Florida Power & Light Company

ST. LUCIE PLANT

ANNUAL NON-RADIOLOGICAL MONITORING REPORT

1980

Volume 1

ABIOTIC MONITORING

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EXECUTIVE SUMMARY

VOLUME I

Introduction

This document is the fourth consecutive annual report on abiotic monitoring at the Florida Power & Light Company, St. Lucie Plant. It is Volume I of three volumes submitted in accordance with the St. Lucie Unit No. 1 Environmental Technical Specifications, Appendix B, Section 5.6.1.a. The report covers the period from January 1, 1980, through December 31, 1980.

Thermal

Four thermal limitations are required by the Environmental Technical Specifications (ETS):

1) discharge canal maximum release temperature (111°F or 44°C);
2) maximum temperature rise across the condenser (26°F or 14.3°C);
3) maximum temperature within the zone of mixing (93°F or 34°C);
4) maximum surface temperature rise over ambient within the zone of mixing (5.5°F or 3.1°C).

Analysis of the thermal data as specified in the preceding paragraph showed that the only ETS violation which occurred during 1980 was for maximum surface temperature rise over ambient within the zone of mixing. The Out-of-Specification duration was brief and only slightly in excess of the limit.

An assessment of the thermal effects on the nearshore marine environment caused by the operation of the St. Lucie Plant is presented in Volumes II and III of the Annual Report. No significant adverse environmental impact could be attributed to plant operations during 1980.

Chemical

Chemical monitoring was conducted during 1980 in the discharge canal at the St. Lucie Plant for dissolved oxygen, pH, heavy metals were also monitored in the intake canal.

Dissolved oxygen was not significantly depleted in the condenser cooling water during plant passage.

Total residual chlorine values were well below ETS limitations for the entire year.

Heavy metals concentrations were generally within the expected ranges with only a few random instances of concentrations above minimum detection limits of the instruments used in analyses. Additionally, no adverse environmental impacts are believed to have occurred from the presence of the noted chemicals.

The pH values were within the normal ranges of nearshore oceanic water.

A. INTRODUCTION

In 1970, Florida Power & Light Company (FPL) was issued a construction permit by the United States Atomic Energy Commission (now Nuclear Regulatory Commission) for the construction of Unit No. 1 of the St. Lucie Plant, and 810-megawatt nuclear-powered electric generating station on Hutchinson Island in St. Lucie County, Florida.

Unit No. 1 was placed on-line in 1976. The plant was base loaded throughout 1977, 1978, 1979, and 1980 except for repair and refueling outages. The condenser cooling water is provided by a once-through circulating water system which consists of intake and discharge pipes in the ocean linked by canals to the plant. Cooling water is drawn from the Atlantic Ocean through an intake structure located 365 m (1,200 ft) offshore. The intake structure is covered with a concrete velocity cap, the top of which is approximately 2.4 m. (8 ft) below the water surface. From the intake point, water is drawn into the intake canal through a pipe buried under the dunes and ocean bottom. The 90 m (300 ft) wide canal carries the cooling water about 1,500 m (5,000 ft) to the plant intake structure where pumps provide a design flow of 33,400 liters/sec (530,000 gpm). The cooling water then moves through the intake screens, passes through the plant, and is released into the discharge canal.

The temperature rise of the water passing through the condensers is limited by the ETS to 26°F (14.3°C). After leaving the plant, the heated water passes through a 60m (200 ft.) wide discharge canal before entering a pipe buried under the dune and the ocean floor. The water is carried about 365m (1,200 ft) offshore and discharged through a Y-port nozzle located approximately 9 m (30ft.) below

the water surface. The discharge pipe is located 730m (2,400 ft.) north of the intake pipe.

The purpose of chemical and thermal limitations and monitoring is to provide a reasonable assurance that the aquatic ecosystem in the immediate area of the thermal plume will not be subjected to any unacceptable environmental impact. It is also desirable to maintain the quality of the receiving body of water so that human uses of the water are protected, and so that local aquatic biota do not suffer adversely from exposure to any plant discharges (chemical and thermal).

This document provides a report of the abiotic monitoring programs for the period from January 1, 1980, through December 31, 1980. Also included herein are discussions of various reports and studies (Sections D, E, and G) prepared or performed during 1980 which are required by the ETS. Submitted simultaneously with this volume (Non-Radiological Environmental Monitoring Report, Volume I, 1980) are two other volumes (Non-Radiological Environmental Monitoring Report, Volumes II and III) which describe the biotic monitoring carried out during 1980. Together, these three volumes satisfy the requirements of St. Lucie Unit No. 1 Environmental Technical Specifications, Appendix B, Section 5.6.1.a.

B. THERMAL (ETS 2.1)

Introduction

Four thermal limitations are prescribed by the St. Lucie Unit 1 Environmental Technical Specifications (ETS):

1) discharge canal maximum release temperature (111°F or 44°C);
2) maximum temperature rise across the condenser (26°F or 14.3°C);
3) maximum temperature within the zone of mixing (93°F or 34 °C);
4) maximum surface temperature rise over ambient within the zone of mixing (5.5°F or 3.1°C).

Data was collected for item (1) using a temperature sensor located near the discharge canal terminus. The output from the sensor is recorded continuously on a strip chart located in a structure near the sensor. Data for item (2) is obtained from a series of RTD sensors located in the intake and discharge water lines. Output is transmitted to the reactor control room where it is logged hourly.

Items (3) and (4) are monitored using self-contained continous recording thermographs located near the ocean intake and at the predicted location of the discharge suface plume maximum temperature.

Maximum Discharge Canal Water Temperature (ETS 2.1.1)

The maximum discharge canal water temperature was determined and tabulated (Table B-1) for each day that the plant was opeating during 1980. As can be seen in the tabulation, no single canal temperature was dominant for the entire reporting period.

The variation in ambient inlet water temperature coupled with fluctuations in power plant thermal output are responsible for the relatively wide fluctuations of discharge canal temperature.

Figure B-1 graphically illustrates the varied maximum discharge canal temperatures observed during 1980 and compares them with observed values during 1979. The maximum discharge canal release temperature limit of 111°F was not exceeded during 1980.

Maximum Condenser Temperature Rise (Condenser ΔT) (ETS 2.1.2)

The specification states:

"Under normal full-power operation, the temperature rise across the condenser shall not exceed 26°F or 14.3°C. Under the following conditions, the condenser temperature rise shall not exceed 35°F or 20°C for greater than a 72-hour period:

1) condenser and/or circulating water pump maintenance;
2) throttling circulating water pumps to minimize use of chlorine;
3) fouling of circulating water system."

Table B-2 shows a tabulation of condenser ΔT values for 1980. Figure B-2 is a comparison of 1979 and 1980 data. Review of Figure B-2 shows that the plant operated near the design temperature rise the majority of the time. The two (2) reported values which exceeded the 26°F limitations were the result of plant maintenance operations.

Maximum Temperature Within the Zone of Mixing (ETS 2.1.1)

Table B-3 summarizes the maximum daily surface temperatures reported within the ocean discharge zone of mixing during 1980. The maximum temperature

observed in the zone of mixing during 1980 was 31°C, thus, all temperature measured in the ocean mixing zone were within the 34°C ETS limitation.

As in previous years, 100% retrieval of surface plume temperature data was not achieved due to exposure to an extremely harsh environment. These factors resulted in loss of data as reported in Section G., Reportable Occurrences, of this report.

Figure B-3 shows a comparison of ocean mixing zone maximum temperatures for 1979 and 1980. It can be seen that temperature ranges and frequencies for the two years are similar.

