Source Water Assessment Plan Report

City of Carrollton

Surface Water Intake
(WSID #0450002)

August 2002

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Introduction

Rationale and Purpose

The 1996 Amendments to the Federal Safe Drinking Water Act (SDWA) introduced a new approach for ensuring clean and safe drinking water served by public water suppliers in the United States. Building upon the past strengths of the Surface Water Treatment Rule, increases in water monitoring and other compliance measures, the U.S. Environmental Protection Agency (USEPA) and the Georgia Environmental Protection Division (GAEPD) are now advocating prevention as an important tool in the protection of public water suppliers from contamination and source protection. In order to implement prevention and protection, an assessment of potential pollution sources must first be conducted.

Georgia's Source Water Assessment Plan (SWAP) has a specific focus on water supply source protection and sharing like goals with other water quality protection and enhancement programs(e.g. GAEPD River Basin Management Planning and Nonpoint Source programs). These programs seek to prevent and control impairments to water quality as well as abate contamination sources currently impacting uses. With these programs sharing similar goals, care should be taken to integrate the activities of SWAP so that its implementation can compliment other water quality protection and enhancement programs.

Limitations

This report was prepared to assess threats to Carrollton's public water supply. It is based on published information and information obtained from local residents and stakeholders familiar with the assessment area. Not all potential or existing sources of groundwater or surface water contamination in the Carrollton area are identified. Only sources of contamination in the catchment area of the surface water intake are considered potential contamination sources. The catchment area is the land area to which atmospheric precipitation falls upon and flows downward to the intake structure.

Source Water Assessment Plan Funding

By the "Safe Drinking Water Act (SDWA) Amendments of 1996", Public L. 104-182, and amending title XIV of the Public Health Service Act, Congress has empowered the United States Environmental Protection Agency (EPA) to make capitalization grants to assist in establishing a drinking water state revolving fund (DWSRF) for assistance to public water systems in financing the cost of infrastructure needed to achieve or maintain compliance with SDWA requirements and to protect public health. Section 1452 of the SDWA authorizes States to provide funding for certain non-project activities, called Set-Asides, from the DWSRF for capacity development and source water assessment and protection for public water systems at the local government level. This funding will also assist EPD in compliance with the requirements of the Safe Drinking Water Amendments of 1996. EPD has appropriated funds for source water assessments to assist local governments through contracts to coordinate and facilitate the implementation of the State's Source Water Assessment and Protection Plan.

The Source Water Assessment carried out in accordance with the Georgia's Source Water Assessment and Protection Plan was funded by a grant of $120,000 to the City of Villa Rica from the Georgia Environmental Facilities Authority (GEFA).

Public Participation

The 1996 SDWA Amendments place a strong emphasis on public awareness and involvement. It is required that the public be involved in the development of this Source Water Assessment Program and that the assessment results be made available to the public. The involvement of public interest groups, business groups, local governments conservation groups, water suppliers, and others is encouraged. Many news releases were distributed via print and broadcast media, to reach the largest geographic area, to inform the general public about the Source Water Assessment Program and it's development.

A technical advisory committee/task force has been established to provide input in the development of this source water assessment plan. Groups that were invited to participate on the committee are listed in Appendixes 1-5. Two (2) public meetings were held prior to development of the Source Water Assessment Plan. The purpose of these meetings was to present the proposed plan to the general public.

Background

The Community

The Little Tallapoosa River is the source of the City of Carrollton's drinking water. The water source intake for the City of Carrollton (WSID #0450002) is located on the Little Tallapoosa River. It is downstream from Little Tallapoosa Lake, approximately one mile west of Lake Carroll, in the north-central quadrant of the City of Carrollton (Figure 1).

Source Delineation

Introduction

The first technical step in the Source Water Assessment Plan is to conduct the delineation of the source waters. This includes identifying the locations of the source water intake points on a map, delineating the topographic boundary of the watersheds, and delineating any and all municipalities and county borders associated with the watershed.

The entire watershed that drains into a surface drinking water intake is considered the Source Water Protection Area. The USEPA realizes, for the purpose of inventorying potential pollution sources and determining susceptibility, the State can identify smaller areas or segments of watersheds and buffer zones for a cost and time effective analysis. The GAEPD has decided to utilize these smaller assessment areas to identify and inventory the potential pollution sources, determine susceptibility, and possibly initiate protection approaches.

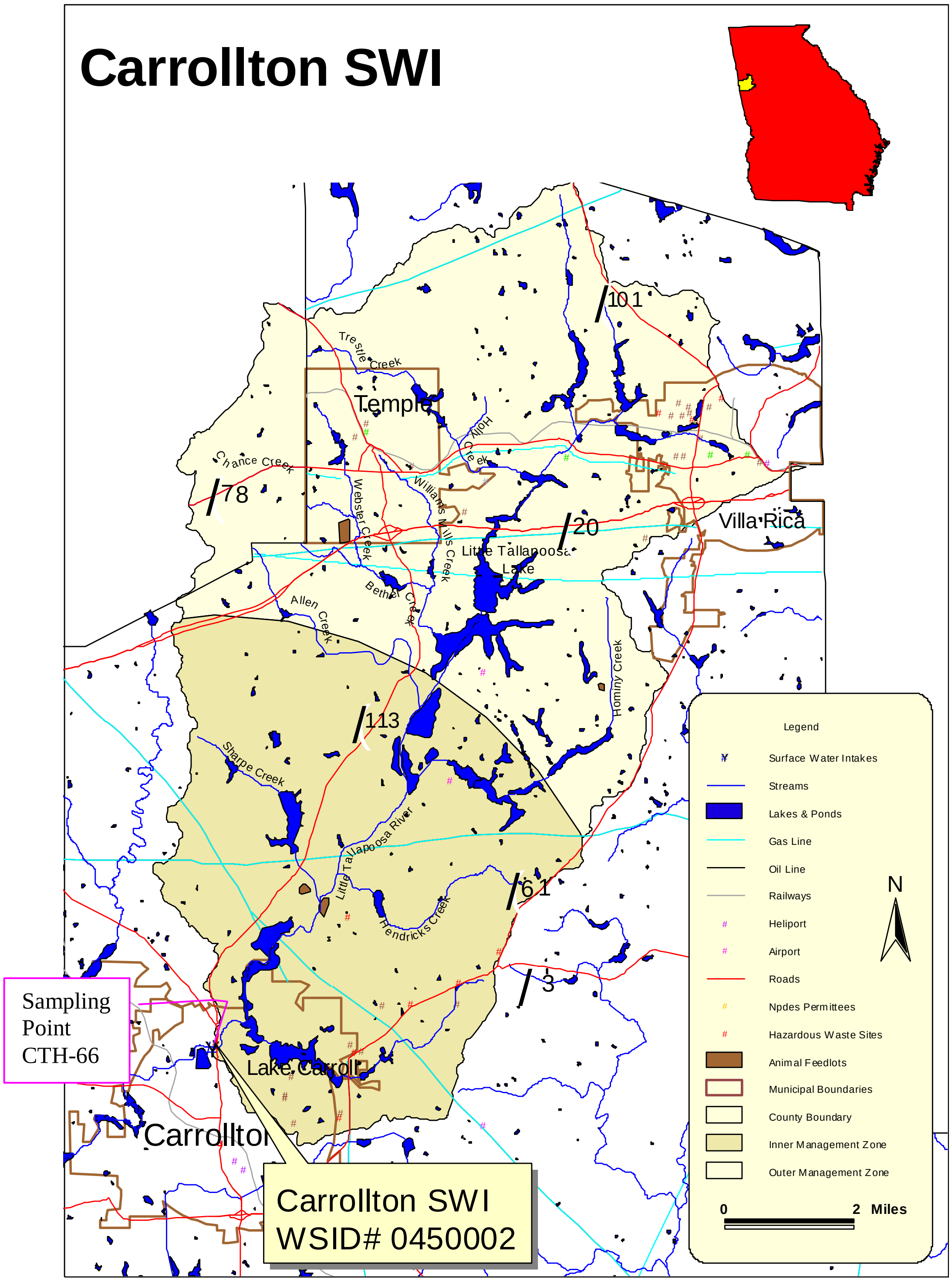
The assessment area methodology is based upon protection distances within the ***GAEPD Rules of Environmental Planning Criteria: Criteria for Water Supply Watersheds (391-3-16-01)***. The assessment area delineation is comprised of three management zones: the 7-mile inner management zone, the 20-mile outer management zone, and the non-management zone that extends beyond 20 miles.

Source Water Delineation

Source water delineation includes identifying the locations of the source water intake points on a map, delineating the topographic boundary of the watersheds, and delineating any and all municipalities and county boundaries associated with the watershed.

The delineation of the watershed for the Carrollton intake was determined utilizing a combination of geographic information system (GIS) software and geographic (topographic) data supplied by numerous sources to include: the US Geological Survey, the US Bureau of the Census, State Base Maps of Georgia, the Georgia Department of Transportation, the Georgia Department of Industry Trade and Tourism, and the Georgia Department of Natural Resources-Environmental Protection Division (EPD).

The catchment area, which is the land area to which atmospheric precipitation falls upon and flows downward to the intake structure, of the Carrollton intake extends for approximately 95 square miles. The perimeter of the catchment area was based on 1:24,000 scale 12-digit Hydrologic Unit Code (HUC) boundaries produced by the EPD.


Carrollton SWI
Temple
Villa Rica
Carrollton
Little Tallapoosa Lake
Lake Carroll
Tresle Creek
Chance Creek
Webster Creek
Williams Mills Creek
Holly Creek
Allen Creek
Bethel Creek
Hominy Creek
Sharpe Creek
Little Tallapoosa River
Hendricks Creek
101
78
20
113
61
3
Sampling Point CTH-66
Carrollton SWI
WSID# 0450002
Legend
Surface Water Intakes
Streams
Lakes & Ponds
Gas Line
Oil Line
Railways
Heliport
Airport
Roads
Npdes Permittees
Hazardous Waste Sites
Animal Feedlots
Municipal Boundaries
County Boundary
Inner Management Zone
Outer Management Zone
N
0
2 Miles

Public Water Supply

The City of Carrollton receives their water from the intake on the Little Tallapoosa River (WSID# 0450002). The City of Carrollton public water system serves approximately 8,024 residents. Coagulation, flocculation, sedimentation, filtration, and disinfection are used to treat the water.

Water Quality

This source water assessment plan had the distinct advantage of being conducted in conjunction with a watershed assessment for Carroll and Heard County. The watershed assessment included conducting water quality monitoring. Because of the watershed assessment being conducted, Carroll and Heard County surface water intakes had the benefit of utilizing the most recent water quality data for their areas' rivers and streams.

The source water assessment of the catchment area that supplies the drinking water to the City of Carrollton's surface water intake (WSID# 0450002) was conducted to evaluate the drinking water quality with regard to land use, point and non-point pollutant loading, and other significant aspects of the catchment area. The results of this study in combination with existing information is used to assess the current water quality in these catchment areas with respect to Georgia EPD water quality standards, and to determine factors that influence water quality in the basins.

Station Selection Criteria

In situ water quality measurements and water sampling for chemical analysis were made at stream location CTH-66 (referred to as sample station) in the Little Tallapoosa River catchment area that feed the Carrollton surface water intake. The sample station was selected to represent a variety of land uses, non-point source pollution loading, potential point sources, and other watershed factors that could affect water quality in Carroll County. Figure 1 illustrates the sampling point location.

Water quality attainment is not an issue for The Little Tallapoosa River because it's stream data fell within the established State of Georgia's standards for raw water sources. However, its turbidity (18.8 NTU) was well above the mandate of no-turbidity. This fact is a natural occurrence created by runoff during storm events, the lack of a sufficient volume of water in the stream to dilute the turbidity, and aquatic life stirring up the bottom of the stream. Under all circumstances, much of the solids that cause the turbidity settle out and the rest is removed in the treatment processes of the water treatment plant.

Two sampling protocols were employed in the study. The first sampling protocol, **wet/dry**, was conducted twelve (12) times (once a month) and included twelve (12) chemical and physical parameters and four (4) metal parameters to be measured. Twelve (12) wet and twelve (12) dry events were captured at the station during the study beginning in January 2001 and ending in December 2001. Samples reflecting dry events were collected after a minimum of 72 hours with less than 0.1 inch of rain. Typically, dry events reflected much longer periods without rainfall. Samples reflecting wet events were collected within 48 hours of at least 0.1 inch of rain.

The second sampling protocol, **fecal**, included only the fecal parameter. Georgia EPD requires that locations potentially out of compliance with standards for fecal coliform must have four samples taken within a 30-day period. The geometric mean of the four samples is calculated and compared to EPD standards to determine compliance. Fecal protocol sampling began in January 2001 and ended in December 2001.

