

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



REPORT
ON
LAKE LEWISVILLE (GARZA-LITTLE ELM)
DENTON COUNTY
TEXAS
EPA REGION VI
Working Paper No. 650

CORVALLIS ENVIRONMENTAL RESEARCH LABORATORY - CORVALLIS, OREGON
and
ENVIRONMENTAL MONITORING & SUPPORT LABORATORY - LAS VEGAS, NEVADA

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ON
LAKE LEWISVILLE (GARZA-LITTLE ELM)
DENTON COUNTY
TEXAS
EPA REGION VI
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WITH THE COOPERATION OF THE
TEXAS WATER QUALITY BOARD
AND THE
TEXAS NATIONAL GUARD
MARCH, 1977

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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 freshwater 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.

ACKNOWLEDGEMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the Texas Water Quality Board for professional involvement, to the Texas National Guard for conducting the tributary sampling phase of the Survey, and to those Texas wastewater treatment plant operators who voluntarily provided effluent samples.

Hugh C. Yantis, Jr., Executive Director of the Texas Water Quality Board, and John B. Latchford, Jr., Director, and the staff of the Field Operations Division 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 Thomas Bishop, the Adjutant General of Texas, and Project Officer Colonel William L. Seals, who directed the volunteer efforts of the Texas National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

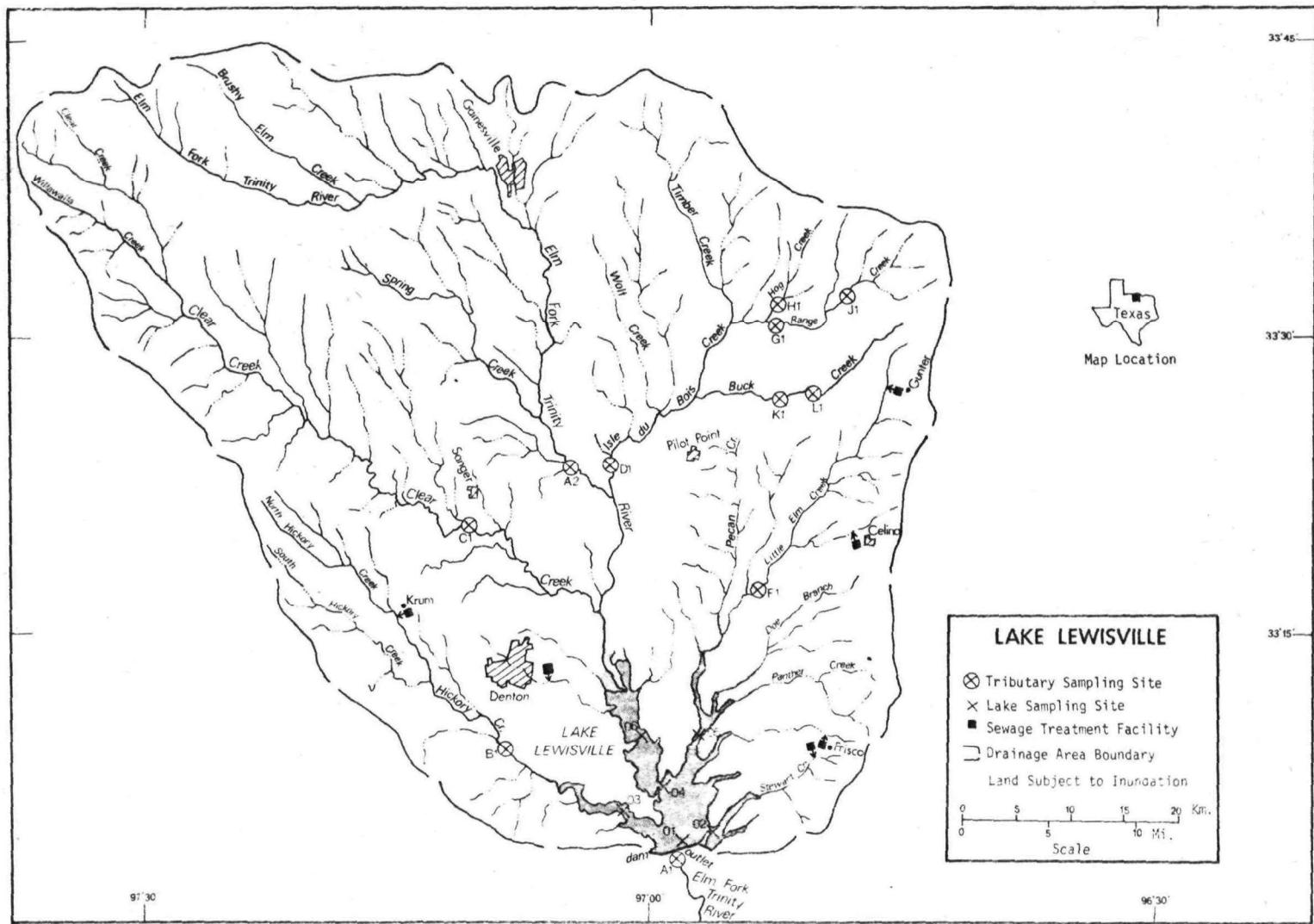
NATIONAL EUTROPHICATION SURVEY

STUDY RESERVOIRS

State of Texas

<u>NAME</u>	<u>COUNTY</u>
Amistad	Val Verde
Bastrop	Bastrop
Belton	Bell, Coryell
Braunig	Bexar
Brownwood	Brown
Buchanan	Burnet, Llano
Caddo	Harrison, Marion, TX; Caddo Parish, LA
Calaveras	Bexar
Canyon	Comal
Colorado City	Mitchell
Corpus Christi	Jim Wells, Live Oak, San Patricio
Diversion	Archer, Baylor
Eagle Mountain	Tarrant, Wise
Fort Phantom Hill	Jones
Houston	Harris
Kemp	Baylor
Lake O'The Pines	Camp, Marion, Morris, Upshur
Lavon	Collin
Lewisville (Garza-Little Elm)	Denton
Livingston	Polk, San Jacinto, Trinity, Walker

Lyndon B. Johnson	Burnet, Llano
Medina	Bandera, Medina
Meredith	Hutchinson, Moore, Potter
O. C. Fisher (San Angelo)	Tom Green
Palestine	Anderson, Cherokee, Henderson, Smith
Possum Kingdom	Palo Pinto, Stephens, Young
Sam Rayburn	Angelina, Jasper Nacogdoches, Sabine, San Augustine
Somerville	Burleson, Lee, Washington
E. V. Spence	Coke
Stamford	Haskell
Stillhouse Hollow	Bell
Tawakoni	Hunt, Rains, Van Zandt
Texoma	Cooke, Grayson TX; Bryan, Johnston, Love, Marshall, OK
Travis	Burnet, Travis
Trinidad	Henderson
Twin Buttes	Tom Green
White River	Crosby
Whitney	Bosque, Hill
Wright Patman (Texarkana)	Bowie, Cass



LAKE LEWISVILLE

STORET NO. 4815

I. CONCLUSIONS

A. Trophic Condition:

Survey data indicate that Lake Lewisville is eutrophic; i.e., well supplied with nutrients and quite productive. Whether nutrient enrichment is beneficial or deleterious depends on the actual or potential effect on the uses of the lake. In this regard, no nuisance conditions are known to personnel of the Texas Water Quality Board and there is little or no impairment of the designated beneficial uses of this water body.

Lake Lewisville ranked 34th in overall trophic quality when the 39 Texas reservoirs sampled in 1974 were compared using a combination of six parameters*. Twenty-five of the reservoirs had less median total phosphorus, 29 had less and two had the same median dissolved phosphorus, 33 had less median inorganic nitrogen, 25 had less mean chlorophyll a, and 32 had greater mean Secchi disc transparency. Marked depression of dissolved oxygen with depth occurred at station 1 in August (0.4 mg/l at 13.7 meters).

Survey limnologists did not observe any phytoplankton blooms or widespread macrophytes.

Excess available phosphorus levels in the Elm Fork embayment suggest potential problems (Anonymous, 1974[?]).

* See Appendix A.

B. Rate-Limiting Nutrient:

The algal assay results indicate that primary productivity was limited by phosphorus at the time of sampling (03/11/74).

The lake data indicate phosphorus was limiting in March and May, and nitrogen was limiting in October. However, the mean Secchi disc transparency of less than one meter indicates primary productivity may be light-limited at times.

C. Nutrient Controllability:

1. Point sources--During the sampling year, a little over 29% of the total phosphorus load is estimated to have been contributed by point sources. The City of Denton wastewater treatment plant was the largest source with 24.2% of the total.

The present loading of $1.25 \text{ g/m}^2/\text{yr}$ is almost 2.5 times that proposed by Vollenweider (Vollenweider and Dillon, 1974) as a eutrophic loading (see page 17). Although elimination of all point-source phosphorus loads would only reduce the loading to $0.88 \text{ g/m}^2/\text{yr}$, if Vollenweider's eutrophic level is applicable to Texas reservoirs, phosphorus control could reduce the potential for the occurrence of nuisance conditions since it appears that suspended materials (as measured by the Secchi disc) might also be limiting primary productivity.

2. Non-point sources--The gaged tributaries were estimated to have contributed about 55% of the total phosphorus load reaching Lake Lewisville. The Elm Fork Trinity River contributed 29.7%; the Isle Du Bois Creek, 13.6%; and the other two tributaries collectively contributed 12.0%.

