

MONTHLY REPORT NO. 61 FOR JULY, 1978
THERMAL AND BIOLOGICAL MONITORING PROGRAMS
Peach Bottom Atomic Power Station
Units No. 2 and 3

The operation of PBAPS during the month of July, 1978 was well within all applicable thermal criteria. The monthly mean delta T temperature (723 hourly readings) for the state line minus S2 location was 2.86°F higher than the preoperational experience. S2 was used this month as the upstream control, because of spurious readings obtained for S18/S18A during low river flows concurrent with Holtwood Dam's normal intermittent operation. The 5°F delta T above ambient criteria at the state line was not exceeded on an hourly basis due to plant operation.

The daily summary of air temperature data for this period is presented in Table 1.

The daily river flows as measured at Holtwood Hydroelectric Station and the daily generation at PBAPS in thermal megawatts for the reporting period are presented in Table 2. Table 3 summarizes the hourly Conowingo Pond temperatures and Table 4 shows the impact hours above the July confidence limits. Figure 1 shows the instrument and survey locations.

Figures 2, 3, 4, and 5 are isotherm plots, which include three (3) horizontal sections of boat surveys made during the July recording period. Boat survey information is tabulated in Table 5. Surveys for this period were started at the north end of Conowingo Pond. The delta T at the state line indicated on the isotherms is calculated by subtracting the Holtwood Dam temperature and the hourly confidence limit (applicable to the mid-survey time) from the state line temperature. This delta T can be interpreted as being caused by PBAPS since ambient hourly variations at the state line have been considered.

Although the isotherm plots do not cover the entire reporting period on a daily, hour by hour basis and cannot be used as a continuous indication of temperature variation, they do represent a fair treatment of typical plume characteristics. In addition, they may also be used as an empirical tool in estimating probable plume patterns in advance of certain natural and plant operating conditions.

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TABLE 1

AIR TEMPERATURE FROM
WEATHER STATION NO. 1
CONOWINGO POND
JULY, 1978

AIR TEMPERATURE

	<u>AT 1200 HOURS</u>	<u>AT 2400 HOURS</u>
	<u>°F</u>	<u>°F</u>
July		
1	74	70
2	62	60
3	62	62
4	62	62
5	74	58
6	80	58
7	80	61
8	82	68
9	84	68
10	86	76
11	72	54
12	74	55
13	80	67
14	75	70
15	78	76
16	76	67
17	76	63
18	82	63
19	86	68
20	85	66
21	88	70
22	90	74
23	92	72
24	90	72
25	74	70
26	82	74
27	90	70
28	80	62
29	84	79
30	82	70
31	74	70

TABLE 2

FCLTWOOD DAILY FLOWS (CFS) AND DAILY THERMAL MEGAWATTS- JUL 1978

YEAR	MONTH	DAY	HW_FLCW	MW_THERM
78	7	1	14700	4831
78	7	2	14100	4874
78	7	3	19200	5075
78	7	4	22300	5503
78	7	5	24800	5827
78	7	6	24700	6078
78	7	7	20500	6271
78	7	8	17500	6345
78	7	9	16100	6310
78	7	10	15900	6178
78	7	11	15000	6317
78	7	12	14200	6312
78	7	13	11900	6292
78	7	14	11500	6286
78	7	15	11900	3592
78	7	16	18500	4359
78	7	17	17800	4523
78	7	18	16600	5274
78	7	19	15300	5385
78	7	20	13500	6308
78	7	21	12400	6245
78	7	22	12000	5228
78	7	23	10800	5631
78	7	24	10700	5708
78	7	25	11500	6494
78	7	26	10800	6559
78	7	27	10500	6565
78	7	28	9600	6564
78	7	29	8800	6544
78	7	30	8800	6532
78	7	31	9700	3284

