THE CITY OF KNOXVILLE
TENNESSEE

NPDES Permit Annual Report

National Pollutant Discharge Elimination System
Stormwater Discharge Permit TNS068055
July 1, 2000 - June 30, 2001

Signature and Certification

NPDES STORMWATER PERMIT TNS068055
2000/2001 MUNICIPAL ANNUAL REPORT

FOR: City of Knoxville, Tennessee

Federal regulations, 40 CFR 122.22 (a) (3) and 122.22 (d), require the application and reports for the NPDES permit to be signed and certified as follows:

> *For a municipality, State, Federal, or other public facility, by either a principal executive officer or ranking elected official.*
>
> *"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."*

xxxxxxx xxxxxxx — 12/19/01

Victor H. Ashe — Date
Mayor

xxxxxxx xxxxxxx — 12/19/01

Samuel L. Parnell, Jr., P.E. — Date
Director of Engineering

xxxxxxx xxxxxxx — 12/19/01

Michael Kelley — Date
Law Director

xxxxxxx xxxxxxx — 12/19/01

Randolph B. Vineyard — Date
Finance Director

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1.0 INTRODUCTION

The Tennessee Department of Environment and Conservation, Division of Water Pollution Control issued the City of Knoxville a National Pollutant Discharge Elimination System (NPDES) Permit (TNS068055) for the discharge of stormwater from the municipal separate storm sewer system (MS4). Stormwater from the City of Knoxville discharges directly to the Tennessee River and to major creeks that drain to the Tennessee River. Only a small portion of the MS4 runoff will drain to sinkholes, ponds, and lakes throughout the area. The current NPDES Permit was issued on July 1, 1996 and expired on June 28, 2001.

The NPDES Permit requires annual reporting of the progress of the Stormwater Management Program outlined in the Part I and Part II applications. The Annual Report was completed in accordance with the reporting requirements of Part VI of the permit and will complete the requirements for the fifth permit year from July 1, 2000 through June 30, 2001.

The Stormwater Quality Section of the City of Knoxville Engineering Department coordinated preparation and submittal of the system-wide Annual Report and Reapplication. Information for the annual report has been provided by the Engineering Department, Public Service Department, Parks and Recreation Department, Knoxville Area Transit (KAT), Knoxville/Knox County Emergency Management Agency (KEMA), and the Knoxville Utilities Board (KUB). The Engineering Department has compiled the available information into the format outlined in Part VI of the current NPDES Permit.

2.0 CONTACTS LIST

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3.0 STORMWATER MANAGEMENT PROGRAM (SWMP) EVALUATION

The objective of the City of Knoxville's SWMP is to protect the taxpayer's health, safety, and welfare through an economically viable comprehensive stormwater quality and quantity program. The City is proud to report some of the major accomplishments related to the SWMP that occurred during the fifth year of the NPDES permit term. Although it would be impossible to list all of the City's water quality related accomplishments in this report, the City has listed some of the significant water quality achievements during year five.

- In an effort to reduce the amount of floating trash, oil, and other pollution entering the Tennessee River, industrial grade calm water skimmers were installed at the outlets of Knoxville's most urban watersheds. A partnership with the Izaak Walton League was developed to install and maintain the floating skimmers. The City purchased the skimmers with penalty funds collected from polluters.

- The City extended the greenway/buffer zones along major waterways throughout the city to include a total of 20.74 miles of trail distributed over 14 greenways/buffers. These linear parks help protect the adjacent waterways and riparian zones.

- The first edition of the City of Knoxville's Best Management Practices manual was completed and may be accessed at www.ci.knoxville.tn.us/engineering/bmp_manual/ for viewing or download. The manual was introduced and distributed to local engineers during a new development workshop during year five.

- The City continued to reduce illegal dumping into storm drains by raising public awareness of the separate storm and sanitary systems. A new standard design was implemented on January 1, 2001 for all new curb irons and solid stormwater manhole covers. Each of the stormwater castings must now include a "No Dumping – Drains to River" message permanently cast into the iron structure. In addition to the new irons on newly developed sites, over 2000 small plastic disks with a "No Dumping" message were glued to existing curb irons throughout the city by students and volunteers.

