

PENNSYLVANIA ELECTRIC COMPANY  
DEEP CREEK HYDROELECTRIC STATION  
WATER APPROPRIATION PERMIT  
NO. GA92S009(01)

ANNUAL REPORT FOR 1995

FEBRUARY 1996

2996-0001

#15240

**DEEP CREEK HYDROELECTRIC STATION  
MDE WATER APPROPRIATION PERMIT NO. GA92S009 (01)  
GARRETT COUNTY, MARYLAND**

**ANNUAL REPORT FOR 1995**

**BY**

**PENNSYLVANIA ELECTRIC COMPANY  
JOHNSTOWN, PA**

**FEBRUARY 1996**

**DEEP CREEK HYDROELECTRIC STATION  
MDE WATER APPROPRIATION PERMIT NO. GA92S009 (01)  
ANNUAL REPORT PER PERMIT CONDITION NO. 23**

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**DEEP CREEK HYDROELECTRIC STATION  
MDNR WATER APPROPRIATION PERMIT NO. GA92S009 (01)  
ANNUAL REPORT PER PERMIT CONDITION NO. 23**

**1.0 SUMMARY**

The Pennsylvania Electric Company ("Permittee") holds Water Appropriation Permit GA92S009(01) originally issued by the Maryland Department of Natural Resources ("MDNR") and now administered by the Maryland Department of the Environment ("Department"). This report is submitted in accordance with Permit Condition 23, which requires the Permittee to submit an annual report to the Department, including data and information as specified in Permit Conditions 15-19 and 21.

**1.1 Lake Level Monitoring**

Permit Condition 15 requires the Permittee to report the results of water-level monitoring at Deep Creek Lake. Appendix A contains daily water-level data and a plot depicting lake levels for 1995.

**1.2 Temperature Monitoring**

Permit Condition 16 requires the Permittee to report the results of temperature monitoring. The "Youghiogeny River Water Temperature Enhancement Plan" was approved by the Department by letter dated June 8, 1995. In accordance with the Plan, the Permittee monitored river water temperature at the Sang Run bridge and made temperature enhancement releases on 24 days.<sup>1/</sup> The days on which temperature enhancement releases were made are tabulated in Appendix E (Table I).

By letters dated August 7, August 24 and September 1, 1995 to MDNR, the Permittee reported recorded occurrences of river water temperature exceeding 25 degrees C, as required by Permit Condition 16. The Permittee provided temperature monitoring data to Mr. S. P. Schreiner of Versar, Inc., consultant to the MDNR, by letter dated November 2, 1995. Copies of the Permittee's August 7, August 24, September 1 and November 2 letters are included herewith in Appendix B. Also included in Appendix B are daily maximum river water temperatures as monitored by the Permittee and by Versar.

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<sup>1/</sup> The Permittee's letter dated November 2, 1995 (see next paragraph) reported that temperature enhancement releases were made on 22 days in 1995. Review of the operating record in preparation of this report indicated that temperature enhancement releases were made on two additional days. For further information see "Information Supplementing Letter to Department - November 2, 1995" in Appendix B.

### 1.3 Minimum Flow Release Monitoring

Permit Condition 17 requires the Permittee to report flow measurements and the occurrence of bypass releases. The Permittee operated the flow bypass to maintain a flow of 40 cfs in the river at the Deep Creek Station on 46 days, during the period beginning July 25 and ending October 11. The bypass was open whenever the river flow measured at the Oakland gage was 19 cfs or lower, in accordance with Table 3 of the Permittee's Flow Bypass Operation Protocol. (Columns 5 and 6 of Table 3 were used to determine the bypass flow requirement and per cent opening, respectively, insofar as the Johnson valves were always open during the bypass release period.) The 1995 flow bypass release represents approx. 240,000 kwh of lost generation. The monthly bypass operating times and estimated release quantities are as follows:

	Hrs. Operated	Total Release (MG)	Avg. Release* (cfs)
July	71	8	4.2
August	149	27	6.9
September	460	127	10.3
October	210	44	7.7
Year	890	207	8.6

\*Note: "Avg. Release" is the average rate of release during the hours of operation.

The log of the flow bypass operation is presented in Appendix C. Also included in Appendix C is the record of daily river flow measured at the Oakland gage for the period October 1, 1994 through November 28, 1995, provided by the U.S. Geological Survey.

### 1.4 Dissolved Oxygen (DO) Monitoring

Permit Condition 18 requires the Permittee to report the results of dissolved oxygen monitoring. The tailrace weir was operated and tested in accordance with the "Dissolved Oxygen (DO) Enhancement Operations and Monitoring Protocol" approved by the Department on January 6, 1995. Appendix D reports the data obtained from monitoring DO and testing the weir in 1995.

The lowest DO measured in the tailrace downstream of the weir during generation (startup excluded) was 4.9 mg/l, when the DO in the powerhouse discharge was 0.5 mg/l. The maximum DO improvement ("uptake") measured at the weir during any weir effectiveness test was 4.5 mg/l, when the DO in the powerhouse discharge was 0.8 mg/l. In general, the magnitude of DO uptake exceeded expectations.

As expected, the magnitude of DO uptake at the tailrace weir varied inversely with the DO in the powerhouse discharge. Also, as expected, DO uptake was greater when the tailrace weir gates were closed.

### **1.5 Releases Unsuitable For Whitewater Recreation**

Permit Condition 19 requires the Permittee to document the "times and dates when generation releases not suitable for whitewater recreation occurred." Such times and dates are presented in Appendix E. Appendix E also presents information about (a) the Permittee's compliance with the Condition 19 requirement for whitewater boating releases on Fridays, Mondays and designated Saturdays and (b) special releases made by the Permittee that were requested by MDNR on behalf of the whitewater boaters. The Permittee continued to announce scheduled releases in advance on the telephone recording, which was updated every Thursday. Also, the recording was updated to announce the two-hour temperature enhancement releases in accordance with the "Youghiogeny River Water Temperature Enhancement Plan."

### **1.6 Zebra Mussel Monitoring**

Permit Condition 21 requires the Permittee to submit the results of its zebra mussel monitoring program. Appendix F is a memorandum report presenting the results of zebra mussel monitoring at Deep Creek Lake. Star substrates placed at the station intake area have shown no signs of the zebra mussel to date.