Measurement Methodology

Measurements of air and water temperature, DO, pH, specific conductivity, turbidity, and flow were made in the field at each sample station. Equipment from YSI Instruments was used to measure pH, DO, and Conductivity and a Le Motte turbidity meter to measure turbidity. Manufacturers' guidelines were followed for calibration, maintenance, and use of the equipment. Average stream velocity was measured as a part of each sampling event with a Global Flow Probe from Global Water Company. A profile of the stream at each station was also measured as a part of each sampling event. Data from the profile was used to calculate the cross-sectional area of the stream (in square feet). Water flow (in cubic feet per second or cfs) is equal to the average velocity in feet/second times the cross-sectional area in square feet.

Water samples for laboratory analyses were collected from just below the surface of the water. Shallow water environments were sampled carefully to avoid disturbing the bottom sediments. Six different sample bottles were filled at each sample station. Separate sample bottles were used for fecal coliform, total metals (preserved with nitric acid at a pH of 1-2), Total Suspended solids (TSS)/ammonium, Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD) and total phosphorus, and nitrite-nitrate and Total Kjeldahl Nitrogen (TKN) (preserved with sulfuric acid at a pH of 1-2). Fecal coliform samples were analyzed within the required maximum holding time of six hours.

Georgia State EPD Standards

The Georgia Environmental Protection Division (EPD) has established general water quality parameters for all waters in the state in its Rules and Regulations for Water Quality Control (Chapter 391-3-6, revised March 2001). Additional water quality parameters are based on the specific water use classification for a stream as established by the EPD. The Little Tallapoosa River is classified as a "fishing stream." Water quality criteria for fishing streams are designed to protect and ensure successful reproduction of fish, shellfish (and other invertebrates) and game, and to protect people that are in secondary contact with the water during recreation in and on the water. Table 1 presents the water quality standards for fishing streams.

Results

In Situ Parameters

The following sections describe the results of the in situ water quality sampling. The complete dataset is listed in Appendix 7.

Water Temperature

Water temperature is an important component of stream water quality for sustaining life. The Georgia EPD water quality standard is a maximum of 90°F (32.2°C). Temperatures above this limit can harm certain species of fish by hindering their ability to reproduce. Decreased levels of dissolved oxygen

(DO), which accompany warmer water temperatures, also have the potential to harm fish. Most changes in water temperature are associated with daily and seasonal changes in solar radiation. Human activities such as clearing of trees that shade the streams, construction of impoundments, discharge of treated wastewater, and replacement of vegetation with paved areas have the potential to raise stream water temperatures.

The average water temperature for sample station CTH-66 was 15.7°C. All temperatures values were within normal ranges for spring and summer in Georgia streams.

Dissolved Oxygen (DO)

Dissolved oxygen, DO, is an important stream water quality parameter because minimum DO levels are required to maintain stream life. Georgia EPD water quality standards require a daily average of 5 mg/L and that no single value fall below 4.0 mg/L for fishing streams. DO concentrations are inversely related to temperature, thus DO values change daily and seasonally. Additional factors that influence DO are photosynthesis, respiration, stream flow rate, and oxidation of organic and chemically reduced compounds in the water.

The average DO for sample station CTH-66 was 5.8 mg/L. This value falls within the State's minimum requirements.

PH

A pH value of 7.0 standard units, SU, is neutral while pH values less that 7.0 indicate acidity, and values greater than 7.0 indicate alkalinity. State of Georgia stream water criteria for pH are values from 6.0 to 8.5 SU. Buffering reactions of carbonic acids, concentration of bicarbonate and carbonate and other substances controls the pH of streams. Major sources of acids, bases and buffers are atmospheric deposition of carbon dioxide (CO_2), and acid rain (mostly sulfuric acid, H_2SO_4, and nitric acid, HNO_3). Natural rainfall in equilibrium with carbon dioxide of the earth's atmosphere (360 parts per million CO_2) has a pH of 5.6. Typical rain falling in west Georgia, including Carroll County, is acid rain with a pH of 4.3. The decomposition of organic material in streams can be a major source of carbonic and organic acids. The weathering of rock and soil in watersheds contribute to base-forming cations such as calcium and magnesium. Photosynthesis and respiration of microorganisms can cause significant seasonal and daily variations in pH. Rapid photosynthetic rates can decrease the amount of CO_2 in the water and raise the pH. Respiration by microorganisms increases CO_2 in the water and reduces pH (Hutchinson, 1957; Maitland, 1978; Strumm and Morgan, 1981; Radtke, 1986; Hollabaugh et al., 1994).

All observed pH values fell within the Georgia EPD stream water standards. The average pH for sample station CTH-66 was 6.8.

Specific Conductivity

Conductivity is a measure of the ability of a solution to carry an electric current. The conductivity of a stream is determined by the presence of ions, ionic concentration, charge, ionic mobility, and water temperature. Specific conductivity is the conductivity of a solution standardized to the reference temperature of 25°C. The unit of measurement of specific conductivity is micro-siemens per centimeter, μS/cm.

The average of specific conductivity for sample station CTH-66 was 62.5 μS/cm. Currently, there are no Georgia EPD standards for specific conductivity.

Turbidity

Turbidity is a measure of the clarity of water. Suspended and colloidal matter such as clay, silt, finely divided organic and inorganic matter, and plankton and other microscopic life cause turbid water. High turbidity can be caused by activities that disturb the soil and cause it to readily be washed into streams by runoff from rains. Turbidity is expressed as light that is scattered or absorbed rather than transmitted through the water. The unit of measurement of turbidity is the nephelometric turbidity unit (NTU). The Georgia EPD does not specify a standard for turbidity, however regulations state "all waters shall be free from turbidity, which results in a substantial visual contrast in a water body due to man-made activities".

The average of turbidity for sample station CTH-37 was 12.5 NTU. This fact is a natural occurrence created by runoff during storm events, the lack of a sufficient volume of water in the stream to dilute the turbidity, and aquatic life stirring up the bottom of the stream. Under all circumstances, much of the solids that cause the turbidity settle out and the rest is removed in the treatment processes of the water treatment plant.

Nutrients (Total Phosphorus, Ammonia-N, Nitrite-Nitrate-N, TKN)

Phosphorus and nitrogen containing compounds are common nutrients in surface waters. Source of these nutrients include runoff from farmland and lawns, leaking septic tanks and sewer lines, discharge from sewage treatment plants, rain, and inflow from groundwater. In surface waters, the nutrients are vital to the food chain because they support the growth of rooted aquatic vegetation and algae. The photosynthetic activity of aquatic plants and algae increases DO. However, elevated concentrations of these nutrients often result in excessive algal growth. DO depletion can occur because of respiration by living algae and the decay of dead algae and detritus.

Total phosphorus is the sum of all forms of phosphorus (dissolved, organic, suspended). The Georgia EPD does not list a stream-water quality standard for total phosphorus, however the U. S. Environmental Protection Agency recommended limit in flowing water is 0.1 mg/L. Phosphorus is often the limiting nutrient that causes rapid eutrophication in surface waters, particularly ponds and lakes. During eutrophication, a water body is transformed from one of low biologic productivity and clear water to turbid water with high biologic productivity with rapid algae growth. Nutrient-enriched streams that have low turbidity have the potential for accelerated plant growth (Litke, 1999; ENVIROFACTS). The average of total phosphorus for sample station CTH-66 was 0.4 mg/L.

Ammonia-N, NH_3-N, is a reduced form of nitrogen that exists in small concentrations in most streams. Ammonia can enter surface waters from the breakdown of manure, and dead plants and animals. Additional sources of ammonia are fertilizer and rainwater. In water ammonia is taken up by plants and microorganisms and is oxidized to nitrate. Ammonia-N concentrations above 1.0 mg/L in streams can indicate a human source.

The average of ammonia-N for sample station CTH-66 was 0.1 mg/L. The ammonia-N levels measured during this assessment were well below 1.0 mg/L, and do not suggest human sources.

Nitrite-nitrate-N is an oxidized form of nitrogen in surface water. The average of nitrite-nitrate-N for sample station CTH-66 was 0.2 mg/L. This value is well below the required drink water standard (<1mg/L) after treatment.

Total kjeldahl nitrogen, TKN, is the sum of ammonia-N and organic nitrogen. Nitrogen in ammonia and organic substances is reduced nitrogen, N^{3-}. The average of TKN for sample station CTH-66 was 0.5 mg/L. Currently, there are no Georgia EPD standards for Total kjeldahl nitrogen.

General Chemistry and Physical Parameters (COD, Hardness, TSS)

Chemical oxygen demand, COD, is the dissolved oxygen depletion caused by the oxidation of chemical bonds. The average of COD for sample station CTH-66 was 17 mg/L.

Hardness is the sum of calcium (Ca) and magnesium (Mg) both expressed as calcium carbonate in mg/L. Dissolved cations (mostly Ca, Mg, Na, and K) in surface waters are controlled by the balance between physical and chemical weathering and human activities. The dissolved cations are charge balanced by bicarbonate and minor sulfate (Bluth and Kump, 1994). The average in hardness for sample station CTH-66 was 20.7 mg/L. High hardness values are associated with the lack of precipitation, which would dilute Calcium and Magnesium concentrations.

Total suspended solids, TSS, are the matter suspended in water. TSS is measured as the portion of total solids retained by a filter. High TSS values can limit light penetration and cause early decline of reservoirs by rapid sedimentation. Events that disturb the soil are going to increase TSS as runoff from rains washes the sediment into the streams. Sediment sources include construction, stream bank erosion, agricultural and timber harvest practices, and runoff from dirt roads, ditches, unpaved driveways, and recreational areas (e.g., 4-wheeling). TSS measures the concentration of suspended solids in the water column. TSS and turbidity indicate sediment transport in a stream. The sediment can contain attached nutrients, metals, and pesticides. High sediment levels can harm the physical habitat for aquatic insects and fish. Excess sediment degrades a stream's usage as a drinking water source and for recreational uses. The average in TSS for sample station CTH-66 was 11.6 mg/L. Higher TSS values are associated with rainfall events and correlate well with higher turbidity.

Metals (cadmium, copper, lead, zinc)

Important metals that impact surface waters are cadmium, copper, lead, and zinc. These metals have many pathways into a stream such as runoff from roads, atmosphere, and discharge of treated sewage. Trace amounts of copper and zinc are needed for proper growth of many plants and animals. Excess amounts of these metals pose a threat to the health of humans and the stream biosphere. Metal concentrations were below detection levels for copper, lead, and zinc (Table 2).

Fecal Coliform Bacteria

Fecal coliform bacteria are an indicator of bacterial contamination of surface water. Increased levels of fecal coliform bacteria indicate the possible presence of pathogens in the water. Fecal coliform bacteria originate in the intestinal track of warm-blooded animals (e.g., humans, livestock, deer, beavers, raccoons). Warmer summer water temperatures can increase the growth and survival of fecal coliform bacteria. Intense rainfall events can wash fecal coliform bacteria into the streams. Runoff from pastureland can have significantly more fecal coliform bacteria than runoff from forests. The average in fecal coliform for sample station CTH-66 was 112.1 colonies per 100mL from May to October and 155 colonies per 100mL from November to April.

Fecal coliform bacteria are the most common cause of stream contamination in the Tallapoosa River Basin. The most common sources if fecal coliform are animal intrusion into streams and animal waste runoff and failing septic tanks. Most of Carroll County operates on septic tanks, whereas, the municipalities of Carrollton, Bowdon, Villa Rica, Temple, and Bremen operate on a sanitary sewer system.

BOD-5

Biochemical oxygen demand, BOD-5, is the dissolved oxygen depletion after five days of bacterial degradation of organic matter. The average BOD-5 for sample station CTH-66 was 1 mg/L.