The phosphorus export rates (page 16) ranged from 7 to 45 kg P/km²/yr with the Elm Fork Trinity River and Little Elm Creek having the highest values (35 and 45 kg P/km²/yr, respectively). Both tributaries may have been influenced by point sources within and outside the 40-kilometer limit of the Survey*.

* See Working Paper No. 175, "...Survey Methods, 1973-1976".

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS[†]

A. Morphometry^{††}:

1. Surface area: 93.93 kilometers².
2. Mean depth: 6.0 meters.
3. Maximum depth: 20.4 meters.
4. Volume: 564.464 x 10⁶ m³.
5. Mean hydraulic retention time: 0.85 years (based on 1972-1976 mean 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>
Elm Fork Trinity River	986.8	4.080
Clear Creek	764.0	2.100
Isle Du Bois Creek	688.9	3.520
Little Elm Creek	195.5	1.177
Minor tributaries & immediate drainage -	<u>1,570.0</u>	<u>6.630</u>
Totals	4,205.2	17.507

2. Outlets -

Diversion by City of Denton**	-	0.200
Elm Fork Trinity River	<u>4,299.4</u>	<u>17.307</u>
Totals	4,299.4***	17.507***

C. Precipitation****:

1. Year of sampling: 110.2 centimeters.
2. Mean annual: 84.6 centimeters.

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

^{††} At conservation pool level; Barrows, 1977.

^{*} For limits of accuracy, see Working Paper No. 175.

^{**} Jones, 1976 (see page 12).

^{***} Includes area of lake; outflow adjusted to equal sum of inflows.

^{****} See Working Paper No. 175.

III. WATER QUALITY SUMMARY

Lake Lewisville was sampled four times in 1974 by means of a pontoon-equipped Huey helicopter. Samples for physical and chemical parameters were collected from two or more depths at six stations on the lake (five in March; see map, page vi). 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, two 18.9-liter depth-integrated samples were 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 16.2 meters at station 1, 9.1 meters at station 2, 10.1 meters at station 3, 8.8 meters at station 4, 7.6 meters at station 5, and 2.1 meters at station 6.

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 GARZA LITTLE ELM RESERVOIR
STORET CODE 4815

PARAMETER	1ST SAMPLING (3/11/74)				2ND SAMPLING (5/17/74)				3RD SAMPLING (8/12/74)			
	5 SITES				6 SITES				6 SITES			
	RANGE	MEAN	MEDIAN	RANGE	MEAN	MEDIAN	RANGE	MEAN	MEDIAN	RANGE	MEAN	MEDIAN
TEMP (C)	14.2 - 18.8	16.4	16.5	20.1 - 27.0	25.0	25.5	25.0 - 27.4	26.3	26.2			
DISS OXY (MG/L)	7.4 - 10.8	9.0	9.0	5.6 - 7.6	6.9	7.0	0.4 - 8.0	6.2	6.7			
CNDCTVY (MICROMHO)	259. - 322.	283.	285.	335. - 470.	394.	384.	339. - 375.	357.	355.			
PH (STAND UNITS)	7.9 - 8.2	8.1	8.1	7.6 - 8.4	8.2	8.2	7.7 - 8.7	8.4	8.4			
TOT ALK (MG/L)	107. - 131.	113.	113.	107. - 118.	113.	113.	116. - 134.	120.	120.			
TOT P (MG/L)	0.020 - 0.096	0.044	0.042	0.026 - 0.304	0.084	0.050	0.021 - 0.126	0.049	0.036			
ORTHO P (MG/L)	0.007 - 0.051	0.020	0.019	0.004 - 0.081	0.023	0.018	0.004 - 0.027	0.009	0.008			
N02+N03 (MG/L)	0.150 - 0.360	0.304	0.330	0.300 - 0.860	0.537	0.490	0.020 - 0.060	0.038	0.035			
AMMONIA (MG/L)	0.050 - 0.140	0.072	0.070	0.020 - 0.070	0.044	0.040	0.040 - 0.330	0.073	0.055			
KJEL N (MG/L)	0.200 - 0.500	0.300	0.300	0.300 - 1.100	0.470	0.400	0.200 - 0.800	0.417	0.300			
INORG N (MG/L)	0.210 - 0.490	0.376	0.400	0.350 - 0.910	0.580	0.530	0.060 - 0.360	0.112	0.100			
TOTAL N (MG/L)	0.360 - 0.850	0.604	0.630	0.720 - 1.440	1.006	0.940	0.220 - 0.860	0.455	0.350			
CHLRPYL A (UG/L)	1.2 - 4.0	2.5	2.4	19.3 - 32.9	25.5	25.0	4.4 - 25.8	14.3	13.7			
SECCHI (METERS)	0.5 - 0.6	0.6	0.6	0.3 - 0.9	0.6	0.5	0.3 - 1.8	0.9	0.9			

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR GARZA LITTLE ELM RESERVO
STORET CODE 4815

4TH SAMPLING (10/31/74)

PARAMETER	6 SITES		
	RANGE	MEAN	MEDIAN
TEMP (C)	18.0 - 19.7	19.3	19.4
DISS OXY (MG/L)	6.2 - 8.2	7.5	7.4
CNDCTVY (MCROMO)	127. - 317.	263.	307.
PH (STAND UNITS)	7.5 - 7.9	7.9	7.9
TOT ALK (MG/L)	60. - 114.	96.	107.
TOT P (MG/L)	0.022 - 1.250	0.251	0.091
ORTHO P (MG/L)	0.008 - 0.080	0.041	0.039
N02+N03 (MG/L)	0.150 - 0.620	0.266	0.240
AMMONIA (MG/L)	0.030 - 0.170	0.076	0.050
KJEL N (MG/L)	0.200 - 2.400	0.684	0.500
INORG N (MG/L)	0.190 - 0.780	0.342	0.300
TOTAL N (MG/L)	0.360 - 3.020	0.950	0.660
CHLRPYL A (UG/L)	5.3 - 23.7	12.3	12.0
SECCHI (METERS)	0.1 - 0.8	0.4	0.3

B. Biological characteristics:

1. Phytoplankton -

<u>Sampling Date</u>	<u>Dominant Genera</u>	<u>Algal Units per ml</u>
03/11/74	1. <u>Chroomonas sp.</u> 2. <u>Stephanodiscus sp.</u> 3. <u>Cryptomonas sp.</u>	87 65 43
	Total	195
05/17-20/74	1. <u>Chroomonas sp.</u> 2. <u>Cryptomonas sp.</u> 3. <u>Ceratium sp.</u> 4. <u>Euglena sp.</u> 5. <u>Merismopedia sp.</u> Other genera	308 154 51 51 51 206
	Total	821
08/12/74	1. <u>Raphidiopsis sp.</u> 2. <u>Synedra sp.</u> 3. <u>Centric diatoms</u> 4. <u>Lyngbya sp.</u> 5. <u>Oscillatoria sp.</u> Other genera	1,627 757 568 530 530 605
	Total	4,617
10/31/74	1. <u>Cryptomonas sp.</u> 2. <u>Scenedesmus sp.</u> 3. <u>Chrysophytan cells</u>	30 30 30
	Total	90

2. Chlorophyll a -

<u>Sampling Date</u>	<u>Station Number</u>	<u>Chlorophyll a (µg/l)</u>
03/11/74	1	1.2
	2	2.1
	3	4.0
	4	3.0
	5	2.4
	6	-
05/17-20/74	1	19.4
	2	29.3
	3	31.7
	4	32.9
	5	20.7
	6	19.3
08/12/74	1	4.4
	2	12.0
	3	12.0
	4	15.4
	5	16.4
	6	25.8
10/31/74	1	5.3
	2	12.5
	3	8.1
	4	11.5
	5	12.5
	6	23.7

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

a. Stations 1, 2, and 3 -

<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	<0.005	0.345	0.2
0.050 P	<0.055	0.345	7.6
0.050 P + 1.0 N	<0.055	1.345	17.4
1.0 N	<0.005	1.345	0.1

b. Stations 4 and 5 -

<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	<0.005	0.405	0.1
0.050 P	<0.055	0.405	8.0
0.050 P + 1.0 N	<0.055	1.405	17.8
1.0 N	<0.005	1.405	0.1

2. Discussion -

The control yields of the assay alga, Selenastrum capricornutum, indicate that the potential primary productivity of Lake Lewisville was low at the time the assay samples were collected (03/11/74). In both assays, the increased yields resulting from increased concentrations of orthophosphorus indicate that the lake was limited by phosphorus at that time. Note that the addition of only nitrogen did not result in increased yields.

The lake data indicate phosphorus limitation in March and May (the mean inorganic nitrogen/orthophosphorus ratios were 14/1 or greater at all stations, with the exception of station 6 in May). The August and November lake data indicate a combination of limiting nutrients. Following is a tabulation of the mean inorganic nitrogen/orthophosphorus ratios for each of the sampling stations and times with indicated limiting nutrient in parentheses:

<u>Station</u>	<u>03/11/74</u>	<u>05/17/74</u>	<u>08/12/74</u>	<u>10/31/74</u>
1	18/1 (P)	27/1 (P)	23/1 (P)	9/1 (N)
2	26/1 (P)	83/1 (P)	9/1 (N)	14/1 (P)
3	23/1 (P)	49/1 (P)	73/1 (P)	11/1 (N)
4	14/1 (P)	18/1 (P)	11/1 (N)	8/1 (N)
5	24/1 (P)	47/1 (P)	90/1 (P)	6/1 (N)
6	-	10/1 (N)	33/1 (P)	5/1 (N)

IV. NUTRIENT LOADINGS
(See Appendix E for data)

For the determination of nutrient loadings, the Texas National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page vi), except for the months of April and May when two samples were collected. Sampling was begun in September, 1974, and was completed in August, 1975.