APPENDIX A

**APPENDIX A**  
**LAKE LEVEL DATA AND PLOT**



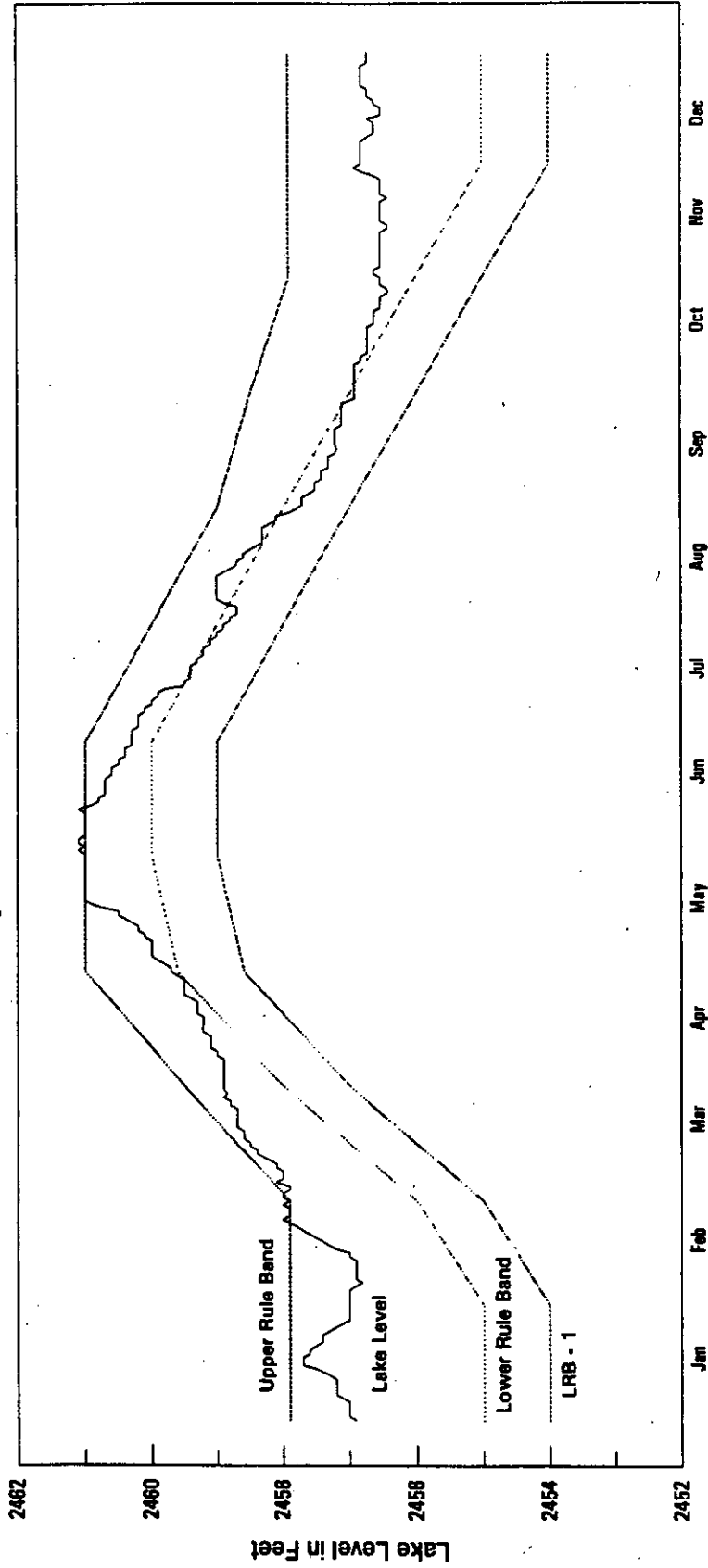
### Deep Creek Lake Level 1995

Month	Day	Lake Level	Rain Fall	Month	Day	Lake Level	Rain Fall	Month	Day	Lake Level	Rain Fall
Jan	1	2456.9	0.52	Feb	1	2457.0	0.00	Mar	1	2457.9	0.00
	2	2457.0	0.18		2	2457.0	0.00		2	2458.0	0.02
	3	2457.0	0.05		3	2457.0	0.27		3	2458.0	0.05
	4	2457.0	0.03		4	2457.0	0.43		4	2457.9	0.00
	5	2457.0	0.02		5	2457.0	0.07		5	2457.9	0.45
	6	2457.0	0.60		6	2458.9	0.05		6	2458.1	0.20
	7	2457.1	0.30		7	2458.8	0.02		7	2458.0	0.00
	8	2457.2	0.02		8	2458.9	0.10		8	2458.0	0.55
	9	2457.2	0.08		9	2458.9	0.00		9	2458.0	0.05
	10	2457.2	0.05		10	2458.9	0.03		10	2458.1	0.02
	11	2457.2	0.08		11	2458.9	0.00		11	2458.1	0.00
	12	2457.2	0.20		12	2458.9	0.02		12	2458.2	0.00
	13	2457.3	0.00		13	2458.9	0.00		13	2458.3	0.00
	14	2457.4	0.04		14	2457.0	0.05		14	2458.4	0.00
	15	2457.5	0.45		15	2457.0	1.30		15	2458.4	0.00
	16	2457.7	0.05		16	2457.2	0.02		16	2458.5	0.00
	17	2457.7	0.00		17	2457.3	0.00		17	2458.5	0.00
	18	2457.7	0.00		18	2457.4	0.00		18	2458.6	0.00
	19	2457.6	0.05		19	2457.5	0.00		19	2458.6	0.00
	20	2457.6	0.95		20	2457.8	0.00		20	2458.6	0.03
	21	2457.5	0.25		21	2457.7	0.10		21	2458.7	0.40
	22	2457.4	0.15		22	2457.8	0.00		22	2458.7	0.03
	23	2457.4	0.10		23	2457.9	0.70		23	2458.7	0.00
	24	2457.4	0.16		24	2458.0	0.20		24	2458.7	0.00
	25	2457.3	0.00		25	2457.9	0.00		25	2458.7	0.00
	26	2457.2	0.05		26	2457.9	0.30		26	2458.7	0.00
	27	2457.1	0.00		27	2457.9	0.28		27	2458.8	0.33
	28	2457.0	0.17		28	2458.0	0.38		28	2458.8	0.03
	29	2457.0	0.02						29	2458.9	0.00
	30	2457.0	0.05						30	2458.9	0.00
	31	2457.0	0.00						31	2458.9	0.03
<b>Total</b>			<b>4.62</b>				<b>4.32</b>				<b>2.19</b>
Apr	1	2458.9	0.02	May	1	2459.7	0.07	Jun	1	2461.0	0.07
	2	2458.9	0.00		2	2459.7	0.77		2	2461.1	0.21
	3	2458.9	0.00		3	2459.8	0.00		3	2461.0	0.17
	4	2458.9	0.35		4	2459.8	0.08		4	2461.1	0.00
	5	2458.9	0.00		5	2460.0	0.10		5	2461.1	0.00
	6	2458.9	0.02		6	2460.0	0.00		6	2461.0	0.00
	7	2458.9	0.03		7	2460.0	0.00		7	2461.0	0.05
	8	2458.9	0.32		8	2460.0	0.00		8	2461.0	0.03
	9	2459.0	0.27		9	2460.0	0.12		9	2461.0	0.10
	10	2459.0	0.35		10	2460.1	0.15		10	2461.0	0.23
	11	2459.1	0.00		11	2460.1	0.10		11	2461.0	0.45
	12	2459.1	0.20		12	2460.2	0.02		12	2461.0	0.65
	13	2459.1	0.13		13	2460.2	0.02		13	2461.1	0.00
	14	2459.1	0.10		14	2460.3	0.98		14	2460.9	0.00
	15	2459.2	0.00		15	2460.4	0.00		15	2460.8	0.00
	16	2459.2	0.00		16	2460.5	0.00		16	2460.8	0.00
	17	2459.2	0.22		17	2460.5	0.55		17	2460.7	0.00
	18	2459.2	0.03		18	2460.7	0.92		18	2460.7	0.00
	19	2459.2	0.00		19	2460.9	0.13		19	2460.7	0.00
	20	2459.3	0.07		20	2461.0	0.00		20	2460.7	0.00
	21	2459.3	0.02		21	2461.0	0.00		21	2460.7	0.00
	22	2459.3	0.00		22	2461.0	0.00		22	2460.6	0.10
	23	2459.3	0.40		23	2461.0	0.00		23	2460.6	0.32
	24	2459.4	0.25		24	2461.0	0.00		24	2460.6	0.03
	25	2459.5	0.02		25	2461.0	0.20		25	2460.5	0.04
	26	2459.5	0.00		26	2461.0	0.06		26	2460.5	0.05
	27	2459.5	0.15		27	2461.0	0.02		27	2460.4	0.02
	28	2459.5	0.03		28	2461.0	0.50		28	2460.4	0.00
	29	2459.5	0.00		29	2461.0	0.05		29	2460.4	0.07
	30	2459.6	0.55		30	2461.0	0.00		30	2460.3	0.52
<b>Total</b>			<b>3.53</b>				<b>4.84</b>				<b>3.11</b>

### Deep Creek Lake Level 1995

Month	Day	Lake Level	Rain Fall	Month	Day	Lake Level	Rain Fall	Month	Day	Lake Level	Rain Fall
Jul	1	2460.3	0.62	Aug	1	2458.9	0.00	Sep	1	2457.8	0.00
	2	2460.3	0.00		2	2458.8	0.00		2	2457.7	0.00
	3	2460.3	0.00		3	2458.8	0.10		3	2457.7	0.00
	4	2460.3	0.00		4	2458.7	0.17		4	2457.7	0.00
	5	2460.2	0.00		5	2458.7	0.50		5	2457.8	0.00
	6	2460.2	0.05		6	2458.7	3.00		6	2457.5	0.00
	7	2480.2	0.13		7	2458.9	0.00		7	2457.5	0.00
	8	2460.2	0.00		8	2459.0	0.00		8	2457.5	0.00
	9	2460.1	0.03		9	2459.0	0.00		9	2457.4	0.00
	10	2460.1	0.03		10	2459.0	0.05		10	2457.4	0.00
	11	2460.0	0.00		11	2459.0	0.11		11	2457.4	0.00
	12	2460.0	0.00		12	2459.0	0.02		12	2457.3	0.05
	13	2459.9	0.00		13	2459.0	0.26		13	2457.3	0.05
	14	2459.9	0.00		14	2459.0	0.02		14	2457.3	0.03
	15	2459.8	0.62		15	2458.9	0.00		15	2457.3	0.02
	16	2459.5	0.00		16	2458.8	0.03		16	2457.2	0.25
	17	2459.5	0.72		17	2458.7	0.00		17	2457.2	0.55
	18	2459.4	0.02		18	2458.7	0.00		18	2457.2	0.04
	19	2459.4	0.00		19	2458.6	0.00		19	2457.2	0.00
	20	2459.4	0.00		20	2458.6	0.00		20	2457.2	0.00
	21	2459.4	0.10		21	2458.5	0.00		21	2457.2	0.00
	22	2459.3	0.02		22	2458.4	0.00		22	2457.2	0.62
	23	2459.3	0.00		23	2458.3	0.00		23	2457.1	0.00
	24	2459.2	0.01		24	2458.3	0.00		24	2457.1	0.00
	25	2459.2	0.45		25	2458.3	0.00		25	2457.1	0.00
	26	2459.2	0.05		26	2458.3	0.00		26	2457.1	0.05
	27	2459.1	0.00		27	2458.3	0.00		27	2457.1	0.00
	28	2459.1	0.25		28	2458.2	0.00		28	2457.1	0.00
	29	2459.0	0.13		29	2458.1	0.00		29	2457.1	0.00
	30	2459.0	0.00		30	2458.1	0.00		30	2456.9	0.00
	31	2458.9	0.00		31	2457.9	0.00				
<b>Total</b>			<b>3.23</b>				<b>4.26</b>				<b>1.66</b>
Oct	1	2456.9	0.00	Nov	1	2456.6	0.45	Dec	1	2456.8	0.00
	2	2456.9	0.00		2	2456.6	0.23		2	2456.8	0.02
	3	2456.9	0.10		3	2456.5	0.00		3	2456.8	0.11
	4	2456.9	0.20		4	2456.5	0.00		4	2456.8	0.00
	5	2456.9	0.57		5	2456.5	0.00		5	2456.8	0.15
	6	2456.9	0.03		6	2456.5	0.62		6	2456.8	0.07
	7	2456.9	0.00		7	2456.5	0.23		7	2456.8	0.00
	8	2456.9	0.00		8	2456.5	0.02		8	2456.7	0.00
	9	2456.9	0.00		9	2456.5	0.02		9	2456.8	0.15
	10	2456.8	0.00		10	2456.5	0.67		10	2456.8	0.05
	11	2456.8	0.00		11	2456.5	0.09		11	2456.8	0.07
	12	2456.7	0.00		12	2456.5	0.05		12	2456.8	0.03
	13	2456.7	0.00		13	2456.4	1.20		13	2456.7	0.22
	14	2456.7	1.17		14	2456.4	0.80		14	2456.5	0.30
	15	2456.7	0.00		15	2456.5	0.10		15	2456.5	0.00
	16	2456.7	0.00		16	2456.5	0.05		16	2456.5	0.60
	17	2456.7	0.00		17	2456.5	0.09		17	2456.6	0.00
	18	2456.7	0.00		18	2456.5	0.02		18	2456.6	0.40
	19	2456.7	0.00		19	2456.5	0.00		19	2456.7	0.60
	20	2456.6	0.45		20	2456.5	0.22		20	2456.7	0.35
	21	2456.6	0.32		21	2456.4	0.02		21	2456.7	0.30
	22	2456.6	0.00		22	2456.5	0.25		22	2456.8	0.10
	23	2456.6	0.00		23	2456.5	0.00		23	2456.8	0.07
	24	2456.5	0.00		24	2456.5	0.00		24	2456.8	0.08
	25	2456.5	0.00		25	2456.5	0.00		25	2456.8	0.35
	26	2456.5	0.00		26	2456.5	0.00		26	2456.8	0.55
	27	2456.5	0.25		27	2456.6	0.55		27	2456.8	0.15
	28	2456.4	0.20		28	2456.6	0.22		28	2456.7	0.03
	29	2456.4	0.80		29	2456.9	0.00		29	2456.7	0.00
	30	2456.5	0.00		30	2456.8	0.00		30	2456.7	0.00
	31	2456.5	0.00						31	2456.7	0.07
<b>Total</b>			<b>4.08</b>				<b>6.1</b>	<b>Year Total</b>			<b>4.82</b>
											<b>46.77</b>

