Water Quality Assessment
Unnamed tributary to Crooked Creek (Lineville Lagoon)
Lineville, Alabama
Clay County

June 1999

Environmental Indicators Section
Field Operations Division
Alabama Department of Environmental Management
Report Date: January 2000

Introduction

The city of Lineville has a NPDES permit (AL0050644) to discharge treated wastewater from Lineville Lagoon in Clay county to an unnamed tributary to Crooked Creek. The unnamed tributary and the segment of Crooked Creek being studied are classified Fish and Wildlife (F&W). Crooked Creek is part of the Tallapoosa River basin and drains into the Tallapoosa River.

Analysis of the results from compliance toxicity tests conducted on samples of the Lineville Lagoon effluent indicates that adverse effects occur sporadically. At the request of the Municipal Branch of the Water Division of the Alabama Department of Environmental Management (ADEM), staff members of the Environmental Indicators Section (EIS) of Field Operations Division conducted a study to document the effects of the wastewater discharge on the in-stream macroinvertebrate community of the unnamed tributary and Crooked Creek. This effort included aquatic macroinvertebrate and habitat assessments, toxicity testing and physical/chemical analyses. The portion of Crooked Creek included in the study extended from AL Hwy 49 to approximately ¾ mile downstream of the confluence with the unnamed tributary.

The aquatic macroinvertebrate sampling, habitat assessments and chemical sample collection were conducted on June 9, 1999. The bioassay portion of the study was initiated on April 7, 1999.

Sampling Locations and Methodology

The following sampling locations were chosen for the unnamed tributary and Crooked Creek (see Figure 1).

LS-1 Unnamed tributary to Crooked Creek immediately upstream of the Lineville Lagoon discharge. T20S, R9E, S7, SW1/4, NE1/4, NE1/4 Lat 33° 17'53.6"N Lon –85°44'55.4"W

LS-2 Unnamed tributary to Crooked Creek downstream of the Lineville Lagoon discharge just below the mixing zone. T20S, R9E, S7, SW1/4, NE1/4, SW1/4 Lat 33° 17'38.6"N Lon –85°44'52.5"W

LS-3 Unnamed tributary to Crooked Creek approximately 1 mile downstream of the Lineville Lagoon discharge. T20S, R9E, S18, NE1/4, SE1/4, SE1/4 Lat 33° 17'15.9"N Lon –85°44'25.5"W

CRCC-1 Crooked Creek at Hwy 49, approximately 1 mile upstream of the confluence of the unnamed tributary. T20S, R9E, S19, NW1/4 Lat 33° 16'35.8"N Lon –85°44'49.8"W

CRCC-2 Crooked Creek approximately 3/4 mile downstream of the confluence of the unnamed tributary. T20S, R9E, S17, SE1/4, SW1/4 Lat 33° 16'46"N Lon –85°43'41.7"W

Macroinvertebrate samples were collected using the intensive Multihabitat Bioassessment method (MB-I) described in the ADEM Standard Operating Procedures (SOP) and Quality Control Assurance (QCA) Manual, Volume 2 (1999). Habitat quality was assessed using the modified Barbour & Stribling (1996) habitat assessment form. Table 1 provides evaluation guidelines for the habitat assessment and macroinvertebrate community metrics.

Instream water samples collected for field parameters and chemical analyses were grab collections using the methodology outlined in Volume 1 of the ADEM SOP and QCA Manual (1994).

Samples collected from the lagoon discharge for toxicity testing were 24-hour composite samples taken at the permitted sampling point. The toxicity test was conducted as specified in NPDES permit number AL0050644 and per methodology outlined in ADEM SOP and QCA Manual, Volume 4 (1994) and the EPA Short-Term Methods For Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms, Third Edition (1994).

Sample handling techniques, physical data collection and chain-of-custody procedures utilized during this assessment were as described in the ADEM Standard Operating Procedures and Quality Control Assurance Manual, Volumes 1(1994), 2(1996) & 4(1994). Chain-of-custody was maintained by locking the samples in a Departmental vehicle when not in sight of a Field Operations employee.

During this study, the ADEM Water Quality Section collected diurnal field parameters over a two-day period using continuous recording remote datasondes at the stations on the unnamed tributary. This information is included in Appendix C.

Discussion and Results

A. Physical

The study reaches of the unnamed tributary are comprised of rocky/sandy substrate with run depths of approximately 0.5-1 foot and pool depths of approximately 2 feet. The unnamed tributary had moderately stable banks along the stream reaches at LS-1 and LS-3. The banks at LS-2 were moderately unstable. The canopy cover ranged from mostly open at LS-1 to mostly shaded/shaded hardwoods at the other two stations. Station LS-1 appeared to have some habitat impairment due to manmade riparian modifications at and above the station location.

The study reaches on Crooked Creek are comprised of bedrock/boulder substrate with run depths of 1-2 feet and pool depths of 2-3 feet. Crooked Creek had moderately stable to stable banks along the stream reaches and canopy cover ranged from mostly open at CRCC-2 to shaded with hardwoods at CRCC-1.

The water quality field assessment at station LS-2 documented a sewage type odor in the water for approximately 50 yards below the lagoon discharge. Station LS-3, which was located just downstream of a ford in a pasture, had a sewage/manure type odor to the sediment/substrate.

B. Chemical

The field parameters measured at each station were pH, conductivity, dissolved oxygen, turbidity and water temperature. Results showed little difference in the pH, dissolved oxygen or conductivity between stations (Table 2).

Water samples were also collected for laboratory analyses and results are provided in Table 2. The Total Suspended Solids concentration downstream of the discharge (LS-2) was elevated as compared to the upstream station (LS-1). Nutrient concentrations downstream of the discharge were also slightly elevated as compared to the upstream station. Nitrate concentrations were elevated at both of the Crooked Creek stations. This could be due to land-use activities in the watershed.

The upstream station on the unnamed tributary had a lead concentration of 4.09 μg/L. All other study stations had trace metals at concentrations below the laboratory detection limits.

C. Aquatic Macroinvertebrate Assessment

Aquatic macroinvertebrate data were analyzed according to EIS draft ecoregional evaluation guidelines. For the study stations on Crooked Creek, all habitats collected were included in the total. The study stations on the unnamed tributary were evaluated without the sand habitat data due to unavailability of a sample from that habitat type. The omission of this habitat type did not adversely affect overall assessment results, as comparisons were not made between Crooked Creek and the unnamed tributary because of physical differences in the streams. Assessments of the macroinvertebrate communities were made for each stream separately.

The upstream station on the unnamed tributary (LS-1) was evaluated as “good/fair”; LS-2, downstream of the effluent discharge, was evaluated as “fair” to “good/fair”, and the station further downstream (LS-3) was evaluated as “good”. As compared to the upstream station, LS-2 was evaluated as “slightly impaired” and LS-3 was evaluated as “unimpaired”. This indicates that there was a slight adverse impact to the macroinvertebrate community as a result of the lagoon discharge but that it had recovered by LS-3. (Table 1)

Macroinvertebrate assessments of the stations on Crooked Creek evaluated the upstream station (CRCC-1) as “good/excellent” and the downstream station (CRCC-2) as “good”. The slight impairment of CRCC-2, as compared to the upstream station, may be due to several factors including watershed land uses. Agricultural activities were present; however, actual land use between CRCC-1 and CRCC-2 is unknown.