Maximum Surface Temperature Rise - Zone of Mixing (ΔT) (ETS 2.1.1)

Daily surface temperature rises above ambient in the ocean zone of mixing are summarized in Table B-4. As has been the case with other data obtained from the thermographs, 100% data retrieval was not possible for the 1980 reporting period. These factors resulted in the loss of data as reported in Section G., Reportable Occurrences, of this report.

Some time periods were observed when the discharge zone of mixing temperature was less than the ocean intake area temperature resulting in negative ΔT values. This was believed to be caused by time delay in passage of water through the plant, variations in ocean surface temperatures and surface currents.

The only out of specification temperature value which occurred during 1980 is addressed in Section G. (Reportable Occurances) page G-1 of this report. This

temperature excursion is believed to be due to instrumental malfunctions rather than an actual thermal state.

Figure B-4 compares 1979 and 1980 data and illustrates the variations which occurred in measuring temperatures under the stated conditions.

TABLE B-1

ST. LUCIE PLANT
MAXIMUM DISCHARGE CANAL TEMPERATURE
TEMPERATURE DURATION CURVE

NUMBER OF DAYS	MAXIMUM TEMPERATURE(^{o}F)	% OF TOTAL DAYS	CUMULATIVE %
0	111	0.0	0.0
0	110	0.0	0.0
0	109	0.0	0.0
0	108	0.0	0.0
0	107	0.0	0.0
0	106	0.0	0.0
0	105	0.0	0.0
7	104	1.9	1.9
10	103	2.7	4.6
26	102	7.1	11.7
21	101	5.7	17.5
28	100	7.7	25.1
21	99	5.7	30.9
19	98	5.2	36.1
14	97	3.8	39.9
6	96	1.6	41.5
8	95	2.2	43.7
14	94	3.8	47.5
14	93	3.8	51.4
13	92	3.6	54.9
13	91	3.6	58.5
16	90	4.4	62.8
13	89	3.6	66.4
8	88	2.2	68.6
3	87	0.8	69.4
10	86	2.7	72.1
5	85	1.4	73.5
9	84	2.5	76.0
8	83	2.2	78.1
9	82	2.5	80.6
4	81	1.1	81.7
7	80	1.9	83.6
0	79	0.0	83.6
9	78	2.5	86.1
5	77	1.4	87.4
14	76	3.8	91.3
10	75	2.7	94.0
17	74	4.6	98.6
1	73	0.3	98.9
2	72	0.5	99.5
1	71	0.3	99.7
1	70	0.3	100.0
0	69	0.0	100.0

TABLE B-2

ST. LUCIE PLANT
MAXIMUM CONDENSER DELTA T
TEMPERATURE DURATION CURVE

NUMBER OF DAYS	MAXIMUM $\Delta T(F^{O})$	% OF TOTAL DAYS	CUMULATIVE %
2	27*	0.7	0.7
0	26	0.0	0.7
3	25	1.0	1.7
14	24	4.9	6.6
144	23	50.0	56.6
115	22	39.9	96.5
2	21	0.7	97.2
2	20	0.7	97.9
1	19	0.3	98.3
1	18	0.3	98.6
0	17	0.0	98.6
0	16	0.0	98.6
1	15	0.3	99.0
1	14	0.3	99.3
0	13	0.0	99.3
0	12	0.0	99.3
0	11	0.0	99.3
0	10	0.0	99.3
0	9	0.0	99.3
1	8	0.3	99.7
0	7	0.0	99.7
0	6	0.0	99.7
0	5	0.0	99.7
1	4	0.3	100.0
0	3	0.0	100.0
0	2	0.0	100.0
0	1	0.0	100.0

* APPARENT OUT-OF-SPECIFICATION VALUE DUE TO PLANT MAINTENANCE OPERATION ON 12-29-80 AND 12-30-80 FOR APPROXIMATELY ONE HOUR EACH DAY AS ALLOWED BY ETS 2.1.2.

TABLE B-3

ST. LUCIE PLANT
ZONE OF MIXING MAXIMUM TEMPERATURE
TEMPERATURE DURATION CURVE

NUMBER OF DAYS	MAXIMUM TEMPERATURE(^{o}C)	% OF TOTAL DAYS	CUMULATIVE %
0	34	0.0	0.0
0	33	0.0	0.0
0	32	0.0	0.0
6	31	1.6	1.6
13	30	3.6	5.2
37	29	10.1	15.3
53	28	14.5	29.8
19	27	5.2	35.0
20	26	5.5	40.4
26	25	7.1	47.5
21	24	5.7	53.3
29	23	7.9	61.2
24	22	6.6	67.8
13	21	3.6	71.3
11	20	3.0	74.3
16	19	4.4	78.7
6	18	1.6	80.3
1	17	0.3	80.6
0	16	0.0	80.6
0	15	0.0	80.6
0	14	0.0	80.6
0	13	0.0	80.6
0	12	0.0	80.6
0	11	0.0	80.6
0	10	0.0	80.6
0	9	0.0	80.6
0	8	0.0	80.6
0	7	0.0	80.6
0	6	0.0	80.6
0	5	0.0	80.6
0	4	0.0	80.6
0	3	0.0	80.6
0	2	0.0	80.6
0	1	0.0	80.6
69	DNRD	18.9	99.5
2	DODM	0.5	100.0

DNRD-DATA NOT REQUIRED DAYS (PLANT SHUT DOWN, ETC.)

DODM-DAYS OF DATA MISSING (DUE TO INSTRUMENT MALFUNCTION, LOSS OF BUOYS, ETC.) REFER TO SECTION G. OF THIS REPORT.

TABLE B-4

ST. LUCIE PLANT
ZONE OF MIXING MAXIMUM SURFACE TEMPERATURE RISE
TEMPERATURE DURATION CURVE

NUMBER OF DAYS	MAXIMUM $\Delta T(C^{O})$	% OF TOTAL DAYS	CUMULATIVE %
1	3.2*	0.3	0.3
0	3.1	0.0	0.3
1	3.0	0.3	0.5
5	2.9	1.4	1.9
7	2.8	1.9	3.8
6	2.7	1.6	5.5
1	2.6	0.3	5.7
13	2.5	3.6	9.3
12	2.4	3.3	12.6
9	2.3	2.5	15.0
5	2.2	1.4	16.4
1	2.1	0.3	16.7
14	2.0	3.8	20.5
18	1.9	4.9	25.4
7	1.8	1.9	27.3
23	1.7	6.3	33.6
3	1.6	0.8	34.4
17	1.5	4.6	39.1
11	1.4	3.0	42.1
21	1.3	5.7	47.8
7	1.2	1.9	49.7
6	1.1	1.6	51.4
4	1.0	1.1	52.5
5	0.9	1.4	53.8
2	0.8	0.5	54.4
4	0.7	1.1	55.5
2	0.6	0.5	56.0
6	0.5	1.6	57.7
4	0.4	1.1	58.7
3	0.3	0.8	59.6
3	0.2	0.8	60.4
0	0.1	0.0	60.4
35	0	9.6	69.9
69	DNRD	18.9	88.8
41	DODM	11.2	100.0

* OUT-OF-SPECIFICATION ΔT VALUE REPORTED IN 1980. REFER TO SECTION G. OF THIS REPORT.

DNRD-DATA NOT REQUIRED DAYS (PLANT SHUT DOWN, ETC.)

DODM-DAYS OF DATA MISSING (DUE TO INSTRUMENT MALFUNCTION, LOSS OF BUOYS, ETC.) REFER TO SECTION G. OF THIS REPORT.

