CHAPTER 6

RESTORATION STRATEGIES IN THE SEQUATCHIE RIVER WATERSHED

6.1. BACKGROUND.

The Watershed Water Quality Management Plan serves as a comprehensive inventory of resources and stressors in the watershed, a recommendation for control measures, and a guide for planning activities in the next five-year watershed cycle and beyond. Water quality improvement will be a result of implementing both regulatory and nonregulatory programs.

In addition to the NPDES program, some state and federal regulations, such as the TMDL and ARAP programs, address point and nonpoint issues. Construction and MS4 storm water rules (implemented under the NPDES program) have transitioned from Phase 1 to Phase 2. More information on storm water rules may be found at: http://www.state.tn.us/environment/wpc/stormh2o/.

This Chapter addresses point and nonpoint source approaches to water quality problems in the Sequatchie River Watershed.

6.2. COMMENTS FROM PUBLIC MEETINGS. Watershed meetings are open to the public, and most meetings were represented by citizens who live in the watershed, NPDES permitees, business people, farmers, and local river conservation interests. Locations for meetings were chosen after consulting with people who live and work in the watershed. Everyone with an interest in clean water is encouraged to be a part of the public meeting process. The times and locations of watershed meetings are posted at: http://www.state.tn.us/environment/wpc/watershed/public.shtml.

6.2.A. Year 1 Public Meeting. The first Sequatchie River Watershed public meeting was held jointly with the Guntersville Lake Watershed on November 9, 2000, at the National Guard Armory in Dunlap. The goals of the meeting were to: (1) present, and review the objectives of, the Watershed Approach, (2) introduce local, state, and federal agency and nongovernmental organization partners, (3) review water quality monitoring strategies, and (4) solicit input from the public.

Major Concerns/Comments

- How can the watershed approach be a coordinated effort when so many agencies are involved?
- Do all agencies use the same tests so that data can be directly compared?
- Agriculture is unfairly shouldering the blame for nonpoint source problems that timberharvesting, mining, and construction are causing.
- Geologic mapping should be used as an indicator for metals and acidity.
- TDOT is the worst polluter in the Sequatchie valley.
- Deforestation causes increases in siltation.
- There is a need for a watershed group that can act as an advocate for rivers without the burden of issuing permits.
- Some farmers alleged that complying with pollution controls will put them out of business.
- Water withdrawal from residential and industrial growth.

6.2.B. Year 3 Public Meeting. The second Sequatchie River Watershed public meeting was held jointly with the Guntersville Lake Watershed at The Sequatchie Valley Co-Op in Dunlap. The goals of the meeting were to: (1) provide an overview of the watershed approach, (2) review the monitoring strategy, (3) summarize the most recent water quality assessment, (4) discuss the TMDL schedule and citizens' role in commenting on draft TMDLs, and (5) discuss BMPs and other nonpoint source tools available through the Tennessee Department of Agriculture 319 Program and NRCS conservation assistance programs.

Major Concerns/Comments

- Illegal dumping of garbage off bridges and along stream banks
- Public access areas for public to launch canoes and small boats
- Allocation of limited water resources before it becomes a problem
- Loss of freshwater mussels
- Release of zebra mussels in upper reaches of Sequatchie River
- Feasibility of water line from Tennessee River to head of Sequatchie Valley
- Watershed Plan/Strategy will become a regulatory document
- Agriculture gets blamed for homeowner origins of nonpoint source pollution.
- If buffer strips become mandated then farmers need to be compensated.
- Wetlands protection is backdoor zoning

How soon after a fish kill can fresh fit be eaten?

6.2.C. Year 5 Public Meeting. Not yet scheduled.

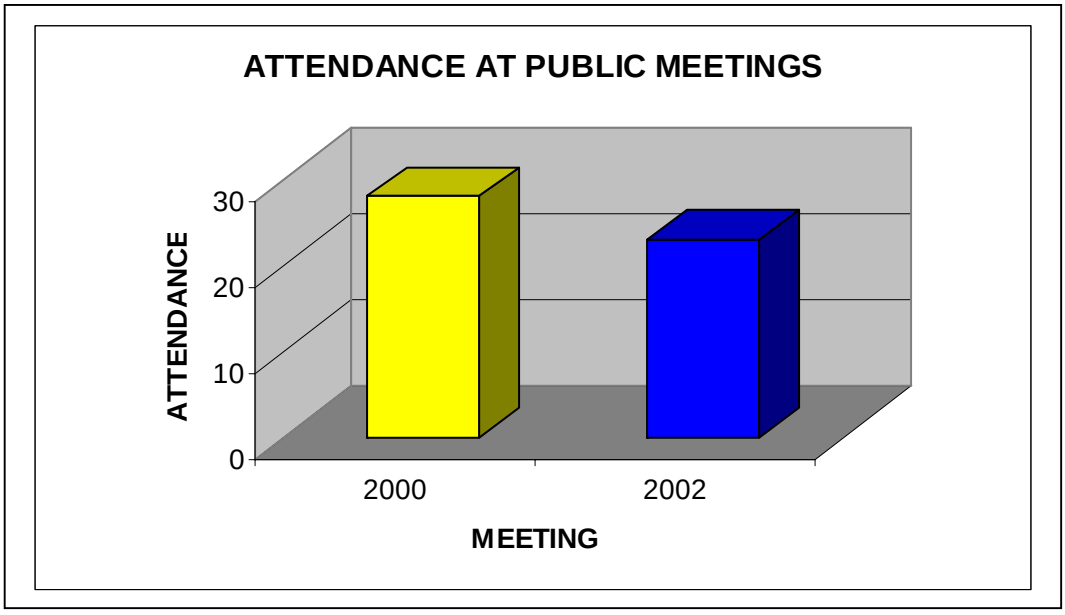

Figure 6-1. Attendance at the Sequatchie River and Guntersville Lake Watershed Joint Public Meetings. *Attendance numbers do not include TDEC personnel.*

6.3. APPROACHES USED.

6.3.A. Point Sources. Point source contributions to stream impairment are primarily addressed by NPDES and ARAP permit requirements and compliance with the terms of the permits. Notices of NPDES and ARAP draft permits available for public comment can be viewed at http://www.state.tn.us/environment/wpc/wpcppo/. Discharge monitoring data submitted by NPDES-permitted facilities may be viewed at http://www.epa.gov/enviro/html/pcs/pcs_query_java.html.

The purpose of the TMDL program is to identify remaining sources of pollution and allocate pollution control needs in places where water quality goals are still not being achieved. TMDL studies are tools that allow for a better understanding of load reductions necessary for impaired streams to return to compliance with water quality standards. More information about Tennessee's TMDL program may be found at: http://www.state.tn.us/environment/wpc/tmdl/.

TMDLs are prioritized for development based on many factors.