# Deep Creek Lake Level - 1995



**APPENDIX B**

## **APPENDIX B**

### **TEMPERATURE MONITORING AND RELEASE REPORTS**

- Letter to Department - August 7, 1995
- Letter to Department - August 24, 1995
- Letter to Department - September 1, 1995
- Letter to Department - November 2, 1995
- Information Supplementing Letter to Department - November 2, 1995
- Maximum Daily Water Temperatures

Please reply to:  
Mr. J. C. Phillips  
c/o GPU Service Corporation  
P.O. Box 15152  
Reading, PA 19612-5152

(610) 375-5827

August 7, 1995

Mr. Matthew G. Pajerowski, Chief  
Water Appropriation Permits Section  
Water Rights Division, E-2  
Water Management Administration  
Maryland Dept. of the Environment  
Tawes State Office Bldg.  
Annapolis, MD 21401

Deep Creek Station Permit No. GA92S009(01)  
Conditions No. 16, 17 and 18

Dear Mr. Pajerowski:

This letter has two purposes:

- (1) as required by Permit Condition 16, to report recently experienced, apparent exceedances of the river water temperature objective; and
- (2) to advise you of the successful operation of the flow bypass and the tailrace weir (Permit Conditions No. 17 and 18, respectively).

River Water Temperature Monitoring (Permit Condition No. 16)

Data downloaded from the river water temperature monitor at Sang Run indicate eight apparent exceedances of the river water temperature objective since the last apparent exceedance reported by my July 11, 1995 letter, as described below:

The recorded data indicate that the river water temperature reached 27.63° C at 8:00 a.m. on July 14. Information from Mr. Schreiner, who we understand corrected the setting of the temperature monitor clock on July 18, suggests that the clock was some 61 hours "fast" prior to correction. On this basis, the 27.63° C reading is believed to have occurred at approx. 7:00 p.m. on July 11. On July 11, a temperature release was made from 12:30 p.m. to 2:30 p.m. in accordance with the protocol based on a predicted maximum temperature of 25.88° C made at 11:00 a.m.

The recorded data indicate that the river water temperature reached 27.05° C at 1:12 a.m. on July 16. Based on the clock error (see above), this reading is believed to have occurred at approx. noon on July 13. On July 13, a scheduled release was made from 10:00 a.m. to 1:00 p.m.

The recorded data indicate that the river water temperature reached 27.01° C at 5:44 p.m. on July 18. This was when the clock was corrected, so that the time and date are believed to be correct. The Oakland gage was inoperative on July 18. There was no release on July 18, but there should have been; when the Oakland gage is not in service, the Friendsville gage is to be used and, if the Friendsville gage is also not in service, then the protocol is to be implemented as if the river flow is low enough to potentially require a release.

The recorded data indicate that the river water temperature reached 26.62° C at 6:32 p.m. on July 19 (correct time and date). There was no release that day. The July 19 7:00 a.m. prediction was 20.94° C based upon a reading of 18.68° C. This predicted temperature was sufficiently low to permit the protocol to be discontinued for the day, hence no release was necessary.

The recorded data indicate that the river water temperature reached 27.06° C at 5:44 p.m. on July 22 (correct time and date). A temperature release was made from 3:30 p.m. to 4:30 p.m. on July 22 as required by the temperature prediction made at 3:00 p.m. However, the 7:00 a.m. temperature prediction was 26.48° C, so that a temperature release should have been scheduled to begin at 11:00 a.m. on July 22.

*moment  
flow  $\leq$  30  
cfs*

The recorded data indicate that the river water temperature reached 27.34° C at 5:30 p.m. on July 23 (correct time and date). The 11:00 a.m. temperature prediction was 25.19° C and the 12:00 noon prediction was 25.73° C. According to the protocol, the 12:00 noon prediction should have triggered a one-hour temperature release to begin not later than 12:30 p.m. However, the temperature release was made from 3:25 p.m. to 4:25 p.m. We have no explanation for the delay in making the temperature release.

The recorded data indicate that the river water temperature reached 26.40° C at 4:02 p.m. on July 25 (correct time and date). The 12:00 noon temperature prediction was 24.96° C and the 2:00 p.m. temperature prediction was 25.29° C. In accordance with the protocol, a temperature release was made from 2:00 p.m. to 3:00 p.m.

The recorded data indicate that the river water temperature reached 25.48° C at 1:54 p.m. on July 27 (correct time and date). The 11:00 a.m. temperature prediction was 25.26° C and the 12:00 noon temperature prediction was 25.57° C. In accordance with the protocol, a temperature release was made from 12:00 noon to 1:00 p.m.

The temperature monitor clock error may affect the actual times and dates of the apparent temperature exceedances reported in my previous letters, namely June 18 (reported on June 27) and June 11 and July 7 (reported on July 11). The real-time monitoring and the recorded magnitudes of the temperature readings of course are not affected by the clock error and are believed to have been correct all along.

The clock has continued to function properly since the July 18 correction. We intend to check the clock when the recorded river water temperature data are downloaded, on a weekly basis. Penelec's ongoing training of on-shift operators will ensure proper implementation of the protocol in the future.

Flow Bypass Operation (Permit Condition No. 17)


In accordance with the Flow Bypass Operation Protocol, the flow bypass has operated frequently beginning on July 25, when the flow at the Oakland gage first dropped below 20 cfs this year.

Tailrace Weir Operation (Permit Condition No. 18)

The tailrace weir has significantly increased the dissolved oxygen (D.O.) in the plant discharge as expected. Our D.O. readings have indicated increases as high as 4 mg/l during the extremely low D.O., high temperature and low river flow conditions prevailing recently. To date, measured D.O. in the project discharge downstream from the weir 30 minutes after start-up has always equalled or exceeded 5.5 mg/l and generally has exceeded 6.0 mg/l.

Please call me if you have any questions about this information.

Very truly yours,



J. C. Phillips

cc: T. N. Atherton, Esq.  
W. M. Dyok  
R. I. McLean  
K. W. Pavol  
S. P. Schreiner

bcc: R. D. Berkhimer  
R. T. Gallus  
J. G. Herbein  
R. D. Imler  
C. A. Rosenberry  
T. J. Simunich/M. J. Kmetz  
R. W. Thomas  
B. A. Williams



Please reply to:  
Mr. J. C. Phillips  
c/o GPU Service Corporation  
P.O. Box 15152  
Reading, PA 19612-5152

(610) 375-5827

August 24, 1995

Mr. Matthew G. Pajerowski, Chief  
Water Appropriation Permits Section  
Water Rights Division, E-2  
Water Management Administration  
Maryland Dept. of the Environment  
Tawes State Office Bldg.  
Annapolis, MD 21401

Deep Creek Project - Permit No. GA92S009(01)  
Condition 16 - River Water Temperature Enhancement

Dear Mr. Pajerowski:

Since my last report to you (letter dated August 7, 1995), maximum daily river water temperatures at Sang Run exceeding the 25.0°C objective have been recorded on four days. On all four of these days, the river flow exceeded 100 cfs at Oakland; thus, in accordance with the Water Temperature Enhancement Plan, the water temperature enhancement protocol did not need to be implemented. The days, maximum temperatures, times, and morning river flows at Oakland were as follows:

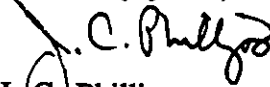
<u>day</u>	<u>max. temp.</u>	<u>time</u>	<u>morning river flow</u>
August 14	26.24°C	6:12 p.m.	308 cfs
August 15	25.93°C	2:12 p.m.	147 cfs
August 16	26.22°C	2:28 p.m.	179 cfs
August 17	26.05°C	2:00 p.m.	116 cfs

August 24, 1995

Generation releases occurred on all four of the above days, as follows:

<u>day</u>	<u>time</u>	<u>explanation</u>
August 14	10:00 a.m. - 1:00 p.m.	scheduled
August 15	12:30 p.m. - 6:30 p.m.	run for cost
August 16	12:50 p.m. - 6:50 p.m.	run for cost
August 17	12:00 noon - 4:00 p.m.	run for cost

If you have any questions, please contact me.