FIGURE B-1

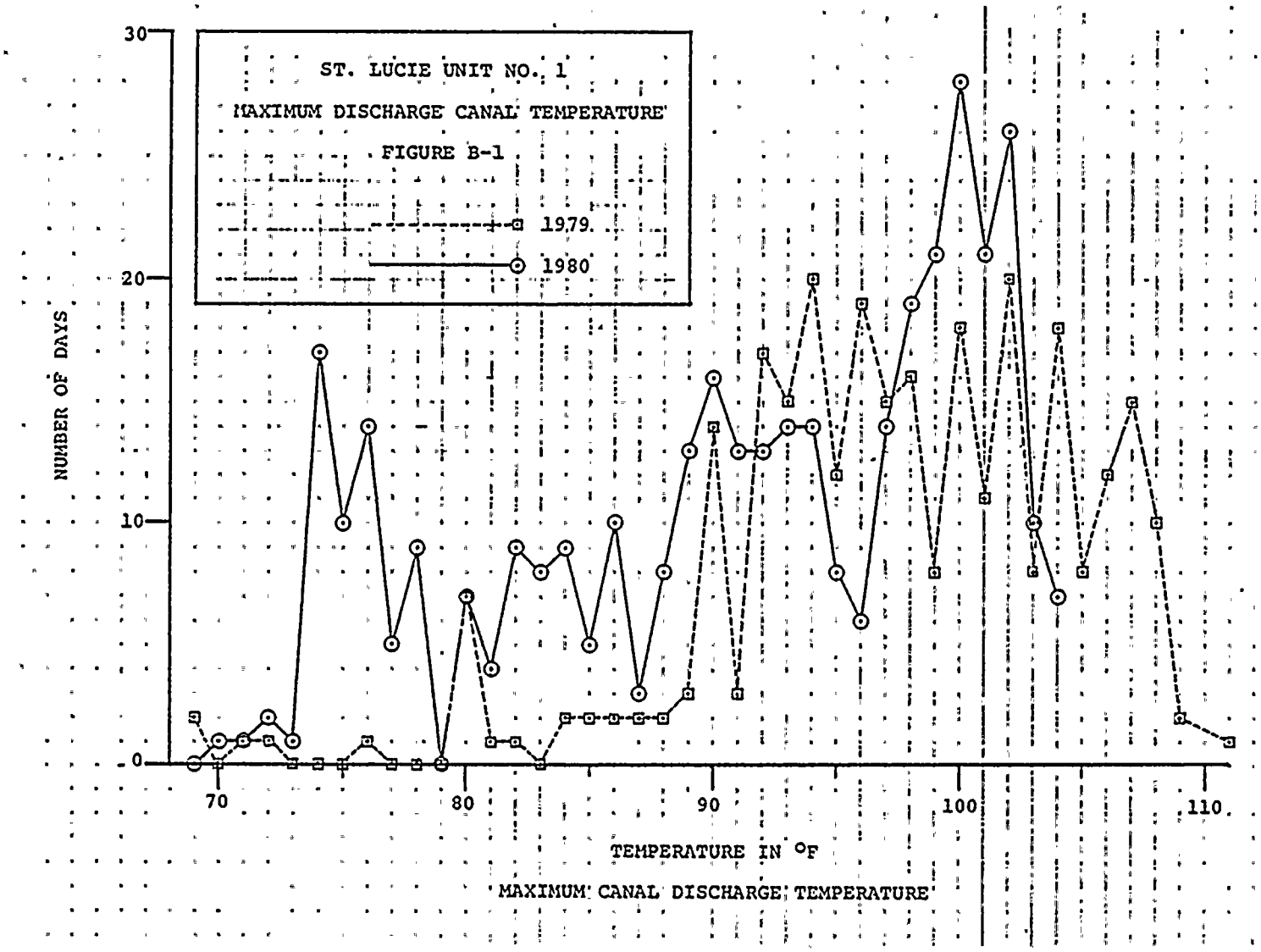

ST. LUCIE UNIT NO. 1
MAXIMUM DISCHARGE CANAL TEMPERATURE
FIGURE B-1
1979
1980
NUMBER OF DAYS
30
20
10
0
70
80
90
100
110
TEMPERATURE IN °F
MAXIMUM CANAL DISCHARGE TEMPERATURE

FIGURE B-2

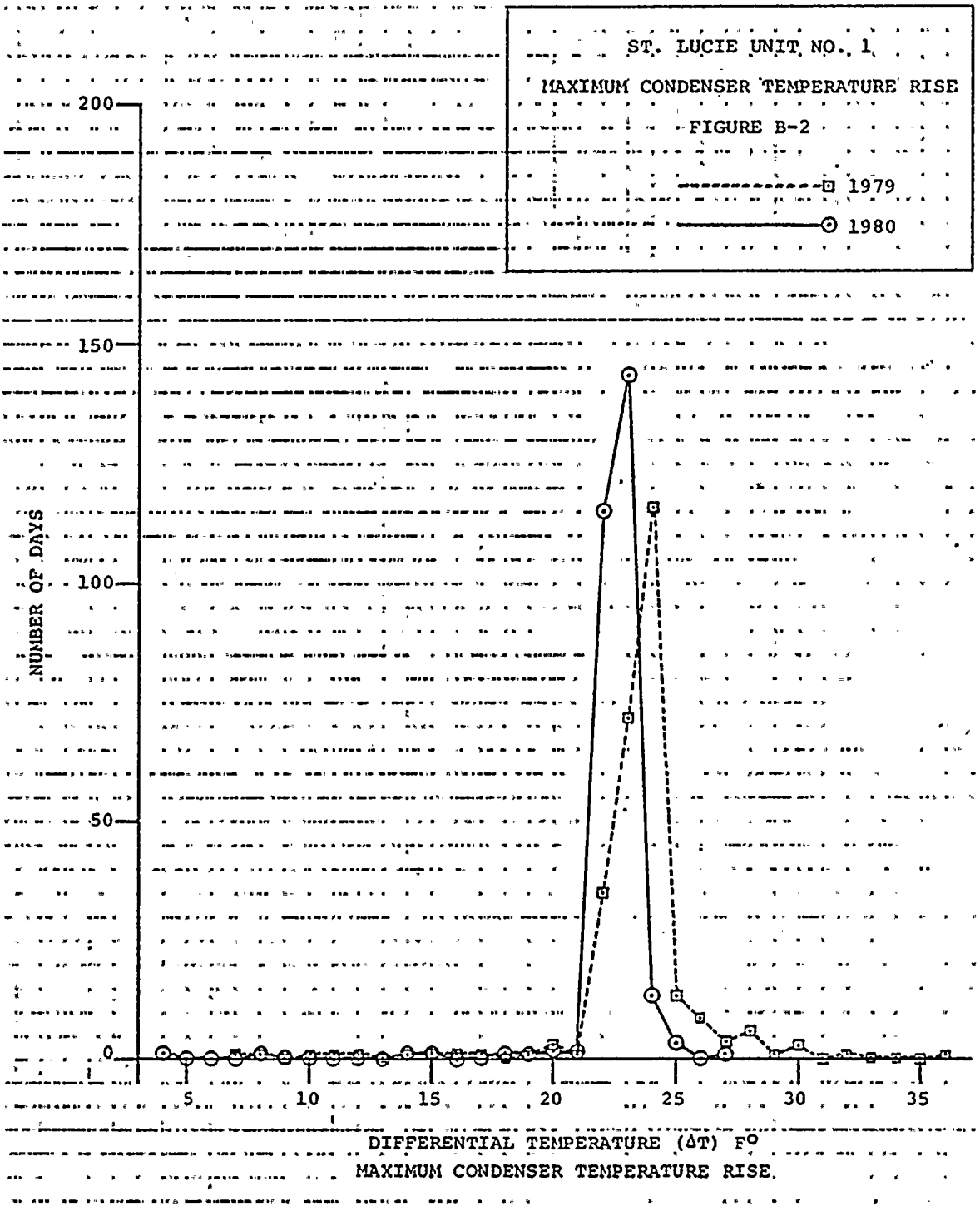

ST. LUCIE UNIT NO. 1
MAXIMUM CONDENSER TEMPERATURE RISE
FIGURE B-2
1979
1980
NUMBER OF DAYS
200
150
100
50
0
5
10
15
20
25
30
35
DIFFERENTIAL TEMPERATURE (ΔT) F°
MAXIMUM CONDENSER TEMPERATURE RISE.