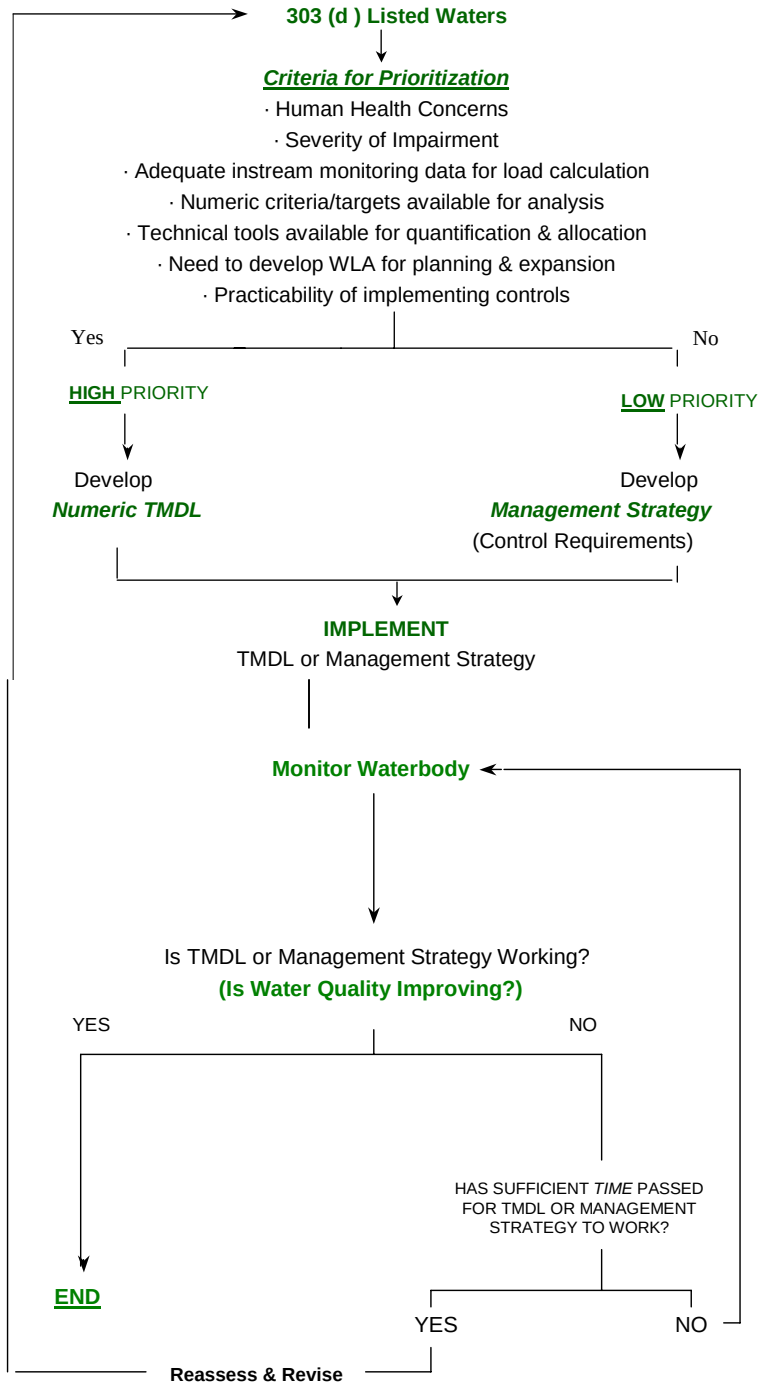

Figure 6-2. Prioritization Scheme for TMDL Development.

6.3.B. Nonpoint Sources

Common nonpoint sources of pollution in the Sequatchie River Watershed include agricultural practices, riparian vegetation removal and other habitat alterations, inappropriate land development, urban storm water runoff, and road construction. Since nonpoint pollution exists essentially everywhere rain falls, existing point source regulations can have only a limited effect. Other measures are, therefore, necessary.

There are several state and federal regulations that address contaminants impacting waters in the Sequatchie River Watershed. Most of these are limited to point sources: a pipe or ditch. Often, controls of point sources are not sufficient to protect waters, so other measures are necessary. Some measures include efforts by landowners and volunteer groups and the possible implementation of new regulations. Many agencies, such as the Tennessee Department of Agriculture (TDA) and the Natural Resources Conservation Service (NRCS), offer financial assistance to landowners for corrective actions (like Best Management Practices) that may be sufficient for recovery of impacted streams. Many nonpoint problems will require an active civic involvement at the local level geared towards establishment of improved zoning guidelines, building codes, streamside buffer zones and greenways, and general landowner education.

The following text describes types of impairments, possible causes, and suggested improvement measures. Restoration efforts should not be limited to only those streams and measures suggested below.

6.3.B.i. Sedimentation.

6.3.B.i.a. From Construction Sites. Construction activities have historically been considered “nonpoint sources.” In the late 1980’s, EPA designated them as being subject to NPDES regulation if more than 5 acres were being disturbed. In the spring of 2003, that threshold became 1 acre. The general permit issued for such construction sites establishes conditions for maintenance of the sites to minimize pollution from storm water runoff, including requirements for installation and inspection of erosion prevention and sediment controls. Also, the general permit imposes more stringent inspection, design criteria, sediment control measures, and self-monitoring requirements on sites in the watershed of streams that are already impaired due to sedimentation or are considered high quality. Regardless of the size, no construction site is allowed to cause a condition of pollution.

Beginning in 2003, the state began requiring some municipalities to obtain coverage under a permit designed to address nonpoint runoff issues: the General NPDES Municipal Separate Storm Sewer System Permit, commonly known as MS4. This permit requires the holder to develop a comprehensive storm water management program, including the adoption of local regulatory ordinances, regular inspection of construction sites and other discharges into their storm sewers, and a variety of educational, mapping, and monitoring activities. The state audits and oversees these local MS4 programs. Due to the rural nature of much of the area, and lack of large high-density population centers, no portion of the Sequatchie River Watershed in Tennessee is currently covered by an active MS4 program.

Construction sites within a sediment-impaired watershed may also have higher priority for inspections by WPC and MS4 personnel, and are likely to have enforcement actions for failure to control erosion.

6.3.B.i.b. From Channel and/or Bank Erosion. Many streams within the Sequatchie River Watershed suffer from varying degrees of stream bank erosion. When stream channels are altered, banks can become unstable and highly erodable. Heavy livestock traffic can also severely disturb banks. When large tracts of land are cleared of vegetation (especially trees) and replaced with impermeable surfaces like asphalt and rooftops, the large increases in the velocities and volumes of storm water runoff can also overwhelm channel and bank integrity because destabilized banks contribute to sediment loadings and to the loss of beneficial riparian vegetation.

Some improper agricultural practices and overzealous land development have impacted the hydrology and morphology of stream channels in Sequatchie River watershed.