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

In this report, nutrient loads for sampled tributaries were calculated using mean concentrations and mean flows. 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 mean concentrations in Clear Creek at station C-1 and the mean ZZ flow.

The City of Denton reported a mean diversion of 0.20 m³/sec from Lake Lewisville during the year (Jones, 1976). Nutrient loads in the diverted water were estimated using the mean lake nutrient concentrations at station three and the mean diversion flow.

The operators of the Celina, Frisco, Gunter, and Krum wastewater treatment plants provided monthly effluent samples and corresponding flow data. The communities of Denton, Lake Dallas, Lakewood Village,

and Prosper did not participate, and nutrient loads were estimated 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>
Celina*	1,272	stab. pond	455.4	Little Elm Creek
Denton**	25,000	act. sludge	14,195.3	Pecan Creek
Frisco				
Cottonwood*	2,200	act. sludge	1,002.0	Cottonwood Creek
Stewart*	800	stab. pond	568.1	Steward Creek
Gunter*	640	stab. pond	147.1	Little Elm Creek
Krum*	700	stab. pond	98.8	Hickory Creek
Lake Dallas	1,350	cont. aer.	757.1	Lake Lewisville
M.U.D.**				
Lakewood Village	80	ext. aer.	45.4	Lake Lewisville
Util. Co.**				
Prosper***	200	stab. pond	37.8	Ditch to Doe Branch

2. Known industrial - None

* Treatment plant questionnaires.

** Wyatt, 1976.

*** Anonymous, 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) -		
Elm Fork Trinity River	34,740	29.7
Clear Creek	5,300	4.5
Isle Du Bois Creek	15,875	13.6
Little Elm Creek	8,755	7.5
b. Minor tributaries & immediate drainage (non-point load) -		16,725
		14.3
c. Known municipal STP's -		
Celina	1,215	1.0
Denton	28,350	24.2
Frisco		
Cottonwood	1,595	1.4
Stewart	645	0.6
Gunter	275	0.2
Krum	135	0.1
Lake Dallas M.U.D.	1,530	1.3
Lakewood Village Util. Co.	90	<0.1
Prosper	225	0.2
d. Septic tanks - Unknown		?
		-
e. Known industrial - None		-
		-
f. Direct precipitation* -		<u>1,650</u>
		<u>1.4</u>
Total	117,105	100.0

2. Outputs -

Lake outlets - City of Denton diversion	1,505
Elm Fork Trinity River	35,475
Total	36,980

3. Net annual P accumulation - 80,125 kg.

* 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) -		
Elm Fork Trinity River	286,410	27.4
Clear Creek	62,320	6.0
Isle Du Bois Creek	153,855	14.7
Little Elm Creek	70,425	6.7
b. Minor tributaries & immediate drainage (non-point load) -		
	196,750	18.8
c. Known municipal STP's -		
Celina	2,770	0.3
Denton	85,025	8.1
Frisco		
Cottonwood	4,185	0.4
Stewart	76,860	7.3
Gunter	595	0.1
Krum	285	<0.1
Lake Dallas M.U.D.	4,590	0.4
Lakewood Village Util. Co.	270	<0.1
Prosper	680	0.1
d. Septic tanks - Unknown		
	?	-
e. Known industrial - None		
	-	-
f. Direct precipitation* -		
	<u>101,710</u>	<u>9.7</u>
Total	1,046,730	100.0

2. Outputs -

Lake outlets - City of Denton diversion	6,530
Elm Fork Trinity River	<u>522,870</u>
Total	529,400

3. Net annual N accumulation - 517,330 kg.

* See Working Paper No. 175.

D. Non-point Nutrient Export by Subdrainage Area:

<u>Tributary</u>	<u>kg P/km²/yr</u>	<u>kg N/km²/yr</u>
Elm Fork Trinity River	35	290
Clear Creek	7	82
Isle Du Bois Creek	23	223
Little Elm Creek	45	360

E. Mean Nutrient Concentrations in Ungaged Streams:

<u>Tributary</u>	<u>Mean Total P Conc. (mg/l)</u>	<u>Mean Total N Conc. (mg/l)</u>
Buck Creek (K-1)	0.239	1.952
Buck Creek (L-1)	0.207	1.735
Hickory Creek	0.145	1.689
Hog Creek	0.108	1.584
Range Creek (G-1)	0.208	1.640
Range Creek (J-1)	0.209	1.704

F. 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.

	Total Phosphorus		Total Nitrogen	
	Total	Accumulated	Total	Accumulated
grams/m ² /yr	1.25	0.85	11.1	5.5

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

"Dangerous" (eutrophic loading)	0.52
"Permissible" (oligotrophic loading)	0.26

V. LITERATURE REVIEWED

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VI. APPENDICES

APPENDIX A

LAKE RANKINGS

LAKE CODE LAKE NAME MEIAN MEDIAN 500- MEAN MEAN 15- MEDIAN
TOTAL P INORG N SEC CHLORA MIN DO DISS ORTHO P

4801	AMISTAD LAKE	0.013	0.500	371.474	2.042	14.900	0.009
4802	BASTROP LAKE	0.022	0.090	419.917	12.392	15.000	0.007
4803	BELTON RESERVOIR	0.016	0.185	378.312	8.025	15.000	0.007
4804	BRAUNIG LAKE	0.134	0.150	461.625	22.762	14.800	0.062
4805	BROWNWOOD LAKE	0.027	0.100	470.375	4.887	14.400	0.007
4806	LAKE BRICHANAN	0.036	0.250	437.625	8.606	15.000	0.012
4807	CADDY LAKE	0.055	0.070	463.333	14.808	11.400	0.013
4808	CALAVERAS LAKE	0.038	0.060	461.667	22.500	13.000	0.007
4809	CANYON RESERVOIR	0.010	0.450	384.812	2.500	14.800	0.006
4810	LAKE COLORADO CITY	0.042	0.090	473.625	12.675	10.200	0.012
4811	CORPUS CRISTI LAKE	0.113	0.130	475.187	19.756	14.000	0.050
4812	DIVERSION LAKE	0.025	0.080	470.111	15.867	9.000	0.009
4813	EAGLE MOUNTAIN LAKE	0.024	0.070	469.625	5.662	11.000	0.008
4814	FT PHANTOM HILL LAKE	0.060	0.105	474.909	6.317	9.800	0.022
4815	GARZA LITTLE ELM RESERVO	0.045	0.380	475.782	14.156	14.600	0.018
4816	KEMP LAKE	0.023	0.110	455.000	10.217	10.400	0.007
4817	HOUSTON LAKE	0.097	0.260	486.187	16.650	12.400	0.036
4818	LAKE OF THE PINES	0.031	0.090	440.000	12.919	15.000	0.011
4819	LAVON RESERVOIR	0.063	0.180	485.333	5.400	8.800	0.018
4820	LIVINGSTON LAKE	0.196	0.555	465.469	16.112	15.000	0.128
4821	LYNDON B JOHNSON LAKE	0.042	0.420	456.500	8.100	14.900	0.013
4822	MEDINA LAKE	0.010	0.600	403.562	12.944	15.000	0.004
4823	LAKE MEREDITH	0.021	0.070	439.312	3.037	14.900	0.009
4824	PALESTINE LAKE	0.031	0.180	442.625	10.619	14.800	0.010
4825	POSSUM KINGDOM RESERVOIR	0.023	0.070	419.045	9.495	15.000	0.009
4826	SAN ANGELO RESERVOIR	0.098	0.140	481.000	24.675	10.200	0.011
4827	SAM RAYBURN RESERVOIR	0.029	0.150	439.458	6.267	15.000	0.009
4828	E V SPENCE RESERVOIR	0.036	0.080	462.583	11.775	15.000	0.008

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500- MEAN SEC	MEAN CHLORA	15- MIN DO	MEDIAN DISS ORTHO P
4829	SOMERVILLE LAKE	0.053	0.115	473.833	24.491	13.000	0.013
4830	STAMFORD LAKE	0.073	0.060	482.714	18.457	10.600	0.012
4831	STILLHOUSE HOLLOW RESERV	0.018	0.160	406.250	3.917	15.000	0.010
4832	TAWAKONI LAKE	0.046	0.100	466.417	18.246	13.200	0.013
4833	TEXARKANA LAKE	0.106	0.120	478.500	19.119	12.400	0.030
4834	TEXOMA LAKE	0.042	0.160	451.321	12.493	15.000	0.018
4835	TRAVIS LAKE	0.018	0.250	389.913	5.595	15.000	0.007
4836	TRINIDAD	0.389	0.110	479.500	24.300	10.000	0.240
4837	TWIN BUTTES RESERVOIR	0.029	0.250	454.917	8.708	14.800	0.009
4838	WHITE RIVER RESERVOIR	0.020	0.110	434.500	4.333	15.000	0.009
4839	WHITNEY LAKE	0.028	0.120	430.500	6.912	15.000	0.008

