

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



REPORT
ON
CLAYTOR LAKE
PULASKI COUNTY
VIRGINIA
EPA REGION III
WORKING PAPER No. 460

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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WORKING PAPER No. 460

WITH THE COOPERATION OF THE
VIRGINIA STATE WATER CONTROL BOARD
AND THE
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 nation-wide 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 Virginia State Water Control Board for professional involvement and to the Virginia National Guard for conducting the tributary sampling phase of the Survey.

Eugene T. Jensen, Executive Secretary of the State Water Control Board; Michael A. Bellanca, Director; Jean W. Gregory, Pollution Control Specialist; and Robert W. Pitchford, Pollution Control Technician; Bureau of Surveillance and Field Studies; 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 William J. McCaddin, the Adjutant General of Virginia, and Project Officer Lt. Colonel James D. Manley, who directed the volunteer efforts of the Virginia National Guardsmen, also are gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF VIRGINIALAKE NAMECOUNTY

Bluestone

Giles, VA; Mercer,
Monroe, Summers, WV

Chesdin

Amelia, Chesterfield,
Dinwiddie

Chickahominy

Charles City, New Kent

Claytor

Pulaski

J. H. Kerr

Charlotte, Hallifax,
Micklenburg, VA;
Granville, Vance,
Warren, NC

J. W. Flannagan

Dickenson

Occoquan

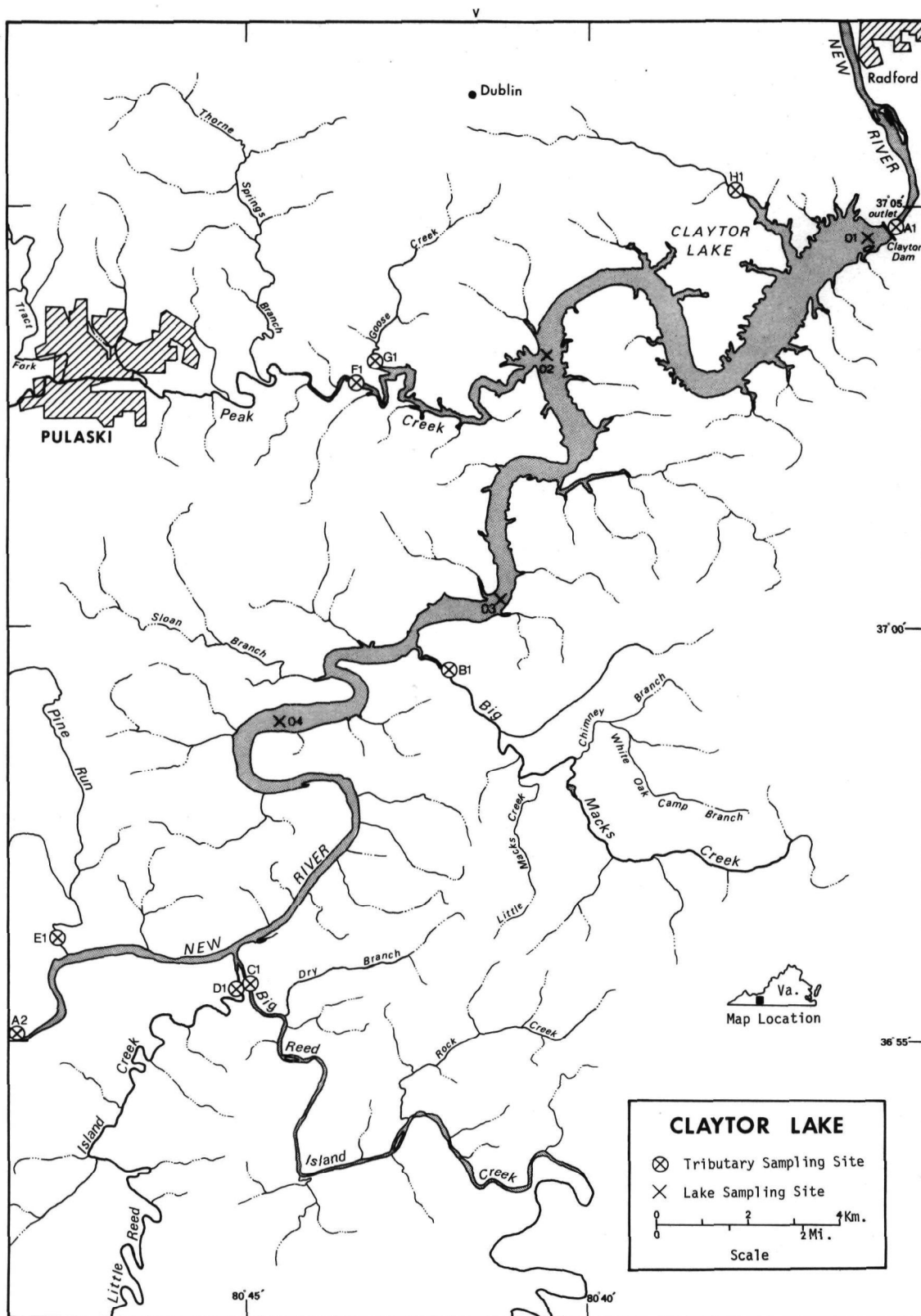
Fairfax, Prince William

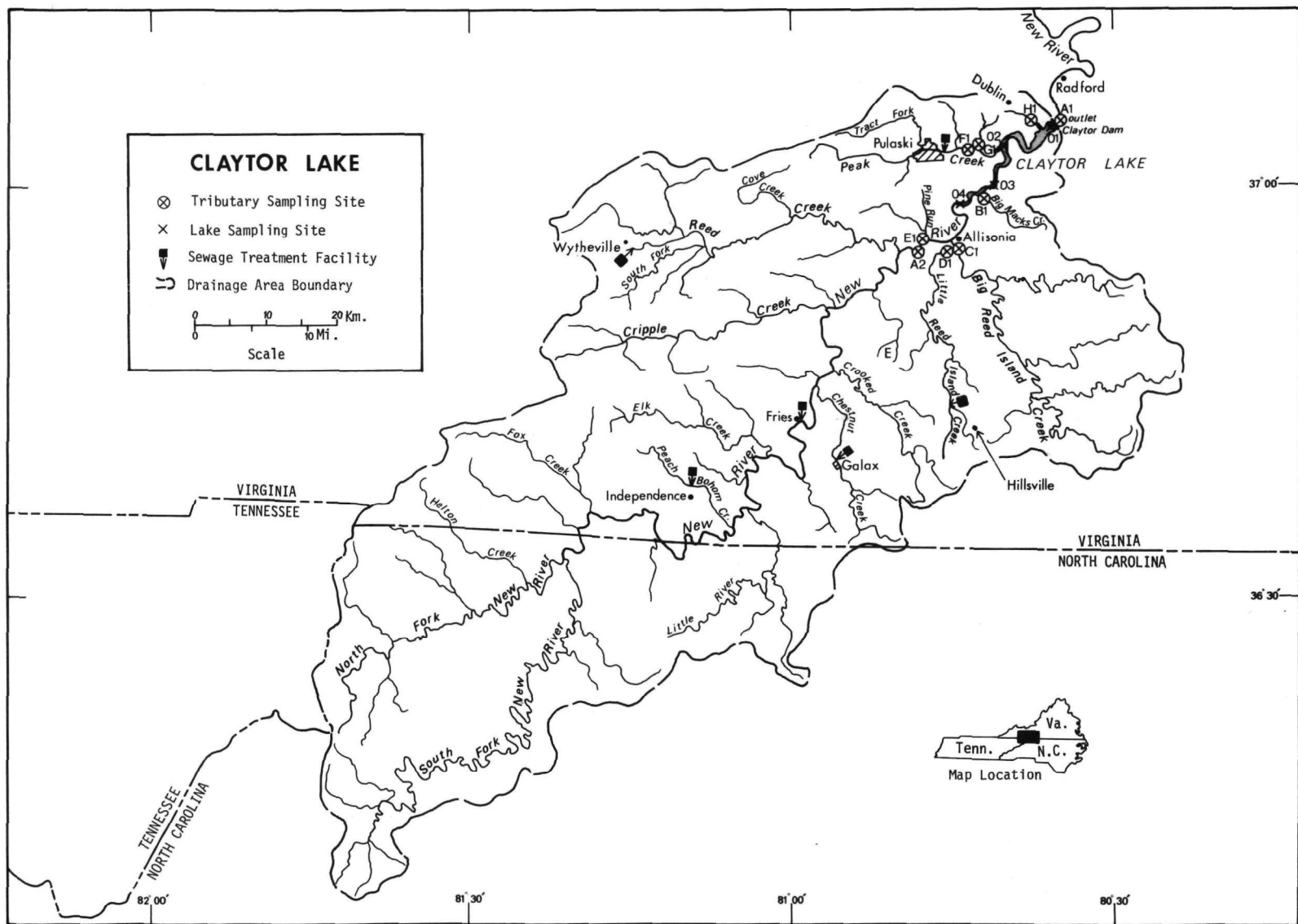
Rivanna

Albemarle

Smith Mountain

Bedford, Franklin,
Pittsylvania





CLAYTOR LAKE
STORET NO. 5103

I. CONCLUSIONS

A. Trophic Condition:

Survey data indicate that Claytor Lake is eutrophic. It ranked third in overall trophic quality when the eight Virginia lakes sampled in 1973 were compared using a combination of six parameters*. Two of the lakes had less median total phosphorus, two had less and one had the same median dissolved phosphorus, five had less median inorganic nitrogen, none had less mean chlorophyll a, and two had greater mean Secchi disc transparency. Marked depression of dissolved oxygen with depth occurred at stations 1, 2, and 3 in July and at stations 1 and 2 in September.

Survey limnologists did not observe algae or other aquatic vegetation but did note much surface debris.

Previous investigators have reported periodic blue-green algae blooms in Peak Creek and Claytor Lake (Gregory, 1973).

B. Rate-Limiting Nutrient:

The algal assay results indicate that Claytor Lake was phosphorus limited at the time the sample was collected (04/04/73). The lake data indicate phosphorus limitation at the other sampling times as well.

C. Nutrient Controllability:

1. Point sources--The phosphorus contribution of known point sources amounted to 19.0% of the total input to Claytor Lake during

* See Appendix A.

the sampling year. Contributing point sources include the sewage treatment facilities in Pulaski (6.0%), Galax (5.4%), Wytheville (3.7%), Independence (2.1%), Fries (1.0%), and Hillsville (0.7%). Lakeshore septic tanks were estimated to have contributed 0.1% of the total load. In addition, three industrial point sources of unknown nutrient significance discharge within the drainage basin (see page 10).