D. Bioassay

Short-term chronic toxicity tests conducted on the Lineville Lagoon effluent indicated that there was a significant difference to *Ceriodaphnia dubia* reproduction and *Pimephales promelas* growth when exposed to a 100% effluent concentration (Appendix A).

Effluent samples were also collected for laboratory analyses in conjunction with the toxicity test. Results summarized in Appendix B showed that trace metal concentrations were below detectable limits. Ammonia levels were elevated in the composite sample collected on April 8, 1999.

Conclusions

The results of this study indicate the water quality of the unnamed tributary below the Lineville Lagoon discharge to be “slightly impaired” as compared to the upstream station. Adverse impact to the macroinvertebrate community below the discharge was evidenced by lower taxa richness. The data from LS-3, further downstream from the discharge, suggest that the macroinvertebrate community had recovered. A decline was observed in the macroinvertebrate assessments between CRCC-1 and CRCC-2. However, since the downstream station was still evaluated as “good”, the impact observed is slight and can not be directly linked to the effects of the unnamed tributary.

The Water Use Classification for the unnamed tributary and this segment of Crooked Creek is Fish & Wildlife, which specifies the best usage of waters to be suitable for fishing, propagation of fish, aquatic life, and wildlife, and any other usage except for swimming, and water-contact sports or as a source of water supply for drinking or food processing purposes (Rules and Regulations: Water Quality Criteria and Use Classifications, Water Division-Water Quality Program, ADEM, Ch.335-6-10). Based on the limited data available, the unnamed tributary and the sample reaches of Crooked Creek do appear to meet the chemical/physical parameters of the Fish & Wildlife Water Use Classification Criteria. However, there was some sewage type water odor at station LS-2 for approximately 50 yards below the lagoon discharge and a sewage/manure type sediment odor at station LS-3.

TABLE 1

Aquatic Macroinvertebrate Habitat/Data

	LS-1	LS-2	LS-3	CRCC-1	CRCC-2
Habitat Assessment Score	152	161	171	203	202.5
Habitat Quality (% comparability to upstream station)		106%	113%		100%
Taxa Richness (water quality increases as the # increases)	37	29	41	62	44
EPT Taxa Richness (water quality increases as the # increases)	7	5	12	22	13
Biotic Index (water quality decreases as the # increases)	5.00	5.36	4.77	4.73	5.03
#EPT / (#EPT + # Chironomidae) (water quality increases as the # approaches 1)	0.37	0.20	0.72	0.84	0.68
Stream Condition Category (based on draft multimetric guidelines)	Good/Fair	Fair to Fair/Good	Good	Good/ Excellent	Good
Biological Condition Scoring Criteria (as compared to a site specific control)		Slightly Impaired	Non-impaired		Slightly Impaired

Evaluation Guidelines

METRIC	RANGE			INTERPRETATION
Habitat Assessment	170-220 118-169 60-117 0-59			Optimal Sub-optimal Marginal Poor
Stream Condition Category (use average of the three scores)	Score	EPT	TXRI	BI
	6	>19	>64	<5.0	Excellent
	4	19-13	64-42	5.0-6.8	Good
	2	12-7	41-21	6.9-8.4	Fair
	0	<7	<21	>8.4	Poor

TABLE 2
Chemical Analyses & Field Parameters

Parameter	L-WWTP	LS-1	LS-2	LS-3	CRCC-1	CRCC-2
Organics (ug/L)						
Diazinon	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Miscellaneous Inorganics (mg/L)						
Total Alkalinity	105.0	30.0	42.0	28.0	22.0	23.0
CBOD	10.8	1.9	3.1	2.4	2.0	2.2
CBOD Ultimate	7.4	N/A	N/A	N/A	N/A	N/A
Total Dissolved Solids	248.0	69.0	94.0	85.0	85.0	72.0
Total Suspended Solids	19.0	10.0	31.0	6.00	6.00	5.00
Nutrients (mg/L)						
Ammonia	1.49	<0.015	0.27	<0.015	<0.015	<0.015
Nitrate	14.23	0.63	0.89	1.27	2.85	2.19
Phosphate	1.17	0.01	0.25	0.16	0.32	0.23
Total Kjeldahl Nitrogen	5.70	0.16	0.51	0.66	0.15	<0.15
Total Organic Nitrogen	4.21	0.16	0.24	0.66	0.15	<0.2
Trace Metals (mg/L except those noted)						
Arsenic (ug/L)	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Cadmium	0.004	<0.003	<0.003	<0.003	<0.003	<0.003
Chromium	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Copper	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Hexavalent Chromium	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Lead (ug/L)	<2.0	4.09	<2.0	<2.0	<2.0	<2.0
Mercury (ug/L)	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Nickel	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Silver	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Zinc	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Dissolved Metals (same as identified above)	<mdl	<mdl	<mdl	<mdl	<mdl	<mdl
Fecal Coliform (colonies/100mL)						
Fecal Coliform Bacteria	est. 53	127	200	120	36	53
Field Parameters						
pH (standard units)	7.5	7.2	7.4	7.2	7.5	7.4
Conductivity (umhos/cm)	381	88	133	113	104	98
Dissolved Oxygen (mg/L)	5.1	8.4	7.5	7.9	8.6	8.6
Turbidity (NTU)	6.8	8.8	11	5.3	6.1	6.4
Water Temperature (C)	29	26	25	23	22	22
Air Temperature (C)	32	28	28	29	27.5	25
Flow (cfs)	0.1	0.8	0.9	0.9	19.4	20.0

Hardness parameter was not determined due to a laboratory error.

LEGEND
<##.## less than method detection limit

APPENDIX A

Toxicity Test Report

ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
FIELD OPERATIONS DIVISION
ENVIRONMENTAL INDICATORS SECTION
BIOASSAY UNIT

TOXICITY TEST REPORT

1. GENERAL

NPDES PERMIT NO.: 0050644 DSN: 001 COUNTY: Clay
Facility Name: Lineville Lagoon
Receiving Water: unn trib to Crooked Creek Design Flow: 0.5
Test Type: Short-term Chronic Screening
Test Id. #: 990406-01

Test Organism	Date/Time Started YYMMDD HHMM	Date/Time Ended YYMMDD HHMM	Control Validity (Acceptable/Unacceptable)
Ceriodaphnia dubia	990407 1255	990414 1300	Acceptable
Pimephales promelas	990407 1330	990414 1310	Acceptable

2A. SUMMARY OF RESULTS FOR SCREENING TEST

Test Org.	Effluent Conc.	Test Number (1) Surv	(1) Repro	(1) Grow	(2) Surv	(2) Repro	(2) Grow	(3) Surv	(3) Repro	(3) Grow	(4) Surv	(4) Repro	(4) Grow
C. d.	100%	PASS	FAIL	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
P. p.	100%	PASS	-----	FAIL	-----	-----	-----	-----	-----	-----	-----	-----	-----

3. LABORATORY ANALYSES OF UNDILUTED SAMPLES(S)

Sample Id.	pH su	Alkalinity mg/L as CaCO3	Hardness mg/L as CaCO3	Conductivity umhos/cm @ °C	TRC mg/L
990406-01	8.0	120	59	379 at 24.4	-----
990408-01	7.9	114	57	394 at 24.9	-----
990410-01	7.8	113	58	396 at 25.1	-----

4. SAMPLE COLLECTION:

Were split samples collected?: No
Were samples collected as specified in NPDES Permit (Location and/or Type)? No. The first sample was grab collection due to a problem with the battery.

