

MONTHLY REPORT NO. 65 FOR NOVEMBER, 1978
THERMAL AND BIOLOGICAL MONITORING PROGRAMS
PEACH BOTTOM ATOMIC POWER STATION
UNITS NO. 2 AND 3

The operation of PBAPS during the month of November, 1978 was well within all applicable thermal criteria. The monthly mean delta T temperature (714 hourly readings) for the state line minus S2 location was 2.90°F higher than the mean of the preoperational experience. 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 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 1. Table 2 summarizes the hourly Conowingo Pond temperatures and Table 3 shows the impact hours above the November 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 November recording period. Boat survey information is tabulated in Table 4. 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

HOLTWOOD DAILY FLOWS(CFS) AND DAILY THERMAL MEGAWATTS- NOV 1978

DES	YEAR	MONTH	DAY	HW_FLOW	MW_THERM
1	78	11	1	19800	6572
2	78	11	2	19200	6573
3	78	11	3	16400	6564
4	78	11	4	12200	6570
5	78	11	5	13800	6570
6	78	11	6	13500	4907
7	78	11	7	12600	4198
8	78	11	8	12400	5273
9	78	11	9	11400	6552
10	78	11	10	12500	6417
11	78	11	11	12400	5646
12	78	11	12	11100	6261
13	78	11	13	12300	6474
14	78	11	14	10300	4148
15	78	11	15	10600	5559
16	78	11	16	10200	6255
17	78	11	17	9300	6255
18	78	11	18	9400	4376
19	78	11	19	8900	6351
20	78	11	20	11900	6552
21	78	11	21	13800	6571
22	78	11	22	17700	6469
23	78	11	23	15700	5570
24	78	11	24	15000	5626
25	78	11	25	15100	6225
26	78	11	26	15000	5082
27	78	11	27	16000	6162
28	78	11	28	16100	6543
29	78	11	29	16000	7061
30	78	11	30	16900	6528

TABLE 2

SUMMARY OF HOURLY CONOWINGO POND WATER TEMPERATURES -NOV, 1978

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE
HW_FLOW	720	13583.33	2866.50	6900.00	19800.00
MW_THERM	720	5997.00	770.81	4148.00	7661.00
S2	714	10.70	1.83	5.10	13.50
S13	716	12.37	1.87	7.50	15.00
S13A	715	12.00	1.91	6.80	15.10
S30	718	10.79	2.09	5.00	13.50
S31	719	20.55	2.32	13.00	24.40
S32	716	18.13	2.16	12.10	21.50
D13_2	714	1.06	0.70	-0.30	3.50
D13_13A	715	0.37	0.23	-0.30	1.3
D31_30	718	9.76	1.39	5.10	11.50
D32_30	715	7.34	1.02	4.10	9.80
D31_32	716	2.44	1.02	-2.80	4.9
S13S	716	12.37	1.87	7.50	15.00
DS13S_S2	714	1.06	0.70	-0.30	3.50

Definitions are as follows:

- N - Number of Observations during the month
- S - Thermograph Station (e.g., S2 is thermograph Station 2)
- (TEMPERATURES ARE IN DEGREES 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 PBAPS in Megawatts

TABLE 3

PBAPS IMPACT HOURS ABOVE NOVEMBER CONFIDENCE LIMITS

DBS	YEAR	MONTH	DAY	HOUR	S2	S131	D13_2	HW_FLOW	HW_THERM	STATUS	CL13_2	EX13_2	IMP13_2
1	73	11	11	3	5.8	7.2	1.4	23800	.	PRE_OP	1.3	0.1	0.18
2	73	11	11	4	5.8	7.3	1.5	23800	.	PRE_OP	1.4	0.1	0.18
3	73	11	11	13	5.9	7.5	1.6	23800	.	PRE_OP	1.5	0.1	0.18

There were no hourly exceptions in November, 1978

Definitions:

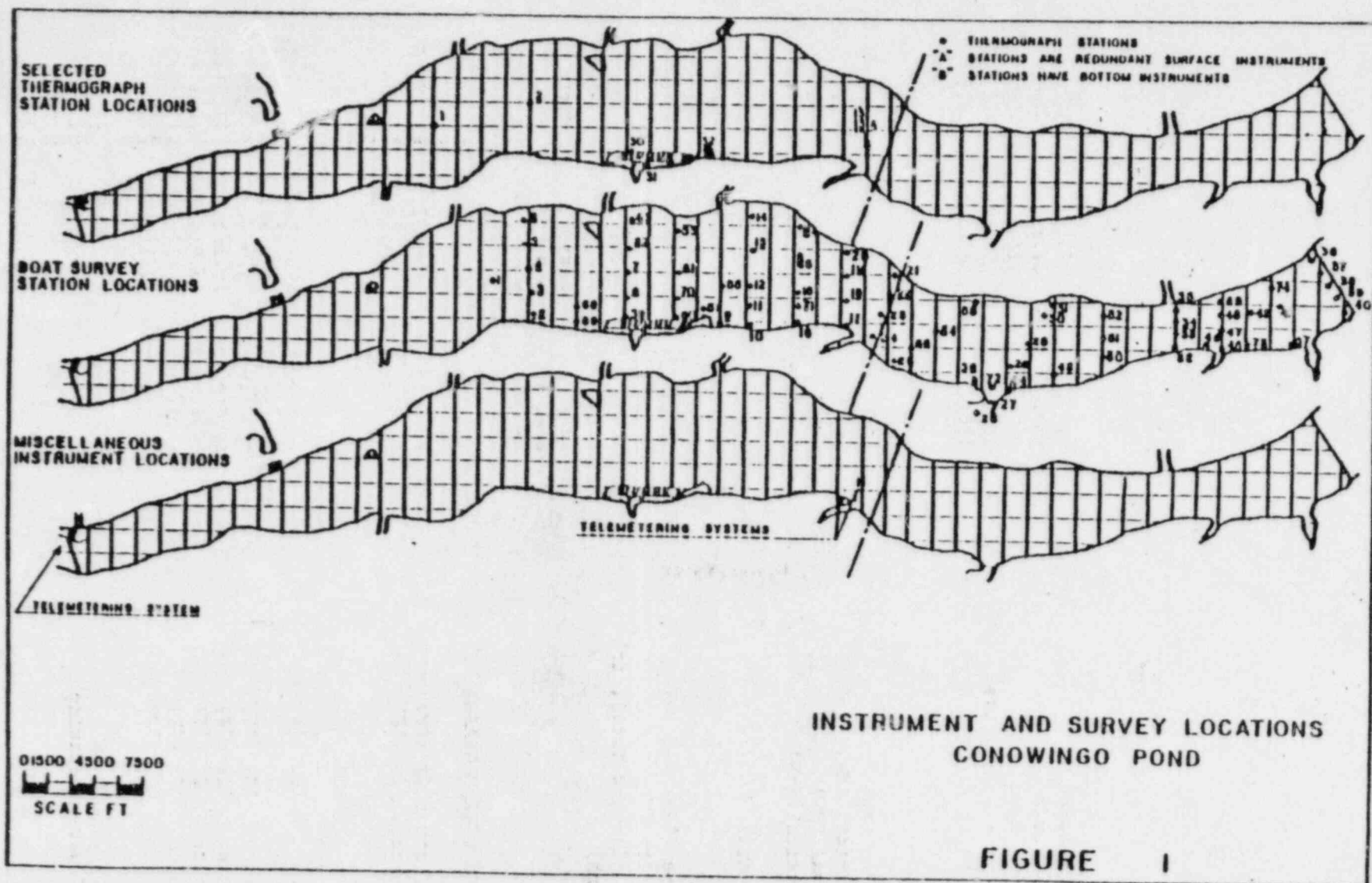
- S - Thermograph
- D - Delta T (C°)
- HWFLOW - Holtwood Daily River Flow (CFS)
- HWTHERM - Daily Thermal Generation of PBAPS (Megawatts)
- CL - Confidence Limit (C°)
- EX - Exceptions (C°)
- IMP - Impact (F°)