Table 1
Summary of State of Georgia Water Quality Standards for Examined Parameters
Carroll County Watersheds

Parameter	State Standard for Raw Water Source	Notes
Temperature	< 32.2° C (90°F)	
DO	4.0-6.0 mg/L [a]	
pH	6.0-8.5 Standard Units (SU)	
Specific Conductivity	None	
Turbidity	None [b]	
Fecal coliform	May-Oct [c]: 200col./100ml	30-day geometric mean [d]
	Nov-Apr: 1,000col./100ml	30-day geometric mean
	Nov-Apr: 4,000col./100ml	maximum
Total Phosphorus	None	
Ammonia-N	None	
Nitrite-nitrate-N	None	
TKN	None	
TSS	None	
Hardness	None	
Metals		
Cadmium (dissolved) [e]	1.7μg/L/0.62μg/L	Acute/Chronic criteria [f]
	0.82μg/L/0.37μg/L	Acute/Chronic criteria [g]
Copper (dissolved) [e]	8.8μg/L/6.2μg/L	Acute/Chronic criteria [f]
	4.6μg/L/3.5μg/L	Acute/Chronic criteria [g]
Lead (dissolved)	30μg/L/1.2μg/L	Acute/Chronic criteria [f]
	14μg/L/0.5μg/L	Acute/Chronic criteria [g]
Zinc (dissolved)	64μg/L/58μg/L	Acute/Chronic criteria [f]
	35μg/L/32μg/L	Acute/Chronic criteria [g]

Notes:
[a] A daily average of 5.0 mg/L and no less than 4.0 mg/L is required for fishing streams supporting warm water fish. The superior DO standards for secondary trout streams are a daily average of 6.0 mg/L and no less than 5.0 mg/L is required for all times.
[b] Georgia EPD has no NTU (nephelometric turbidity unit) standard for turbidity. Georgia EPD regulations state that "all waters shall be free from turbidity which results in a substantial visual contrast in a water body due to man-made activities".
[c] The criterion for May to October in fresh flowing streams is 500 colonies/100ml when water quality studies show that fecal coliform from none human sources exceed 200 colonies/100ml (geometric mean)
[d] The 30-day geometric mean is the average of at least four samples taken within a 30 day period. There must be at least 24 hours between samples.
[e] "The in-stream criterion is lower than the EPD laboratory detection values."
[f] Hardness = 50mg/L
[g] Hardness = 25mg/L
Source: Georgia EPD (Chapter 391-3-6)

Table 2
Summary of Examined Parameters for Little Tallapoosa River

Parameter	State Standards for Raw Water Source	Average Measured Values	National Primary Drinking Water Regulations
Temperature	< 32.2° C (90°F)	15.7° C (60°F)	None
DO	4.0-6.0 mg/L [a]	5.8 mg/L	None
pH	6.0-8.5 Standard Units (SU)	6.8	6.0-8.5 Standard Units (SU)
Specific Conductivity	None	62.5 µs/cm	None
Turbidity	None [b]	12.5 NTU	<1
Fecal coliform	May-Oct [c]: 200col./100mL (30-day geometric mean [d])	112.1 col/100 mL	0
	Nov-Apr: 1,000col./100mL (30-day geometric mean)	155 col/100 mL	
	Nov-Apr: 4,000col./100mL (maximum)		
Total Phosphorus	None	0.4 mg/L	None
Ammonia-N	None	0.1 mg/L	None
Nitrite-nitrate-N	None	0.2 mg/L	<1 mg/L (Nitrite) <10 mg/L (Nitrate)
TKN	None	0.5 mg/L	None
TSS	None	11.6 mg/L	<500 mg/L
Hardness	None	20.7 mg/L	None
Metals			
Cadmium (dissolved) [e]	1.7µg/L/0.62µg/L (Acute/Chronic criteria [f]) 0.82µg/L/0.37µg/L (Acute/Chronic criteria [g])	Below Detection Level	<0.005 mg/L
Copper (dissolved) [e]	8.8µg/L/6.2µg/L (Acute/Chronic criteria [f]) 4.6µg/L/3.5µg/L (Acute/Chronic criteria [g])	Below Detection Level	<1 mg/L
Lead (dissolved)	30µg/L/1.2µg/L (Acute/Chronic criteria [f]) 14µg/L/0.5µg/L (Acute/Chronic criteria [g])	Below Detection Level	0
Zinc (dissolved)	64µg/L/58µg/L (Acute/Chronic criteria [f]) 35µg/L/32µg/L	Below Detection Level	<5 mg/L

(Acute/Chronic criteria [g])

Notes:

[a] A daily average of 5.0 mg/L and no less than 4.0 mg/L is required for fishing streams supporting warm water fish. The superior DO standards for secondary trout streams are a daily average of 6.0 mg/L and no less than 5.0 mg/L is required for all times.
[b] Georgia EPD has no NTU (nephelometric turbidity unit) standard for turbidity. Georgia EPD regulations state that "all waters shall be free from turbidity which results in a substantial visual contrast in a water body due to man-made activities".
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[e] "The in-stream criterion is lower than the EPD laboratory detection values."
[f] Hardness = 50mg/L
[g] Hardness = 25mg/L
Source: Georgia EPD (Chapter 391-3-6)

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Potential Contaminant Inventory

An inventory of potential contaminant sources was conducted to assess the susceptibility of Carrollton's drinking water source to contamination. Sources of all primary water contaminants and cryptosporidium were identified, however, only potential sources of contaminants that are the greatest threat to human health were selected for detailed inventory. The contaminants of greatest concern to Carrollton are nitrate, microbial contaminants, solvents, and sediment.

The inventory for Carrollton focuses on the facilities that possibly generate, use, or store potential contaminants in the assessment region.

Inventory Method

Available databases were searched to identify businesses and land uses that are potential sources of regulated contaminants in the inventory region. The following steps were followed:

1. Airports, confined animal feedlots, oil pipelines, gas pipelines, railways, and roads were downloaded form the Georgia GIS Clearinghouse.
2. EPA's Envirofacts System was queried to identify EPA regulated facilities located in the inventory region. This system accessed facilities listed in the following databases: Resource Conservation and Recovery Information System (RCRIS), Biennial Reporting System (BRS), Toxic Release Inventory (TRI), Permit Compliance System (PCS), and Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS).
3. An inventory of facilities that possess NPDES permits was obtained from the Georgia Department of Natural Resources Environmental Protection Division (EPD) Water Protection Branch.
4. An inventory of facilities that possess NPDES stormwater permits was obtained from the Georgia GIS Clearinghouse.
5. Potential pollution sites were verified and amended through telephone calls, visual sightings, and communal knowledge from members of the advisory and technical committees.

Potential contaminant sources are designated as significant if they are in the surface water catchment area and fall into one of the following categories:

Table 3
Potential Contaminant Sources

1. Agricultural Waste Lagoon
2. Airports
3. Confined Animal Feedlots
4. Garbage Transfer Stations
5. Hazardous Waste Facilities
6. LAS Permit Holders
7. Landfills
8. Large Industries Which Utilize Hazardous Chemicals
9. Large Industries Which Have Bulk Chemical and Petroleum Storage
10. Large Industries Which Have Federal Categorical Standards
11. Large Quantity Generators
12. Lift Stations
13. Marinas
14. Military Bases
15. Mining
16. NPDES Permit Holders
17. NPDES Industrial Stormwater
18. Non-sewer Areas
19. Oil Pipelines
20. Power Plants
21. Railways Adjacent to or on Bridges Crossing over Streams
22. Roads Adjacent to or Bridges Crossing over Streams
23. Sewer Areas
24. Wastewater Plants
25. Water plants

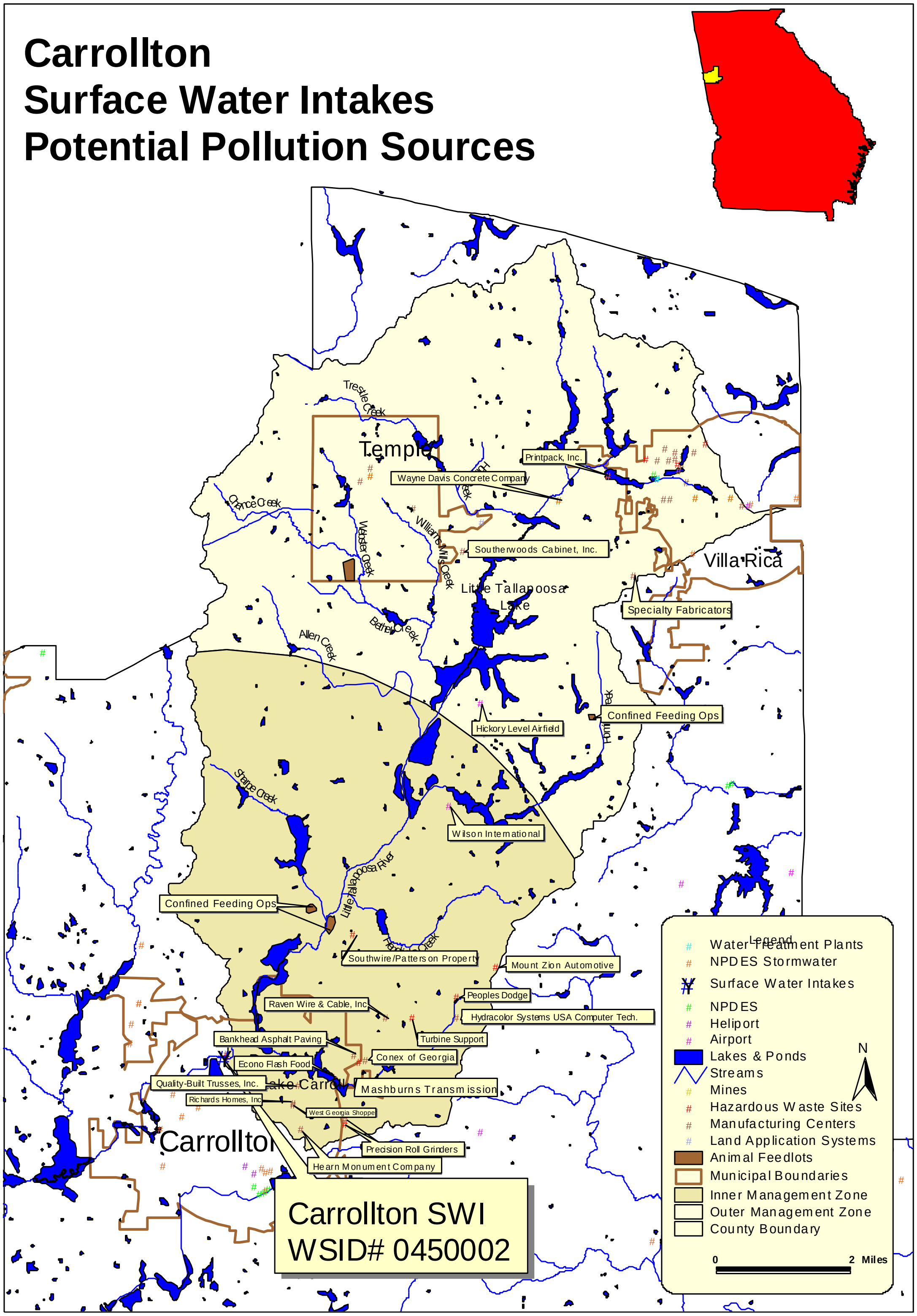
Carrollton
Surface Water Intakes
Potential Pollution Sources
Temple
Villa Rica
Carrollton
Little Tallapoosa Lake
Printpack, Inc.
Wayne Davis Concrete Company
Southerwoods Cabinet, Inc.
Specialty Fabricators
Confined Feeding Ops
Hickory Level Airfield
Wilson International
Confined Feeding Ops
Southwire/Patterson Property
Mount Zion Automotive
Peoples Dodge
Raven Wire & Cable, Inc
Hydracolor Systems USA Computer Tech.
Bankhead Asphalt Paving
Turbine Support
Conex of Georgia
Econo Flash Food
Quality-Built Trusses, Inc.
Mashburns Transmission
Richards Homes, Inc
West Georgia Shoppe
Precision Roll Grinders
Hearn Monument Company
Carrollton SWI
WSID# 0450002
Legend
Water Treatment Plants
NPDES Stormwater
Surface Water Intakes
NPDES
Heliport
Airport
Lakes & Ponds
Streams
Mines
Hazardous Waste Sites
Manufacturing Centers
Land Application Systems
Animal Feedlots
Municipal Boundaries
Inner Management Zone
Outer Management Zone
County Boundary
N
0
2 Miles

