

**U.S. ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL EUTROPHICATION SURVEY  
WORKING PAPER SERIES**



Characteristics  
dry  
REPORT  
ON  
TYGART RESERVOIR  
BARBOUR AND TAYLOR COUNTIES  
WEST VIRGINIA  
EPA REGION III  
WORKING PAPER No. 470

**PACIFIC NORTHWEST ENVIRONMENTAL RESEARCH LABORATORY**

**An Associate Laboratory of the**

**NATIONAL ENVIRONMENTAL RESEARCH CENTER - CORVALLIS, OREGON**

**and**

**NATIONAL ENVIRONMENTAL RESEARCH CENTER - LAS VEGAS, NEVADA**

REPORT  
ON  
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EPA REGION III  
WORKING PAPER No. 470

WITH THE COOPERATION OF THE  
WEST VIRGINIA DEPARTMENT OF NATURAL RESOURCES  
AND THE  
WEST VIRGINIA NATIONAL GUARD  
JUNE, 1975

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## F O R E W O R D

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to fresh water lakes and reservoirs.

### OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

### ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

- a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.
- b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.
- c. With such a transformation, an assessment of the potential for eutrophication control can be made.

### LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

#### ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the West Virginia Department of Natural Resources for professional involvement and to the West Virginia National Guard for conducting the tributary sampling phase of the Survey.

Ira S. Latimer, Jr., Director of the Department of Natural Resources; and John H. Hall, Chief of the Water Resources Division; and the Water Resources Division staff provided invaluable lake documentation and counsel during the Survey, reviewed the preliminary reports, and provided critiques most useful in the preparation of this Working Paper series.

Major General Jack W. Blair, the Adjutant General of West Virginia, and Project Officer Major Manuel G. Goble, who directed the volunteer efforts of the West Virginia National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

## NATIONAL EUTROPHICATION SURVEY

## STUDY LAKES

STATE OF WEST VIRGINIALAKE NAMECOUNTY

Bluestone

Mercer, Monroe, Summers,  
WV; Giles, VA

Lynn

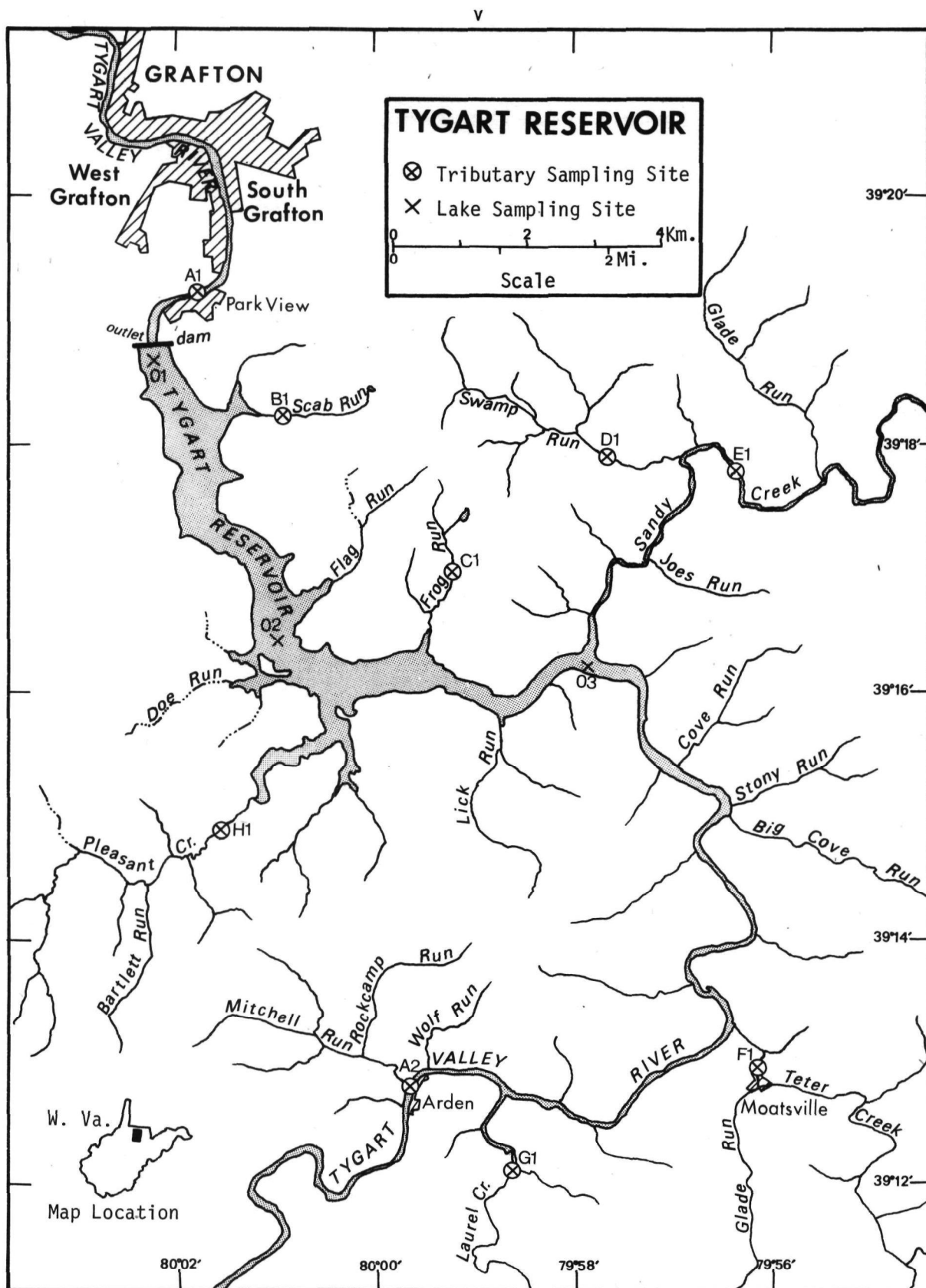
Monongalia

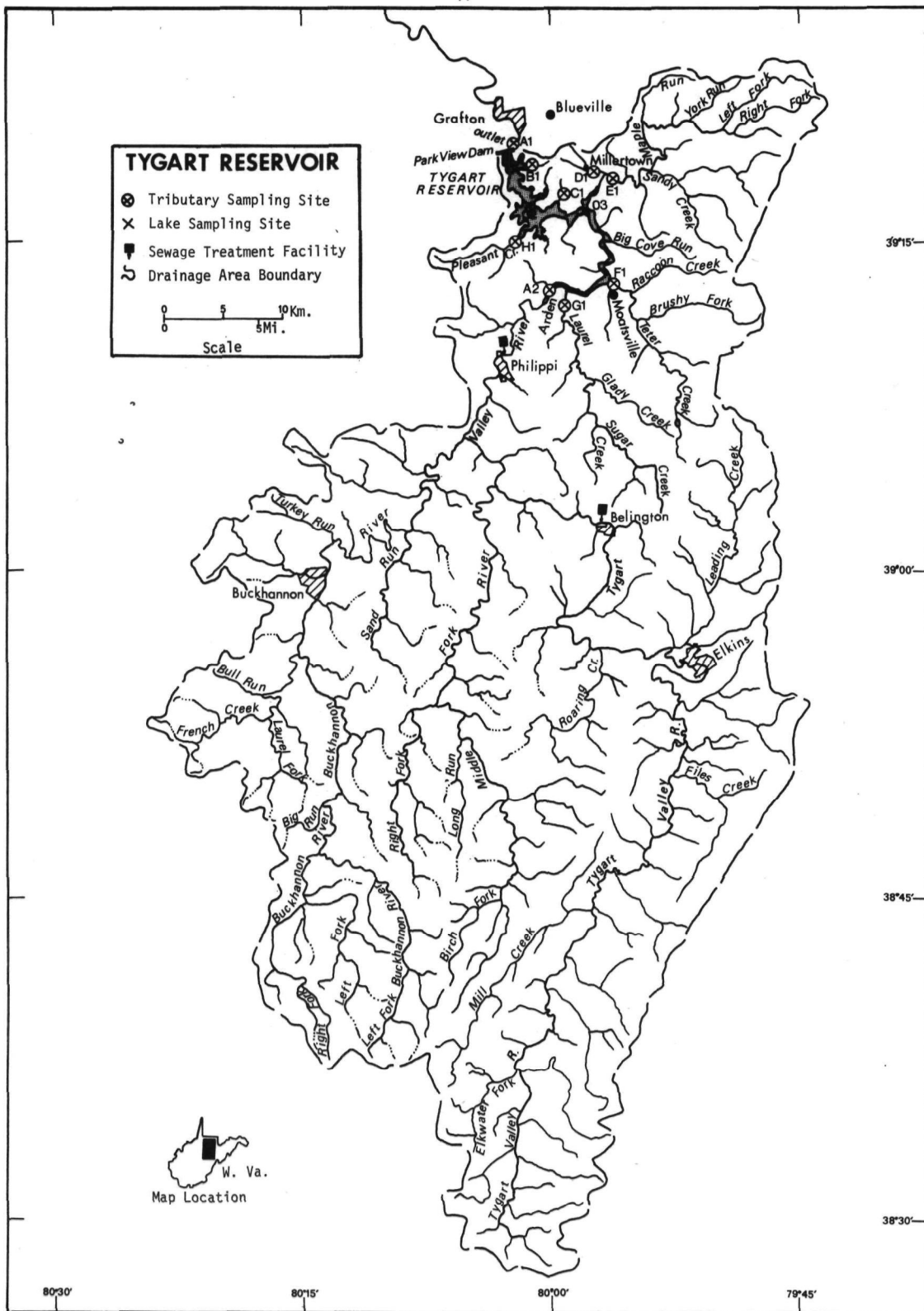
Summersville

Nicholas

Tygart

Barbour, Taylor





## TYGART RESERVOIR

STORET NO. 5404

### I. CONCLUSIONS

#### A. Trophic Condition:

Survey data indicate that Tygart Reservoir is mesotrophic. It ranked first in overall trophic condition when the four West Virginia lakes sampled in 1973 were compared using a combination of six parameters\*. None of the other lakes had less but one had the same median total phosphorus, one had less median dissolved phosphorus, none had less median inorganic nitrogen or mean chlorophyll a, and one had greater mean Secchi disc transparency. Marked depression of dissolved oxygen with depth occurred at all three sampling stations in July and at station 1 in October.

Much of the Tygart Valley River drainage downstream from the confluence of Roaring Creek (about ten kilometers west of Elkins; see map, page vi) is impacted by acid mine wastes (Hall, 1975). The effect of these wastes on the trophic condition of Tygart Reservoir was not determined although evidenced by the rather low pH of the reservoir water. It is reported that a continuing supply of acid substances to certain lakes in Sweden causes oligotrophication of those waters (Grahm et al., 1974); conversely, some mid-Missouri strip mine lakes are reported to have become early eutrophic as the acid production of the stripped areas gradually diminished (King et al., 1974). The

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\* See Appendix A.

question of controllability of acid mine wastes was not addressed during the Survey.

B. Rate-Limiting Nutrient:

The algal assay results and the high ratios of inorganic nitrogen to orthophosphorus measured in the reservoir indicate phosphorus was the limiting nutrient at all sampling times.

C. Nutrient Controllability:

1. Point sources--During the sampling year, the estimated phosphorus contribution of point sources amounted to 11.1% of the total load. The Philippi sewage treatment plant accounted for an estimated 7.5% of the total, and the Belington plant contributed an estimated 3.5%.

The reservoir received a total phosphorus loading of 6.79 g/m<sup>2</sup>/yr during the sampling year. This loading is twice that proposed by Vollenweider (Vollenweider and Dillon, 1974) as a eutrophic loading (see page 14).

Now, Vollenweider's model probably does not apply to water bodies with short hydraulic retention times, and the mean hydraulic retention time of the reservoir is a relatively short 20 days. However, regardless of the applicability of the model, Tygart Reservoir is phosphorus limited, and all phosphorus inputs should be reduced to the greatest practicable degree to protect the existing water quality.

2. Non-point sources--Non-point sources contributed about 89% of the total phosphorus load during the year of sampling. The Tygart Valley River contributed 55.3% of the load, and 11.5%

of the load was contributed by the remaining seven sampled tributaries. Unsampled tributaries and immediate drainage accounted for an estimated 21.8% of the load.