- The City continues to sponsor and support an Americorps Water Quality team. The Water Quality team assists the City with community water quality education, creekbank stabilization projects, water quality testing, and creek cleanups. Americorps coordinates the Adopt-a-Watershed program in eight area schools.

- The City sponsored Ijams Nature Center to coordinate the 12th Annual River Rescue event to help cleanup trash and debris from the waterways throughout the area. The spring 2001 event attracted 835 volunteers who collected approximately 17.7 tons of trash and 167 tires from 36 sites on 100 miles of river/lake shoreline.

- Over 101 tons of Household Hazardous Waste (HHW) was processed last year at the permanent HHW facility. The facility is available to residents Tuesday through Saturday.

- A pipe camera was acquired during year five to improve our illicit discharge inspections program. During the first few months of operation, the camera has helped the City locate several discharges to the MS4. Soon after the camera was put into operation, an illegal sewer connection to the MS4 was discovered from a private home and a fuel line cross connection was discovered under a freight company's parking lot.

During the first five years of the stormwater quality program, the City defined a baseline by which future improvements and/or degradations may be measured. Although the improvements can not be measured quantitatively at this time, many programs initiated during the first five years have undeniably made improvements in the state of water quality throughout the city. The long-term results should become apparent in future years. The City implemented many of the SWMP tasks beyond the minimum permit requirements and will continue to advance the water quality programs beyond the NPDES Permit requirements as economically feasible.

4.0 STORMWATER MANAGEMENT PROGRAM SUMMARY TABLE

SWMP activity summary tables for the fifth year of the NPDES permit program were compiled in accordance with the reporting requirements specified in Part VI(A)(2)(c) of the permit. Although the following summary tables concisely document many program activities, some activities could not be quantified and have therefore been omitted.

4.0 STORMWATER MANAGEMENT PROGRAM SUMMARY TABLE

MONITORING TASKS WET/DRY WEATHER	SCHEDULE OF ACTIVITIES	SCHEDULE FOLLOWED	ACTIVITIES ACCOMPLISHED	COMMENTS
Repeat High Parameter Sites	35 Outfalls repeated from year two	Yes	27	Each outfall tested atleast four times this year
Field Screening Industrial Outfalls	Visits to all Industrial outfalls	Yes	55	Continued retesting outfalls from Industrial areas (four times)
Total Field Screening Outfalls	High Parameter repeats + 30 to 40	Yes	137	All field data sheets available for inspection. Outfalls tested four times this year.
Full Suite Stormwater Analysis (one station per year)	One Station pr year	Yes	1	This year's site was our Second Creek Monitoring Station
Storms Sampled at 5 monitoring stations	3 to 4 Storms / Quarter / 5 Sites	No	44	Summer: 8 storms, Fall: 9 storms, Winter: 18 storms, Spring: 9 storms

STORMWATER MANAGEMENT & INDUSTRIAL PROGRAM TASKS	SCHEDULE OF ACTIVITIES	SCHEDULE FOLLOWED	ACTIVITIES ACCOMPLISHED	COMMENTS
Stormwater Quantity Requests for Service (Received / Resolved)	As Needed	Yes	534/504	Complaints are investigated as received and resolved as solutions or resources are available
Stormwater Quality Requests for Service (Received / Resolved)	As Needed	Yes	346/361	Complaints are investigated as received and resolved as solutions or resources are available
Construction Site Erosion & Sediment Control Workshops	Annually	Yes	90 attendees	Included Engineers, contractors, developers, etc. involved in land disturbing activities.
Water Quality / NPDES / Development Program Summaries	As Required	Yes	Approx. 100 attendees at 2 presentations	Included Engineers, contractors, developers, planners, city managers, environmentalist, and other government officials
Spills Response & Emergency Management Coordination	As Required	Yes	11 accidents	The Knoxville Emergency Mgmt. Agency responded to spills and trained COK staff.
Collect KUB Industrial Inspection Reports	Every Two Years	No	0	KUB stopped supplying inspection reports. The City will develop an alternate program as soon as possible.
Collect NOI's for Industries	Collect in Year 1 plus ongoing	Yes	2	All NOI's were collected in year 1. Two new NOI's were received this year.
Industrial Investigations	As Needed	Yes	9	These are a combination of random inspections and complaint based request for service.