The high nutrient export rates of Peak Creek and Unnamed Stream H-1 indicate that the contributions attributed to point sources may be too low (see discussion below).

The present phosphorus loading of 10.06 g/m²/yr is over four times that proposed by Vollenweider (Vollenweider and Dillon, 1974) as a eutrophic loading (see page 14). While even complete removal of phosphorus at the listed point sources would only reduce the overall loading to 8.15 g/m²/yr, Claytor Lake is phosphorus-limited, and all phosphorus inputs should be minimized to the greatest practicable extent to slow the aging of this water body.

2. Non-point sources--Over 80% of the total phosphorus load to Claytor Lake was from non-point sources. The New River contributed 69.4%, Big Reed Island Creek contributed 5.1%, Peak Creek contributed 4.0%, and five other gauged tributaries collectively contributed 1.5% of the load. Minor tributaries and immediate drainage were estimated to have contributed 0.8% of the load.

The phosphorus export rates of Peak Creek ($34 \text{ kg/km}^2/\text{yr}$), Unnamed Stream H-1 ($35 \text{ kg/km}^2/\text{yr}$), and New River ($28 \text{ kg/km}^2/\text{yr}$) were somewhat higher than the rates of the other tributaries in the drainage (see page 13). The higher rates of Peak Creek and Unnamed Stream H-1 may be due to additional unsampled point sources or to underestimation of the nutrient loads from the known point sources.

The high export rate of the New River also may be due to unsampled point sources but probably is due to agricultural and urban runoff (Gregory, 1974). Note that the phosphorus load in the New River alone is large enough to result in an overall loading of $6.98 \text{ g/m}^2/\text{yr}$, or almost three times Vollenweider's eutrophic loading, and any significant improvement in the trophic condition of Claytor Lake would require a marked reduction of the New River phosphorus load.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS[†]

A. Lake Morphometry^{††}:

1. Surface area: 18.19 kilometers².
2. Mean depth: 29.0 meters.
3. Maximum depth: >35.0 meters.
4. Volume: 527.510 x 10⁶ m³.
5. Mean hydraulic retention time: 63 days (based on outflow).

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

1. Tributaries -

<u>Name</u>	<u>Drainage area (km²)*</u>	<u>Mean flow (m³/sec)*</u>
New River	4,763.0	83.1
Big Macks Creek	48.4	0.4
Big Reed Island Creek	673.4	8.2
Little Reed Island Creek	216.3	2.0
Pine Run	38.3	0.3
Peak Creek	220.4	2.0
Goose Creek	9.3	0.1
Unnamed Stream H-1	9.6	0.1
Minor tributaries & immediate drainage -	<u>141.4</u>	<u>1.6</u>
Totals	6,120.1	97.8

2. Outlet -

New River	6,138.3**	97.5
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C. Precipitation***:

1. Year of sampling: 122.7 centimeters.
2. Mean annual: 94.0 centimeters.

[†] Table of metric conversions--Appendix B.

^{††} Bellanca, 1975.

* 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

Claytor Lake 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 four stations on the lake and from two or more depths at each station (see map, page v). During each visit, a single depth-integrated (4.6 m or near bottom to surface) sample was composited from the stations for phytoplankton identification and enumeration; and during the first 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 35.0 meters at station 1, 24.4 meters at station 2, 13.1 meters at station 3, and 3.0 meters at station 4.