TABLE 3

SUMMARY OF HOURLY CONCRETE POND WATER TEMPERATURES - JULY 1978

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE
Mo_FLOW	744	14567.74	4357.63	0.00	24300.00
Mo_THERM	744	5715.15	875.20	2234.00	6565.00
S2	723	25.36	1.49	21.80	27.70
S13	723	27.40	1.77	23.80	31.50
S13A	723	27.10	1.70	23.80	31.10
S13	743	24.80	3.37	14.50	37.70
S13A	743	24.23	4.13	12.90	43.20
S30	742	25.37	1.54	22.10	28.50
S31	742	35.21	2.12	30.70	38.60
S32	742	31.04	1.94	27.50	35.60
D13_2	723	2.04	1.06	-1.00	5.20
D2_13	722	0.45	2.74	-14.10	10.50
D13_18	722	2.50	2.69	-10.40	12.00
D13_13A	723	0.30	0.20	-0.60	0.30
D13_13A	743	0.57	2.55	-14.60	13.40
D31_30	742	5.84	1.21	6.10	11.30
D32_30	742	5.67	1.35	2.70	9.40
D31_32	742	4.17	1.20	0.70	6.60
S13S	743	24.80	3.37	14.50	37.70
S13S	723	27.40	1.77	23.80	31.50
D13S_13A	743	0.57	2.55	-14.60	13.40
D13S_S2	723	2.04	1.06	-1.00	5.20
D13S_13S	722	2.50	2.69	-10.40	12.00

Definitions are as follows:

- N - Number of Observations during the month
- S - Thermograph Station (e.g., S2 is thermograph Station 2)
(TEMPERATURES ARE IN DEGREE CENTIGRADE)
- D - Difference in temperature of the two stations (e.g. D13-2 is the temperature at Station 13 minus the temperature at Station 2, in degrees Centigrade)
- HW Flow - Holtwood Flow in CFS
- MW Therm - Total Thermal Output of PEAPS in Megawatts
- S13S - Thermograph S13A is substituted when S13 is missing or spurious readings are observed when low river flows occur and Holtwood Dam is not operating. S13S is used to determine exceptions

TABLE 4

PBAPS IMPACT HOURS ABOVE JULY CONFIDENCE LIMITS

D B S	Y E S	M A R	D A T E	H O U R	S T E M	S T E M	D I S T R I B U T I O N	D I S T R I B U T I O N	D I S T R I B U T I O N	H W L O W	M W T H R M	S T A T E	C L 1	C L 2	C L 3	E X 1	E X 2	E X 3	I M P A C T	R E C I R C	I M P I B
1	73	7	8	22	30.2	28.0			2.2	27400	PRE_OP	2.3	2.0	1.8				.4			.72
2	73	7	8	23	30.0	28.0			2.0	27400	PRE_OP	2.1	1.8	1.7				.3			.54
3	73	7	8	24	30.0	27.9			2.1	27400	PRE_OP	2.0	1.3	1.7				.4			.72
4	73	7	9	1	29.9	27.8			2.1	23800	PRE_OP	2.1	1.6	1.6				.5			.90
5	73	7	9	2	29.5	27.9			1.6	23800	PRE_OP	2.4	1.6	1.3				.3			.54
6	73	7	9	10	29.3	27.8			1.5	23800	PRE_OP	2.4	1.7	1.4				.1			.18
7	73	7	9	11	29.6	27.8			1.8	23800	PRE_OP	2.6	1.5	1.7				.1			.18
8	73	7	9	12	30.2	27.9			2.3	23800	PRE_OP	2.5	1.7	2.0				.3			.54
9	73	7	9	13	30.7	28.0			2.7	23800	PRE_OP	2.3	1.7	2.4				.3			.54
10	73	7	9	14	31.2	28.0			3.2	23800	PRE_OP	2.8	1.7	3.0				.2			.36

There were no hourly exceptions in July, 1978.