4.0 STORMWATER MANAGEMENT PROGRAM SUMMARY TABLE

EDUCATIONAL PROGRAM TASKS	SCHEDULE OF ACTIVITIES	SCHEDULE FOLLOWED	ACTIVITIES ACCOMPLISHED	COMMENTS
Publicize Hotline Number	Within 24 Months	Yes	Undetermined	Hotline number has been published in phone book, on road signs, pamphlets, magnets, etc.
River Rescue	Annual Event	Yes	1 day event	17.7 tons of trash removed by 835 volunteers from 100 miles of shoreline at 36 sites.
Adopt-a-Creek	As Accepted	Yes	throughout year	1042 volunteers removed 18.75 tons of trash at 32 sites along urban creeks
Water Quality Forum	Meets Monthly and Quarterly	Yes	Undetermined	Three committees meet monthly to plan projects focused on urban water quality.
Storm Drain Marking	As Needed or by volunteers	Yes	Approx. 2000	Catch Basins marked with decals labeled "Dump No Waste-Drains to Waterway"
Volunteer Creek Cleanups	Volunteers	Yes	Multiple days on several creeks	Over 175 volunteers at 10 sites removed 15.75 tons of trash from local creeks
Waterfest	Annual Event	Yes	1 Day Educational Event	A unique community event dedicated to educate citizens about water quality. 900 youths from 15 different schools participated.

NEW DEVELOPMENT PROGRAM TASKS	SCHEDULE OF ACTIVITIES	SCHEDULE FOLLOWED	ACTIVITIES ACCOMPLISHED	COMMENTS
New Development Inspections	As Required	Yes	2500	As Required
Building Permits Issued	As Required	Yes	886	As Required
Grading Permits Inspected	As Required	Yes	105	As Required
Right of Way Permits Investigated	As Required	Yes	520	As Required
Citizen Concerns Investigated	As Required	Yes	Approx. 150	Development Complaints include erosion, sediment, grading, dumping, etc.

4.0 STORMWATER MANAGEMENT PROGRAM SUMMARY TABLE

STRUCTURAL CONTROLS	SCHEDULE OF ACTIVITIES	SCHEDULE FOLLOWED	ACTIVITIES ACCOMPLISHED	COMMENTS
Stabilization of Creek/River Banks for Erosion Control	As Needed	Yes	Various	1,641 native species planted. 1300 ft. of channel stabilized.
Street Cleaning	Daily/Bi-Weekly	Yes	32,760 Miles	Daily for downtown streets. Frequency varies for other streets.
Litter Pick-up, Hand	As Needed	Yes	93,540 Bags	Routine Schedule
Curb and Gutter Repair	As Needed	Yes	11 Feet	Per work order and requests
Catch Basin Cleaning and Repair	As Needed	Yes	3,520 Jobs	Per work order and requests
Ditching: Hand, Truck, & Track/Gradall	As Needed	Yes	32,637 Feet	Per work order and requests
Storm Sewer Installation & Repair	As Needed	Yes	98 Jobs	Per work order and requests
Brush & Leaf Pick-up	Bi-Weekly	Yes	15,007 Tons	Bi-Weekly curb pick-up
Seed/Sod, ROW	As Needed	Yes	27 Feet	Per work order and requests
Storm Sewer Cleaning	As Needed	Yes	14,131 Feet	Per work order and requests
Grate Replacement	As Needed	Yes	53 Jobs	As Needed
Field Inventory & Inspection of On-Site Detention Facilities	Within 60 Months	Yes	100% of City Completed	All new facilities are mapped after construction is complete. Existing facility's inventory is complete.
Creek Cleaning by Creek Restoration Crew	As Needed	Yes	204 Jobs	Creeks are inspected and cleaned on a routine schedule
Tree and Plant Planting	When Applicable	Yes	2,467 trees and plants	About 50% planted by Americorp volunteers
Total Waste Recycled	As Brought In	Yes	Over 29,378 Tons	4,849 tons of paper, metal, plastic, glass, etc. and over 24,528 tons of yard wastes