Unpermitted rock harvesting can also severely disturb stream banks. Destabilized banks contribute to sediment load and to the loss of beneficial riparian vegetation to the stream. The historical removal of cobble and rock from stream channels has resulted in destabilization of stream channels and aggressive erosion of stream banks.

Several agencies such as the NRCS, TVA, and TDA, are working to stabilize portions of stream banks using bioengineering and other techniques. Many of the affected streams, Hicks Creek, Cove Branch and Big Brush Creek, would benefit from these types of projects.

Another form of Channel and Bank erosion is coming from a new source of concern. Off-road and All-terrain vehicle clubs are becoming increasingly popular. Many of the routes the vehicles take are directly in the stream channels or cross streams. The areas where the vehicles routinely go in and out of the streams are heavily eroded and due to the lack of a stable bank, continue to erode during storm events and in some cases during normal flows. The most extensive habitat damage occurs in the areas where the vehicles are crossing frequently as well as the areas of extended channel use (Little Sequatchie River, Pocket Creek).

Some methods or controls that might be necessary to address common problems are:

Voluntary Activities

- Re-establish bank vegetation. (Unnamed Tributary to the Sequatchie River in Marion County, Unnamed Tributary to Shelton Creek, Second Unnamed Tributary to Sequatchie River in Marion County, Peck Branch, McWilliams Creek, Hall Creek, Little Creek, Brown Creek, Swafford Branch, Stephens Branch, Manning Springs, Unnamed Tributary to Sequatchie River in Bledsoe County, Skillern Creek, Second Unnamed Tributary to Sequatchie River in Bledsoe County, Maise Creek, Daniel Creek, and Grassy Cove Creek).
- Establish off-channel watering areas for livestock by moving watering troughs and feeders back from stream banks, or at least limit cattle access to restricted

areas with armored banks entry *(*Unnamed Tributary to the Sequatchie River in Marion County, Unnamed Tributary to Shelton Creek, Second Unnamed Tributary to Sequatchie River in Marion County, Peck Branch, McWilliams Creek, Hall Creek, Little Creek, Brown Creek, Swafford Branch, Stephens Branch, Manning Springs, Unnamed Tributary to Sequatchie River in Bledsoe County, Skillern Creek, Second Unnamed Tributary to Sequatchie River in Bledsoe County, Maise Creek, Daniel Creek, and Grassy Cove Creek*).*

- Limit cattle access to streams and bank vegetation *(*Unnamed Tributary to the Sequatchie River in Marion County, Unnamed Tributary to Shelton Creek, Second Unnamed Tributary to Sequatchie River in Marion County, Peck Branch, McWilliams Creek, Hall Creek, Little Creek, Brown Creek, Swafford Branch, Stephens Branch, Manning Springs, Unnamed Tributary to Sequatchie River in Bledsoe County, Skillern Creek, Second Unnamed Tributary to Sequatchie River in Bledsoe County, Maise Creek, Daniel Creek, and Grassy Cove Creek*).*
- Limit vehicle access to streams (Little Sequatchie River, Pocket Creek).
- Stabilize fords and stream crossings (Little Sequatchie River, Pocket Creek).
- Move trails out of stream channel and stabilize trails near streams (Little Sequatchie, Pocket Creek)
- Educate Off road enthusiast of the damaging effects they cause to streams.

Regulatory Strategies

- Increase efforts in the Master Logger program to recognize impaired streams and require more effective management practices. (Tributary to Glady Fork)
- Require post-construction run-off rates to be no greater than pre-construction rates in order to avoid in-channel erosion. (Little Sequatchie River, Pocket Creek)
- Implement additional restrictions on logging in streamside management zones. (Tibutary to Glady Fork)
- Limit road and utility crossings of streams through better site design. (Little Sequatchie River, Pocket Creek)
- Restrict the use of off-highway vehicles on stream banks and in stream channels. (Little Sequatchie River, Pocket Creek)
- Limit clearing of stream and roadside ditch banks or other alterations *Note: Permits may be required for any work along streams.*
- Encourage or require strong local buffer ordinances.
- Restrict rock harvesting to permitted sites. (Pocket Creek, Hicks Creek, Woodcock Creek, Brush Creek)
- Require established Clubs to get appropriate permitting.

Additional Strategies

- Better community planning for the impacts of development on small streams, especially development in growing.

6.3.B.i.c. From Agriculture and Silviculture. The Water Quality Control Act exempts normal agricultural and silvicultural practices that do not result in a point source discharge. Nevertheless, efforts are being made to address impacts due to these exempted practices.

The Master Logger Program has been in place for several years to train loggers how to install Best Management Practices that lessen the impact of logging activities on streams. Recently, laws and regulations established the authority for the Commissioners of the Departments of Environment and Conservation and of Agriculture to stop the logging operation that, upon failing to install these BMPs, is causing impacts to streams.

Since the Dust Bowl era, the agriculture community has strived to protect the soil from wind and water erosion. Agencies such as the Natural resources Conservation Service (NRCS), the University of Tennessee Agricultural Extension Service, and the Tennessee Department of Agriculture are striving to identify better ways of farming, to educate the farmers, and to install the methods that address the sources of some of the impacts due to agriculture. Cost sharing is available for many of these measures.

Many sediment problems traceable to agricultural practices also involve riparian loss due to close row cropping or pasture clearing for grazing. Lack of vegetated buffers along stream corridors is a problem in most areas of the Sequatchie River Watershed, due both to agricultural and residential/commercial land uses. Many streams, like Unnamed Tributary to the Sequatchie River in Marion County, Unnamed Tributary to Shelton Creek, Second Unnamed Tributary to Sequatchie River in Marion County, Peck Branch, McWilliams Creek, Hall Creek, Little Creek, Brown Creek, Swafford Branch, Stephens Branch, Manning Springs, Unnamed Tributary to Sequatchie River in Bledsoe County, Skillern Creek, Second Unnamed Tributary to Sequatchie River in Bledsoe County, Maise Creek, and Daniel Creek, could benefit from the establishment of more extensive riparian buffer zones.

6.3.B.i.d. From Point Sources. Several permitted discharges within the Sequatchie River (Dunlap STP, Pikeville STP) discharge suspended solids under the conditions of an NPDES permit and are reviewed during the watershed cycle for reissuance. A few will also have limits on settleable solids. Those facilities with solids restrictions are Dunlap STP.

6.3.B.ii. Pathogen Contamination.

Possible sources of pathogens are inadequate or failing septic tank systems, overflows or breaks in public sewer collection systems, poorly disinfected discharges from sewage treatment plants, and fecal matter from pets, livestock and wildlife washed into streams and storm drains. When fecal bacterial levels are shown to be consistently elevated to dangerously high levels, especially in streams with high potential for recreational uses, the division must post signage along the creek, warning the public to avoid contact. Once pathogen sources have been identified and corrected, and pathogen level reductions are documented, the posting is lifted.

