	<0.003	4.4	<0.3	--	0.02	--
(CSMRI)	3/26/81	0.20	<0.01	--	<0.0005	--	<0.05	--	<0.02	--	<0.003	3.4	--	--	<0.01	--

WELL BX-36 (continued)

Lab	Date	Phenols (mg/l)	Thiocyanate (mg/l)
(CAL)	8/17/79	<0.1	
(CAL)	9/7/79	<0.1	
(CAL)	9/27/79		
(CAL)	10/11/79		
(CAL)	12/6/79	<0.1	
(CAL)	12/20/79		
(CAL)	1/3/80		
(CAL)	1/10/80		
(CAL)	1/24/80		
(CAL)	1/31/80		
(CAL)	2/7/80		
(CAL)	2/14/80		
(CAL)	2/21/80		
(CAL)	3/9/80		
(CAL)	3/13/80		
(CAL)	3/18/80		
(CAL)	5/8/80		
(CAL)	6/12/80		
(CSMRI)	6/12/80		
(CAL)	9/30/80		
(CSMRI)	9/30/80		
(CSMRI)	2/3/81	0.118	<0.1
(CSMRI)	3/26/81	.007	<0.1

POND INTAKE LINE

Lab	Date	Spec. Cond. at 25°C Field (umhos/cm)	Spec. Cond. at 25°C Lab (umhos/cm)	Water Temp. (°C)	pH Field (units)	pH Lab (units)	Turb. Lab (NTU)	Diss. Oxygen (mg/l)	Susp. Solids (mg/l)	Diss. Solids, Calc. Sum. (mg/l)	Diss. Solids, FR 180C (mg/l)	Alka- linity as CaCO ₃ (mg/l)
(CSMRI)	9/30 80	2490	6260	15.6	7.8	7.9	39	3.0	16	4320	4530	1020
(CSMRI)	2/3/81	2720	2580	12.0	8.0	7.7	---	1.9	--	1720	1600	1140
(CSMRI)	3/27/81	2650	2110	13.0	7.8	7.8	45	1.0	24	1720	1640	1080

POND INTAKE LINE (cont.)

Lab	Date	Hardness as CaCO ₃ (mg/l)	Sodium Adsorption Ratio	Oil & Grease (mg/l)	Bicar- bonate (mg/l)	Carbonate (mg/l)	Chloride (mg/l)	Sulfate (mg/l)	Sulfide as S (mg/l)	Fluoride (mg/l)	Bromide (mg/l)	Calcium (mg/l)	Magne- sium (mg/l)	Sodium (mg/l)
(CSMR1)	9/30/80	337	40.25	<4	1240	<0.4	2150	137	1.5	4.3	<0.1	60.5	45.3	1700
(CSMR1)	2/3/81	400	11.52	<5	1390	<0.5	195	117	0.6	4.1	<0.1	79.1	49.3	530
(CSMR1)	3/27/81	396	11.4	19	1320	<0.5	240	116	0.7	4.2	--	80.5	47.4	520

POND INTAKE LINE (cont.)

Lab	Date	Potas- sium (mg/l)	Ammonia as N (mg/l)	Total Kjeldahl Nitrogen as N (mg/l)	Nitrite as N (mg/l)	Nitrate as N (mg/l)	Total Phosphorus as P (mg/l)	Diss. Ortho Phosph. as P (mg/l)	COD (mg/l)	TOC (mg/l)	DOC (mg/l)	Arsenic (mg/l)	Alumi- num (mg/l)	Barium (mg/l)
(CSMRI)	9/30/80	4.46	6.7	8.9	<0.01	0.01	0.08	0.02	31	9	8	<0.005	<0.1	0.9
(CSMRI)	2/3/81	4.55	18.5	7.4	0.01	0.02	0.26	0.06	125	20	19	<0.003	<0.2	1.1
(CSMRI)	3/27/81	4.50	12.2	13.4	<0.01	<0.01	0.28	0.06	161	34	23	<0.003	--	0.7

POND INTAKE LINE (cont.)

Lab	Date	Boron (mg/l)	Diss. Cadmium (mg/l)	Total Cadmium (mg/l)	Diss. Chromium (mg/l)	Total Chromium (mg/l)	Diss. Cobalt (mg/l)	Total Cobalt (mg/l)	Diss. Copper (mg/l)	Total Copper (mg/l)	Cyanide (mg/l)	Diss. Iron (mg/l)	Total Iron (mg/l)	Diss. Lead (mg/l)	Total Lead (mg/l)
(CSMRI)	9/30/80	2.6	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	0.17	0.69	<0.02	<0.02
(CSMRI)	2/3/81	1.4	<0.01	--	<0.02	--	<0.02	--	<0.02	--	<0.01	0.16	--	<0.05	--
(CSMRI)	3/27/81	1.7	<0.01	--	<0.01	--	<0.01	--	<0.01	--	<0.004	0.14	--	<0.05	--

POND INTAKE LINE (cont.)

Lab	Date	Lithium (mg/l)	Diss. Manga- nese (mg/l)	Total Manga- nese (mg/l)	Diss. Mercury (mg/l)	Total Mercury (mg/l)	Diss. Molyb- denum (mg/l)	Total Molyb- denum (mg/l)	Diss. Nickel (mg/l)	Total Nickel (mg/l)	Sele- nium (mg/l)	Silica as SiO2 (mg/l)	Diss. Vana- dium (mg/l)	Total Vana- dium (mg/l)	Diss. Zinc (mg/l)	Total Zinc (mg/l)
(CSMRI)	9/30/80	0.30	0.05	0.04	<0.0005	<0.0005	<0.1	<0.1	<0.02	<0.02	<0.005	24.0	<0.1	<0.1	0.06	0.05
(CSMRI)	2/3/81	0.39	0.01	--	<0.0005	--	<0.1	--	<0.03	--	<0.003	26.0	<0.3	--	0.02	--
(CSMRI)	3/27/81	0.39	0.02	--	<0.0005	--	<0.05	--	<0.02	--	<0.003	27.8	--	--	<0.01	--

POND INTAKE LINE (cont.)

<u>Lab</u>	<u>Date</u>	<u>Phenols (mg/l)</u>	<u>Thiocyanate (mg/l)</u>
(CSMRI)	2/3/81	0.70	0.1
(CSMRI)	3/27/81	0.26	0.4

STATION ES-2

Lab	Date	Spec. Cond. at 25°C Field (umhos/cm)	Spec. Cond. at 25°C Lab (umhos/cm)	Water Temp. (°C)	pH Field (units)	pH Lab (units)	Turb. Field (ppm)	Turb. Lab (NTU)	Diss. Oxygen (mg/l)	Gage Height (ft)	Stream Flow (cfs)	Susp. Solids (mg/l)	Diss. Solids Cal.Sum. (mg/l)	Alka- linity as CaCO ₃ (mg/l)	Hard- ness as CaCO ₃ (mg/l)	Sodium Adsorption Ratio
	7/5/79	550		13.7	8.2		2		10.0	1.31	9.09					
(CAL)	7/19/79	550	680	14.4	7.1	8.0	7	4	10.2	0.92	5.28	<5	395	288	273	1.2
	8/17/79	540		12.4	8.3		15		10.2	0.73	3.70					
(CAL)	9/7/79	690	900	16.7	8.3	7.8	6		12.3	0.41	1.52	<5	513	318	345	1.4
(CAL)	9/27/79	730	620	17.9	7.5	8.0	1	<1	14.3	0.38	1.36	<5	426	304	274	1.3
(CAL)	12/3/79	570	740	5.3	8.2	8.0	7	2	10.9	0.32	1.04	<5	585	284	378	1.5
(CAL)	12/27/79	500	690	1.1	8.3	8.0	5	<1	10.8	0.32	1.04	<5	557	313	364	1.4
(CAL)	1/10/80	480	785	2.7	8.2	7.9	8	2	10.8	0.34	1.14	<5	614	312	360	1.9
(CAL)	1/21/80	530	850	4.6	8.4	7.7	9	3	10.2	0.34	1.14	16	560	309	357	1.5
(CAL)	1/24/80	460	840	2.8	8.6	7.9	12	<1		0.34	1.14	<5	558	317	350	1.7
(CAL)	2/7/80	520	910	1.4	8.0	8.1	3	1	12.0	0.33	1.09	<5	585	340	375	1.6
(CAL)	2/21/80	560	900	5.4	8.2	8.0	1	2	14.3	0.34	1.14	8	590	331	361	1.7
(CAL)	3/9/80	510	540	8.8	8.5	7.9	18	1	11.5	0.35	1.19	<5	434	311	304	1.2
	3/13/80	390		8.5	8.1		108		13.2	0.34	1.14					
(CSMRI)	3/18/80	590	874	10.7	8.0	8.4	2		14.8	0.33	1.09	2	565	325	320	1.65
	4/10/80	690		8.7	8.2		3			0.32	1.04					
(CAL)	5/8/80	430	660	4.8	7.7	8.3	580	340		>1.5		1391	556	291	323	0.9
(CSMRI)	5/8/80	430	703	4.8	7.7	8.3	580	350		>1.5		1570	406	256	267	0.98
	5/16/80	350		6.5	8.4		430			>1.5						
(CAL)	6/12/80	440	510	13.0	8.1	8.3	35	26		>1.5		123	528	255	328	1.4
(CSMRI)	6/12/80	440	765	13.0	8.1	8.0	35	11.2		>1.5		118	440	214	321	1.10
	6/20/80	550		14.8	8.2		14		9.9	>1.5						
	7/7/80	580		11.0	8.3		129		9.5	0.96	5.64					
(CAL)	9/29/80	605	770	13.5	8.2	8.2	11	0	13.9	0.40	1.46	<5	575	251	342	1.6
(CSMRI)	9/29/80	605	860	13.5	8.2	8.4	11	1.8	13.9	0.40	1.46	1	572	313	341	1.62
(CSMRI)	2/3/81	859	874	3.0	8.0	8.3	--	<0.5	11.1	1.32	9.20	2	588	319	374	1.55
(CSMRI)	3/26/81	805	937	12.0	8.6	8.4	4	<0.5	10.3	0.3	0.7	2	585	314	378	1.53

STATION ES-2 (continued)

Lab	Date	Oil & Grease (mg/l)	Carbonate (mg/l)	Bicarbonate (mg/l)	Chloride (mg/l)	Sulfate (mg/l)	Sulfide as S (mg/l)	Fluoride (mg/l)	Bromide (mg/l)	Calcium (mg/l)	Magnesium (mg/l)	Sodium (mg/l)	Potassium (mg/l)	Ammonia as N (mg/l)	Total Kjeldahl Nitrogen as N (mg/l)
(CAL)	7/5/79														
(CAL)	7/19/79	<5	0	345	3	69	<0.1	0.42	<0.1	54	33	46	1	0.52	1.72
(CAL)	8/17/79	<5	0	419	3	123	<0.1	1.0	<0.1	71	40	60	<1	0.35	0.46
(CAL)	9/7/79	5	0	371	4	72	<0.1	1.5	<0.1	79	18	50	1	0.08	1.6
(CAL)	9/27/79	<5	0	440	5	153	<0.1	0.42	<0.1	76	45	69	1	0.16	0.24
(CAL)	12/3/79	<5	0	382	8	162	<0.1	0.84	<0.1	74	43	59	<1	0.14	0.22
(CAL)	12/27/79	<5	0	381	10	201	<0.1	1.2	<0.1	69	45	81	<1	0.08	1.2
(CAL)	1/10/80	<5	0	377	1	177	<0.1	0.71	<0.1	70	44	64	<1	0.10	0.23
(CAL)	1/21/80	<5	0	387	1	168	<0.1	0.57	<0.1	65	45	73	<1	0.10	0.22
(CAL)	1/24/80	12	0	414	3	174	<0.1	1.3	<0.1	75	45	70	<1	0.08	0.25
(CAL)	2/7/80	7	0	403	5	183	<0.1	0.9	<0.1	71	44	76	2	0.06	0.31
(CAL)	2/21/80	<5	0	380	7	84	0.2	1.0	<0.1	61	36	48	<1	0.19	0.29
(CAL)	3/9/80	<5	0												
(CSMRI)	3/13/80	<2	17	362	3.8	172	0.3	0.04	1.5	72	34	68	0.60	0.03	0.4
(CAL)	3/18/80	<5	0	355	4	102	0.1	0.96	<0.1	76	32	37	1	0.10	0.33
(CSMRI)	4/10/80	9	12	288	5.0	108	<0.1	0.29	0.3	52.5	33.0	36.8	0.80	0.23	4.0
(CAL)	5/8/80	<5	0	311	4	189	<0.1	0.89	<0.1	71	36	57	4	0.16	0.41
(CSMRI)	5/16/80	<2	0	261	4.9	133	<0.1	0.29	0.7	69.0	36.2	45.2	0.66	0.06	<0.2
(CAL)	6/12/80	<5	0	306	2	231	<0.1	0.46	<0.1	70	40	70	<1	0.08	0.31
(CSMRI)	6/12/80	<4	8	366	4.1	178	<0.1	0.37	0.8	66.6	42.4	68.4	0.63	<0.02	0.3
(CSMRI)	6/20/80	<5	<0.5	389	4.0	178	<0.1	0.34	0.7	75.6	45.0	69.0	0.53	<0.1	0.4
(CSMRI)	7/7/80	<2	21	337	4.2	178	<0.2	0.36	--	79.5	43.6	68.5	0.50	<0.1	<0.1
(CAL)	9/29/80	<5	0												
(CSMRI)	9/29/80	<4	8	366	4.1	178	<0.1	0.37	0.8	66.6	42.4	68.4	0.63	<0.02	0.3
(CSMRI)	2/3/81	<5	<0.5	389	4.0	178	<0.1	0.34	0.7	75.6	45.0	69.0	0.53	<0.1	0.4
(CSMRI)	3/26/81	<2	21	337	4.2	178	<0.2	0.36	--	79.5	43.6	68.5	0.50	<0.1	<0.1