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 CLAYTOR LAKE
STORET CODE 5103

PARAMETER	1ST SAMPLING (4/ 4/73)				2ND SAMPLING (7/16/73)				3RD SAMPLING (9/27/73)			
	4 SITES				4 SITES				4 SITES			
	RANGE	MEAN	MEDIAN		RANGE	MEAN	MEDIAN		RANGE	MEAN	MEDIAN	
TEMP (C)	8.2 - 13.6	11.5	11.9		11.5 - 27.5	23.5	25.1		12.3 - 23.6	21.6	23.1	
DISS OXY (MG/L)	9.4 - 9.8	9.6	9.5		0.2 - 8.6	4.7	5.6		0.1 - 8.0	4.5	5.6	
CNDCTVY (MCROMO)	88. - 135.	95.	92.		53. - 241.	87.	84.		17. - 120.	96.	100.	
PH (STAND UNITS)	7.7 - 7.9	7.7	7.7		6.7 - 9.4	7.6	7.5		6.6 - 7.5	7.0	7.0	
TOT ALK (MG/L)	25. - 36.	30.	30.		22. - 49.	33.	30.		28. - 74.	39.	36.	
TOT P (MG/L)	0.030 - 0.068	0.041	0.040		0.012 - 0.064	0.029	0.022		0.014 - 0.089	0.027	0.021	
ORTHO P (MG/L)	0.008 - 0.019	0.011	0.010		0.003 - 0.010	0.005	0.004		0.005 - 0.049	0.009	0.007	
NO2+NO3 (MG/L)	0.600 - 0.770	0.684	0.685		0.080 - 0.690	0.302	0.290		0.030 - 0.350	0.178	0.160	
AMMONIA (MG/L)	0.050 - 0.120	0.082	0.080		0.050 - 0.580	0.135	0.080		0.040 - 1.350	0.222	0.060	
KJEL N (MG/L)	0.200 - 0.500	0.311	0.300		0.200 - 0.900	0.388	0.400		0.200 - 1.800	0.533	0.400	
INORG N (MG/L)	0.660 - 0.860	0.766	0.770		0.160 - 0.900	0.437	0.380		0.120 - 1.380	0.400	0.250	
TOTAL N (MG/L)	0.820 - 1.240	0.996	0.980		0.300 - 1.220	0.690	0.610		0.360 - 1.840	0.711	0.605	
CHLRPYL A (UG/L)	1.0 - 3.0	1.8	1.7		3.3 - 8.7	6.0	5.9		3.3 - 15.3	9.1	8.9	
SECCHI (METERS)	0.6 - 0.9	0.7	0.7		0.9 - 2.7	2.1	2.4		0.8 - 2.6	1.7	1.8	

B. Biological characteristics:

1. Phytoplankton -

<u>Sampling Date</u>	<u>Dominant Genera</u>	<u>Algal Units per ml</u>
04/04/73	1. Flagellates	490
	2. <u>Fragilaria sp.</u>	306
	3. <u>Scenedesmus sp.</u>	215
	4. <u>Synedra sp.</u>	184
	5. <u>Tetraedon sp.</u>	122
	Other genera	<u>488</u>
	Total	1,805
07/16/73	1. Flagellates	1,947
	2. <u>Navicula sp.</u>	201
	3. <u>Nitzschia sp.</u>	113
	4. <u>Cymbella sp.</u>	88
	5. <u>Dinobryon sp.</u>	63
	Other genera	<u>302</u>
	Total	2,714
09/27/73	1. Flagellates	801
	2. <u>Aphanizomenon sp.</u>	272
	3. <u>Synedra sp.</u>	256
	4. <u>Fragilaria sp.</u>	256
	5. <u>Dactylococcopsis sp.</u>	96
	Other genera	<u>225</u>
	Total	1,906

2. Chlorophyll a -

<u>Sampling Date</u>	<u>Station Number</u>	<u>Chlorophyll <u>a</u> (μg/l)</u>
04/04/73	01	2.3
	02	1.0
	03	1.1
	04	3.0
07/16/73	01	3.3
	02	3.9
	03	8.0
	04	8.7
09/27/73	01	5.2
	02	12.6
	03	15.3
	04	3.3

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

<u>Spike (mg/l)</u>	<u>Ortho P Conc. (mg/l)</u>	<u>Inorganic N Conc. (mg/l)</u>	<u>Maximum yield (mg/l-dry wt.)</u>
Control	0.015	0.702	1.1
0.050 P	0.065	0.702	15.3
0.050 P + 1.0 N	0.065	1.702	19.0
1.0 N	0.015	1.702	1.8

2. Discussion -

The control yield of the assay alga, Selenastrum capricornutum, indicates that the potential primary productivity of Claytor Lake was moderately high at the time the sample was collected (04/04/73). A significant increase in yield resulted from the addition of orthophosphorus, but no such increase occurred when only nitrogen was added. These results indicate phosphorus limitation.

The lake data substantiate phosphorus limitation. The mean inorganic nitrogen/orthophosphorus ratios were 20/1 or greater at all sampling stations and times, and phosphorus limitation would be expected.

IV. NUTRIENT LOADINGS (See Appendix E for data)

For the determination of nutrient loadings, the Virginia National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the maps (pages v and vi). 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 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/km²/year, at stations B-1, C-1, E-1, and G-1 and multiplying the means by the ZZ area in km².

The operators of the Pulaski, Galax, and Independence wastewater treatment plants provided monthly effluent samples and corresponding flow data. The operator of the Fries wastewater treatment plant also provided monthly effluent samples but only estimated flow data. The operators of the wastewater treatment plants at Hillsville and Wytheville did not participate, and nutrient loads from these sources were estimated

* See Working Paper No. 175.

at 1.134 kg P and 3.401 kg N/capita/year.

A. Waste Sources:

1. Known municipal[†] -

<u>Name</u>	<u>Pop. Served</u>	<u>Treatment</u>	<u>Mean Flow (m³/d)</u>	<u>Receiving Water</u>
Fries	867	septic tank	696.5	New River
Pulaski	10,500	tr. filter	5,100.1	Peak Creek
Galax	8,000	tr. filter	4,088.2	Chestnut Creek
Independence	200	lagoon	402.8	Peach Bottom Creek
Hillsville*	1,149	lagoon	434.9	Little Reed Island Creek
Wytheville*	6,069	prim. clarifier	2,297.1	Atkins Mill Branch/Reed Creek

2. Known industrial** -

<u>Name</u>	<u>Product</u>	<u>Treatment</u>	<u>Mean Flow (m³/d)</u>	<u>Receiving Water</u>
Klopman Mills	-	?	-	?
New Jersey Zinc	-	?	-	?
Pet Milk	-	?	-	?

[†] Treatment plant questionnaires.

* Anonymous, 1971 (population is 1970 census; flow estimated at 0.3785 m³/capita/day).

** Gregory, 1974.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

<u>Source</u>	<u>kg P/ yr</u>	<u>% of total</u>
a. Tributaries (non-point load) -		
New River	127,025	69.4
Big Macks Creek	290	0.2
Big Reed Island Creek	9,415	5.1
Little Reed Island Creek	1,605	0.9
Pine Run	225	0.1
Peak Creek	7,385	4.0
Goose Creek	135	0.1
Unnamed Stream H-1	335	0.2
b. Minor tributaries & immediate drainage (non-point load) -		
	1,450	0.8
c. Known municipal STP's -		
Fries	1,805	1.0
Pulaski	11,055	6.0
Galax	9,825	5.4
Independence	3,860	2.1
Hillsville	1,305	0.7
Wytheville	6,880	3.7
d. Septic tanks* -		
	145	0.1
e. Known industrial -		
Klopman Mills	?	-
New Jersey Zinc	?	-
Pet Milk	?	-
f. Direct precipitation** -		
	<u>320</u>	<u>0.2</u>
Total	183,060	100.0