Permits issued by the Division of Water Pollution Control regulate discharges from point sources and require adequate control for these sources. Individual homes are required to have subsurface, on-site treatment (i.e., septic tank and field lines) if public sewers are not available. The Division of Ground Water Protection within the Chattanooga Environmental Field Office regulate septic tanks and field lines. In addition to discharges

to surface waters, businesses may employ subsurface treatment for domestic wastewater or surface discharge of treated process wastewater. The Division of Water Pollution Control regulates surface water discharges and near-surface land application of treated wastewater.

Currently, 17 stream systems in the Sequatchie River Watershed are known to have excessive pathogen contamination. Streams in the watersheds that show elevated bacterial levels include, Unnamed Tributary to the Sequatchie River in Marion County, Unnamed Tributary to Shelton Creek, Second Unnamed Tributary to Sequatchie River in Marion County, Peck Branch, McWilliams Creek, Hall Creek, Little Creek, Brown Creek, Swafford Branch, Stephens Branch, Manning Springs, Unnamed Tributary to Sequatchie River in Bledsoe County, Skillern Creek, Second Unnamed Tributary to Sequatchie River in Bledsoe County, Maise Creek, Daniel Creek and Grassy Cove Creek.

Some measures that may be necessary to control pathogens are:

Voluntary Activities

- Repair failed septic systems.
- Establish off-channel watering of livestock (Unnamed Tributary to the Sequatchie River in Marion County, Unnamed Tributary to Shelton Creek, Second Unnamed Tributary to Sequatchie River in Marion County, Peck Branch, McWilliams Creek, Hall Creek, Little Creek, Brown Creek, Swafford Branch, Stephens Branch, Manning Springs, Unnamed Tributary to Sequatchie River in Bledsoe County, Skillern Creek, Second Unnamed Tributary to Sequatchie River in Bledsoe County, Maise Creek, Daniel Creek and Grassy Cove Creek)
- Limit livestock access to streams *(*Unnamed Tributary to the Sequatchie River in Marion County, Unnamed Tributary to Shelton Creek, Second Unnamed Tributary to Sequatchie River in Marion County, Peck Branch, McWilliams Creek, Hall Creek, Little Creek, Brown Creek, Swafford Branch, Stephens Branch, Manning Springs, Unnamed Tributary to Sequatchie River in Bledsoe County, Skillern Creek, Second Unnamed Tributary to Sequatchie River in Bledsoe County, Maise Creek, Daniel Creek and Grassy Cove Creek)
- Improve and educate on the proper management of animal waste from confined feeding operations.

Regulatory Strategies

- Strengthen enforcement of regulations governing on-site wastewater treatment.
- Determine timely and appropriate enforcement for non-complying sewage treatment plants, large and small, and their collection systems. (Dunlap STP, Pikeville STP)
- Identify Concentrated Animal Feeding Operations not currently permitted.

Additional Strategies

- Develop intensive planning in areas where sewer is not available and treatment by subsurface disposal is not an option due to poor soils, floodplains, or high water tables.
- Greater efforts by sewer utilities to identify leaking lines or overflowing manholes.
- Review the pathogen limits in discharge permits to determine the need for further restriction.

6.3.B.iii. Excessive Nutrients and/or Dissolved Oxygen Depletion.

These two impacts are usually listed together because high nutrients often contribute to low dissolved oxygen within a stream. Since nutrients often have the same source as pathogens, the measures previously listed can also address many of these problems. Elevated nutrient loadings are also often associated with urban runoff from impervious surfaces, from fertilized lawns and croplands, and faulty sewage disposal processes. Nutrients are often transported with sediment, so many of the measures designed to reduce sediment runoff will also aid in preventing organic enrichment of streams and lakes.

Dissolved oxygen depletion can also be due to the discharge of other biodegradable materials. These are limited in NPDES permits as ammonia and as either Biological Oxygen Demand (BOD) or Carbonaceous Oxygen Demand (CBOD).

Some sources of nutrients can be addressed by:

Voluntary Activities

- Educate homeowners and lawn care companies in the proper application of fertilizers.
- Encourage landowners, developers, and builders to leave stream buffer zones. Streamside vegetation can filter out many nutrients and other pollutants before they reach the stream. These riparian buffers are also vital along livestock pastures. Many streams in the Sequatchie River Watershed within agricultural areas would benefit from additional riparian buffers.
- Use grassed drainage ways that can remove fertilizer and sediment before it enters streams.
- Use native plants for landscaping since they don't require as much fertilizer and water.
- Develop better overall storm water management in urban and residential areas, including retrofitting existing commercial lots, homes, and roadways with storm water quality and quantity BMPs. This would especially improve the urban streams and lakes currently polluted by excessive nutrient and sediment inputs.

Physical changes to streams can prevent them from providing enough oxygen to biodegrade the materials that are naturally present. A few additional actions can address this problem:

- Maintain shade over a stream. Cooler water can hold more oxygen and retard the growth of algae. As a general rule, all stream channels suffer from some canopy removal. An intact riparian zone also acts as a buffer to filter out nutrient loads before they enter the water.
- Discourage impoundments and instead encourage filtration basins/ constructed wetlands. Ponds and lakes do not aerate water, and cause many water quality problems downstream. *Note: Permits may be required for any work on a stream, including impoundments.*

Regulatory Strategies.

- Strengthen enforcement of regulations governing on-site wastewater treatment.
- Impose more stringent permit limits for nutrients discharged from sewage treatment plants *(Dunlap STP, Pikeville STP)*
- Impose timely and appropriate enforcement for noncomplying sewage treatment plants, large and small, and their collection systems *(Dunlap STP, Pikeville STP)*.
- Identify Concentrated Animal Feeding Operations (CAFO) not currently permitted.
- Identify any Animal Feeding Operations (AFO) that contribute to stream impacts and declare them as a CAFO requiring a permit.
- Require nutrient management plans for all golf courses. (Mount Airy Golf Club)

Additional Strategies

- Encourage TDA- and NRCS-sponsored educational programs targeted to agricultural landowners and aimed at better nutrient management, as well as information on technology-based application tools.

6.3.B.iv. Toxins and Other Materials.

Although some toxic substances are discharged directly into waters of the state from a point source, much of these materials are washed in during rainfalls from an upland location, or via improper waste disposal that contaminates groundwater. In the Tennessee portion of the Sequatchie River Watershed, a relatively small number of streams are damaged by toxins in storm water runoff from industrial facilities or urban areas. More stringent inspection and regulation of permitted industrial facilities, and local storm water quality initiatives and regulations, could help reduce the amount of contaminated runoff reaching state waters.

Individuals may also cause contaminants to enter streams by activities that may be attributed to apathy or the lack of knowledge or civility. Litter in roadside ditches, garbage bags tossed over bridge railings, paint brushes washed off over storm drains, and oil drained into ditches are all blatant examples of pollution in streams. Misapplication of chemicals, on agricultural and suburban areas, is another source of toxins.