STATION ES-2 (continued)

Lab	Date	Nitrite as N (mg/l)	Nitrate as N (mg/l)	Total Phosphorus as P (mg/l)	Diss. Ortho. Phos. as P (mg/l)	COD (mg/l)	TOC (mg/l)	DOC (mg/l)	Arsenic (mg/l)	Aluminum (mg/l)	Barium (mg/l)	Boron (mg/l)	Diss. Cadmium (mg/l)	Total Cadmium (mg/l)	Diss. Chromium (mg/l)	Total Chromium (mg/l)
(CAL)	7/5/79															
(CAL)	7/9/79	0.01	0.91	0.78	0.65	77	24	21	<0.002	<0.1	<0.03	0.32	<0.002	<0.002	<0.02	<0.02
(CAL)	8/17/79															
(CAL)	9/7/79	<0.01	1.6	0.29	0.28	59	23	20	<0.002	<0.1	<0.03	0.05	<0.002	<0.002	<0.02	<0.02
(CAL)	9/27/79	0.01	1.5	0.46	0.38	20.4	8.0	8.0	<0.002	<0.1	<0.03	0.55	<0.002	<0.002	<0.02	<0.02
(CAL)	12/3/79	0.02	0.61	0.52	0.36	23	8.0	7.3	<0.002	<0.1	<0.03	0.62	<0.002	<0.002	<0.02	<0.02
(CAL)	12/27/79	<0.01	2.1	0.36	0.22	59.1	21	20	<0.002	<0.1	<0.03	0.13	<0.002	<0.002	<0.02	<0.02
(CAL)	1/10/80	0.01	3.2	0.10	0.07	11	3.8	2.8	<0.002	<0.1	<0.03	0.09	<0.002	<0.002	<0.02	<0.02
(CAL)	1/21/80	0.01	0.90	0.38	0.24	15	4.5	3.6	<0.002	<0.1	<0.03	0.04	<0.002	<0.002	<0.02	<0.02
(CAL)	1/24/80	0.01	0.71	0.40	0.25	6.9	2.0	1.0	<0.002	<0.1	<0.03	0.04	<0.002	<0.002	<0.02	<0.02
(CAL)	2/7/80	0.01	0.30	0.08	0.06	16	6	5	<0.002	<0.1	<0.03	0.09	<0.002	<0.002	<0.02	<0.02
(CAL)	2/21/80	<0.01	0.8	0.05	0.02	8	3	3	<0.002	<0.1	<0.03	0.07	<0.002	<0.002	<0.02	<0.02
(CAL)	3/9/80	0.03	0.03	<0.01	<0.01	13	5	4	<0.002	<0.1	<0.03	0.13	<0.002	<0.002	<0.02	<0.02
(CAL)	3/13/80															
(CSMRI)	3/18/80	<0.01	0.06	<0.01	<0.01	13	5	5	0.002	<0.1	<0.1	0.2	<0.01	<0.01	<0.01	<0.01
(CAL)	4/10/80															
(CAL)	5/8/80	0.01	2.0	0.09	0.01	11	8	6	<0.002	<0.1	<0.03	0.05	<0.002	<0.002	<0.02	<0.02
(CSMRI)	5/8/80	0.01	2.4	0.20	0.01	84	7	7	0.005	<0.2	<0.2	<0.05	<0.01	<0.01	<0.02	<0.02
(CAL)	5/16/80															
(CAL)	6/12/80	<0.01	1.3	<0.01	<0.01	6	4	4	<0.002	<0.1	<0.03	0.03	<0.002	<0.002	<0.02	<0.02
(CSMRI)	6/12/80	<0.01	1.21	0.13	0.06	8	5	4	<0.005	<0.2	<0.1	0.2	<0.01	<0.01	<0.02	0.02
(CAL)	6/20/80															
(CAL)	7/7/80															
(CAL)	9/29/80	0.01	0.6	0.03	<0.01	7	5	5	<0.002	<0.1	<0.03	0.08	<0.002	<0.002	<0.02	<0.02
(CSMRI)	9/29/80	<0.01	0.02	0.01	0.02	23	4	4	0.005	0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
(CSMRI)	2/3/81	0.01	0.13	0.01	<0.01	7	3	2	<0.003	<0.2	<0.1	<0.1	<0.01	--	<0.02	--
(CSMRI)	3/26/81	<0.01	<0.01	0.02	<0.01	<5	4	2	<0.003	--	<0.1	<0.1	<0.01	--	<0.01	--

STATION ES-2 (continued)

Lab	Date	Diss. Cobalt (mg/l)	Total Cobalt (mg/l)	Diss. Copper (mg/l)	Total Copper (mg/l)	Cyanide (mg/l)	Diss. Iron (mg/l)	Total Iron (mg/l)	Diss. Lead (mg/l)	Total Lead (mg/l)	Lithium (mg/l)	Diss. Manganese (mg/l)	Total Manganese (mg/l)	Diss. Mercury (mg/l)	Total Mercury (mg/l)	Diss. Molyb- denum (mg/l)	Total Molyb- denum (mg/l)
(CAL)	7/5/79																
(CAL)	7/19/79	<0.03	<0.03	<0.01	<0.01	<0.02	<0.02	0.24	<0.05	<0.05	<0.03	0.03	0.04		<0.0002	<0.1	<0.1
(CAL)	8/17/79																
(CAL)	9/7/79	<0.03	<0.03	<0.01	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.03	0.03	0.04		<0.0002	<0.1	<0.1
(CAL)	9/27/79	<0.03	<0.03	<0.01	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.03	<0.01	0.02		<0.0002	<0.1	<0.1
(CAL)	12/3/79	<0.03	<0.03	<0.01	<0.01	<0.02	<0.02	0.03	<0.05	<0.05	<0.03	0.01	0.03		<0.0002	<0.1	<0.1
(CAL)	12/27/79	<0.03	<0.03	<0.01	0.03	<0.02	<0.02	<0.02	<0.05	<0.05	<0.03	<0.01	0.01		<0.0002	<0.1	<0.1
(CAL)	1/10/80	<0.03	<0.03	<0.01	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.03	<0.01	<0.01	<0.0002	<0.0002	<0.1	<0.1
(CAL)	1/21/80	<0.03	<0.03	<0.01	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.03	<0.01	<0.01	<0.0002	<0.0002	<0.1	<0.1
(CAL)	1/24/80	<0.03	<0.03	<0.01	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.03	<0.01	<0.01	<0.0002	<0.0002	<0.1	<0.1
(CAL)	2/7/80	<0.03	<0.03	<0.01	<0.01	<0.02	0.08	0.10	<0.05	<0.05	<0.03	<0.01	<0.01	<0.0002	<0.0002	<0.1	<0.1
(CAL)	2/21/80	<0.03	<0.03	<0.01	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.03	0.02	0.05	<0.0002	<0.0002	<0.1	<0.1
(CAL)	3/9/80	<0.03	<0.03	0.01	0.89	<0.02	0.05	0.14	<0.05	<0.05	<0.03	<0.01	0.02	<0.0002	<0.0002	<0.1	<0.1
(CAL)	3/13/80																
(CSMRI)	3/18/80	0.02	0.02	0.01	0.01	<0.01	<0.01	0.08	<0.02	0.05	0.01	0.01	0.02	<0.0005	<0.0005	<0.1	<0.1
(CAL)	4/10/80																
(CAL)	5/8/80	<0.03	<0.03	<0.01	0.04	<0.02	0.02	0.04	<0.05	<0.05	<0.03	<0.01	0.08	<0.0002	<0.0002	<0.1	<0.1
(CSMRI)	5/8/80	<0.02	0.02	<0.01	0.06	<0.01	0.07	360	<0.03	<0.03	0.02	0.01	0.79	<0.0005	<0.0005	<0.1	<0.1
(CAL)	5/16/80																
(CAL)	6/12/80	<0.03	<0.03	<0.01	0.02	<0.02	<0.02	1.0	<0.05	<0.05	0.03	<0.01	0.10	<0.0002	<0.0002	<0.1	<0.1
(CSMRI)	6/12/80	<0.02	<0.02	<0.01	0.02	<0.005	0.02	1.79	<0.05	<0.05	<0.01	<0.01	0.05	<0.0005	<0.0005	<0.1	<0.1
(CAL)	6/20/80																
(CAL)	7/7/80																
(CAL)	9/29/80	<0.03	<0.03	<0.01	<0.01	<0.02	<0.02	0.03	<0.05	<0.05	<0.01	0.01	0.03	<0.0002	<0.0002	<0.1	<0.1
(CSMRI)	9/29/80	<0.01	<0.01	<0.01	<0.01	<0.01	0.04	0.10	<0.02	<0.02	<0.01	<0.01	0.01	<0.0005	<0.0005	<0.1	<0.1
(CAL)	9/29/80	<0.03	<0.03	<0.01	<0.01	<0.02	<0.02	0.03	<0.05	<0.05	<0.01	0.01	0.03	<0.0002	<0.0002	<0.1	<0.1
(CSMRI)	9/29/80	<0.01	<0.01	<0.01	<0.01	<0.01	0.04	0.10	<0.02	<0.02	<0.01	<0.01	0.01	<0.0005	<0.0005	<0.1	<0.1
(CSMRI)	2/3/81	<0.02	--	<0.02	--	<0.01	<0.02	--	<0.05	--	<0.01	<0.01	--	<0.0005	--	<0.1	--
(CSMRI)	3/26/81	<0.01	--	<0.01	--	<0.004	0.02	--	<0.05	--	0.01	<0.01	--	<0.0005	--	<0.05	--

STATION ES-2 (continued)