Figure 2

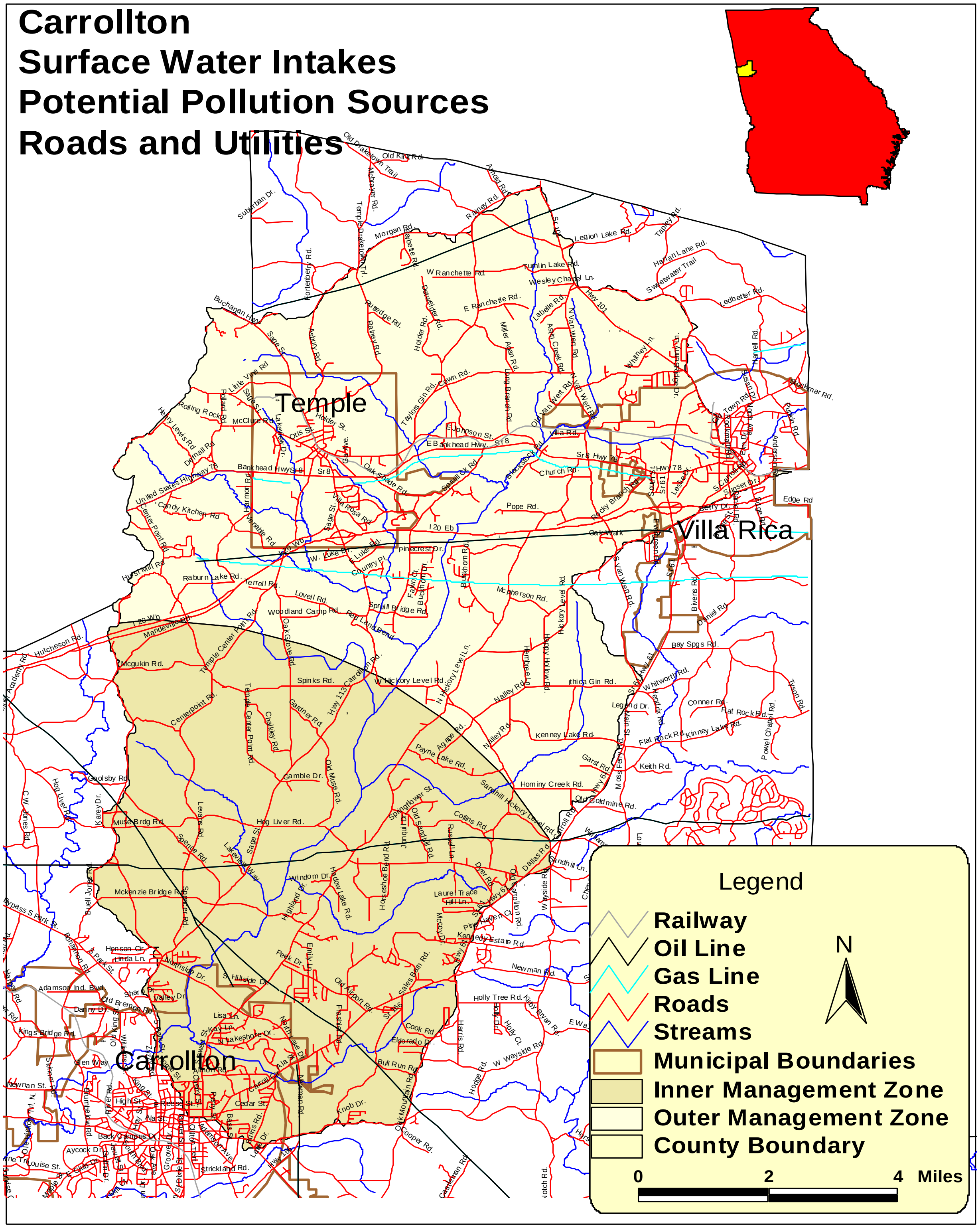
Carrollton
Surface Water Intakes
Potential Pollution Sources
Roads and Utilities
Temple
Villa Rica
Carrollton
Legend
Railway
Oil Line
Gas Line
Roads
Streams
Municipal Boundaries
Inner Management Zone
Outer Management Zone
County Boundary
N
0
2
4
Miles

Figure 3

The following are the references for the databases that were searched for the potential pollution inventory:

Tallapoosa River Basin Management Plan

The Georgia Department of Natural Resources Environmental Protection Division, in cooperation with the USDA Natural Resources and Conservation Commission, Georgia Soil and Water Conservation Commission, Georgia Forestry Commission, the US Geological Survey, and Georgia Wildlife Resources Division, developed and implemented a river basin management planning program to protect, enhance, and restore the waters of the Tallapoosa River Basin, which include the Little Tallapoosa River and its tributaries. The Tallapoosa River Basin Management Plan provide for effective monitoring, allocation, use, regulation, and management of water resources. It also identified existing and future water quality issues, emphasizing nonpoint sources of pollution.

The Georgia 2000 List of Waters

The Georgia 2000 List of Waters is a requirement by Section 303(d) of the Federal Clean Water Act (CWA). The list was developed in accordance with 40 CFR Part 130.7(b)(4) and specific guidance provided by the United States Environmental Protection Agency (USEPA) Office of Water.
The Georgia Environmental Protection Division (EPD) has used the "List of Waters" approach since the late 1970s. The lists of waters have been included in the *Water Quality in Georgia* reports submitted to the USEPA in accordance with Section 305(b) of the CWA. Expanded lists including waters partially or not supporting water uses have been included in each Georgia 305(b) Report beginning with the 1982-1983 report. The lists have provided information on parameters violated, causes of the violations, and actions planned to reduce the problems. The lists included point and nonpoint source issues.

STORET

(www.epa.gov/storet/)

STORET is EPA's STOrage and RETrieval database system for water quality monitoring data. The states, local governments, and federal agencies, e.g. the US Geological Survey and the Corps of Engineers, have extensively monitored water quality in the Tallapoosa River Basin. Some of this data was available on STORET.

ENVIROFACTS

(http://www.epa.gov/enviro/)

EPA's ENVIROFACTS System was queried to identify EPA regulated facilities located in the Little Tallapoosa River Drainage Basin. This system accesses facilities listed in the following databases: Resource Conservation and Recovery Information System (RCRIS), Biennial Reporting System (BRS), Toxic Release Inventory (TRI), Hazardous Substances Inventory (HSI), and the Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS). The available reports were browsed for facility information including handler/facility classification to be used in assessing whether a facility should be classified as a significant potential contaminant source. The Permit Compliance System (PCS) was queried to identify concentrated animal feeding operations with NPDES permits.

The Department of Natural Resources Environmental Protection Division (EPD)
(http://www.dnr.state.ga.us/dnr/environ/)

The State of Georgia GIS Clearinghouse

(http://www.gis.state.ga.us/Clearinghouse/clearinghouse.html)

Inventory Limitations

The potential sources of contaminants for Carrollton's public water supply are identified from data and reports that are readily available. Consequently, unregulated activities or unreported contaminant releases may have been missed. The use of multiple sources of data should ensure that the sources identified represent the major threats to the source water for Carrollton.

Cryptosporidium/Giardia Sampling

Cryptosporidium, or "Crypto" for short, is a disease-causing parasite (*Cryptosporidium parvum*) found in most surface waters across the United States. Sometimes, it finds its way into drinking water. If swallowed, it can cause cryptosporidiosis, a disease with symptoms of diarrhea, stomach cramps, and fever. In the severest case, it can cause death in weakened persons. Though dangerous, the parasite succumbs to ozone.

Giardia lamblia is a disease-causing flagellated protozoan, which can grow in the upper small intestine. It is the cause of the intestinal disease giardiasis. The symptoms of giardiasis are varied depending on the individual but include diarrhea, nausea, indigestion, flatulence, bloating, fatigue, and appetite and weight loss. Unless treated properly, this disease can be chronic. Giardiasis is the most widespread of the protozoan diseases occurring throughout the world.

GAEPD is currently conducting the raw water cryptosporidium/giardia sampling for the surface water sources. Its results will be added as an attachment to this report once the results become available.

Results

SEE ATTACHMENT

Susceptibility Assessment

The main focus of the susceptibility determination methodology is to determine overall susceptibility of the source water prior to being withdrawn in the drinking water intake. Susceptibility is defined as "the potential for a Public Water System to draw water contaminated by inventoried sources at concentrations that would pose concern." The determination would take into account the "toxicity, environmental fate and transport" of the contaminant and the "location, likelihood of release and effectiveness of mitigation" for the potential pollution sources. This produces a qualitative measure (high, medium, low) that enables those delegated to do assessments, and the state to determine easily and quickly the level of susceptibility the surface water intake has to potential pollution sources upstream (**EPD Source Water Assessment Implementation Plan, 2000**).

The susceptibility determination consists of two main parts: the release potential of a contaminant and the risk the contaminant would be to the surface source water and eventually the surface water intake. Risk is in the event the contaminant does reach the surface water and the drinking water intake, how great is the risk to the drinking water supply. The combination of the scores from the release potential and risk make up the overall l source water susceptibility. The overall source water susceptibility score accounts for the type of water quality that could be present at a drinking water intake prior to being withdrawn into the intake.

Release Potential

The method for determining the release potential include categories for consideration that have weight measures for High, Medium, and Low priority ranking. Depending on the source and/or the contaminant (s), one or more of the following categories may be appropriate for consideration in evaluating the release potential:

- ***Determine the distance from surface water*** – Potential pollution sources within the assessment area that are in closer proximity to surface water pose a greater threat to raw water quality than do those sources that are further away.
- ***Estimate the volume of the release*** – Potential pollution sources in the assessment area are not actual pollution sources until an actual release to the environment occurs. The amount of a possible release is estimated using good sound judgment.
- ***Estimate the duration of the release*** – Sudden releases are usually accidental spills or storm events. Both may pose a threat to the drinking water supply.
- ***Determine the ease of travel/transport*** – General topography, the presence of defined channels or other considerations that would enhance or mitigate the ease of travel/transport of the potential pollutant to surface water are important considerations. Travel via overland flow

and/or possible run-off conveyances to surface water such as drainage ditches, etc. will be much easier than travel through the soil via groundwater.

Table 4
Release Potential Categories for Surface Source Water

Category	Ranking
Distance from surface water	High – less than or equal to 500 ft. Low – further than 500 ft.
Volume of release	High – greater than 10,000 gallons Medium – greater than 1,000 gallons and less than 10,000 gallons Low – less than 1,000 gallons
Duration of release	High – on-going unpermitted releases, high likelihood of unanticipated one time catastrophic event Medium – on-going, permitted releases, chronic small events, likelihood of continued releases Low – little likelihood of a release, no reported releases
Ease of Travel/Transport	High – hilly topography, many run-off conveyances, overland flow very likely, few or no structural controls in place Medium – moderate topography or number of run-off conveyances, overland flow likely, use of some structural controls Low – generally flat topography, travel primarily through soil via groundwater, highly volatile substances that adhere to soils, overland flow not likely and structural controls in place.

Risk

As with determining release potential, the method for determining the risk to the surface water intake includes different categories for consideration that have weight measures for High, Medium, and Low priority ranking.

Determine the contaminant(s) of concern – Is the contaminant biological, physical, or chemical?

Determine the distance from the surface water intake – Potential pollution sources within the assessment area that are in closer proximity to the surface water intake pose a greater threat to raw water quality than do those sources that are further away.

Determine the toxicity – The more toxic, the higher the risk posed to the drinking water supply and public health.

Table 5
Risk Categories for Surface Source Water

Category	Ranking
Distance from surface water intake	High – within 7 miles upstream Medium – between 7 and 15 miles upstream Low – between 15 and 20 miles upstream
Toxicity	High – acute, pathogens Medium - chronic, chemicals Low – secondary, taste, odor

Along with the general categories listed above, EPD proposes additional guidance to supplement the assessment of two different categories of potential pollutant sources: Regulated Pollutant Sources and Non-Point Sources. Regulated Pollutant Sources include those facilities EPD monitors and regulates. The following table lists the potential and risk guidelines for regulated pollutant sources.

Table 6
Regulated Pollutant Sources Potential and Risk Guidelines

Point Source	Potential	Risk
Landfills, Dumps	High – abandoned/closed landfills, history of groundwater contamination Medium – open dumps, inert waste, no groundwater contamination Low – contained landfills, no groundwater contamination, in compliance	Based on waste categorization
Hazardous Waste Large Quantity Generators and/or TSD Facilities, Superfund Sites	High – history of spills, unremediated sites, not following corrective action plan Medium – periodic noncompliance, partly remediated sites, generators or sites with permits (even in compliance) Low – compliance with regulations, few or no releases, fully remediated sites.	Based on type of operation and volume of materials handled
NPDES Permit Holders, LAS Permit Holders	High – chronic permit violations, waste lagoons (especially unlined), chronic sewer overflows and/or bypasses Medium – periodic permit violations, moderate number of sewer overflows and/or bypasses Low – compliance with permit conditions, few sewer overflows and/or bypasses	Based on regulated pollutants

Non-Point Sources include potential pollution in runoff from various land uses in the watershed. Susceptibility is determined by the type of land use in the assessment area and if information is available showing use of best management practices or buffer zones. The following is a list of non-point source guidelines.