Very truly yours,  
  
J. C. Phillips

cc: T. N. Atherton, Esq.  
W. M. Dyok  
R. I. McLean  
K. W. Pavol  
S. P. Schreiner

bcc: R. D. Berkhimer  
R. T. Gallus  
J. G. Herbein  
R. D. Imler  
C. A. Rosenberry  
T. J. Simunich/M. J. Kmetz  
R. W. Thomas  
B. A. Williams

Please reply to:  
Mr. J. C. Phillips  
c/o GPU Service Corporation  
P.O. Box 15152  
Reading, PA 19612-5152

(610) 375-5827

September 1, 1995

Mr. Matthew G. Pajerowski, Chief  
Water Appropriation Permits Section  
Water Rights Division, E-2  
Water Management Administration  
Maryland Dept. of the Environment  
Tawes State Office Bldg.  
Annapolis, MD 21401

Deep Creek Project - Permit No. GA92S009(01)  
Condition 16 - River Water Temperature Enhancement

Dear Mr. Pajerowski:

This is the final report on monitored exceedances of the river water temperature objective for 1995; as you know, the 1995 river water annual temperature enhancement period ended on August 31.

Since my last report to you (letter dated August 24, 1995), maximum daily river water temperatures at Sang Run exceeding the 25.0°C objective have been recorded on two (2) days. The days, maximum temperatures, times, and morning river flows at Oakland were as follows:

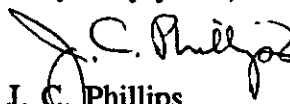
day	max. temp.	time	morning river flow
August 23	26.53°C	5:24 p.m.	36 cfs
August 24	26.14°C	4:42 p.m.	29 cfs

Temperature releases were made on both of the above days. The release times and the times and temperatures of the prediction triggering the release and the immediate prior prediction were as follows:

day	release time	prediction time	predicted temp.
August 23	3:15 p.m. - 4:15 p.m.	2:00 p.m.	24.97°C
		3:00 p.m.	25.59°C
August 24	2:30 p.m. - 3:30 p.m.	12:00 noon	24.98°C
		2:00 p.m.	25.32°C

If you have any questions, please contact me.

Very truly yours,



J. C. Phillips

cc: T. N. Atherton, Esq.  
W. M. Dyok  
R. I. McLean  
K. W. Pavol  
S. P. Schreiner

bcc: R. D. Berkhimer  
R. T. Gallus  
J. G. Herbein  
R. D. Imler  
C. A. Rosenberry  
T. J. Simunich/M. J. Kmetz  
R. W. Thomas  
B. A. Williams



Pennsylvania Electric Company  
Please reply to:  
Mr. J. C. Phillips  
c/o GPU Service Corporation  
P. O. Box 15152  
Reading, PA 19612-5152

(610) 375-5827

November 2, 1995

Mr. S. P. Schreiner  
VERSAR ESM, INC  
9200 Rumsey Road  
Columbia, MD 21045

Deep Creek - Temperature Enhancement

Dear Steve:

For your information and use, enclosed are:

- (1) printouts of the temperature enhancement release software program screen for the 22 days in 1995 on which temperature enhancement releases were made, plus one day (July 31) on which a temperature enhancement release would have been required but a scheduled release was made; and
- (2) diskettes (3) of recorded river water temperature data downloaded from the temperature monitor at the Sang Run Bridge for June, July and August 1995, respectively.

Regarding the printouts (1) above, please note:

- (a) Data corresponding to the times after a temperature enhancement release was committed were "carried over" from the prior day and are stricken.
- (b) The 0700 and 0900 hour predictions that do not apply (based on Oakland flow relative to 30 cfs) are stricken.
- (c) "Confirmed" means that the release was made as called for by the instruction.
- (d) The protocol was met on each day except July 22 and 23, when the temperature releases were delayed.
- (e) The temperature enhancement releases on August 13 and 15 were unnecessary due to river flow at Oakland exceeding 100 cfs.

Please call if you have any questions about this information.

Very truly yours,

  
J. C. Phillips

bec  
Enclosure

cc: Wayne Dyok - printouts only  
Rich McLean - printouts only  
bcc: R. D. Berkhimer - printouts only  
R. D. Imler - w/o encl.  
C. A. Rosenberry - printouts only  
R. W. Thomas - w/o encl.

67.0 = CFS River Flow at Oakland

Time	Oakland Flow CFS	Predicted Maximum River Water Temperature Degree C	Deep Creek Action
------	------------------	--	-------------------

0700 > 30 Check again at 0900  
~~< -30 Check again at 0900~~

0900 > 30 Check again at 1100  
~~< -30 Release at 1100 for 2 hours~~

1100 All ~~25.67~~ Release at 1230 for 2 hours *Confirmed*

~~1200 All 24.31 Check again at 1400~~

~~1400 All 18.64 No further predictions necessary today~~

~~1500 All 19.16 No further predictions necessary today~~

Tair	30.0	Air Temp, Elkins WV - Degree C
CCF	36	Cloud Cover Factor, Elkins WV
T7	18.25	River Temp Sang Run @700
T9	18.65	River Temp Sang Run @900
T11	20.00	River Temp Sang Run @1100
T12	19.79	<del>River Temp Sang Run @1200</del>
T14	17.60	<del>River Temp Sang Run @1400</del>
T15	18.23	<del>River Temp Sang Run @1500</del>
Q	67.0	River Flow at Oakland

86 Air Temp, Elkins WV - Degree F  
 PTCLDY Cloud Cover, Elkins WV

Youghiogheny River Water Temperature Enhancement Plan

21-Jun-95

64.0 = CFS River Flow at Oakland

Time	Oakland Flow CFS	Predicted Maximum River Water Temperature Degree C	Deep Creek Action
------	------------------	--	-------------------

0700 > 30 24.82 Check again at 0900  
 <=30 26.18 Check again at 0900

0900 > 30 25.28 Check again at 1100  
 <=30 26.64 Release at 1100 for 2 hours

~~1100 All 26.70 Release at 230 for 2 hours~~ *Confirmed*

~~1200 All 24.09 Check again at 1400~~

~~1400 All 18.64 No further predictions necessary today~~

~~1500 All 19.16 No further predictions necessary today~~

Tair	30.0	Air Temp, Elkins WV - Degree C
CCF	36	Cloud Cover Factor, Elkins WV
T7	18.56	River Temp Sang Run @700
T9	19.15	River Temp Sang Run @900
T11	21.04	River Temp Sang Run @1100
T12	19.79	River Temp Sang Run @1200
T14	17.60	River Temp Sang Run @1400
T15	18.23	River Temp Sang Run @1500
Q	64.0	River Flow at Oakland

~~86 Air Temp, Elkins WV - Degree F  
 PLCLD Cloud Cover, Elkins WV~~

47.0 = CFS River Flow at Oakland

Time	Oakland Flow CFS	Predicted Maximum River Water Temperature Degree C	Deep Creek Action
------	------------------	--	-------------------

0700 > 30 25.58 Check again at 0900  
~~<=30 26.26 Check again at 0900~~

0900 > 30 25.61 Check again at 1100  
~~<=30 26.29 Release at 1100 for 2 hours~~

~~1100 All 26.20 Release at 1230 for 2 hours~~ *Confirmed*

~~1200 All 26.23 Release ASAP - not later than 1230 for 1 hour~~

~~1400 All 17.29 No further predictions necessary today~~

~~1500 All 18.67 No further predictions necessary today~~

Tair	30.6	Air Temp, Elkins WV - Degree C
CCF	36	Cloud Cover Factor, Elkins WV
T7	18.27	River Temp Sang Run @700
T9	18.54	River Temp Sang Run @900
T11	20.22	River Temp Sang Run @1100
T12	21.44	River Temp Sang Run @1200
T14	17.29	River Temp Sang Run @1400
T15	18.23	River Temp Sang Run @1500
Q	47.0	River Flow at Oakland

87 Air Temp, Elkins WV - Degree F  
 PTCLOUDY Cloud Cover, Elkins WV



Youghiogheny River Water Temperature Enhancement Plan

11-Jul-95

47.0 = CFS River Flow at Oakland

Time	Oakland Flow CFS	Predicted Maximum River Water Temperature Degree C	Deep Creek Action
------	------------------	--	-------------------

0700 > 30 25.17 Check again at 0900  
~~<=30 25.85 Check again at 0900~~

0900 > 30 25.09 Check again at 1100  
~~<=30 25.77 Check again at 1100~~

1100 All 25.88 Release at 1230 for 2 hours Confirmed

~~1200 All 25.86 Release ASAP - not later than 1230 for 1 hour~~

~~1400 All 17.22 No further predictions necessary today~~

~~1500 All 18.38 No further predictions necessary today~~

83 Air Temp, Elkins WV - Degree F  
 FAIR Cloud Cover, Elkins WV

Tair	28.3	Air Temp, Elkins WV - Degree C
CCF	16	Cloud Cover Factor, Elkins WV
T7	18.04	River Temp Sang Run @700
T9	18.14	River Temp Sang Run @900
T11	20.00	River Temp Sang Run @1100
<del>T12</del>	<del>21.22</del>	<del>River Temp Sang Run @1200</del>
<del>T14</del>	<del>17.31</del>	<del>River Temp Sang Run @1400</del>
<del>T15</del>	<del>18.01</del>	<del>River Temp Sang Run @1500</del>
O	47.0	River Flow at Oakland

# Youghiogheny River Water Temperature Enhancement Plan

20-Jul-95

25.0 = CFS River Flow at Oakland

Time	Oakland Flow CFS	Predicted Maximum River Water Temperature Degree C	Deep Creek Action
------	------------------	--	-------------------

0700 → 30 → 25.82 Check again at 0900  
 < = 30 25.62 Check again at 0900

0900 → 30 → 25.39 Check again at 1100  
 < = 30 25.19 Check again at 1100

1100 All 25.40 Release at 1230 for 2 hours *Confirmed*

~~1200 All 26.25 Release ASAP not later than 1230 for 1 hour~~

~~1400 All 25.51 Release ASAP not later than 1430 for 1 hour~~

~~1500 All 25.62 Release ASAP not later than 1530 for 1 hour~~

Tair	29.4	Air Temp, Elkins WV - Degree C
CCF	36	Cloud Cover Factor, Elkins WV
T7	17.44	River Temp Sang Run @ 700
T9	17.36	River Temp Sang Run @ 900
T11	19.14	River Temp Sang Run @ 1100
T12	21.18	River Temp Sang Run @ 1200
T14	23.32	River Temp Sang Run @ 1400
T15	24.30	River Temp Sang Run @ 1500
Q	25.0	River Flow at Oakland

85 Air Temp, Elkins WV - Degree F  
 PTCLDY Cloud Cover, Elkins WV

Note: Enter only the Green Temps -  
 T9 - T11 - T12 - T14 - T15  
 all other numbers are automatic.