FIGURE B-3

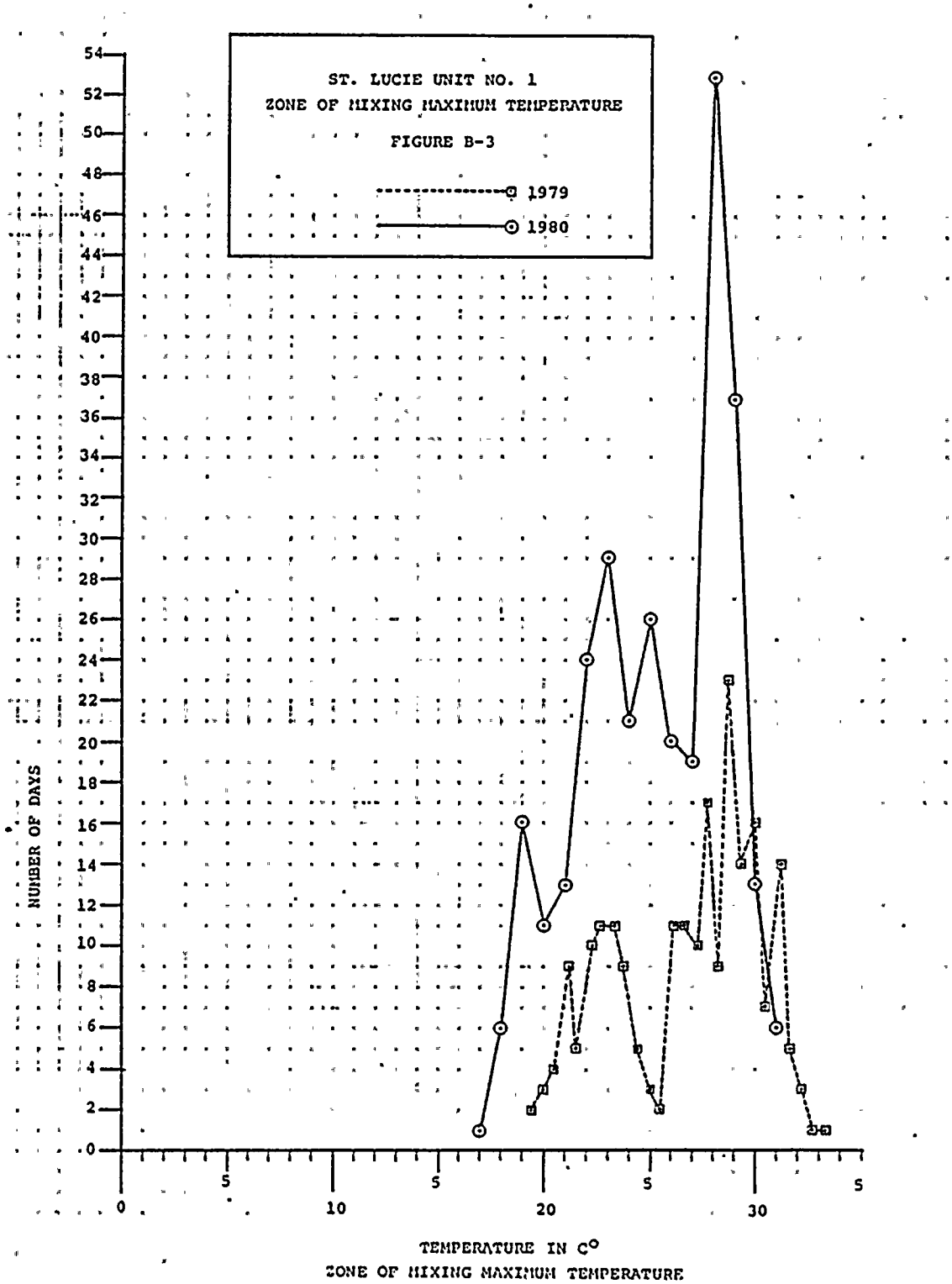
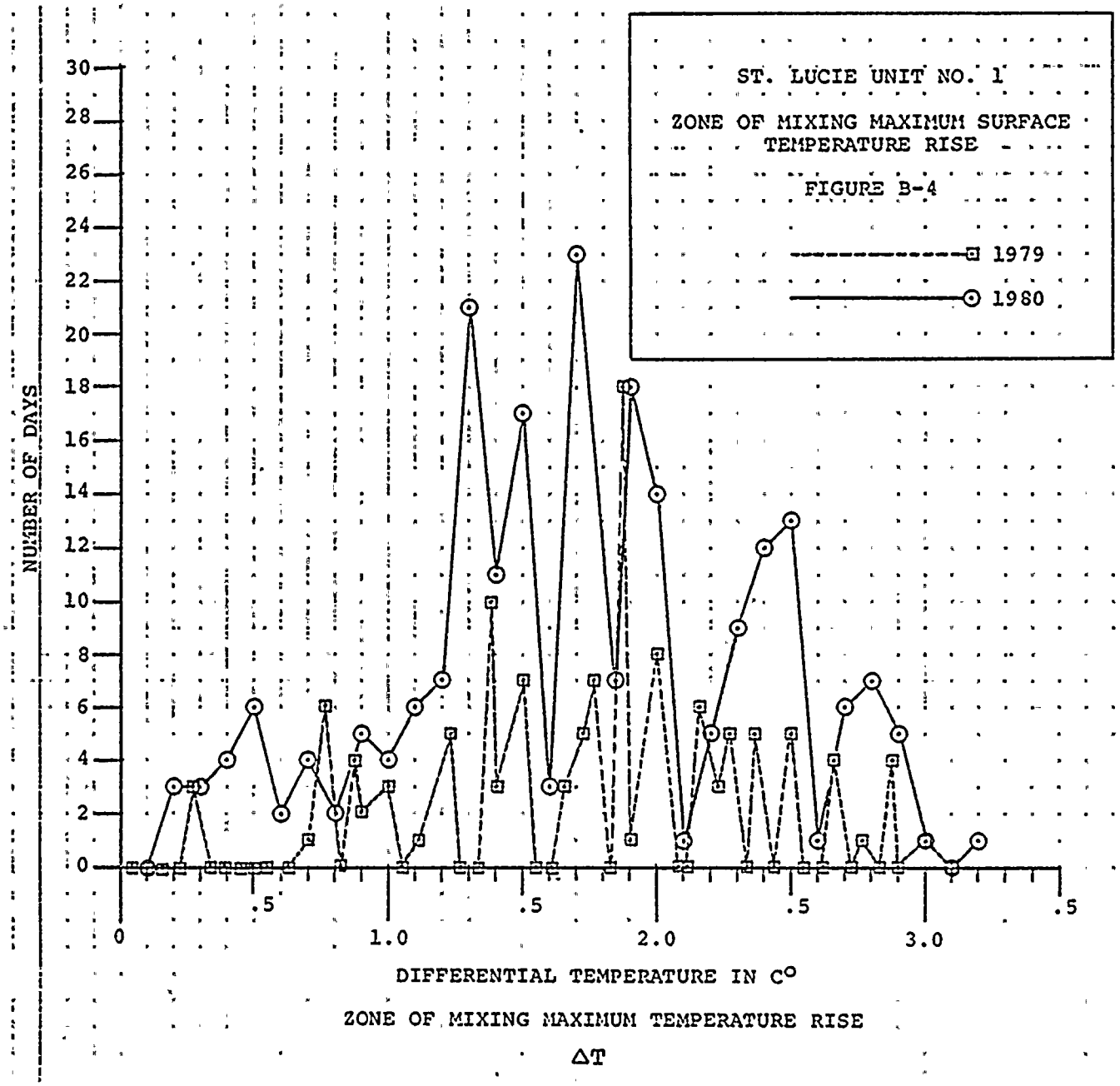