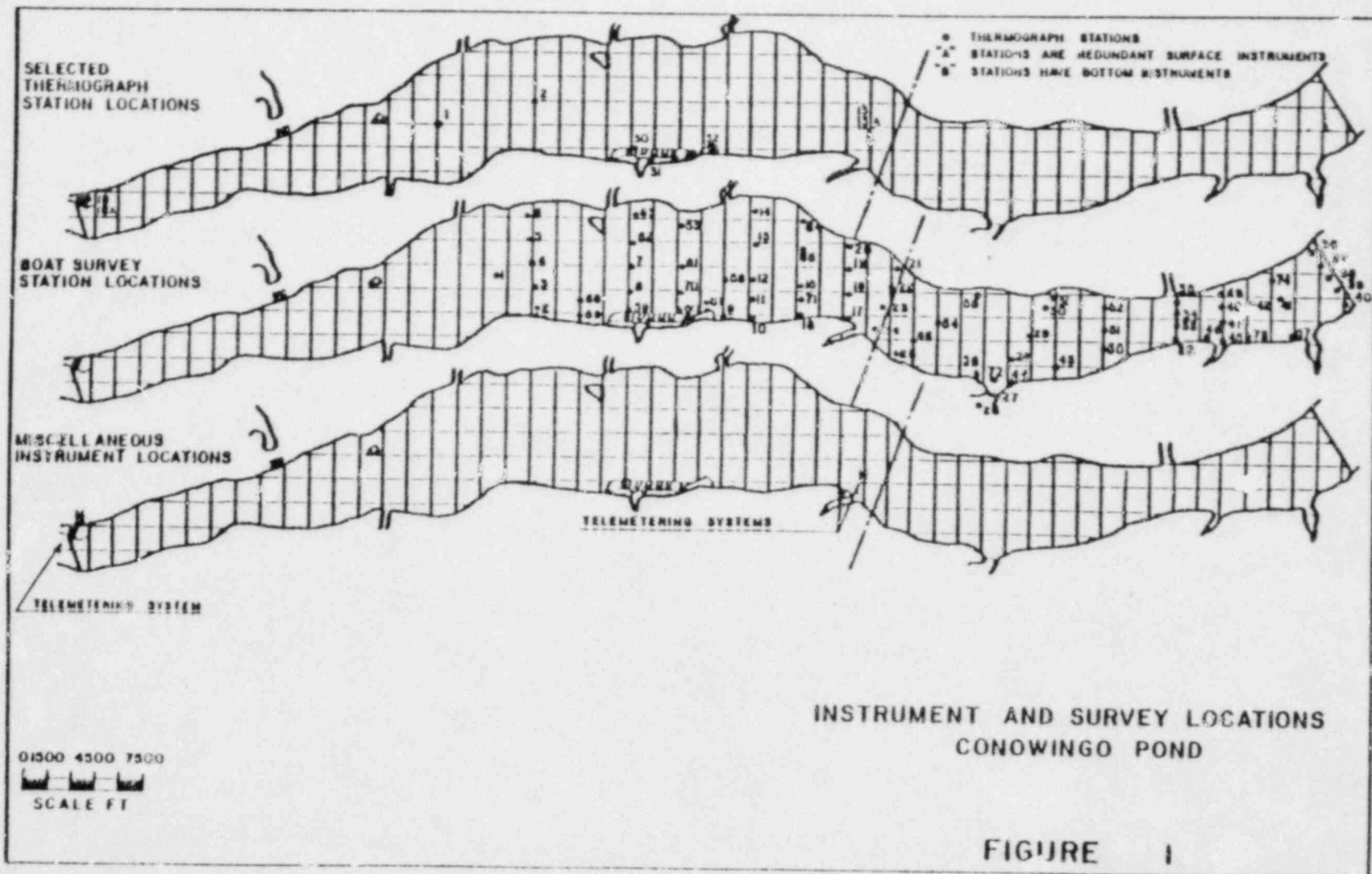
Definitions:

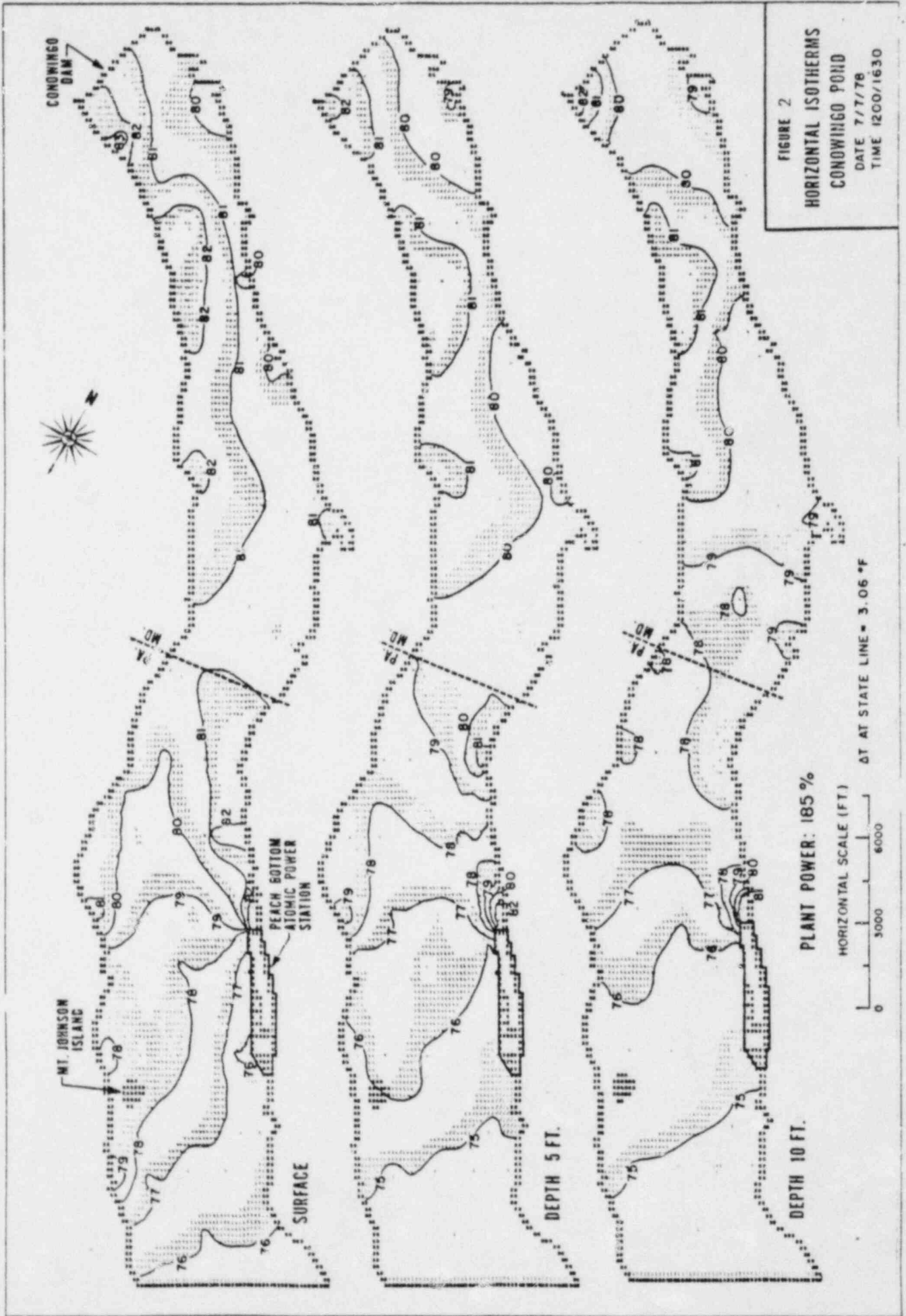
- S = Thermograph Station Temperature
- D = Delta T (C°)
- HWFLOW = Holtwood Daily River Flow (CFS)
- MWTHERM = Daily Thermal Generation of PBAPS (Megawatts)
- CL = Confidence Limit (C°)
- EX = Exceptions (C°)
- IMP = Impact (F°)
- RECIRC_F = Recirculation (F°)