Some of these problems can be addressed by:

Voluntary Activities

- Provide public education.
- Paint warnings on storm drains that connect to a stream.
- Sponsor community clean-up days.
- Landscape public areas.
- Encourage public surveillance of their streams and reporting of dumping activities to their local authorities.

Regulatory Strategies

- Continue to prohibit illicit discharges to storm drains and to search them out.
- Strengthen litter law enforcement at the local level.
- Increase the restrictions on storm water runoff from industrial facilities.

6.3.B.v. Habitat Alteration.

The alteration of the habitat within a stream can have severe consequences. Whether it is the removal of the vegetation, providing a root system network for holding soil particles together, the release of sediment, which increases the bed load and covers benthic life and fish eggs, the removal of gravel bars, "cleaning out" creeks with heavy equipment, or the impounding of the water in ponds and lakes, many alterations impair the use of the stream for designated uses. Habitat alteration also includes the draining or filling of wetlands.

Many streams within the Sequatchie River Watershed suffer from some degree of habitat alteration, especially riparian loss and bank disturbances from agricultural practices. Some notable streams in the watershed that have suffered significant harm from riparian loss and bank disturbances from agricultural practices include (Unnamed Tributary to the Sequatchie River in Marion County, Unnamed Tributary to Shelton Creek, Second Unnamed Tributary to Sequatchie River in Marion County, Peck Branch, McWilliams Creek, Hall Creek, Little Creek, Brown Creek, Swafford Branch, Stephens Branch, Manning Springs, Unnamed Tributary to Sequatchie River in Bledsoe County, Skillern Creek, Second Unnamed Tributary to Sequatchie River in Bledsoe County, Maise Creek, Daniel Creek and Grassy Cove Creek).

Although large-scale public projects such as highway construction can alter significant portions of streams, individual landowners and developers are responsible for the vast majority of stream alterations. Some measures that can help address these problems are:

Voluntary Activities

- Sponsor litter pickup days to remove litter that might enter streams
- Organize stream cleanups removing trash, limbs and debris before they cause blockage.
- Avoid use of heavy equipment to "clean out" streams. *Instream work other than debris removal will require an Aquatic Resource Alteration Permit (ARAP).*
- Plant native vegetation along streams to stabilize banks and provide habitat
- Encourage developers to avoid extensive use of culverts in streams.

Regulatory Strategies

- Restrict modification of streams by means such as culverting, lining, or impounding.
- Require mitigation for impacts to streams and wetlands when modifications are allowed.
- Require permitting of all rock harvesting operations.
- Increased enforcement may be needed when violations of current regulations occur, especially for illicit gravel dredging.

6.3.B.vi. Tennessee Land Reclamation.

Abandoned Coal Mines pose serious threats to public health, safety, and welfare as well as degrade the environment. The programs of Tennessee Land reclamation Section accomplish three important things: (1) They remove dangerous health and safety hazards that threaten the citizens of Tennessee, (2) They improve the environment, and (3) They restore resources to make them available for economic development, recreation, and other uses. Problems typically addressed by the Land Reclamation Section include open or improperly filled mine shafts, dilapidated mine buildings and equipment, toxic mine refuse and drainage, landslides, mine fires, highwalls, and subsidence.

Projects on the ground:

- Studer Mines associated with Skyline Coal Co.
- Sequatchie Valley Coal Co.

6.3.B.vii. Acid Rock Drainage (ARD).

Another source of pollution comes from abandoned and active mines as well as the disturbance of strata containing certain sulphide minerals such as those containing pyrite. Fore example, roads cuts through certain types of rock layers can also contribute to the pollution of waters of the state. These streams are impacted by ARD, which causes the pH to drop to below 6.0.

Streams may be impacted by chemical reactions that result in orange flocculent material in the water and on the bottom of streams. Seeps may develop an oily film on the surface of the water. The orange color comes from the iron in the water precipitating out when the water reaches the surface and starts to oxidize. Once the iron has precipitated out, other metals will start to precipitate, like manganese and aluminum (manganese forms a hard black coating on the substrate and aluminum a fine white chalky layer). Examples of streams affected by ARD are the Big Brush Creek, Glady Fork Creek, Caney Creek, a tributary to Woodcock Creek, Coal Stonebank Creek, Kelly Creek, and Greys Creek.

The means necessary to remove ARD from these streams is complicated and expensive. There are two types of treatment systems, Passive Treatment and Active Treatment. Two examples of Passive Treatment facilities are anoxic limestone drains and constructed wetlands (alone or in some combination lined with limestone rock). These systems are used to precipitate the flocculants and stabilize the pH. Active Treatment systems collect the water at the source and actively drop neutralizing chemicals into the water in order to stabilize the pH and precipitate iron prior to discharging to a stream. Since these treatment systems will have to go on for many years, the most cost effective means to treat these streams is by Passive Treatment. In order to install these systems the landowners, stakeholders and Office of Surface Mining all have to work together.

Some of these problems can be addressed by:

Voluntary Activities

- Provide public education.
- Get stakeholders involved in the construction and maintenance of the wetlands.
- Skyline Coal Co. and Sequatchie Valley Coal Co. and Tennessee Consolidated Coal Co. have taken voluntary measures to remove ARD from the watersheds they previously mined.

Regulatory Strategies

- Mining (and some TDOT) activities covered by an NPDES or ARAP permit should have a longer period of post-termination monitoring and remediation as a requirement of permit issuance.

6.3.B.vi. Storm Water.

MS4 discharges are regulated through the Phase I or II NPDES-MS4 permits. These permits require the development and implementation of a Storm Water Management Program (SWMP) that will reduce the discharge of pollutants to the maximum extent practicable and not cause or contribute to violations of state water quality standards. The NPDES General Permit for Discharges from Phase I and II MSF facilities can be found at:

http://www.state.tn.us/environment/wpc/stormh2o/.

For discharges into impaired waters, the MS4 General Permit requires that SWMPs include a section describing how discharges of pollutants of concern will be controlled to ensure that they do not cause or contribute to instream exceedences of water quality standards. Specific measurements and BMPs to control pollutants of concern must also be identified. In addition, MS4s must implement the proposed waste load allocation provisions of an applicable TMDL (i.e., siltation/habitat alteration, pathogens) and describe methods to evaluate whether storm water controls are adequate to meet the waste load allocation. In order to evaluate SWMP effectiveness and demonstrate compliance with specified waste load allocations, MS4s are encouraged to develop and implement appropriate monitoring programs by the designated date.

Some storm sewer discharges are not regulated through the NPDES MS4 program. Strategies to address runoff in these urban areas include adapting Tennessee Growth Readiness Program (TGRP) educational materials to the watershed. TGRP is a statewide program built on existing best management practices from the Nonpoint Education for Municipal Officials program and the Center for Watershed Protection. TGRP developed the program to provide communities and counties with tools to design economically viable and watershed friendly developments. The program assists community leaders in reviewing current land use practices, determining impacts of imperviousness on watershed functions, and allowing them to understand the economics of good watershed management and site design.