TABLE 4

BOAT SURVEY INFORMATION

SURVEY DATE	11/6/78	11/14/78	11/21/78	11/28/78
TIME:				
Survey Start (EST)	945	0920	1105	1042
State Line (EST)	1048	1027	1410	1330
Survey Finish (EST)	1215	1145	1530	1520
HYDRAULIC DATA:				
Pond Elevation Start (Ft.)	107.95	107.6	107.7	106.98
Pond Elevation Finish (Ft.)	107.93	107.8	108.6	107.20
Natural Flow (24 hour ave., CFS)	11500	9200	12800	15000
Conowingo Inflow (24 hrs. ave., CFS)	11950	9075	17875	16275
Conowingo Dam Draft (24 hr. ave., CFS)	15600	13475	18,875	22450
PBAPS Power Output:				
Unit 2: Thermal (MW)	3283	1227	3282	3256
Electrical (MW)	1050	181	1054	1050
Unit 3: Thermal (MW)	1624	2921	3289	3286
Electrical (MW)	507	897	1037	1042
METEOROLOGICAL DATA:				
Time (EST)	0940	0905	1100	1020
Air Temperature (°F)	54	60	44	38
Relative Humidity (%)	62	66	68	89
Precipitation (24 hour total, in)	0	.01	0	.04
Wind Speed (mph)	2	10	3-5	2-4
Cloud Over	Full	Hazy	Partly	Full
Location:	Sta. 7	Sta. 7	Sta. 7	Sta. 7
Wind Direction	SE	S	N	SW
WATER TEMPERATURE (THERMOGRAPH)				
Daily Mean: Station 2* (°F)	12.4(54.3)	11.3(52.5)	10.5(50.9)	7.5(45.4)
Mid Survey: Station 2* (°F)	12.3(54.1)	11.3(52.5)	10.5(50.9)	7.5(45.4)
WATER TEMPERATURE (SURVEY)				
PBAPS Discharge °C, (°F)	18.8(65.8)	16.1(61.0)	17.5(63.5)	14.0(57.2)
Intake °C, (°F)	12.9(55.2)	11.1(52.0)	10.66(51.2)	6.4(43.5)
ΔT °C, (°F)	5.9(10.6)	5.0(9.0)	6.84(12.3)	7.6(13.7)
Pond Surface Max. °C, (°F)	19.6(67.3)	16.2(61.2)	17.7(68.9)	14.4(57.9)
Min. °C, (°F)	12.1(53.8)	10.9(51.6)	10.1(50.2)	5.7(42.3)
Pond Bottom Max. °C, (°F)	17.5(63.5)	15.8(60.4)	17.1(62.8)	14.8(58.6)
Min. °C, (°F)	11.8(53.2)	10.9(51.6)	10.1(50.2)	5.9(41.9)
No. of C.W. Pumps Operating	6	4	6	6
No. of Cooling Towers Operating	4	3	4	3

* Station 2 is located approximately 1 mile upstream of PBAPS.