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
4801	AMISTAD LAKE	95 (36)	5 (2)	100 (38)	100 (38)	39 (14)	63 (21)	402
4802	BASTROP LAKE	79 (30)	76 (28)	82 (31)	47 (18)	17 (0)	92 (34)	393
4803	BELTON RESERVOIR	92 (35)	26 (10)	97 (37)	68 (26)	17 (0)	84 (31)	384
4804	BRAUNIG LAKE	5 (2)	42 (16)	50 (19)	8 (3)	49 (17)	5 (2)	159
4805	BROWNWOOD LAKE	66 (25)	70 (26)	29 (11)	87 (33)	58 (22)	84 (31)	394
4806	LAKE BUCHANAN	47 (18)	21 (7)	74 (28)	63 (24)	17 (0)	39 (14)	261
4807	CADDY LAKE	26 (10)	91 (33)	42 (16)	32 (12)	76 (29)	30 (10)	297
4808	CALAVERAS LAKE	45 (17)	100 (38)	47 (18)	11 (4)	67 (25)	92 (34)	362
4809	CANYON RESERVOIR	99 (37)	8 (3)	95 (36)	97 (37)	49 (17)	97 (37)	445
4810	LAKE COLORADO CITY	39 (14)	76 (28)	26 (10)	42 (16)	88 (33)	39 (14)	310
4811	CORPUS CRISTI LAKE	8 (3)	47 (18)	18 (7)	13 (5)	61 (23)	8 (3)	155
4812	DIVERSION LAKE	68 (26)	83 (31)	32 (12)	29 (11)	97 (37)	63 (21)	372
4813	EAGLE MOUNTAIN LAKE	71 (27)	91 (33)	34 (13)	79 (30)	79 (30)	76 (28)	430
4814	FT PHANTOM HILL LAKE	24 (9)	66 (25)	21 (8)	74 (28)	95 (36)	16 (6)	296
4815	GARZA LITTLE ELM RESERVO	34 (13)	13 (5)	16 (6)	34 (13)	55 (21)	21 (7)	173
4816	KEMP LAKE	76 (29)	61 (22)	55 (21)	55 (21)	84 (32)	92 (34)	423
4817	HOUSTON LAKE	16 (6)	16 (6)	0 (0)	24 (9)	72 (27)	11 (4)	139
4818	LAKE OF THE PINES	54 (20)	76 (28)	66 (25)	39 (15)	17 (0)	46 (17)	298
4819	LAVON RESERVOIR	21 (8)	29 (11)	3 (1)	84 (32)	100 (38)	21 (7)	258
4820	LIVINGSTON LAKE	3 (1)	3 (1)	39 (15)	26 (10)	17 (0)	3 (1)	91
4821	LYNDON B JOHNSON LAKE	39 (14)	11 (4)	53 (20)	66 (25)	39 (14)	30 (10)	238
4822	MEDINA LAKE	99 (37)	0 (0)	89 (34)	37 (14)	17 (0)	100 (38)	342
4823	LAKE MEREDITH	82 (31)	91 (33)	71 (27)	95 (36)	39 (14)	63 (21)	441
4824	PALESTINE LAKE	54 (20)	32 (12)	63 (24)	53 (20)	49 (17)	51 (19)	302
4825	POSSUM KINGDOM RESERVOIR	74 (28)	91 (33)	84 (32)	58 (22)	17 (0)	63 (21)	387
4826	SAN ANGELO RESERVOIR	13 (5)	45 (17)	8 (3)	0 (0)	88 (33)	46 (17)	200
4827	SAM RAYBURN RESERVOIR	59 (22)	39 (15)	68 (26)	76 (29)	17 (0)	63 (21)	322
4828	E V SPENCE RESERVOIR	50 (19)	83 (31)	45 (17)	50 (19)	17 (0)	76 (28)	321

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 URTHO P	INDEX NO
4829	SOMERVILLE LAKE	29 (11)	55 (21)	24 (9)	3 (1)	67 (25)	30 (10)	208
4830	STAMFORD LAKE	18 (7)	97 (37)	5 (2)	18 (7)	82 (31)	39 (14)	259
4831	STILLHOUSE HOLLOW RESERV	88 (33)	37 (14)	87 (33)	92 (35)	17 (0)	51 (19)	372
4832	TAWAKONI LAKE	32 (12)	70 (26)	37 (14)	21 (8)	63 (24)	30 (10)	253
4833	TEXARKANA LAKE	11 (4)	51 (19)	13 (5)	16 (6)	72 (27)	13 (5)	176
4834	TEXOMA LAKE	39 (14)	34 (13)	61 (23)	45 (17)	17 (0)	21 (7)	217
4835	TRAVIS LAKE	88 (33)	21 (7)	92 (35)	82 (31)	17 (0)	84 (31)	384
4836	TRINIDAD	0 (0)	61 (22)	11 (4)	5 (2)	92 (35)	0 (0)	169
4837	TWIN BUTTES RESERVOIR	59 (22)	21 (7)	58 (22)	61 (23)	49 (17)	63 (21)	311
4838	WHITE RIVER RESERVOIR	84 (32)	61 (22)	76 (29)	89 (34)	17 (0)	63 (21)	390
4839	WHITNEY LAKE	63 (24)	51 (19)	79 (30)	71 (27)	17 (0)	76 (28)	357

LAKES RANKED BY INDEX NO.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	4809	CANYON RESERVOIR	445
2	4823	LAKE MEREDITH	441
3	4813	EAGLE MOUNTAIN LAKE	430
4	4816	KEMP LAKE	423
5	4801	AMISTAD LAKE	402
6	4805	BROWNWOOD LAKE	394
7	4802	BASTRUP LAKE	393
8	4838	WHITE RIVER RESERVOIR	390
9	4825	POSSUM KINGDOM RESERVOIR	387
10	4835	TRAVIS LAKE	384
11	4803	BELTON RESERVOIR	384
12	4831	STILLHOUSE HOLLOW RESERV	372
13	4812	DIVERSION LAKE	372
14	4808	CALAVERAS LAKE	362
15	4839	WHITNEY LAKE	357
16	4822	MEDINA LAKE	342
17	4827	SAM RAYBURN RESERVOIR	322
18	4828	E V SPENCE RESERVOIR	321
19	4837	TWIN BUTTES RESERVOIR	311
20	4810	LAKE COLORADO CITY	310
21	4824	PALESTINE LAKE	302
22	4818	LAKE OF THE PINES	298
23	4807	CADDO LAKE	297
24	4814	FT PHANTOM HILL LAKE	296
25	4806	LAKE BUCHANAN	261
26	4830	STAMFORD LAKE	259
27	4819	LAVON RESERVOIR	258
28	4832	TAWAKONI LAKE	253

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
29	4821	LYNDON B JOHNSON LAKE	238
30	4834	TEXOMA LAKE	217
31	4829	SOMERVILLE LAKE	208
32	4826	SAN ANGELO RESERVOIR	200
33	4833	TEXARKANA LAKE	176
34	4815	GARZA LITTLE ELM RESERVO	173
35	4836	TRINIDAD	169
36	4804	BRAUNIG LAKE	159
37	4811	CORPUS CRISTI LAKE	155
38	4817	HOUSTON LAKE	139
39	4820	LIVINGSTON LAKE	91

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 TEAMS

03/16/76

LAKE CODE 4815 LEWISVILLE RESERVOIR

TOTAL DRAINAGE AREA OF LAKE (SQ KM) 4299.4

TRIBUTARY	SUB-DRAINAGE AREA (SQ KM)	NORMALIZED FLOWS (CMS)												MEAN
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
4815A1	4299.4	14.33	10.93	21.83	16.54	37.41	36.87	14.07	8.86	10.99	10.68	14.30	17.44	17.89
4815A2	986.8	2.35	3.82	3.91	7.56	10.48	3.77	1.56	1.61	4.67	2.75	3.65	2.94	4.08
4815C1	764.0	1.16	1.84	2.10	4.30	5.01	2.63	0.54	0.28	2.66	1.19	2.12	1.39	2.10
4815D1	688.9	1.87	2.75	3.85	8.07	7.45	3.57	1.02	0.28	5.44	1.78	3.57	2.75	3.52
4815F1	195.5	0.481	0.963	1.161	3.058	3.455	0.850	0.130	0.088	1.444	0.595	0.934	0.991	1.177
4815ZZ	1662.8	3.65	5.69	6.80	13.85	15.49	6.85	2.10	1.33	8.92	3.82	6.46	4.87	6.63

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 4299.4
SUM OF SUB-DRAINAGE AREAS = 4298.1TOTAL FLOW IN = 210.67
TOTAL FLOW OUT = 214.25

MEAN MONTHLY FLOWS AND DAILY FLOWS (CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
4815A1	9	74	8.297	8	5.692				
	10	74	10.166	6	10.307				
	11	74	112.418	10	106.188				
	12	74	118.648	15	124.028				
	1	75	12.403	12	7.985				
	2	75	84.101	8	53.519				
	3	75	39.077	16	36.812				
	4	75	43.325	13	8.778	27	10.279		
	5	75	26.250	18	43.608	31	39.077		
	6	75	85.234	14	102.507				
	7	75	7.419	26	3.483				
	8	75	6.230	17	4.701				
4815A2	9	74	10.081	8	0.187				
	10	74	34.547	6	0.850				
	11	74	30.497	10	139.036				
	12	74	1.869	15	2.039				
	1	75	4.531	12	1.614				
	2	75	16.990	8	6.654				
	3	75	14.300	16	64.562				
	4	75	9.061	13	4.474	30	1.614		
	5	75	7.306	18	1.246	31	10.760		
	6	75	9.175	14	3.285				
	7	75	0.821	26	0.566				
	8	75	1.501	17	2.039				