2. Outputs -

Lake outlet - New River 89,960

3. Net annual P accumulation - 93,100 kg.

* Estimate based on 496 lakeshore dwellings, one park, and one camp; 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/ yr</u>	<u>% of total</u>
a. Tributaries (non-point load) -		
New River	2,211,795	82.4
Big Macks Creek	5,775	0.2
Big Reed Island Creek	141,890	5.3
Little Reed Island Creek	48,700	1.8
Pine Run	13,585	0.5
Peak Creek	100,120	3.7
Goose Creek	5,090	0.2
Unnamed Stream H-1	3,340	0.1
b. Minor tributaries & immediate drainage (non-point load) -	43,480	1.6
c. Known municipal STP's -		
Fries	6,715	0.3
Pulaski	24,885	0.9
Galax	27,680	1.0
Independence	2,820	0.1
Hillsville	3,910	0.2
Wytheville	20,640	0.8
d. Septic tanks* -	5,390	0.2
e. Known industrial -		
Klopman Mills	?	-
New Jersey Zinc	?	-
Pet Milk	?	-
f. Direct precipitation** -	<u>19,640</u>	<u>0.7</u>
Total	2,685,455	100.0

2. Outputs -

Lake outlet - New River 3,905,320

3. Net annual N loss - 1,219,865 kg.

* Estimate based on 496 lakeshore dwellings, one park, and one camp; 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/km²/yr</u>	<u>kg N/km²/yr</u>
New River	28	469
Big Macks Creek	6	119
Big Reed Island Creek	14	211
Little Reed Island Creek	7	225
Pine Run	6	355
Peak Creek	34	454
Goose Creek	15	547
Unnamed Stream H-1	35	348

E. Yearly Loads:

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.

	<u>Total Phosphorus</u>		<u>Total Nitrogen</u>	
	<u>Total</u>	<u>Accumulated</u>	<u>Total</u>	<u>Accumulated</u>
grams/m ² /yr	10.06	5.12	147.5	loss*

Vollenweider phosphorus loadings
(g/m²/yr) based on mean depth and mean
hydraulic retention time of Claytor Lake:

"Dangerous" (eutrophic loading)	2.46
"Permissible" (oligotrophic loading)	1.23

* 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 nitrogen loss has occurred at Shagawa Lake, Minnesota, which has been intensively studied by EPA's former National Eutrophication and Lake Restoration Branch (Malueg et al., 1975).

V. LITERATURE REVIEWED

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VI. APPENDICES

APPENDIX A

LAKE RANKINGS

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500- MEAN SEC	MEAN CHLOROPH	15- MIN DO	MEDIAN DISS ORTHO P
5103	CLAYTOR LAKE	0.031	0.450	439.500	5.642	14.900	0.008
5105	JOHN W. FLANNAGAN DAM	0.011	0.320	415.700	5.955	14.800	0.004
5106	JOHN H. KERR RESERVOIR	0.044	0.290	458.937	8.833	15.000	0.009
5108	OCCOQUAN RESERVOIR	0.098	0.525	459.750	12.417	15.000	0.037
5110	SMITH MOUNTAIN LAKE	0.015	0.410	419.667	11.593	15.000	0.005
5111	LAKE CHESDIN	0.044	0.240	465.778	12.556	14.800	0.008
5112	CHICKAHOMINY LAKE	0.066	0.125	455.333	13.600	9.400	0.017
5113	RIVANNA (SOUTH FORK) RES	0.079	0.475	460.222	6.667	13.000	0.022

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

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500- MEAN SEC	MEAN CHLORA	15- MIN DO	MEDIAN DISS ORTHO P	INDEX NO
5103	CLAYTOR LAKE	71 (5)	29 (2)	71 (5)	100 (7)	43 (3)	64 (4)	378
5105	JOHN W. FLANNAGAN DAM	100 (7)	57 (4)	100 (7)	86 (6)	64 (4)	100 (7)	507
5106	JOHN H. KERR RESERVOIR	43 (3)	71 (5)	43 (3)	57 (4)	14 (0)	43 (3)	271
5108	OCCOQUAN RESERVOIR	0 (0)	0 (0)	29 (2)	29 (2)	14 (0)	0 (0)	72
5110	SMITH MOUNTAIN LAKE	86 (6)	43 (3)	86 (6)	43 (3)	14 (0)	86 (6)	358
5111	LAKE CHESDIN	57 (4)	86 (6)	0 (0)	14 (1)	64 (4)	64 (4)	285
5112	CHICKAHOMINY LAKE	29 (2)	100 (7)	57 (4)	0 (0)	100 (7)	29 (2)	315
5113	RIVANNA (SOUTH FORK) RES	14 (1)	14 (1)	14 (1)	71 (5)	86 (6)	14 (1)	213

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	5105	JOHN W. FLANNAGAN DAM	507
2	5103	CLAYTOR LAKE	378
3	5110	SMITH MOUNTAIN LAKE	358
4	5112	CHICKAHOMINY LAKE	315
5	5111	LAKE CHESDIN	285
6	5106	JOHN H. KERR RESERVOIR	271
7	5113	RIVANNA (SOUTH FORK) RES	213
8	5108	OCCOQUAN RESERVOIR	72

APPENDIX B

CONVERSION FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-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 VIRGINIA

02/05/76

LAKE CODE 5103 CLAYTOR LAKE

TOTAL DRAINAGE AREA OF LAKE(SQ KM) 6138.3

TRIBUTARY	SUR-DRAINAGE AREA(SQ KM)	NORMALIZED FLOWS(CMS)												MEAN
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
5103A1	6138.3	116.10	141.58	152.91	130.26	99.11	73.62	76.46	79.29	65.13	70.79	76.46	90.61	97.46
5103A2	4763.0	99.11	116.10	127.43	107.60	82.12	65.13	65.13	70.79	59.47	62.30	67.96	76.46	83.12
5103B1	48.4	0.57	0.76	0.96	0.68	0.57	0.25	0.34	0.14	0.08	0.06	0.20	0.45	0.42
5103C1	673.4	10.82	13.65	15.97	13.42	10.25	6.26	5.41	3.06	2.94	2.86	5.69	8.58	8.21
5103D1	216.3	2.83	2.94	3.03	2.92	2.83	1.53	1.30	1.10	0.71	0.59	1.39	2.41	1.96
5103E1	38.3	0.42	0.57	0.76	0.51	0.45	0.20	0.14	0.11	0.06	0.06	0.14	0.34	0.31
5103F1	220.4	2.86	2.97	3.03	2.92	2.86	1.59	1.30	1.13	0.71	0.59	1.39	2.41	1.98
5103G1	9.3	0.08	0.14	0.17	0.11	0.08	0.03	0.03	0.02	0.01	0.01	0.03	0.06	0.06
5103H1	9.6	0.08	0.14	0.17	0.11	0.11	0.03	0.03	0.02	0.01	0.01	0.03	0.06	0.07
5103ZZ	159.5	2.12	2.83	3.40	2.55	2.04	1.05	0.85	0.71	0.45	0.37	0.85	1.64	1.57

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 6138.3
SUM OF SUB-DRAINAGE AREAS = 6138.2