TABLE 5

BOAT SURVEY INFORMATION

SURVEY DATE	7/7/78	7/12/78	7/19/78	7/24/78
TIME:				
Survey Start (EST)	1200	1210	0850	0900
State Line (EST)	1403	1340	1005	1033
Survey Finish (EST)	1630	1520	1110	1300
HYDRAULIC DATA:				
Pond Elevation Start (Ft.)	107.49	107.8	107.2	106.91
Pond Elevation Finish (Ft.)	107.09	107.6	107.5	107.66
Natural Flow (24 hour ave., CFS)	18,100	12,400	13,500	9,500
Conowingo Inflow (24 hrs. ave., CFS)	21,050	13,650	14,800	10,600
Conowingo Dam Draft (24 hr. ave., CFS)	24,050	17,000	17,650	10,950
PBAPS Power Output:				
Unit 2: Thermal (MW)	3141	3100	2122	2803
Electrical (MW)	994	978	656	851
Unit 3: Thermal (MW)	3130	3212	3263	2905
Electrical (MW)	991	1018	1028	889
METEOROLOGICAL DATA:				
Time (EST)	1200	1220	0900	0915
Air Temperature (°F)	78	74	78	77
Relative Humidity (%)	60	54	86	74
Precipitation (24 hour total, in)	0	0	0	0
Wind Speed (mph)	10	2-5	0-3	10-15
Cloud Over	Clear	Scat.	Haze	Scat.
Location:	Sta. 7	Sta. 7	Sta. 7	Sta. 7
Wind Direction	S	NNW	E	NNW
WATER TEMPERATURE (THERMOGRAPH)				
Daily Mean: Holtwood °C, (°F)	21.7(71.1)	25.5(77.8)	25.8(78.4)	26.9(80.5)
Muddy Run °C, (°F)	-	-	-	-
Mid Survey: Holtwood °C, (°F)	21.8(71.2)	25.4(77.7)	26.1(80.0)	28.3(82.9)
Muddy Run °C, (°F)	-	-	-	-
WATER TEMPERATURE (SURVEY)				
PBAPS Discharge °C, (°F)	28.6(83.5)	28.7(83.7)	32.6(90.7)	31.3(87.8)
Intake °C, (°F)	23.8(74.8)	27.0(80.6)	26.9(80.4)	29.8(85.6)
T °C, (°F)	4.8(8.7)	1.7(3.1)	5.7(10.3)	1.3(2.2)
Pond Surface Max. °C, (°F)	28.9(84.0)	29.5(85.1)	32.6(90.7)	33.1(91.4)
Min. °C, (°F)	24.3(75.7)	25.7(89.3)	26.7(80.1)	29.0(84.2)
Pond Bottom Max. °C, (°F)	27.8(82.0)	29.0(84.2)	32.8(91.0)	31.8(89.2)
Min. °C, (°F)	23.3(73.9)	24.9(76.8)	26.0(78.8)	28.8(83.8)
No. of C.W. Pumps Operating	6	6	6	6
No. of Cooling Towers Operating	4	4	2	4