Sample Id.	Sample(s) Collected YYMMDD HHMM to YYMMDD HHMM	Arrival Temp (°C)	Used in Test(s) YYMMDD to YYMMDD
990406-01	990406 1100 to N/A	2	990407 to 990408
990408-01	990407 1000 to 990408 0945	1	990409 to 990410
990410-01	990409 0900 to 990410 0845	1	990411 to 990413

5.CONTROL/DILUTION WATER

Carboy #	Preparation YYMMDD	Begin Use YYMMDD	Initial Water Chemistries pH (su)	Alkalinity (mg/L)	Hardness (mg/L)	Conductivity @ °C (umhos/cm)
C-2	990405	990407	8.1	69	88	322 at 25.8
C-3	990407	990413	8.2	68	86	321 at 25.6

PERMITTEE: Lineville Lagoon NPDES #: 0050644 DSN: 001 TEST Id #: 990406-01

6. TOXICITY TEST INFORMATION

Test Organism	Organism Age	Organism Source	Org./Test Vessel	Replicates/Conc.
C.d.	<24h	ADEM In-house cultures	1	10
P.p.	<24h	ADEM In-house cultures	15	4

Test Organism	Temperature Range (°C)	D.O. Range (mg/L)	pH Range (su)	Light Intensity Average (ft-c)
C.d.	24.0 - 25.7	7.7 - 9.6	7.8 - 8.4	86
P.p.	24.0 - 25.7	5.0 - 8.9	7.2 - 8.0	86

7. FEEDING: Fed Daily

Brine Shrimp Fed 0.15 mL Suspension of Newly Hatched Larvae 2 Times Daily.
YCT Fed 0.155 mL Suspension Containing 1800 mg/L TSS Daily.
Algae Fed 0.155 mL Suspension Containing ~ 3.2 x 10^7 Algal Cells/mL Daily.

8. REFERENCE TOXICANT TESTS

TOXICANT - Sodium Chloride (NaCl)

Test Organism	Test Date YYMMDD	Results LC50 (mg/L)	95% Confidence Interval (mg/L)
C.d.	990330	1746.33	1664.29/1832.42
P.p.	990330	6864.56	6651.60/7084.33

9. TEST CONDITION VARIABILITY

A. Deviations From Standard Test Conditions: The first sample was grab collection instead of composite due to a problem with the battery. The fish were dried at 102°C for 17.5 hours. The P.p. control data is from a concurrent test.

B. Test Solution Manipulations or Test Modifications

- ☐ Dechlorination
- ☐ Aeration during the test
- ☐ Aeration prior to test initiation or sample renewal
- ☒ Filtration
- ☐ pH adjustment
- ☐ NO sample modifications

All samples were filtered to remove indigenous organisms which could attack or be confused with the test organisms.

PERMITTEE: Lineville Lagoon NPDES #: 0050644 DSN: 001 TEST Id #: 990406-01

11. CHRONIC SCREENING TOXICITY TESTS RESULTS **TEST ORGANISM: Ceriodaphnia dubia**

Test Validity:
Is survival in the CONTROL ≥ 80%? Yes
Are Average Neonates/Surviving Female in the CONTROL ≥ 15.0? Yes
Did 60% of the CONTROL Females Produce Their Third Brood? Yes

SURVIVAL **CHRONIC TOXICITY INDICATED? PASS**

Solution Concentration (%)	% Survival at 7 days
Control (0%)	100
100	90

STATISTICAL ANALYSES (Using proportion surviving):
☒ No Statistical Analysis Necessary

COMMENTS: None

REPRODUCTION **CHRONIC TOXICITY INDICATED? FAIL**

Solution Concentration (%)	Reproduction (Average # young /female)
Control (0%)	21.1
100	9.5

STATISTICAL ANALYSES (Using number of neonates):
Shapiro Wilk's Test (Normality)
Test Statistic: 0.9838 Critical Value: 0.8680 (Parametric)
Normally Distributed ☒ Yes (if test stat is > critical value) GOTO VARIANCE F-TEST
☐ No (if test stat is < critical value) GOTO WILCOXON RANK SUM TEST
F-TEST
F Statistic: 2.5955 Critical F: 6.5411
Variance ☒ Equal (if f stat is < critical f) GOTO T-TEST
☐ Unequal (if f stat is > critical f) GOTO MODIFIED T-TEST
T-TEST
t Statistic: 2.5198 Critical t value: 1.7341
Significant Difference ☒ YES (if t stat is > critical t) FAIL
☐ NO (if t stat is < critical t) PASS

COMMENTS: None

11. CHRONIC SCREENING TOXICITY TESTS RESULTS **TEST ORGANISM: Pimephales promelas**

Test Validity: Is survival in the CONTROL ≥ 80%? Yes
Is mean dry weight of surviving CONTROL fish ≥ 0.25mg? Yes

SURVIVAL **CHRONIC TOXICITY INDICATED? PASS**

Solution Concentration (%)	% Survival at 7 days
Control (0%)	98
100	90

STATISTICAL ANALYSES (Using Survival data as proportion surviving that is arc sine transformed):
☒ No Statistical Analysis Necessary

COMMENTS: The control data is from a concurrent test.

GROWTH **CHRONIC TOXICITY INDICATED? FAIL**

Solution Concentration (%)	Mean dry weight (mg)
Control (0%)	0.653
100	0.538

STATISTICAL ANALYSES (Using mean dry weights):

Shapiro Wilk's Test (Normality)
Test Statistic: 0.9215 Critical Value: 0.7490 (Parametric)
Normally Distributed ☒ Yes (if test stat is > critical value) GOTO VARIANCE F-TEST
☐ No (if test stat is < critical value) GOTO WILCOXON RANK SUM TEST
F-TEST
F Statistic: 1.0618 Critical F: 47.47
Variance ☒ Equal (if f stat is < critical f) GOTO T-TEST
☐ Unequal (if f stat is > critical f) GOTO MODIFIED T-TEST
T-TEST
t Statistic: 3.4478 Critical t value: 1.9432
Significant Difference ☒ YES (if t stat is > critical t) FAIL
☐ NO (if t stat is < critical t) PASS

COMMENTS: None

Signature: _____ Date: _____

APPENDIX B

Chemical Analyses of Samples Collected for Toxicity Testing

Chemical Analysis of Samples Collected for Toxicity Testing

Facility Name: Lineville Lagoon
Location: Clay Co.
NPDES #: 0050644 DSN: 001
Collection Date: 4/8/99

PARAMETER	Result	
Arsenic	U 10.0	µg/l
Cadmium	U 0.003	mg/l
Chromium	U 0.015	mg/l
Copper	U 0.02	mg/l
Lead by Graphite Furnace	U 2.00	µg/l
Mercury	U 0.3	µg/l
Nickel	U 0.03	mg/l
Silver	U 0.015	mg/l
Zinc	U 0.03	mg/l
Dissolved Arsenic	U 0.0100	mg/l
Dissolved Cadmium	U 0.0030	mg/l
Dissolved Chromium	U 0.015	mg/l
Dissolved Copper	U 0.02	mg/l
Dissolved Lead	U 2.0	µg/l
Dissolved Mercury	U 0.5	µg/l
Dissolved Nickel	U 0.03	mg/l
Dissolved Silver	U 0.015	mg/l
Dissolved Zinc	U 0.03	mg/l

CBOD	4.8	mg/l
TSS	16.0	mg/l
Ammonia	11.68	mg/l

U denotes results less than instrument detection limit.