6.4. PERMIT REISSUANCE PLANNING

Under the *Tennessee Water Quality Control Act*, municipal, industrial and other dischargers of wastewater must obtain a permit from the Division. Approximately 1,700 permits have been issued in Tennessee under the federally delegated National Pollutant Discharge Elimination System (NPDES). These permits establish pollution control and monitoring requirements based on protection of designated uses through implementation of water quality standards and other applicable state and federal rules.

The following three sections provide specific information on municipal, industrial, and water treatment plant active permit holders in the Sequatchie River Watershed. Compliance information was obtained from EPA's Permit Compliance System (PCS). All data was queried for a five-year period between May 1, 2002 and May 31, 2007. PCS can be accessed publicly through EPA's Envirofacts website. This website provides access to several EPA databases to provide the public with information about environmental activities that may affect air, water, and land anywhere in the United States:

http://www.epa.gov/enviro/html/ef_overview.html

Stream Segment information, including designated uses and impairments, are described in detail in Chapter 3, *Water Quality Assessment of the Sequatchie River Watershed.*

6.4.A. Municipal Permits

TN0025054 Pikeville STP

Discharger rating: Minor
City: Pikeville
County: Bledsoe
EFO Name: Chattanooga
Issuance Date: 10/31/05
Expiration Date: 10/31/10
Receiving Stream(s): Sequatchie River Mile 78.4
HUC-12: 060200040103
Effluent Summary: Treated municipal wastewater from Outfall 001
Treatment system: WAS to aerobic digester to drybeds to landfill

PARAMETER	SEASON	LIMIT	UNITS	SAMPLE DESIGNATOR	MONITORING FREQUENCY	SAMPLE TYPE	MONITORING LOCATION
Ammonia as N (Total)	All Year	22.5	mg/L	DMax Conc	3/Week	Composite	Effluent
Ammonia as N (Total)	All Year	37	lb/day	WAvg Load	3/Week	Composite	Effluent
Ammonia as N (Total)	All Year	17.5	mg/L	WAvg Conc	3/Week	Composite	Effluent
Ammonia as N (Total)	All Year	12.5	mg/L	MAvg Conc	3/Week	Composite	Effluent
Ammonia as N (Total)	All Year	26	lb/day	MAvg Load	3/Week	Composite	Effluent
Bypass of Treatment (occurrences)	All Year		Occurences/Month	MAvg Load	Continuous	Visual	Wet Weather
CBOD % Removal	All Year	40	Percent	DMin % Removal	3/Week	Calculated	% Removal
CBOD % Removal	All Year	85	Percent	MAvg % Removal	3/Week	Calculated	% Removal
CBOD5	All Year	40	mg/L	DMax Conc	3/Week	Composite	Effluent
CBOD5	All Year	35	mg/L	WAvg Conc	3/Week	Composite	Effluent
CBOD5	All Year		mg/L	MAvg Conc	3/Week	Composite	Influent (Raw Sewage)
CBOD5	All Year		mg/L	DMax Conc	3/Week	Composite	Influent (Raw Sewage)
CBOD5	All Year	53	lb/day	MAvg Load	3/Week	Composite	Effluent
CBOD5	All Year	25	mg/L	MAvg Conc	3/Week	Composite	Effluent
CBOD5	All Year	74	lb/day	WAvg Load	3/Week	Composite	Effluent
D.O.	All Year	1	mg/L	DMin Conc	Weekdays	Grab	Effluent
E. coli	All Year	941	#/100mL	DMax Conc	3/Week	Grab	Effluent
E. coli	All Year	126	#/100mL	MAvg Geo Mean	3/Week	Grab	Effluent
Flow	All Year		MGD	MAvg Load	Daily	Continuous	Influent (Raw Sewage)
Flow	All Year		MGD	MAvg Load	Daily	Continuous	Effluent
Flow	All Year		MGD	DMax Load	Daily	Continuous	Effluent
Flow	All Year		MGD	DMax Load	Daily	Continuous	Influent (Raw Sewage)

Table 6-1a.

PARAMETER	SEASON	LIMIT	UNITS	SAMPLE DESIGNATOR	MONITORING FREQUENCY	SAMPLE TYPE	MONITORING LOCATION
Overflow Use Occurences	All Year		Occurences/Month	MAvg Load	Continuous	Visual	Wet Weather
Overflow Use Occurences	All Year		Occurences/Month	MAvg Load	Continuous	Visual	Non Wet Weather
Settleable Solids	All Year	1	mL/L	DMax Conc	Weekdays	Grab	Effluent
TRC	All Year	0.4	mg/L	DMax Conc	Weekdays	Grab	Effluent
TSS	All Year	45	mg/L	DMax Conc	3/Week	Composite	Effluent
TSS	All Year	85	lb/day	WAvg Load	3/Week	Composite	Effluent
TSS	All Year	30	mg/L	MAvg Conc	3/Week	Composite	Effluent
TSS	All Year	64	lb/day	MAvg Load	3/Week	Composite	Effluent
TSS	All Year		mg/L	DMax Conc	3/Week	Composite	Influent (Raw Sewage)
TSS	All Year		mg/L	MAvg Conc	3/Week	Composite	Influent (Raw Sewage)
TSS	All Year	40	mg/L	WAvg Conc	3/Week	Composite	Effluent
TSS % Removal	All Year	40	Percent	DMin % Removal	3/Week	Calculated	% Removal
TSS % Removal	All Year	85	Percent	MAvg % Removal	3/Week	Calculated	% Removal
pH	All Year	9	SU	DMax Conc	Weekdays	Grab	Effluent
pH	All Year	6	SU	DMin Conc	Weekdays	Grab	Effluent

Table 6-1b.

Tables 6-1.a-b. Permit Limits for Pikeville STP.

Compliance History:
The following numbers of exceedences were noted in PCS:

- 4 Total Chlorine
- 18 Carbonaceous Biological Oxygen Demand (CBOD)
- 22 Settleable Solids
- 4 Ammonia
- 24 Total Suspended Solids
- 16 Suspended Solids % Removal
- 6 Carbonaceous Oxygen demand (COD)
- 1 Dissolved Oxygen
- 26 overflows
- 4 bypasses

Comments:
Operational problems due to power surges. Pretreatment Compliance Evaluation Inspection on 2/1/07: In Compliance

TN0077577 Valley View of Whitwell STP

Discharger rating: Minor
City: Whitwell
County: Marion
EFO Name: Chattanooga
Issuance Date: 5/31/06
Expiration Date: 10/31/10
Receiving Stream(s): Sequatchie River at mile 23.0
HUC-12: 060200040202
Effluent Summary: Treated domestic wastewater from Outfall 001
Treatment system: Septic tank, recirculating sand filter

Segment	TN06020004001_1000
Name	Sequatchie River
Size	38.1
Unit	Miles
First Year on 303(d) List	-
Designated Uses	Domestic Water Supply (Supporting), Industrial Water Supply (Supporting), Fish and Aquatic Life (Supporting), Recreation (Supporting), Irrigation (Supporting), Livestock Watering and Wildlife (Supporting)
Causes	N/A
Sources	N/A

Table 6-2. Stream Segment Information for Valley View of Whitwell STP.