TOTAL FLOW IN = 1175.07
TOTAL FLOW OUT = 1172.32

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
5103A1	7	73	90.05	16	146.40				
	8	73	84.95	12	23.05				
	9	73	53.24	8	25.26				
	10	73	70.79	12	88.63				
	11	73	68.24	11	35.11				
	12	73	169.62	9	102.51				
	1	74	193.40	12	183.49				
	2	74	168.77	9	136.49				
	3	74	148.95	9	96.28				
	4	74	195.10	6	438.91				
	5	74	134.79	8	120.35				
	6	74	126.01	8	202.47				
5103A2	7	73	67.11	15	52.10				
	8	73	62.01	11	69.66				
	9	73	42.76	8	28.12				
	10	73	52.10	12	53.24				
	11	73	53.24	10	42.76				
	12	73	133.94	8	98.54				
	1	74	154.61	12	186.89				
	2	74	141.58	9	112.98				
	3	74	118.65	9	78.15				
	4	74	159.42	6	387.94				
	5	74	97.41	7	95.71	21	28.03		
	6	74	91.18	8	172.73	18	81.84		

TRIBUTARY FLOW INFORMATION FOR VIRGINIA

02/05/76

LAKE CODE 5103 CLAYTOR LAKE

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
5103B1	7	73	0.34	15	0.10				
	8	73	0.34	11	0.11				
	9	73	0.21	8	0.06				
	10	73	0.23	12	0.07				
	11	73	0.34	10	0.08				
	12	73	0.93	8	0.15				
	1	74	1.59	12	0.42				
	2	74	1.22	9	0.20				
	3	74	1.25	9	0.16				
	4	74	1.02	6	0.37				
	5	74	0.74	7	0.17	21	0.14		
	6	74	0.48	8	0.12	18	0.12		
5103C1	7	73	12.97	15	17.73				
	8	73	10.62	11	11.78				
	9	73	8.27	8	7.11				
	10	73	10.14	12	8.47				
	11	73	8.66	10	7.31				
	12	73	28.60	8	12.37				
	1	74	23.39	12	23.67				
	2	74	21.80	9	18.21				
	3	74	17.13	9	14.33				
	4	74	26.11	6	44.46				
	5	74	13.59	7	14.81	21	14.41		
	6	74	10.76	8	13.45	18	11.78		
5103D1	7	73	3.14	15	3.91				
	8	73	2.58	11	2.69				
	9	73	2.01	8	1.70				
	10	73	2.46	12	1.93				
	11	73	2.10	10	1.73				
	12	73	6.97	8	2.66				
	1	74	5.66	12	5.52				
	2	74	5.30	9	3.96				
	3	74	4.16	9	3.06				
	4	74	6.34	6	13.59				
	5	74	3.40	7	3.17	21	3.11		
	6	74	2.83	8	2.89	18	2.55		
5103E1	7	73	0.27	15	0.27				
	8	73	0.26	11	0.28				
	9	73	0.16	8	0.19				
	10	73	0.18	12	0.21				
	11	73	0.27	10	0.22				
	12	73	0.74	8	0.40				
	1	74	1.27	12	0.96				
	2	74	0.96	9	0.51				
	3	74	0.99	9	0.40				
	4	74	0.82	6	0.91				
	5	74	0.59	7	0.42	21	0.37		
	6	74	0.37	8	0.31	18	0.28		

TRIBUTARY FLOW INFORMATION FOR VIRGINIA

02/05/76

LAKE CODE 5103 CLAYTOR LAKE

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
5103F1	7	73	1.53	15	0.85				
	8	73	1.53	12	0.91				
	9	73	0.93	8	0.51				
	10	73	1.05	12	0.62				
	11	73	1.53	11	0.62				
	12	73	4.28	9	1.33				
	1	74	7.25	12	2.89				
	2	74	5.58	9	1.64				
	3	74	5.69	9	1.36				
	4	74	4.64	6	2.78				
	5	74	3.34	8	1.30				
	6	74	2.18	8	1.02				
5103G1	7	73	0.07	15	0.05				
	8	73	0.07	12	0.06				
	9	73	0.04	8	0.02				
	10	73	0.05	12	0.03				
	11	73	0.07	11	0.03				
	12	73	0.18	9	0.15				
	1	74	0.31	12	2.21				
	2	74	0.24	9	0.28				
	3	74	0.24	9	0.17				
	4	74	0.20	6	1.81				
	5	74	0.14	8	0.14				
	6	74	0.09	8	0.08				
5103H1	7	73	0.14	15	0.06				
	8	73	0.11	12	0.03				
	9	73	0.09	8	0.02				
	10	73	0.11	12	0.02				
	11	73	0.09	11	0.02				
	12	73	0.31	9	0.08				
	1	74	0.25	12	0.11				
	2	74	0.24	9	0.07				
	3	74	0.18	9	0.05				
	4	74	0.28	6	0.45				
	5	74	0.15	8	0.04				
	6	74	0.11	8	0.04				

APPENDIX-D

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 76/02/05

510301
37 04 25.0 080 35 25.0
CLAYTOR LAKE
51155 VIRGINIA

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010	00300	00077	00094	00400	00410	00610	00625	00630	00671
			WATER TEMP CENT	DO MG/L	TRANSP SECCHI INCHES	CONDUCTVY FIELD MICROMHO	PH SU	T ALK CACO3 MG/L	NH3-N TOTAL MG/L	TOT KJEL N MG/L	NO2&NO3 N-TOTAL MG/L	PHOS-DIS ORTHO MG/L P
73/04/04	11	10	0000	11.4	31	88	7.90	26	0.090	0.300	0.680	0.010
	11	10	0004	11.4		88	7.80	27	0.080	0.300	0.680	0.008
	11	10	0015	11.3		88	7.80	28	0.080	0.300	0.690	0.011
	11	10	0045	11.2		90	7.80	28	0.080	0.400	0.690	0.011
	11	10	0070	9.4		92	7.70	25	0.120	0.500	0.740	0.019
73/07/16	11	10	0095	8.2	108	92	7.70	29	0.100	0.400	0.760	0.012
	09	30	0000	27.5		76	9.40	33	0.080	0.500	0.080	0.004
	09	30	0010	27.5		84	9.30	32	0.080	0.200	0.100	0.005
	09	30	0015	27.2		83						
	09	30	0022	26.7		79	6.90	30	0.080	0.200K	0.190	0.004
	09	30	0030	24.9		72						
	09	30	0040	24.0		72						
	09	30	0050	23.6		72	7.00	29	0.060	0.200K	0.500	0.004
	09	30	0060	23.3		80						
	09	30	0070	21.7		86						
	09	30	0080	18.2		53						
	09	30	0090	15.5		63	6.70	25	0.180	0.400	0.690	0.010
	09	30	0100	12.8		100						
	09	30	0110	12.1		115						
	09	30	0115	11.5		241	6.90	39	0.580	0.900	0.320	0.005
73/09/27	10	00	0000	23.6	102	91	7.50	33	0.060	0.500	0.210	0.009
	10	00	0005	23.6		94	7.20	31	0.040	0.200K	0.190	0.007
	10	00	0020	23.5		101	7.00	34	0.090	0.200K	0.200	0.007
	10	00	0040	23.3		96	6.80	32	0.080	0.200K	0.250	0.009
	10	00	0055	22.8		88	6.70	33	0.040	0.400	0.080	0.049
	10	00	0070	21.8		80	6.70	28	0.140	0.200K	0.350	0.010
	10	00	0080	17.7		90	6.60	38	0.440	0.600	0.270	0.008
	10	00	0095	13.2		17	6.60	53	0.930	1.300	0.030	0.007
	10	00	0105	12.3		113	6.70	61	1.270	1.800	0.040	0.006