APPENDIX C

Diurnal Field Parameters

Tributary to Crooked Creek - Lineville
Station LS-1
June 6 - 8, 1999

Date	Time	Temp	DO%	SpCond	pH	DO
MMDDYY	HHMMSS	°C	Sat	mS/cm	Units	mg/l
60899	140000	24.61	117.2	0.09	7.25	9.72
60899	141500	24.9	118.4	0.089	7.27	9.78
60899	143000	24.58	115.6	0.089	7.28	9.6
60899	144500	24.94	117.6	0.089	7.29	9.7
60899	150000	25.36	119.7	0.088	7.3	9.8
60899	151500	25.38	120	0.088	7.31	9.82
60899	153000	25.59	120.3	0.088	7.31	9.8
60899	154500	25.25	116.2	0.088	7.3	9.53
60899	160000	24.57	108.1	0.088	7.27	8.98
60899	161500	23.94	103.4	0.089	7.24	8.69
60899	163000	23.73	105.8	0.088	7.23	8.92
60899	164500	23.72	108.6	0.088	7.23	9.16
60899	170000	23.69	109.3	0.087	7.23	9.23
60899	171500	23.66	109.4	0.087	7.23	9.24
60899	173000	23.58	108.4	0.086	7.23	9.17
60899	174500	23.46	106.9	0.086	7.21	9.06
60899	180000	23.28	105.1	0.086	7.19	8.94
60899	181500	23.11	102.3	0.086	7.17	8.73
60899	183000	22.9	100	0.086	7.15	8.57
60899	184500	22.7	97.6	0.087	7.14	8.39
60899	190000	22.51	95	0.087	7.12	8.2
60899	191500	22.31	92.4	0.087	7.1	8
60899	193000	22.14	90.2	0.086	7.09	7.84
60899	194500	21.98	88.4	0.086	7.08	7.71
60899	200000	21.81	87.1	0.086	7.07	7.62
60899	201500	21.66	86	0.086	7.06	7.55
60899	203000	21.53	85.2	0.085	7.05	7.49
60899	204500	21.41	85	0.085	7.05	7.5
60899	210000	21.31	84.4	0.085	7.04	7.46
60899	211500	21.23	84.5	0.085	7.04	7.48
60899	213000	21.15	84.3	0.084	7.04	7.47
60899	214500	21.06	84.2	0.084	7.03	7.48
60899	220000	20.99	84.2	0.084	7.02	7.48
60899	221500	20.92	83.6	0.084	7.02	7.44
60899	223000	20.86	83.6	0.083	7.02	7.45

60899	224500	20.8	83.8	0.083	7.01	7.47
60899	230000	20.75	83.7	0.083	7.01	7.47
60899	231500	20.71	83.5	0.083	7.01	7.47
60899	233000	20.66	83	0.083	7.01	7.43
60899	234500	20.6	83	0.083	7	7.44
60999	0	20.56	82.9	0.082	7	7.44
60999	1500	20.51	83.1	0.082	7	7.46
60999	3000	20.46	82.6	0.082	7	7.42
60999	4500	20.42	82.3	0.082	7	7.4
60999	10000	20.37	82.8	0.082	7	7.45
60999	11500	20.33	82.4	0.082	7	7.42
60999	13000	20.29	82.4	0.082	7	7.43
60999	14500	20.25	82.4	0.082	7	7.43
60999	20000	20.21	82.1	0.081	7	7.41
60999	21500	20.18	82.6	0.081	7.01	7.46
60999	23000	20.16	82.3	0.081	7.01	7.44
60999	24500	20.13	82.2	0.081	7.01	7.43
60999	30000	20.1	82.4	0.082	7.01	7.46
60999	31500	20.07	82.2	0.082	7.01	7.44
60999	33000	20.03	82	0.081	7.01	7.43
60999	34500	19.99	82.2	0.082	7.02	7.46
60999	40000	19.95	81.9	0.082	7.02	7.43
60999	41500	19.91	81.9	0.081	7.02	7.44
60999	43000	19.86	82.1	0.081	7.02	7.46
60999	44500	19.82	81.6	0.082	7.02	7.43
60999	50000	19.79	81.4	0.081	7.02	7.41
60999	51500	19.76	81.1	0.082	7.02	7.39
60999	53000	19.73	81.6	0.082	7.02	7.44
60999	54500	19.7	81.5	0.082	7.02	7.43
60999	60000	19.68	81.8	0.082	7.03	7.46
60999	61500	19.68	82.4	0.082	7.03	7.51
60999	63000	19.72	83.7	0.081	7.04	7.63
60999	64500	19.78	84.5	0.081	7.04	7.7
60999	70000	19.86	85.1	0.081	7.04	7.74
60999	71500	19.95	85.8	0.081	7.04	7.79
60999	73000	20.04	86.7	0.081	7.04	7.85
60999	74500	20.12	86.9	0.081	7.04	7.86
60999	80000	20.21	88	0.081	7.05	7.94
60999	81500	20.3	89.3	0.081	7.05	8.05
60999	83000	20.4	90.2	0.081	7.06	8.12
60999	84500	20.52	91.8	0.081	7.06	8.24
60999	90000	20.66	93.3	0.081	7.07	8.35

60999	91500	20.78	94.6	0.081	7.07	8.45
60999	93000	20.9	95.2	0.081	7.07	8.48
60999	94500	21.03	96.6	0.081	7.08	8.59
60999	100000	21.2	98.2	0.081	7.09	8.7
60999	101500	21.37	99.5	0.081	7.09	8.78
60999	103000	21.55	100.3	0.081	7.1	8.82
60999	104500	21.75	100.7	0.081	7.11	8.82
60999	110000	21.93	101.6	0.081	7.11	8.87
60999	111500	22.14	103.2	0.081	7.11	8.97
60999	113000	22.35	104.5	0.081	7.12	9.05
60999	114500	22.56	107	0.081	7.14	9.23
60999	120000	22.79	108.8	0.081	7.15	9.35
60999	121500	23.02	110	0.081	7.16	9.4
60999	123000	23.21	110.3	0.081	7.17	9.4
60999	124500	23.63	112.1	0.081	7.19	9.47
60999	130000	23.9	113.3	0.081	7.19	9.52
60999	131500	24.13	113.3	0.081	7.2	9.49
60999	133000	23.99	110.2	0.081	7.18	9.25
60999	134500	23.9	107.9	0.081	7.17	9.07
60999	140000	23.87	108.6	0.082	7.16	9.14
60999	141500	24.28	112.8	0.082	7.18	9.42
60999	143000	24.75	114.9	0.082	7.19	9.51
60999	144500	25.21	117	0.082	7.2	9.61
60999	150000	25.51	116.9	0.081	7.21	9.54
60999	151500	25.57	116.4	0.082	7.21	9.49
60999	153000	25.21	113.5	0.082	7.2	9.32
60999	154500	24.68	108.9	0.083	7.17	9.03
60999	160000	24.26	106	0.083	7.15	8.85
60999	161500	23.91	104.3	0.083	7.13	8.77
60999	163000	23.63	102.8	0.083	7.12	8.69
60999	164500	23.47	102	0.084	7.1	8.64
60999	170000	23.4	101.5	0.084	7.1	8.61
60999	171500	23.47	102.8	0.084	7.1	8.72
60999	173000	23.56	103.2	0.084	7.1	8.74
60999	174500	23.55	102.4	0.083	7.09	8.67
60999	180000	23.36	100.4	0.083	7.07	8.53
60999	181500	23.18	98.5	0.084	7.07	8.4
60999	183000	22.98	95.9	0.082	7.08	8.2
60999	184500	22.74	92.2	0.081	7.07	7.92
60999	190000	22.53	89.3	0.081	7.07	7.71
60999	191500	22.31	87.4	0.081	7.06	7.58
60999	193000	22.13	85.8	0.081	7.05	7.46