Table 7
Non-Point Source Guidelines

Non-Point Source	Potential	Risk
Agriculture, Urban, Forestry	High – No BMP, high pesticide use, high livestock density, high density of forestry activities, high percentage of impervious surface, hilly topography, abandoned mines, visible signs of erosion or other water quality violations Medium – BMP in place but not always properly implemented, moderate livestock density, moderate density of forestry activities, moderate percentage of impervious surface, moderate topography, some buffers in place. Low – BMP in place and properly implemented, low livestock density, low density of forestry activities, low percentage of impervious surface, generally flat topography, buffer zones in place	High – Immediate proximity of surface water, high toxicity and/or volume Medium – Near main stem or major tributary, moderate volume and/or toxicity Low – No surface water in close proximity, low or little volume and/or toxicity

After determining the overall potential and risk using the weighted measures along with good judgement, each source is plotted on a chart in relation to the other sources with the axes representing the potential and risk as shown below:

Figure 4
Release Potential Chart

High	(4) High Risk Low Potential	(7) High Risk Medium Potential	(9) High Risk High Potential
High	(2) Medium Risk Low Potential	(5) Medium Risk Medium Potential	(8) Medium Risk High Potential
High	(1) Low Risk Low Potential	(3) Low Risk Medium Potential	(6) Low Risk High Potential
	Low	Medium	High

After all sources were charted, they were prioritized as follows:

High Priority: Contaminant Sources located in Grid Squares 7,8, and 9

Medium Priority: Contaminant Sources located in Grid Squares 4,5, and 6

Low Priority: Contaminant Sources located in Grid Squares 1,2, and 3

High priority would be the pollutant sources to be addressed first in order to have the maximum impact on reducing the susceptibility of the drinking water intake to potential adverse effects.

The overall susceptibility of the intake can be determined as follows:

Table 8
Susceptibility Scoring

High Susceptibility	40% or more of the sources chart in grid squares 7, 8, and 9
Medium Susceptibility	20% or less of the sources chart in grid squares 7, 8, and 9 and 40% or more of the grid squares chart in grid squares 4, 5, and 6
Low Susceptibility	20% or less of the sources chart in grid squares 7, 8, and 9 and 20% or less of the sources chart in grid squares 4, 5, and 6

Figures 2 and 3 show the location of the potential contamination sources in relation to their proximity to Carrollton's surface water intake. Appendix 6 details the items researched in conducting the susceptibility determination.

Results

Out of fifty-one (51) potential contamination sources sited in this report, fourteen (14) fell in the low priority range, thirty-six (36) fell in the medium priority range, and one (1) fell in the high priority range. Most of the potential contaminant sources fell in the medium priority category, which means those potential source do not warrant a significant level of concern. The high priority entity is a confined animal feedlot located on the Little Tallapoosa River. With it being in close proximity to surface waters, special care must be given to maintain a good vegetative buffer between its operations and the surface water. Direct runoff from feedlot operations can introduce high levels of fecal coliform and disease into surface waters. The overall susceptibility score for the Carrollton Surface Water Intake (WSID #0450002) was **Medium**.

The results of the susceptibility determination are summarized in the following tables:

Table 9
Susceptibility Classification

Pollutant Classes		
Low Priority	Medium Priority	High Priority
Wilson International	Confined Animal Feedlot (Sharpe)	Confined Animal Feedlot (Little Tallapoosa)
Mt. Zion Automotive	Confined Animal Feedlot (Hominy)	
Turbine Support	Confined Animal Feedlot (Webster)	
Precision Roll Grinders Inc.	Northside Dr.	
Denmom tool, Inc.	McKenzie Bridge Rd.	
Belyeu Danny Chevrolet	Sage St.	
City of Temple	Centerpoint Rd.	
Flowers Baking Company	Oak Grove Rd.	
Sonoco Products Company	Temple Center Point Rd.	
PFI Transport Inc.	Raburn Lake Rd.	
Southwire/Patterson Co.	I20	
Mashburns Transmission Service	Carrollton Rd.	
	Lively Rd.	
Printpack, Inc.	Sage St.	
Holcombe Armiture Co.	Villa Rosa Rd.	
	I20	
	Ashbury Rd.	
	Sage St.	
	Rainey Rd.	
	East Johnson St.	
	State Route 8	
	Villa Rosa Rd.	
	I20	
	Harmon Rd.	
	Spruill Bridge Rd.	
	Spruill Ck. Rd.	
	HWY 78	
	North Van Wert	
	HWY 101	
	HWY 20	
	Buckhorn Rd.	
	North Hickory Level Rd.	
	West Hickory Level Rd.	
	Hog Liver Rd.	
	Makenzie Bridge Rd.	
	Northside Dr.	
	North Park St.	
	Newman Rd.	
	Jennifer Ln.	

Figure 5
Susceptibility Results

		Low	Medium	High
Risk	High	High Risk/Low Potential (39)	High Risk/Medium Potential	High Risk/High Potential (1)
	Medium	Medium Risk/Low Potential (2)	Medium Risk/Medium Potential (3)	Medium Risk/High Potential
	Low	Low Risk/Low Potential (15)	Low Risk/Medium Potential	Low Risk/High Potential

Release Potential

Overall source water susceptibility score = Medium Susceptibility

Conclusion

Overall, Carrollton's surface water intake (WSID #0450002) and its associated source water are in good standings in terms of meeting the minimal requirements for a raw water drinking source. The only issue that currently plagues the area, along with the rest of the State of Georgia, is water quantity. This issue is an issue that can only be rectified through nature's course of replenishment (i.e. precipitation). Continued monitoring is recommended as well as total compliance with the County regulations regarding stream buffers and stream buffer protection.

Appendix

Appendix 1 - Stakeholders

Name	Company
Kristian Taylor	Coosa Valley RDC
Kevin Farrell	GAEPD Watershed Planning & Monitoring
Henry Booker, Executive Director	Chattachoochee Flint RDC
Teresa Chapman, Mayor	City of Franklin
Teresa Ferguson, City Clerk	City of Mount Zion
John Griffin, Mayor	City of Mount Zion
Walter Hines, Mayor	City of Whitesburg
Eley Loftin, Mayor	City of Centralhatchee
Bob Merrill, Mayor	City of Roopville
Gerald Pilgrim, Mayor	City of Carrollton
Denney H. Rogers, Mayor	City of Ephesus
Tom Sills, Planning Director	Chattahoochee-Flint RDC
Mick Smith, Environmental Engineer	Georgia EPD Water Protection Branch
Jerry Hood	City of Buchanan
Monroe Spake, Mayor	City of Villa Rica
Mark Teal, Engineer	City of Carrollton
James W. Watts Jr., Mayor	City of Bowdon
Micajah Bagwell, Mayor	City of Tallapoosa
Travis Pritchard, Mayor	City of Waco

Appendix 2 - Advisory Committee Members

Name	Company
Charles Sanders, Sole Commissioner	Haralson County
Sharon Swell, Mayor	City of Bremen
Jim Carden, Past Mayor	City of Bremen
Mr. Robert Barr	Carroll County
Lester Harmon, Mayor	City of Temple
Dr. Jim Agan	
Carl Brack	
Tom Crawford	
Perry Hicks, Past City Manager	City of Bowdon
Tommy J. Holland, County Engineer	Carroll County
Donna Lackey, Director	Heard County Chamber of Commerce
Lewis Mason, Water Superintendent	Carrollton Water Plant
Mal Milam, Manager	GA Power Plant Wansley
Larry Pike, Chairman	Heard County Commissioners
Steve Russell, City Manager	City of Villa Rica
Randy Williams	
Randy Yarbrough, Executive Director	Heard County Water Authority

Appendix 3 - State Executives

Name
Rep. Lynn Smith
Rep. Tracy Stallings
Rep. Jack West

Appendix 4 - Technical Committee

Name	Company
Jim Baxley, Executive Director	Carroll County Water Authority
Doyle Bentley, Water Plant Manager	City of Buchanan
Sam Sharp, District Conservationist	NRCS
Frank Carlson, Water Treatment Superintendent	City of Bowdon
John Edwards, Water Superintendent	City of Temple
Mike Kaufmann, Wastewater Superintendent	City of Villa Rica
Howard Ray	Hughes & Ray
Paul Sims, Sr. Env. Engineer	Southwire
Lynn Smith, Water Superintendent	City of Villa Rica
Lewis Mason, Water Superintendent	Carrollton Water Plant
Ed Reynolds, Water Plant Manager	Heard County
Tom Roberts, Plant Manager	Gold Kist
Donny Boswell	
Stephen Cash, Water Treatment Plant Manager	City of Bremen

Appendix 5 - Consultants

Consultants

Name	Company
Johnny Waters, Geosciences Dept. Head	State University of West Georgia
Thomas Hynes, Vice President	State University of West Georgia
Richard Miller, Dean of Arts & Sciences	State University of West Georgia
Beheruz Sethna, President	State University of West Georgia
Jet Toney	Cornerstone Communications
Nolton Johnson	Department of Natural Resources Environmental Protection Division
Robert Scott, Program Manager	DNR Environmental Protection Division
Sue Grunwald, SWAP Program Manager	EPD
Paul R. Burks, Executive Director	Georgia Environmental Facilities Authority (GEFA)
Elizabeth Booth	DNR-EPD-WP
Paul Lamarre, Unit Coordinator	DNR-EPD-WP
Lonice Barrett, Commissioner	GA – DNR

Appendix 6 - Susceptibility Data

Carrollton SWI									
	Facility Name	Entity	Nearest Receiving Stream	SWI source water	Category	Data	Ranking	Potential	Risk
1	Confined Animal Feedlot	Confined Animal Feedlot	Little Tallapoosa River	Little Tallapoosa River	Distance from surface water	0 ft.	High - less than or equal to 500 ft	High - High livestock density, moderate percentage of impervious surface, moderate topography, close proximity (actually surrounds) to surface water	High - Immediate proximity of surface water, significant and toxic volume of animal waste
					Distance from SWI	2.31 mi.	High - within 7 miles upstream		
					Volume of Release	N/A	Low - less than 1,000 gallons		
					Duration of Release	N/A	Medium - on-going, chronic small relaeses, and likelihood of continued releases		
					Ease of Travel/Transport	N/A	High - generally flat topography, travel primarily through soil that straddles the Little Tallapoosa River, overland is likely, and some structural controls in place		
					Toxicity		High - acute, pathogen, odor		
2	Confined Animal Feedlot	Confined Animal Feedlot	Sharpe Creek	Little Tallapoosa River	Distance from surface water	528 ft.	Low - further than 500 ft.	Medium - Moderate livestock density, moderate percentage of impervious surface, moderate topography, some buffers in place	Medium - no surface water in close proximity but topography may allow for transport into surface water catchment
					Distance from SWI	2.16 mi.	High - within 7 miles upstream		
					Volume of Release	N/A	Low - less than 1,000 gallons		
					Duration of Release	N/A	Medium - on-going, chronic small relaeses, and likelihood of continued releases		
					Ease of Travel/Transport	N/A	Medium - moderate topography, number of run-off conveyances, use of some structural controls		
					Toxicity		High - acute, pathogen, odor		
3	Confined Animal Feedlot	Confined Animal Feedlot	Hominy Creek	Little Tallapoosa River	Distance from surface water	581 ft.	Low - further than 500 ft.	Medium - Moderate livestock density, moderate percentage of impervious surface, moderate topography, some buffers in place	Medium - no surface water in close proximity but topography may allow for transport into surface water catchment
					Distance from SWI	7.5 mi.	Medium - between 7 and 15 miles upstream		
					Volume of Release	N/A	Low - less than 1,000 gallons		
					Duration of Release	N/A	Medium - on-going, chronic small relaeses, and likelihood of continued releases		
					Ease of Travel/Transport	N/A	Medium - moderate topography, number of run-off conveyances, use of some structural controls		
					Toxicity		High - acute, pathogen, odor		
4	Confined Animal Feedlot	Confined Animal Feedlot	Webster Creek	Little Tallapoosa River	Distance from surface water	898 ft.	Low - further than 500 ft.	Medium - Moderate livestock density, moderate percentage of impervious surface, moderate topography, some buffers in	Medium - no surface water in close proximity but topography may allow for transport into surface water catchment
					Distance from SWI	7.3 mi.	Medium - between 7 and 15 miles upstream		
					Volume of Release	N/A	Low - less than 1,000 gallons		
					Duration of Release	N/A	Medium - on-going, chronic small relaeses, and likelihood of continued releases		
					Ease of Travel/Transport	N/A	Medium - moderate topography, number of run-off conveyances, use of some structural controls		
					Toxicity		High - acute, pathogen, odor		
6	Wayne Davis Concrete Company	NPDES Stormwater Mining	Little Tallapoosa River	Little Tallapoosa River	Distance from surface water	581 ft.	Low - further than 500 ft.	Low - Compliance with permit conditions, few sewer overflows and/or bypasses	Medium - no surface water in close proximity but topography may allow for transport into surface water catchment
					Distance from SWI	9.6 mi.	Medium - between 7 and 15 miles upstream		
					Volume of Release	N/A	Medium - greater than 1,000 gallons and less than 10,000 gallons		
					Duration of Release	N/A	Medium - on-going, chronic small relaeses, and likelihood of continued releases		
					Ease of Travel/Transport	N/A	Medium - moderate topography, number of run-off conveyances, use of some structural controls		
					Toxicity		Low - secondary, taste, odor		
7	East-West Express	NPDES Stormwater	Little Tallapoosa River	Little Tallapoosa River	Distance from surface water	1,426 ft.	Low - further than 500 ft.	Low - Compliance with permit conditions, few sewer overflows and/or bypasses	Medium - no surface water in close proximity but topography may allow for transport into surface water catchment
					Distance from SWI	10.1 mi.	Medium - between 7 and 15 miles upstream		
					Volume of Release	N/A	Medium - greater than 1,000 gallons and less than 10,000 gallons		
					Duration of Release	N/A	Medium - on-going, chronic small relaeses, and likelihood of continued releases		
					Ease of Travel/Transport	N/A	Medium - moderate topography, number of run-off conveyances, use of some structural controls		
					Toxicity		Low - secondary, taste, odor		
8	Wilson International	Airports	Little Tallapoosa River	Little Tallapoosa River	Distance from surface water	686 ft.	Low - further than 500 ft.	Low - Compliance with permit conditions, few sewer overflows and/or bypasses	Low - no surface water in close proximity
					Distance from SWI	4.98 mi.	High - within 7 miles upstream		
					Volume of Release	N/A	Low - less than 1000 gallons		
					Duration of Release	N/A	Low - little likelyhood of a release, no reported releases		
					Ease of Travel/Transport	N/A	Low - low percentage of impervious surface area, generally flat topography, buffer zones in place		
					Toxicity		Medium - chronic, chemicals		