5.0 NARRATIVE REPORT

The following narrative report is divided into the five main programs of the SWMP. The SWMP is described in the program element schedules listed in Part II of the permit application and Part III of the permit. The main programs are listed as follows:

5.1 Residential and Commercial Program (RC).
5.2 Illicit Discharges and Improper Disposal Program (ILL).
5.3 Industrial and Related Facilities Program (IN).
5.4 Construction Site Runoff Program (CS).
5.5 Educational Activities and Public Outreach.

Each of the above programs are further divided into separate program elements and related tasks that correspond to the Implementation Schedules listed in Part IV of the Permit and to the requirements listed in 40 CFR 122.26(d)(2)(iv). Each specific task will be briefly discussed in accordance with the reporting guidelines outlined in Part VI of the NPDES Permit.

5.1 RESIDENTIAL AND COMMERCIAL PROGRAM (RC)

Program of Structural and Source Controls for Reducing Pollutants to the Municipal Separate Storm Sewer System, 40 CFR 122.26(d)(2)(iv)(A).

RC-1 Maintenance Activities for Structural Controls

SWMP Task: Continue Existing Maintenance Activities from Part 2 application, pp. 5-5 to 5-9.
Status: Ongoing

The City's Public Service Department (PSD) currently performs maintenance of the municipal stormwater system. The PSD has developed and maintains an extensive database to track work tasks performed during the year. The database not only tracks labor category (e.g., Equipment Operator) and labor hours devoted to each task, but also includes equipment type and costs. The PSD database produces summary reports for monthly and annual work production and costs. The database includes more than 80 task activities of which 18 were identified as relating directly or indirectly to stormwater management. Only a small portion of the stormwater conveyance system is located on public rights-of-way and city-held easements. The City generally assumes no responsibility for maintenance or improvements on private property even though the new creek crew may work in some of those areas.

Maintenance by the City within rights-of-way and easements is normally performed on an as-needed basis by the PSD. Approximately 75 percent of the storm drainage system maintenance work performed by the PSD is in response to direct calls from property owners and requests from the Engineering Department. The remainder of the storm drainage system maintenance work is in response to maintenance needs detected by the PSD, such as repairing collapsed pipes. Under normal conditions, the PSD can respond to all complaints that are the responsibility of the City as

defined by the City's stormwater policy.

Under the current system, the PSD has divided the City into six geographic maintenance zones, for routine work. Duties performed in each zone relating to stormwater are brush collection, leaf collection, street sweeping, and the cleaning of curb inlets. Catch basins are inspected annually. Cleaning and maintenance of catch basins are performed "as-needed". Most drainage facility maintenance is performed in response to complaints or known problems. The PSD logs all complaints by address and by category into the computerized database. The Construction Division of the PSD performs non-routine storm drain maintenance and installation.

Two seven-person crews perform storm drain installation. Their primary responsibilities include installing various sizes of corrugated metal pipe and reinforced concrete pipe, major repair to existing storm drains, and building catch basins. Each of the two crews has seven employees, a backhoe, two single-axle dump trucks, and one 3/4-ton pickup truck. A 12-ton tool truck services both crews. These crews also provide emergency response in the event of flooding. The Storm Drain Maintenance Crew has five employees. They perform such tasks as: clearing culverts of debris, flushing storm drains, hand and mechanical ditching, and performing minor catch basin repair. A Storm Drain Vacuum Machine, a ditching machine, and a 3/4-ton pickup truck with a small crane are used to perform these tasks.

SWMP Task: Stream Restoration and Channel Maintenance Program. Status: Ongoing

Stream restoration and channel maintenance has been addressed with two new programs during the first permit cycle. These programs include stream bank stabilization projects to reduce erosion and sediment and a creek restoration crew to remove litter, debris, and flow blockages.