Lab	Date	Diss. Nickel (mg/l)	Total Nickel (mg/l)	Selenium (mg/l)	Silica as SiO ₂ (mg/l)	Diss. Vanadium (mg/l)	Total Vanadium (mg/l)	Diss. Zinc (mg/l)	Total Zinc (mg/l)	Diss. Solids FR180C (mg/l)	Phenols (mg/l)	Thiocyanate (mg/l)
	7/5/79											
(CAL)	7/19/79	<0.02	<0.02	<0.002	16	<0.2	<0.2	<0.005	<0.005	388		
	8/17/79											
(CAL)	9/7/79	<0.02	<0.02	<0.002	6.1	<0.2	<0.2	<0.005	0.007	613	<0.1	
(CAL)	9/27/79	<0.02	<0.02	<0.002	15	<0.2	<0.2	0.03	0.04	612		
(CAL)	12/3/79	<0.02	<0.02	<0.002	17	<0.2	<0.2	<0.005	<0.005	622		
(CAL)	12/27/79	<0.02	<0.02	<0.002	19	<0.2	<0.2	<0.005	0.02	606		
(CAL)	1/10/80	<0.02	<0.02	<0.002	16	<0.2	<0.2	<0.005	<0.005	389		
(CAL)	1/21/80	<0.02	<0.02	<0.002	16	<0.2	<0.2	<0.005	<0.005	595		
(CAL)	1/24/80	<0.02	<0.02	<0.002	14	<0.2	<0.2	<0.005	<0.005	650		
(CAL)	2/7/80	<0.02	<0.02	<0.002	11	<0.2	<0.2	<0.005	<0.005	449		
(CAL)	2/21/80	<0.02	<0.02	<0.002	9	<0.2	<0.2	<0.005	<0.005	410		
(CAL)	3/9/80	<0.02	<0.02	<0.002	9	<0.2	<0.2	0.036	0.14	358		
	3/13/80											
(CSMRI)	3/18/80	<0.01	<0.01	<0.002	14.4	<0.1	<0.1	<0.01	<0.01	563		
	4/10/80											
(CAL)	5/8/80	<0.02	<0.02	<0.002	10	<0.2	<0.2	<0.01	0.03	357		
(CSMRI)	5/8/80	<0.02	0.07	<0.002	6.9	<0.1	0.1	0.01	0.13	449		
	5/16/80											
(CAL)	6/12/80	<0.02	<0.02	<0.002	12	<0.2	<0.2	<0.005	0.011	371		
(CSMRI)	6/12/80	<0.02	<0.02	<0.005	18.2	<0.1	<0.1	<0.01	<0.02	489		
	6/20/80											
	7/7/80											
(CAL)	9/29/80	<0.02	<0.02	<0.002	11	<0.2	<0.2	<0.005	<0.005	436		
(CSMRI)	9/29/80	<0.02	<0.02	<0.005	20.0	<0.1	<0.1	<0.01	0.06	578		
(CSMRI)	2/3/81	<0.03	--	<0.003	19.8	<0.3	--	0.01	--	542	<0.005	<0.1
(CSMRI)	3/26/81	<0.02	--	<0.003	21.0	--	--	<0.01	--	577	<0.005	<0.1

STATION ES-3

Lab	Date	Spec. Cond. at 25°C Field (umhos/cm)	Spec. Cond. at 25°C Lab (umhos/cm)	Water Temp. (°C)	pH Field (units)	pH Lab (units)	Turb. Field (ppm)	Turb. Lab (NTU)	Diss. Oxygen (mg/l)	Gage Height (ft)	Stream Flow (cfs)	Susp. Solids (mg/l)	Diss. Solids Cal. Sum. (mg/l)	Alkalinity as CaCO ₃ (mg/l)	Hardness as CaCO ₃ (mg/l)	Sodium Adsorption Ratio
(CAL)	7/5/79	540	690	13.6	8.0	7.9	1	1	10.3	1.20	7.95	7	475	286	303	1.1
(CAL)	7/19/79	490	680	12.5	7.9	8.1	2	3	9.3	0.92	5.28	<5	409	292	293	1.1
	8/17/79	540		12.9	8.3		42		10.5							
(CAL)	9/7/79	660	870	20.3	8.3	8.0	5	<1	9.2			<5	564	308	369	1.5
(CAL)	9/27/79	720	670	20.3	7.7	8.0		1	9.6			<5	475	284	288	1.5
(CAL)	10/11/79	750	870	18.4	8.3	7.9		3	9.4			<5	508	288	323	1.4
(CAL)	11/22/79	370	810	1.1	9.4	7.8	20	3	9.5	0.19	0.47	<5	522	326	345	1.4
(CAL)	12/3/79	520	720	4.4	7.9	8.0	7.5	2		0.22	0.58	<5	575	309	360	1.6
(CAL)	12/6/79	500	820	4.3	8.3	7.9	8	<1	8.7	0.12	0.23	<5	588	328	386	1.5
(CAL)	12/20/79	390	860	3.9	8.4	7.8	4	1	10.0	0.26	0.75	<5	599	306	372	1.7
(CAL)	12/27/79	400	640	0.5	8.2	7.8	15	<1	9.6	0.26	0.75	<5	628	303	376	1.5
(CAL)	1/3/80	350	590	1.2	8.5	8.0	5	5	10.4	0.22	0.58	<5	500	309	351	1.6
(CAL)	1/10/80	430	975	2.0	8.2	7.8	6	1	10.7	0.24	0.67	<5	562	295	353	1.5
(CAL)	1/21/80	500	790	4.5	8.3	8.1	13	1	10.0	0.21	0.54	<5	527	315	348	1.4
(CAL)	1/25/80	420	860	1.4	8.3	8.0	11	1	9.9	0.25	0.71	<5	556	318	363	1.5
(CAL)	1/31/80	330	570	1.3	9.0	7.9		1	8.5	0.23	0.63	<5	707	343	418	1.6
(CAL)	2/7/80	470	880	0.9	8.0	8.0	4	<1	11.2	0.21	0.54	7	600	321	371	1.6
(CAL)	2/14/80	500	630	4.2	8.3	8.2	1	<1	12.6	0.21	0.54	<5	551	312	347	1.8
(CAL)	2/21/80	550	890	5.1	8.3	8.1	1	2	11.7	0.21	0.54	8	559	325	356	1.6
(CAL)	3/9/80	480	520	9.8	8.2	8.0	5	0	9.6	0.21	0.54	<5	438	295	289	1.4
(CAL)	3/13/80	300	540	9.3	7.9	8.3		0	8.3	0.22	0.58	<5	462	312	297	1.5
(CSMRI)	3/18/80	580	875	12.5	7.9	7.2	2	<1	11.8	0.21	0.54	4	528	263	310	1.71
	4/10/80	690		10.0	8.4		3			0.18	0.43					
(CAL)	5/8/80	450	640	5.4	7.8	8.1	586	350		>1.5		1584	565	331	330	0.90
(CSMRI)	5/8/80	450	729	5.4	7.8	7.8	586	360		>1.5		1610	394	237	266	0.94
	5/16/80	320		6.5	8.3		480			>1.5						
(CAL)	6/12/80	460	510	15.2	8.1	8.3	15	26		>1.5		123	508	247	343	1.1
(CSMRI)	6/12/80	460	747	15.2	8.1	6.8	15	13.4		>1.5		116	462	217	330	1.07
	6/20/80	540		15.2	8.2		11		10.4	>1.5						
	7/7/80	660		11.8	8.3		127		10.6							
(CAL)	9/29/80	589	820	18.1	8.3	8.3	3	0	13.3			<5	553	222	317	1.7
(CSMRI)	9/29/80	589	833	18.1	8.3	8.3	3	<0.5	13.3			<1	553	222	317	1.62
(CSMRI)	2/3/81	793	803	0.1	8.5	8.5	3	<0.5	11.7			3	604	238	360	1.58
(CSMRI)	3/26/81	759	890	10.4	8.7	8.4	5	<0.5	10.8	0.9	0.23		576	308	389	

STATION ES-3 (continued)

Lab	Date	Oil & Grease (mg/l)	Carbonate (mg/l)	Bicarbonate (mg/l)	Chloride (mg/l)	Sulfate (mg/l)	Sulfide as S (mg/l)	Fluoride (mg/l)	Bromide (mg/l)	Calcium (mg/l)	Magnesium (mg/l)	Sodium (mg/l)	Potassium (mg/l)	Ammonia as N (mg/l)	Total Kjeldahl Nitrogen as N (mg/l)
(CAL)	7/5/79	<5	0	349	1.1	129	<0.1	0.38		61	43	47	1	0.36	0.54
(CAL)	7/19/79	<5	0	351	1	78	<0.1	0.33	<0.1	57	36	44	1	0.13	1.43
	8/17/79														
(CAL)	9/7/79	<5	0	404	2	171	<0.1	0.76	<0.1	71	46	66	<1	0.09	0.13
(CAL)	9/27/79	<5	0	346	4	123	<0.1	1.2	<0.1	67	29	59	2	0.05	1.9
(CAL)	10/11/79	7	0	352	9	147	<0.1	0.63	<0.1	59	42	60	2	0.14	0.26
(CAL)	11/22/79	<5	0	398	4	135	<0.1	0.48	<0.1	68	42	58	<1	0.01	0.03
(CAL)	12/3/79	5	0	377	5	183	<0.1	0.25	<0.1	69	45	68	1	0.16	0.19
(CAL)	12/6/79	<5	0	401	3	174	<0.1	0.40	<0.1	76	47	69	1	0.20	1.3
(CAL)	12/20/79	<5	0	430	4	174	<0.1	0.72	<0.1	72	46	76	2	0.11	0.98
(CAL)	12/27/79	<5	0	292	6	270	<0.1	0.46	<0.1	72	47	69	2	0.07	0.16
(CAL)	1/3/80	<5	0	377	2	114	<0.1	0.83	<0.1	62	47	69	<1	0.05	0.11
(CAL)	1/10/80	<5	0	362	10	180	<0.1	0.9	<0.1	66	45	65	<1	0.03	0.05
(CAL)	1/21/80	<5	0	401	4	141	<0.1	0.71	<0.1	65	44	61	<1	0.21	0.22
(CAL)	1/25/80	<5	0	437	2	141	<0.1	0.53	<0.1	70	45	66	<1	0.08	0.09
(CAL)	1/31/80	5	0	419	3	264	<0.1	0.7	<0.1	84	50	77	2	0.1	0.23
(CAL)	2/7/80	7	0	392	5	204	<0.1	0.76	<0.1	70	47	70	<1	0.10	0.29
(CAL)	2/14/80	5	0	381	3	162	<0.1	0.8	<0.1	67	43	75	<1	0.08	0.21
(CAL)	2/21/80	<5	0	398	3	168	<0.1	0.7	<0.1	67	45	69	1	0.04	0.19
(CAL)	3/9/80	<5	0	360	3	102	0.2	0.8	<0.1	56	36	54	<1	0.13	0.19
(CAL)	3/13/80	<5	0	381	4	105	0.7	0.81	<0.1	57	37	61	<1	0.09	0.23
(CSMRI)	3/18/80	<2	0	321	4.2	176	0.2	0.04	1.5	68	34	69	0.63	<0.02	0.3
(CAL)	5/8/80	<5	0	403	5	69	0.2	0.62	<0.1	77	33	36	1	0.08	0.21
(CSMRI)	5/8/80	12	0	290	4.8	106		0.28	0.2	53	32.5	35.4	0.83	0.10	4.1
	5/16/80														
(CAL)	6/12/80	<5	3	294	4	186	<0.1	0.61	<0.1	74	38	46	1	0.11	0.31
(CSMRI)	6/12/80	<2	0	265	4.2	149	<0.1	0.25	0.5	69.6	38.0	44.7	0.68	0.12	0.3
	6/20/80														
	7/7/80														
(CAL)	9/29/80	<5	0	271	4	237	<0.1	0.45	<0.1	60	40	70	<1	0.06	0.27
(CSMRI)	9/29/80	<4	18	321	4.2	176	<0.1	0.36	0.4	58.7	42.4	66.7	0.63	<0.02	0.7
(CSMRI)	2/3/81	<5	<0.5	403	4.2	182	<0.1	0.37	0.8	76.3	46.1	71.0	0.62	<0.1	0.3
(CSMRI)	3/26/81	<2	18	336	4.1	177	<0.2	0.34	--	76.5	43.2	68.0	0.48	0.2	0.4

STATION ES-3 (continued)