ST. LUCIE UNIT NO. 1
ZONE OF MIXING MAXIMUM TEMPERATURE
FIGURE B-3
1979
1980
NUMBER OF DAYS
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
50
52
54
0
5
10
5
20
5
30
5
TEMPERATURE IN C°
ZONE OF MIXING MAXIMUM TEMPERATURE

FIGURE B-4


ST. LUCIE UNIT NO. 1
ZONE OF MIXING MAXIMUM SURFACE TEMPERATURE RISE
FIGURE B-4
1979
1980
NUMBER OF DAYS
30
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
0
.5
1.0
.5
2.0
.5
3.0
.5
DIFFERENTIAL TEMPERATURE IN C°
ZONE OF MIXING MAXIMUM TEMPERATURE RISE
ΔT

C. CHEMICAL (ETS 3.1.A.1 through 3.1.A.4)

Introduction

Tables C-1 and C-2 summarize the chemical monitoring program for 1980 associated with the operations of the cooling water system at the St. Lucie Plant. Dissolved oxygen (DO), pH, heavy metals, and total residual chlorine (TRC) were monitored in the discharge canal. Dissolved oxygen and heavy metals were also measured in the intake canal.

Total Residual Chlorine (ETS 3.1.A.1)

During 1980, total residual chlorine levels ranged from below the instrument manufacturer's specified analytical detection limit of 0.01 ppm to a high of 0.02 ppm. All reported values were well below the ETS limit of 0.1 mg/L at the terminus of the discharge canal. Due to the very low residual chlorine values, it is believed that no adverse environmental impact occurred as a result of chlorination at the St. Lucie Plant.

Section D of this report updates the St. Lucie Plant's Minimum Effective Chlorine Usage Program as required by the ETS 4.2.

Heavy Metals (ETS 3.1.A.2)

The purpose of heavy metals monitoring was to detect any measurable concentrations above ambient seawater levels which could be attributed to cooling water passage through the plant.

Table C-2 shows the intake and discharge canal heavy metals concentrations measured during 1980. Values for arsenic, chromium, lead, mercury, and nickel show no measurable increase in concentration after plant cooling system passage.

Values obtained for copper showed an increase in copper concentration of 0.04 mg/L for the sample #4 and an increase of 0.01 mg/L for sample #8. No specific conclusions could be drawn from this data since these were the only times that copper was observed above detectable levels in intake or discharge canal water for 1979 and 1980.

Relatively small amounts of zinc were detected in some intake and discharge water samples during 1980. Table C-2 illustrates a rather random occurrence of zinc during the sampling. All values are near minimum detection limit except for the discharge sample #1, for which no explanation was apparent.

Iron was routinely found in all intake and discharge canal samples in relatively low concentrations except for intake sample #12, which was below detectable.

None of the heavy metal concentrations observed during 1980 are believed to have resulted in any adverse environmental impact to the nearshore ecosystem at the St. Lucie Plant site.

pH (ETS 3.1.A.3)

The purpose of pH monitoring in the discharge canal was to insure that the pH of once-through cooling system water was not being altered by plant passage when compared to the generally accepted pH levels for nearshore marine waters. The pH for the 1980 samples ranged from 8.1 to 8.3, thus the pH is stable and within the normal range of these waters.

Dissolved Oxygen (ETS 3.1.A.4)

Dissolved oxygen was monitored in the intake and discharge canals to determine the effect of plant cooling water system passage. As can be seen in Figure C-1, dissolved oxygen concentrations are generally unaffected by plant passage. The very slight depletion occurring between intake and discharge waters is not unexpected due to the heating of water during passage through the plant condensers. No adverse environmental impact was believed to have occurred from the minimal dissolved oxygen depletion observed during 1980.

ST. LUCIE PLANT UNIT NO. 1
CIRCULATING WATER CHEMICAL PARAMETERS
TABLE C-1

Month & Year January 1980

DAY	INTAKE	DISCHARGE			REMARKS
	D.O.[1]	pH	D.O.[1]	T.R.C.[2]	
1		8.2			
2	6.7	8.1	5.7	0.01	
3		8.1			
4		8.1			
5		8.1			
6		8.1			
7		8.1			
8	6.8	8.2	7.3		
9		8.2		0.01	
10		8.2			
11		8.1			
12		8.1			
13		8.1			
14		8.1			
15	6.7	8.1	6.6		
16		8.2			
17		8.2			
18		8.2		0.01	
19		8.2			
20		8.2			
21		8.2			
22	6.8	8.2	6.4	0.02	
23		8.2			
24		8.2			
25		8.2			
26		8.2			
27		8.2			
28		8.2			
29	6.6	8.2	6.3		
30		8.2			
31		8.2		0.02	

NOTES:
[1]Dissolved Oxygen in ppm.
[2]Total Residual Chlorine in ppm.

ST. LUCIE PLANT UNIT NO. 1
CIRCULATING WATER CHEMICAL PARAMETERS
TABLE C-1
Month & Year February 1980

DAY	INTAKE	DISCHARGE			REMARKS
	D.O.[1]	pH	D.O.[1]	T.R.C.[2]	
1		8.2			
2		8.2			
3		8.2			
4		8.2			
5	7.5	8.1	7.1		
6		8.2			
7		8.2		0.01	
8		8.2			
9		8.2			
10		8.2			
11		8.2			
12	7.1	8.1	7.2	0.01	
13		8.1			
14		8.1			
15		8.1			
16		8.1			
17		8.1			
18		8.1			
19	7.2	8.1	7.2	0.01	
20		8.1			
21		8.1			
22		8.1			
23		8.1			
24		8.1			
25		8.1			
26	6.0	8.1	6.0	0.01	
27		8.1			
28		8.1			
29		8.1			
30					
31					

NOTES:
[1] Dissolved Oxygen in ppm.
[2] Total Residual Chlorine in ppm.