**Youghiogheny River Water Temperature Enhancement Plan**

22-Jul-95

19.0 = CFS River Flow at Oakland

Time	Oakland Flow CFS	Predicted Maximum River Water Temperature Degree C	Deep Creek Action
------	------------------	--	-------------------

0700 → ~~30~~ 26.48 Release at 1100 for 2 hours -  
 < = 30 26.04 Check again at 0900

0900 → ~~30~~ 25.03 Check again at 1100  
 < = 30 24.59 Check again at 1100

1100 All 26.26 Release at 1230 for 2 hours

1200 All 25.73 Release ASAP - not later than 1230 for 1 hour

1400 All 25.49 Release ASAP - not later than 1430 for 1 hour

1500 All 25.96 Release ASAP - not later than 1530 for 1 hour

*Release not made*

*Release not made*

*Release not made*

Confirmed

Tair	27.8	Air Temp, Elkins WV - Degree C
CCF	36	Cloud Cover Factor, Elkins WV
T7	20.26	River Temp Sang Run @700
T9	19.07	River Temp Sang Run @900
T11	21.07	River Temp Sang Run @1100
T12	21.75	River Temp Sang Run @1200
T14	23.69	River Temp Sang Run @1400
T15	24.83	River Temp Sang Run @1500
Q	19.0	River Flow at Oakland

82 Air Temp, Elkins WV - Degree F  
 HAZE Cloud Cover, Elkins WV

Note: Enter only the Green Temps -  
 T9 - T11 - T12 - T14 - T15  
 as required -- all other numbers  
 are automatic.

24.0 = CFS River Flow at Oakland

Time	Oakland Flow CFS	Predicted Maximum River Water Temperature Degree C	Deep Creek Action
------	------------------	--	-------------------

0700 → ~~30~~ 25.63 ~~Check again at 0900~~  
 < =30 25.39 Check again at 0900

0900 → ~~30~~ 25.75 ~~Check again at 1100~~  
 < =30 25.51 Check again at 1100

1100 All 25.19 Check again at 1200

1200 All 25.73 Release ASAP - not later than 1230 for 1 hour *release not made*

1400 All 25.99 Release ASAP - not later than 1430 for 1 hour *release not made*

1500 All 26.07 Release ASAP - not later than 1530 for 1 hour *Confirmed*

Tair	27.8	Air Temp, Elkins WV - Degree C
CCF	36	Cloud Cover Factor, Elkins WV
T7	18.35	River Temp Sang Run @700
T9	18.60	River Temp Sang Run @900
T11	20.02	River Temp Sang Run @1100
T12	21.55	River Temp Sang Run @1200
T14	23.97	River Temp Sang Run @1400
T15	24.87	River Temp Sang Run @1500
Q	24.0	River Flow at Oakland

82 Air Temp, Elkins WV - Degree F  
 HAZE Cloud Cover, Elkins WV

Note: Enter only the Green Temps -  
 T9 - T11 - T12 - T14 - T15  
 as required -- all other numbers  
 are automatic.

# Youghiogheny River Water Temperature Enhancement Plan

25-Jul-95

18.0 = CFS River Flow at Oakland

Time	Oakland Flow CFS	Predicted Maximum River Water Temperature Degree C	Deep Creek Action
0700	→ 30	25.06	Check again at 0900
	< = 30	24.58	Check again at 0900
0900	→ 30	25.09	Check again at 1100
	< = 30	24.61	Check again at 1100
1100	All	24.96	Check again at 1200
1200	All	24.96	Check again at 1400
1400	All	25.29	Release ASAP - not later than 1430 for 1 hour <i>confirmed</i>
1500	All	17.72	No further predictions necessary today

Tair	28.3	Air Temp, Elkins WV - Degree C
CCF	100	Cloud Cover Factor, Elkins WV
T7	19.00	River Temp Sang Run @700
T9	19.26	River Temp Sang Run @900
T11	20.61	River Temp Sang Run @1100
T12	21.48	River Temp Sang Run @1200
T14	23.38	River Temp Sang Run @1400
T15	17.50	River Temp Sang Run @1500
Q	18.0	River Flow at Oakland

83 Air Temp, Elkins WV - Degree F  
tstrms Cloud Cover, Elkins WV

Note: Enter only the Green Temps -  
T9 - T11 - T12 - T14 - T15  
as required -- all other numbers  
are automatic.

# Youghiogheny River Water Temperature Enhancement Plan

27-Jul-95

19.0 = CFS River Flow at Oakland

Time	Oakland Flow CFS	Predicted Maximum River Water Temperature Degree C	Deep Creek Action
------	------------------	--	-------------------

0700 → 30 ~~24.82~~ Check again at 0900  
 < = 30 24.38 Check again at 0900

0900 → 30 ~~24.80~~ Check again at 1100  
 < = 30 24.36 Check again at 1100

1100 All 25.26 Check again at 1200

1200 All 25.57 Release ASAP - not later than 1230 for 1 hour Confirmed

~~1400 All 6.85 No further predictions necessary today~~

~~1500 All 2.46 No further predictions necessary today~~

Tair	27.8	Air Temp, Elkins WV - Degree C
CCF	100	Cloud Cover Factor, Elkins WV
T7	18.96	River Temp Sang Run @ 700
T9	19.15	River Temp Sang Run @ 900
T11	20.86	River Temp Sang Run @ 1100
T12	22.12	River Temp Sang Run @ 1200
<del>T14</del>	<del>0.00</del>	<del>River Temp Sang Run @ 1400</del>
<del>T15</del>	<del>0.00</del>	<del>River Temp Sang Run @ 1500</del>
Q	19.0	River Flow at Oakland

82 Air Temp, Elkins WV - Degree F  
 TSTRMS Cloud Cover, Elkins WV

Note: Enter only the Green Temps -  
 T9 - T11 - T12 - T14 - T15  
 as required -- all other numbers  
 are automatic.

Youghiogheny River Water Temperature Enhancement Plan

30-Jul-95

16.0 = CFS River Flow at Oakland

Time	Oakland Flow CFS	Predicted Maximum River Water Temperature Degree C	Deep Creek Action
------	------------------	--	-------------------

0700	> 30	26.97	Release at 1100 for 2 hours
	< = 30	26.41	Release at 1100 for 2 hours
0900	> 30	2.97	No further predictions necessary today
	< = 30	2.41	No further predictions necessary today
1100	All	13.11	No further predictions necessary today
1200	All	11.59	No further predictions necessary today
1400	All	6.59	No further predictions necessary today
1500	All	4.52	No further predictions necessary today

*confirmed*

Tair	29.4	Air Temp, Elkins WV - Degree C
CCF	36	Cloud Cover Factor, Elkins WV
T7	19.76	River Temp Sang Run @700
T9	0.00	River Temp Sang Run @900
T11	0.00	River Temp Sang Run @1100
T12	0.00	River Temp Sang Run @1200
T14	0.00	River Temp Sang Run @1400
T15	0.00	River Temp Sang Run @1500
Q	16.0	River Flow at Oakland

85 Air Temp, Elkins WV - Degree F  
PTCLDY Cloud Cover, Elkins WV

Note: Enter only the Green Temps -  
T9 - T11 - T12 - T14 - T15  
as required -- all other numbers  
are automatic.

# Youghiogheny River Water Temperature Enhancement Plan

31-Jul-95

22.0 = CFS River Flow at Oakland

Time	Oakland Flow CFS	Predicted Maximum River Water Temperature Degree C	Deep Creek Action
------	------------------	--	-------------------

0700 → 30 Release at 1100 for 2 hours  
 < 30 Check again at 0900

0900 → 30 Release at 1100 for 2 hours  
 < 30 Release at 1100 for 2 hours

*Scheduled release 1000 - 1300*

~~1100 All No further predictions necessary today~~

~~1200 All No further predictions necessary today~~

~~1400 All No further predictions necessary today~~

~~1500 All No further predictions necessary today~~

Tair	29.4	Air Temp, Elkins WV - Degree C
CCF	36	Cloud Cover Factor, Elkins WV
T7	19.07	River Temp Sang Run @700
T9	19.54	River Temp Sang Run @900
T11	0.00	River Temp Sang Run @1100
T12	0.00	River Temp Sang Run @1200
T14	0.00	River Temp Sang Run @1400
T15	0.00	River Temp Sang Run @1500
Q	22.0	River Flow at Oakland

85 Air Temp, Elkins WV - Degree F  
 PTCLDY Cloud Cover, Elkins WV

Note: Enter only the Green Temps -  
 T9 - T11 - T12 - T14 - T15  
 as required -- all other numbers  
 are automatic.



# Youghiogheny River Water Temperature Enhancement Plan

01-Aug-95

## 19.0 = CFS River Flow at Oakland

Time	Oakland Flow CFS	Predicted Maximum River Water Temperature Degree C	Deep Creek Action
------	------------------	--	-------------------

0700 → 30 Release at 1100 for 2 hours  
 < 30 Release at 1100 for 2 hours

0900 → 30 No further predictions necessary today  
 ← 30 No further predictions necessary today

1100 All No further predictions necessary today

1200 All No further predictions necessary today

1400 All No further predictions necessary today

1500 All No further predictions necessary today

*Confirmed*

Tair	31.7	Air Temp, Elkins WV - Degree C
CCF	1	Cloud Cover Factor, Elkins WV
T7	19.74	River Temp Sang Run @700
T9	0.00	River Temp Sang Run @900
T11	0.00	River Temp Sang Run @1100
T12	0.00	River Temp Sang Run @1200
T14	0.00	River Temp Sang Run @1400
T15	0.00	River Temp Sang Run @1500
Q	19.0	River Flow at Oakland

89 Air Temp, Elkins WV - Degree F  
 SUNNY Cloud Cover, Elkins WV

Note: Enter only the Green Temps -  
 T9 - T11 - T12 - T14 - T15  
 as required -- all other numbers  
 are automatic.