Lab	Date	Nitrite as N (mg/l)	Nitrate as N (mg/l)	Total Phosphorus as P (mg/l)	Diss. Ortho. Phos. as P (mg/l)	COD (mg/l)	TOC (mg/l)	DOC (mg/l)	Arsenic (mg/l)	Aluminum (mg/l)	Barium (mg/l)	Boron (mg/l)	Diss. Cadmium (mg/l)	Total Cadmium (mg/l)	Diss. Chromium (mg/l)	Total Chromium (mg/l)
(CAL)	7/5/79	0.01	1.2	0.91	0.43							0.02				
(CAL)	7/19/79	0.01	0.82	0.72	0.59	31	8.8	8.6	<0.002	<0.1	<0.03	0.26	<0.002	<0.002	<0.02	<0.02
	8/17/79															
(CAL)	9/7/79	<0.01	0.9	0.29	0.29	23	11	11	<0.002	<0.1	<0.03	0.05	<0.002	<0.002	<0.02	<0.02
(CAL)	9/27/79	<0.01	1.2	0.36	0.35	22.8	7.0	6.0	<0.002	<0.1	<0.03	0.75	<0.002	<0.002	<0.02	<0.02
(CAL)	10/11/79	0.01	1.0	0.39	0.26	29	10	7	<0.002	<0.1	<0.03	0.30	<0.002	<0.002	<0.02	<0.02
(CAL)	11/22/79	0.03	4.5	0.71	0.59	14	5.0	4.8	<0.002	<0.1	<0.03	0.7	<0.002	<0.002	<0.02	<0.02
(CAL)	12/3/79	0.02	0.73	0.44	0.33	33	10	6.1	<0.002	<0.1	<0.03	0.71	<0.002	<0.002	<0.02	<0.02
(CAL)	12/6/79	<0.01	3.1	1.85	1.74	13	5.0	3.2	<0.002	<0.1	<0.03	0.45	<0.002	<0.002	<0.02	<0.02
(CAL)	12/20/79	<0.01	0.5	0.44	0.37	38	10	7.3	<0.002	<0.1	<0.03	0.28	<0.002	<0.002	<0.02	<0.02
(CAL)	12/27/79	<0.01	2.4	0.34	0.20	41.1	16	15	<0.002	<0.1	<0.03	0.13	<0.002	<0.002	<0.02	<0.02
(CAL)	1/3/80	0.01	3.3	0.62	0.40	19.3	6.4	5.8	<0.002	<0.1	<0.03	0.06	<0.002	<0.002	<0.02	<0.02
(CAL)	1/10/80	0.01	2.2	0.13	0.09	8.3	2.0	1.3	<0.002	<0.1	<0.03	0.11	<0.002	<0.002	<0.02	<0.02
(CAL)	1/21/80	0.01	0.62	0.34	0.26	8.1	2.7	1.3	<0.002	<0.1	<0.03	0.04	<0.002	<0.002	<0.02	<0.02
(CAL)	1/25/80	0.02	0.72	0.39	0.26	5.9	1.8	1.6	<0.002	<0.1	<0.03	0.04	<0.002	<0.002	<0.02	<0.02
(CAL)	1/31/80	0.01	1.5	0.38	0.10	38	12	8.9	<0.002	<0.1	<0.03	0.29	<0.002	<0.002	<0.02	<0.02
(CAL)	2/7/80	0.01	0.30	0.10	0.08	21	8	6	<0.002	<0.1	<0.03	0.07	<0.002	<0.002	<0.02	<0.02
(CAL)	2/14/80	0.01	0.8	0.41	0.34	26	10	8	<0.002	<0.1	<0.03	0.08	<0.002	<0.002	<0.02	<0.02
(CAL)	2/21/80	<0.01	0.7	0.07	0.04	14	5	4	<0.002	<0.1	<0.03	0.08	<0.002	<0.002	<0.02	<0.02
(CAL)	3/9/80	0.03	0.5	0.03	<0.01	17	6	5	<0.002	<0.1	<0.03	0.12	<0.002	<0.002	<0.02	<0.02
(CAL)	3/13/80	0.03	0.5	0.01	<0.01	20	7	6	<0.002	<0.1	<0.03	0.11	<0.002	<0.002	<0.02	<0.02
(CSMRI)	3/18/80	<0.01	0.02	<0.01	<0.01	12	4	4	0.003	0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
(CAL)	5/8/80	0.01	2.1	0.11	0.03	12	5	4	<0.002	<0.1	<0.03	0.04	<0.002	<0.002	<0.02	<0.02
(CSMRI)	5/8/80	<0.01	2.6	0.16	0.01	128	5	5	0.004	<0.2	<0.2	0.1	<0.01	<0.01	<0.02	<0.02
	5/16/80															
(CAL)	6/12/80	<0.01	1.5	<0.01	<0.01	7	5	5	<0.002	<0.1	<0.03	0.03	<0.002	<0.002	<0.02	<0.02
(CSMRI)	6/12/80	<0.01	1.31	0.14	0.03	12	6	4	<0.005	<0.2	<0.1	0.3	<0.01	<0.01	<0.02	<0.02
	6/20/80															
	7/7/80															
(CAL)	9/29/80	<0.01	0.5	<0.01	<0.01	9	6	6	<0.002	<0.1	<0.03	0.09	<0.002	<0.002	<0.02	<0.02
(CSMRI)	9/29/80	<0.01	<0.01	0.01	0.02	6	4	4	<0.005	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01
(CSMRI)	2/3/81	0.01	0.16	0.01	<0.01	7	3	1	<0.003	<0.2	<0.1	<0.1	<0.01	--	<0.02	--
(CSMRI)	3/26/81	<0.01	<0.01	0.02	<0.01	9	2	4	<0.003	--	<0.1	<0.1	<0.01	--	<0.01	--

STATION ES-3 (continued)

Lab	Date	Diss. Cobalt (mg/l)	Total Cobalt (mg/l)	Diss. Copper (mg/l)	Total Copper (mg/l)	Cyanide (mg/l)	Diss. Iron (mg/l)	Total Iron (mg/l)	Diss. Lead (mg/l)	Total Lead (mg/l)	Lithium (mg/l)	Diss. Manganese (mg/l)	Total Manganese (mg/l)	Diss. Mercury (mg/l)	Total Mercury (mg/l)	Diss. Molyb- denum (mg/l)	Total Molyb- denum (mg/l)
(CAL)	7/5/79						<0.02	0.23				0.01	0.04				
(CAL)	7/19/79	<0.03	<0.03	<0.01	<0.01	<0.02	<0.02	0.24	<0.05	<0.05	<0.03	0.04	0.04		<0.0002	<0.1	<0.1
	8/17/79																
(CAL)	9/7/79	<0.03	<0.03	<0.01	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.03	0.02	0.02		<0.0002	<0.1	<0.1
(CAL)	9/27/79	<0.03	<0.03	<0.01	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.03	<0.01	0.01		<0.0002	<0.1	<0.1
(CAL)	10/11/79	<0.03	<0.03	<0.01	<0.01	<0.02	<0.02	0.10	<0.05	<0.05	<0.03	0.02	0.03		<0.0002	<0.1	<0.1
(CAL)	11/22/79	<0.03	<0.03	<0.01	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	0.03	<0.01	<0.01		<0.0002	<0.1	<0.1
(CAL)	12/3/79	<0.03	<0.03	<0.01	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	0.13	<0.01	<0.01		<0.0002	<0.1	<0.1
(CAL)	12/6/79	<0.03	<0.03	<0.01	<0.01	<0.02	0.04	0.06	<0.05	<0.05	<0.03	<0.01	<0.01		0.0003	<0.1	<0.1
(CAL)	12/20/79	<0.03	<0.03	<0.01	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.03	<0.01	<0.01	<0.0002	<0.0002	<0.1	<0.1
(CAL)	12/27/79	<0.03	<0.03	<0.01	0.03	<0.02	<0.02	<0.02	<0.05	<0.05	<0.03	<0.01	<0.01		<0.0002	<0.1	<0.1
(CAL)	1/3/80	<0.03	<0.03	<0.01		<0.02	<0.02	<0.02	<0.05	<0.05	<0.03	<0.01	<0.01		<0.0002	<0.1	<0.1
(CAL)	1/10/80	<0.03	<0.03	<0.01	<0.01	<0.02	<0.02	0.04	<0.05	<0.05	<0.03	<0.01	<0.01	<0.0002	<0.0002	<0.1	<0.1
(CAL)	1/21/80	<0.03	<0.03	<0.01	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.03	<0.01	<0.01	<0.0002	<0.0002	<0.1	<0.1
(CAL)	1/25/80	<0.03	<0.03	<0.01	<0.01	<0.02	<0.02	0.04	<0.05	<0.05	<0.03	<0.01	<0.01	<0.0002	<0.0002	<0.1	<0.1
(CAL)	1/31/80	<0.03	<0.03	<0.01	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	0.05	<0.01	<0.01	<0.0002	<0.0002	<0.1	<0.1
(CAL)	2/7/80	<0.03	<0.03	<0.01	<0.01	<0.02	0.05	0.15	<0.05	<0.05	<0.03	<0.01	<0.01	<0.0002	<0.0002	<0.1	<0.1
(CAL)	2/14/80	<0.03	<0.03	<0.01	<0.01	<0.02	0.03	0.09	<0.05	<0.05	<0.03	<0.01	0.03	<0.0002	<0.0002	<0.1	<0.1
(CAL)	2/21/80	<0.03	<0.03	<0.01	<0.01	<0.02	<0.02	0.07	<0.05	<0.05	<0.03	0.01	0.05	<0.0002	<0.0002	<0.1	<0.1
(CAL)	3/9/80	<0.03	<0.03	0.01	0.44	<0.02	0.04	0.22	<0.05	<0.05	<0.03	<0.01	<0.01	<0.0002	<0.0002	<0.1	<0.1
(CAL)	3/13/80	<0.03	<0.03	0.01	0.05	<0.02	0.08	0.15	<0.05	<0.05	<0.03	<0.01	<0.01	<0.0002	<0.0002	<0.1	<0.1
(CSMRI)	3/18/80	0.02	0.01	0.01	0.01	<0.01	<0.01	0.11	<0.02	0.04	0.01	<0.01	<0.01	<0.0005	<0.0005	<0.1	<0.1
(CAL)	5/8/80	<0.03	<0.03	<0.01	<0.01	<0.02	<0.01	0.06	<0.05	<0.05	<0.03	<0.01	0.14	<0.0002	<0.0002	<0.1	<0.1
(CSMRI)	5/8/80	<0.02	0.02	<0.01	0.05	<0.01	0.07	360	<0.03	<0.03	0.02	<0.01	0.76	<0.0005	<0.0005	<0.1	<0.1
	5/16/80																
(CAL)	6/12/80	<0.03	<0.03	<0.01	0.01	<0.02	<0.02	0.80	<0.05	<0.05	0.04	<0.01	0.08	<0.0002	<0.0002	<0.1	<0.1
(CSMRI)	6/12/80	<0.02	<0.02	<0.01	0.02	<0.005	0.02	1.63	<0.05	<0.05	<0.01	<0.01	0.04	<0.0005	<0.0005	<0.1	<0.1
	6/20/80																
	7/7/80																
(CAL)	9/29/80	<0.03	<0.03	<0.01	<0.01	<0.02	<0.02	<0.02	<0.05	<0.05	<0.01	0.01	0.02	<0.0002	<0.0002	<0.1	<0.1
(CSMRI)	9/29/80	<0.01	<0.01	<0.01	<0.01	<0.01	0.04	0.12	<0.02	<0.02	<0.01	<0.01	<0.01	<0.0005	<0.0005	<0.1	<0.1
(CSMRI)	2/3/81	<0.02	--	<0.02	--	<0.01	<0.02	--	<0.05	--	<0.01	<0.01	--	<0.0005	--	<0.1	--
(CSMRI)	3/26/81	<0.01	--	<0.01	--	<0.004	0.03	--	0.05	--	0.01	<0.01	--	<0.0005	--	<0.05	--

STATION ES-3 (continued)