The phosphorus export rate of Scab Run was over six times the mean of the export rates of the other Tygart Reservoir tributaries (see page 13). The high export rate resulted from exceptionally high phosphorus concentrations in the stream in July, August, and September of 1973 (see Appendix E). The cause of these high phosphorus levels is not known but may have been due to recreational use of the area.

## II. LAKE AND DRAINAGE BASIN CHARACTERISTICS<sup>†</sup>

### A. Lake Morphometry<sup>††</sup>:

1. Surface area: 7.08 kilometers<sup>2</sup>.
2. Mean depth: 17.4 meters.
3. Maximum depth: 53.9 meters.
4. Volume:  $123.192 \times 10^6 \text{ m}^3$ .
5. Mean hydraulic retention time: 20 days (based on outlet flow).

### B. Tributary and Outlet: (See Appendix C for flow data)

#### 1. Tributaries -

| <u>Name</u>                                 | <u>Drainage<br/>area (km<sup>2</sup>)*</u> | <u>Mean flow<br/>(m<sup>3</sup>/sec)*</u> |
|---------------------------------------------|--------------------------------------------|-------------------------------------------|
| Tygart Valley River                         | 2,447.5                                    | 50.1                                      |
| Scab Run                                    | 4.3                                        | 0.1                                       |
| Frog Run                                    | 3.4                                        | 0.1                                       |
| Swamp Run                                   | 9.7                                        | 0.2                                       |
| Sandy Creek                                 | 207.2                                      | 4.5                                       |
| Teter Creek                                 | 138.6                                      | 3.1                                       |
| Laurel Creek                                | 140.1                                      | 3.1                                       |
| Pleasant Creek                              | 32.6                                       | 0.7                                       |
| Minor tributaries &<br>immediate drainage - | <u>547.4</u>                               | <u>11.3</u>                               |
| Totals                                      | 3,530.8                                    | 73.2                                      |

#### 2. Outlet -

|                     |           |      |
|---------------------|-----------|------|
| Tygart Valley River | 3,537.9** | 72.7 |
|---------------------|-----------|------|

### C. Precipitation\*\*\*:

1. Year of sampling: 135.3 centimeters.
2. Mean annual: 105.4 centimeters.

<sup>†</sup> Table of metric conversions--Appendix B.

<sup>††</sup> Robinson, 1974.

\* For limits of accuracy, see Working Paper No. 175, "...Survey Methods, 1973-1976".

\*\* Includes area of lake.

\*\*\* See Working Paper No. 175.

### III. LAKE WATER QUALITY SUMMARY

Tygart Reservoir was sampled three times during the open-water season of 1973 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from three stations on the reservoir and from a number of depths at each station (see map, page v). During each visit, a single depth-integrated (4.6 m to surface) sample was composited from the stations for phytoplankton identification and enumeration; and during the April visit, a single 18.9-liter depth-integrated sample was composited for algal assays. Also each time, a depth-integrated sample was collected from each of the stations for chlorophyll a analysis. The maximum depths sampled were 38.1 meters at station 1, 28.0 meters at station 2, and 22.9 meters at station 3.

The sampling results are presented in full in Appendix D and are summarized in the following table.

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR TYGART RESERVOIR  
STORET CODE 5404

| PARAMETER        | 1ST SAMPLING ( 4/23/73) |       |        |  | 2ND SAMPLING ( 7/28/73) |       |        |  | 3RD SAMPLING (10/ 5/73) |       |        |  |
|------------------|-------------------------|-------|--------|--|-------------------------|-------|--------|--|-------------------------|-------|--------|--|
|                  | 3 SITES                 |       |        |  | 3 SITES                 |       |        |  | 3 SITES                 |       |        |  |
|                  | RANGE                   | MEAN  | MEDIAN |  | RANGE                   | MEAN  | MEDIAN |  | RANGE                   | MEAN  | MEDIAN |  |
| TEMP (C)         | 8.3 - 17.0              | 12.8  | 11.9   |  | 13.7 - 27.7             | 23.2  | 24.9   |  | 16.7 - 23.7             | 22.2  | 23.2   |  |
| DISS OXY (MG/L)  | 9.3 - 11.1              | 10.6  | 10.7   |  | 0.3 - 8.1               | 6.0   | 7.4    |  | 0.4 - 8.6               | 7.0   | 7.4    |  |
| CNDCTVY (MCROMO) | 70. - 80.               | 74.   | 75.    |  | 66. - 138.              | 95.   | 97.    |  | 88. - 132.              | 120.  | 127.   |  |
| PH (STAND UNITS) | 5.8 - 6.7               | 6.5   | 6.6    |  | 5.8 - 6.8               | 6.3   | 6.1    |  | 6.2 - 7.0               | 6.5   | 6.4    |  |
| TOT ALK (MG/L)   | 10. - 10.               | 10.   | 10.    |  | 10. - 18.               | 12.   | 10.    |  | 10. - 18.               | 12.   | 11.    |  |
| TOT P (MG/L)     | 0.004 - 0.013           | 0.007 | 0.006  |  | 0.004 - 0.023           | 0.006 | 0.005  |  | 0.004 - 0.045           | 0.013 | 0.007  |  |
| ORTHO P (MG/L)   | 0.002 - 0.008           | 0.005 | 0.005  |  | 0.002 - 0.012           | 0.003 | 0.003  |  | 0.003 - 0.009           | 0.006 | 0.006  |  |
| NO2+NO3 (MG/L)   | 0.440 - 0.500           | 0.474 | 0.480  |  | 0.090 - 0.480           | 0.295 | 0.280  |  | 0.040 - 0.360           | 0.287 | 0.280  |  |
| AMMONIA (MG/L)   | 0.020 - 0.070           | 0.037 | 0.030  |  | 0.030 - 0.620           | 0.099 | 0.040  |  | 0.060 - 0.590           | 0.111 | 0.080  |  |
| KJEL N (MG/L)    | 0.200 - 0.600           | 0.270 | 0.200  |  | 0.200 - 0.900           | 0.276 | 0.200  |  | 0.200 - 0.900           | 0.289 | 0.200  |  |
| INORG N (MG/L)   | 0.470 - 0.540           | 0.511 | 0.510  |  | 0.290 - 0.720           | 0.394 | 0.320  |  | 0.330 - 0.630           | 0.398 | 0.370  |  |
| TOTAL N (MG/L)   | 0.640 - 1.080           | 0.743 | 0.690  |  | 0.440 - 0.990           | 0.571 | 0.540  |  | 0.470 - 0.940           | 0.577 | 0.550  |  |
| CHLRPYL A (UG/L) | 0.5 - 0.9               | 0.6   | 0.5    |  | 1.0 - 2.0               | 1.5   | 1.6    |  | 1.2 - 1.6               | 1.4   | 1.3    |  |
| SECCHI (METERS)  | 0.9 - 3.7               | 2.2   | 2.1    |  | 2.9 - 3.5               | 3.2   | 3.1    |  | 3.7 - 4.0               | 3.8   | 3.8    |  |

## B. Biological characteristics:

## 1. Phytoplankton -

| <u>Sampling Date</u> | <u>Dominant Genera</u>       | <u>Algal Units per ml</u> |
|----------------------|------------------------------|---------------------------|
| 04/23/73             | 1. Flagellates               | 104                       |
|                      | 2. <u>Dinobryon sp.</u>      | 57                        |
|                      | 3. Pennate diatoms           | 17                        |
|                      | 4. <u>Nitzschia sp.</u>      | 13                        |
|                      | 5. <u>Navicula (?) sp.</u>   | 10                        |
|                      | Other genera                 | <u>11</u>                 |
|                      | Total                        | 212                       |
| 07/28/73             | 1. <u>Glenodinium sp.</u>    | 69                        |
|                      | 2. Centric diatoms           | 69                        |
|                      | 3. <u>Ankistrodesmus sp.</u> | 35                        |
|                      | 4. Flagellates               | <u>35</u>                 |
|                      | Total                        | 208                       |
| 10/05/73             | 1. <u>Microcystis sp.</u>    | 287                       |
|                      | 2. <u>Scenedesmus sp.</u>    | 202                       |
|                      | 3. <u>Phormidium sp.</u>     | 169                       |
|                      | 4. Flagellates               | 118                       |
|                      | 5. <u>Nitzschia sp.</u>      | 67                        |
|                      | Other genera                 | <u>135</u>                |
|                      | Total                        | 978                       |

2. Chlorophyll a -

| <u>Sampling Date</u> | <u>Station Number</u> | <u>Chlorophyll <u>a</u> (<math>\mu\text{g/l}</math>)</u> |
|----------------------|-----------------------|----------------------------------------------------------|
| 04/23/73             | 01                    | 0.9                                                      |
|                      | 02                    | 0.5*                                                     |
|                      | 03                    | 0.5*                                                     |
| 07/28/73             | 01                    | 2.0                                                      |
|                      | 02                    | 1.0                                                      |
|                      | 03                    | 1.6                                                      |
| 10/05/73             | 01                    | 1.3                                                      |
|                      | 02                    | 1.6                                                      |
|                      | 03                    | 1.2                                                      |

\* Value known to be less than indicated.

## C. Limiting Nutrient Study:

## 1. Autoclaved, filtered, and nutrient spiked -

| <u>Spike (mg/l)</u> | <u>Ortho P<br/>Conc. (mg/l)</u> | <u>Inorganic N<br/>Conc. (mg/l)</u> | <u>Maximum yield<br/>(mg/l-dry wt.)</u> |
|---------------------|---------------------------------|-------------------------------------|-----------------------------------------|
| Control             | 0.005                           | 0.420                               | 0.1                                     |
| 0.050 P             | 0.055                           | 0.420                               | 11.0                                    |
| 0.050 P + 1.0 N     | 0.055                           | 1.420                               | 14.8                                    |
| 1.0 N               | 0.005                           | 1.420                               | 0.1                                     |

## 2. Discussion -

The control yield of the assay alga, Selenastrum capricornutum, indicates that the potential primary productivity of Tygart Reservoir was low at the time the sample was collected (04/23/73). The yield increased significantly when orthophosphorus alone was added, but the addition of nitrogen alone had no effect on yield. Phosphorus is thus indicated as the limiting nutrient.

Phosphorus limitation is also indicated by the high mean ratios of inorganic nitrogen to orthophosphorus measured in the reservoir (55 to 1 or greater at all sampling stations and times).

#### IV. NUTRIENT LOADINGS (See Appendix E for data)

For the determination of nutrient loadings, the West Virginia National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page vi), except for the high runoff months of February and March when two samples were collected. Sampling was begun in July, 1973, and was completed in June, 1974.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the West Virginia District Office of the U.S. Geological Survey for the tributary sites nearest the lake.

In this report, nutrient loads for sampled tributaries were determined by using a modification of a U.S. Geological Survey computer program for calculating stream loadings\*. Nutrient loads shown are those measured minus point-source loads, if any.

Nutrient loads for unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated using the means of the nutrient loads, in kg/km<sup>2</sup>/year, at stations C-1, D-1, E-1, F-1, G-1, and H-1 and multiplying the means by the ZZ area in km<sup>2</sup>.

The operator of the Elkins wastewater treatment plant provided monthly effluent samples and corresponding flow data. However, the operator of the Philippi plant submitted only two samples, and the operator of the Belington plant did not provide sufficient flow data

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\* See Working Paper No. 175.

to permit calculation of the effluent loads. Consequently, the nutrient loads from these two sources were estimated at 1.134 kg P and 3.401 kg N/capita/year, and flows were estimated at 0.3785 m<sup>3</sup>/capita/day.

Also, the Elkins plant is not included as a point source in this report since it is located so far upstream from the reservoir (the sampling data are included in Appendix E for the record, however).

A. Waste Sources:

1. Known municipal\* -

| <u>Name</u> | <u>Pop.<br/>Served</u> | <u>Treatment</u>   | <u>Mean Flow<br/>(m<sup>3</sup>/d)</u> | <u>Receiving<br/>Water</u> |
|-------------|------------------------|--------------------|----------------------------------------|----------------------------|
| Philippi    | 3,200                  | prim.<br>clarifier | 1,211.2                                | Tygart Valley<br>River     |
| Belington   | 1,500                  | oxidation<br>ditch | 567.8                                  | Tygart Valley<br>River     |

2. Known industrial - None

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\* Leon, 1973.