# Youghiogheny River Water Temperature Enhancement Plan

02-Aug-95

## 13.0 = CFS River Flow at Oakland

Time	Oakland Flow CFS	Predicted Maximum River Water Temperature Degree C	Deep Creek Action
------	------------------	--	-------------------

0700 → 30 ———— 27.50 ———— Release at 1100 for 2 hours  
 < = 30 ———— 26.82 ———— Release at 1100 for 2 hours

*Confirmed*

0900 → 30 ———— 3.84 ———— No further predictions necessary today  
 < = 30 ———— 3.16 ———— No further predictions necessary today

1100 All ———— 13.52 ———— No further predictions necessary today

1200 All ———— 11.95 ———— No further predictions necessary today

1400 All ———— 6.76 ———— No further predictions necessary today

1500 All ———— 4.60 ———— No further predictions necessary today

Tair	31.1	Air Temp, Elkins WV - Degree C
CCF	36	Cloud Cover Factor, Elkins WV
T7	19.41	River Temp Sang Run @700
T9	0.00	River Temp Sang Run @900
T11	0.00	River Temp Sang Run @1100
T12	0.00	River Temp Sang Run @1200
T14	0.00	River Temp Sang Run @1400
T15	0.00	River Temp Sang Run @1500
Q	13.0	River Flow at Oakland

88 Air Temp, Elkins WV - Degree F  
 PTCLDY Cloud Cover, Elkins WV

Note: Enter only the Green Temps -  
 T9 - T11 - T12 - T14 - T15  
 as required -- all other numbers  
 are automatic.

# Youghiogheny River Water Temperature Enhancement Plan

03-Aug-95

14.0 = CFS River Flow at Oakland

Time	Oakland Flow CFS	Predicted Maximum River Water Temperature Degree C	Deep Creek Action
------	------------------	--	-------------------

0700 → 30 Release at 1100 for 2 hours  
 < = 30 Check again at 0900

0900 → 30 Release at 1100 for 2 hours  
 < = 30 Release at 1100 for 2 hours

1100 All 1.49 No further predictions necessary today

1200 All 3.83 No further predictions necessary today

1400 All 6.76 No further predictions necessary today

1500 All 4.60 No further predictions necessary today

*Confirmed*

Tair	31.1	Air Temp, Elkins WV - Degree C
CCF	36	Cloud Cover Factor, Elkins WV
T7	17.74	River Temp Sang Run @700
T9	18.13	River Temp Sang Run @900
T11	0.00	River Temp Sang Run @1100
T12	0.00	River Temp Sang Run @1200
T14	0.00	River Temp Sang Run @1400
T15	0.00	River Temp Sang Run @1500
Q	14.0	River Flow at Oakland

88 Air Temp, Elkins WV - Degree F  
 PTCLDY Cloud Cover, Elkins WV

Note: Enter only the Green Temps -  
 T9 - T11 - T12 - T14 - T15  
 as required -- all other numbers  
 are automatic.

101.0 = CFS River Flow at Oakland

Time	Oakland Flow CFS	Predicted Maximum River Water Temperature Degree C	Deep Creek Action
------	------------------	--	-------------------

0700 > 30 Check again at 0900  
~~<=30 Release at 1100 for 2 hours~~

0900 > 30 Check again at 1100  
~~<=30 Release at 1100 for 2 hours~~

1100 All Release at 1230 for 2 hours

~~1200 All No further predictions necessary today~~

~~1400 All No further predictions necessary today~~

~~1500 All No further predictions necessary today~~

*Confirmed*

Tair	32.2	Air Temp, Elkins WV - Degree C
CCF	36	Cloud Cover Factor, Elkins WV
T7	20.44	River Temp Sang Run @700
T9	20.86	River Temp Sang Run @900
T11	21.40	River Temp Sang Run @1100
<del>T12</del>	<del>0.00</del>	<del>River Temp Sang Run @1200</del>
<del>T14</del>	<del>0.00</del>	<del>River Temp Sang Run @1400</del>
<del>T15</del>	<del>0.00</del>	<del>River Temp Sang Run @1500</del>
Q	101.0	River Flow at Oakland

90 Air Temp, Elkins WV - Degree F  
 HAZE Cloud Cover, Elkins WV

Note: Enter only the Green Temps -  
 T9 - T11 - T12 - T14 - T15  
 as required -- all other numbers  
 are automatic.

# Youghiogeny River Water Temperature Enhancement Plan

15-Aug-95

147.0 = CFS River Flow at Oakland

Time	Oakland Flow CFS	Predicted Maximum River Water Temperature Degree C	Deep Creek Action
------	------------------	--	-------------------

0700	> 30	23.64	Check again at 0900
	<del>&lt;=30</del>	<del>28.32</del>	<del>Release at 1100 for 2 hours</del>
0900	> 30	23.97	Check again at 1100
	<del>&lt;=30</del>	<del>28.65</del>	<del>Release at 1100 for 2 hours</del>
1100	All	27.79	Release at 1230 for 2 hours
<del>1200</del>	<del>All</del>	<del>2.21</del>	<del>No further predictions necessary today</del>
<del>1400</del>	<del>All</del>	<del>6.94</del>	<del>No further predictions necessary today</del>
<del>1500</del>	<del>All</del>	<del>4.69</del>	<del>No further predictions necessary today</del>

*Confirmed (release not required due to high flow)*

Tair	32.8	Air Temp, Elkins WV - Degree C
CCF	36	Cloud Cover Factor, Elkins WV
T7	22.25	River Temp Sang Run @700
T9	22.54	River Temp Sang Run @900
T11	23.34	River Temp Sang Run @1100
<del>T12</del>	<del>0.00</del>	<del>River Temp Sang Run @1200</del>
<del>T14</del>	<del>0.00</del>	<del>River Temp Sang Run @1400</del>
<del>T15</del>	<del>0.00</del>	<del>River Temp Sang Run @1500</del>
0	147.0	River Flow at Oakland

91 Air Temp, Elkins WV - Degree F  
HAZE Cloud Cover, Elkins WV

Note: Enter only the Green Temps - T9 - T11 - T12 - T14 - T15 as required -- all other numbers are automatic.

69.0 = CFS River Flow at Oakland

Time	Oakland Flow CFS	Predicted Maximum River Water Temperature Degree C	Deep Creek Action
------	------------------	--	-------------------

0700 > 30 25.64 Check again at 0900  
~~<=30 27.20 Release at 1100 for 2 hours~~

0900 > 30 25.53 Check again at 1100  
~~<=30 27.09 Release at 1100 for 2 hours~~

1100 All 26.02 Release at 1230 for 2 hours

~~1200 All 3.06 No further predictions necessary today~~

~~1400 All 6.71 No further predictions necessary today~~

~~1500 All 4.58 No further predictions necessary today~~

*Confirmed*

Tair	30.6	Air Temp, Elkins WV - Degree C
CCF	16	Cloud Cover Factor, Elkins WV
T7	19.93	River Temp Sang Run @700
T9	19.93	River Temp Sang Run @900
T11	20.77	River Temp Sang Run @1100
<del>T12</del>	<del>0.00</del>	<del>River Temp Sang Run @1200</del>
<del>T14</del>	<del>0.00</del>	<del>River Temp Sang Run @1400</del>
<del>T15</del>	<del>0.00</del>	<del>River Temp Sang Run @1500</del>
Q	69.0	River Flow at Oakland

87 Air Temp, Elkins WV - Degree F  
 FAIR Cloud Cover, Elkins WV

Note: Enter only the Green Temps -  
 T9 - T11 - T12 - T14 - T15  
 as required -- all other numbers  
 are automatic.

# Youghiogheny River Water Temperature Enhancement Plan

20-Aug-95

58.0 = CFS River Flow at Oakland

Time	Oakland Flow CFS	Predicted Maximum River Water Temperature Degree C	Deep Creek Action
------	------------------	--	-------------------

0700 > 30 25.95 Check again at 0900  
~~< 30 27.07 Release at 1100 for 2 hours~~

0900 > 30 25.42 Check again at 1100  
~~< 30 26.54 Release at 1100 for 2 hours~~

1100 All 26.50 Release at 1230 for 2 hours

~~1200 All 3.38 No further predictions necessary today~~

~~1400 All 6.71 No further predictions necessary today~~

~~1500 All 4.58 No further predictions necessary today~~

*Confirmed*

Tair	30.6	Air Temp, Elkins WV - Degree C
CCF	16	Cloud Cover Factor, Elkins WV
T7	19.55	River Temp Sang Run @700
T9	19.23	River Temp Sang Run @900
T11	20.70	River Temp Sang Run @1100
T12	0.00	<del>River Temp Sang Run @1200</del>
T14	0.00	<del>River Temp Sang Run @1400</del>
T15	0.00	<del>River Temp Sang Run @1500</del>
Q	58.0	River Flow at Oakland

87 Air Temp, Elkins WV - Degree F  
 FAIR Cloud Cover, Elkins WV

Note: Enter only the Green Temps -  
 T9 - T11 - T12 - T14 - T15  
 as required -- all other numbers  
 are automatic.