Lab	Date	Diss. Nickel (mg/l)	Total Nickel (mg/l)	Selenium (mg/l)	Silica as SiO ₂ (mg/l)	Diss. Vanadium (mg/l)	Total Vanadium (mg/l)	Diss. Zinc (mg/l)	Total Zinc (mg/l)	Diss. Solids FR180C (mg/l)	Phenols (mg/l)	Thiocyanate (mg/l)
(CAL)	7/5/79				19					428		
(CAL)	7/19/79	<0.02	<0.02	0.002	17	<0.2	<0.2	<0.005	<0.005	379		
	8/17/79											
(CAL)	9/7/79	<0.02	<0.02	<0.002	7.2	<0.2	<0.2	<0.005	0.009	579	<0.1	
(CAL)	9/27/79	<0.02	<0.02	0.002	17	<0.2	<0.2	0.04	0.04	582		
(CAL)	10/11/79	<0.02	<0.02	0.003	13	<0.2	<0.2	<0.005	0.10	621		
(CAL)	11/22/79	<0.02	<0.02	0.003	13	<0.2	<0.2	<0.005	<0.005	603		
(CAL)	12/3/79	<0.02	<0.02	0.002	16	<0.2	<0.2	0.007	0.02	588		
(CAL)	12/6/79	<0.02	<0.02	0.005	16	<0.2	<0.2	<0.005	<0.005	549		
(CAL)	12/20/79	<0.02	<0.02	0.002	11	<0.2	<0.2	<0.005	<0.005	580		
(CAL)	12/27/79	<0.02	<0.02	0.003	15	<0.2	<0.2	<0.005	0.02	478		
(CAL)	1/3/80	<0.02	<0.02	0.005	16	<0.2	<0.2	0.03	0.05	403		
(CAL)	1/10/80	<0.02	<0.02	0.002	14	<0.2	<0.2	<0.005	0.04	398		
(CAL)	1/21/80	<0.02	<0.02	<0.002	13	<0.2	<0.2	<0.005	0.02	573		
(CAL)	1/25/80	<0.02	<0.02	<0.002	15	<0.2	<0.2	<0.005	0.02	638		
(CAL)	1/31/80	<0.02	<0.02	0.002	18	<0.2	<0.2	<0.005	<0.005	448		
(CAL)	2/7/80	<0.02	<0.02	<0.002	9	<0.2	<0.2	<0.005	<0.005	441		
(CAL)	2/14/80	<0.02	<0.02	<0.002	10	<0.2	<0.2	<0.005	<0.005	383		
(CAL)	2/21/80	<0.02	<0.02	<0.002	8	<0.2	<0.2	<0.005	<0.005	391		
(CAL)	3/9/80	<0.02	<0.02	<0.002	8	<0.2	<0.2	<0.005	0.02	349		
(CAL)	3/13/80	<0.02	<0.02	<0.002	8	<0.2	<0.2	<0.005	<0.005	349		
(CSMRI)	3/18/80	<0.01	<0.01	0.003	14.1	<0.1	<0.1	<0.01	<0.01	562		
(CAL)	5/8/80	<0.02	<0.02	<0.002	11	<0.2	<0.2	<0.005	<0.005	353		
(CSMRI)	5/8/80	<0.02	0.06	<0.002	7.3	<0.1	0.1	0.02	0.11	441		
	5/16/80											
(CAL)	6/12/80	<0.02	<0.02	<0.002	9	<0.2	<0.2	<0.005	<0.005	330		
(CSMRI)	6/12/80	<0.02	<0.02	<0.005	17.8	<0.1	<0.1	<0.01	<0.02	486		
	6/20/80											
	7/7/80											
(CAL)	9/29/80	<0.02	<0.02	<0.002	8	<0.2	<0.2	<0.005	<0.005	392		
(CSMRI)	9/29/80	<0.02	<0.02	<0.005	19.0	<0.1	<0.1	<0.01	0.02	540		
(CSMRI)	2/3/81	<0.03	--	<0.003	20.0	<0.3	--	0.01	--	563	<0.005	<0.1
(CSMRI)	3/26/81	<0.02	--	<0.003	20.0	--	--	<0.01	--	592	<0.005	<0.1

SECTION C
AQUATIC BIOLOGY

QUARTERLY REPORT ON THE AQUATIC BIOLOGY
ON THE BLACK SULPHUR CREEK DRAINAGE
BX IN SITU OIL SHALE PROJECT
JUNE 1981

Introduction

Black Sulphur Creek has been sampled since 1978 to obtain baseline information on the fauna and flora at the Equity Oil Bx Insitu Oil Shale Project site. The purpose of this report is to present the data collected during the initial two aquatic biology field sampling trips of 1981. These two trips were conducted on February 3 and March 29. On the February 3rd field trip, benthic invertebrates and periphyton algae were collected at four stations. Stations were located above and below the two flumes at the upper and lower boundaries of the project site (Figure 1). On March 29th, benthic invertebrates and periphyton algae samples were collected at the same sites. In addition, substrate samples were collected at the four sites, and a fisheries survey was conducted. Two more field trips will be conducted in 1981; one in August and October.

Methods

Periphyton Algae

Periphyton algae samples were randomly selected using a measuring tape and a random numbers table. Four pairs of random numbers were chosen and used as position coordinates. Each sample point was located, and streambed material that was representative of the substrate in a one foot radius around the point was collected. Four substrate samples were collected above and below each weir. The algal material was removed in the field with a stiff bristle brush, preserved, and transported to the laboratory for examination. In addition, quantitative grab samples using a core sampler were collected of abundant matt algae.

Figure 1. Location of aquatic biology sample stations (benthic invertebrates and periphyton algae) at the Equity Oil Bx Insitu Oil Shale Project site.

Samples from below the lower weir and above the upper weir were analyzed from the February and March trips. Samples from above the lower weir were also analyzed from the March trip. In the laboratory the algal samples were heated to 80°C for five minutes to reduce clumping and then well-mixed by shaking. An aliquot of appropriate size was withdrawn by calibrated pipet and filtered through 0.45 micrometer millipore membrane filters. The filters were dried, cleared and permanently mounted on microscope slides. Four subsamples of each replicate were processed from the February trip, while three subsamples were processed from the March trip. The algae were enumerated using the presence/absence technique (Standard Methods, 1975). This processing scheme was selected to increase the statistical reliability of the results and to allow the use of statistical procedures (eg. ANOVA).

Taxonomic identification was made by reference to Patrick and Reimer (1966), Hustedt (1930a, 1930b), Prescott (1962), Weber (1971), Drouet (1968), Drouet and Daily (1956), and Bourrelly (1968). Species diversity was estimated with the Shannon-Weaver Index (Pielou, 1969).

Benthic Invertebrates

Benthic invertebrates were sampled with a Surber sampler (30.48 x 30.48 cm, net mesh 335 microns) in riffle areas and preserved in Kahle's solution. Three samples were randomly selected above and below each weir using the same procedures as described for randomly selecting the algae samples. Although three samples were collected at each station, only two samples from each station were analyzed.

Invertebrates from each sample were hand sorted from debris by placing the contents in white plastic photo trays. The invertebrates were then identified to genus and species when possible and each taxa counted. Taxonomic references used for identification included Pennak (1978),

Wiggins (1977), Edmunds, Jensen, and Berner (1976), Edmondson, (1959), Jewett (1959), Merritt and Cummins (1978), Jensen (1966), Baumam, Gaufin, and Surdick (1977), and Usinger (1956). Species diversity was calculated from the Shannon-Weaver Index (Pielou, 1969).

Substrate Samples

During the March field trip three substrate samples were taken above and below each weir. Substrate samples were taken adjacent to each Surber sample so correlations between the invertebrate population and the substrate composition could be tested. Sediment samples were collected with a stainless steel core sampler 10.2 cm in diameter and 14 cm deep. After pushing the core sampler into the substrate, the sediments (sand and gravel) were scooped out, placed in plastic bags and frozen. Once the sediments were removed, a plug was fitted in the bottom of the sampler which trapped the remaining water and fine sediments (silt and clay) inside the metal core. The sampler was then pulled from the streambed and the water measured and drained into a gallon jug which was then frozen.

The substrate samples were analyzed for the amount of organic material and the substrate particle size composition following the methods outlined in the American Society for Testing and Materials (1972). Four samples, one from each station, were analyzed in the VTN, Oregon laboratory. A Tyler RX-24 portable shaker was used to sieve the sediments. Table 1 lists sieve number and mesh size used for substrate analyses. Four replicate samples from the same stations were sent to Coffey Laboratories, Inc. for analysis. Besides being analyzed for substrate composition, these samples were also analyzed for total solids, volatile solids, and oil and grease.

Table 1. Sieve sizes and corresponding sediment size used for analyzing substrate samples.

<u>Seive Number</u>	<u>Mesh Size</u>	<u>Phi</u>	
1	63.50 mm		coarse gravel
2	15.80 mm		
5	4.00 mm	-2.0	medium gravel
7	2.80 mm	-1.5	
10	2.00 mm	-1.0	
14	1.40 mm	-0.5	fine gravel
18	1.00 mm	0.0	
25	.71 mm	0.5	coarse sand
35	.50 mm	1.0	
45	.35 mm	1.5	medium sand
60	.25 mm	2.0	
80	.18 mm	2.5	fine sand
120	.125 mm	3.0	
170	.090 mm	3.5	very fine sand
230	.063 mm	4.0	
Hydrometer	.05-0.005 mm		silt
	<0.005 mm		clay

Fisheries Survey

Prior to the March 1981 field visit the only fisheries study of Black Sulphur Creek was conducted in September 1976, by the Colorado Division of Wildlife (pers. comm. Dave Weber, Colorado Division of Wildlife). Twenty-nine cutthroat trout were electroshocked from 81 feet of stream during the Colorado Division of Wildlife study. The exact location of this study on Black Sulphur Creek could not be determined. In addition, 0-2 inch rainbow trout were stocked in Black Sulphur Creek in 1966, 1970, and 1971. Because of the past record of fish in Black Sulphur Creek, but the limited nature of the available data, it was decided to electrofish four sections of stream in and near the project site.

Fish surveys were conducted using a Smith-Root Type VII backpack electroshocker. The section of stream to be sampled was first blocked at the upstream end with a 10' x 4' siene to prevent fish movement out of the section. The area was then shocked by walking from the lower end of the section upstream to the siene. Captured fish were identified, measured, weighed (volumetrically) and then released unharmed at their point of capture. Photographs were taken of selected fish for documentation. The sections of stream sampled were located below the lower weir (190 m long), between the lower and upper weirs (440 m long), above the upper weir (231 m long) and at a section 400 m long approximately three miles below the project site (Figure 2). Beaver ponds above the project site were covered with snow and ice and could not be sampled.

Results

Stream Description

Stream observations during the February and March field visits indicate that the stream habitat (substrate, stream channel, and vegetation) has remained unchanged since the August 1980 field visit. Grasses and

■ = Equity Oil Project Site

○ = Fish Survey Sample Site Locations

Figure 2. Location of the fish survey sample sites on Black Sulphur Creek, March 31, 1981.

sagebrush are still the predominant riparian vegetation at the upper weir. At the lower weir riparian vegetation is sparse and provides little cover for fish. There are several pools and brushy areas between the two weirs that provides habitat for fish. The substrate at the lower weir appears to be smaller and to contain more sand and silt than at the upper weir. These conditions are similar to those observed in 1980.

There appears to have been no channel shifts or alterations to the streambed since August 1980. During the March water quality field visit an apparent oil sheen was observed on the surface of the water and in the sediment above the lower weir. However, analyses of water samples and sediment material found no trace of oil or grease (see substrate results section for complete data).

Periphyton Algae

The densities, standard deviations, and percent relative frequencies of the epilithic algae collected in February and March, 1981 are presented in Tables 2 and 3. Densities and standard deviations are weighted with the area of each sample. Because of the clumped nature of the algal distributions in the stream, a square root transformation was performed on the data before statistical analyses.

Not presented in Tables 2 and 3 is the alga Cladophora fracta. This alga was found growing along the edges of the stream in thin, but long mats. Because C. fracta is a filamentous alga, it is not suited to the counting method and is reported as ash free dry weight for February, 1981 in Table 4. The mat biomass, as measured as ash free dry weight, was greatest below the upper weir. The mat harbored large populations of Cocconeis pediculus and Synedra fasciculata that contributed to the ash free dry weight figures. C. pediculus and S. fasciculata in the mat were not enumerated because of the interference of the great amount of ash in the ashed samples.

Table 2. Epilithic algal densities, standard deviations, and percent relative frequency in Black Sulphur Creek in February, 1981. (D = density (organisms/mm²), SD = standard deviation, % = percent relative frequency.)