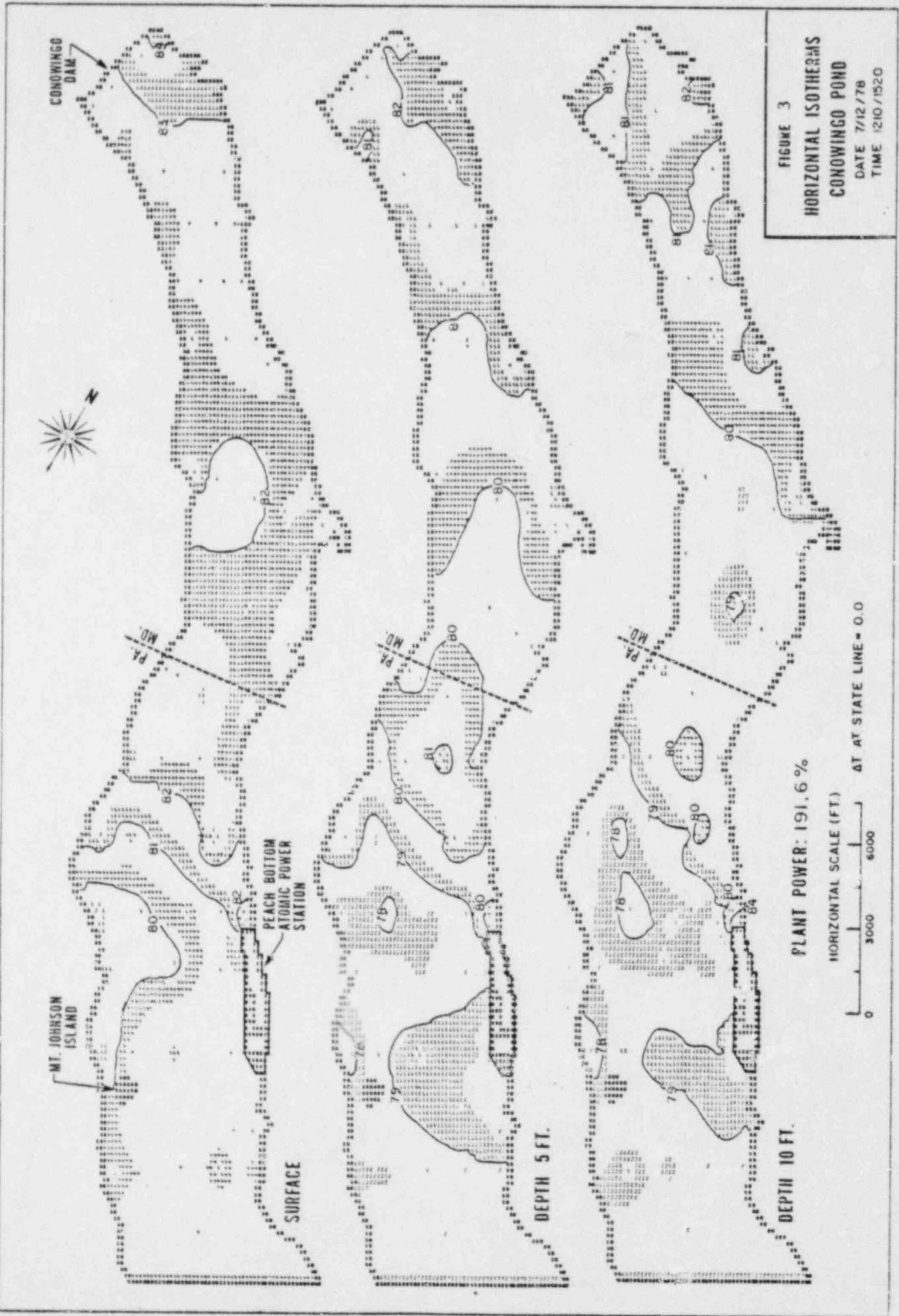


FIGURE 3
 HORIZONTAL ISOTHERMS
 COWLINGO POND
 DATE 7/12/78
 TIME 1210/1520

PLANT POWER: 191.6 %
 HORIZONTAL SCALE (FT.)
 0 3000 6000
 ΔT AT STATE LINE = 0.0



MT. JOHNSON ISLAND

COWLINGO DAM

PEACH BOTTOM ATOMIC STATION

SURFACE

DEPTH 5 FT.

DEPTH 10 FT.