60999	194500	22	85.1	0.08	7.04	7.41
60999	200000	21.9	84	0.08	7.03	7.34
60999	201500	21.35	90.8	0.068	7.01	8.02
60999	203000	20.98	91.7	0.064	6.88	8.15
60999	204500	21.35	80.7	0.078	6.86	7.12
60999	210000	21.55	86.9	0.065	6.77	7.65
60999	211500	21.3	88.4	0.064	6.83	7.81
60999	213000	21.1	86.9	0.075	6.86	7.71
60999	214500	21.37	85.6	0.103	6.97	7.56
60999	220000	21.62	85.1	0.117	7.09	7.47
60999	221500	21.65	84.9	0.119	7.1	7.46
60999	223000	21.64	84.6	0.119	7.1	7.42
60999	224500	21.64	84.5	0.117	7.1	7.42
60999	230000	21.62	84.1	0.115	7.11	7.38
60999	231500	21.57	83.8	0.114	7.1	7.37
60999	233000	21.51	83.4	0.112	7.1	7.34
60999	234500	21.44	83.1	0.111	7.1	7.32
61099	0	21.38	82.8	0.11	7.09	7.3
61099	1500	21.33	82.3	0.11	7.09	7.27
61099	3000	21.28	81.5	0.11	7.08	7.2
61099	4500	21.24	81.4	0.109	7.08	7.2
61099	10000	21.2	81.2	0.109	7.07	7.19
61099	11500	21.16	80.7	0.109	7.07	7.15
61099	13000	21.12	80.4	0.108	7.07	7.13
61099	14500	21.08	80.1	0.108	7.06	7.11
61099	20000	21.04	79.8	0.114	7.06	7.09
61099	21500	20.93	79.9	0.119	7.05	7.11
61099	23000	20.69	80.2	0.053	7.05	7.18
61099	24500	20.55	80.7	0.043	7.09	7.24
61099	30000	20.31	80.8	0.042	7.11	7.28
61099	31500	20.36	80.7	0.042	7.11	7.26
61099	33000	20.31	80.3	0.042	7.12	7.24
61099	34500	20.3	80.2	0.043	7.1	7.23
61099	40000	20.23	80.4	0.043	7.1	7.25
61099	41500	20.24	80	0.043	7.1	7.22
61099	43000	20.17	79.8	0.044	7.09	7.21
61099	44500	20.16	79.7	0.043	7.09	7.2
61099	50000	20.13	79.6	0.043	7.11	7.2
61099	51500	20.12	79.8	0.043	7.14	7.22
61099	53000	20.02	80.1	0.043	6.96	7.26
61099	54500	20.04	79.9	0.043	6.97	7.24
61099	60000	20.03	79.8	0.043	6.97	7.23

61099	61500	20.07	79.6	0.042	6.98	7.2
61099	63000	20.12	79.8	0.043	6.99	7.22
61099	64500	20.18	79.8	0.043	7.01	7.21
61099	70000	20.28	79.6	0.043	7.05	7.18
61099	71500	20.38	79.5	0.043	7.06	7.15
61099	73000	20.48	79.3	0.043	7.07	7.12
61099	74500	20.59	79.2	0.043	7.07	7.09
61099	80000	20.69	78.6	0.042	7.07	7.03
61099	81500	20.83	78.7	0.042	7.06	7.02
61099	83000	21.01	78.6	0.042	7.06	6.99
61099	84500	21.16	79.2	0.042	7.06	7.02
61099	90000	21.34	78.8	0.042	7.06	6.96
61099	91500	21.42	78.3	0.042	7.05	6.91
61099	93000	21.58	78.4	0.042	7.05	6.89
61099	94500	21.67	78.2	0.042	7.04	6.86
61099	100000	21.83	79	0.042	7.05	6.91
61099	101500	22.06	78.6	0.042	7.04	6.85
61099	103000	22.25	78.9	0.042	7.03	6.85
61099	104500	22.36	78.9	0.042	7.02	6.84
61099	110000	22.46	78.4	0.042	7.01	6.78

Recovery finished at 061099 155034

Tributary to Crooked Creek - Lineville
Station LS-2
June 6 - 8, 1999

Date	Time	Temp	DO%	DO	SpCond	pH
MMDDYY	HHMMSS	øC	Sat	mg/l	mS/cm	Units
60899	140000	24.34	71.8	5.99	0.125	7.37
60899	141500	24.46	68.6	5.7	0.123	7.09
60899	143000	24.7	67.3	5.58	0.123	7.01
60899	144500	24.89	68.3	5.64	0.122	6.97
60899	150000	24.96	68.9	5.68	0.122	6.95
60899	151500	25.14	68.8	5.66	0.123	6.93
60899	153000	25.34	68.8	5.63	0.121	6.92
60899	154500	25.4	68.9	5.64	0.12	6.91
60899	160000	25.32	67.7	5.55	0.117	6.91
60899	161500	25.02	66.5	5.48	0.116	6.9
60899	163000	24.7	64.1	5.31	0.116	6.87
60899	164500	24.46	63.8	5.31	0.116	6.86
60899	170000	24.35	64.1	5.34	0.116	6.86
60899	171500	24.25	64.4	5.38	0.116	6.86
60899	173000	24.19	64.3	5.38	0.115	6.86
60899	174500	24.14	63.7	5.33	0.115	6.86
60899	180000	24.08	62.9	5.27	0.114	6.85
60899	181500	23.96	61.6	5.18	0.113	6.84
60899	183000	23.82	62.1	5.23	0.113	6.83
60899	184500	23.66	61.3	5.17	0.112	6.82
60899	190000	23.49	60.1	5.09	0.112	6.81
60899	191500	23.29	59.7	5.07	0.111	6.8
60899	193000	23.1	59.1	5.04	0.11	6.79
60899	194500	22.91	58	4.97	0.11	6.78
60899	200000	22.72	57.2	4.92	0.109	6.77
60899	201500	22.54	56.8	4.9	0.108	6.76
60899	203000	22.37	56.2	4.86	0.107	6.75
60899	204500	22.22	54.8	4.75	0.107	6.74
60899	210000	22.08	55.3	4.81	0.106	6.74
60899	211500	21.95	54.9	4.79	0.105	6.74
60899	213000	21.84	53.7	4.7	0.105	6.73
60899	214500	21.75	54.9	4.81	0.105	6.73
60899	220000	21.65	54.2	4.76	0.104	6.72
60899	221500	21.59	54	4.74	0.105	6.72
60899	223000	21.49	54.2	4.77	0.104	6.72