	Above Upper Weir			Below Lower Weir		
	D	S.D.	%	D	S.D.	%
CYANOPHYCOPHYTA						
Coccoid Blue-green	5	(2)	.021	3	(4)	.021
<u>Chamaesiphon incrustans</u>						
Grunow	50	(36)	.21	23	(13)	.16
Filamentous Blue-green	13	(9)	.56	11	(7)	.077
<u>Schizothrix calcicola</u>	48	(35)	.21	5	(5)	.035
(Agardh) Gomont						
CHLOROPHYCOPHYTA						
Green coccoid #2	55	(41)	.23	13	(14)	.091
#3	1	(1)	.0060	2	(2)	.014
#4	2	(3)	.0081	7	(4)	.049
#5	2	(3)	.0081	4	(3)	.028
#6	2	(3)	.0081	5	(4)	.035
CHRYCOPHYCOPHYTA						
Chrysophyceae						
<u>Hydrurus foetidus</u>						
(Vill.) Trev.	10430	(5692)	45.	73	(53)	.51
<u>Hydrurus foetidus</u> -						
statospores	16	(16)	.07	2	(2)	.014
Bacillariophyceae						
Coscinodiscaceae						
Melosira sp. Agardh.	-	-	-	3	(2)	.021
<u>Cyclotella</u> sp. Kutz.	2	(2)	.0085	4	(3)	.028
Fragilariaceae						
<u>Meridion circulare</u> (Grev.)						
Ag. var. <u>circulare</u>	6	(3)	.025	1	(1)	.0070
<u>Fragilaria</u> sp. Lyngb.	3	(2)	.0011	6	(2)	.042
<u>F. vaucheriae</u> (Kutz.)						
Peters. var. <u>vaucheriae</u>	3	(3)	.0011	12	(6)	.084
<u>Synedra</u> sp. Ehr.	-	-	-	-	-	-
<u>S. ulna</u> (Nitz.) Ehr. var.						
<u>ulna</u>	52	(37)	.22	118	(50)	.82

Table 2. (continued)

	Above Upper Weir			Below Lower Weir		
	<u>D</u>	<u>S.D.</u>	<u>%</u>	<u>D</u>	<u>S.D.</u>	<u>%</u>
CHRYSTOPHYCOPHYTA						
Bacillariophyceae (continued)						
Achnantheae						
<u>Cocconeis pediculus</u>						
Ehr. var. <u>pediculus</u>	18	(9)	.075	17	(7)	.12
<u>C. placentula</u> Ehr. var.						
<u>placentula</u>	1	(1)	.0060	-	-	-
<u>Achnanthes minutissima</u>						
Kutz. var. <u>minutissima</u>	8747	(6032)	37.	9958	(3229)	69.
<u>A. lanceolata</u> Breb. ex.						
Kutz. var. <u>lanceolata</u>	108	(49)	.46	25	(7)	.17
<u>A. lanceolata</u> var.						
<u>dubia</u> Grun.	7	(6)	.031	-	-	-
Naviculaceae						
<u>Frustulia rhomboides</u> (Ehr.)						
De t. var. <u>rhomboides</u>	-	-	-	1	(1)	.0070
<u>Stauroneis smithii</u> Grun.						
var. <u>smithii</u>	1	(.5)	.0030	-	-	-
<u>Navicula</u> sp. Bory	-	-	-	12	(6)	.084
<u>Navicula</u> sp. #2 Bory	3	(2)	.0015	-	-	-
<u>N. secreta</u> var. <u>apiculata</u>						
Patr.	427	(209)	1.8	100	(30)	.70
<u>N. arvensis</u> Hust. var.						
<u>arvensis</u>	359	(114)	1.5	250	(92)	1.7
<u>N. cryptocephala</u> Kutz.						
var. <u>cryptocephala</u>	21	(14)	.091	23	(9)	.16
<u>N. cryptocephala</u> var.						
<u>veneta</u> (Kutz.) Rabh.	196	(109)	.84	46	(17)	.32
<u>N. viridula</u> var. <u>arenacea</u>						
(Breb. ex. Grun.) V.H.	1157	(571)	4.9	110	(46)	.76
<u>N. radiosa</u> Kutz. var.						
<u>radiosa</u>	7	(4)	.029	-	-	-
<u>N. tripunctata</u> (O.F. Mull)						
Bory var. <u>tripunctata</u>	9	(6)	.037	3	(4)	.021
<u>Caloneis ventricosa</u> var.						
<u>minuta</u> (Grun.) Mills	2	(3)	.0081	-	-	-
<u>Pinnularia</u> sp. Ehr.	-	-	-	3	(2)	.021
<u>Pinnularia brebissoni</u>						
var. <u>diminuta</u> (Grun.) Cl.	-	-	-	4	(2)	.028

Table 2. (continued)

	Above Upper Weir			Below Lower Weir		
	<u>D</u>	<u>S.D.</u>	<u>%</u>	<u>D</u>	<u>S.D.</u>	<u>%</u>
CHRYSTOPHYCOPHYTA						
Bacillariophyceae (continued)						
Cymbellaceae						
<u>Cymbella amphicephala</u> Naeg.						
ex. Kutz. var.						
<u>amphicephala</u>	-	-	-	22	(12)	.15
<u>C. microcephala</u> Grun. var.						
<u>microcephala</u>	-	-	-	44	(17)	.31
<u>C. minuta</u> Hilse ex. Rahb.						
var. <u>minuta</u>	73	(37)	.31	320	(105)	2.2
<u>C. sinuata</u> Greg. var.						
<u>sinuata</u>	120	(89)	.51	-	-	-
<u>C. affinis</u> Kutz. var.						
<u>affinis</u>	805	(463)	3.4	2273	(796)	16.
<u>C. cistula</u> (Ehr.) Kirchn.						
var. <u>cistula</u>	10	(5)	.041	99	(36)	.69
<u>Amphora</u> sp. Ehr. ex Kutz.	2	(3)	.0081	-	-	-
<u>A. perpusilla</u> (Grun.)						
Grun. var. <u>perpusilla</u>	17	(9)	.074	-	-	-
Gomphonemaceae						
<u>G. parvulum</u> (Kutz.) Grun.	25	(12)	.11	44	(19)	.31
<u>G. angustatum</u> (Lyngb.)						
Kutz. var. <u>angustatum</u>	106	(66)	.45	5	(4)	.035
<u>G. dichotomum</u> Kutz. var.						
<u>dichotomum</u>	1	(1)	.0060	-	-	-
<u>G. olivaceum</u> (Lyngb.)						
Kutz. var. <u>olivaceum</u>	395	(226)	1.7	223	(121)	1.6
<u>G. tenellum</u>	-	-	-	1	(1)	.0070
Epithemiaceae						
<u>Denticula</u> sp. Kutz.	-	-	-	1	(1)	.0070
Nitzschiaceae						
<u>Nitzschia</u> sp. #1 Hassall	23	(14)	.097	26	(15)	.18
<u>Nitzschia</u> sp. #2 Hassall	56	(29)	.24	88	(47)	.61
<u>N. dissapata</u> (Kutz.) Grun.	6	(3)	.025	11	(2)	.077
<u>N. frustulum</u> (Kutz.) Grun.						
var. <u>frustulum</u>	7	(5)	.028	24	(8)	.17
<u>N. frustulum</u> var.						
<u>subsalina</u> Hurt.	3	(2)	.011	6	(3)	.042
<u>N. subtilis</u> (Kutz.) Grun.	12	(9)	.053	64	(30)	.45
<u>N. sigmoidea</u> (Ehr.) W. Smith	1	(1)	.0060	5	(3)	.035
<u>Hantzschia amphioxys</u>	1	(.5)	.0030	2	(2)	.014

Table 2. (continued)

	Above Upper Weir			Below Lower Weir		
	<u>D</u>	<u>S.D.</u>	<u>%</u>	<u>D</u>	<u>S.D.</u>	<u>%</u>
CHRYSTOPHYCOPHYTA						
Bacillariophyceae (continued)						
Surirellaceae						
<u>Surirella ovalis</u> Brebisson	-	-	-	5	(5)	.035
Miscellaneous Diatoms	19	(10)	.082	25	(8)	.17
Number of Species	50			50		
Total Density	23435	(8840)		14371	(4701)	
Diversity (Shannon-Weaver)	2.16			1.74		
J (Evenness)	0.38			0.31		

Table 3. Epilithic algal densities, standard deviations, and percent relative frequency in Black Sulphur Creek in March, 1981. (D = density (organisms/mm²), SD = standard deviation, % = percent relative frequency.)

	Above Lower Weir			Above Upper Weir			Below Lower Weir		
	D	S.D.	%	D	S.D.	%	D	S.D.	%
CYANOPHYCOPHYTA									
Cocoid Blue-green	5259	(18)	16.	230	(74)	.41	308	(98)	.75
<u>Merismopedia</u> sp. Meyen	35	(17)	.11	-	-	-	8	(9)	.019
<u>Chamaesiphon</u> <u>incrustans</u>									
Grunow	-	-	-	-	-	-	21	(14)	.051
<u>Schizothrix calcicola</u>									
(Agardh) Goment	27	(13)	.084	152	(77)	.27	10	(7)	.024
CHLOROPHYCOPHYTA									
Green cocoid #2	-	-	-	-	-	-	7	(5)	.017
#3	11	(2)	.034	34	(12)	.061	83	(48)	.20
<u>Closterium</u> sp. Nitzsch.	5	(1)	.016	-	-	-	8	(9)	.019
CHRYCOPHYCOPHYTA									
Chrysophyceae									
<u>Hydrurus foetidus</u> (Vill.)									
Trev.	225	(13)	.70	21214 (12382)	38.		255	(78)	.62
<u>Hydrurus foetidus</u> -									
statozooids	-	-	-	46	(45)	.083	16	(17)	.039
Bacillariophyceae									
Fragilariaceae									
<u>Meridion circulare</u> (Grev.)									
Ag. var. <u>circulare</u>	-	-	-	-	-	-	7	(5)	.017
<u>Synedra ulna</u> (Nitz.) Ehr.									
var. <u>ulna</u>	66	(19)	.21	12	(6)	.022	338	(213)	.82
<u>Fragilaria</u> sp. Lyngb.	44	(36)	.14	8	(8)	.014	381	(204)	.92
<u>F. vaucheriae</u> (Kutz.)									
Peters. var. <u>vaucheriae</u>	9	(3)	.028	14	(3)	.025	37	(18)	.090

Table 3. (continued)

	Above Lower Weir			Above Upper Weir			Below Lower Weir		
	D	S.D.	%	D	S.D.	%	D	S.D.	%
CHRYSTOPHYCOPHYTA									
Bacillariophyceae (continued)									
Achnanthaceae									
<u>Cocconeis pediculus</u>									
Ehr. var. <u>pediculus</u>	12	(2)	.038	-	-	-	38	(32)	.092
<u>Achnanthes</u> sp. Bory	2	(3)	.0063	-	-	-	-	-	-
<u>Achnanthes minutissima</u>									
Kutz. var. <u>minutissima</u>	24232	(504)	76.	22043	(4246)	40.	32085	(10248)	78.
<u>A. exigua</u> (Grun. var. <u>exigua</u>)	-	-	-	8	(8)	.014	-	-	-
<u>A. lanceolata</u> Breb. ex. Kutz var. <u>lanceolata</u>	9	(3)	.028	108	(18)	.19	192	(177)	.47
Naviculaceae									
<u>Navicula</u> sp. 2 Bory	6	(1)	.019	17	(16)	.031	8	(9)	.019
<u>Navicula</u> sp. 3 Bory	-	-	-	24	(13)	.043	30	(15)	.073
<u>N. secreta</u> var. <u>apiculata</u> Patr.	61	(10)	.19	582	(258)	1.0	250	(126)	.61
<u>N. arvensis</u> Hust. var. <u>arvensis</u>	91	(29)	.28	165	(69)	.30	491	(297)	1.2
<u>N. cryptocephala</u> Kutz. var. <u>cryptocephala</u>	-	-	-	46	(28)	.083	112	(91)	.27
<u>N. cryptocephala</u> var. <u>veneta</u> (Kutz.) Rabh.	26	(16)	.069	308	(116)	.55	104	(73)	.25
<u>N. viridula</u> var. <u>arenacea</u> (Breb. ex. Grun.) V.H.	145	(12)	.45	807	(152)	1.4	370	(190)	.90
<u>N. radiosa</u> Kutz. var. <u>radiosa</u>	-	-	-	51	(50)	.092	18	(6)	.044
<u>N. tripunctata</u> (O.F. Mull) Bory var. <u>tripunctata</u>	2	(3)	.0063	19	(12)	.034	-	-	-
<u>Caloneis</u> sp. Cl.	-	-	-	-	-	-	15	(15)	.036
<u>Pinnularia</u> sp. Ehr.	-	-	-	4	(2)	.0072	23	(15)	.056

Table 3. (continued)

	Above Lower Weir			Above Upper Weir			Below Lower Weir		
	<u>D</u>	<u>S.D.</u>	<u>%</u>	<u>D</u>	<u>S.D.</u>	<u>%</u>	<u>D</u>	<u>S.D.</u>	<u>%</u>
CHRYSTOPHYCOPHYTA									
Bacillariophyceae (continued)									
Cymbellaceae									
<u>Cymbella minuta</u> Hilse ex.									
Rahb. var. <u>minuta</u>	86	(35)	.27	63	(10)	.11	734	(466)	1.8
<u>C. sinuata</u> Greg. var.									
<u>sinuata</u>	12	(5)	.038	119	(73)	.21	8	(9)	.019
<u>C. cymbiformis</u> var.									
<u>nonpunctata</u> Font.	-	-	-	-	-	-	7	(5)	.017
<u>C. affinis</u> Kutz. var.									
<u>affinis</u>	1163	(122)	3.6	9120	(1644)	16.	2653	(1361)	6.4
<u>C. amphicephala</u> Naeg.									
ex. Kutz. var.									
<u>amphicephala</u>	2	(1)	.0063	-	-	-	53	(50)	.13
<u>C. microcephala</u> Grun.									
var <u>microcephala</u>	40	(8)	.13	4	(2)	.0072	60	(30)	.15
<u>C. cistula</u> (Ehr.) Kirchn.									
var. <u>cistula</u>	96	(12)	.30	7	(2)	.013	425	(333)	1.0
<u>Amphora ovalis</u> var. <u>pediculus</u>									
(Kutz.) V.H. ex Det.	-	-	-	-	-	-	1	(1)	.0024
<u>A. perpusilla</u> (Grun.)									
Grun. var. <u>perpusilla</u>	5	(1)	.016	55	(32)	.099	30	(16)	.073
Gomphonemaceae									
<u>Gomphonema parvulum</u>	14	(4)	.044	3	(3)	.0054	79	(66)	.19
<u>G. angustatum</u> (Lyngb.)									
Kutz. var. <u>angustatum</u>	60	(6)	.19	153	(25)	.27	95	(16)	.23
<u>G. olivaceum</u> (Lyngb.)									
Kutz. var. <u>olivaceum</u>	136	(35)	.43	212	(17)	.38	675	(322)	1.6
<u>G. subclavatum</u> (Grun.)									
Grun. var <u>subclavatum</u>	8	(0)	.025	-	-	-	-	-	-