PARAMETER	SEASON	LIMIT	UNITS	SAMPLE DESIGNATOR	MONITORING FREQUENCY	SAMPLE TYPE	MONITORING LOCATION
BOD5	All Year	30	mg/L	MAvg Conc	2/Month	Grab	Effluent
BOD5	All Year	45	mg/L	DMax Conc	2/Month	Grab	Effluent
D.O.	All Year	1	mg/L	DMin Conc	Weekly	Grab	Effluent
E. coli	All Year	126	#/100mL	MAvg Geo Mean	2/Month	Grab	Effluent
E. coli	All Year	941	#/100mL	MAvg Ari Mean	2/Month	Grab	Effluent
Flow	All Year		MGD	MAvg Load	Weekdays	Instantaneous	Effluent
Flow	All Year		MGD	DMax Load	Weekdays	Instantaneous	Effluent
TRC	All Year	2	mg/L	DMax Conc	Weekly	Grab	Effluent
TSS	All Year	30	mg/L	MAvg Conc	2/Month	Grab	Effluent
TSS	All Year	45	mg/L	DMax Conc	2/Month	Grab	Effluent
pH	All Year	6	SU	DMin Conc	Weekly	Grab	Effluent
pH	All Year	9	SU	DMax Conc	Weekly	Grab	Effluent

Table 6-3. Permit Limits for Valley View of Whitwell STP.

Enforcement:
NOV for late application on 9/7/05.

Comments: None

TN0021946 Dunlap STP

Discharger rating: Minor
City: Dunlap
County: Sequatchie
EFO Name: Chattanooga
Issuance Date: 3/1/06
Expiration Date: 10/31/10
Receiving Stream(s): Sequatchie River at mile 43.9
HUC-12: 060200040201
Effluent Summary: Treatment of municipal sewage from Outfall #001
Treatment system: WAS to aerobic digester to land application or to dry beds to landfill

PARAMETER	SEASON	LIMIT	UNITS	SAMPLE DESIGNATOR	MONITORING FREQUENCY	SAMPLE TYPE	MONITORING LOCATION
Ammonia as N (Total)	All Year	20	mg/L	DMax Conc	3/Week	Composite	Effluent
Ammonia as N (Total)	All Year	117	lb/day	WAvg Load	3/Week	Composite	Effluent
Ammonia as N (Total)	All Year	10	mg/L	MAvg Conc	3/Week	Composite	Effluent
Ammonia as N (Total)	All Year	15	mg/L	WAvg Conc	3/Week	Composite	Effluent
Ammonia as N (Total)	All Year	78	lb/day	MAvg Load	3/Week	Composite	Effluent
Bypass of Treatment (occurrences)	All Year		Occurences/Month	MAvg Load	Continuous	Visual	Wet Weather
CBOD % Removal	All Year	40	Percent	DMin % Removal	3/Week	Calculated	% Removal
CBOD % Removal	All Year	85	Percent	MAvg % Removal	3/Week	Calculated	% Removal
CBOD5	All Year	40	mg/L	DMax Conc	3/Week	Composite	Effluent
CBOD5	All Year	25	mg/L	MAvg Conc	3/Week	Composite	Effluent
CBOD5	All Year		mg/L	MAvg Conc	3/Week	Composite	Influent (Raw Sewage)
CBOD5	All Year		mg/L	DMax Conc	3/Week	Composite	Influent (Raw Sewage)
CBOD5	All Year	194	lb/day	MAvg Load	3/Week	Composite	Effluent
CBOD5	All Year	35	mg/L	WAvg Conc	3/Week	Composite	Effluent
CBOD5	All Year	273	lb/day	WAvg Load	3/Week	Composite	Effluent
D.O.	All Year	1	mg/L	DMin Conc	Weekdays	Grab	Effluent
E. coli	All Year	941	#/100mL	DMax Conc	3/Week	Grab	Effluent
E. coli	All Year	126	#/100mL	MAvg Geo Mean	3/Week	Grab	Effluent
Flow	All Year		MGD	MAvg Load	Daily	Continuous	Effluent
Flow	All Year		MGD	MAvg Load	Daily	Continuous	Influent (Raw Sewage)
Flow	All Year		MGD	DMax Load	Daily	Continuous	Effluent
Flow	All Year		MGD	DMax Load	Daily	Continuous	Influent (Raw Sewage)
IC25 7day *Ceriodaphnia Dubia*	All Year	8	Percent	DMin Conc	Quarterly	Composite	Effluent
IC25 7day Fathead Minnows	All Year	8	Percent	DMin Conc	Quarterly	Composite	Effluent
Overflow Use Occurences	All Year		Occurences/Month	MAvg Load	Continuous	Visual	Wet Weather
Overflow Use Occurences	All Year		Occurences/Month	MAvg Load	Continuous	Visual	Non Wet Weather
Settleable Solids	All Year	1	mL/L	DMax Conc	Weekdays	Grab	Effluent

Table 6-4a.

PARAMETER	SEASON	LIMIT	UNITS	SAMPLE DESIGNATOR	MONITORING FREQUENCY	SAMPLE TYPE	MONITORING LOCATION
TRC	All Year	0.2	mg/L	DMax Conc	Weekdays	Grab	Effluent
TSS	All Year	45	mg/L	DMax Conc	3/Week	Composite	Effluent
TSS	All Year	312	lb/day	WAvg Load	3/Week	Composite	Effluent
TSS	All Year	40	mg/L	WAvg Conc	3/Week	Composite	Effluent
TSS	All Year	234	lb/day	MAvg Load	3/Week	Composite	Effluent
TSS	All Year		mg/L	DMax Conc	3/Week	Composite	Influent (Raw Sewage)
TSS	All Year		mg/L	MAvg Conc	3/Week	Composite	Influent (Raw Sewage)
TSS	All Year	30	mg/L	MAvg Conc	3/Week	Composite	Effluent
TSS % Removal	All Year	40	Percent	DMin % Removal	3/Week	Calculated	% Removal
TSS % Removal	All Year	85	Percent	MAvg % Removal	3/Week	Calculated	% Removal
pH	All Year	9	SU	DMax Conc	Weekdays	Grab	Effluent
pH	All Year	6	SU	DMin Conc	Weekdays	Grab	Effluent

Table 6-4b.