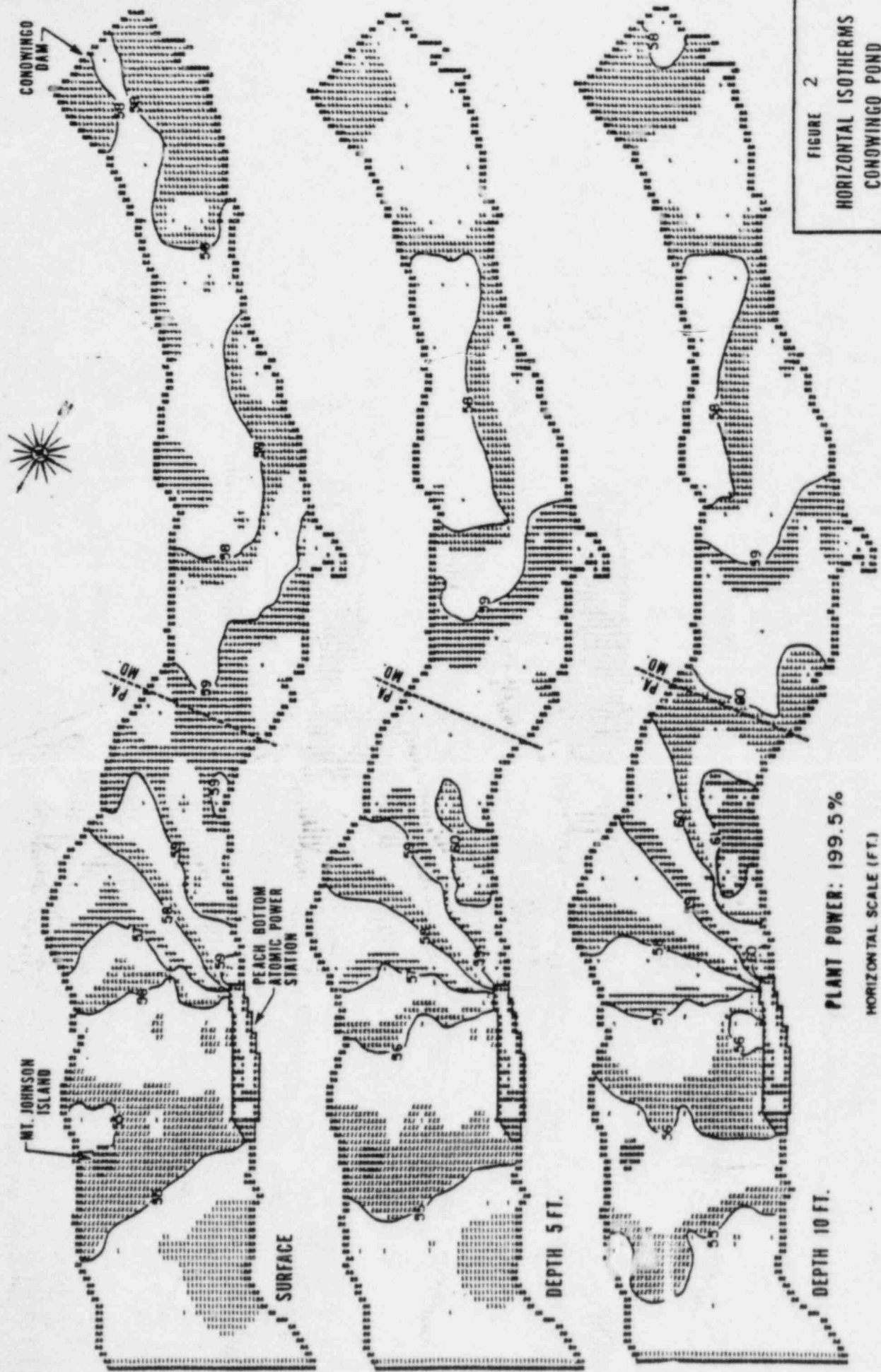


FIGURE 2
HORIZONTAL ISOOTHERMS
CONOWINGO POND
DATE 11/6/78
TIME 0945/1215

PLANT POWER: 199.5%

HORIZONTAL SCALE (FT.)

0 3000 6000
AT AT STATE LINE = 3.43°F

SURFACE

DEPTH 5 FT.

DEPTH 10 FT.