## B. Annual Total Phosphorus Loading - Average Year:

## 1. Inputs -

| <u>Source</u>                                                   | <u>kg P/<br/>yr</u> | <u>% of<br/>total</u> |
|-----------------------------------------------------------------|---------------------|-----------------------|
| a. Tributaries (non-point load) -                               |                     |                       |
| Tygart Valley River                                             | 26,615              | 55.3                  |
| Scab Run                                                        | 495                 | 1.0                   |
| Frog Run                                                        | 140                 | 0.3                   |
| Swamp Run                                                       | 295                 | 0.6                   |
| Sandy Creek                                                     | 1,455               | 3.0                   |
| Teter Creek                                                     | 1,435               | 3.0                   |
| Laurel Creek                                                    | 1,080               | 2.3                   |
| Pleasant Creek                                                  | 620                 | 1.3                   |
| b. Minor tributaries & immediate<br>drainage (non-point load) - | 10,490              | 21.8                  |
| c. Known municipal STP's -                                      |                     |                       |
| Philippi                                                        | 3,630               | 7.5                   |
| Belington                                                       | 1,700               | 3.5                   |
| d. Septic tanks* -                                              | 15                  | <0.1                  |
| e. Known industrial - None                                      | -                   | -                     |
| f. Direct precipitation** -                                     | <u>125</u>          | <u>0.3</u>            |
| Total                                                           | 48,095              | 100.0                 |

## 2. Outputs -

Lake outlet - Tygart Valley R. 43,935

## 3. Net annual P accumulation - 4,160 kg.

\* Estimate based on 61 lakeshore dwellings: see Working Paper No. 175.

\*\* See Working Paper No. 175.

## C. Annual Total Nitrogen Loading - Average Year:

## 1. Inputs -

| <u>Source</u>                                                   | <u>kg N/<br/>yr</u> | <u>% of<br/>total</u> |
|-----------------------------------------------------------------|---------------------|-----------------------|
| a. Tributaries (non-point load) -                               |                     |                       |
| Tygart Valley River                                             | 897,575             | 63.3                  |
| Scab Run                                                        | 3,625               | 0.3                   |
| Frog Run                                                        | 2,615               | 0.2                   |
| Swamp Run                                                       | 6,385               | 0.5                   |
| Sandy Creek                                                     | 73,255              | 5.2                   |
| Teter Creek                                                     | 55,935              | 3.9                   |
| Laurel Creek                                                    | 52,085              | 3.7                   |
| Pleasant Creek                                                  | 18,075              | 1.3                   |
| b. Minor tributaries & immediate<br>drainage (non-point load) - | 283,825             | 20.0                  |
| c. Known municipal STP's -                                      |                     |                       |
| Philippi                                                        | 10,885              | 0.8                   |
| Belington                                                       | 5,100               | 0.4                   |
| d. Septic tanks* -                                              | 650                 | <0.1                  |
| e. Known industrial - None                                      | -                   | -                     |
| f. Direct precipitation** -                                     | <u>7,645</u>        | <u>0.5</u>            |
| Total                                                           | 1,417,655           | 100.0                 |

## 2. Outputs -

Lake outlet - Tygart Valley R. 1,507,515

## 3. Net annual N loss - 89,860 kg.

\* Estimate based on 61 lakeshore dwellings; see Working Paper No. 175.

\*\* See Working Paper No. 175.

## D. Mean Annual Non-point Nutrient Export by Subdrainage Area:

| <u>Tributary</u>    | <u>kg P/km<sup>2</sup>/yr</u> | <u>kg N/km<sup>2</sup>/yr</u> |
|---------------------|-------------------------------|-------------------------------|
| Tygart Valley River | 11                            | 367                           |
| Scab Run            | 115                           | 843                           |
| Frog Run            | 41                            | 769                           |
| Swamp Run           | 30                            | 658                           |
| Sandy Creek         | 7                             | 354                           |
| Teter Creek         | 10                            | 404                           |
| Laurel Creek        | 8                             | 372                           |
| Pleasant Creek      | 19                            | 554                           |

### E. Yearly Loadings:

In the following table, the existing phosphorus loadings are compared to those proposed by Vollenweider (Vollenweider and Dillon, 1974). Essentially, his "dangerous" loading is one at which the receiving water would become eutrophic or remain eutrophic; his "permissible" loading is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic loading would be considered one between "dangerous" and "permissible".

Note that Vollenweider's model may not be applicable to water bodies with short hydraulic retention times.

|                                                                                                                                          | Total Phosphorus |             | Total Nitrogen |             |
|------------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------|----------------|-------------|
|                                                                                                                                          | Total            | Accumulated | Total          | Accumulated |
| grams/m <sup>2</sup> /yr                                                                                                                 | 6.79             | 0.59        | 200.2          | loss*       |
| Vollenweider phosphorus loadings<br>(g/m <sup>2</sup> /yr) based on mean depth and mean<br>hydraulic retention time of Tygart Reservoir: |                  |             |                |             |
| "Dangerous" (eutrophic loading)                                                                                                          |                  | 3.36        |                |             |
| "Permissible" (oligotrophic loading)                                                                                                     |                  | 1.68        |                |             |

\* There was an apparent loss of nitrogen during the sampling year. This may have been due to nitrogen fixation in the lake, solubilization of previously sedimented nitrogen, recharge with nitrogen-rich ground water, or unknown and unsampled point sources discharging directly to the lake. Whatever the cause, a similar loss of nitrogen has occurred at Shagawa Lake, Minnesota, which has been intensively studied by EPA's Eutrophication and Lake Restoration Branch (Malueg et al., 1975).

## V. LITERATURE REVIEWED

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## VI. APPENDICES

### APPENDIX A

#### LAKE RANKINGS

LAKES RANKED BY INDEX NOS.

| RANK | LAKE CODE | LAKE NAME              | INDEX NO |
|------|-----------|------------------------|----------|
| 1    | 5404      | TYGART RESERVOIR       | 450      |
| 2    | 5402      | LAKE LYNN RESERVOIR    | 350      |
| 3    | 5403      | SUMMERSVILLE RESERVOIR | 299      |
| 4    | 5401      | BLUESTONE RESERVOIR    | 100      |

LAKE DATA TO BE USED IN RANKINGS

| LAKE<br>CODE | LAKE NAME              | MEDIAN<br>TOTAL P | MEDIAN<br>INORG N | 500-<br>MEAN SEC | MEAN<br>CHLORA | 15-<br>MIN DO | MEDIAN<br>DISS ORTHO P |
|--------------|------------------------|-------------------|-------------------|------------------|----------------|---------------|------------------------|
| 5401         | BLUESTONE RESERVOIR    | 0.074             | 1.080             | 473.700          | 14.900         | 11.800        | 0.018                  |
| 5402         | LAKE LYNN RESERVOIR    | 0.006             | 0.490             | 403.222          | 4.733          | 14.800        | 0.003                  |
| 5403         | SUMMERSVILLE RESERVOIR | 0.011             | 0.660             | 363.818          | 6.242          | 14.600        | 0.006                  |
| 5404         | TYGART RESERVOIR       | 0.006             | 0.430             | 378.667          | 1.178          | 14.700        | 0.005                  |

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

| LAKE<br>CODE | LAKE NAME              | MEDIAN<br>TOTAL P | MEDIAN<br>INORG N | 500-<br>MEAN SEC | MEAN<br>CHLORA | 15-<br>MIN DO | MEDIAN<br>DISS ORTHO P | INDEX<br>NO |
|--------------|------------------------|-------------------|-------------------|------------------|----------------|---------------|------------------------|-------------|
| 5401         | BLUESTONE RESERVOIR    | 0 ( 0)            | 0 ( 0)            | 0 ( 0)           | 0 ( 0)         | 100 ( 3)      | 0 ( 0)                 | 100         |
| 5402         | LAKE LYNN RESERVOIR    | 83 ( 2)           | 67 ( 2)           | 33 ( 1)          | 67 ( 2)        | 0 ( 0)        | 100 ( 3)               | 350         |
| 5403         | SUMMERSVILLE RESERVOIR | 33 ( 1)           | 33 ( 1)           | 100 ( 3)         | 33 ( 1)        | 67 ( 2)       | 33 ( 1)                | 299         |
| 5404         | TYGART RESERVOIR       | 83 ( 2)           | 100 ( 3)          | 67 ( 2)          | 100 ( 3)       | 33 ( 1)       | 67 ( 2)                | 450         |

## APPENDIX B

### CONVERSION FACTORS

## CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x  $8.107 \times 10^{-4}$  = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

## APPENDIX C

### TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR WEST VIRGINA

3/25/75

LAKE CODE 5404 TYGART RESERVOIR

TOTAL DRAINAGE AREA OF LAKE(SQ KM) 3537.9

| TRIBUTARY | SUB-DRAINAGE<br>AREA(SQ KM) | NORMALIZED FLOWS(CMS) |        |        |       |       |       |       |       |       |       |       |       | MEAN  |
|-----------|-----------------------------|-----------------------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|           |                             | JAN                   | FEB    | MAR    | APR   | MAY   | JUN   | JUL   | AUG   | SEP   | OCT   | NOV   | DEC   |       |
| 5404A1    | 3537.9                      | 112.70                | 127.14 | 152.34 | 85.23 | 69.09 | 49.55 | 31.71 | 40.49 | 25.77 | 29.45 | 56.35 | 95.71 | 72.72 |
| 5404A2    | 2447.5                      | 83.25                 | 91.18  | 82.12  | 77.87 | 57.77 | 33.98 | 24.07 | 24.07 | 11.61 | 16.14 | 35.68 | 66.54 | 50.14 |
| 5404B1    | 4.3                         | 0.17                  | 0.17   | 0.20   | 0.14  | 0.11  | 0.06  | 0.06  | 0.03  | 0.03  | 0.03  | 0.06  | 0.14  | 0.10  |
| 5404C1    | 3.4                         | 0.11                  | 0.14   | 0.17   | 0.11  | 0.08  | 0.06  | 0.03  | 0.03  | 0.03  | 0.03  | 0.06  | 0.11  | 0.08  |
| 5404D1    | 9.7                         | 0.34                  | 0.40   | 0.45   | 0.31  | 0.23  | 0.14  | 0.11  | 0.08  | 0.06  | 0.06  | 0.14  | 0.28  | 0.22  |
| 5404E1    | 207.2                       | 7.65                  | 8.21   | 9.91   | 7.08  | 3.68  | 2.97  | 1.98  | 1.56  | 0.85  | 1.42  | 3.11  | 5.66  | 4.49  |
| 5404F1    | 138.6                       | 5.10                  | 5.66   | 6.51   | 4.81  | 3.40  | 1.98  | 1.27  | 0.99  | 0.57  | 0.99  | 1.98  | 3.96  | 3.09  |
| 5404G1    | 140.1                       | 5.10                  | 5.66   | 6.51   | 4.81  | 3.40  | 1.98  | 1.42  | 0.99  | 0.57  | 0.99  | 1.98  | 3.96  | 3.10  |
| 5404H1    | 32.6                        | 1.13                  | 1.27   | 1.56   | 1.13  | 0.85  | 0.42  | 0.28  | 0.25  | 0.14  | 0.23  | 0.42  | 0.99  | 0.72  |
| 5404Z2    | 554.3                       | 17.56                 | 19.82  | 23.79  | 13.31 | 10.76 | 7.65  | 5.10  | 6.23  | 3.96  | 4.53  | 8.78  | 15.01 | 11.34 |

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 3537.9  
SUM OF SUB-DRAINAGE AREAS = 3537.7