ST. LUCIE PLANT UNIT NO. 1
CIRCULATING WATER CHEMICAL PARAMETERS
TABLE C-1
Month & Year March 1980

DAY	INTAKE	DISCHARGE			REMARKS
	D.O.[1]	pH	D.O.[1]	T.R.C.[2]	
1		8.1			
2		8.1			
3		8.1			
4	6.9	8.1	7.1	0.01	
5		8.1			
6		8.1			
7		8.1			
8		8.1			
9		8.1			
10		8.1			
11	6.2	8.1	5.6	0.01	
12		8.2			
13		8.2			
14		8.2			
15		8.1			
16		8.1			
17		8.1			PLANT SHUTDOWN-REFUELING
18	5.6	8.1	5.8		NO CHLORINATION
19		8.1			"
20		8.1			"
21		8.1			"
22		8.1			"
23		8.1			"
24		8.1			"
25	7.9	8.2	7.5		"
26		8.2			"
27		8.2			"
28		8.2			"
29		8.2			"
30		8.2			"
31		8.2			"

NOTES:
[1] Dissolved Oxygen in ppm.
[2] Total Residual Chlorine in ppm.

ST. LUCIE PLANT UNIT NO. 1
CIRCULATING WATER CHEMICAL PARAMETERS
TABLE C-1
Month & Year April 1980

DAY	INTAKE	DISCHARGE			REMARKS
	D.O.[1]	pH	D.O.[1]	T.R.C.[2]	
1		8.2			PLANT SHUTDOWN-REFUELING
2	6.5	8.2	4.6		NO CHLORINATION
3		8.2			"
4		8.2			"
5		8.2			"
6		8.2			"
7		8.2			"
8	6.4	8.2	6.3		"
9		8.2			"
10		8.2			"
11		8.2			"
12		8.2			"
13		8.2			"
14		8.2			"
15	6.3	8.2	6.5		"
16		8.2			"
17		8.2			"
18		8.2			"
19		8.2			"
20		8.2			"
21		8.2			"
22	6.6	8.2	6.7		"
23		8.2			"
24		8.2			"
25		8.2			"
26		8.2			"
27		8.2			"
28		8.2			"
29	7.1	8.2	6.2		"
30		8.2			"
31					

NOTES:
[1]Dissolved Oxygen in ppm.
[2]Total Residual Chlorine in ppm.

ST. LUCIE PLANT UNIT NO. 1
CIRCULATING WATER CHEMICAL PARAMETERS
TABLE C-1
Month & Year May 1980

DAY	INTAKE	DISCHARGE			REMARKS
	D.O.[1]	pH	D.O.[1]	T.R.C.[2]	
1		8.2			PLANT SHUTDOWN-REFUELING
2		8.2			NO CHLORINATION
3		8.2			"
4		8.2			"
5		8.2			"
6	7.7	8.2	6.6		"
7		8.2			
8		8.2			
9		8.2			
10		8.2			
11		8.2			
12		8.2			
13	5.8	8.2	6.6		
14		8.2			
15		8.2			
16		8.2			
17		8.2			
18		8.2			
19		8.2			
20	5.7	8.2	5.3		
21		8.2		0.01	
22		8.2			
23		8.2			
24		8.1			
25		8.2			
26		8.2			
27	5.7	8.2	5.7		
28		8.1		0.01	
29		8.2			
30		8.2			
31		8.2			

NOTES:
[1] Dissolved Oxygen in ppm.
[2] Total Residual Chlorine in ppm.

ST. LUCIE PLANT UNIT NO. 1
CIRCULATING WATER CHEMICAL PARAMETERS
TABLE C-1
Month & Year June 1980

DAY	INTAKE	DISCHARGE			REMARKS
	D.O.[1]	pH	D.O.[1]	T.R.C.[2]	
1		8.2			
2		8.2			
3	5.4	8.2	5.4		
4		8.2		0.01	
5		8.2			
6		8.2			
7		8.2			
8		8.2			
9		8.2			
10	6.2	8.2	6.3		
11		8.2			
12		8.2			PLANT S/D: NO CHLORINATION
13		8.2			"
14		8.2			"
15		8.2			"
16		8.2			"
17	5.8	8.2	6.1		"
18		8.2			"
19		8.2			"
20		8.2			"
21		8.2			"
22		8.2			"
23		8.2			"
24	6.0	8.2	6.0		"
25		8.3			"
26		8.3			"
27		8.3			"
28		8.3			"
29		8.3			"
30		8.2			"
31					

NOTES:
[1] Dissolved Oxygen in ppm.
[2] Total Residual Chlorine in ppm.

ST. LUCIE PLANT UNIT NO. 1
CIRCULATING WATER CHEMICAL PARAMETERS
TABLE C-1

Month & Year July 1980

DAY	INTAKE	DISCHARGE			REMARKS
	D.O.[1]	pH	D.O.[1]	T.R.C.[2]	
1	5.2	8.3	5.4		
2		8.2			
3		8.2		0.01	
4		8.3			
5		8.3			
6		8.2			
7		8.2		0.01	
8	6.0	8.3	6.2		
9		8.2			
10		8.2			
11		8.2			
12		8.2			
13		8.2			
14		8.2			
15	5.6	8.2	5.8	0.01	
16		8.2			
17		8.2			
18		8.2			
19		8.2			
20		8.3		0.01	
21		8.3			
22	6.0	8.2	6.4		
23		8.2			
24		8.2			
25		8.2			
26		8.2			
27		8.2		0.01	
28	6.4	8.2	6.6		
29		8.2			
30		8.2			
31		8.2			

NOTES:
[1] Dissolved Oxygen in ppm.
[2] Total Residual Chlorine in ppm.

ST. LUCIE PLANT UNIT NO. 1
CIRCULATING WATER CHEMICAL PARAMETERS
TABLE C-1
Month & Year August 1980

DAY	INTAKE	DISCHARGE			REMARKS
	D.O.[1]	pH	D.O.[1]	T.R.C.[2]	
1		8.3			
2		8.3			
3		8.3		0.01	
4	6.4	8.2	6.3		
5		8.3			
6		8.2			
7		8.2			
8		8.2			
9		8.2			
10		8.2			
11	6.7	8.2	6.8		
12		8.2		0.01	
13		8.2			
14		8.2			
15		8.2			
16		8.2			
17		8.2			
18		8.2			
19	8.0	8.2	8.5	0.01	
20		8.2			
21		8.3			
22		8.3			
23		8.3			
24		8.2			
25		8.2			
26	6.5	8.2	6.1	0.01	
27		8.2			
28		8.2			
29		8.2			
30		8.2			
31		8.2			

NOTES:
[1]Dissolved Oxygen in ppm.
[2]Total Residual Chlorine in ppm.

ST. LUCIE PLANT UNIT NO. 1
CIRCULATING WATER CHEMICAL PARAMETERS
TABLE C-1

Month & Year September 1980

DAY	INTAKE	DISCHARGE			REMARKS
	D.O.[1]	pH	D.O.[1]	T.R.C.[2]	
1		8.3			
2	6.2	8.3	6.4		
3		8.2		0.01	
4		8.2			
5		8.2			
6		8.2			
7		8.2			
8		8.2		0.01	
9	6.7	8.2	6.8		
10		8.2			
11		8.2			
12		8.2			
13		8.2			
14		8.2			
15		8.3		0.01	
16	4.7	8.3	5.2		
17		8.3			
18		8.3			
19		8.2			
20		8.2			
21		8.2			
22		8.2		0.01	
23	5.3	8.2	5.6		
24		8.2			
25		8.2			
26		8.2			
27		8.2			
28		8.2			
29		8.3		0.01	
30	5.4	8.2	5.4		
31					

NOTES:
[1] Dissolved Oxygen in ppm.
[2] Total Residual Chlorine in ppm.