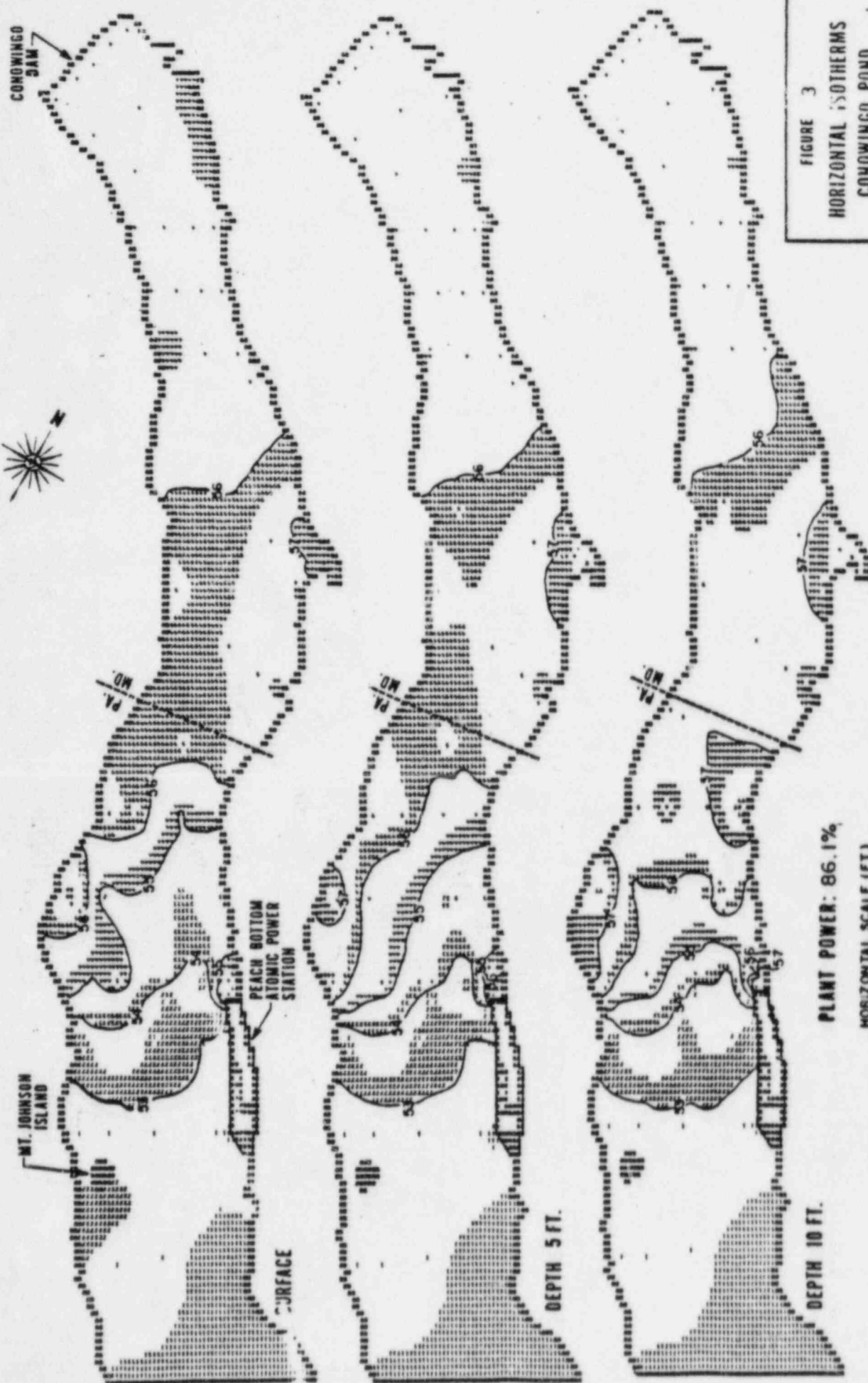
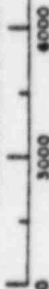


FIGURE 3
HORIZONTAL ISOTHERMS
CONOWINGO POND
DATE 11/14/78
TIME 0920/1145

PLANT POWER: 86.1%

HORIZONTAL SCALE (FT.)



ΔT AT STATE LINE = 2.71°F

SURFACE

DEPTH 5 FT.

DEPTH 10 FT.



MT. JOHNSON
ISLAND

CONOWINGO
DAM

PEARL BOTTOM
ATOMIC POWER
STATION

SURFACE

DEPTH 5 FT.

DEPTH 10 FT.

PLANT POWER: 86.1%

HORIZONTAL SCALE (FT.)