TOTAL FLOW IN = 882.90  
TOTAL FLOW OUT = 875.56

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

| TRIBUTARY | MONTH | YEAR | MEAN FLOW | DAY | FLOW   | DAY | FLOW   | DAY | FLOW |
|-----------|-------|------|-----------|-----|--------|-----|--------|-----|------|
| 5404A1    | 7     | 73   | 9.40      | 28  | 8.72   |     |        |     |      |
|           | 8     | 73   | 26.22     | 18  | 54.93  |     |        |     |      |
|           | 9     | 73   | 23.59     | 15  | 26.11  |     |        |     |      |
|           | 10    | 73   | 39.64     | 23  | 36.53  |     |        |     |      |
|           | 11    | 73   | 97.69     | 16  | 65.41  |     |        |     |      |
|           | 12    | 73   | 183.49    | 21  | 236.16 |     |        |     |      |
|           | 1     | 74   | 209.83    | 18  | 288.83 |     |        |     |      |
|           | 2     | 74   | 108.74    | 12  | 99.11  | 24  | 89.76  |     |      |
|           | 3     | 74   | 110.15    | 15  | 120.06 | 30  | 71.64  |     |      |
|           | 4     | 74   | 75.89     | 29  | 13.11  |     |        |     |      |
|           | 5     | 74   | 53.24     | 20  | 18.63  |     |        |     |      |
|           | 6     | 74   | 167.64    | 28  | 198.78 |     |        |     |      |
| 5404A2    | 7     | 73   | 7.93      | 28  | 17.84  |     |        |     |      |
|           | 8     | 73   | 20.67     | 18  | 58.90  |     |        |     |      |
|           | 9     | 73   | 10.62     | 17  | 9.20   |     |        |     |      |
|           | 10    | 73   | 25.80     | 23  | 5.95   |     |        |     |      |
|           | 11    | 73   | 80.99     | 25  | 35.11  |     |        |     |      |
|           | 1     | 74   | 134.79    | 13  | 247.21 | 27  | 101.37 |     |      |
|           | 2     | 74   | 84.38     | 11  | 64.56  | 24  | 81.27  |     |      |
|           | 3     | 74   | 93.16     | 10  | 95.43  | 30  | 31.43  |     |      |
|           | 4     | 74   | 75.89     | 21  | 30.02  |     |        |     |      |
|           | 5     | 74   | 49.84     | 20  | 30.02  |     |        |     |      |
|           | 6     | 74   | 117.23    | 16  | 13.03  |     |        |     |      |

TRIBUTARY FLOW INFORMATION FOR WEST VIRGINA

3/25/75

LAKE CODE 5404 TYGART RESERVOIR

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

| TRIBUTARY | MONTH | YEAR | MEAN FLOW | DAY | FLOW  | DAY | FLOW | DAY | FLOW |
|-----------|-------|------|-----------|-----|-------|-----|------|-----|------|
| 5404B1    | 7     | 73   | 0.01      | 28  | 0.01  |     |      |     |      |
|           | 8     | 73   | 0.05      | 18  | 0.20  |     |      |     |      |
|           | 9     | 73   | 0.03      | 15  | 0.02  |     |      |     |      |
|           | 10    | 73   | 0.04      | 23  | 0.01  |     |      |     |      |
|           | 11    | 73   | 0.11      | 16  | 0.15  |     |      |     |      |
|           | 12    | 73   | 0.18      | 21  | 0.51  |     |      |     |      |
|           | 1     | 74   | 0.15      | 18  | 0.13  |     |      |     |      |
|           | 2     | 74   | 0.13      | 11  | 0.09  | 26  | 0.10 |     |      |
|           | 3     | 74   | 0.15      | 15  | 0.07  | 30  | 0.07 |     |      |
|           | 4     | 74   | 0.13      | 29  | 0.04  |     |      |     |      |
|           | 5     | 74   | 0.05      | 20  | 0.03  |     |      |     |      |
|           | 6     | 74   | 0.19      | 28  | 0.03  |     |      |     |      |
| 5404C1    | 7     | 73   | 0.01      | 28  | 0.01  |     |      |     |      |
|           | 8     | 73   | 0.04      | 18  | 0.16  |     |      |     |      |
|           | 9     | 73   | 0.02      | 15  | 0.02  |     |      |     |      |
|           | 10    | 73   | 0.03      | 23  | 0.01  |     |      |     |      |
|           | 11    | 73   | 0.09      | 16  | 0.12  |     |      |     |      |
|           | 12    | 73   | 0.14      | 21  | 0.48  |     |      |     |      |
|           | 1     | 74   | 0.12      | 18  | 0.10  |     |      |     |      |
|           | 2     | 74   | 0.10      | 11  | 0.07  | 26  | 0.06 |     |      |
|           | 3     | 74   | 0.11      | 15  | 0.06  | 30  | 0.05 |     |      |
|           | 4     | 74   | 0.10      | 29  | 0.03  |     |      |     |      |
|           | 5     | 74   | 0.03      | 20  | 0.03  |     |      |     |      |
|           | 6     | 74   | 0.15      | 28  | 0.02  |     |      |     |      |
| 5404D1    | 7     | 73   | 0.03      | 28  | 0.02  |     |      |     |      |
|           | 8     | 73   | 0.11      | 18  | 0.45  |     |      |     |      |
|           | 9     | 73   | 0.06      | 15  | 0.05  |     |      |     |      |
|           | 10    | 73   | 0.09      | 23  | 0.02  |     |      |     |      |
|           | 11    | 73   | 0.25      | 16  | 0.34  |     |      |     |      |
|           | 12    | 73   | 0.42      | 21  | 1.42  |     |      |     |      |
|           | 1     | 74   | 0.34      | 18  | 0.28  |     |      |     |      |
|           | 2     | 74   | 0.28      | 11  | 0.20  | 26  | 0.18 |     |      |
|           | 3     | 74   | 0.34      | 15  | 0.17  | 30  | 0.15 |     |      |
|           | 4     | 74   | 0.28      | 29  | 0.10  |     |      |     |      |
|           | 5     | 74   | 0.10      | 20  | 0.07  |     |      |     |      |
|           | 6     | 74   | 0.42      | 28  | 0.06  |     |      |     |      |
| 5404E1    | 7     | 73   | 0.99      | 28  | 1.70  |     |      |     |      |
|           | 8     | 73   | 1.84      | 18  | 7.93  |     |      |     |      |
|           | 9     | 73   | 1.42      | 15  | 1.84  |     |      |     |      |
|           | 10    | 73   | 3.11      | 23  | 1.13  |     |      |     |      |
|           | 11    | 73   | 7.65      | 16  | 9.06  |     |      |     |      |
|           | 12    | 73   | 9.06      | 21  | 29.73 |     |      |     |      |
|           | 1     | 74   | 7.36      | 18  | 7.08  |     |      |     |      |
|           | 2     | 74   | 6.51      | 11  | 5.66  | 26  | 4.25 |     |      |
|           | 3     | 74   | 7.08      | 15  | 5.66  | 30  | 3.68 |     |      |
|           | 4     | 74   | 6.23      | 29  | 2.27  |     |      |     |      |
|           | 5     | 74   | 2.27      | 20  | 1.70  |     |      |     |      |
|           | 6     | 74   | 9.06      | 28  | 1.42  |     |      |     |      |

TRIBUTARY FLOW INFORMATION FOR WEST VIRGINA

3/25/75

LAKE CODE 5404 TYGART RESERVOIR

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

| TRIBUTARY | MONTH | YEAR | MEAN FLOW | DAY | FLOW  | DAY | FLOW | DAY | FLOW |
|-----------|-------|------|-----------|-----|-------|-----|------|-----|------|
| 5404F1    | 7     | 73   | 0.71      | 28  | 1.13  |     |      |     |      |
|           | 8     | 73   | 1.84      | 18  | 5.95  |     |      |     |      |
|           | 9     | 73   | 0.85      | 17  | 0.57  |     |      |     |      |
|           | 10    | 73   | 2.12      | 21  | 0.85  |     |      |     |      |
|           | 11    | 73   | 5.10      | 25  | 2.55  |     |      |     |      |
|           | 1     | 74   | 8.50      | 13  | 16.99 | 27  | 7.08 |     |      |
|           | 2     | 74   | 4.25      | 11  | 3.96  | 24  | 2.55 |     |      |
|           | 3     | 74   | 4.81      | 10  | 4.53  | 30  | 2.55 |     |      |
|           | 4     | 74   | 4.25      | 21  | 1.70  |     |      |     |      |
|           | 5     | 74   | 4.25      | 5   | 4.53  |     |      |     |      |
|           | 6     | 74   | 7.08      | 16  | 1.42  |     |      |     |      |
| 5404G1    | 7     | 73   | 0.71      | 28  | 1.13  |     |      |     |      |
|           | 8     | 73   | 1.84      | 18  | 6.23  |     |      |     |      |
|           | 9     | 73   | 0.85      | 17  | 0.57  |     |      |     |      |
|           | 10    | 73   | 2.12      | 21  | 0.85  |     |      |     |      |
|           | 11    | 73   | 5.10      | 25  | 2.55  |     |      |     |      |
|           | 1     | 74   | 8.50      | 13  | 16.99 | 27  | 7.08 |     |      |
|           | 2     | 74   | 4.25      | 11  | 3.96  | 24  | 2.55 |     |      |
|           | 3     | 74   | 4.81      | 10  | 5.10  | 30  | 2.55 |     |      |
|           | 4     | 74   | 4.25      | 21  | 1.70  |     |      |     |      |
|           | 5     | 74   | 4.25      | 5   | 4.53  |     |      |     |      |
|           | 6     | 74   | 7.08      | 16  | 1.42  |     |      |     |      |
| 5404H1    | 7     | 73   | 0.08      | 28  | 0.07  |     |      |     |      |
|           | 8     | 73   | 0.37      | 18  | 1.53  |     |      |     |      |
|           | 9     | 73   | 0.20      | 17  | 0.06  |     |      |     |      |
|           | 10    | 73   | 0.31      | 21  | 0.06  |     |      |     |      |
|           | 11    | 73   | 0.85      | 25  | 0.40  |     |      |     |      |
|           | 1     | 74   | 1.13      | 13  | 2.10  | 27  | 0.85 |     |      |
|           | 2     | 74   | 0.99      | 11  | 0.68  | 24  | 0.57 |     |      |
|           | 3     | 74   | 1.10      | 10  | 0.82  | 30  | 0.48 |     |      |
|           | 4     | 74   | 0.96      | 21  | 0.37  |     |      |     |      |
|           | 5     | 74   | 0.34      | 5   | 0.48  |     |      |     |      |
|           | 6     | 74   | 1.44      | 16  | 0.24  |     |      |     |      |