TRIBUTARY FLOW INFORMATION FOR TEXAS

03/15/78

LAKE CODE 4815 LEWISVILLE RESERVOIR

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
4815C1	9	74	3.483	8	0.082				
	10	74	12.544	6	0.425				
	11	74	22.087	10	69.376				
	12	74	1.699	15	1.869				
	1	75	2.379	12	1.416				
	2	75	11.129	8	6.711				
	3	75	8.240	16	28.260				
	4	75	5.918	13	4.927	27	1.982		
	5	75	8.353	18	1.784	31	20.190		
	6	75	7.108	14	9.146				
	7	75	1.161	26	2.492				
	8	75	0.263	17	0.130				
4815D1	9	74	5.154	8	0.034				
	10	74	20.190	6	0.059				
	11	74	15.461	10	54.368				
	12	74	0.538	15	0.510				
	1	75	1.954	12	0.821				
	2	75	13.762	8	4.049				
	3	75	9.769	16	35.113				
	4	75	6.428	13	2.237	27	0.510		
	5	75	9.826	18	0.878	31	26.335		
	6	75	5.663	14	1.246				
	7	75	0.173	26	0.991				
	8	75	0.028	17	0.028				
4815F1	9	74	2.747	8	0.003				
	10	74	4.870	6	0.275				
	11	74	9.373	10	41.909				
	12	74	0.906	15	0.481				
	1	75	0.736	12	0.311				
	2	75	3.200	8	2.209				
	3	75	0.991	16	3.398				
	4	75	2.237	13	1.869	27	0.074		
	5	75	2.265	18	0.623	31	8.042		
	6	75	5.720	14	9.401				
	7	75	0.003	26	0.0				
	8	75	0.0	17	0.0				
4815Z2	9	74	15.093						
	10	74	44.004						
	11	74	54.179						
	12	74	3.993						
	1	75	5.805						
	2	75	28.317						
	3	75	18.548						
	4	75	15.631						
	5	75	23.645						
	6	75	23.276						
	7	75	5.465						
	8	75	0.793						

APPENDIX D
PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 76/02/11

481501
 33 04 18.0 096 57 54.0
 GARZA LITTLE ELM RESERVOIR
 48121 TEXAS

11EPALES
 3 2111202
 0046 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	WATER TEMP CENT	00010 DO MG/L	00300 TRANSP INCHES	00077 SECCHI FIELD	00094 CNDUCTVY MICROMHO	00400 PH SU	00410 ALK CACO3	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
74/03/11	11 40	0000	15.2	24	263	8.20	107	0.060	0.300	0.340	0.019		
	11 40	0005	14.9		9.2	263	8.15	107	0.070	0.300	0.340	0.019	
	11 40	0015	14.7		9.8	261	8.15	107	0.060	0.300	0.350	0.028	
	11 40	0025	14.5		9.4	259	8.05	107	0.070	0.300	0.350	0.025	
	11 40	0041	14.2		9.6	260	8.05	107	0.070	0.200	0.360	0.024	
74/05/17	16 05	0000	23.9	36	371	8.30	114	0.070	0.500	0.450	0.018		
	16 05	0005	23.4		7.0	366	8.25	114	0.050	0.400	0.440	0.017	
	16 05	0015	22.8		6.6	362	8.20	113	0.040	0.300	0.440	0.015	
	16 05	0030	21.9		7.0	351	8.00	114	0.040	0.300	0.470	0.023	
	16 05	0040	20.1		5.6	335	7.90	114	0.040	0.300	0.490	0.020	
74/08/12	11 35	0000	26.2	72	354	8.16	118	0.080	0.500	0.060	0.005		
	11 35	0020	26.1		5.0	353	8.11	119	0.070	0.200	0.060	0.005	
	11 35	0040	26.1		5.0	354	8.08	120	0.080	0.200K	0.060	0.009	
	11 35	0045	25.0		0.4	375	7.66	134	0.330	0.400	0.030	0.014	
	09 25	0000	19.4		7.8	30	315	7.91	108	0.040	0.400	0.150	0.026
74/10/31	09 25	0005	19.4	30	7.8	315	7.91	107	0.030	0.200	0.160	0.023	
	09 25	0015	19.4		7.2	315	7.91	107	0.030	0.300	0.160	0.024	
	09 25	0025	19.4		7.8	315	7.89	104	0.030	0.300	0.160	0.023	
	09 25	0040	19.4		7.8	313	7.89	107	0.030	0.300	0.170	0.025	
	09 25	0053	19.4		8.2	313	7.89	108	0.040	0.300	0.180	0.015	

K VALUE KNOWN TO BE
 LESS THAN INDICATED

STORET RETRIEVAL DATE 76/02/11

481501
33 04 18.0 096 57 54.0
GARZA LITTLE ELM RESERVOIR
48121 TEXAS

11EPALES 2111202
3 0046 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL UG/L	00031 INCDT LT REMNING PERCENT
74/03/11	11 40	0000	0.034	1.2	
	11 40	0005	0.030		
	11 40	0015	0.041		
	11 40	0025	0.042		
	11 40	0041	0.041		
74/05/17	16 05	0000	0.048	19.4	
	16 05	0005	0.041		
	16 05	0015	0.043		
	16 05	0030	0.043		
	16 05	0040	0.050		
74/08/12	11 35	0000	0.026	4.4	
	11 35	0020	0.028		
	11 35	0040	0.027		
	11 35	0045	0.126		
74/10/31	09 25	0000	0.040	5.3	
	09 25	0005	0.036		
	09 25	0015	0.035		
	09 25	0025	0.036		
	09 25	0040	0.037		
	09 25	0053	0.036		

STORET RETRIEVAL DATE 76/02/11

481502
 33 04 57.0 096 56 22.0
 GARZA LITTLE ELM RESERVOIR
 48121 TEXAS

11EPALES
 3 2111202
 0030 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 MICRUMHO	00400 PH SU	00410 TALK CACO ₃ MG/L	00610 NH ₃ -N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO ₂ &NO ₃ N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
74/03/11	10 55 0000	17.6			24	285	8.20	111	0.050	0.300	0.260	0.007
	10 55 0005	17.6	9.0			286	8.20					
	10 55 0015	17.2	9.0			282	8.20	111	0.050	0.300	0.270	0.013
	10 55 0025	14.9	10.8			266	8.10	108	0.070	0.300	0.340	0.024
74/05/20	12 05 0000	25.5			36	376	8.40	114	0.030	0.700	0.390	0.004
	12 05 0005	25.5	7.2			375	8.40	113	0.020	0.500	0.400	0.004
	12 05 0015	25.4	7.4			379	8.40	113	0.030	0.400	0.410	0.005
	12 05 0025	24.7	7.6			375	8.30	113	0.040	0.400	0.420	0.008
74/08/12	11 10 0000	26.4	7.0	36		358	8.49	118	0.060	0.700	0.050	0.011
	11 10 0015	26.1	6.6			359	8.45	120	0.040	0.400	0.020K	0.008
	11 10 0026	26.0	6.2			359	8.40	120	0.050	0.200K	0.020K	0.008
74/10/31	09 55 0000	19.6	7.4	24		317	7.93	110	0.050	0.500	0.160	0.015
	09 55 0005	19.6	8.2			317	7.91	112	0.040	0.400	0.160	0.015
	09 55 0015	19.5	7.4			317	7.88	113	0.040	0.300	0.160	0.014
	09 55 0030	19.5	8.0			317	7.87	114	0.040	0.300	0.160	0.014

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL UG/L	00031 INCDT LT PERCENT
74/03/11	10 55 0000	0.020		2.1	
	10 55 0015	0.027			
	10 55 0025	0.042			
74/05/20	12 05 0000	0.030	29.3		
	12 05 0005	0.026		1.0	
	12 05 0015	0.033			
	12 05 0025	0.036			
74/08/12	11 10 0000	0.031	12.0		
	11 10 0015	0.021			
	11 10 0026	0.037			
74/10/31	09 55 0000	0.048	12.5		
	09 55 0005	0.043		1.0	
	09 55 0015	0.051			
	09 55 0030	0.045			

K VALUE KNOWN TO BE
 LESS THAN INDICATED

STORE1 RETRIEVAL DATE 76/02/11

481503
 33 06 06.0 097 01 35.0
 GARZA LITTLE ELM RESERVOIR
 48121 TEXAS

11EPALES
 3 2111202
 0037 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	WATER TEMP CENT	00010 DO MG/L	00300 TRANSP INCHES	00077 SECCHI FIELD	00094 MICROMHO	00400 PH SU	00410 TALK CACO3 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
74/03/11	12 10	0000	18.8		24	305	8.20	120	0.060	0.300	0.150	0.007	
	12 10	0005	18.4	8.6		297	8.20	118	0.060	0.200	0.160	0.008	
	12 10	0015	15.6	9.2		266	8.15	109	0.060	0.200	0.290	0.017	
		12 10	0032	14.5	9.0		261	8.00	110	0.080	0.200	0.330	0.019
74/05/20	10 00	0000	23.4		30	384	8.20	114	0.070	1.100	0.310	0.008	
	10 00	0005	26.4	6.8		384	8.30	114	0.050	0.500	0.300	0.007	
	10 00	0015	26.3	6.8		384	8.25	114	0.070	0.400	0.320	0.007	
		10 00	0033	22.8	7.2		363	7.65	117	0.040	0.400	0.490	0.012
74/08/12	12 05	0000	26.9	7.8	41	355	8.54	120	0.040	0.600	0.020K	0.004	
	12 05	0013	26.7	6.0		354	8.46	118	0.050	0.300	0.020K	0.004	
	12 05	0020	26.2	5.2		354	8.13	121	0.080	0.300	0.020	0.011	
	74/10/31	10 20	0000	18.8	7.2	3	185	7.87	85	0.140	1.100	0.380	0.054
10 20		0005	18.8	7.2		187	7.87	83	0.160	1.000	0.430	0.050	
10 20		0015	18.6	7.2		167	7.87	74	0.170	2.200	0.490	0.061	
		10 20	0028	18.0	6.4		127	7.93	66	0.160	2.400	0.620	0.071