PA MD

PA MD

PA MD

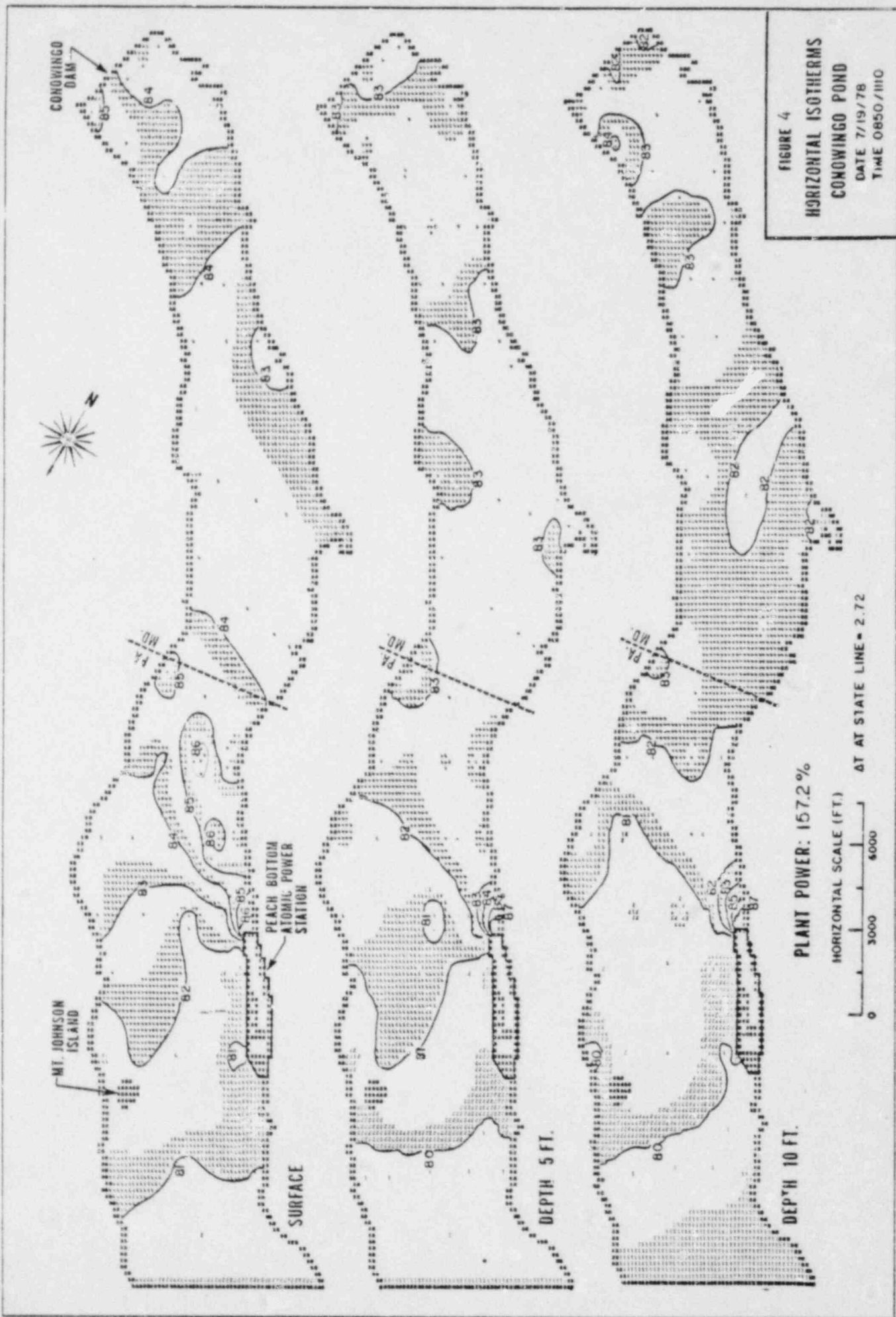


FIGURE 4
 HORIZONTAL ISOTHERMS
 CONOWINGO POND
 DATE 7/19/78
 TIME 0850/1110



PLANT POWER: 157.2%
 ΔT AT STATE LINE = 2.72
 HORIZONTAL SCALE (FT.)
 0 3000 6000

MT. JOHNSON ISLAND

CONOWINGO DAM

PEACH BOTTOM ATOMIC POWER STATION

SURFACE

DEPTH 5 FT.

DEPTH 10 FT.