## APPENDIX D

### PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 75/03/25

540401  
39 18 40.0 080 02 00.0  
TYGART RESERVOIR  
54091 WEST VIRGINIA

11EPALES  
3

2111202  
0104 FEET DEPTH

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | DEPTH<br>FEET | 00010<br>WATER<br>TEMP<br>CENT | 00300<br>DO<br>MG/L | 00077<br>TRANSP<br>SECCHI<br>INCHES | 00094<br>CONDUCTVY<br>FIELD<br>MICROMHO | 00400<br>PH<br>SU | 00410<br>T ALK<br>CAC03<br>MG/L | 00610<br>NH3-N<br>TOTAL<br>MG/L | 00625<br>TOT KJEL<br>N<br>MG/L | 00630<br>NO2&NO3<br>N-TOTAL<br>MG/L | 00671<br>PHOS-DIS<br>ORTHO<br>MG/L P |
|--------------------|-------------------|---------------|--------------------------------|---------------------|-------------------------------------|-----------------------------------------|-------------------|---------------------------------|---------------------------------|--------------------------------|-------------------------------------|--------------------------------------|
| 73/04/23           | 12 55             | 0000          | 16.6                           |                     | 36                                  |                                         |                   |                                 |                                 |                                |                                     |                                      |
|                    | 12 55             | 0006          | 16.0                           | 10.3                |                                     | 70                                      | 6.60              | 10K                             | 0.040                           | 0.400                          | 0.500                               | 0.008                                |
|                    | 12 55             | 0015          | 15.5                           | 10.3                |                                     | 70                                      | 6.70              | 10K                             | 0.030                           | 0.200                          | 0.490                               | 0.006                                |
|                    | 12 55             | 0022          | 13.1                           | 10.8                |                                     | 70                                      | 6.70              | 10K                             | 0.030                           | 0.200K                         | 0.490                               | 0.005                                |
|                    | 12 55             | 0035          | 11.9                           | 10.9                |                                     | 70                                      | 6.70              | 10K                             | 0.040                           | 0.200K                         | 0.470                               | 0.005                                |
|                    | 12 55             | 0050          | 11.1                           | 11.1                |                                     | 70                                      | 6.70              | 10K                             | 0.030                           | 0.200K                         | 0.470                               | 0.006                                |
|                    | 12 55             | 0067          | 10.4                           | 11.0                |                                     | 70                                      | 6.70              | 10K                             | 0.030                           | 0.200K                         | 0.460                               | 0.005                                |
|                    | 12 55             | 0087          | 9.7                            | 11.1                |                                     | 70                                      | 6.70              | 10K                             | 0.040                           | 0.200K                         | 0.470                               | 0.005                                |
|                    | 12 55             | 0107          | 8.3                            | 11.1                |                                     | 80                                      | 6.70              | 10K                             | 0.060                           | 0.200K                         | 0.480                               | 0.005                                |
| 73/07/28           | 14 35             | 0000          | 27.6                           |                     | 138                                 | 96                                      | 6.80              | 17                              | 0.040                           | 0.200                          | 0.280                               | 0.003                                |
|                    | 14 35             | 0005          | 27.5                           | 7.8                 |                                     | 97                                      | 6.70              | 18                              | 0.040                           | 0.400                          | 0.280                               | 0.003                                |
|                    | 14 35             | 0025          | 26.4                           | 7.8                 |                                     | 97                                      | 6.60              | 18                              | 0.030                           | 0.200K                         | 0.280                               | 0.002K                               |
|                    | 14 35             | 0045          | 23.1                           | 7.5                 |                                     | 80                                      | 6.20              | 18                              | 0.040                           | 0.200K                         | 0.330                               | 0.003                                |
|                    | 14 35             | 0070          | 18.9                           | 8.1                 |                                     | 71                                      | 6.10              | 18                              | 0.050                           | 0.200K                         | 0.370                               | 0.003                                |
|                    | 14 35             | 0100          | 16.7                           | 4.1                 |                                     | 66                                      | 5.90              | 10K                             | 0.030                           | 0.200K                         | 0.480                               | 0.002K                               |
|                    | 14 35             | 0125          | 13.7                           | 0.4                 |                                     | 70                                      | 5.80              | 10K                             | 0.360                           | 0.400                          | 0.360                               | 0.003                                |
| 73/10/05           | 12 55             | 0000          | 23.7                           |                     | 156                                 | 127                                     | 6.60              | 11                              | 0.110                           | 0.500                          | 0.270                               | 0.008                                |
|                    | 12 55             | 0005          | 23.5                           | 7.6                 |                                     | 127                                     | 6.40              | 10                              | 0.080                           | 0.300                          | 0.270                               | 0.007                                |
|                    | 12 55             | 0015          | 23.4                           | 7.2                 |                                     | 127                                     | 6.30              | 10                              | 0.090                           | 0.200K                         | 0.270                               | 0.005                                |
|                    | 12 55             | 0025          | 22.8                           | 6.2                 |                                     | 132                                     | 6.20              | 12                              | 0.120                           | 0.200                          | 0.280                               | 0.003                                |
|                    | 12 55             | 0050          | 21.6                           | 6.4                 |                                     | 120                                     | 6.20              | 13                              | 0.130                           | 0.300                          | 0.340                               | 0.007                                |
|                    | 12 55             | 0080          | 20.4                           | 7.6                 |                                     | 105                                     | 6.40              | 10                              | 0.100                           | 0.300                          | 0.360                               | 0.009                                |
|                    | 12 55             | 0114          | 16.7                           | 0.4                 |                                     | 88                                      | 6.20              | 18                              | 0.590                           | 0.900                          | 0.040                               | 0.006                                |

K VALUE KNOWN TO BE  
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/03/25

540401  
39 18 40.0 080 02 00.0  
TYGART RESERVOIR  
54091 WEST VIRGINIA

11EPALES 2111202  
3 0104 FEET DEPTH

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | DEPTH<br>FEET | 00665<br>PHOS-TOT<br>MG/L P | 32217<br>CHLRPHYL<br>A<br>UG/L |
|--------------------|-------------------|---------------|-----------------------------|--------------------------------|
| 73/04/23           | 12 55             | 0000          |                             | 0.9                            |
|                    | 12 55             | 0006          | 0.007                       |                                |
|                    | 12 55             | 0015          | 0.006                       |                                |
|                    | 12 55             | 0022          | 0.008                       |                                |
|                    | 12 55             | 0035          | 0.006                       |                                |
|                    | 12 55             | 0050          | 0.006                       |                                |
|                    | 12 55             | 0067          | 0.004                       |                                |
|                    | 12 55             | 0087          | 0.006                       |                                |
|                    | 12 55             | 0107          | 0.006                       |                                |
| 73/07/28           | 14 35             | 0000          | 0.005                       | 2.0                            |
|                    | 14 35             | 0005          | 0.005                       |                                |
|                    | 14 35             | 0025          | 0.005                       |                                |
|                    | 14 35             | 0045          | 0.005                       |                                |
|                    | 14 35             | 0070          | 0.005                       |                                |
|                    | 14 35             | 0100          | 0.006                       |                                |
|                    | 14 35             | 0125          | 0.007                       |                                |
| 73/10/05           | 12 55             | 0000          | 0.008                       | 1.3                            |
|                    | 12 55             | 0005          | 0.007                       |                                |
|                    | 12 55             | 0015          | 0.005                       |                                |
|                    | 12 55             | 0025          | 0.005                       |                                |
|                    | 12 55             | 0050          | 0.013                       |                                |
|                    | 12 55             | 0080          | 0.022                       |                                |
|                    | 12 55             | 0114          | 0.023                       |                                |

STORET RETRIEVAL DATE 75/03/25

540402  
39 16 24.0 080 00 49.0  
TYGART RESERVOIR  
54091 WEST VIRGINIA

11EPALES  
3

2111202  
0085 FEET DEPTH

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | DEPTH<br>FEET | 00010<br>WATER<br>TEMP<br>CENT | 00300<br>DO<br>MG/L | 00077<br>TRANSP<br>SECCHI<br>INCHES | 00094<br>CONDUCTVY<br>FIELD<br>MICROMHO | 00400<br>PH<br>SU | 00410<br>T ALK<br>CAC03<br>MG/L | 00610<br>NH3-N<br>TOTAL<br>MG/L | 00625<br>TOT KJEL<br>N<br>MG/L | 00630<br>NO2&NO3<br>N-TOTAL<br>MG/L | 00671<br>PHOS-DIS<br>ORTHO<br>MG/L P |
|--------------------|-------------------|---------------|--------------------------------|---------------------|-------------------------------------|-----------------------------------------|-------------------|---------------------------------|---------------------------------|--------------------------------|-------------------------------------|--------------------------------------|
| 73/04/23           | 13 50             | 0000          | 15.7                           |                     | 84                                  | 75                                      | 6.60              | 10K                             | 0.030                           | 0.400                          | 0.490                               | 0.006                                |
|                    | 13 50             | 0006          | 15.5                           | 10.0                |                                     | 75                                      | 6.60              | 10K                             | 0.020                           | 0.600                          | 0.480                               | 0.004                                |
|                    | 13 50             | 0015          | 15.0                           | 10.2                |                                     | 75                                      | 6.60              | 10K                             | 0.030                           | 0.300                          | 0.490                               | 0.002K                               |
|                    | 13 50             | 0021          | 13.6                           | 10.5                |                                     | 70                                      | 6.60              | 10K                             | 0.030                           | 0.300                          | 0.500                               | 0.004                                |
|                    | 13 50             | 0041          | 11.4                           | 11.1                |                                     | 75                                      | 6.60              | 10K                             | 0.030                           | 0.200                          | 0.470                               | 0.004                                |
|                    | 13 50             | 0061          | 10.1                           | 11.0                |                                     | 75                                      | 6.60              | 10K                             | 0.040                           | 0.200                          | 0.470                               | 0.003                                |
|                    | 13 50             | 0081          | 9.3                            | 10.6                |                                     | 75                                      | 6.60              | 10K                             | 0.070                           | 0.300                          | 0.460                               | 0.005                                |
| 73/07/28           | 15 20             | 0000          | 27.2                           |                     | 116                                 | 105                                     | 6.70              | 10K                             | 0.040                           | 0.200K                         | 0.270                               | 0.003                                |
|                    | 15 20             | 0005          | 27.0                           | 7.8                 |                                     | 105                                     | 6.70              | 10K                             | 0.040                           | 0.200K                         | 0.270                               | 0.003                                |
|                    | 15 20             | 0025          | 26.4                           | 7.4                 |                                     | 138                                     | 6.10              | 10K                             | 0.060                           | 0.200K                         | 0.240                               | 0.002K                               |
|                    | 15 20             | 0045          | 22.8                           | 7.0                 |                                     | 74                                      | 6.20              | 10K                             | 0.050                           | 0.200K                         | 0.340                               | 0.002                                |
|                    | 15 20             | 0070          | 18.9                           | 7.8                 |                                     | 69                                      | 6.10              | 10K                             | 0.040                           | 0.200K                         | 0.360                               | 0.002                                |
|                    | 15 20             | 0092          | 17.4                           | 2.9                 |                                     | 67                                      | 5.90              |                                 |                                 |                                |                                     |                                      |
| 73/10/05           | 13 20             | 0000          | 23.4                           |                     | 150                                 | 127                                     | 6.60              | 10K                             | 0.080                           | 0.400                          | 0.270                               | 0.004                                |
|                    | 13 20             | 0005          | 23.5                           | 7.6                 |                                     | 128                                     | 6.50              | 10K                             | 0.080                           | 0.200                          | 0.280                               | 0.004                                |
|                    | 13 20             | 0015          | 23.3                           | 7.2                 |                                     | 127                                     | 6.40              | 10K                             | 0.090                           | 0.200K                         | 0.280                               | 0.004                                |
|                    | 13 20             | 0025          | 23.2                           | 7.4                 |                                     | 128                                     | 6.40              | 11                              | 0.070                           | 0.200K                         | 0.280                               | 0.005                                |
|                    | 13 20             | 0050          | 21.9                           | 7.4                 |                                     | 119                                     | 6.50              | 11                              | 0.080                           | 0.200K                         | 0.340                               | 0.007                                |
|                    | 13 20             | 0088          | 20.1                           | 8.0                 |                                     | 109                                     | 6.70              | 15                              | 0.080                           | 0.300                          | 0.350                               | 0.006                                |

K VALUE KNOWN TO BE  
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/03/25

540402  
39 16 24.0 080 00 49.0  
TYGART RESERVOIR  
54091 WEST VIRGINIA

11EPALES 2111202  
3 0085 FEET DEPTH

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | DEPTH<br>FEET | 00665<br>PHOS-TOT<br>MG/L P | 32217<br>CHLRPHYL<br>A<br>UG/L |
|--------------------|-------------------|---------------|-----------------------------|--------------------------------|
| 73/04/23           | 13 50             | 0000          | 0.006                       | 0.5K                           |
|                    | 13 50             | 0006          | 0.004                       |                                |
|                    | 13 50             | 0015          | 0.006                       |                                |
|                    | 13 50             | 0021          | 0.009                       |                                |
|                    | 13 50             | 0041          | 0.008                       |                                |
|                    | 13 50             | 0061          | 0.007                       |                                |
|                    | 13 50             | 0081          | 0.007                       |                                |
| 73/07/28           | 15 20             | 0000          | 0.005                       | 1.0                            |
|                    | 15 20             | 0005          | 0.005                       |                                |
|                    | 15 20             | 0025          | 0.005                       |                                |
|                    | 15 20             | 0045          | 0.005                       |                                |
|                    | 15 20             | 0070          | 0.004                       |                                |
| 73/10/05           | 13 20             | 0000          | 0.005                       | 1.6                            |
|                    | 13 20             | 0005          | 0.004                       |                                |
|                    | 13 20             | 0015          | 0.004                       |                                |
|                    | 13 20             | 0025          | 0.005                       |                                |
|                    | 13 20             | 0050          | 0.011                       |                                |
|                    | 13 20             | 0088          | 0.045                       |                                |

K VALUE KNOWN TO BE  
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/03/25