DATE FROM TO	TIME OF DAY	DEPTH FEET	PHOS-TOT MG/L P	00665 CHLRPHYL A UG/L	32217 INCDT LT REMNING PERCENT	00031	
74/03/11	12 10	0000	0.027		4.0		
	12 10	0005	0.030				
	12 10	0015	0.031				
		12 10	0032	0.043			
74/05/20	10 00	0000	0.042		31.7		
	10 00	0005	0.040				
	10 00	0015	0.041				
		10 00	0033	0.087			
74/08/12	12 05	0000	0.032		12.0		
	12 05	0013	0.030				
	12 05	0020	0.045				
		10 20	0000	0.303			
74/10/31	10 20	0005	0.762				
	10 20	0015	0.818				
		10 20	0028	1.250			
				8.1			

K VALUE KNOWN TO BE
 LESS THAN INDICATED

STORET RETRIEVAL DATE 76/02/11

481504
 33 07 13.0 096 59 22.0
 GARZA LITTLE ELM RESERVOIR
 48121 TEXAS

11EPALES
 3 2111202
 0025 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CONDCTVY FIELD MICROMHO	00400 PH SU	00410 TALK CACO3 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
74/03/11	12 40	0000	16.5		18	295	8.10	131	0.140	0.500	0.350	0.051
	12 40	0005	16.5	9.2		294	8.15	114	0.070	0.300	0.330	0.023
	12 40	0015	16.0	8.6		285	8.10	114	0.070	0.300	0.330	0.023
	12 40	0020	15.8	8.6		280	8.10	114	0.070	0.300	0.340	0.023
74/05/20	10 35	0000	26.0		12	400	8.20	113	0.040	0.500	0.580	0.040
	10 35	0005	25.9	6.8		398	8.20	113	0.030	0.400	0.570	0.037
	10 35	0015	25.8	7.2		394	8.20	112	0.040	0.400	0.540	0.030
	10 35	0020	25.1	7.2		394	8.30	112	0.040	0.400	0.540	0.030
74/08/12	14 45	0000	27.0	8.0	36	358	8.59	120	0.050	0.800	0.030	0.006
	14 45	0011	26.4	7.2		354	8.43	119	0.040	0.300	0.040	0.008
	14 45	0022	26.1	6.8		359	8.39	122	0.040	0.200	0.060	0.010
74/10/31	10 40	0000	19.5	8.2	24	305	7.91	110	0.060	0.800	0.240	0.031
	10 40	0005	19.5	8.2		305	7.91	109	0.050	0.500	0.360	0.057
	10 40	0015	19.7	8.2		313	7.93	109	0.040	0.400	0.230	0.043
	10 40	0029	19.7	8.2		309	7.93	108	0.040	0.300	0.270	0.039

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL UG/L	00031 INCOT LT REMNING PERCENT
74/03/11	12 40	0000	0.096	3.0	
	12 40	0005	0.048		
	12 40	0015	0.049		
	12 40	0020	0.052		
74/05/20	10 35	0000	0.094	32.9	
	10 35	0005	0.088		
	10 35	0015	0.069		
	10 35	0020	0.071		
74/08/12	14 45	0000	0.035	15.4	
	14 45	0011	0.035		
	14 45	0022	0.047		
74/10/31	10 40	0000	0.092	11.5	
	10 40	0005	0.107		1.0
	10 40	0015	0.076		
	10 40	0029	0.091		

STORET RETRIEVAL DATE 76/02/11

481505
 33 09 27.0 097 57 16.0
 GARZA LITTLE ELM RESERVOIR
 48121 TEXAS

11EPALES
 3 2111202
 0030 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 TALK CACO ₃ MG/L	00610 NH ₃ -N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO ₂ &NO ₃ N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	
74/03/11	13 00	0000	18.4		20	322	8.15	118	0.070	0.400	0.290	0.016	
	13 00	0005	18.4	8.4		322	8.10	116	0.080	0.300	0.290	0.014	
	13 00	0015	17.6	8.2		299	8.10	114	0.060	0.300	0.300	0.015	
		13 00	0025	16.7	7.4		295	7.90	115	0.120	0.400	0.320	0.020
74/05/20	11 30	0000	27.0		12	470	8.30	109	0.050	0.600	0.840	0.022	
	11 30	0005	26.7	7.2		469	8.25	109	0.040	0.400	0.810	0.018	
	11 30	0015	26.4	6.8		455	8.20	107	0.040	0.400	0.800	0.018	
		11 30	0024	26.3	6.4		400	8.10	107	0.050	0.500	0.860	0.016
74/08/12	15 05	0000	27.4	7.4	24	351	8.74	120	0.050	0.700	0.020	0.006	
	15 05	0010	26.7	6.8		348	8.45	116	0.040	0.300	0.020K	0.004	
		15 05	0015	25.4	5.6		339	8.12	119	0.100	0.300	0.040	0.006
	74/10/31	11 00	0000	19.6	7.4	3	243	7.77	93	0.080	0.600	0.190	0.045
11 00		0005	19.6	6.6		243	7.73	78	0.090	0.700	0.360	0.080	
		11 00	0015	19.3	6.2		193	7.61	73	0.100	0.800	0.360	0.076
		11 00	0022	19.1	6.6		193	7.53	60	0.120	1.100	0.320	0.066

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL UG/L	00031 INCDT LT A REMNING PERCENT	
74/03/11	13 00	0000	0.050	2.4		
	13 00	0005	0.051			
	13 00	0015	0.050			
		13 00	0025	0.071		
74/05/20	11 30	0000	0.073	20.7		
		11 30	0003		1.0	
		11 30	0005	0.091		
		11 30	0015	0.119		
74/08/12	15 05	0000	0.046	16.4		
	15 05	0010	0.045			
		15 05	0015	0.074		
	74/10/31	11 00	0000	0.197	12.5	
11 00		0001			1.0	
		11 00	0005	0.401		
		11 00	0015	0.458		
	11 00	0022	0.452			

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/02/11

481506
 33 09 52.0 097 37 00.0
 GARZA LITTLE ELM RESERVOIR
 48121 TEXAS

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 TALK CACO3 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
74/05/20	11 15	0000	26.7		12	433	8.10	118	0.050	0.600	0.740	0.081
	11 15	0005	26.6	6.6		435	8.10	118	0.040	0.400	0.730	0.078
74/08/12	15 30	0000	27.2	7.4	13	373	8.63	121	0.060	0.800	0.060	0.027
	15 30	0007	26.3	7.2		367	8.49	120	0.060	0.300	0.060	0.021
74/10/31	11 30	0000	18.5	7.4	3	199	7.75	82	0.120	0.900	0.260	0.076
	11 30	0007	18.5	7.0		199	7.81	75	0.140	0.800	0.270	0.073

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL UG/L	00031 INCDT LT A REMNING PERCENT
74/05/20	11 15	0000	0.233	19.3	
	11 15	0001			1.0
	11 15	0005	0.226		
74/08/12	15 30	0000	0.108	25.8	
	15 30	0007	0.082		
74/10/31	11 30	0000	0.378	23.7	
	11 30	0007	0.450		

APPENDIX E

**TRIBUTARY AND WASTEWATER
TREATMENT PLANT DATA**

STORET RETRIEVAL DATE 76/03/10

4815A1
33 04 02.0 097 57 50.0 4
ELM FORK TRINITY RIVER
48253 7.5 LEWISVILLE E
0/GARZA-LITTLE ELM RES
BANK SAMP BELOW LEWISVILLE DAM
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 N02&N03 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
74/09/08	11	50	0.160	0.400	0.020	0.005K	0.020
74/10/06	10	30	0.160	1.100	0.030	0.015	0.040
74/11/10	09	10	0.272	0.500	0.025	0.040	0.080
74/12/15	09	30	0.320	0.500	0.024	0.060	0.090
75/01/12	09	00	0.352	0.700	0.072	0.064	0.120
75/02/08	09	30	0.384	0.300	0.008	0.056	0.070
75/03/16	07	30	0.590	0.600	0.035	0.055	0.090
75/04/13	08	40	0.590	0.700	0.040	0.045	0.070
75/04/27	08	00	0.620	0.750	0.060	0.045	0.070
75/05/18	08	00	0.590	0.450	0.020	0.035	0.060
75/05/31	07	30	0.550	0.900	0.030	0.025	0.090
75/06/14	14	15	0.500	0.500	0.015	0.020	0.050
75/07/26	09	40	0.120	0.400	0.025	0.010	0.020
75/08/17	08	10	0.100	0.300	0.010	0.005K	0.040

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/03/10

4815A2
 33 23 15.0 097 05 00.0 4
 ELM FORK TRINITY RIVER
 48 UENTON CO MAP
 T/GARZA-LITTLE ELM RES
 SEC RU 445 BRDG 6 MI ENE OF SANGER
 11EPALES 2111204
 0000 FEET DEPTH CLASS 00