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/02/05

510301
37 04 25.0 080 35 25.0
CLAYTOR LAKE
51155 VIRGINIA

11EPALES 2111202
3 0100 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/04/04	11 10	0000	0.044	2.3
	11 10	0004	0.040	
	11 10	0015	0.041	
	11 10	0045	0.039	
	11 10	0070	0.068	
	11 10	0095	0.042	
73/07/16	09 30	0000	0.018	3.3
	09 30	0010	0.020	
	09 30	0022	0.018	
	09 30	0050	0.012	
	09 30	0090	0.046	
	09 30	0115	0.051	
73/09/27	10 00	0000	0.018	5.2
	10 00	0005	0.018	
	10 00	0020	0.014	
	10 00	0040	0.015	
	10 00	0055	0.089	
	10 00	0070	0.022	
	10 00	0080	0.027	
	10 00	0095	0.021	
	10 00	0105	0.031	

STORET RETRIEVAL DATE 76/02/05

510302
37 03 06.0 080 40 10.0
CLAYTOR LAKE
51155 VIRGINIA

11EPALES 2111202
3 0085 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CAC03 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/04/04	12 10	0000	12.8		24	90	7.70	30	0.070	0.500	0.630	0.009
	12 10	0004	12.7	9.5		90	7.80	31	0.060	0.200	0.620	0.009
	12 10	0015	12.7	9.5		92	7.80	31	0.070	0.200K	0.650	0.011
	12 10	0035	12.4	9.5		92	7.70	30	0.100	0.200	0.750	0.014
	12 10	0055	9.5	9.5		100	7.70	30	0.090	0.200	0.770	0.010
	12 10	0080	8.4	9.4		100	7.70	34	0.110	0.300	0.750	0.009
73/07/16	10 45	0000	27.2	7.6	108	75	8.50	22	0.090	0.400	0.180	0.004
	10 45	0010	27.1			80						
	10 45	0021	26.2	5.2		87	7.50	25	0.100	0.200	0.290	0.003
	10 45	0030	25.4			82						
	10 45	0040	24.5			85						
	10 45	0050	23.9	3.4		85	7.00	24	0.050	0.200K	0.480	0.004
	10 45	0060	23.3			92						
	10 45	0070	20.5			102						
	10 45	0075	18.8	0.3		84	6.90	30	0.250	0.500	0.610	0.006
	10 45	0080	17.8	0.1		120	6.80	74	1.350	1.700	0.030	0.005
73/09/27	10 30	0000	23.5		72	120			0.050	0.600	0.160	0.006
	10 30	0005	23.4	7.0		100	7.00	35	0.040	0.400	0.160	0.006
	10 30	0015	23.4	7.0		100	7.00	33	0.040	0.400	0.160	0.006
	10 30	0030	23.3	5.8		100	6.90	32	0.050	0.300	0.150	0.006
	10 30	0045	23.0	5.8		100	7.00	36	0.070	0.200	0.160	0.005
	10 30	0060	22.0	5.0		100	6.90	36	0.180	0.400	0.290	0.006
	10 30	0080	17.8	0.1		120	6.80	74	1.350	1.700	0.030	0.005

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/02/05

510302
37 03 06.0 080 40 10.0
CLAYTOR LAKE
51155 VIRGINIA

11EPALES
3

2111202
0085 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/04/04	12 10	0000	0.040	1.0
	12 10	0004	0.030	
	12 10	0015	0.031	
	12 10	0035	0.040	
	12 10	0055	0.031	
	12 10	0080	0.032	
73/07/16	10 45	0000	0.017	3.9
	10 45	0021	0.015	
	10 45	0050	0.015	
	10 45	0075	0.034	
73/09/27	10 30	0000	0.021	12.6
	10 30	0005	0.022	
	10 30	0015	0.021	
	10 30	0030	0.018	
	10 30	0045	0.016	
	10 30	0060	0.036	
	10 30	0080	0.048	

STORET RETRIEVAL DATE 76/02/05

510303
37 00 13.0 080 40 52.0
CLAYTOR LAKE
51155 VIRGINIA

11EPALES
3

2111202
0045 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CAC03 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&N03 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/04/04	12 50	0000	12.6		36	90	7.70	28	0.060	0.300	0.610	0.009
	12 50	0004	12.6	9.6		90	7.70	29	0.060	0.300	0.600	0.008
	12 50	0015	12.6	9.5		95	7.70	31	0.100	0.300	0.720	0.010
	12 50	0040	9.9	9.4		95	7.70	31	0.090	0.400	0.710	0.008
73/07/16	11 30	0000	26.9	7.0	84	77	8.00	24	0.080	0.400	0.160	0.004
	11 30	0010	26.7			86						
	11 30	0015	26.7	7.2		85	7.70	28	0.110	0.300	0.180	0.003
	11 30	0020	26.5			86						
	11 30	0025	26.1			85						
	11 30	0030	25.8	5.6		85	7.30	31	0.120	0.400	0.200	0.005
	11 30	0035	25.5			85						
	11 30	0040	25.0			86						
	11 30	0043	24.8	1.4		88	7.00	49	0.220	0.600	0.230	0.006
73/09/27	11 10	0000	23.5		68	100	7.20	40	0.060	0.500	0.110	0.006
	11 10	0005	23.5	7.0		100	7.20	41	0.040	0.500	0.110	0.014
	11 10	0015	23.3	7.0		100	7.00	41	0.050	0.400	0.110	0.008
	11 10	0025	23.2	7.0		100	7.10	41	0.050	0.500	0.100	0.007
	11 10	0040	23.0	7.0		100	7.20	40	0.050	0.400	0.120	0.006

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/04/04	12 50	0000	0.045	1.1
	12 50	0004	0.036	
	12 50	0015	0.034	
	12 50	0040	0.036	
73/07/16	11 30	0000	0.022	8.0
	11 30	0015	0.021	
	11 30	0030	0.032	
	11 30	0043	0.064	
73/09/27	11 10	0000	0.023	15.3
	11 10	0005	0.019	
	11 10	0015	0.016	
	11 10	0025	0.016	
	11 10	0040	0.028	

STORET RETRIEVAL DATE 76/02/05

510304
36 58 55.0 080 44 13.0
CLAYTOR LAKE
51155 VIRGINIA

11EPALES
3 2111202
0010 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CAC03 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&N03 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/04/04	17 15	0000	13.6		24	100	7.80	36	0.060	0.200	0.640	0.014
	17 15	0006	13.6	9.4		135	7.80	35	0.050	0.300	0.630	0.011
73/07/16	12 10	0000	25.3		36	75	8.00	45	0.070	0.500	0.300	0.005
	12 10	0005	25.1	7.2		80	7.80	47	0.070	0.300	0.310	0.004
	12 10	0010	25.1	7.2		83	7.80	49	0.080	0.400	0.310	0.008
73/09/27	11 25	0000	21.6		33	100	7.50	36	0.060	0.400	0.330	0.008
	11 25	0005	21.5	8.0		100	7.50	36	0.070	0.300	0.330	0.009
	11 25	0010	21.5	7.8		100	7.30	37	0.070	0.400	0.330	0.009

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/04/04	17 15	0000	0.046	3.0
	17 15	0006	0.056	
73/07/16	12 10	0000	0.036	8.7
	12 10	0005	0.034	
	12 10	0010	0.033	
73/09/27	11 25	0000	0.032	3.3
	11 25	0005	0.030	
	11 25	0010	0.049	