540403  
39 16 03.0 079 57 38.0  
TYGART RESERVOIR  
54091 WEST VIRGINIA

11EPALES  
3

2111202  
0077 FEET DEPTH

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | DEPTH<br>FEET | 00010<br>WATER<br>TEMP<br>CENT | 00300<br>DO<br>MG/L | 00077<br>TRANSP<br>SECCHI<br>INCHES | 00094<br>CONDUCTVY<br>FIELD<br>MICROMHO | 00400<br>PH<br>SU | 00410<br>T ALK<br>CAC03<br>MG/L | 00610<br>NH3-N<br>TOTAL<br>MG/L | 00625<br>TOT KJEL<br>N<br>MG/L | 00630<br>NO2&NO3<br>N-TOTAL<br>MG/L | 00671<br>PHOS-DIS<br>ORTHO<br>MG/L P |
|--------------------|-------------------|---------------|--------------------------------|---------------------|-------------------------------------|-----------------------------------------|-------------------|---------------------------------|---------------------------------|--------------------------------|-------------------------------------|--------------------------------------|
| 73/04/23           | 14 20             | 0000          |                                |                     | 144                                 | 80                                      | 5.80              | 10K                             | 0.040                           | 0.200                          | 0.440                               | 0.004                                |
|                    | 14 20             | 0006          | 17.0                           | 9.3                 |                                     | 75                                      | 6.10              | 10K                             | 0.030                           | 0.200K                         | 0.440                               | 0.005                                |
|                    | 14 20             | 0015          | 16.9                           | 9.8                 |                                     | 80                                      | 6.20              | 10K                             | 0.030                           | 0.200K                         | 0.440                               | 0.007                                |
|                    | 14 20             | 0022          | 12.3                           | 10.5                |                                     | 75                                      | 6.30              | 10K                             | 0.040                           | 0.300                          | 0.470                               | 0.007                                |
|                    | 14 20             | 0030          | 11.7                           | 10.7                |                                     | 75                                      | 6.40              | 10K                             | 0.040                           | 0.300                          | 0.480                               | 0.007                                |
|                    | 14 20             | 0040          | 11.4                           | 10.8                |                                     | 75                                      | 6.50              | 10K                             | 0.030                           | 0.300                          | 0.480                               | 0.004                                |
|                    | 14 20             | 0055          | 11.3                           | 10.9                |                                     | 75                                      | 6.50              | 10K                             | 0.040                           | 0.200                          | 0.480                               | 0.002                                |
|                    | 14 20             | 0073          | 11.1                           | 10.7                |                                     | 75                                      | 6.50              | 10K                             | 0.050                           | 0.400                          | 0.480                               | 0.004                                |
| 73/07/28           | 17 00             | 0000          | 27.7                           |                     | 124                                 | 130                                     | 6.60              | 10K                             | 0.050                           | 0.200K                         | 0.250                               | 0.002                                |
|                    | 17 00             | 0005          | 27.5                           | 7.7                 |                                     | 126                                     | 6.50              | 10K                             | 0.040                           | 0.300                          | 0.250                               | 0.002K                               |
|                    | 17 00             | 0025          | 26.8                           | 7.4                 |                                     | 128                                     | 6.10              | 10K                             | 0.050                           | 0.200K                         | 0.240                               | 0.004                                |
|                    | 17 00             | 0050          | 23.4                           | 5.6                 |                                     | 101                                     | 5.90              | 10K                             | 0.110                           | 0.300                          | 0.320                               | 0.003                                |
|                    | 17 00             | 0075          | 18.4                           | 0.3                 |                                     | 83                                      | 6.00              | 11                              | 0.620                           | 0.900                          | 0.090                               | 0.012                                |
| 73/10/05           | 13 55             | 0000          | 23.6                           |                     | 144                                 | 127                                     | 6.30              | 11                              | 0.070                           | 0.300                          | 0.280                               | 0.008                                |
|                    | 13 55             | 0005          | 23.4                           | 7.4                 |                                     | 128                                     | 6.50              | 11                              | 0.070                           | 0.200K                         | 0.280                               | 0.008                                |
|                    | 13 55             | 0015          | 23.3                           | 7.4                 |                                     | 127                                     | 6.40              | 10                              | 0.060                           | 0.200K                         | 0.270                               | 0.005                                |
|                    | 13 55             | 0030          | 23.0                           | 7.5                 |                                     | 123                                     | 6.40              | 10K                             | 0.070                           | 0.200K                         | 0.290                               | 0.006                                |
|                    | 13 55             | 0050          | 20.7                           | 8.4                 |                                     | 102                                     | 7.00              | 13                              | 0.060                           | 0.200                          | 0.350                               | 0.007                                |
|                    | 13 55             | 0064          | 20.4                           | 8.6                 |                                     | 101                                     | 7.00              | 14                              | 0.070                           | 0.200                          | 0.360                               | 0.007                                |

K VALUE KNOWN TO BE  
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/03/25

540403  
39 16 03.0 079 57 38.0  
TYGART RESERVOIR  
54091 WEST VIRGINIA

11EPALES 2111202  
3 0077 FEET DEPTH

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | DEPTH<br>FEET | 00665<br>PHOS-TOT<br>MG/L P | 32217<br>CHLRPHYL<br>A<br>UG/L |
|--------------------|-------------------|---------------|-----------------------------|--------------------------------|
| 73/04/23           | 14 20             | 0000          | 0.005                       | 0.5K                           |
|                    | 14 20             | 0006          | 0.006                       |                                |
|                    | 14 20             | 0015          | 0.006                       |                                |
|                    | 14 20             | 0022          | 0.008                       |                                |
|                    | 14 20             | 0030          | 0.009                       |                                |
|                    | 14 20             | 0040          | 0.010                       |                                |
|                    | 14 20             | 0055          | 0.009                       |                                |
|                    | 14 20             | 0073          | 0.013                       |                                |
| 73/07/28           | 17 00             | 0000          | 0.006                       | 1.6                            |
|                    | 17 00             | 0005          | 0.005                       |                                |
|                    | 17 00             | 0025          | 0.004                       |                                |
|                    | 17 00             | 0050          | 0.005                       |                                |
|                    | 17 00             | 0075          | 0.023                       |                                |
| 73/10/05           | 13 55             | 0000          | 0.008                       | 1.2                            |
|                    | 13 55             | 0005          | 0.007                       |                                |
|                    | 13 55             | 0015          | 0.005                       |                                |
|                    | 13 55             | 0030          | 0.007                       |                                |
|                    | 13 55             | 0050          | 0.026                       |                                |
|                    | 13 55             | 0064          | 0.034                       |                                |

K VALUE KNOWN TO BE  
LESS THAN INDICATED

## APPENDIX E

### TRIBUTARY and WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 75/03/25

5404A1  
 39 19 14.0 080 01 32.0  
 TYGART VALLEY RIVER  
 54067 7.5 GRAFTON  
 U/TYGART RES  
 USGS GAGING STATION DOWNSTREAM OF DAM  
 11EPALES 2111204  
 4 0000 FEET DEPTH

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | DEPTH<br>FEET | 00630<br>NO2&NO3<br>N-TOTAL<br>MG/L | 00625<br>TOT KJEL<br>N<br>MG/L | 00610<br>NH3-N<br>TOTAL<br>MG/L | 00671<br>PHOS-DIS<br>ORTHO<br>MG/L P | 00665<br>PHOS-TOT<br>MG/L P |
|--------------------|-------------------|---------------|-------------------------------------|--------------------------------|---------------------------------|--------------------------------------|-----------------------------|
| 73/07/28           | 16 00             |               | 0.420                               | 0.210                          | 0.080                           | 0.005K                               | 0.015                       |
| 73/08/18           | 11 35             |               | 0.360                               | 0.110                          | 0.060                           | 0.024                                |                             |
| 73/09/15           | 11 30             |               | 0.300                               | 0.340                          | 0.132                           | 0.005K                               | 0.015                       |
| 73/10/23           | 11 20             |               | 0.288                               | 0.250                          | 0.095                           | 0.018                                | 0.018                       |
| 73/11/16           | 10 00             |               | 0.370                               | 0.100K                         | 0.063                           | 0.005K                               | 0.005K                      |
| 73/12/21           | 11 15             |               | 0.620                               | 0.300                          | 0.052                           | 0.016                                | 0.065                       |
| 74/01/18           | 10 20             |               | 0.490                               | 0.100                          | 0.036                           | 0.008                                | 0.055                       |
| 74/02/12           | 12 10             |               | 0.490                               | 0.200                          | 0.040                           | 0.005                                | 0.005K                      |
| 74/02/24           | 13 40             |               | 0.410                               | 0.100K                         | 0.030                           | 0.005K                               | 0.015                       |
| 74/03/15           | 11 30             |               | 0.420                               | 0.600                          | 0.065                           | 0.005K                               | 0.005K                      |
| 74/03/30           | 11 55             |               | 0.410                               | 0.700                          | 0.080                           | 0.005K                               | 0.005K                      |
| 74/04/29           | 11 30             |               | 0.360                               | 0.400                          | 0.055                           | 0.005K                               | 0.010                       |
| 74/05/20           | 11 25             |               | 0.260                               | 0.100K                         | 0.050                           | 0.002                                | 0.005K                      |
| 74/06/28           | 12 00             |               | 0.310                               | 0.100K                         | 0.057                           | 0.005                                | 0.030                       |

K VALUE KNOWN TO BE  
 LESS THAN INDICATED

STORET RETRIEVAL DATE 75/03/25

5404A2  
 39 12 35.0 079 59 40.0  
 TYGART VALLEY RIVER  
 54 7.5 NESTORVILLE  
 1/TYGART RES  
 RD BRDG AT W EDGE OF ARDEN  
 11EPALES 2111204  
 4 0000 FEET DEPTH

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | DEPTH<br>FEET | 00630<br>NO2&NO3<br>N-TOTAL<br>MG/L | 00625<br>TOT KJEL<br>N<br>MG/L | 00610<br>NH3-N<br>TOTAL<br>MG/L | 00671<br>PHOS-DIS<br>ORTHO<br>MG/L P | 00665<br>PHOS-TOT<br>MG/L P |
|--------------------|-------------------|---------------|-------------------------------------|--------------------------------|---------------------------------|--------------------------------------|-----------------------------|
| 73/07/28           | 10 45             |               | 0.390                               | 0.210                          | 0.044                           | 0.005K                               | 0.020                       |
| 73/08/18           | 10 35             |               | 0.035                               | 0.100K                         | 0.096                           | 0.009                                | 0.009                       |
| 73/09/17           | 11 40             |               | 0.115                               | 0.210                          | 0.050                           | 0.011                                | 0.015                       |
| 73/10/23           | 11 00             |               | 0.208                               | 0.250                          | 0.052                           | 0.013                                |                             |
| 73/11/25           | 10 55             |               | 0.384                               | 0.150                          | 0.032                           | 0.005K                               | 0.035                       |
| 74/01/13           | 10 30             |               | 0.570                               | 0.100                          | 0.020                           | 0.005K                               | 0.025                       |
| 74/01/27           | 11 05             |               | 0.480                               | 0.100                          | 0.028                           | 0.005K                               | 0.010                       |
| 74/02/11           | 14 20             |               | 0.480                               | 0.100K                         | 0.035                           | 0.005                                | 0.020                       |
| 74/02/24           | 10 35             |               | 0.430                               | 0.200                          | 0.025                           | 0.005K                               | 0.030                       |
| 74/03/10           | 10 00             |               | 0.440                               | 0.200                          | 0.040                           | 0.010                                | 0.030                       |
| 74/03/30           | 09 45             |               | 0.400                               | 0.900                          | 0.072                           | 0.005K                               | 0.020                       |
| 74/04/21           | 10 55             |               | 0.340                               | 0.200                          | 0.047                           | 0.010                                | 0.010                       |
| 74/05/20           | 10 05             |               | 0.264                               | 0.400                          | 0.040                           | 0.005K                               | 0.017                       |
| 74/06/16           | 09 40             |               | 0.280                               | 0.100K                         | 0.055                           | 0.005K                               | 0.020                       |

K VALUE KNOWN TO BE  
 LESS THAN INDICATED

STORET RETRIEVAL DATE 75/03/25

540481  
 39 18 16.0 030 00 45.0  
 SCAB RUN  
 54 7.5 GRAFTON  
 T/TYGART RES  
 RD BRDG 2 MI S OF PARK VIEW  
 11EPALES 2111204  
 4 0000 FEET DEPTH