DATE	TIME	DEPTH	NO2&N03	00630	00625	00610	00671	00665
FROM	OF		N-TOTAL	TUT KJEL	N	NH3-N	PHOS-DIS	PHOS-TOT
TO	DAY	FEET	MG/L	MG/L	MG/L	MG/L	MG/L P	MG/L P
74/09/08	09	25		0.680	2.700	0.580	0.195	0.315
74/10/06	15	00		0.480	0.800	0.045	0.155	0.210
74/11/10	14	05		0.368	2.000	0.050		0.500
74/12/15	13	30		1.520	1.300	0.080	0.110	0.140
75/01/12	13	30		1.280	0.900	0.048	0.200	0.260
75/02/08	08	40		0.940	0.700	0.104	0.088	0.130
75/03/16	09	55		0.650	3.500	0.095	0.155	
75/04/13	13	40		0.830	0.550	0.030	0.055	0.110
75/05/18	12	30		1.200	0.800	0.030	0.110	0.200
75/05/31	14	30		0.500	0.850	0.045	0.095	0.200
75/06/14	11	40		0.810	0.800	0.025	0.135	0.210
75/07/26	14	11		1.950	1.030	0.055	0.330	0.400
75/08/17	12	30		0.700	1.100	0.050	0.390	0.560

STORET RETRIEVAL DATE 76/03/10

481581
 33 09 03.0 097 08 30.0 4
 HICKORY CREEK
 48 7.5 DENTON WEST
 T/GARZA-LITTLE ELM RES
 SEC RD 1830 BRDG 4.5 MI S OF DENTON
 11EPALES 2111204
 0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&N03 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
74/09/08	11 35		0.052	1.000	0.065	0.005	0.040
74/10/06	09 30		0.464	1.400	0.670	0.390	0.420
74/11/10	08 30		0.500	1.900	0.045		0.440
74/12/15	08 50		1.010	1.200	0.120	0.015	0.050
75/01/12	08 00		0.680	1.600	0.232	0.200	0.240
75/02/08	07 55		1.010	0.700	0.048	0.040	0.080
75/03/16	09 10		0.850	1.300	0.050	0.035	
75/04/13	08 00		0.910	1.150	0.035	0.025	0.060
75/04/27	15 30		0.500	0.450	0.025	0.005	0.030
75/05/18	07 00		1.650	1.150	0.025	0.035	0.140
75/05/31	15 45		0.550	0.850	0.035	0.045	0.130
75/06/14	13 40		0.540	0.550	0.015	0.035	0.070
75/07/26	08 50		0.290	0.900	0.035	0.040	0.130
75/08/17	07 20		0.035	0.450	0.010	0.010	0.060

STORET RETRIEVAL DATE 76/03/10

4815C1
33 20 13.0 097 10 45.0 4
CLEAR CREEK
48 DENTON CO MAP
T/GARZA-LITTLE ELM RES
SEC RD BRUG 1.5 MI S OF SANGER
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TU	TIME OF DAY	DEPTH FEET	00630 N02&N03 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
74/09/08	09 00		0.108	0.850	0.050	0.010	0.067
74/10/06	15 15		0.032	0.300	0.020	0.020	0.020
74/11/10	14 30		0.184	1.700	0.155	0.045	0.055
74/12/15	13 50		0.224	1.100	0.040	0.008K	0.010
75/01/12	14 45		0.176	0.500	0.024	0.040	0.044
75/02/08	15 00		0.480	0.600	0.032	0.024	0.070
75/03/16	09 30		0.440	0.420	0.085	0.035	0.100
75/04/13	13 55		0.230	0.600	0.020	0.010	0.050
75/04/27	15 00		0.095	0.400	0.070	0.005K	0.030
75/05/18	12 55		0.360	0.200	0.005K	0.010	0.040
75/05/31	15 00		0.195	0.650	0.015	0.020	0.100
75/06/14	10 00		0.155	0.700	0.015	0.020	0.100
75/07/26	15 20		0.200	1.750	0.055	0.015	0.380
75/08/17	13 10		0.120	0.400	0.020	0.005K	0.050

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/03/10

481501
33 24 23.0 097 00 45.0 4
ISLE DU DIS CREEK
48 DENTON CO MAP
T/GARZA-LITTLE ELM RES
SEC RD 372 BRDG 3 MI W OF PILOT POINT
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00530 NO2&NO3 N-TOTAL MG/L	00625 TUT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/09/08	09 40		0.156	1.100	0.195	0.045	0.150
74/10/06	14 30		0.072	0.900	0.035	0.075	0.130
74/11/10	13 45		0.096	1.500	0.150		0.440
74/12/15	13 10		0.144	1.400	0.040	0.055	0.180
75/01/12	12 50		0.072	0.400	0.016	0.024	0.070
75/02/08	14 20		0.272	0.800	0.072	0.032	0.120
75/03/16	10 00		0.260	2.100	0.100	0.075	
75/04/13	13 10		0.430	0.400	0.010	0.020	0.090
75/04/27	13 30		0.035	0.300	0.025	0.010	0.020
75/05/18	12 00		0.560	1.050	0.045	0.045	0.170
75/05/31	14 00		0.120	1.050	0.050	0.040	0.200
75/06/14	11 50		0.165	0.800	0.065	0.030	0.100
75/07/26	13 50		0.570	3.450	0.095	0.040	0.115
75/08/17	11 10		0.500	0.700	0.010	0.010	0.070

STORET RETRIEVAL DATE 76/03/10

4815F1
 33 17 12.0 096 53 30.0 4
 LITTLE ELM CREEK
 48 DENTON CO MAP
 T/GARZA-LITTLE ELM RES
 SEC RD 1385 BRDG 8 MI SE OF PILOT POINT
 11EPALES 2111204
 0000 FEET DEPTH CLASS 00

DATE	TIME	DEPTH	00630 NO26N03	00625 TOT KJEL	00610 NH3-N	00671 PHOS-DIS	00665 PHOS-TOT
FROM OF			N-TOTAL MG/L	N MG/L	TOTAL MG/L	ORTHO MG/L P	MG/L P
TO DAY		FEET					
74/09/08	10	15	0.660	1.800	0.047	0.015	0.175
74/10/06	11	25	0.016	0.900	0.007	0.070	0.180
74/11/10	13	05	0.288	1.200	0.085	0.125	0.420
74/12/15	10	20	0.576	1.400	0.064	0.200	0.340
75/01/12	09	40	0.368	1.300	0.032	0.200	0.270
75/02/08	10	30	1.200	1.600	0.256	0.192	0.350
75/03/16	09	10	0.870	2.000	0.035		0.500
75/04/13	09	10	0.830	1.450	0.050	0.090	0.390
75/04/27	08	45	0.010	1.200	0.025	0.015	0.160
75/05/18	18	40	1.880	1.800	0.030	0.070	0.330
75/05/31	08	30	1.150	1.150	0.035	0.060	0.320
75/06/14	14	50	0.450	0.700	0.010	0.115	0.290
75/07/26	11	05	0.400	0.650	0.020	0.005	0.060
75/08/17	08	40		0.750	0.010	0.010	0.080

STORET RETRIEVAL DATE 76/03/10

4815G1
33 30 50.0 096 52 00.0 4
RANGE CREEK
48 15 WHITESBURG
T/GARZA-LITTLE ELM RES
SEC RD BRUG 5.5 MI SE OF COLLINSVILLE
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FRUM 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
74/12/15	12 05		0.184	1.500	0.256	0.120	0.240
75/02/08	13 45		0.240	0.800	0.064	0.072	0.140
75/04/13	11 00		0.280	0.850	0.055	0.025	0.120
75/04/27	11 00		0.015	1.900	0.590	0.020	0.120
75/05/18	10 05		0.960	1.380	0.095	0.060	0.205
75/05/31	12 00		0.170	0.975	0.060	0.060	0.190
75/06/14	13 20		0.115	1.350	0.047	0.040	0.130
75/07/26	12 48		0.650	1.750	0.040	0.130	0.520

STORET RETRIEVAL DATE 76/03/10

4815H1
33 31 55.0 096 52 20.0 4
HOG CREEK
48 15 WHITESBORO
T/GARZA-LITTLE ELM RES
SEC RD 8RJD 4 MI SE OF COLLINSVILLE
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE	TIME	DEPTH	NO2&N03	00625	00610	00671	00665
FROM	OF		N-TOTAL	TOT KJEL	NH3-N	PHOS-DIS	PHOS-10T
TO	DAY	FEET	MG/L	MG/L	TOTAL	ORTHO	MG/L P
74/12/15	12	13		0.800	1.700	0.040	0.035
75/02/08	13	37		0.750	0.900	0.080	0.024
75/04/13	11	15		0.185	0.900	0.070	0.010
75/04/27	11	30		0.010	0.700	0.065	0.010
75/05/18	10	20		1.300	1.300	0.080	0.020
75/05/31	12	45		0.115	1.200	0.055	0.025
75/06/14	13	40		0.125	1.100	0.060	0.015

STORET RETRIEVAL DATE 76/03/10

4815J1
 33 32 05.0 096 48 30.0 4
 RANGE CREEK
 48 15 WHITESBORO
 T/GARZA-LITTLE ELM RES
 SEC RD 902 BRDG 2.8 MI SE OF ETHEL
 11EPALES 2111204
 0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 N02&N03 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
			0.248	0.900	0.035	0.180	0.365
74/11/10	12 15						
74/12/15	11 35		0.064	1.400	0.192	0.115	0.200
75/02/08	12 00		0.720	0.600	0.040	0.056	0.090
75/03/16	10 40		1.000	3.400	0.065	0.085	
75/04/13	10 30		0.070	0.500	0.035	0.025	0.070
75/04/27	10 30		0.095	1.000	0.070	0.010	0.110
75/05/18	09 45		1.250	1.300	0.057	0.056	0.260
75/05/31	11 15		0.195	0.750	0.035	0.060	0.140
75/06/14	13 00		0.085	0.650	0.025	0.045	0.090
75/07/26	12 20		0.315	2.500	0.035	0.155	0.560