AT AT STATE LINE = 2 71°F

FIGURE 4
HORIZONTAL ISOTHERMS
CONOWINGO POND
DATE 11/14/78
TIME 0920/1145

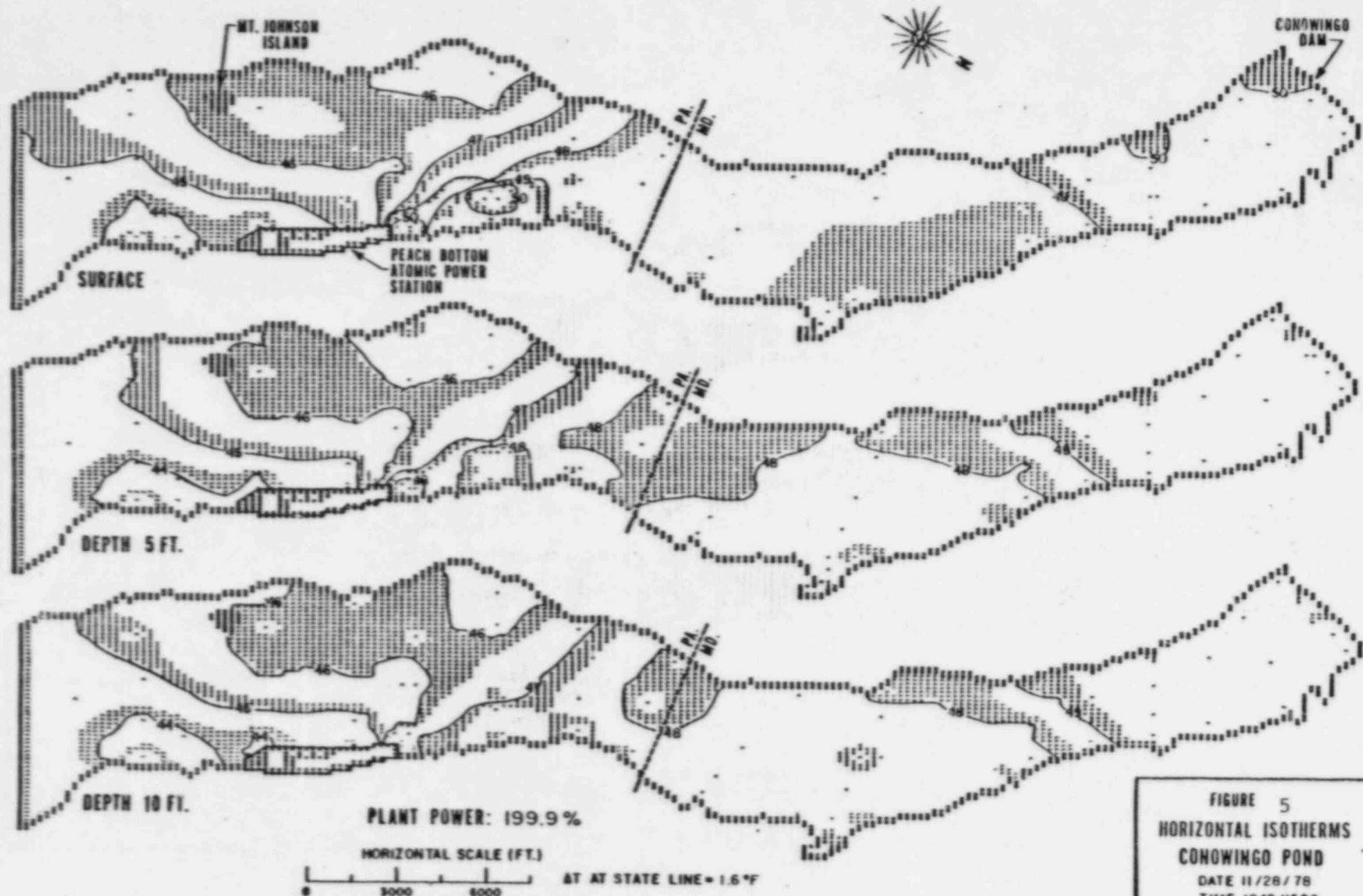


FIGURE 5
HORIZONTAL ISOOTHERMS
CONOWINGO POND
DATE 11/28/78
TIME 1042/1520