ST. LUCIE PLANT UNIT NO. 1
CIRCULATING WATER CHEMICAL PARAMETERS
TABLE C-1

Month & Year October 1980

DAY	INTAKE	DISCHARGE			REMARKS
	D.O.[1]	pH	D.O.[1]	T.R.C.[2]	
1		8.2			
2		8.2			
3		8.2			
4		8.2			
5		8.2			
6		8.2			
7	6.2	8.2	5.5	0.01	
8		8.2			
9		8.2			
10		8.2			
11		8.2			
12		8.2			
13		8.2		0.01	
14	5.8	8.2	5.6		
15		8.2			
16		8.2			
17		8.2			
18		8.2			
19		8.2			
20		8.2		0.01	
21	5.9	8.3	5.7		
22		8.4			
23		8.3			
24		8.3			
25		8.2			
26		8.2			
27		8.3		0.01	
28	5.7	8.3	5.6		
29		8.3			
30		8.3			
31		8.3			

NOTES:
[1] Dissolved Oxygen in ppm.
[2] Total Residual Chlorine in ppm.

ST. LUCIE PLANT UNIT NO. 1
CIRCULATING WATER CHEMICAL PARAMETERS
TABLE C-1
Month & Year November 1980

DAY	INTAKE	DISCHARGE			REMARKS
	D.O.[1]	pH	D.O.[1]	T.R.C.[2]	
1		8.3			
2		8.3			
3		8.3		0.01	
4		8.3			
5	6.3	8.3	6.2		
6		8.3			
7		8.3			
8		8.3			
9		8.3			
10		8.3		0.01	
11		8.3			
12	6.1	8.3	6.4		
13		8.3			
14		8.3			
15		8.2			
16		8.2			
17		8.3			
18	6.1	8.3	6.1		
19		8.3		0.01	
20		8.3			
21		8.3			
22		8.3			
23		8.3			
24		8.2		0.01	
25	6.4	8.3	6.2		
26		8.3			
27		8.3			
28		8.3			
29		8.2			
30		8.2			
31					

NOTES:
[1]Dissolved Oxygen in ppm.
[2]Total Residual Chlorine in ppm.

ST. LUCIE PLANT UNIT NO. 1
CIRCULATING WATER CHEMICAL PARAMETERS
TABLE C-1

Month & Year December 1980

DAY	INTAKE	DISCHARGE			REMARKS
	D.O.[1]	pH	D.O.[1]	T.R.C.[2]	
1		8.2			
2	6.2	8.2	6.2	<0.01	
3		8.2			
4		8.2			
5		8.2			
6		8.3			
7		8.2			
8		8.2		<0.01	
9	6.3	8.3	6.4		
10		8.3			
11		8.3			
12		8.2			
13		8.2			
14		8.2			
15	6.6	8.3	6.3	<0.01	
16		8.3			
17		8.3			
18		8.3			
19		8.3			
20		8.3			
21		8.3			
22		8.2		<0.01	
23	5.6	8.2	7.3		
24		8.2			
25		8.2			
26		8.1			
27		8.2			
28		8.2			
29		8.2		<0.01	
30	6.8	8.2	7.0		
31		8.2			

NOTES:
[1] Dissolved Oxygen in ppm.
[2] Total Residual Chlorine in ppm.

TABLE C-2

ST. LUCIE PLANT UNIT NO. 1
CIRCULATING WATER HEAVY METALS DETERMINATIONS

YEAR 1980

A. INTAKE

SAMPLE NUMBER	SAMPLE DATE	ARSENIC[1]	CHROMIUM[2]	COPPER	IRON[2]	LEAD[2]	MERCURY[2]	NICKEL[2]	ZINC[2]
1	1-29-80	<0.0002	<0.02	<0.02	0.43	<0.05	<0.0002	<0.02	<0.02
2	2-26-80	<0.001	<0.02	<0.02	0.23	<0.05	<0.0002	<0.02	0.03
3	3-28-80	<0.001	<0.02	<0.02	0.18	<0.05	0.0009	<0.02	<0.02
4	5-1-80	<0.001	<0.02	<0.02	0.24	<0.05	<0.0002	<0.02	0.02
5	6-2-80	<0.001	<0.02	<0.02	0.75	<0.05	<0.0002	<0.02	0.08
6	7-1-80	<0.001	<0.02	<0.02	0.24	<0.05	0.0003	<0.02	0.05
7	8-4-80	<0.001	<0.02	<0.02	0.35	<0.05	<0.0002	<0.02	0.04
8	9-2-80	<0.001	<0.02	<0.02	0.05	<0.05	<0.0002	<0.02	<0.02
9	10-1-80	<0.001	<0.02	<0.02	0.12	<0.05	<0.0002	<0.02	0.03
10	11-3-80	<0.001	<0.02	<0.02	0.27	<0.05	<0.0002	<0.02	0.03
11	12-1-80	<0.001	<0.02	<0.02	0.15	<0.05	<0.0002	<0.02	<0.02
12	1-2-81	<0.01	<0.02	<0.02	<0.1	<0.1	<0.0002	<0.02	<0.02

B. DISCHARGE

SAMPLE NUMBER	SAMPLE DATE	ARSENIC[1]	CHROMIUM[2]	COPPER	IRON[2]	LEAD[2]	MERCURY[2]	NICKEL[2]	ZINC[2]
1	1-29-80	<0.0002	<0.02	<0.02	0.14	<0.05	<0.0002	<0.02	0.43
2	2-26-80	<0.001	<0.02	<0.02	0.86	<0.05	<0.0002	<0.02	0.03
3	3-28-80	<0.001	<0.02	<0.02	0.04	<0.05	0.0006	<0.02	<0.02
4	5-1-80	<0.001	<0.02	0.06	0.18	<0.05	<0.0002	<0.02	0.06
5	6-2-80	<0.001	<0.02	<0.02	0.48	<0.05	<0.0002	<0.02	0.05
6	7-1-80	<0.001	<0.02	<0.02	0.25	<0.05	0.0003	<0.02	0.04
7	8-4-80	<0.001	<0.02	<0.02	0.35	<0.05	<0.0002	<0.02	0.04
8	9-2-80	<0.001	<0.02	0.03	0.06	<0.05	<0.0002	<0.02	<0.02
9	10-1-80	<0.001	<0.02	<0.02	0.14	<0.05	<0.0002	<0.02	0.06
10	11-3-80	<0.001	<0.02	<0.02	0.17	<0.05	<0.0002	<0.02	<0.02
11	12-1-80	<0.001	<0.02	<0.02	0.10	<0.05	<0.0002	<0.02	<0.02
12	1-2-81	<0.01	<0.02	<0.02	0.2	<0.1	<0.0002	<0.02	<0.02

NOTE: [1] Results Reported in PPM

[2] Results Reported in mg/L

* See Page C-17

* The absence of report data for the month of April 1980, is within Environmental Technical Specification reporting requirements, defined in Appendix "B", ETS 1.5, Frequency Definitions, "Monthly-not less than 12 times per annum-interval may vary by 15 days," referenced in R.J. Frechette's memorandum of interpretation of May 19, 1980, as follows:

"Monthly - Not less than 12 times per annum-interval may vary by 15 days. Monthly denotes analyses done at 30-day intervals not necessarily corresponding to the calendar month with an allowable variance of not more than 15 days on either side of the 30 day period. This is to say 45 days may elapse between analyses without missing a T.S. surveillance; therefore, a calendar month may be skipped without missing any analyses or violating any T.S."