# Youghiogheny River Water Temperature Enhancement Plan

22-Aug-95

## 42.0 = CFS River Flow at Oakland

Time	Oakland Flow CFS	Predicted Maximum River Water Temperature Degree C	Deep Creek Action
------	------------------	--	-------------------

0700 > 30 24.81 Check again at 0900  
~~< 30 25.29 Check again at 0900~~

0900 > 30 26.47 Release at 1100 for 2 hours  
~~< 30 26.95 Release at 1100 for 2 hours~~

*Confirmed*

~~1100 All 2.68 No further predictions necessary today~~

~~1200 All 2.91 No further predictions necessary today~~

~~1400 All 6.31 No further predictions necessary today~~

~~1500 All 4.39 No further predictions necessary today~~

Tair	26.7	Air Temp, Elkins WV - Degree C
CCF	1	Cloud Cover Factor, Elkins WV
T7	17.14	River Temp Sang Run @ 700
T9	18.67	River Temp Sang Run @ 900
<del>T11</del>	<del>0.00</del>	<del>River Temp Sang Run @ 1100</del>
<del>T12</del>	<del>0.00</del>	<del>River Temp Sang Run @ 1200</del>
<del>T14</del>	<del>0.00</del>	<del>River Temp Sang Run @ 1400</del>
<del>T15</del>	<del>0.00</del>	<del>River Temp Sang Run @ 1500</del>
Q	42.0	River Flow at Oakland

80 Air Temp, Elkins WV - Degree F  
 SUNNY Cloud Cover, Elkins WV

Note: Enter only the Green Temps -  
 T9 - T11 - T12 - T14 - T15  
 as required -- all other numbers  
 are automatic.



# Youghiogheny River Water Temperature Enhancement Plan

23-Aug-95

## 36.0 = CFS River Flow at Oakland

Time	Oakland Flow CFS	Predicted Maximum River Water Temperature Degree C	Deep Creek Action
0700	> 30	24.84	Check again at 0900
	<=30	<del>25.08</del>	<del>Check again at 0900</del>
0900	> 30	24.44	Check again at 1100
	<=30	<del>24.68</del>	<del>Check again at 1100</del>
1100	All	24.66	Check again at 1200
1200	All	24.65	Check again at 1400
1400	All	24.97	Check again at 1500
1500	All	25.59	Release ASAP - not later than 1530 for 1 hour

*Confirmed*

Tair	28.3	Air Temp, Elkins WV - Degree C
CCF	36	Cloud Cover Factor, Elkins WV
T7	16.88	River Temp Sang Run @700
T9	16.84	River Temp Sang Run @900
T11	18.50	River Temp Sang Run @1100
T12	19.68	River Temp Sang Run @1200
T14	22.34	River Temp Sang Run @1400
T15	23.91	River Temp Sang Run @1500
Q	36.0	River Flow at Oakland

83 Air Temp, Elkins WV - Degree F  
PTCLDY Cloud Cover, Elkins WV

Note: Enter only the Green Temps -  
T9 - T11 - T12 - T14 - T15  
as required -- all other numbers  
are automatic.

# Youghiogeny River Water Temperature Enhancement Plan

24-Aug-95

29.0 = CFS River Flow at Oakland

Time	Oakland Flow CFS	Predicted Maximum River Water Temperature Degree C	Deep Creek Action
------	------------------	--	-------------------

0700 → 30 ~~Check again at 0900~~  
 < = 30 25.56 Check again at 0900

0900 → 30 ~~Check again at 1100~~  
 < = 30 25.74 Check again at 1100

1100 All 25.06 Check again at 1200

1200 All 24.98 Check again at 1400

1400 All 25.32 Release ASAP - not later than 1430 for 1 hour

~~1500 All 1.57 No further predictions necessary today~~

*Confirmed*

Tair	29.4	Air Temp, Elkins WV - Degree C
CCF	16	Cloud Cover Factor, Elkins WV
T7	16.13	River Temp Sang Run @700
T9	16.62	River Temp Sang Run @900
T11	18.31	River Temp Sang Run @1100
T12	19.52	River Temp Sang Run @1200
T14	22.45	River Temp Sang Run @1400
<del>T15</del>	<del>0.00</del>	<del>River Temp Sang Run @1500</del>
Q	29.0	River Flow at Oakland

85 Air Temp, Elkins WV - Degree F  
 FAIR Cloud Cover, Elkins WV

Note: Enter only the Green Temps -  
 T9 - T11 - T12 - T14 - T15  
 as required -- all other numbers  
 are automatic.

# Youghiogeny River Water Temperature Enhancement Plan

29-Aug-95

20.0 = CFS River Flow at Oakland

Time	Oakland Flow CFS	Predicted Maximum River Water Temperature Degree C	Deep Creek Action
------	------------------	--	-------------------

0700 → 30 Release at 1100 for 2 hours  
 < = 30 Release at 1100 for 2 hours

*Confirmed*

0900 → 30 No further predictions necessary today  
 < = 30 No further predictions necessary today

1100 All No further predictions necessary today

1200 All No further predictions necessary today

1400 All No further predictions necessary today

1500 All No further predictions necessary today

Tair	29.4	Air Temp, Elkins WV - Degree C
CCF	16	Cloud Cover Factor, Elkins WV
T7	19.52	River Temp Sang Run @700
T9	0.00	River Temp Sang Run @900
T11	0.00	River Temp Sang Run @1100
T12	0.00	River Temp Sang Run @1200
T14	0.00	River Temp Sang Run @1400
T15	0.00	River Temp Sang Run @1500
Q	20.0	River Flow at Oakland

85 Air Temp, Elkins WV - Degree F  
 FAIR Cloud Cover, Elkins WV

Note: Enter only the Green Temps -  
 T9 - T11 - T12 - T14 - T15  
 as required -- all other numbers  
 are automatic.

# Youghiogheny River Water Temperature Enhancement Plan

31-Aug-95

## 17.0 = CFS River Flow at Oakland

Time	Oakland Flow CFS	Predicted Maximum River Water Temperature Degree C	Deep Creek Action
------	------------------	--	-------------------

0700 → 30 ~~Check again at 0900~~  
 < = 30 26.19 Check again at 0900  
 25.67

0900 → 30 ~~Release at 1100 for 2 hours~~  
 < = 30 26.02 Check again at 1100  
 25.50

1100 All 25.59 Release at 1230 for 2 hours

1200 All 4.32 ~~No further predictions necessary today~~

1400 All 6.71 ~~No further predictions necessary today~~

1500 All 4.58 ~~No further predictions necessary today~~

*Confirmed*

Tair	30.6	Air Temp, Elkins WV - Degree C
CCF	36	Cloud Cover Factor, Elkins WV
T7	16.53	River Temp Sang Run @700
T9	16.77	River Temp Sang Run @900
T11	18.73	River Temp Sang Run @1100
T12	0.00	River Temp Sang Run @1200
T14	0.00	River Temp Sang Run @1400
T15	0.00	River Temp Sang Run @1500
Q	17.0	River Flow at Oakland

87 Air Temp, Elkins WV - Degree F  
 HAZE Cloud Cover, Elkins WV

Note: Enter only the Green Temps -  
 T9 - T11 - T12 - T14 - T15  
 as required -- all other numbers  
 are automatic.

INFORMATION SUPPLEMENTING LETTER TO DEPARTMENT  
NOVEMBER 2, 1995

The Permittee's letter to the Department dated November 2, 1995 presented information concerning the temperature releases made on 22 days in 1995. Review of the operating record in preparation of this report indicates that temperature releases were made on two additional days, namely July 29 (1100 to 1300 hours) and August 27 (1230 to 1330 hours).

Attached is the printout of the temperature enhancement software program screen for July 29 annotated as the printouts for the 22 days enclosed with the November 2 letter.

No temperature enhancement software program screen is available for August 27. On that day, the water temperature monitoring instrument at Sang Run apparently became inoperative and a temperature enhancement release was made as required by the contingency protocol in the Youghiogheny River Water Temperature Enhancement Plan.

29-Jul-85

**Youghiogheny River Water Temperature Enhancement Plan**

16.0 = CFS River Flow at Oakland

Time	Oakland Flow CFS	Predicted Maximum River Water Temperature Degree C	Deep Creek Action
------	------------------	--	-------------------

0700	> 30	28.97	Release at 1100 for 2 hours -
	< 30	28.41	Release at 1100 for 2 hours
0900	> 30	2.07	No further predictions necessary today
	< 30	2.41	No further predictions necessary today
1100	All	13.11	No further predictions necessary today
1200	All	11.50	No further predictions necessary today
1400	All	8.59	No further predictions necessary today
1500	All	4.52	No further predictions necessary today

*Confirmed*

Tair	29.4	Air Temp, Elkins WV - Degree C
CCF	36	Cloud Cover Factor, Elkins WV
T7	19.76	River Temp Sang Run @ 700
T8	0.00	River Temp Sang Run @ 800
T11	0.00	River Temp Sang Run @ 1100
T12	0.00	River Temp Sang Run @ 1200
T14	0.00	River Temp Sang Run @ 1400
T15	0.00	River Temp Sang Run @ 1500
Q	16.0	River Flow at Oakland

85 Air Temp, Elkins WV - Degree F  
PTCLDY Cloud Cover, Elkins WV

Note: Enter only the Green Temps -  
T8 - T11 - T12 - T14 - T15  
as required - all other numbers  
are automatic.

## MAXIMUM DAILY RIVER WATER TEMPERATURES

Daily maximum water temperatures in the Youghiogheny River at Sang Run are presented on the following sheet. The data were provided by Mr. S. P. Schreiner of Versar Inc., consultant to the MDNR Power Plant Research Program (PPRP).

The data labelled "SMAX" (left temperature column) are the arithmetic means of the daily maximum water temperatures, in degrees C, measured by two "Tempmentors" placed in the river by MDNR. The data labelled "PenMAX" (right temperature column) are the maximum water temperatures, in degrees C, measured by the Permittee's temperature monitor at the Sang Run Bridge. Mr. Schreiner prepared the "PenMAX" data from data downloaded electronically from the Permittee's monitor and provided to him on diskettes by the Permittee; he adjusted the recorded times and dates of the data during the period in which the monitor's clock was known to have been incorrect.