Tables 6-4a-b. Permit Limits for Dunlap STP.

Compliance History:
The following numbers of exceedences were noted in PCS:

- 1 Total Suspended Solids
- 1 Ammonia
- 1 Settleable Solids
- 35 overflows
- 1 bypass

Enforcement:
NOV issued on June 15, 2007, for failure to meet the sampling requirements of NPDES permit.

Comments:
3/1/07 Pretreatment Compliance Evaluation Inspection: Minor deficiency.

6.4.B. Industrial Permits

TN0060399 Castle's Coin Laundry

Discharger rating: Minor
City: Whitwell
County: Marion
EFO Name: Chattanooga
Issuance Date: 5/31/05
Expiration Date: 5/31/10
Receiving Stream(s): Unnamed tributary at mile 0.9 to Big Spring Branch at mile 0.2 to the Sequatchie River at mile 22.1
HUC-12: 060200040202
Effluent Summary: Laundry wastewater through Outfall 001
Treatment system: Sand Filter

Segment	TN06020004001_0200
Name	Unnamed Trib to Sequatchie River
Size	9.3
Unit	Miles
First Year on 303(d) List	-
Designated Uses	Recreation (Supporting), Irrigation (Supporting), Fish and Aquatic Life (Supporting), Livestock Watering and Wildlife (Supporting)
Causes	N/A
Sources	N/A

Table 6-5. Stream Segment Information for Castle's Coin Laundry.

PARAMETER	SEASON	LIMIT	UNITS	SAMPLE DESIGNATOR	MONITORING FREQUENCY	SAMPLE TYPE	MONITORING LOCATION
CBOD5	All Year	15	mg/L	DMax Conc	Quarterly	Grab	Effluent
CBOD5	All Year	10	mg/L	MAvg Conc	Quarterly	Grab	Effluent
E. coli	All Year	941	#/100mL	DMax Conc	2/Month	Grab	Effluent
E. coli	All Year	126	#/100mL	MAvg Geo Mean	2/Month	Grab	Effluent
Flow	All Year		MGD	DMax Load	Weekly	Instantaneous	Effluent
Flow	All Year		MGD	MAvg Load	Weekly	Instantaneous	Effluent
Settleable Solids	All Year	0.5	mL/L	DMax Conc	Quarterly	Grab	Effluent
TRC	All Year	0.019	mg/L	DMax Conc	Weekly	Grab	Effluent
TRC	All Year	0.011	mg/L	MAvg Conc	Weekly	Grab	Effluent
TSS	All Year	40	mg/L	DMax Conc	Quarterly	Grab	Effluent
TSS	All Year	30	mg/L	MAvg Conc	Quarterly	Grab	Effluent
Temperature (°C)	All Year		°C	DMax Load	2/Month	Grab	Effluent
pH	All Year	9	SU	DMax Conc	2/Month	Grab	Effluent
pH	All Year	6	SU	DMin Conc	2/Month	Grab	Effluent

Table 6-6. Permit Limits for Castle's Coin Laundry.

Compliance History:
The following numbers of exceedences were noted in PCS:

- 3 Total Chlorine

Comments:
None.

6.4.C. Water Treatment Permits

TN0078581 Pikeville Water Treatment Plant

Discharger rating: Minor
City: Pikeville
County: Bledsoe
EFO Name: Chattanooga
Issuance Date: 3/18/05
Expiration Date: 9/27/09
Receiving Stream(s): Unnamed ditch which ultimately discharges to the Sequatchie River
HUC-12: 060200040103
Effluent Summary: Filter backwash and/or sedimentation basin washdown from Outfall 001
Treatment system: Raw water pumping, polymer feed, filtration, post chlorination and high service pumping. Sludge is land applied on property approved to accept WWTP sludge.

Segment	TN06020004007_1000
Name	Sequatchie River
Size	53.1
Unit	Miles
First Year on 303(d) List	-
Designated Uses	Recreation (Supporting), Livestock Watering and Wildlife (Supporting), Irrigation (Supporting), Industrial Water Supply (Supporting), Domestic Water Supply (Supporting), Fish and Aquatic Life (Supporting)
Causes	N/A
Sources	N/A

Table 6-7. Stream Segment Information for Pikeville Water Treatment Plant.

PARAMETER	SEASON	LIMIT	UNITS	SAMPLE DESIGNATOR	MONITORING FREQUENCY	SAMPLE TYPE	MONITORING LOCATION
Flow	All Year		MGD	DMax Load	Monthly	Instantaneous	Effluent
Settleable Solids	All Year	0.5	mL/L	DMax Conc	Monthly	Grab	Effluent
TRC	All Year	0.019	mg/L	DMax Conc	Monthly	Grab	Effluent
TSS	All Year	40	mg/L	DMax Conc	Monthly	Grab	Effluent
pH	All Year	9	SU	DMax Conc	Monthly	Grab	Effluent
pH	All Year	6.5	SU	DMin Conc	Monthly	Grab	Effluent

Table 6-8. Permit Limits for Pikeville Water Treatment Plant.

Comments:
Pikeville WTP has serious backwash filter issues.

TN0078921 Whitwell Water Plant

Discharger rating: Minor
City: Whitwell
County: Marion
EFO Name: Chattanooga
Issuance Date: 2/15/06
Expiration Date: 9/27/09
Receiving Stream(s): Sequatchie River at approximate mile 23.0
HUC-12: 060200040202
Effluent Summary: Filter backwash and/or sedimentation basin washdown from Outfall 001
Treatment system:

Segment	TN06020004001_1000
Name	Sequatchie River
Size	38.1
Unit	Miles
First Year on 303(d) List	-
Designated Uses	Domestic Water Supply (Supporting), Industrial Water Supply (Supporting), Fish and Aquatic Life (Supporting), Recreation (Supporting), Irrigation (Supporting), Livestock Watering and Wildlife (Supporting)
Causes	N/A
Sources	N/A

Table 6-9. Stream Segment Information for Whitwell Water Plant.

PARAMETER	SEASON	LIMIT	UNITS	SAMPLE DESIGNATOR	MONITORING FREQUENCY	SAMPLE TYPE	MONITORING LOCATION
Al (T)	All Year	10	mg/L	DMax Conc	Monthly	Grab	Effluent
Flow	All Year		MGD	DMax Load	Monthly	Instantaneous	Effluent
Settleable Solids	All Year	0.5	mL/L	DMax Conc	Monthly	Grab	Effluent
TRC	All Year	1	mg/L	DMax Conc	Monthly	Grab	Effluent
TSS	All Year	40	mg/L	DMax Conc	Monthly	Grab	Effluent
pH	All Year	6.5	SU	DMin Conc	Monthly	Grab	Effluent
pH	All Year	9	SU	DMax Conc	Monthly	Grab	Effluent

Table 6-10. Permit Limits for Whitwell Water Plant.

Comments:
None.