Table 3. (continued)

	Above Lower Weir			Above Upper Weir			Below Lower Weir		
	<u>D</u>	<u>S.D.</u>	<u>%</u>	<u>D</u>	<u>S.D.</u>	<u>%</u>	<u>D</u>	<u>S.D.</u>	<u>%</u>
CHRYSTOPHYCOPHYTA									
Bacillariophyceae (continued)									
Epithemiaceae									
<u>Denticula</u> sp. Kutz.	-	-	-	-	-	-	8	(9)	.019
Nitzschiaceae									
<u>Nitzschia</u> sp. #1 Hassall	21	(5)	.066	17	(16)	.03	7	(5)	.017
<u>Nitzschia</u> sp. #2 Hassall	7	(.3)	.022	23	(.3)	.041	99	(74)	.24
<u>N. dissapata</u> (Kutz.) Grun.	7	(3)	.022	4	(2)	.0072	29	(15)	.070
<u>N. frustulum</u> (Kutz.) Grun.									
var. <u>frustulum</u>	10	(6)	.031	22	(16)	.040	26	(15)	.063
<u>N. subtilis</u> (Kutz.) Grun.	40	(3)	.13	-	-	-	902	(623)	2.2
<u>N. sigmoidea</u> (Ehr.) W. Smith	2	(1)	.0063	3	(3)	.0054	7	(5)	.017
Surirellaceae									
<u>Surirella ovalis</u>	-	-	-	-	-	-	68	(35)	.16
Miscellaneous Diatoms	-	-	-	41	(29)	.074	85	(43)	.21
Number of Species	36			37			47		
Total Density	31974 (741)			55749 (19147)			41269 (14823)		
Diversity (Shannon-Weaver)	1.26			1.93			1.64		
J (Evenness)	0.24			0.37			0.29		

Table 4. Ash free dry weight of Cladophora fracta mats in Black Sulphur Creek in February, 1981.

Ash free dry weight February, 1981

Above Upper Weir	0.030 gm/m ²
Below Upper Weir	1.6 gm/m ²
Below Lower Weir	0.099 gm/m ²

Table 5 presents a summary of Tables 2 and 3 containing only the most numerous algae.

No significant differences in total algal density between stations in either month ($P > 0.2$) were observed. There was a significant increase above the upper weir between February and March (23400 orgs/mm² to 55700 orgs/mm²) ($P = 0.04$) as well as below the lower weir (14400 orgs/mm² to 41300 orgs/mm²) ($P = 0.038$). The average total density for all stations combined increased from 18768 orgs/mm² in February to 40943 orgs/mm² in March ($P = 0.020$).

Species composition of the most numerous algae did not change significantly. Hydrurus foetidus, Achnanthes minutissima, and Cymbella affinis made the most contribution to the total densities. A coccoid blue-green (possibly Chamaesiphon incrustans) was a major fraction of the total cell density above the lower weir in March, 1981.

There was a significant ($P = 0.02$) difference in the density of H. foetidus between above the upper weir (10400 orgs/mm²) and below the lower weir (73 orgs/mm²) in February. There was also a significant difference in densities ($P = 0.026$) between these two stations (21200 orgs/mm² and 255 orgs/mm², respectively) in March, 1981. The density of H. foetidus above the upper weir was significantly higher above the lower weir in March ($P = 0.02$). Between February and March the density of H. foetidus (10400 orgs/mm² and 21200 orgs/mm², respectively) did not increase significantly ($P = 0.26$). There was a slight, but significant increase in density below the lower weir (75 to 255 orgs/mm²) between February and March ($P = 0.030$).

Between above the upper weir and below the lower weir there was no significant change in the density of Achnanthes minutissima (8700 orgs/mm² and 9960 orgs/mm², respectively) in either February or March (22000 and 32100 orgs/mm²) ($P > 0.900$). The density of A. minutissima above the lower weir (24200 orgs/mm²) was not different from the other

Table 5. Summary of Epilithic Algae densities from Black Sulphur Creek in February and March, 1981.
(D = density (organisms/mm²), SD = standard deviation, % = percent relative frequency.)

	<u>Above Lower Weir</u>			<u>Above Upper Weir</u>			<u>Below Lower Weir</u>		
	<u>D</u>	<u>S.D.</u>	<u>%</u>	<u>D</u>	<u>S.D.</u>	<u>%</u>	<u>D</u>	<u>S.D.</u>	<u>%</u>
<u>February, 1981</u>									
<u>Hydrurus foetidus</u>	10430	(5692)	45.	-	-	-	73	(53)	.51
<u>Achnanthes minutissima</u>	8747	(6032)	37.	-	-	-	9958	(3229)	69.
<u>Cymbella affinis</u>	805	(463)	3.4	-	-	-	2273	(796)	16.
Total Density	23435	(8840)					14371	(4371)	
Number Species	50						50		
Diversity (Shannon-Weaver)	2.16						1.74		
Evenness	0.38						0.31		
<u>March, 1981</u>									
<u>Coccoid Blue-green</u>	230	(74)	.41	5259	(81)	16.	308	(98)	.75
<u>Hydrurus foetidus</u>	21214	(12382)	38.	225	(13)	.70	255	(78)	.62
<u>Achnanthes minutissima</u>	22043	(4446)	40.	24232	(504)	76.	32085	(10248)	78.
<u>Cymbella affinis</u>	9120	(1644)	16.	1163	(122)	3.6	2653	(1361)	6.4
Total Density	55749	(19147)		31974	(741)		41269	(14823)	
Number Species	37			36			47		
Diversity (Shannon-Weaver)	1.93			1.26			1.63		
Evenness	0.37			0.24			0.29		

two stations in March. There was a significant ($P=0.034$) increase in its density above the upper weir between February and March as well as below the lower weir ($P=0.03$).

The density of Cymbella affinis exhibited a significant change between above the lower weir (800 orgs/mm²) and below the lower weir (2300 orgs/mm²) in February ($P=0.036$). During March there was no significant difference ($P>0.40$) in the density of C. affinis between above the lower weir and below the lower weir. Its density above the upper weir (9100 orgs/mm²) was significantly different from above the lower weir (2700 orgs/mm²) ($P=0.45$). Above the upper weir the density of C. affinis increased from 800 orgs/mm² in February to 9100 orgs/mm² in March ($P<0.01$).

Benthic Invertebrates

A total of 31 taxa were collected and identified from the February and March field trips. Twenty taxa, the most collected at a single station, were identified from both above and below the upper weir in February (Table 6). Of the 31 taxa identified, three consistently occurred as the dominant invertebrates at all four stations: Baetis tricaudatus, Isoperla quinquepunctata, and Chironomidae. The changes observed in total density and in species composition between months (February and March) or stations are almost completely due to changes in one or more of these three taxa.

In February, Baetis spp. were the dominant taxa at both lower weir stations, while chironomids were the dominant taxa at both upper weir stations. In March Baetis spp. remained dominant below the lower weir. However, above the lower weir chironomids dominated due to a large reduction in the numbers of Baetis. At the upper weir in March both stations were dominated by I. quinquepunctata, primarily as a result of a large reduction in the numbers of chironomids from February.

Table 6. Comparison of benthic invertebrate species composition, relative abundance, and density at four sample sites on Black Sulphur Creek, February 3, 1981.

TAXA	Below Lower Weir		Above Lower Weir		Below Upper Weir		Above Upper Weir	
	No/m ²	%	No/m ²	%	No/m ²	%	No/m ²	%
EPHEMEROPTERA		47.8		59.6		24.7		11.7
Baetidae								
<u>Baetis tricaudatus</u>	881.8	29.9	13,451.6	37.8	1,636.2	9.6	892.5	2.8
<u>Baetis bicaudatus</u>	462.4	15.7	7,053.8	19.8	785.8	4.6	397.8	1.2
Heptageniidae								
<u>Epeorus</u> sp.	-	-	10.8	<0.1	-	-	-	-
Leptophlebiidae								
<u>Paraleptophlebia</u> sp.	21.5	0.7	-	-	-	-	-	-
Ephemerellidae								
<u>Ephemerella inermis</u>	43.0	1.5	720.4	2.0	1,781.5	10.5	2,494.6	7.7
Tricorythodidae								
<u>Tricorythodes minutus</u>	-	-	-	-	-	-	10.8	<0.1
PLECOPTERA		5.2		14.4		34.8		28.4
Capniidae	16.1	0.5	677.4	1.9	75.3	0.4	107.5	0.3
Perlodidae								
<u>Isoperla quinquepunctata</u>	118.3	4.0	4,462.4	12.5	5,818.1	34.4	9,107.5	28.1
<u>Utacopia logana</u> (adult)	21.5	0.7	-	-	-	-	-	-
TRICHOPTERA		0		0.1		1.6		0.8
Glossosomatidae								
<u>Glossosoma</u> sp.	-	-	-	-	91.5	0.5	86.0	0.3
Hydropsychidae								
<u>Hydropsyche</u> sp.	-	-	32.3	0.1	193.8	1.1	129.0	0.4
Brachycentridae								
<u>Brachycentrus</u> sp.	-	-	-	-	5.4	<0.1	-	-
Limnephilidae								
<u>Hesperophylax</u> sp.	-	-	-	-	-	-	32.3	0.1
Hydroptilidae								
<u>Hydroptila</u> sp.	-	-	-	-	-	-	10.8	<0.1
COLEOPTERA		0		0.1		0.4		0.2
Elmidae (adult)							10.8	<0.1
<u>Optioservus quadri-</u> <u>maculatus</u> (adult)	-	-	-	-	-	-	21.5	<0.1
<u>Optioservus quadri-</u> <u>maculatus</u> (larvae)	-	-	32.3	0.1	64.5	0.4	21.5	<0.1

Table 6. (continued)

TAXA	Below Lower Weir		Above Lower Weir		Below Upper Weir		Above Upper Weir	
	No/m ²	%	No/m ²	%	No/m ²	%	No/m ²	%
DIPTERA		45.0		25.2		37.5		58.9
Tipulidae								
Dicranota sp.	-	-	21.5	<0.1	59.2	0.3	86.0	0.3
Hexatoma sp.	-	-	32.3	0.1	43.1	0.2	21.5	<0.1
Limnophila sp.	-	-	-	-	-	-	10.8	<0.1
Tipula sp.	21.5	0.7	-	-	37.7	0.2	10.8	<0.1
Chironomidae								
Adult	16.1	0.5	-	-	32.3	0.2	21.5	<0.1
Larvae	1,166.9	39.5	8,096.8	22.8	5,861.1	34.6	17,924.7	55.3
Pupae	43.0	1.5	817.2	2.3	53.8	0.3	741.9	2.3
Empididae								
Chelifera sp.	64.5	2.2	-	-	279.9	1.7	258.1	0.8
Psychodidae								
Pericoma sp.	5.4	0.2	10.8	<0.1	-	-	-	-
Stratiomyidae								
Euparyphus sp.	10.8	0.4	-	-	5.4	<0.1	-	-
HYDRACARINA								
Lebertiidae	-	-	-	-	59.2	0.3	21.5	<0.1
Sperchonidae	-	-	-	-	5.4	<0.1	-	-
OLIGOCHAETA	59.1	2.0	150.5	0.4	48.4	0.3	-	-
NEMATODA	-	-	-	-	-	-	10.8	<0.1
TURBELLARIA	-	-	-	-	-	-	10.8	<0.1
Total No/m ² (1 Standard Deviation)	2,951.9 (3,124.4)		35,508.7 (6,371.5)		16,937.5 (8,273.6)		32,440.9	
Species Diversity	2.35		2.08		2.36		1.83	
Total Number of Taxa	15		12		20		20	

Total invertebrate densities were higher at all stations in February than in March (Tables 6 and 7). These differences were insignificant ($P=0.05$) at all stations except below the lower weir. High densities of either Baetis spp. or chironomids generally accounted for the higher densities in February. Overall, there was a reduction in the density of most taxa between February and March. Climatic conditions may be partially responsible for this reduction. In February streamflow was low and ice and snow covered much of the stream. Invertebrate numbers may have been reduced when the ice washed out, scouring the bottom and increasing the streamflow, before the March field visit. The March 1981 densities are similar to densities recorded in March 1980 (VTN Annual Report 1980).