60899	224500	21.41	54.3	4.79	0.103	6.72
60899	230000	21.33	54.4	4.81	0.103	6.71
60899	231500	21.24	54	4.77	0.102	6.71
60899	233000	21.2	54.3	4.81	0.102	6.71
60899	234500	21.13	54.5	4.83	0.102	6.7
60999	0	21.06	54.1	4.81	0.101	6.7
60999	1500	21.01	54.4	4.84	0.101	6.7
60999	3000	20.94	54.8	4.87	0.1	6.7
60999	4500	20.87	55.4	4.93	0.1	6.7
60999	10000	20.82	55.5	4.95	0.1	6.69
60999	11500	20.76	54.6	4.88	0.099	6.69
60999	13000	20.7	55.1	4.93	0.098	6.69
60999	14500	20.63	55.1	4.93	0.097	6.69
60999	20000	20.56	55.4	4.96	0.097	6.69
60999	21500	20.51	55.6	4.99	0.097	6.69
60999	23000	20.45	56.1	5.04	0.096	6.68
60999	24500	20.4	55.2	4.96	0.096	6.68
60999	30000	20.37	53.5	4.82	0.096	6.69
60999	31500	20.33	55.1	4.96	0.095	6.69
60999	33000	20.29	54.9	4.95	0.095	6.69
60999	34500	20.24	54.6	4.92	0.095	6.68
60999	40000	20.18	56.5	5.11	0.094	6.69
60999	41500	20.13	56.1	5.07	0.094	6.68
60999	43000	20.08	57.4	5.19	0.093	6.68
60999	44500	20.04	57.3	5.19	0.094	6.69
60999	50000	19.99	55.8	5.06	0.093	6.68
60999	51500	19.94	54.7	4.97	0.093	6.68
60999	53000	19.91	54.1	4.91	0.093	6.69
60999	54500	19.87	54.9	4.99	0.093	6.68
60999	60000	19.83	55	5	0.093	6.68
60999	61500	19.81	54.7	4.97	0.092	6.68
60999	63000	19.82	55.4	5.04	0.092	6.68
60999	64500	19.85	55.4	5.04	0.092	6.68
60999	70000	19.91	55.8	5.07	0.092	6.68
60999	71500	19.97	56.3	5.1	0.091	6.69
60999	73000	20.07	55.6	5.03	0.092	6.69
60999	74500	20.17	56.1	5.07	0.092	6.69
60999	80000	20.27	57.5	5.19	0.092	6.7
60999	81500	20.39	57.1	5.14	0.092	6.7
60999	83000	20.53	56.3	5.05	0.093	6.71
60999	84500	20.64	57.5	5.15	0.093	6.72
60999	90000	20.75	57.5	5.14	0.093	6.72

60999	91500	20.87	58.5	5.22	0.093	6.73
60999	93000	20.99	58	5.16	0.093	6.73
60999	94500	21.13	58.3	5.17	0.094	6.74
60999	100000	21.3	59.5	5.26	0.094	6.74
60999	101500	21.44	61.1	5.39	0.094	6.75
60999	103000	21.61	62.7	5.5	0.095	6.76
60999	104500	21.76	62.7	5.49	0.095	6.77
60999	110000	21.91	64.4	5.62	0.095	6.77
60999	111500	22.07	64.6	5.62	0.094	6.77
60999	113000	22.21	64.1	5.57	0.094	6.78
60999	114500	22.38	62.6	5.42	0.094	6.78
60999	120000	22.55	63.3	5.46	0.094	6.79
60999	121500	22.74	63.1	5.42	0.094	6.8
60999	123000	22.95	64.9	5.55	0.095	6.81
60999	124500	23.14	65.6	5.59	0.094	6.81
60999	130000	23.35	65.6	5.57	0.095	6.82
60999	131500	23.62	66.7	5.64	0.095	6.82
60999	133000	23.76	66.8	5.63	0.094	6.83
60999	134500	23.85	66	5.55	0.093	6.82
60999	140000	23.83	65.3	5.5	0.093	6.81
60999	141500	23.88	66.8	5.62	0.093	6.81
60999	143000	24.06	65.9	5.52	0.094	6.82
60999	144500	24.34	66.6	5.56	0.095	6.83
60999	150000	24.64	67.1	5.56	0.095	6.83
60999	151500	24.91	66.8	5.51	0.095	6.84
60999	153000	25.06	66.4	5.46	0.094	6.83
60999	154500	25.06	66.5	5.47	0.092	6.82
60999	160000	24.9	64.2	5.3	0.093	6.82
60999	161500	24.64	63.5	5.27	0.093	6.81
60999	163000	24.37	62.8	5.24	0.093	6.8
60999	164500	24.14	62	5.19	0.093	6.79
60999	170000	23.92	60.6	5.09	0.093	6.78
60999	171500	23.81	61.3	5.16	0.093	6.77
60999	173000	23.78	60.1	5.07	0.093	6.77
60999	174500	23.78	61.4	5.17	0.093	6.77
60999	180000	23.76	60.4	5.1	0.092	6.77
60999	181500	23.65	61.8	5.22	0.089	6.76
60999	183000	23.5	63.8	5.4	0.09	6.75
60999	184500	23.32	61	5.18	0.09	6.76
60999	190000	23.11	61.3	5.23	0.088	6.75
60999	191500	22.89	58.7	5.04	0.087	6.75
60999	193000	22.7	58.2	5.01	0.087	6.74

60999	194500	22.52	58.3	5.03	0.086	6.74
60999	200000	22.34	58.9	5.1	0.086	6.73
60999	201500	21.75	65	5.69	0.081	6.7
60999	203000	21.14	66.7	5.91	0.061	6.5
60999	204500	21.01	69.9	6.21	0.064	6.4
60999	210000	21.19	81.6	7.23	0.065	6.23
60999	211500	21.39	85.8	7.57	0.066	6.35
60999	213000	21.06	85.6	7.59	0.068	6.39
60999	214500	21.15	81.9	7.26	0.088	6.53
60999	220000	21.4	80.2	7.07	0.109	6.71
60999	221500	21.53	80.3	7.06	0.115	6.74
60999	223000	21.54	80.8	7.11	0.116	6.73
60999	224500	21.54	80.5	7.08	0.116	6.74
60999	230000	21.53	81.6	7.17	0.115	6.74
60999	231500	21.51	80.4	7.09	0.114	6.74
60999	233000	21.46	80.2	7.07	0.113	6.74
60999	234500	21.41	80	7.05	0.112	6.73
61099	0	21.35	79.6	7.02	0.111	6.73
61099	1500	21.31	78.9	6.97	0.111	6.73
61099	3000	21.26	78.4	6.93	0.111	6.72
61099	4500	21.23	77.8	6.89	0.111	6.72
61099	10000	21.21	77.4	6.85	0.112	6.71
61099	11500	21.18	77.1	6.83	0.112	6.71
61099	13000	21.15	76.5	6.78	0.112	6.71
61099	14500	21.13	76.3	6.76	0.112	6.71
61099	20000	21.12	76.1	6.75	0.113	6.71
61099	21500	21.04	75.4	6.7	0.111	6.7
61099	23000	21.05	75.5	6.71	0.113	6.7
61099	24500	21.02	75.2	6.68	0.114	6.7
61099	30000	20.99	74.7	6.64	0.114	6.69
61099	31500	20.96	74.6	6.63	0.114	6.69
61099	33000	20.92	74.5	6.63	0.114	6.7
61099	34500	20.9	74	6.59	0.114	6.69
61099	40000	20.87	74.2	6.61	0.114	6.7
61099	41500	20.85	74.5	6.64	0.114	6.7
61099	43000	20.82	73.9	6.6	0.115	6.7
61099	44500	20.8	73.7	6.58	0.115	6.7
61099	50000	20.78	73.7	6.58	0.115	6.69
61099	51500	20.76	73.7	6.58	0.116	6.69
61099	53000	20.75	73.2	6.54	0.116	6.69
61099	54500	20.73	73.2	6.54	0.116	6.69
61099	60000	20.72	72.8	6.51	0.117	6.69