APPENDIX E

TRIBUTARY and WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 75/03/26

5103A1
37 04 30.0 080 35 02.0
NEW RIVER
51019 7.5 RADFORTH S
O/CLAYTOR LAKE
CLAYTOR DAM
11EPALES
4

2111204
0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/07/16	09 05		0.530	2.300	0.050	0.019	0.035
73/08/12	15 30		0.400	0.600	0.034	0.011	0.030
73/09/08	09 20		0.336	0.190	0.036	0.022	0.045
73/10/12	09 30		0.260	1.100	0.077	0.016	0.045
73/11/11	15 00		0.220	1.750	0.189	0.011	0.025
74/01/12	09 35		0.032	1.100	0.060	0.005K	0.010
74/03/09	11 30		0.667	0.200	0.020	0.010	0.055
74/04/06	10 15		0.616	0.360	0.060	0.015	0.015
74/05/08	10 15		0.520	0.490	0.050	0.005K	0.020
74/06/08	10 30		0.450	0.750	0.045	0.005	0.010

K VALUE KNOWN TO BE LESS
THAN INDICATED

STORET RETRIEVAL DATE 75/03/26

5103A2
36 55 09.0 080 48 17.0
NEW RIVER
51 7.5 FOSTER FALLS
T/CLAYTOR LAKE
100 YDS ABOV BARREN SPR STA ON RT 100
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/07/15	10 30		0.390	0.500	0.018	0.008	0.030
73/08/11	09 55		0.570	0.300	0.027	0.018	0.075
73/09/08	10 20		0.110	0.190	0.075	0.009	0.035
73/10/12	10 35		0.480	0.300	0.032	0.020	0.032
73/11/10	10 15		0.380	0.175	0.044	0.012	0.035
73/12/08	10 45		0.600	0.400	0.030	0.014	0.135
74/01/12	10 25		0.720	0.400	0.016	0.016	0.085
74/03/09	10 20		0.640	0.200	0.016	0.007	0.050
74/04/06	10 18		0.740	1.300	0.045	0.015	0.040
74/05/07	10 40		0.400	0.200	0.025	0.005	0.030
74/05/21	11 00		0.490	0.200	0.055	0.020	0.050
74/06/08	10 00		0.440	0.300	0.035	0.010	0.085
74/06/18	09 30		0.480	0.300	0.010	0.015	0.055

STORET RETRIEVAL DATE 75/03/26

510381
 36 59 20.0 080 41 44.0
 BIG MACKS CREEK
 51 7.5 HIWASSEE
 T/CLAYTON LAKE
 BRDG .5 MI NW OF MACK CREEK VILLAGE
 11EPALES 2111204
 4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/07/15	09 25		0.061	0.440	0.021	0.006	0.010
73/08/11	09 00		0.120	0.340	0.066	0.013	0.080
73/09/08	09 30		0.044	0.580	0.023	0.010	0.035
73/10/12	09 45		0.035	0.850	0.020	0.012	0.012
73/11/10	09 30		0.024	0.100K	0.017	0.005K	0.020
73/12/08	09 35		0.052	0.100K	0.012	0.005K	0.045
74/01/12	08 40		0.730	0.800	0.124	0.012	0.035
74/03/09	09 15		0.024	0.100K	0.010	0.005K	0.020
74/04/06	09 31		0.068	0.500	0.040	0.005K	0.005
74/05/07	10 00		0.016	0.100K	0.010	0.005K	0.005K
74/05/21	10 00		0.028	0.100K	0.015	0.005	0.005K
74/06/08	09 00		0.076	0.200	0.020	0.005K	0.005
74/06/18	08 50		0.041	0.100K	0.010	0.005K	0.005

K VALUE KNOWN TO BE LESS
 THAN INDICATED

STORET RETRIEVAL DATE 75/03/26

5103C1
 36 55 35.0 080 44 50.0
 BIG REED ISLAND CREEK
 51 7.5 HIWASSEE
 T/CLAYTON LAKE
 BRDG ON SEC RD 1 MI SW OF ALLISONIA
 11EPALES 2111204
 4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/07/15	09 52		0.250	0.770	0.042	0.005K	0.030
73/08/11	09 30		0.250	0.480	0.016	0.005K	0.055
73/09/08	09 50		0.170	5.000	0.030	0.006	0.032
73/10/12	10 10		0.140	0.300	0.019	0.015	0.020
73/11/10	09 50		0.189	0.100K	0.017	0.005K	0.025
73/12/08	09 55		0.380	0.100	0.016	0.005K	0.055
74/01/12	09 55		0.340	0.300	0.024	0.008	0.047
74/03/09	09 35		0.276	0.100	0.010	0.005K	0.040
74/04/06	10 01		0.420	0.600	0.025	0.005	0.070
74/05/07	10 20		0.232	0.100K	0.010	0.005K	0.015
74/05/21	10 25		0.252	0.100K	0.010	0.005K	0.015
74/06/08	09 30		0.264	0.100	0.020	0.005K	0.015
74/06/18	09 10		0.224	0.400	0.025	0.005K	0.035

K VALUE KNOWN TO BE LESS
 THAN INDICATED

STORET RETRIEVAL DATE 75/03/26

510301
36 55 40.0 080 44 55.0
LITTLE REED ISLAND CREEK
51 7.5 HIWASSEE
T/CLAYTON LAKE
BRDG ON SEC RD 1.25 MI SW OF ALLISONIA
11EPALES 2111204
4 0000 FEET DEPTH

DATE	TIME	DEPTH	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
FROM	OF						
TO	DAY	FEET					
73/07/15	10	00	0.370	0.280	0.018	0.008	0.035
73/08/11	09	35	0.380	0.640	0.008	0.014	0.020
73/09/08	10	00	0.100	2.100	0.018	0.006	0.020
73/10/12	10	15	0.315	0.275	0.027	0.018	0.030
73/11/10	09	55	0.250	0.150	0.017	0.008	0.030
73/12/08	10	10	0.480	0.100	0.012	0.016	0.060
74/01/12	10	01	0.450	0.300	0.020	0.012	0.080
74/03/09	09	50	0.440	1.500	0.050	0.010	0.055
74/04/06	10	10	0.550	0.400	0.030	0.010	0.065
74/05/07	10	25	0.224	0.100K	0.005	0.005K	0.025
74/05/21	10	30	0.390	0.100K	0.015	0.010	0.040
74/06/08	09	35	0.336	0.200	0.025	0.005	0.075
74/06/18	09	45	0.312	0.500	0.015	0.010	0.050

K VALUE KNOWN TO BE LESS
THAN INDICATED

STORET RETRIEVAL DATE 75/03/26

5103E1
 36 56 17.0 080 47 35.0
 PINE RUN
 51 7.5 FOSTER FALLS
 T/CLAYTON LAKE
 BRDG ON RD 1.5 MI NNE OF BARREN SPRS STA
 11EPALES 2111204
 4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/07/15	11 45		0.870	0.500	0.022	0.005K	0.020
73/08/11	10 05		1.100	0.840	0.020		0.020
73/09/08	10 45		0.850	1.050	0.042	0.010	0.020
73/10/12	10 55		0.740	0.150	0.020	0.015	0.015
73/11/10	10 25		0.810	0.200	0.012	0.007	0.020
73/12/08	11 05		0.870	0.100K	0.005K	0.008	0.035
74/01/12	11 00		1.300	0.300	0.016	0.012	0.025
74/03/09	11 00		1.010	0.200	0.005	0.005K	0.020
74/04/06	11 03		1.600	0.500	0.015	0.010	0.015
74/05/07	11 00		0.820	0.100K	0.005	0.005K	0.010
74/05/21	11 15		0.950	0.100	0.020	0.010	0.025
74/06/08	10 10		0.910	0.300	0.025	0.010	0.040
74/06/18	09 45		0.890	0.800	0.015	0.020	0.025