Species diversity values were moderate to low in both February and March. This is due to the dominance of only a few taxa. These values are also similar to those found in 1980 and indicate that no significant changes have occurred for this season.

Substrate Samples

Substrate samples from above the upper weir consisted of 40% gravel with no gravel larger than 15.8mm (Figure 3). Sand comprised 56% of the substrate, and silt and clay, 4%. Below the upper weir medium and fine gravel predominated, equaling 85% of the sample, with 25% of the gravel larger than 15.8mm. Sands equaled 17% and silt and clay only 1% of the sample (Figure 3). Samples from above the lower weir consisted of 77% gravels with 25% of the gravel larger than 15.8mm in diameter. Sands made up 21% of the sample, and silt and clay totaled 2% (Figure 3). Below the lower weir gravels made up 40% of the substrate, sands 28%, and silt and clay 32%.

Substrate from below the lower weir contained more silt and clay (32%) than any other stations. This increased amount of silt and clay is probably due to stream rechanneling and alterations that have occurred during maintenance of the weir. Silt and clay tend to accumulate

Table 7. Comparison of benthic invertebrate species composition, relative abundance, and density at four sample sites on Black Sulphur Creek, March 29, 1981.

TAXA	Below Lower Weir		Above Lower Weir		Below Upper Weir		Above Upper Weir	
	No/m ²	%	No/m ²	%	No/m ²	%	No/m ²	%
EPHEMEROPTERA		45.1		19.9		27.4		24.9
Baetidae								
<u>Baetis tricaudatus</u>	1,451.6	32.5	1,698.9	11.9	871.0	12.1	989.2	11.9
<u>Baetis bicaudatus</u>	150.5	3.4	537.6	3.7	96.8	1.3	225.8	2.7
Heptageniidae								
<u>Epeorus sp.</u>	-	-	10.8	<0.1	-	-	-	-
Leptophlebiidae								
<u>Paraleptophlebia sp.</u>	21.5	0.5	-	-	10.8	0.1	-	-
Ephemerellidae								
<u>Ephemerella inermis</u>	397.1	8.7	591.4	4.2	1,000.0	13.9	849.5	10.2
Tricorythodidae								
<u>Tricorythodes minutus</u>	-	-	-	-	-	-	10.8	0.1
PLECOPTERA		22.6		15.8		56.2		42.2
Capniidae	10.8	0.2	-	-	-	-	-	-
Perlodidae								
<u>Isoperla quinquepunctata</u>	1,000.0	22.4	2,258.1	15.8	4,053.8	56.2	3,505.4	42.2
<u>Utacopia logana (adult)</u>								
TRICHOPTERA		0.2		0.2		3.3		0.7
Glossosomatidae								
<u>Glossosoma sp.</u>	-	-	-	-	43.0	0.6	32.3	0.4
Hydropsychidae								
<u>Hydropsyche sp.</u>	10.8	0.2	21.5	0.2	193.5	2.7	21.5	0.3
COLEOPTERA		1.7		0.5		2.4		0.9
Elmidae (adult)								
<u>Optioservus quadri-</u> <u>maculatus</u>	75.3	1.7	75.3	0.5	172.0	2.4	75.3	0.9
DIPTERA		29.9		37.5		10.5		31.1
Tipulidae								
<u>Dicranota sp.</u>	-	-	10.8	<0.1	107.5	1.5	-	-
<u>Hexatoma sp.</u>	21.5	0.5	107.5	0.8	118.3	1.6	53.8	0.6
<u>Limnophila sp.</u>	10.8	0.2	-	-	-	-	32.3	0.4
<u>Tipula sp.</u>	43.0	1.0	10.8	<0.1	21.5	0.3	-	-
Chironomidae								
Adult	-	-	96.8	0.7	-	-	10.8	0.1
Larvae	892.5	20.0						
Pupae	53.8	1.2	75.3	0.6	-	-	43.0	0.5

Table 7. (continued)

TAXA	Below Lower Weir		Above Lower Weir		Below Upper Weir		Above Upper Weir	
	No/m ²	%	No/m ²	%	No/m ²	%	No/m ²	%
DIPTERA (continued)								
Empididae								
Chelifera sp.	258.1	5.8	172.0	1.2	204.3	2.8	279.6	3.4
Clinocera	-	-	10.8	<0.1	-	-	-	-
Psychodidae								
Pericoma sp.	-	-	-	-	21.5	0.3	-	-
Stratiomyidae								
Euparyphus sp.	53.8	1.2	64.5	0.5	53.8	0.7	10.8	0.1
HYDRACARINA								
Lebertiidae	-	-	43.0	0.3	-	-	-	-
OLIGOCHAETA	21.5	0.5	3,548.4	24.9	-	-	10.8	0.1
OSTRACADA	-	-	118.3	0.8	-	-	-	-
TURBELLARIA	-	-	-	-	10.8	0.1	-	-
Total No/m ² (1 Standard Deviation)	4,462.4 (2,813.2)		14,247.3 (5,459.1)		7,215.1 (288.9)		8,311.1 (1,292.6)	
Species Diversity	2.68		2.61		2.25		2.32	
Total Number of Taxa	16		19		16		16

Figure 3. Substrate composition at four stations on Black Sulphur Creek,
March 29, 1981.

at the lower weir during low flows, then during high flows the silt and clay is washed downstream. Substrate samples taken from above the lower weir and below the upper weir show several similarities. Both stations have a high percentage of gravel and sand, with silt and clay accounting for less than 2% by weight. Also, both stations consisted of approximately 25% gravel greater than 15.8mm. Samples from above the upper weir and below the lower weir both contained approximately 40% gravel, none of which was larger than 15.8mm.

Chemical analysis of streambed sediments for oil and grease, total solids, and volatile solids are shown in Table 8. The results show that the station above the upper weir had a slightly higher percentage of total and dissolved solids. Oil and grease were below detectable levels at all stations. Despite the presence of an apparent oil sheen on the water, oil and grease do not appear to be present in the sediments. However, sediment samples used for chemical analyses were collected four days after the oil sheen was observed. Thus, some oils may have washed downstream prior to sampling the sediments.

Fisheries Survey

Cutthroat trout (Salmo clarki) was the only fish species collected during the survey. From the four areas sampled a total of 41 fish were captured. The fish ranged in length from 155-360mm and in weight from 40-220 gms. (Table 8). The most fish (27) were caught from the 400m section approximately three miles below the project site. Twenty-three of these fish came from a single pool. Eight fish were caught from the 231m section above the upper weir. All eight fish were caught from a small pool that was covered by a tangle of sagebrush and aquatic plants. Six fish were caught in the 440m section between the lower and upper weirs. Four of the fish were caught in a pool approximately 6' deep, while the other two were caught in shallow riffles. No fish were captured in the 190m section below the lower weir. Several beaver ponds above the project site reportedly contain fish, but they were covered with snow and ice and could not be sampled.

Table 9. Length (mm) and weight (gm) of cutthroat trout collected from Black Sulphur Creek on March 31, 1981.

<u>Station</u>	<u>Length</u> (mm)	<u>Weight</u> (gm)
440 meter section between Upper and Lower Weir	160	40
	166	50
	170	50
	189	60
	197	90
	<u>203</u>	<u>100</u>
(Average)	180	65
231 meter section Above Upper Weir	162	50
	171	50
	175	80
	194	70
	197	90
	225	130
	246	200
	<u>247</u>	<u>200</u>
(Average)	202	108
400 meter section three miles below the project site	188	80
	189	90
	198	90
	200	80
	205	80
	210	100
	210	110
	211	160
	212	100
	216	120
	221	130
	224	120
	224	120
	224	120
	227	160
	228	140
	229	130
	230	140
	232	140

Table 9. (continued)

<u>Station</u>	<u>Length</u> (mm)	<u>Weight</u> (gm)
	232	160
	241	170
	247	190
	249	150
	251	190
	257	200
	254	220
	274	210
	<u>360</u>	<u>-</u>
(Average)	230	137

Summary

There were no changes in the epilithic algae in Black Sulphur Creek between February and March, 1981 or between stations that can be attributed to plant operations. There was a general increase in epilithic algal density throughout the whole study area and at the stations above the upper weir and below the lower weir between February and March. The algal species composition did not change in this interval. The increase in density reflects the expected increase in productivity at this time of the year due to increasing water temperatures and light intensity and duration.

The large difference in the density of Hydrurus foetidus between above the upper weir and below the lower weir is probably due to the difference in water velocity and substrate material between the two stations. H. foetidus prefers cold water with substantial velocity and a stable substrate. The lower density of H. foetidus near the lower weir reflects the finer, more unstable substrate and lower water velocity that occurs there.

The results from above the upper weir and below the lower weir for March 1981 are different from those of March, 1980. In March 1980, the total density from above the upper weir and below the lower weir was 6,900 orgs/mm² and 450 orgs/mm², respectively. The increased densities in March, 1981 appear due to the milder 1980-81 winter. There were no major differences in the species list between the two years, but Navicula secreta and N. viridula, which were common in March 1980, were replaced with Cymbella affinis and Hydrurus foetidus in March 1981.

Of the three dominant taxa of invertebrates, Baetis tricaudatus was generally more abundant at the lower weir stations than at the upper weir. In contrast, Isoperla quinquepunctata was more abundant at the two upper weir stations than at the lower weir sites. Water quality is similar (VTN Annual Report 1980) at all four stations and does not

appear to be a factor causing these differences. The substrate below the lower weir contains more fine sediments (silt and clay) than at the upper weir, which suggests that Baetis tricaudatus is more tolerant of fine sediments than Isoperla quinquepunctata. The finer sediments at the lower weir also make the substrate less stable and subject to more channel shifts than at the upper weir stations. It is possible that Baetis tricaudatus, a good swimmer, can survive better in shifting substrates than I. quinquepunctata, which crawls on the bottom (Merritt and Cummins 1978). Another crawler, Ephemerella inermis was also more abundant at the upper weir than at the lower weir. The density of chironomids, the other major taxa, fluctuated at all four stations and showed no consistent pattern.

Species diversity in February and March were moderate to low (Wilhm 1972). This is due to the dominance of only a few taxa and suggests that habitat conditions (temperature, water chemistry, streamflows, substrate) may be limiting many species so that only a few tolerant species proliferate. Similar results have been found previously for Black Sulphur Creek and for other streams in the area (Ward and Gray 1975; Pennak 1974), suggesting that this is a natural condition and not due to project operations. However, it should be noted that any perturbation which adversely effects only a few major species could significantly reduce invertebrate densities.

The dominant substrates at the two upper weir sites and above the lower weir were medium and fine gravels. Sand and silt, however, dominated the substrate at the site below the lower weir. These results generally confirm streamside observations that the lower weir has finer sediments and less stable substrate than the upper weir. Differences in the invertebrate fauna between stations closely reflect the differences in substrate composition. Similar findings have been reported in other studies (Hynes 1970).

The channel at the lower weir appears to have remained stable since the August 1980, field trip. However, high flows during spring runoff may again alter the stream channel at this station. Sediment samples taken in the fall will provide information on the sediment composition after summer low flows.

Fish survey results show that Black Sulphur Creek contains fish at several locations including the stream section within the project site. There is no clear explanation why cutthroat trout (Salmo clarki) was the only species of fish present. The absence of fry (0-2" fish) suggests that fish do not remain in the stream year round. In contrast, however, there are reports of trout being caught in the stream most of the year. Also, maximum summer temperatures at the project site appear to be near 20°C, which is still below upper lethal temperatures for some trout (Black 1953). Beaver ponds above the project site may also hold fish throughout the year. Some of these fish may occasionally migrate downstream.

The number and size of fish collected suggests that Black Sulphur Creek may be an important stream for cutthroat trout in the Piceance Creek Basin. More data is necessary to determine the movement of cutthroat trout in Black Sulphur Creek, important spawning areas, and areas of critical habitat to evaluate the importance of Black Sulphur Creek to the regions fishery.

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