61099	61500	20.71	72.9	6.52	0.117	6.69
61099	63000	20.7	73.1	6.53	0.116	6.69
61099	64500	20.7	73.3	6.55	0.116	6.69
61099	70000	20.71	74.1	6.62	0.116	6.69
61099	71500	20.73	73.8	6.59	0.116	6.7
61099	73000	20.77	73.9	6.6	0.117	6.7
61099	74500	20.81	74.3	6.63	0.116	6.7
61099	80000	20.84	74.6	6.65	0.116	6.69
61099	81500	20.9	74.4	6.63	0.116	6.69
61099	83000	20.97	74.7	6.65	0.117	6.69
61099	84500	21.05	75.3	6.68	0.117	6.7
61099	90000	21.18	75.1	6.65	0.117	6.7
61099	91500	21.27	75.2	6.65	0.118	6.7
61099	93000	21.39	75.6	6.67	0.118	6.7
61099	94500	21.45	76.1	6.71	0.118	6.71
61099	100000	21.49	75.9	6.68	0.118	6.71

Recovery finished at 061099 153904

Tributary to Crooked Creek - Lineville
Station LS-3
June 6 - 8, 1999

Date	Time	Temp	DO	SpCond	pH
MMDDYY	HHMMSS	øC	mg/l	mS/cm	Units
60899	143000	23.82	9.01	0.108	7.34
60899	144500	23.71	8.89	0.108	7.41
60899	150000	23.85	8.88	0.109	7.43
60899	151500	23.83	8.75	0.109	7.43
60899	153000	23.94	8.87	0.108	7.44
60899	154500	23.87	8.89	0.108	7.44
60899	160000	23.6	8.58	0.108	7.43
60899	161500	23.52	8.45	0.108	7.43
60899	163000	23.43	8.49	0.108	7.42
60899	164500	23.39	8.56	0.108	7.41
60899	170000	23.39	8.54	0.107	7.41
60899	171500	23.31	8.56	0.107	7.41
60899	173000	23.29	8.37	0.107	7.4
60899	174500	23.23	8.48	0.107	7.4
60899	180000	23.17	8.44	0.106	7.39
60899	181500	23.11	8.39	0.106	7.38
60899	183000	23.04	8.29	0.106	7.37
60899	184500	22.97	8.17	0.106	7.36
60899	190000	22.91	8.17	0.106	7.34
60899	191500	22.84	8.06	0.106	7.33
60899	193000	22.77	7.96	0.106	7.31
60899	194500	22.71	7.96	0.105	7.3
60899	200000	22.64	7.9	0.105	7.29
60899	201500	22.59	7.9	0.104	7.28
60899	203000	22.52	7.87	0.104	7.27
60899	204500	22.47	7.9	0.103	7.27
60899	210000	22.4	7.94	0.103	7.26
60899	211500	22.35	7.86	0.102	7.26
60899	213000	22.29	7.9	0.102	7.25
60899	214500	22.24	7.95	0.101	7.26
60899	220000	22.19	7.89	0.101	7.26
60899	221500	22.13	8.03	0.1	7.26
60899	223000	22.07	7.94	0.1	7.26
60899	224500	22	8.04	0.099	7.25

60899	230000	21.95	7.97	0.099	7.26
60899	231500	21.9	8.05	0.099	7.25
60899	233000	21.83	8	0.098	7.24
60899	234500	21.79	8.05	0.098	7.24
60999	0	21.73	8.08	0.098	7.24
60999	1500	21.67	8.02	0.098	7.23
60999	3000	21.61	8.08	0.097	7.23
60999	4500	21.55	8.12	0.097	7.23
60999	10000	21.5	8.17	0.097	7.22
60999	11500	21.45	8.13	0.096	7.22
60999	13000	21.39	8.12	0.096	7.22
60999	14500	21.32	8.18	0.095	7.22
60999	20000	21.26	8.14	0.095	7.22
60999	21500	21.18	8.17	0.094	7.21
60999	23000	21.14	8.22	0.094	7.21
60999	24500	21.08	8.2	0.094	7.22
60999	30000	21.01	8.29	0.093	7.22
60999	31500	20.96	8.3	0.093	7.22
60999	33000	20.89	8.28	0.092	7.22
60999	34500	20.82	8.3	0.092	7.21
60999	40000	20.75	8.31	0.091	7.22
60999	41500	20.68	8.38	0.091	7.22
60999	43000	20.62	8.41	0.091	7.21
60999	44500	20.56	8.27	0.09	7.21
60999	50000	20.5	8.43	0.09	7.21
60999	51500	20.43	8.43	0.089	7.22
60999	53000	20.38	8.46	0.089	7.21
60999	54500	20.32	8.45	0.088	7.21
60999	60000	20.26	8.53	0.088	7.2
60999	61500	20.23	8.6	0.088	7.2
60999	63000	20.21	8.62	0.087	7.21
60999	64500	20.21	8.73	0.087	7.22
60999	70000	20.23	8.77	0.086	7.22
60999	71500	20.27	8.85	0.086	7.23
60999	73000	20.33	8.87	0.085	7.24
60999	74500	20.39	8.99	0.085	7.24
60999	80000	20.45	9	0.085	7.26
60999	81500	20.57	9.05	0.084	7.27
60999	83000	20.69	9.17	0.084	7.28
60999	84500	20.8	9.23	0.083	7.28
60999	90000	20.91	9.28	0.083	7.3
60999	91500	21	9.32	0.083	7.31

60999	93000	21.11	9.39	0.082	7.33
60999	94500	21.25	9.24	0.082	7.34
60999	100000	21.44	9.39	0.082	7.35
60999	101500	21.58	9.44	0.081	7.36
60999	103000	21.73	9.45	0.081	7.37
60999	104500	21.86	9.37	0.081	7.38
60999	110000	22.06	9.39	0.081	7.39
60999	111500	22.13	9.67	0.081	7.4
60999	113000	22.17	9.66	0.08	7.42
60999	114500	22.31	9.61	0.08	7.43
60999	120000	22.37	9.65	0.08	7.43
60999	121500	22.54	9.64	0.079	7.44
60999	123000	22.58	9.58	0.079	7.44
60999	124500	22.83	9.18	0.079	7.44
60999	130000	22.97	9.53	0.079	7.45
60999	131500	23.18	9.55	0.079	7.46
60999	133000	23.05	9.37	0.079	7.46
60999	134500	23.08	9.25	0.079	7.45
60999	140000	23.18	9.25	0.08	7.45
60999	141500	23.33	9.22	0.08	7.44
60999	143000	23.46	9.27	0.08	7.45
60999	144500	23.64	9.3	0.079	7.45
60999	150000	23.78	9.31	0.079	7.46
60999	151500	23.75	9.24	0.079	7.47
60999	153000	23.66	9.2	0.079	7.47
60999	154500	23.53	9.07	0.08	7.47
60999	160000	23.43	9.01	0.079	7.45
60999	161500	23.35	8.96	0.079	7.45
60999	163000	23.26	8.88	0.08	7.43
60999	164500	23.23	8.86	0.08	7.43
60999	170000	23.21	8.85	0.08	7.41
60999	171500	23.23	8.82	0.08	7.4
60999	173000	23.23	8.85	0.08	7.41
60999	174500	23.22	8.8	0.08	7.4
60999	180000	23.15	8.72	0.08	7.39
60999	181500	23.14	8.69	0.08	7.39
60999	183000	23.11	8.57	0.08	7.38
60999	184500	23.01	8.44	0.081	7.36
60999	190000	22.94	8.38	0.081	7.35
60999	191500	22.88	8.31	0.081	7.34
60999	193000	22.81	8.22	0.081	7.31
60999	194500	22.76	8.2	0.081	7.3