K VALUE KNOWN TO BE LESS
 THAN INDICATED

STORET RETRIEVAL DATE 75/03/26

5103F1
 37 02 46.0 080 43 00.0
 PEAK CREEK
 51 7.5 DUBLIN
 T/CLAYTOR LAKE
 BRDG ON US 81 1.5 MI N OF MCADAM
 11EPALES 2111204
 4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/07/15	09 30		0.570	2.100	0.033	0.073	0.185
73/08/12	14 30		0.580	0.420	0.115	0.110	0.195
73/09/08	10 30		0.880	0.480	0.250	0.180	0.470
73/10/12	08 30		0.950	2.300	0.154	0.231	0.640
73/11/11	14 15		1.240	1.050	0.231	0.330	0.500
74/01/12	09 25		0.730	1.900	0.248	0.034	0.090
74/03/09	10 15		1.200	0.800	0.155	0.110	0.265
74/04/06	10 55		0.523	0.500	0.055	0.025	0.025
74/05/08	09 30		0.890	0.500	0.150	0.135	0.240
74/06/08	10 40		0.400	2.000	0.045	0.080	0.320

STORET RETRIEVAL DATE 75/03/26

510361
 37 03 00.0 080 42 44.0
 GOOSE CREEK
 51 7.5 DUBLIN
 T/CLAYTON LAKE
 BANK ON RD 1.5 MI N OF MCADAM
 11EPALES 2111204
 4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/07/15	10 15		1.880	1.300	0.011	0.110	0.135
73/08/12	14 45		1.520	0.190	0.032	0.058	0.075
73/09/08	10 00		0.440	0.180	0.075	0.140	0.180
73/10/12	08 45		1.920	0.200	0.026	0.027	0.040
73/11/11	14 45		2.060	2.150	0.280		0.020
74/01/12	10 00		2.100	1.500	0.250	0.028	0.045
74/03/09	10 30		2.200	0.900	0.035	0.020	0.055
74/04/06	11 05		1.760	0.400	0.025	0.005	0.050
74/05/08	09 45		1.760	0.400	0.025	0.015	0.030
74/06/08	11 00		1.760	0.900	0.045	0.010	0.025

STORET RETRIEVAL DATE 75/03/26

5103H1
 37 05 13.0 080 37 31.0
 UNNAMED STREAM
 51 7.5 DUBLIN
 T/CLAYTOR LAKE
 BANK ON E US 81 .5 MI W OF MTN VIEW
 11EPALES 2111204
 4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/07/15	10	30	0.013	2.700	0.020	0.610	0.735
73/08/12	15	15	0.420	0.360	0.022	0.180	0.210
73/09/08	10	45	1.600	1.260	0.141	0.083	0.100
73/10/12	09	00	0.610	0.650	0.023	0.060	0.124
73/11/11	14	30	0.370	0.950	0.075	0.028	0.075
74/01/12	09	00	1.340	0.500	0.032	0.016	0.055
74/03/09	11	00	1.010	0.500	0.020	0.040	0.095
74/04/06	10	35	1.340	0.300	0.045	0.005K	0.025
74/05/08	10	00	0.590	0.700	0.030	0.020	0.035
74/06/08	11	15	0.540	0.600	0.025	0.015	0.090

K VALUF KNOWN TO BE LESS
 THAN INDICATED

STORET RETRIEVAL DATE 75/03/26

5103FA TFS103FA P010500
 37 02 55.0 080 46 00.0
 TOWN OF PULASKI
 51 7.5 PULASKI
 T/CLAYTOR LAKE
 PEAK CREEK/NEW RIVER
 11EPALES 2141204
 4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/10/02	06 00								
CP(T)-			4.300	7.800	0.630	2.310	3.300	2.400	0.800
73/10/02	15 00								
73/11/30	06 00								
CP(T)-			3.000	9.700	0.040K	2.800	4.600	2.300	1.280
73/11/30	15 00								
73/12/31	06 00								
CP(T)-			1.520	7.800	0.145	2.090	3.300	1.940	1.820
73/12/31	15 00								
74/01/31	06 00								
CP(T)-			0.800	9.600	0.430	2.600	5.600	2.040	1.950
74/01/31	15 00								
74/02/28	06 00								
CP(T)-			0.720	9.400	0.630	2.500	4.200	1.720	1.840
74/02/28	15 00								
74/04/01	06 00								
CP(T)-			0.760	4.000	0.425	3.500	4.800	1.480	1.480
74/04/01	15 00								
74/05/01	06 00								
CP(T)-			2.640	18.000	2.800	4.500	5.900	1.340	1.530
74/05/01	15 00								
74/06/03	06 00								
CP(T)-			1.120	16.000	3.800	6.600	8.000	1.220	1.370
74/06/03	15 00								
74/07/01	06 00								
CP(T)-			1.000	1.900	1.900	3.400	5.300	1.400	1.200
74/07/01	15 00								
74/08/01	06 00								
CP(T)-			0.350	22.000	8.200	7.500	9.600	0.868	1.000
74/08/01	15 00								
74/09/02	06 00								
CP(T)-			1.360	21.000	10.500	9.200	11.000	0.876	0.945
74/09/02	15 00								
74/10/01	06 00								
CP(T)-			4.000	19.000		9.100	10.500	1.060	1.180
74/10/01	15 00								

K VALUE KNOWN TO BE LESS
 THAN INDICATED

STORET RETRIEVAL DATE 75/03/26

5103YA PDS103YA P000200
 36 38 15.0 081 08 40.0
 TOWN OF INDEPENDENCE
 51 GRAYSON CO
 T/CLAYTOR LAKE
 PEACH BOHOM CREEK
 11EPALES 2141204
 4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/12/03	09 30		0.200	15.000	0.260	27.000	32.000	0.101	
73/12/31	08 40		0.200	18.500	0.100	22.000	24.500	0.101	
74/01/23	09 30		0.360	15.500	2.900	24.000	25.000	0.102	0.102
74/01/29	09 20		0.120	34.000	1.920	22.000	26.300	0.177	0.139
74/02/14	09 20		0.080	15.000	0.330	19.500	24.000	0.101	0.139
74/02/27	10 25		0.080	17.000	0.530	19.500	26.000	0.086	0.093
74/03/21	09 40		0.160	14.000	1.250	23.000	25.000	0.177	0.131
74/04/01	11 20		0.040	16.000	0.087	18.000	23.000	0.136	0.156
74/04/08	14 55		0.040	4.050	0.110	16.500	22.000	0.101	0.118
74/05/29	11 15		0.040	29.000	3.400	22.500	31.300	0.072	0.087
74/06/24	08 20		0.625	31.000	9.700	24.000	34.500	0.049	0.061
74/07/18	11 20		3.400	19.000	1.900	31.000	32.000	0.049	0.049