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | DEPTH<br>FEET | 00630<br>NO2&NO3<br>N-TOTAL<br>MG/L | 00625<br>TOT KJEL<br>N<br>MG/L | 00610<br>NH3-N<br>TOTAL<br>MG/L | 00671<br>PHOS-DIS<br>ORTHO<br>MG/L P | 00665<br>PHOS-TOT<br>MG/L P |
|--------------------|-------------------|---------------|-------------------------------------|--------------------------------|---------------------------------|--------------------------------------|-----------------------------|
| 73/07/28           | 15 35             |               | 0.315                               | 0.640                          | 0.071                           | 0.130                                | 0.220                       |
| 73/08/18           | 11 10             |               | 0.048                               | 20.000                         | 2.900                           | 0.540                                | 1.350                       |
| 73/09/15           | 11 10             |               | 0.600                               | 1.300                          | 0.230                           | 0.058                                | 0.240                       |
| 73/10/23           | 11 05             |               | 0.700                               | 0.900                          | 0.089                           | 0.036                                |                             |
| 73/11/16           | 10 15             |               | 0.200                               | 0.250                          | 0.026                           | 0.008                                | 0.015                       |
| 73/12/21           | 11 00             |               | 0.500                               | 0.100                          | 0.020                           | 0.008                                | 0.025                       |
| 74/01/18           | 10 13             |               | 0.330                               | 1.300                          | 0.100                           | 0.008                                | 0.015                       |
| 74/02/11           | 12 00             |               | 0.352                               | 0.100K                         | 0.020                           | 0.005                                | 0.010                       |
| 74/02/26           | 13 30             |               | 0.264                               | 0.100K                         | 0.010                           | 0.010                                | 0.030                       |
| 74/03/15           | 11 20             |               | 0.232                               | 0.200                          | 0.020                           | 0.010                                | 0.015                       |
| 74/03/30           | 11 40             |               | 0.152                               | 0.700                          | 0.025                           | 0.005                                | 0.035                       |
| 74/04/29           | 11 15             |               | 0.200                               | 1.000                          | 0.045                           | 0.010                                | 0.010                       |
| 74/05/20           | 11 15             |               | 0.112                               | 3.100                          | 0.150                           | 0.007                                | 0.035                       |
| 74/06/28           | 11 40             |               | 0.168                               | 1.000                          | 0.070                           | 0.020                                | 0.065                       |

K VALUE KNOWN TO BE  
 LESS THAN INDICATED

STORET RETRIEVAL DATE 75/03/25

S40401  
39 16 55.0 079 59 00.0  
FROG RUN  
54 7.5 THORNTON  
T/TYGART RES  
RD BRDG 5 MI S OF BLUEVILLE  
11EPALES 2111204  
4 0000 FEET DEPTH

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | DEPTH<br>FEET | 00630<br>NO2&NO3<br>N-TOTAL<br>MG/L | 00625<br>TOT KJEL<br>N<br>MG/L | 00610<br>NH3-N<br>TOTAL<br>MG/L | 00671<br>PHOS-DIS<br>ORINHO<br>MG/L P | 00665<br>PHOS-TOT<br>MG/L P |
|--------------------|-------------------|---------------|-------------------------------------|--------------------------------|---------------------------------|---------------------------------------|-----------------------------|
| 73/07/28           | 15 15             |               | 1.020                               | 0.450                          | 0.198                           | 0.092                                 | 0.115                       |
| 73/08/18           | 10 55             |               | 0.450                               | 0.320                          | 0.090                           | 0.048                                 | 0.050                       |
| 73/09/15           | 10 55             |               | 0.940                               | 1.290                          | 0.075                           | 0.023                                 | 0.190                       |
| 73/10/23           | 10 52             |               | 0.420                               | 0.500                          | 0.150                           | 0.030                                 | 0.175                       |
| 73/11/16           | 10 25             |               | 0.310                               | 0.300                          | 0.017                           | 0.008                                 | 0.020                       |
| 73/12/21           | 10 45             |               | 0.672                               | 0.200                          | 0.020                           | 0.012                                 | 0.030                       |
| 74/01/18           | 10 05             |               | 0.490                               | 0.100K                         | 0.028                           | 0.008                                 | 0.020                       |
| 74/02/11           | 11 45             |               | 0.528                               | 0.100K                         | 0.040                           | 0.010                                 | 0.015                       |
| 74/02/26           | 13 20             |               | 0.470                               | 0.900                          | 0.090                           | 0.010                                 | 0.030                       |
| 74/03/15           | 11 10             |               | 0.390                               | 0.300                          | 0.025                           | 0.005                                 | 0.015                       |
| 74/03/30           | 11 30             |               | 0.300                               | 0.700                          | 0.025                           | 0.005K                                | 0.045                       |
| 74/04/29           | 11 00             |               | 0.300                               | 1.000                          | 0.070                           | 0.005                                 | 0.005K                      |
| 74/05/20           | 11 05             |               | 0.352                               | 0.300                          | 0.060                           | 0.010                                 | 0.045                       |
| 74/06/28           | 11 30             |               | 0.240                               | 0.700                          | 0.035                           | 0.010                                 | 0.030                       |

K VALUE KNOWN TO BE  
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/03/25

540401  
39 17 46.0 079 57 20.0  
SWAMP RUN  
54 7.5 THORNTON  
T/TYGART RES  
RD BRDG .5 MI SE OF MILLERTOWN  
11EPALES 2111204  
4 0000 FEET DEPTH

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | DEPTH<br>FEET | 00630<br>NO2&NO3<br>N-TOTAL<br>MG/L | 00625<br>TOT KJEL<br>N<br>MG/L | 00610<br>NH3-N<br>TOTAL<br>MG/L | 00671<br>PHOS-DIS<br>ORTHO<br>MG/L P | 00665<br>PHOS-TOT<br>MG/L P |
|--------------------|-------------------|---------------|-------------------------------------|--------------------------------|---------------------------------|--------------------------------------|-----------------------------|
| 73/07/28           | 14                | 55            | 0.280                               | 0.600                          | 0.110                           | 0.021                                | 0.055                       |
| 73/08/18           | 10                | 40            | 0.231                               | 0.310                          | 0.098                           | 0.020                                | 0.040                       |
| 73/09/15           | 10                | 40            | 1.800                               | 3.700                          | 0.560                           | 0.132                                | 0.525                       |
| 73/10/23           | 10                | 40            | 0.310                               | 0.550                          | 0.083                           | 0.023                                | 0.180                       |
| 73/11/16           | 10                | 45            | 0.399                               | 0.850                          | 0.063                           | 0.008                                | 0.040                       |
| 73/12/21           | 10                | 35            | 0.650                               | 0.300                          | 0.020                           | 0.008                                | 0.035                       |
| 74/01/18           | 09                | 50            | 0.570                               | 1.700                          | 0.136                           | 0.008                                | 0.030                       |
| 74/02/11           | 11                | 35            | 0.588                               | 0.100K                         | 0.030                           | 0.005                                | 0.015                       |
| 74/02/26           | 13                | 10            | 0.520                               | 0.100                          | 0.030                           | 0.010                                | 0.025                       |
| 74/03/15           | 11                | 00            | 0.480                               | 0.300                          | 0.020                           | 0.005K                               | 0.025                       |
| 74/03/30           | 11                | 15            | 0.300                               | 0.300                          | 0.015                           | 0.005                                | 0.025                       |
| 74/04/29           | 10                | 50            | 0.208                               | 0.700                          | 0.150                           | 0.010                                | 0.010                       |
| 74/05/20           | 10                | 55            | 0.200                               | 0.300                          | 0.050                           | 0.007                                | 0.045                       |
| 74/06/28           | 11                | 15            | 0.330                               | 0.700                          | 0.065                           | 0.005K                               | 0.035                       |

K VALUE KNOWN TO BE  
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/03/25

5404E1  
 39 17 10.0 079 56 00.0  
 SANDY CREEK  
 54 7.5 THORNTON  
 T/TYGART RES  
 RD BRDG IN VILLAGE OF HIRAM  
 11EPALES 2111204  
 4 0000 FEET DEPTH

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | DEPTH<br>FEET | 00630<br>NO2&NO3<br>N-TOTAL<br>MG/L | 00625<br>TOT KJEL<br>N<br>MG/L | 00610<br>NH3-N<br>TOTAL<br>MG/L | 00671<br>PHOS-DIS<br>ORTHO<br>MG/L P | 00665<br>PHOS-TOT<br>MG/L P |
|--------------------|-------------------|---------------|-------------------------------------|--------------------------------|---------------------------------|--------------------------------------|-----------------------------|
| 73/07/28           | 14                | 40            | 0.280                               | 0.340                          | 0.153                           | 0.007                                | 0.007                       |
| 73/08/18           | 10                | 25            | 0.336                               | 0.230                          | 0.110                           | 0.006                                | 0.006                       |
| 73/09/15           | 10                | 25            | 0.180                               | 0.180                          | 0.120                           | 0.009                                | 0.020                       |
| 73/10/23           | 10                | 30            | 0.280                               | 0.250                          | 0.078                           | 0.012                                |                             |
| 73/11/16           | 10                | 50            | 0.336                               | 0.150                          | 0.041                           | 0.005K                               | 0.010                       |
| 73/12/21           | 10                | 25            | 0.520                               | 0.300                          | 0.032                           | 0.005K                               | 0.035                       |
| 74/01/18           | 09                | 42            | 0.440                               | 0.100K                         | 0.052                           | 0.005K                               | 0.005                       |
| 74/02/11           | 11                | 25            | 0.450                               | 0.100K                         | 0.030                           | 0.005K                               | 0.005                       |
| 74/02/26           | 13                | 00            | 0.410                               | 0.200                          | 0.030                           | 0.005                                | 0.015                       |
| 74/03/15           | 10                | 50            | 0.340                               | 0.200                          | 0.030                           | 0.005K                               | 0.005K                      |
| 74/03/30           | 09                | 55            | 0.288                               | 0.300                          | 0.030                           | 0.005K                               | 0.005K                      |
| 74/04/29           | 11                | 40            | 0.184                               | 0.100                          | 0.020                           | 0.005K                               | 0.010                       |
| 74/05/20           | 10                | 45            | 0.160                               | 0.100K                         | 0.055                           | 0.005K                               | 0.005K                      |
| 74/06/28           | 11                | 05            | 0.260                               | 0.100K                         | 0.050                           | 0.005K                               | 0.005K                      |

K VALUE KNOWN TO BE  
 LESS THAN INDICATED

STORET RETRIEVAL DATE 75/03/25

5404F1  
 39 12 40.0 079 56 00.0  
 TETER CREEK  
 54 7.5 NESTORVILLE  
 T/TYGART RES  
 BANK BELO CONFLUENCE WITH GLADE RUN  
 11EPALES 2111204  
 4 0000 FEET DEPTH

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | DEPTH<br>FEET | 00630<br>NO2&NO3<br>N-TOTAL<br>MG/L | 00625<br>TOT KJEL<br>N<br>MG/L | 00610<br>NH3-N<br>TOTAL<br>MG/L | 00671<br>PHOS-DIS<br>ORTHO<br>MG/L P | 00665<br>PHOS-TOT<br>MG/L P |
|--------------------|-------------------|---------------|-------------------------------------|--------------------------------|---------------------------------|--------------------------------------|-----------------------------|
| 73/07/28           | 11                | 39            | 0.154                               | 0.170                          | 0.026                           | 0.006                                | 0.010                       |
| 73/08/18           | 11                | 05            | 0.170                               | 0.100K                         | 0.028                           | 0.007                                | 0.016                       |
| 73/09/17           | 11                | 00            | 0.950                               | 0.220                          | 0.017                           | 0.008                                | 0.015                       |
| 73/10/21           | 11                | 15            | 0.230                               | 0.300                          | 0.019                           | 0.011                                |                             |
| 73/11/25           | 11                | 27            | 0.276                               | 0.100K                         | 0.020                           | 0.005K                               | 0.015                       |
| 74/01/13           | 11                | 00            | 0.460                               | 0.100K                         | 0.016                           | 0.006                                | 0.010                       |
| 74/01/27           | 11                | 35            | 0.384                               | 0.100K                         | 0.016                           | 0.005K                               | 0.005K                      |
| 74/02/11           | 14                | 45            | 0.410                               | 0.100K                         | 0.010                           | 0.005K                               | 0.010                       |
| 74/02/24           | 11                | 06            | 0.352                               | 0.400                          | 0.025                           | 0.005                                | 0.015                       |
| 74/03/10           | 10                | 25            | 0.340                               | 0.200                          | 0.010                           | 0.005K                               | 0.040                       |
| 74/03/30           | 10                | 00            | 0.276                               | 0.300                          | 0.020                           | 0.005K                               | 0.015                       |
| 74/04/21           | 11                | 25            | 0.224                               | 0.300                          | 0.020                           | 0.005                                | 0.010                       |
| 74/05/05           | 09                | 40            | 0.240                               | 0.200                          | 0.035                           | 0.003                                | 0.015                       |
| 74/06/16           | 10                | 05            | 0.300                               | 0.600                          | 0.025                           | 0.005                                |                             |