Mt. Zion Automotive	Hazardous Waste	Curtis Creek	Little Tallapoosa River	*Distance from surface water*	2,851 ft.	*Low - further than 500 ft.*	*Low - Compliance with*	*Low - no surface water in close proximity*
	Facilities			*Distance from SWI*	4.3 mi.	*High - within 7 miles upstream*	*regulations, few or no releases*	
				Volume of Release	*N/A*	*Low - less than 1000 gallons*		
				Duration of Release	*N/A*	*Low - little likelyhood of a release, no reported releases*		
				Ease of Travel/Transport	*N/A*	*Low - low percentage of impervious surface area, generally flat*		
						topography, buffer zones in place		
				Toxicity		*Medium - chronic, chemicals*		
Turbine Support	Hazardous Waste	Curtis Creek	Little Tallapoosa River	*Distance from surface water*	2,904 ft.	*Low - further than 500 ft.*	*Low - Compliance with*	*Low - no surface water in close proximity*
	Facilities			*Distance from SWI*	2.8 mi.	*High - within 7 miles upstream*	*regulations, few or no releases*	
				Volume of Release	*N/A*	*Low - less than 1000 gallons*		
				Duration of Release	*N/A*	*Low - little likelyhood of a release, no reported releases*		
				Ease of Travel/Transport	*N/A*	*Low - low percentage of impervious surface area, generally flat*		
						topography, buffer zones in place		
				Toxicity		*Medium - chronic, chemicals*		
Precision Roll Grinders Inc.	Hazardous Waste	Curtis Creek	Little Tallapoosa River	*Distance from surface water*	3,590 ft.	*Low - further than 500 ft.*	*Low - Compliance with*	*Low - no surface water in close proximity*
	Facilities			*Distance from SWI*	2.13 mi.	*High - within 7 miles upstream*	*regulations, few or no releases*	
				Volume of Release	*N/A*	*Low - less than 1000 gallons*		
				Duration of Release	*N/A*	*Low - little likelyhood of a release, no reported releases*		
				Ease of Travel/Transport	*N/A*	*Low - low percentage of impervious surface area, generally flat*		
						topography, buffer zones in place		
				Toxicity		*Medium - chronic, chemicals*		
Denmom tool, Inc.	Hazardous Waste	Little Tallapoosa River	Little Tallapoosa River	*Distance from surface water*	1,109 ft.	*Low - further than 500 ft.*	*Low - Compliance with*	*Low - no surface water in close proximity*
	Facilities			*Distance from SWI*	11 mi.	*Medium - between 7 and 15 miles upstream*	*regulations, few or no releases*	
	Mining			*Volume of Release*	*N/A*	*Low - less than 1000 gallons*		
				Duration of Release	*N/A*	*Low - little likelyhood of a release, no reported releases*		
				Ease of Travel/Transport	*N/A*	*Low - low percentage of impervious surface area, generally flat*		
						topography, buffer zones in place		
				Toxicity		*Medium - chronic, chemicals*		
Belyeu Danny Chevrolet	Hazardous Waste	Little Tallapoosa River	Little Tallapoosa River	*Distance from surface water*	53 ft.	*High - less than or equal to 500 ft*	*Low - Compliance with*	*Low - no surface water in close proximity*
	Facilities			*Distance from SWI*	0.04 mi.	*High - within 7 miles upstream*	*regulations, few or no releases*	
				Volume of Release	*N/A*	*Low - less than 1000 gallons*		
				Duration of Release	*N/A*	*Low - little likelyhood of a release, no reported releases*		
				Ease of Travel/Transport	*N/A*	*Low - low percentage of impervious surface area, generally flat*		
						topography, buffer zones in place		
				Toxicity		*Medium - chronic, chemicals*		
City of Temple	LAS Permit Holders	Holly Creek	Little Tallapoosa River	*Distance from surface water*	1,056 ft.	*Low - further than 500 ft.*	*Low - Compliance with permit*	*Low - no surface water in close proximity*
				Distance from SWI	9.6 mi.	*Medium - between 7 and 15 miles upstream*	*conditions, few sewer overflows*	
				Volume of Release	*N/A*	*Medium - greater than 1,000 gallons and less than 10,000 gallons*	*and/or bypasses*	
				Duration of Release	*N/A*	*Medium - on-going, permitted releases, chronic small events,*		
						likelihood of continued releases		
				Ease of Travel/Transport	*N/A*	*Medium - moderate topography, number of run-off conveyances,*		
						use of some structural controls		
				Toxicity		*Low - secondary, taste, odor*		
Flowers Baking Company	NPDES Stormwater	Little Tallapoosa River	Little Tallapoosa River	*Distance from surface water*	580.8 ft.	*Low - further than 500 ft.*	*Low - Compliance with permit*	*Low - no surface water in close proximity*
				Distance from SWI	11 mi.	*Medium - between 7 and 15 miles upstream*	*conditions, few sewer overflows*	
				Volume of Release	*N/A*	*Medium - greater than 1,000 gallons and less than 10,000 gallons*	*and/or bypasses*	
				Duration of Release	*N/A*	*Medium - on-going, permitted releases, chronic small events,*		
						likelihood of continued releases		
				Ease of Travel/Transport	*N/A*	*Medium - moderate topography, number of run-off conveyances,*		
						use of some structural controls		
				Toxicity		*Low - secondary, taste, odor*		
Sonoco Products Company	NPDES Stormwater	Williams Mills Creek	Little Tallapoosa River	*Distance from surface water*	2,165 ft.	*Low - further than 500 ft.*	*Low - Compliance with permit*	*Low - no surface water in close proximity*
	Mining			*Distance from SWI*	8.9 mi.	*Medium - between 7 and 15 miles upstream*	*conditions, few sewer overflows*	
				Volume of Release	*N/A*	*Medium - greater than 1,000 gallons and less than 10,000 gallons*	*and/or bypasses*	
				Duration of Release	*N/A*	*Medium - on-going, permitted releases, chronic small events,*		
						likelihood of continued releases		
				Ease of Travel/Transport	*N/A*	*Medium - moderate topography, number of run-off conveyances,*		
						use of some structural controls		
				Toxicity		*Low - secondary, taste, odor*		

PFI Transport Inc.	NPDES Stormwater Mining	Little Tallapoosa River	Little Tallapoosa River	Distance from surface water	950 ft.	Low - further than 500 ft.	Low - Compliance with permit conditions, few sewer overflows and/or bypasses	Low - no surface water in close proximity
				Distance from SWI	10.8 mi.	Medium - between 7 and 15 miles upstream		
				Volume of Release	N/A	Medium - greater than 1,000 gallons and less than 10,000 gallons		
				Duration of Release	N/A	Medium - on-going, permitted releases, chronic small events, likelihood of continued releases		
				Ease of Travel/Transport	N/A	Medium - moderate topography, number of run-off conveyances, use of some structural controls		
				Toxicity		Low - secondary, taste, odor		
Southwire/Patterson Co.	Hazardous Waste Facilities	Hendricks Creek	Little Tallapoosa River	Distance from surface water	2,534 ft.	Low - further than 500 ft.	Low - Compliance with regulations, few or no releases	Low - no surface water in close proximity
				Distance from SWI	2.7 mi.	High - within 7 miles upstream		
				Volume of Release	N/A	Medium - greater than 1,000 gallons and less than 10,000 gallons		
				Duration of Release	N/A	Medium - on-going, permitted releases, chronic small events, likelihood of continued releases		
				Ease of Travel/Transport	N/A	Medium - moderate topography, number of run-off conveyances, use of some structural controls		
				Toxicity		Medium - chronic, chemicals		
Peoples Dodge	Hazardous Waste Facilities	Curtis Creek	Little Tallapoosa River	Distance from surface water	158 ft.	High - less than or equal to 500 ft	Low - Compliance with regulations, few or no releases	High - surface water in close proximity
				Distance from SWI	3.6 mi.	High - within 7 miles upstream		
				Volume of Release	N/A	Medium - greater than 1,000 gallons and less than 10,000 gallons		
				Duration of Release	N/A	Low - little likelyhood of a release, no reported releases		
				Ease of Travel/Transport	N/A	Low - low percentage of impervious surface area, generally flat topography, buffer zones in place		
				Toxicity		Medium - chronic, chemicals		
Mashburns Transmission Service	Hazardous Waste Facilities	Curtis Creek	Little Tallapoosa River	Distance from surface water	2,112 ft.	Low - further than 500 ft.	Low - Compliance with regulations, few or no releases	Low - no surface water in close proximity
				Distance from SWI	2.13 mi.	High - within 7 miles upstream		
				Volume of Release	N/A	Medium - greater than 1,000 gallons and less than 10,000 gallons		
				Duration of Release	N/A	Low - little likelyhood of a release, no reported releases		
				Ease of Travel/Transport	N/A	Low - low percentage of impervious surface area, generally flat topography, buffer zones in place		
				Toxicity		Medium - chronic, chemicals		
Printpack, Inc.	Hazardous Waste Facilities NPDES Stormwater	Little Tallapoosa River	Little Tallapoosa River	Distance from surface water	2,165 ft.	Low - further than 500 ft.	Low - Compliance with regulations, few or no releases	Low - no surface water in close proximity
				Distance from SWI	11.02 mi.	Medium - between 7 and 15 miles upstream		
				Volume of Release	N/A	Medium - greater than 1,000 gallons and less than 10,000 gallons		
				Duration of Release	N/A	Medium - on-going, permitted releases, chronic small events, likelihood of continued releases		
				Ease of Travel/Transport	N/A	Medium - moderate topography, number of run-off conveyances, use of some structural controls		
				Toxicity		Medium - chronic, chemicals		
Holcombe Armiture Co.	Hazardous Waste Facilities	Little Tallapoosa River	Little Tallapoosa River	Distance from surface water	3,960 ft.	Low - further than 500 ft.	Low - Compliance with regulations, few or no releases	Low - no surface water in close proximity
				Distance from SWI	11.6 mi.	Medium - between 7 and 15 miles upstream		
				Volume of Release	N/A	Medium - greater than 1,000 gallons and less than 10,000 gallons		
				Duration of Release	N/A	Low - little likelyhood of a release, no reported releases		
				Ease of Travel/Transport	N/A	Medium - moderate topography, number of run-off conveyances, use of some structural controls		
				Toxicity		Medium - chronic, chemicals		
Econo Food Flash Store #1	Hazardous Waste Facilities	Curtis Creek	Little Tallapoosa River	Distance from surface water	106 ft.	High - less than or equal to 500 ft	Low - Compliance with regulations, few or no releases	High - surface water and surface water intake in
				Distance from SWI	1.8 mi.	High - within 7 miles upstream		
				Volume of Release	N/A	Medium - greater than 1,000 gallons and less than 10,000 gallons		
				Duration of Release	N/A	Low - little likelyhood of a release, no reported releases		
				Ease of Travel/Transport	N/A	Medium - moderate topography, number of run-off conveyances, use of some structural controls		
				Toxicity		Medium - chronic, chemicals		
Villa Rica West WPCP	NPDES Permit Holders Wastewater Plants	Little Tallapoosa River	Little Tallapoosa River	Distance from surface water	52.8 ft.	High - less than or equal to 500 ft	Low - Compliance with regulations, few or no releases	High - surface water in close proximity
				Distance from SWI	10.8 mi.	Medium - between 7 and 15 miles upstream		
				Volume of Release	N/A	Low - little likelyhood of a release, no reported releases		
				Duration of Release	N/A	Medium - on-going, permitted releases, chronic small events, likelihood of continued releases		
				Ease of Travel/Transport	N/A	Medium - moderate topography, number of run-off conveyances, use of some structural controls		
				Toxicity		High - acute, pathogen, odor		