STORET RETRIEVAL DATE 76/03/10

4815K1
33 26 30.0 096 52 16.0 4
BUCK CREEK
48 GRAYSON CO MAP
T/GARZA-LITTLE ELM RES
SEC RD BRDG 3.5 MI SE OF TIOGA
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 N02&N03 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
74/11/10	11 40		0.240	1.500	0.025	0.240	0.420
74/12/15	11 05		0.168	1.400	0.304	0.185	0.350
75/01/12	10 35		0.232	1.000	0.040	0.032	0.120
75/02/08	11 20		0.690	1.700	0.152	0.128	0.230
75/03/16	09 55		1.450	4.000	0.135	0.135	
75/04/13	09 45		0.375	1.050	0.075	0.045	0.235
75/04/27	09 30		0.550	1.150	0.080	0.020	0.120
75/05/18	09 10		0.170	1.350	0.080	0.105	0.230
75/05/31	09 45		0.085	1.200	0.075	0.125	0.280
75/06/14	12 40		0.110	1.100	0.065	0.075	0.170

STORET RETRIEVAL DATE 76/03/10

4815L1
33 27 30.0 096 48 45.0 4
BUCK CREEK
48 GRAYSON CO MAP
T/GARZA-LITTLE ELM RES
SEC RD 121 BRDG 3.5 MI W OF GUNTER
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 N026N03 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS URTHO MG/L P	00665 PHOS-TOT MG/L P
74/09/08	13 10		0.076	1.800	0.160	0.045	0.195
74/10/06	12 50		0.600	1.200	0.030	0.120	0.140
74/11/10	09 10		0.144	0.800	0.020	0.175	0.300
74/12/15	11 20		0.144	1.600	0.128	0.220	0.340
75/01/12	11 00		0.272	1.200	0.040	0.072	0.170
75/02/08	11 40		0.640	1.000	0.096	0.160	0.230
75/03/16	10 15		1.800	3.530	0.135	0.095	
75/04/13	10 00		0.375	1.100	0.050	0.065	0.220
75/04/27	10 00		0.500	1.050	0.035	0.010	0.690
75/05/18	09 30		0.120	1.550	0.060	0.125	0.260
75/05/31	10 30		0.065	1.050	0.060	0.160	0.270
75/06/14	12 50		0.055	1.400	0.050	0.110	0.230
75/07/26	12 00		0.050	1.350	0.110	0.025	0.120
75/08/17	09 30		0.025	0.800	0.045	0.020	0.120

STORET RETRIEVAL DATE 76/03/10

4815BA PD4815BA P000700
 33 04 30.0 097 11 30.0 4
 KRUM
 48253 7.5 SANGER TX
 T/GARZA-LITTLE ELM RES.
 HICKORY CREEK
 11EPALES 2141204
 0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 N026N03 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 INST MGD	50051 FLOW RATE MG/L P	50053 CONDUIT FLOW-MGD MONTHLY
74/10/12	10 00		0.040	2.625	0.110	1.950	2.400	0.025	0.027
74/11/05	10 00		0.560	8.700	0.067	3.150	4.000	0.025	0.027
74/12/05	08 30		1.520	8.300	0.088	2.400	3.200	0.020	0.020
75/01/05	09 00		1.280	13.000	0.140	3.800	4.900	0.025	0.027
75/02/04	10 00		1.120		0.290	5.300	5.650	0.025	0.027
75/03/04	15 00		0.800		0.170	3.400	3.500	0.025	0.027
75/04/02	11 00		0.720	7.900	0.250	3.520	4.300	0.025	0.027
75/06/10	10 00		0.100	2.200	0.044	2.900	3.200	0.025	0.027
75/07/02			0.025	5.800	0.180	2.500	2.900	0.025	0.027
75/08/06	10 00		0.250	10.000		2.900	3.400	0.025	0.027
75/09/03	10 00		0.075	8.900		3.400	4.100	0.025	0.027

STORET RETRIEVAL DATE 76/03/10

4815FA PD4815FA P000640
 33 27 00.0 096 46 00.0 4
 GUNTER DISPOSAL
 48 7.5 GUNTER TX
 T/GARZA LITTLE ELM RES.
 LITTLE ELM CREEK
 11EPALES 2141204
 0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 N02&N03	00625 TOT KJEL	00610 NH3-N N	00671 PHOS-DIS TOTAL MG/L	00665 PHOS-TOT ORTHO MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
75/03/06			0.160	18.000	1.360	4.950	5.900	0.040	0.040
75/05/01			0.150	1.200	0.100	1.600	8.500	0.040	0.040
75/05/08			0.050	13.000	0.090	2.800	3.700	0.037	0.037
75/06/19 08 00			0.050	10.000	0.050K	1.850	2.800	0.040	0.035
75/07/08 11 00			0.025	8.250	0.025K	1.570	2.200	0.038	0.042
75/07/14			0.100	15.000	0.990	7.600	8.400	0.040	0.040
75/07/29 13 00			0.025	11.500	0.390	3.400	4.200	0.040	0.038
75/09/10								0.040	0.040

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/03/10

4815XA PD4815XA P001272
33 19 00.0 096 47 30.0 4
CELINA
48 7.5 CELINA
T/GARZA-LITTLE ELM RES
UNNAMED TRIBUTARY
11EPALES 2141204
0000 FEET DEPTH CLASS 00

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	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGU	50053 CONDUIT FLOW-MGU MONTHLY
74/10/24	16 00		1.280	11.000	0.110	3.200	4.400	0.100	0.150
74/11/11	09 30		0.480	8.600	0.050	2.800	3.400	0.180	0.165
74/12/04	15 30		0.160	14.000	3.700	3.900	5.100	0.150	0.125
75/03/31	14 00		0.160	19.000	2.400	2.560	3.700	0.080	0.109
75/04/25	10 00		0.300	10.000	0.220	3.800	4.900	0.137	0.107
75/05/12	11 00		0.100	12.500	0.120	3.700	4.500	0.110	0.124
75/05/29	13 00		0.250	3.800	0.050K	1.400	11.500	0.088	0.095
75/06/20	14 00		0.100	11.500	0.050K	2.100	2.900	0.112	0.104
75/07/09	14 00		0.100	16.500	0.530	4.200	5.300	0.127	0.120
75/10/31	14 00		2.400	19.500	0.400	8.600	10.100	0.950	0.104

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/03/10

4815YA AS4815YA P002200
 33 09 00.0 096 50 00.0 4
 COTTONWOOD
 48085 7.5 FRISCO
 T/GARZA-LITTLE ELM RES
 COTTONWOOD CREEK
 11EPALES 2141204
 0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 N02&N03 N-TOTAL	00625 TOT KJEL MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
74/09/30	10 00		1.320	1.000K	0.031	1.720	1.850	0.150	0.200
74/10/29	12 30		5.760	10.000	0.360	4.200	6.200	0.215	0.164
74/11/18	11 30		0.080	9.500	0.100	2.200	2.500	0.318	0.483
74/12/17	10 30		0.400	10.000	0.720	1.200	2.100	0.310	0.314
75/01/21	10 20		0.080	16.000	0.080K		2.600	0.210	0.298
75/02/18	10 30		0.560	3.500	0.080K	0.200	0.375	0.290	0.384
75/03/10	10 15		0.480	3.000	0.080K		0.560	0.250	0.216
75/04/17	10 30		0.700	1.890	0.061	1.040	1.175	0.290	0.327
75/05/19	13 40		0.100	10.000	0.310	5.250	5.900	0.225	0.226
75/06/18	10 30		0.200	2.700	0.050K	0.460	0.600	0.275	0.282
75/07/15	10 30		0.025	21.000	9.500	12.000	12.000	0.175	0.196
75/08/18	10 40		0.100	30.000	10.500	11.500	13.500	0.220	0.170
75/09/15	14 45		0.075	32.000	16.500	13.000	15.000	0.190	0.181

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/03/10

4815ZA PD4815ZA P000800
 33 08 00.0 096 50 00.0 4
 STEWART CREEK
 48 7.5 FRISCO
 T/GARZA-LITTLE ELM RES
 STEWART CREEK
 11EPALES 2141204
 0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L	00665 PHOS-TOT P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
74/09/30	10 00		3.800	350.000		2.100	2.600	0.060	0.075
74/10/29	12 30		6.900	210.000	200.000	3.150	3.800	0.106	0.090
74/11/18	11 00		1.920	32.000	20.000	1.400	1.850	0.160	0.173
74/12/17	10 30		8.400	340.000	300.000	1.650	2.200	0.181	0.159
75/01/21	10 15		0.400	175.000		2.000	2.400	0.104	0.214
75/02/18	10 30		9.300	135.000	124.500	1.380	1.700	0.206	0.336
75/03/10	10 15		4.000	430.000	330.000	2.500	3.200	0.062	0.075
75/04/17	10 30		11.500	150.000	31.000	1.550	1.900	0.181	0.191
75/05/19	13 30		17.300	410.000	400.000	3.300	3.600	0.050	0.077
75/06/18	10 40		13.500	200.000	200.000	1.050	1.900	0.160	0.186
75/07/15	10 20		11.000	590.000	12.600K	4.100	4.100	0.053	0.057
75/08/18	10 30		1.300	950.000	500.000L	5.400	7.000	0.100	0.117
75/09/15	14 45		9.700	970.000		5.400	6.100	0.210	0.201

K* VALUE KNOWN TO BE LESS
THAN INDICATED

J* VALUE KNOWN TO BE IN ERROR