K VALUE KNOWN TO BE  
 LESS THAN INDICATED

STORET RETRIEVAL DATE 75/03/25

5404G1  
 39 11 50.0 079 58 43.0  
 LAUREL CREEK  
 54 7.5 NESTORVILLE  
 T/TYGART RES  
 RD BRDG 5 MI WSW OF MOATSVILLE  
 11EPALES 2111204  
 4 0000 FEET DEPTH

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | DEPTH<br>FEET | 00630<br>NO2&NO3<br>N-TOTAL<br>MG/L | 00625<br>TOT KJEL<br>N<br>MG/L | 00610<br>NH3-N<br>TOTAL<br>MG/L | 00671<br>PHOS-DIS<br>ORTHO<br>MG/L P | 00665<br>PHOS-TOT<br>MG/L P |
|--------------------|-------------------|---------------|-------------------------------------|--------------------------------|---------------------------------|--------------------------------------|-----------------------------|
| 73/07/28           | 11 05             |               | 0.270                               | 0.210                          | 0.015                           | 0.005K                               | 0.005K                      |
| 73/08/18           | 10 48             |               | 0.160                               | 0.140                          | 0.018                           | 0.005K                               | 0.005K                      |
| 73/09/17           | 11 20             |               | 0.260                               | 0.320                          | 0.017                           | 0.006                                | 0.020                       |
| 73/10/21           | 11 15             |               | 0.176                               | 0.300                          | 0.030                           | 0.009                                |                             |
| 73/11/25           | 11 10             |               | 0.192                               | 0.100K                         | 0.016                           | 0.005K                               | 0.010                       |
| 74/01/13           | 10 45             |               | 0.384                               | 0.100K                         | 0.016                           | 0.012                                | 0.012                       |
| 74/01/27           | 11 20             |               | 0.336                               | 0.100K                         | 0.016                           | 0.005K                               | 0.005K                      |
| 74/02/11           | 14 30             |               | 0.368                               | 0.100K                         | 0.020                           | 0.005K                               | 0.005K                      |
| 74/02/24           | 10 50             |               | 0.310                               | 0.100K                         | 0.010                           | 0.005                                | 0.015                       |
| 74/03/10           | 10 10             |               | 0.260                               | 0.200                          | 0.025                           | 0.005K                               | 0.015                       |
| 74/03/30           | 10 00             |               | 0.232                               | 1.000                          | 0.030                           | 0.005                                | 0.015                       |
| 74/04/21           | 11 07             |               | 0.200                               | 0.300                          | 0.020                           | 0.005K                               | 0.010                       |
| 74/05/05           | 09 50             |               | 0.138                               | 0.200                          | 0.035                           | 0.005K                               | 0.015                       |
| 74/06/16           | 09 50             |               | 0.224                               | 0.700                          | 0.047                           | 0.005K                               |                             |

K VALUE KNOWN TO BE  
 LESS THAN INDICATED

STORET RETRIEVAL DATE 75/03/25

5404H1  
 39 14 50.0 080 01 25.0  
 PLEASANT CREEK  
 54 7.5 PHILLIPPI  
 T/TYGART RES  
 RD BRDG 9 MI N OF PHILLIPPI  
 11EPALES 2111204  
 4 0000 FEET DEPTH

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | DEPTH<br>FEET | 00630<br>NO2&NO3<br>N-TOTAL<br>MG/L | 00625<br>TOT KJEL<br>N<br>MG/L | 00610<br>NH3-N<br>TOTAL<br>MG/L | 00671<br>PHOS-DIS<br>ORTHO<br>MG/L P | 00665<br>PHOS-TOT<br>MG/L P |
|--------------------|-------------------|---------------|-------------------------------------|--------------------------------|---------------------------------|--------------------------------------|-----------------------------|
| 73/07/28           | 10                | 10            | 0.032                               | 0.440                          | 0.078                           | 0.006                                | 0.025                       |
| 73/08/18           | 10                | 05            | 0.064                               | 0.440                          | 0.093                           | 0.007                                | 0.020                       |
| 73/09/17           | 12                | 05            | 0.010K                              | 1.000                          | 0.010                           | 0.008                                | 0.095                       |
| 73/10/21           | 10                | 40            | 0.033                               | 0.400                          | 0.047                           | 0.009                                |                             |
| 73/11/25           | 10                | 35            | 0.192                               | 0.100                          | 0.044                           | 0.005K                               | 0.025                       |
| 74/01/13           | 10                | 10            | 0.710                               | 0.100K                         | 0.016                           | 0.008                                | 0.020                       |
| 74/01/27           | 10                | 40            | 0.450                               | 0.200                          | 0.024                           | 0.005K                               | 0.005K                      |
| 74/02/11           | 14                | 00            | 0.510                               | 0.100                          | 0.100                           | 0.005K                               | 0.005K                      |
| 74/02/24           | 10                | 10            | 0.440                               | 0.100K                         | 0.012                           | 0.007                                | 0.015                       |
| 74/03/10           | 09                | 40            | 0.360                               | 0.500                          | 0.025                           | 0.005K                               | 0.025                       |
| 74/03/30           | 09                | 20            | 0.288                               | 0.800                          | 0.040                           | 0.005K                               | 0.030                       |
| 74/04/21           | 09                | 45            | 0.208                               | 2.000                          | 0.110                           | 0.005K                               | 0.025                       |
| 74/05/05           | 10                | 22            | 0.132                               | 0.400                          | 0.040                           | 0.005K                               | 0.025                       |
| 74/06/16           | 09                | 15            | 0.084                               | 0.750                          | 0.060                           | 0.005K                               | 0.040                       |

K VALUE KNOWN TO BE  
 LESS THAN INDICATED

STORET RETRIEVAL DATE 75/03/25

5404AA PR5404AA P003200  
39 09 20.0 080 02 40.0  
PHILIPPI  
54067 7.5 PHILIPPI  
T/TYGART RESERVOIR  
TYGART VALLEY RIVER  
11EPALES 2141204  
4 0000 FEET DEPTH

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | DEPTH<br>FEET | 00630<br>NO2&NO3<br>N-TOTAL<br>MG/L | 00625<br>TOT KJEL<br>N<br>MG/L | 00610<br>NH3-N<br>TOTAL<br>MG/L | 00671<br>PHOS-DIS<br>ORTHO<br>MG/L P | 00665<br>PHOS-TOT<br>MG/L P | 50051<br>FLOW<br>RATE<br>INST MGD | 50053<br>CONDUIT<br>FLOW-MGD<br>MONTHLY |
|--------------------|-------------------|---------------|-------------------------------------|--------------------------------|---------------------------------|--------------------------------------|-----------------------------|-----------------------------------|-----------------------------------------|
| 73/08/28           | 10 00             |               | 0.176                               | 0.200                          | 0.176                           | 0.056                                | 0.085                       | 0.251                             | 0.489                                   |
| 73/09/28           | 10 00             |               | 0.780                               | 0.800                          | 0.670                           | 0.040                                | 0.395                       | 0.450                             | 0.194                                   |

STORET RETRIEVAL DATE 75/03/25

5404AB TF5404AB P006000  
 39 01 30.0 079 07 00.0  
 ELKINS  
 54 BARBOUR COUNTY  
 T/TYGART RESERVOIR  
 TYGART VALLEY RIVER  
 11EPALES 2141204  
 4 0000 FEET DEPTH

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | DEPTH<br>FEET | 00630<br>NO2&NO3<br>N-TOTAL<br>MG/L | 00625<br>TOT KJEL<br>N<br>MG/L | 00610<br>NH3-N<br>TOTAL<br>MG/L | 00671<br>PHOS-DIS<br>ORTHO<br>MG/L P | 00665<br>PHOS-TOT<br>MG/L P | 50051<br>FLOW<br>RATE<br>INST MGD | 50053<br>CONDUIT<br>FLOW-MGD<br>MONTHLY |
|--------------------|-------------------|---------------|-------------------------------------|--------------------------------|---------------------------------|--------------------------------------|-----------------------------|-----------------------------------|-----------------------------------------|
| 73/09/19           | 07 00             |               |                                     |                                |                                 |                                      |                             |                                   |                                         |
| CP(T)-             |                   |               | 1.900                               | 11.500                         | 2.700                           | 3.780                                | 7.100                       | 1.000                             | 0.800                                   |
| 73/09/19           | 19 00             |               |                                     |                                |                                 |                                      |                             |                                   |                                         |
| 73/10/24           | 08 00             |               |                                     |                                |                                 |                                      |                             |                                   |                                         |
| CP(T)-             |                   |               | 0.370                               | 16.500                         | 3.780                           | 6.000                                | 8.500                       | 0.800                             | 0.800                                   |
| 73/10/24           | 20 00             |               |                                     |                                |                                 |                                      |                             |                                   |                                         |
| 73/12/03           | 07 00             |               |                                     |                                |                                 |                                      |                             |                                   |                                         |
| CP(T)-             |                   |               | 0.500                               | 12.500                         | 2.100                           | 2.900                                | 6.200                       | 1.750                             | 1.200                                   |
| 73/12/03           | 17 00             |               |                                     |                                |                                 |                                      |                             |                                   |                                         |
| 74/01/15           | 07 00             |               |                                     |                                |                                 |                                      |                             |                                   |                                         |
| CP(T)-             |                   |               | 1.920                               | 10.000                         | 0.425                           | 1.440                                | 2.800                       | 1.250                             | 1.500                                   |
| 74/01/15           | 15 30             |               |                                     |                                |                                 |                                      |                             |                                   |                                         |
| 74/02/18           |                   |               | 1.680                               | 7.400                          | 0.830                           | 3.110                                | 4.400                       | 1.320                             | 1.430                                   |
| 74/04/24           |                   |               | 0.640                               | 17.000                         | 1.500                           | 1.900                                | 6.600                       | 1.430                             | 1.600                                   |

STORET RETRIEVAL DATE 75/03/25

5404AC 005404AC P001500  
 38 55 30.0 079 52 30.0  
 BELINGTON  
 54 RANDOLPH COUNTY  
 T/TYGART RESERVOIR  
 TYGART VALLEY RIVER  
 11EPALES 2141204  
 4 0000 FEET DEPTH

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | DEPTH<br>FEET | 00630<br>NO2&NO3<br>N-TOTAL<br>MG/L | 00625<br>TOT KJEL<br>N<br>MG/L | 00610<br>NH3-N<br>TOTAL<br>MG/L | 00671<br>PHOS-DIS<br>ORTHO<br>MG/L P | 00665<br>PHOS-TOT<br>MG/L P | 50051<br>FLOW<br>RATE<br>INST MGD | 50053<br>CONDUIT<br>FLOW-MGD<br>MONTHLY |
|--------------------|-------------------|---------------|-------------------------------------|--------------------------------|---------------------------------|--------------------------------------|-----------------------------|-----------------------------------|-----------------------------------------|
| 73/08/17           | 11 00             |               | 0.450                               | 5.000                          | 1.800                           | 1.500                                | 2.100                       |                                   |                                         |
| 73/09/07           | 09 00             |               | 1.100                               | 12.600                         | 5.900                           | 3.700                                | 4.500                       |                                   |                                         |
| 73/10/19           | 09 00             |               | 0.960                               | 13.500                         | 6.700                           | 5.200                                | 6.600                       |                                   |                                         |
| 73/11/21           | 11 00             |               | 0.190                               | 9.600                          | 4.700                           | 3.360                                | 4.100                       |                                   |                                         |
| 73/12/19           | 11 00             |               | 0.660                               | 7.100                          | 2.400                           | 1.400                                | 2.500                       |                                   |                                         |
| 74/01/18           | 10 00             |               | 1.000                               | 7.600                          | 3.200                           | 2.080                                | 3.800                       |                                   |                                         |
| 74/02/22           | 09 00             |               | 1.000                               | 6.600                          | 2.600                           | 1.700                                | 3.400                       |                                   |                                         |
| 74/03/23           | 11 00             |               | 0.840                               | 6.000                          | 2.200                           | 1.000                                | 2.400                       |                                   |                                         |
| 74/04/22           | 11 00             |               | 0.320                               | 7.200                          | 3.100                           | 1.400                                | 3.000                       |                                   |                                         |
| 74/09/06           | 09 30             |               | 2.300                               | 4.000                          | 2.400                           | 1.350                                | 1.600                       | 0.335                             |                                         |
| 74/10/29           | 10 00             |               | 0.640                               | 8.800                          | 4.600                           | 2.800                                | 3.200                       |                                   | 0.335                                   |