MDNR-PPRP and Versar are analyzing the data and evaluating the Water Temperature Enhancement Plan according to which the Permittee determines the need for and timing of daily temperature releases based in part upon the real-time measurements of river water temperature by the Permittee's temperature monitor.

DATE	SMAX	PenSMAX
01-Jun-95		
02-Jun-95		
03-Jun-95		
04-Jun-95		
05-Jun-95		
06-Jun-95		
07-Jun-95		
08-Jun-95		
09-Jun-95		
10-Jun-95		22.4
11-Jun-95		21.4
12-Jun-95		23.4
13-Jun-95		24.7
14-Jun-95		25.3
15-Jun-95		19.0
16-Jun-95		18.8
17-Jun-95		20.1
18-Jun-95		21.1
19-Jun-95		21.1
20-Jun-95	24.1	24.2
21-Jun-95	25.7	25.9
22-Jun-95	21.4	20.0
23-Jun-95	20.8	20.0
24-Jun-95	20.8	20.6
25-Jun-95	22.7	20.1
26-Jun-95	22.1	22.6
27-Jun-95	20.7	21.4
28-Jun-95	20.0	20.7
29-Jun-95	20.1	22.8
30-Jun-95	21.0	
01-Jul-95	20.1	
02-Jul-95	22.3	
03-Jul-95	20.8	
04-Jul-95	20.5	
05-Jul-95	23.2	
06-Jul-95	24.7	
07-Jul-95	22.2	
08-Jul-95	20.0	20.6
09-Jul-95	25.6	25.8
10-Jul-95	21.3	21.4
11-Jul-95	25.3	24.9
12-Jul-95	22.3	22.6
13-Jul-95	22.5	22.8
14-Jul-95	23.3	23.4
15-Jul-95	21.2	21.3
16-Jul-95	26.9	27.6
17-Jul-95	23.9	24.4
18-Jul-95	26.7	27.1

19-Jul-95	25.3	25.6
20-Jul-95	24.7	24.7
21-Jul-95	20.9	21.0
22-Jul-95	26.4	27.1
23-Jul-95	27.2	27.3
24-Jul-95	21.0	21.4
25-Jul-95	26.0	26.4
26-Jul-95	21.2	21.7
27-Jul-95	25.8	25.5
28-Jul-95	22.0	22.3
29-Jul-95	22.7	23.1
30-Jul-95	23.9	23.6
31-Jul-95	22.6	22.9
01-Aug-95	23.8	24.1
02-Aug-95	24.1	24.5
03-Aug-95	23.8	23.8
04-Aug-95	22.5	22.7
05-Aug-95	21.7	21.8
06-Aug-95	21.0	21.2
07-Aug-95	20.4	20.3
08-Aug-95	20.4	20.2
09-Aug-95	20.1	20.0
10-Aug-95	22.8	22.6
11-Aug-95	21.0	20.5
12-Aug-95	22.2	22.6
13-Aug-95	25.1	24.9
14-Aug-95	25.9	26.2
15-Aug-95	26.4	25.9
16-Aug-95	26.7	26.2
17-Aug-95	27.1	26.1
18-Aug-95	22.5	22.5
19-Aug-95	24.5	24.2
20-Aug-95	25.1	24.4
21-Aug-95	22.2	23.3
22-Aug-95	22.5	22.1
23-Aug-95	25.4	26.5
24-Aug-95	25.4	26.1
25-Aug-95	22.2	22.8
26-Aug-95	21.5	21.8
27-Aug-95	24.8	24.4
28-Aug-95	22.2	22.6
29-Aug-95	22.8	23.2
30-Aug-95	20.7	21.2
31-Aug-95	23.2	23.4
01-Sep-95	19.9	
02-Sep-95	19.9	
03-Sep-95	22.0	
04-Sep-95	20.4	
05-Sep-95	23.2	
06-Sep-95	22.5	
07-Sep-95	22.2	

08-Sep-95	18.5
09-Sep-95	21.1
10-Sep-95	20.7
11-Sep-95	19.7
12-Sep-95	17.9
13-Sep-95	18.9
14-Sep-95	20.6
15-Sep-95	19.7



APPENDIX C



**APPENDIX C**  
**FLOW BYPASS OPERATION RECORD**  
**AND**  
**USGS RECORD OF DAILY FLOW AT OAKLAND**

UNITED STATES DEPARTMENT OF THE INTERIOR - GEOLOGICAL SURVEY - TONSON PRIME

01/30/96

STATION NUMBER 1307500 YCUGHIOGMENT R NR OAKLAND, MO STREAM SOURCE AGENCY USGS  
 LATITUDE 392519 LONGITUDE 0792532 DRAINAGE AREA 134.00 DATUM 2353.61 STATE 24 COUNTY 023

PROVISIONAL DATA SUBJECT TO REVISION

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1994 TO SEPTEMBER 1995  
 DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	24	26	173	282	157	906	91	246	110	83	16	15
2	34	127	143	504	155	630	86	486	115	115	12	15
3	42	61	124	389	143	302	81	557	282	60	13	14
4	32	50	114	319	163	402	96	423	318	44	14	14
5	27	36	781	155	123	327	100	308	196	38	10	14
6	27	33	817	230	144	553	85	302	156	55	1010	14
7	25	31	526	587	137	524	79	239	137	57	671	13
8	23	29	379	720	130	485	75	204	137	47	203	11
9	22	28	345	495	127	416	103	178	110	33	126	10
10	20	79	1200	372	114	350	105	179	99	33	96	9.9
11	20	90	1660	316	111	355	132	181	106	26	102	9.5
12	19	56	1000	585	97	440	117	158	252	22	155	9.6
13	19	48	846	782	91	359	148	136	205	20	88	11
14	19	45	443	580	91	350	155	545	146	20	228	13
15	19	41	343	601	98	307	145	1010	116	21	124	14
16	17	40	282	609	1530	264	133	505	96	110	201	13
17	17	93	391	474	1230	223	139	496	82	63	97	47
18	17	77	389	388	723	193	160	1010	71	46	69	55
19	17	65	350	324	912	174	141	1260	64	31	55	31
20	21	56	257	836	697	158	123	843	58	23	45	22
21	29	81	266	708	815	176	124	590	52	20	41	21
22	26	137	233	539	603	146	115	417	47	21	36	46
23	24	93	216	426	714	156	106	297	50	23	31	73
24	26	78	211	146	1410	137	196	234	55	20	28	36
25	25	71	159	303	925	122	385	206	48	18	24	24
26	24	66	169	265	686	112	353	215	45	12	22	21
27	23	66	152	253	593	107	236	163	56	15	20	18
28	20	458	142	202	861	117	211	159	47	17	20	16
29	19	338	132	212	---	110	121	195	42	15	19	15
30	19	225	118	176	---	101	206	160	39	20	14	14
31	21	---	112	178	---	92	---	129	---	17	17	---
TOTAL	717	2755	12420	13654	12282	9363	4339	12470	3345	1141	3611	635.0
MEAN	23.1	92.0	401	440	474	302	145	402	111	36.8	116	21.3
MAX	42	458	1660	587	1530	906	385	1260	318	115	1010	73
MIN	17	28	112	174	91	98	75	129	39	17	10	9.5
QPSM	-17	.05	2.59	3.29	3.54	2.25	1.08	3.00	.83	.27	.87	.16
IN.	.20	.77	3.45	3.79	3.69	2.60	1.20	3.46	.93	.52	1.00	.18

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1941 - 1995, BY WATER YEAR (WY)

	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955
MEAN	115	238	410	424	495	604	453	325	200	156	130	80.0			
MAX	608	1152	1027	801	1100	1477	879	676	730	629	586	533			
(WY)	1955	1986	1973	1952	1986	1963	1973	1956	1981	1978	1956	1965			
MIN	4.45	7.08	62.2	63.2	127	168	121	76.0	24.0	10.3	10.5	5.99			
(WY)	1954	1954	1944	1977	1978	1990	1946	1982	1965	1952	1944	1953			

SUMMARY STATISTICS

FOR 1994 CALENDAR YEAR

FOR 1995 WATER YEAR

WATER YEARS 1941 - 1995

UNITED STATES DEPARTMENT OF THE INTERIOR

STATION NUMBER C3075500 YCUGHIOGHENY R NR OAI

LATITUDE 392519 LONGITUDE 0792532 DRAINAGE AREA

PROVISIONAL DATA

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR DAILY MEAN VA

DAY	OCT 1995	NOV 1995	DEC	JAN	FEB	MAR
1	13	76	---	---	---	---
2	15	70	---	---	---	---
3	18	83	---	---	---	---
4	21	84	---	---	---	---
5	29	70	---	---	---	---
6	40	60	---	---	---	---
7	33	72	---	---	---	---
8	21	199	---	---	---	---
9	17	162	---	---	---	---
10	15	137	---	---	---	---
11	13	124	---	---	---	---
12	13	354	---	---	---	---
13	12	240	---	---	---	---
14	41	214	---	---	---	---
15	161	233	---	---	---	---
16	79	233	---	---	---	---
17	44	219	---	---	---	---
18	31	226	---	---	---	---
19	27	350	---	---	---	---
20	28	344	---	---	---	---
21	72	394	---	---	---	---
22	70	352	---	---	---	---
23	46	323	---	---	---	---
24	33	395	---	---	---	---
25	29	324	---	---	---	---
26	29	265	---	---	---	---
27	26	409	---	---	---	---
28	44	1460	---	---	---	---
29	157	---	---	---	---	---
30	187	---	---	---	---	---
31	104	---	---	---	---	---
TOTAL	1468	---	---	---	---	---
MEAN	47.4	---	---	---	---	---
MAX	187	---	---	---	---	---
MIN	12	---	---	---	---	---
CFSM	.55	---	---	---	---	---
IN.	.41	---	---	---	---	---