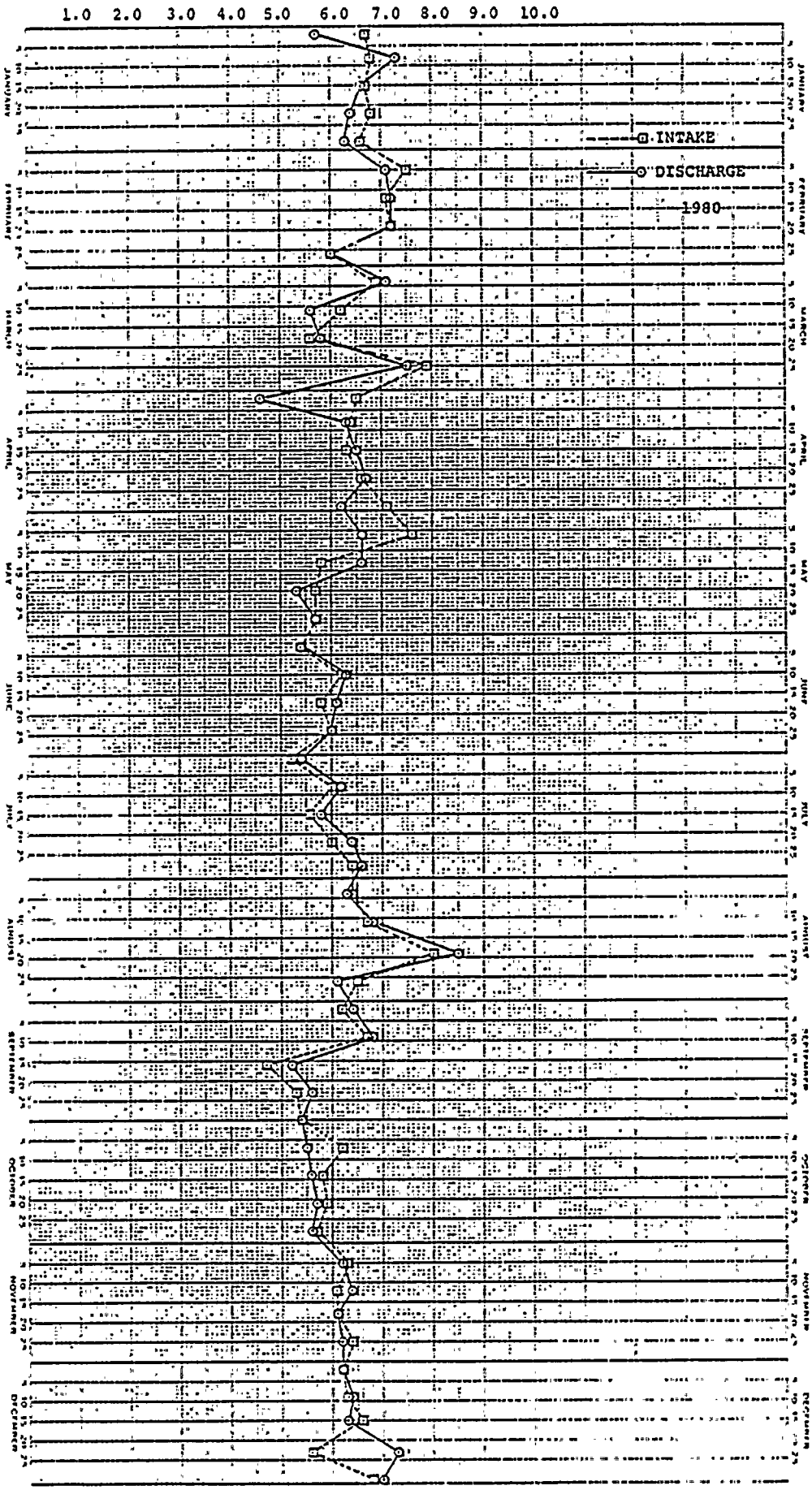
The logical extension of this interpretation is that a fifteen (15) day time "window" exists on either end of the calendar year of concern, and that if twelve (12) samples are collected within this 380-day period, the specification sampling frequency is satisfied.

Accordingly, the sample taken on 1/2/81 is included as the twelfth sample for the 1980 report period. Since the first sample was taken on 1/29/80, the total time span between the twelve samples is 340 days including the sampled-date days.

The St. Lucie Facility Review Group concurs with this report of St. Lucie Plant Unit No. 1 Circulating Water Heavy Metals Determinations Data, and will ensure that this departure from the usual practice will not result in any future failure to perform required sampling within the applicable report period.

FIGURE C-1

DISSOLVED OXYGEN (mg/L)



D. MINIMUM EFFECTIVE CHLORINE USAGE STUDY PROGRESS REPORT (ETS 4.2)

Chlorine injection rates for 1980 were relatively consistent at approximately 146 pounds per hour. Observations conducted at the St. Lucie Plant during 1980, as well as in the previous three years, have indicated that chlorine injection rates of less that 146 pounds per hour do not prevent cooling system macrobiofouling. The chlorine injection rates used in 1980 did not result in any total residual chlorine concentrations at the terminus of the discharge canal to exceed the ETS limitation 0.1 milligrams per liter.

TABLE D-1

ST. LUCIE UNIT NO. 1
CHLORINE INJECTION RATES
1980

Months	Cl_2 Injection Rate (lbs/hr)	Total Number of Days/Month Chlorination Occurred
January	146	28
February	146	24
March	146	15
April	0 (Refueling)	0
May	146	17
June	146	9
July	146	30
August	146	31
September	146	27
October	146	26
November	146	28
December	146	25

NOTE: Chlorination was performed on one waterbox once per day for 1.5 hours at the above listed injection rates.

E. ADDITIONAL BIOTIC RESULTS

SEA TURTLE ENTRAPMENT

Sea turtle entrapment in the intake canal has occurred during the monitoring period from January 1, 1980 through December 31, 1980. A large mesh turtle net placed in the intake canal is used to capture the entrapped turtles. A total of 107 turtles were caught, tagged and released unharmed to the ocean. Loggerhead turtles accounted for 101 of the number and six green turtles comprised the balance.

In addition to the number of turtles noted above, some mortality of sea turtles has been noted in the intake canal with five loggerheads and two greens being recovered. Four turtle deaths (two loggerheads and two greens) were directly associated with netting and we assume drowning to be the cause. The cause of death for the remaining three turtles was unknown.

F. CHANGES TO THE ENVIRONMENTAL TECHNICAL SPECIFICATIONS

During 1980, several minor changes were made to the Environmental Procedures. All changes were properly documented and approved by the Company Environmental Review Group (CERG) and thus are fully established as quality documents.

There were no changes to the Environmental Technical Specifications of a non-radiological nature.

G. REPORTABLE OCCURRENCES

The following Reportable Occurrence Reports were filed with NRC's Region II Office of Inspection and Enforcement during 1980.

R.O. NUMBER	DATE OF R.O.	TITLE
335-B-80-01	02-13-80	Zone of Mixing - surface temperature rise
335-B-80-02*	10-30-80	Non-transmittal of record documentation for Reportable Occurrence No. 335-B-77-01
335-B-80-03	12-02-80	St. Lucie Plant Unit #1, Ocean Intake Area, recording thermograph loss
335-B-81-03	03-05-81	Temporary Loss of Ocean Thermal Monitoring Capability

* R.O. 335-B-77-01, dated 1-10-77, entitled, "Discharge Zone of Mixing - Recording Thermographs" was prepared and executed with exception of the non-transmittal of the document to NRC. R.O. 335-B-77-01 was referenced in the Florida Power & Light Company St. Lucie Plant, Unit No. 1, Annual Non-Radiological Environmental Monitoring Report No. 2 for 1977, Page 13, Section VII, Reportable Occurrences.