60999	200000	22.66	8.15	0.08	7.29
60999	201500	22.34	8.74	0.068	7.12
60999	203000	21.93	8.79	0.069	7.07
60999	204500	21.44	8.51	0.058	6.94
60999	210000	21.33	8.5	0.058	6.85
60999	211500	22.07	8.87	0.072	6.96
60999	213000	21.42	9.46	0.066	6.98
60999	214500	21.45	9.49	0.065	7.01
60999	220000	21.43	9.38	0.065	7.04
60999	221500	21.32	9.35	0.065	7.06
60999	223000	21.21	9.3	0.067	7.07
60999	224500	21.15	9.23	0.073	7.09
60999	230000	21.14	9.15	0.082	7.09
60999	231500	21.16	9.06	0.09	7.11
60999	233000	21.17	8.96	0.095	7.14
60999	234500	21.17	8.87	0.098	7.16
61099	0	21.16	8.81	0.1	7.17
61099	1500	21.14	8.73	0.1	7.17
61099	3000	21.11	8.66	0.1	7.17
61099	4500	21.08	8.57	0.1	7.17
61099	10000	21.06	8.53	0.1	7.17
61099	11500	21.03	8.46	0.1	7.16
61099	13000	21.01	8.43	0.099	7.15
61099	14500	20.98	8.37	0.098	7.15
61099	20000	20.95	8.25	0.097	7.15
61099	21500	20.91	8.26	0.097	7.15
61099	23000	20.88	8.27	0.096	7.15
61099	24500	20.85	8.29	0.096	7.14
61099	30000	20.82	8.23	0.095	7.13
61099	31500	20.79	8.16	0.095	7.13
61099	33000	20.75	8.2	0.095	7.13
61099	34500	20.72	8.16	0.094	7.13
61099	40000	20.69	8.2	0.094	7.12
61099	41500	20.67	8.15	0.094	7.12
61099	43000	20.65	8.25	0.093	7.12
61099	44500	20.62	8.08	0.093	7.11
61099	50000	20.6	8.2	0.093	7.1
61099	51500	20.58	8.2	0.093	7.1
61099	53000	20.56	8.17	0.093	7.11
61099	54500	20.53	8.22	0.092	7.11
61099	60000	20.51	8.19	0.092	7.09
61099	61500	20.5	8.34	0.092	7.09

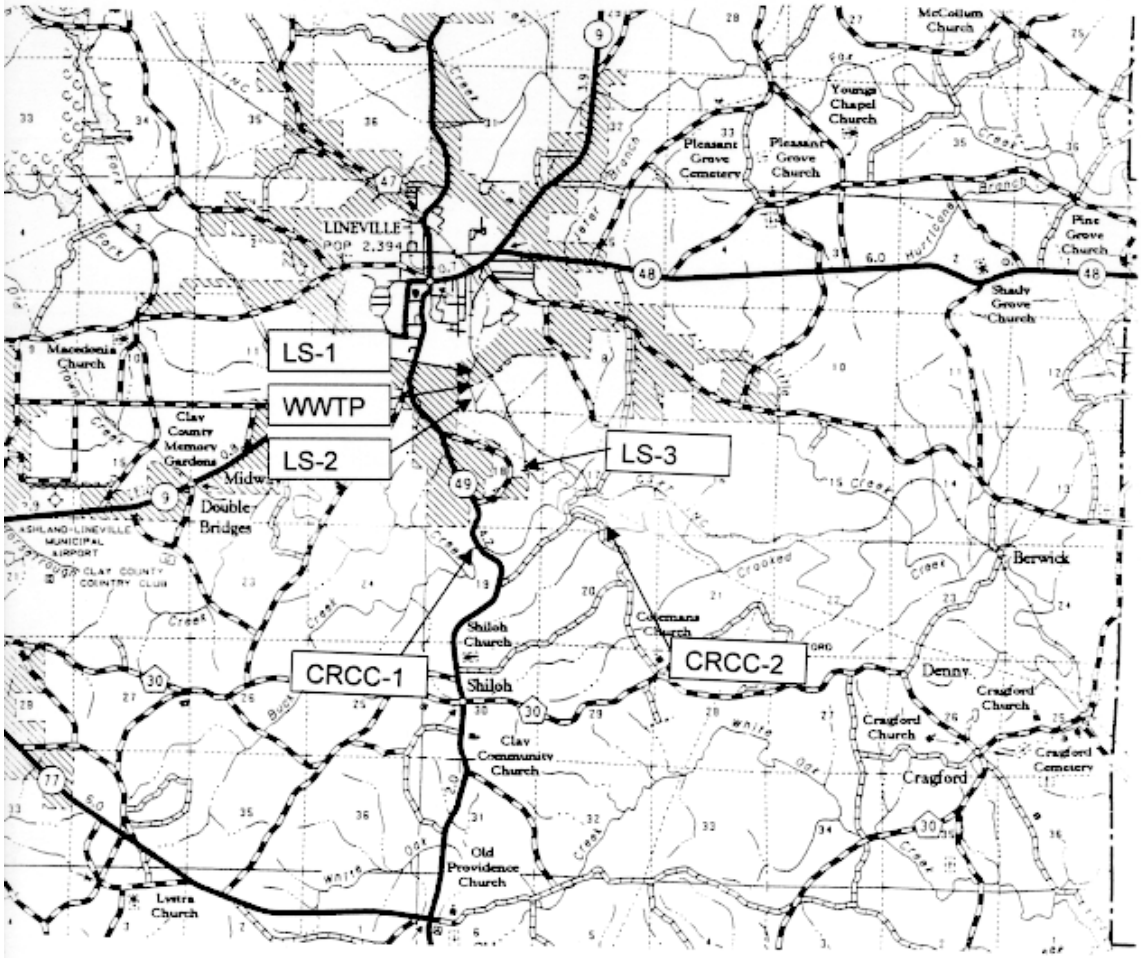
61099	63000	20.49	8.44	0.092	7.1
61099	64500	20.49	8.39	0.091	7.1
61099	70000	20.5	8.45	0.091	7.1
61099	71500	20.51	8.44	0.091	7.11
61099	73000	20.52	8.46	0.091	7.11
61099	74500	20.55	8.52	0.091	7.12
61099	80000	20.57	8.52	0.091	7.12
61099	81500	20.66	8.65	0.091	7.12
61099	83000	20.74	8.68	0.091	7.14
61099	84500	20.8	8.62	0.091	7.14
61099	90000	20.89	8.7	0.091	7.15
61099	91500	20.92	8.7	0.091	7.16
61099	93000	20.99	8.65	0.091	7.17
61099	94500	21.05	8.7	0.091	7.18
61099	100000	21.08	8.75	0.091	7.19

Recovery finished at 061099 161515

Crooked Creek
Lineville, AL

Figure 1

Station Location Map



LEGEND	
Not to scale	N ↑