	Carrollton SWI					
	Facility Name	**Entity**	**Nearest Receiving Stream**	**SWI source water**	**Potential**	**Risk**
1	Northside Dr.	Road that crosses over streams	Little Tallapoosa River	Little Tallapoosa River	*Low - low percentage of impervious surface area, generally flat topography, buffer zones in place*	*High - Immediate proximity of surface water*
2	McKenzie Bridge Rd.	Road that crosses over streams	Little Tallapoosa River	Little Tallapoosa River	*Low - low percentage of impervious surface area, generally flat topography, buffer zones in place*	*High - Immediate proximity of surface water*
3	Sage St.	Road that crosses over streams	Sharpe Creek	Little Tallapoosa River	*Low - low percentage of impervious surface area, generally flat topography, buffer zones in place*	*High - Immediate proximity of surface water*
4	Centerpoint Rd.	Road that crosses over streams	Sharpe Creek	Little Tallapoosa River	*Low - low percentage of impervious surface area, generally flat topography, buffer zones in place*	*High - Immediate proximity of surface water*
5	Oak Grove Rd.	Road that crosses over streams	Allen Creek	Little Tallapoosa River	*Low - low percentage of impervious surface area, generally flat topography, buffer zones in place*	*High - Immediate proximity of surface water*
6	Temple Center Point Rd.	Road that crosses over streams	Allen Creek	Little Tallapoosa River	*Low - low percentage of impervious surface area, generally flat topography, buffer zones in place*	*High - Immediate proximity of surface water*
7	Raburn Lake Rd.	Road that crosses over streams	Allen Creek	Little Tallapoosa River	*Low - low percentage of impervious surface area, generally flat topography, buffer zones in place*	*High - Immediate proximity of surface water*
8	I20	Road that crosses over streams	Allen Creek	Little Tallapoosa River	*Low - low percentage of impervious surface area, generally flat topography, buffer zones in place*	*High - Immediate proximity of surface water*
9	Carrollton Rd.	Road that crosses over streams	Allen Creek	Little Tallapoosa River	*Low - low percentage of impervious surface area, generally flat topography, buffer zones in place*	*High - Immediate proximity of surface water*
10	Lively Rd.	Road that crosses over streams	Bethel Creek	Little Tallapoosa River	*Low - low percentage of impervious surface area, generally flat topography, buffer zones in place*	*High - Immediate proximity of surface water*
11	Sage St.	Road that crosses over streams	Bethel Creek	Little Tallapoosa River	*Low - low percentage of impervious surface area, generally flat topography, buffer zones in place*	*High - Immediate proximity of surface water*
12	Villa Rosa Rd.	Road that crosses over streams	Bethel Creek	Little Tallapoosa River	*Low - low percentage of impervious surface area, generally flat topography, buffer zones in place*	*High - Immediate proximity of surface water*
13	I20	Road that crosses over streams	Bethel Creek	Little Tallapoosa River	*Low - low percentage of impervious surface area, generally flat topography, buffer zones in place*	*High - Immediate proximity of surface water*
14	Ashbury Rd.	Road that crosses over streams	Trestle Creek	Little Tallapoosa River	*Low - low percentage of impervious surface area, generally flat topography, buffer zones in place*	*High - Immediate proximity of surface water*
15	Sage St.	Road that crosses over streams	Trestle Creek	Little Tallapoosa River	*Low - low percentage of impervious surface area, generally flat topography, buffer zones in place*	*High - Immediate proximity of surface water*
16	Rainey Rd.	Road that crosses over streams	Trestle Creek	Little Tallapoosa River	*Low - low percentage of impervious surface area, generally flat topography, buffer zones in place*	*High - Immediate proximity of surface water*

17	East Johnson St.	Road that crosses over streams	Trestle Creek	Little Tallapoosa River	Low - low percentage of impervious surface area, generally flat topography, buffer zones in place	High - Immediate proximity of surface water
18	State Route 8	Road that crosses over streams	William Mills creek	Little Tallapoosa River	Low - low percentage of impervious surface area, generally flat topography, buffer zones in place	High - Immediate proximity of surface water
19	Villa Rosa Rd.	Road that crosses over streams	Williams Mill Creek	Little Tallapoosa River	Low - low percentage of impervious surface area, generally flat topography, buffer zones in place	High - Immediate proximity of surface water
20	I20	Road that crosses over streams	Williams Mill Creek	Little Tallapoosa River	Low - low percentage of impervious surface area, generally flat topography, buffer zones in place	High - Immediate proximity of surface water
21	Harmon Rd.	Road that crosses over streams	Webster Creek	Little Tallapoosa River	Low - low percentage of impervious surface area, generally flat topography, buffer zones in place	High - Immediate proximity of surface water
22	Spruill Bridge Rd.	Road that crosses over streams	Williams Mill Creek	Little Tallapoosa River	Low - low percentage of impervious surface area, generally flat topography, buffer zones in place	High - Immediate proximity of surface water
23	Spruill Ck. Rd.	Road that crosses over streams	Holly Creek	Little Tallapoosa River	Low - low percentage of impervious surface area, generally flat topography, buffer zones in place	High - Immediate proximity of surface water
24	HWY 78	Road that crosses over streams	Little Tallapoosa River	Little Tallapoosa River	Low - low percentage of impervious surface area, generally flat topography, buffer zones in place	High - Immediate proximity of surface water
25	North Van Wert	Road that crosses over streams	Little Tallapoosa River	Little Tallapoosa River	Low - low percentage of impervious surface area, generally flat topography, buffer zones in place	High - Immediate proximity of surface water
26	HWY 101	Road that crosses over streams	Little Tallapoosa River	Little Tallapoosa River	Low - low percentage of impervious surface area, generally flat topography, buffer zones in place	High - Immediate proximity of surface water
27	HWY 20	Road that crosses over streams	Little Tallapoosa River	Little Tallapoosa River	Low - low percentage of impervious surface area, generally flat topography, buffer zones in place	High - Immediate proximity of surface water
28	Buckhorn Rd.	Road that crosses over streams	Little Tallapoosa River	Little Tallapoosa River	Low - low percentage of impervious surface area, generally flat topography, buffer zones in place	High - Immediate proximity of surface water
29	North Hickory Level Rd.	Road that crosses over streams	Little Tallapoosa River	Little Tallapoosa River	Low - low percentage of impervious surface area, generally flat topography, buffer zones in place	High - Immediate proximity of surface water
30	West Hickory Level Rd.	Road that crosses over streams	Little Tallapoosa River	Little Tallapoosa River	Low - low percentage of impervious surface area, generally flat topography, buffer zones in place	High - Immediate proximity of surface water
31	Hog Liver Rd.	Road that crosses over streams	Little Tallapoosa River	Little Tallapoosa River	Low - low percentage of impervious surface area, generally flat topography, buffer zones in place	High - Immediate proximity of surface water
32	Makenzie Bridge Rd.	Road that crosses over streams	Little Tallapoosa River	Little Tallapoosa River	Low - low percentage of impervious surface area, generally flat topography, buffer zones in place	High - Immediate proximity of surface water

33	Northside Dr.	Road that crosses over streams	Little Tallapoosa River	Little Tallapoosa River	*Low - low percentage of impervious surface area, generally flat topography, buffer zones in place*	*High - Immediate proximity of surface water*
34	North Park St.	Road that crosses over streams	Little Tallapoosa River	Little Tallapoosa River	*Low - low percentage of impervious surface area, generally flat topography, buffer zones in place*	*High - Immediate proximity of surface water*
35	Newman Rd.	Road that crosses over streams	Little Tallapoosa River	Little Tallapoosa River	*Low - low percentage of impervious surface area, generally flat topography, buffer zones in place*	*High - Immediate proximity of surface water*
36	Jennifer Ln.	Road that crosses over streams	Hendricks Creek	Little Tallapoosa River	*Low - low percentage of impervious surface area, generally flat topography, buffer zones in place*	*High - Immediate proximity of surface water*

Appemdix 7 - Water Quality Data (Little Tallapoosa River)

Sample ID	Date	Air Temperature (°C)	Water Temperature (°C)	Dissolved Oxygen (ppm)	pH	Conductivity (µs/cm)	Turbidity (NTU)	Hardness (mg/l)	Ammonia (mg/l)	Nitrite-Nitrate-N (mg/l)	TKN (mg/l)	Phosphorus (mg/l)	COD (mg/l)
Little Tallapoosa River													
	Average	18.0	15.7	8.7	6.8	62.5	12.5	20.7	0.1	0.2	0.5	0.4	17
	Min	0.8	0.4	6.2	5.8	35.3	4.7	3.7	0.1	0.0	0.1	0.0	1
	Max	32.9	27.9	13.6	7.7	86.5	68.4	84.3	0.3	0.3	1.0	2.3	105
CTH-66	1/4/2001	2.1	0.4	13.6	6.6	72.6	6.9	17.4	0.1	0.2	0.5	0.4	9
CTH-66	1/10/2001	0.8	1.8	13.3	7.5	71.1	6.6	19.3	0.3	0.2	0.2	0.2	12
CTH-66	1/17/2001	12.7	6.6	10.6	6.4	70.9	6.2	18.4	0.1	0.2	0.4	0.0	1
CTH-66	1/24/2001	7.6	5.4	11.3	6.7	59.5	33.0	16.0	0.1	0.3	0.4	2.3	15
CTH-66	1/31/2001	12.5	8.4	11.1	6.3	54.8	27.0	14.7	0.1	0.2	0.4	0.1	2
CTH-66	2/7/2001	10.3	6.5	11.1	6.7	58.4	16.0	17.6	0.2	0.2	0.7	0.9	4
CTH-66	2/14/2001	16.2	9.8	10.6	6.4	57.9	13.8	17.0	0.1	0.2	0.6	0.5	13
CTH-66	2/21/2001	16.3	10.7	9.8	6.7	59.4	13.0	16.6	0.2	0.2	0.5	0.4	5
CTH-66	2/28/2001	14.1	12.5	9.1	6.7	55.3	18.1	15.8	0.1	0.3	0.4	0.2	20
CTH-66	3/7/2001	11.2	8.6	10.2	7.0	54.0	29.4	15.2	0.1	0.2	0.6	1.7	2
CTH-66	3/14/2001	17.5	12.0	10.5	6.9	46.3	39.6	12.6	0.1	0.2	0.7	0.7	23
CTH-66	3/20/2001	10.5	8.5	10.7	7.2	35.3	68.4	9.7	0.2	0.3	0.9	0.5	14
CTH-66	3/28/2001	13.5	9.0	10.5	6.4	47.1	18.5	13.7	0.1	0.3	0.8	0.4	30
CTH-66	4/2/2001	12.6	10.6	10.5	7.4	47.4	17.8	13.1	0.1	0.2	0.6	0.4	12
CTH-66	4/11/2001	21.1	18.8	7.8	6.8	48.9	14.9	15.8	0.1	0.2	0.8	0.0	67
CTH-66	4/18/2001	9.9	13.8	8.6	7.3	50.8	14.9	17.8	0.1	0.2	0.4	0.5	34
CTH-66	4/25/2001	15.1	17.0	7.7	7.1	51.5	9.7	18.4		0.2	0.4	0.0	37
CTH-66	5/3/2001	23.3	17.9	7.8	7.0	57.7	8.9	18.8	0.2	0.2	0.8	0.4	1
CTH-66	5/9/2001	23.9	19.4	7.4	6.9	57.1	9.0	18.9	0.2	0.2	0.1	0.6	105
CTH-66	5/16/2001	24.7	19.6	7.6	6.7	62.4	9.1	22.2	0.1	0.2	0.6	1.2	7
CTH-66	5/23/2001	27.5	18.9	7.2	7.1	59.6	9.5	20.6	0.1	0.1	0.4	0.3	14
CTH-66	5/30/2001	23.2	21.6	7.4	7.7	62.0	11.0	21.7	0.1	0.1	0.5	0.7	7
CTH-66	6/6/2001	29.1	24.6	7.3	6.8	57.9	13.0	19.5	0.1	0.1	0.4	0.9	1
CTH-66	6/13/2001	29.0	26.3	7.1	7.0	59.1	11.0	19.7	0.1	0.1	0.4	1.0	23
CTH-66	6/20/2001	24.3	24.3	6.4	7.2	63.4	9.1	23.8	0.1	0.2	0.3	0.3	1
CTH-66	6/27/2001	28.8	25.2	6.8	7.1	64.2	11.0	28.1	0.1	0.2	0.4	0.2	37
CTH-66	7/5/2001	31.4	27.2	6.4	7.1	57.0	20.0	18.7	0.1	0.1	0.4	0.4	8
CTH-66	7/11/2001	29.5	27.9	6.2	6.9	59.8	9.9	39.1	0.1	0.2	0.4	0.5	1
CTH-66	7/18/2001	18.4	22.4	6.8	7.4	66.5	11.0	84.3	0.2	0.2	0.3	0.5	1
CTH-66	7/25/2001	30.4	27.0	6.8	7.2	53.9	8.5	37.4	0.1	0.2	0.3	0.3	1
Sample ID	Date	Air Temperature (°C)	Water Temperature (°C)	Dissolved Oxygen (ppm)	pH	Conductivity (µs/cm)	Turbidity	Hardness	Ammonia	Nitrite-Nitrate-N	TKN	Phosphorus	COD
CTH-66	8/1/2001	28.4	26.4	6.6	6.6	57.6	8.3	15.6	0.1	0.1	0.5	0.3	11
CTH-66	8/8/2001	32.0	27.3	7.1	7.2	61.1	10.0	20.5	0.1	0.1	0.5	0.4	20
CTH-66	8/15/2001	32.9	26.2	7.5	7.2	66.0	8.1	25.1	0.1	0.2	0.4	0.2	12
CTH-66	8/22/2001	17.3	20.7	7.0	6.6	77.4	13.0	27.9	0.1	0.1	0.5	0.1	18
CTH-66	8/29/2001	21.5	23.3	6.3	5.9	73.2	7.5	25.9	0.1	0.2	0.5	0.2	25
CTH-66	9/5/2001	22.7	23.2	6.5	6.4	60.5	8.8	18.0	0.2	0.1	0.4	0.2	12
CTH-66	9/13/2001	20.5	21.5	7.1	6.9	75.4	7.3	23.2	0.2	0.1	0.5	0.2	12
CTH-66	9/20/2001	21.8	21.5	7.2	6.9	46.1	5.6	14.9	0.1	0.1	0.4	0.1	5
CTH-66	9/26/2001	13.1	15.3	8.2	6.2	50.4	6.4	19.4	0.1	0.1	0.4	0.1	13
CTH-66	10/3/2001	13.9	15.5	8.3	5.8	38.6	6.1	15.7	0.1	0.1	0.3	0.1	3
CTH-66	10/10/2001	13.1	14.0	8.6	6.1	86.5	5.6	24.4	0.1	0.1	0.5	0.1	35
CTH-66	10/17/2001	9.3	12.0	8.5	5.8	83.6	5.5	22.7	0.1	0.0	1.0	0.1	10
CTH-66	10/25/2001	15.9	17.1	7.3	6.8	84.7	5.4	22.6	0.1	0.0	0.4	0.1	11
CTH-66	10/31/2001	12.6	8.8	9.5	6.3	83.7	6.2	3.7	0.1	0.1	0.6	0.2	23
CTH-66	11/14/2001	14.5	9.5	9.6	5.9	84.0	4.7	20.9	0.1	0.1	0.6	0.3	31
CTH-66	11/19/2001	12.1	9.5	9.6	6.1	82.8	4.7	24.2	0.1	0.1	0.3	0.1	26
CTH-66	11/29/2001	18.9	14.8	8.4	6.4	80.0	5.4	19.2	0.2	0.1	0.5	0.2	9
CTH-66	12/6/2001	13.9	10.1	9.7	6.4	81.7	6.2	21.2	0.1	0.1	0.3	0.1	16
CTH-66	12/12/2001	13.2	11.7	9.5	7.4	71.8	6.6	17.0	0.1	0.2	0.4	0.3	9
CTH-66	12/17/2001	18.4	13.1	8.9	7.4	62.6	7.3	19.6	0.1	0.1	0.5	0.1	34
CTH-66	12/21/2001	11.0	6.3	10.8	7.4	58.4	8.5	15.5	0.1	0.2	0.5	0.1	16
CTH-66	12/28/2001	9.7	3.3	12.4	7.2	63.0	9.7	19.4	0.2	0.3	0.6	0.3	11