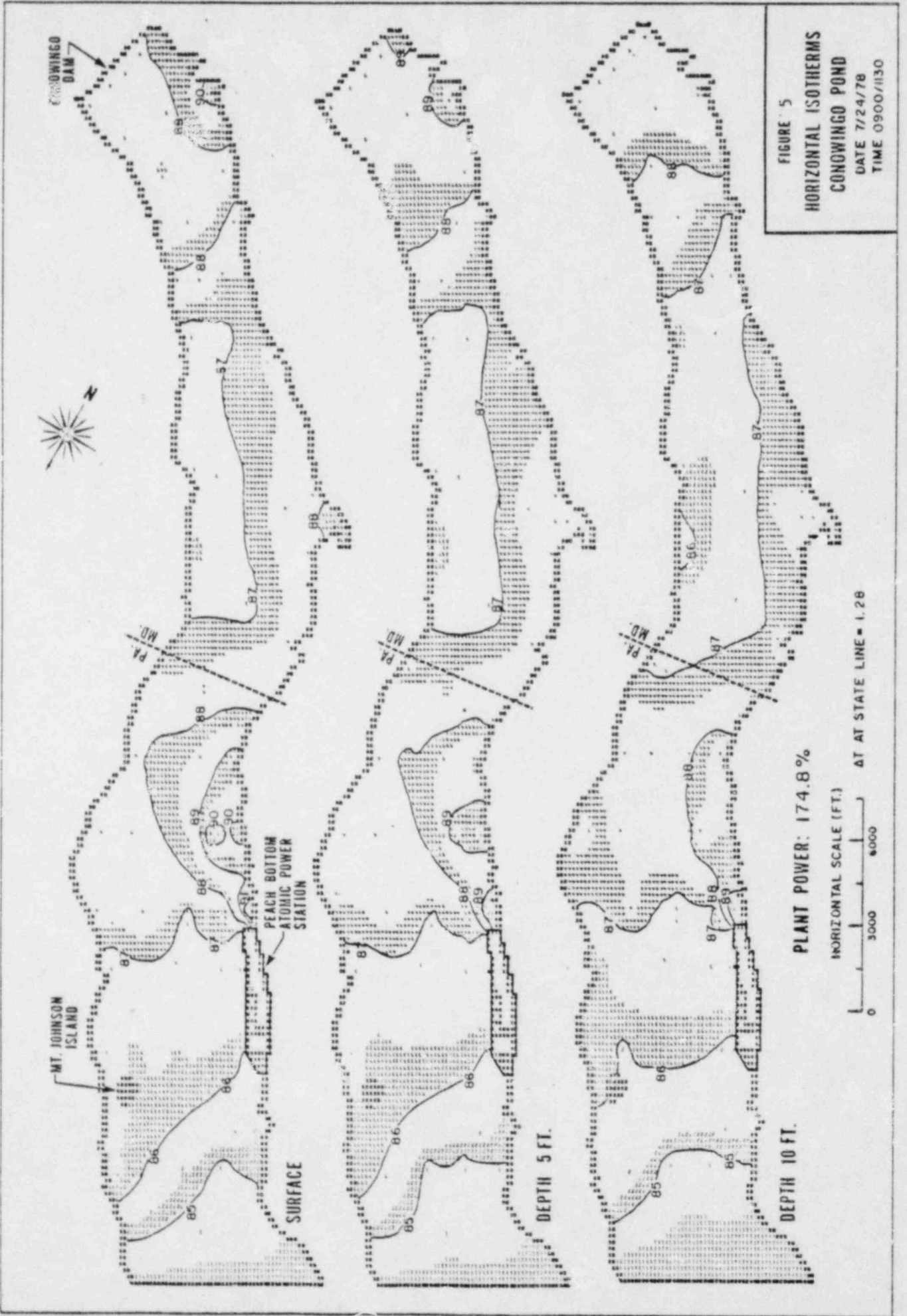


FIGURE 5
 HORIZONTAL ISOOTHERMS
 CONOWINGO POND
 DATE 7/24/78
 TIME 0900/1130



MT. JOHNSON ISLAND

CONOWINGO DAM

PEACH BOTTOM
 ATOMIC POWER
 STATION

SURFACE

DEPTH 5 FT.

DEPTH 10 FT.

PLANT POWER: 174.8%
 AT STATE LINE = 1.28

HORIZONTAL SCALE (FT.)
 0 3000 6000

PEACH BOTTOM ATOMIC POWER STATION

Monthly Report No. 62

for

August 1978

Thermal and Biological

Monitoring Programs

for

Units No. 2 and 3

PHILADELPHIA ELECTRIC COMPANY

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