Sample ID	Date	TSS (mg/l)	Fecal (mg/l)	FC (col/100 ml)	BOD (mg/l)	alcium (mg	agnesium (mg	ardness (mg	Se (mg/l)	Zn (mg/l)	Pb (mg/l)	Cd (mg/l)	Ni (mg.l)	Cu (mg/l)
Little Tallapoosa River														
	Average	11.6		171	87	133	7	21						
	Min	1.3		1	1	1	0	4						
	Max	81.3		2000	2978	3874	155	84						
CTH-66	1/4/2001	8.0		22	1	4.30	1.61	17.40	<0.025	<0.025	<0.025	<0.005	<0.005	<0.005
CTH-66	1/10/2001	6.0		27	1	4.84	1.74	19.30	<0.025	<0.025	<0.025	<0.005	0.005	0.005
CTH-66	1/17/2001	9.0		42	1	4.71	1.61	18.40	<0.025	<0.025	<0.025	<0.005	<0.005	<0.005
CTH-66	1/24/2001	20.7		25	1	4.06	1.43	16.00	<0.025	<0.025	<0.025	<0.005	<0.005	<0.005
CTH-66	1/31/2001	23.4		82	1	3.61	1.38	14.70	<0.025	<0.025	<0.025	<0.005	<0.005	<0.005
CTH-66	2/7/2001	16.3		33	2	4.46	1.57	17.60	<0.025	<0.025	<0.025	<0.005	<0.005	<0.005
CTH-66	2/14/2001	18.5		21	1	4.26	1.54	17.00	<0.025	<0.025	0.0345	<0.005	<0.005	<0.005
CTH-66	2/21/2001	9.3		74	1	4.18	1.49	16.60	<0.025	<0.025	<0.025	<0.005	<0.005	<0.005
CTH-66	2/28/2001	19.3		100	1	3.92	1.47	15.80	<0.025	<0.025	<0.025	<0.005	<0.005	<0.005
CTH-66	3/7/2001	12.6		91	1	3.76	1.40	15.20	<0.025	<0.025	<0.025	<0.005	<0.005	<0.005
CTH-66	3/14/2001	35.5		130	1	3.10	1.18	12.60	<0.025	<0.025	<0.025	<0.005	<0.005	<0.005
CTH-66	3/20/2001	81.3		2000	4	2.32	0.95	9.70	<0.025	<0.025	<0.025	<0.005	<0.005	0.005
CTH-66	3/28/2001	18.9		52	1	3.33	1.30	13.70	<0.025	<0.025	<0.025	<0.005	<0.005	<0.005
CTH-66	4/2/2001	18.5		7	1	3.02	1.34	13.10	<0.025	<0.025	<0.025	<0.005	0.0165	<0.005
CTH-66	4/11/2001	18.3		80	1	3.71	1.58	15.80	<0.025	<0.025	<0.025	<0.005	<0.005	<0.005
CTH-66	4/18/2001	13.1		120	1	4.35	1.69	17.80	<0.025	<0.025	<0.025	<0.005	<0.005	<0.005
CTH-66	4/25/2001	11.0		72	1	4.47	1.75	18.40	<0.025	<0.025	<0.025	<0.005	<0.005	<0.005
CTH-66	5/3/2001	12.2		52	1	4.64	1.76	18.83	<0.025	<0.025	<0.025	<0.005	0.005	<0.005
CTH-66	5/9/2001	8.7	<1	1	2	4.62	1.79	18.90	<0.025	<0.025	<0.025	<0.005	<0.005	<0.005
CTH-66	5/16/2001	7.5		120	1	5.52	2.05	22.20	<0.025	<0.025	<0.025	<0.005	<0.005	<0.005
CTH-66	5/23/2001	3.5		160	2	5.08	1.93	20.60	<0.025	<0.025	<0.025	<0.005	<0.005	<0.005
CTH-66	5/30/2001	5.5		110	1	5.48	1.94	21.70	<0.025	<0.025	<0.025	<0.005	<0.005	<0.005
CTH-66	6/6/2001	19.7		62	1	4.98	1.71	19.50	<0.025	<0.025	<0.025	<0.005	<0.005	<0.005
CTH-66	6/13/2001	12.0		120	1	4.89	1.81	19.70	<0.025	<0.025	<0.025	<0.005	<0.005	<0.005
CTH-66	6/20/2001	14.1		130	1	5.97	2.17	23.80						
CTH-66	6/27/2001	19.8		130	1	7.09	2.52	28.10	<0.025	0.044	<0.025	<0.005	<0.005	<0.005
CTH-66	7/5/2001	19.0		190	1	4.54	1.79	18.70	<0.025	<0.025	<0.025	<0.005	<0.005	<0.005
CTH-66	7/11/2001	10.1		67	1	9.82	3.54	39.10	0.0335	<0.025	<0.025	<0.005	<0.005	<0.005
CTH-66	7/18/2001	8.0		160	1	21.50	7.44	84.30	<0.025	<0.025	<0.025	<0.005	<0.005	<0.005
CTH-66	7/25/2001	8.5		130	1	9.51	3.31	37.40	0.0255	<0.025	<0.025	<0.005	<0.005	<0.005
Sample ID	Date	TSS	Fecal	FC	BOD	Calcium	Magnesium	Hardness	Se	Zn	Pb	Cd	Ni	Cu
CTH-66	8/1/2001	4.1		83	1	3.79	1.49	15.60	<0.025	<0.025	<0.025	<0.005	<0.005	<0.005
CTH-66	8/8/2001	10.0		84	1	5.09	1.89	20.50	<0.025	<0.025	<0.025	<0.005	<0.005	<0.005
CTH-66	8/15/2001	6.9		24	1	6.34	2.26	25.10	<0.025	0.025	<0.025	<0.005	<0.005	<0.005
CTH-66	8/22/2001	7.1		50	1	7.18	2.41	27.90	<0.025	<0.025	<0.025	<0.005	<0.005	<0.005
CTH-66	8/29/2001	3.4		180	3	6.95	2.08	25.90	0.031	0.043	<0.025	<0.005	0.02	0.007
CTH-66	9/5/2001	3.4		110	1	4.54	1.61	18.00	<0.025	<0.025	<0.025	<0.005	0.005	<0.005
CTH-66	9/13/2001	2.4		150	1	5.86	2.07	23.20	<0.025	<0.025	<0.025	<0.005	<0.005	<0.005
CTH-66	9/20/2001	2.9		230	1	3.58	1.45	14.90	<0.025	<0.025	<0.025	<0.005	<0.005	<0.005
CTH-66	9/26/2001	4.7		140	1	4.80	1.80	19.40	<0.025	<0.025	<0.025	<0.005	<0.005	<0.005
CTH-66	10/3/2001	3.5		57	1	3.80	1.50	15.70	<0.025	<0.025	0.031	<0.005	0.038	<0.005
CTH-66	10/10/2001	6.9		80	2	6.37	2.07	24.40	0.0555	<0.025	0.028	<0.005	0.034	<0.005
CTH-66	10/17/2001	3.8		130	1	5.81	1.98	22.70	0.0865	0.077	0.0465	0.005	<0.005	<0.005
CTH-66	10/25/2001	1.3		180		5.57	2.10	22.60	0.038	<0.025	<0.025	<0.005	<0.005	<0.005
CTH-66	10/31/2001	2.4		97	1	0.90	0.35	3.70	0.0335	<0.025	<0.025	<0.005	<0.005	<0.005
CTH-66	11/14/2001	2.7		90	1	5.01	2.04	20.90	0.0265	<0.025	<0.025	<0.005	<0.005	<0.005
CTH-66	11/19/2001	6.0		130	1	5.93	2.28	24.20	0.029	0.0635	<0.025	<0.005	0.007	<0.005
CTH-66	11/29/2001	1.3		100	1	4.50	1.93	19.20	<0.025	<0.025	<0.025	<0.005	<0.005	<0.005
CTH-66	12/6/2001	1.3		140	1	5.27	1.95	21.20	0.0275	<0.025	<0.025	<0.005	0.05	<0.005
CTH-66	12/12/2001	7.0		170	1	4.24	1.55	17.00	<0.025	<0.025	<0.025	<0.005	0.0075	<0.005
CTH-66	12/17/2001	21.0		93	1	4.53	2.00	19.55	<0.025	<0.025	<0.025	<0.005	<0.005	<0.005
CTH-66	12/21/2001	8.0		160	1	3.59	1.59	15.51	<0.025	<0.025	<0.025	<0.005	0.0165	<0.005
CTH-66	12/28/2001	6.0		13	1	4.50	1.98	19.39	<0.025	<0.025	<0.025	<0.005	<0.005	<0.005