In the first five years, several bank stabilization projects have been completed with the help of TDEC, TVA, USCOE, UTK, and CAC Americorps along urban creeks throughout the city. The first demonstration project was completed Fall 1997 at Inskip Ball field by using natural fiber coconut rolls and jute fiber mats and a synthetic mattress to protect the grass and live stakes during high water. Similar projects have been completed on Goose Creek at Mary James Park in South Knoxville, on First Creek at the new greenway site near Luttrell Street and Hoitt Avenue, on Love Creek near Holston Middle School, and along Second Creek above the Worlds Fair Park.

During year five, the City contracted with the University of Tennessee Agricultural Department to help restore the riparian zone on two different areas of First Creek. The work on the First Creek Greenway location included removing invasive plants and replacing with native vegetation. The City also repaired approximately 1300 feet of a deep eroding channel (see photo) at the headwaters of Fourth Creek along East Weisgarber Road. The channel had eroded in some locations to ten feet deep and 20 feet wide. The channel was successfully stabilized by the PSD.

Since sediment is one of the most common non-point source pollutants in our urban creeks, the City will continue to complete at least two bank stabilization projects per year during the new permit term. Although these projects will certainly vary in scope, biostabilization techniques will be used instead of concrete or riprap. Whenever possible, the adjacent riparian zone will be

enhanced with trees and native vegetation to provide cooling effects and help restore habitat. The City will work with TDEC to obtain the appropriate ARAP permits before work begins.

The 4-person Creek Restoration Crew was added to the PSD in August 1996. This crew is primarily responsible for implementing a routine schedule of inspections and maintenance on the major creeks and tributaries. It has a knuckle boom and a single-axle dump truck assigned to aid in performing these duties. The crew routinely removes trash and debris from habitual dumpsites and responds to citizen requests and specific work orders. Often the crew is used to assist with illicit discharge investigations in the MS4.

This program will continue to focus on stream restoration and channel maintenance along the major creeks and the riverfront in the city. The creek crew has a laminated GIS field book, which contains every urban creek within the city limits. Each creek has been further divided into workable sections or map pages that show significant surrounding details such as topography, planimetrics, stormwater features, outfalls, streets, and addresses. This allows the crew to efficiently inspect and clear each segment of the creek before moving on to the next task. The PSD field crews have been instructed to document and report signs or incidences of illicit discharges and/or improper disposal as they are identified. The creek crew's superintendent reports the progress of this crew at the Stormwater Management weekly planning meetings.

The City continued to support Ijams Nature Center and the "Adopt-a-Stream" program that organizes volunteers to periodically pick up trash and debris along stream reaches within the City. The PSD crews assist volunteers by providing receptacles for collecting trash and debris and removal of these receptacles. The City provides Adopt-a-Stream volunteers with safety information, trash bags, pickup sticks, and assistance with coordination. Because the Adopt-a-Stream volunteers are not able to handle larger items, the PSD crews use the appropriate equipment needed to remove these items. The Engineering Department will coordinate the Adopt-a-Stream program directly or by contract with Ijams Nature Center.

SWMP Task: Implement structural controls to prevent floating discharges to the TN River.

Status: Ongoing.

Since the summer of 1999, the City has been coordinating with TVA, UTK, TDEC, USACOE, the Isaac Walton League, Keep America Beautiful and area businesses to reduce the amount of floating pollution entering the river from the urban creeks. The City has studied and identified several possible solutions. Short-term solutions have included increasing the frequency of the creek crew maintenance at the mouths of the major creeks, adding more trash receptacles at bus stops, increasing public awareness, installing temporary skimmers, etc. Long-term solutions have been researched and may include permanent skimmers on the major creeks, increased manpower on the river, and improved public awareness/participation. Current activities include working with volunteers to distribute BMPs and pollution prevention information to area restaurants and businesses. The City donated a new boat

to help Isaac Walton League volunteers collect litter and debris along the riverfront within the city limits. Although the focus of this initiative has largely been to reduce unsightly trash from entering the river, several spills on First Creek were effectively detained by the floating trash skimmer at the mouth of the creek until remediation personnel could respond.

This ongoing cooperative effort will continue to be defined by the committee of Water Quality Forum member agencies that meet monthly to plan, discuss, and implement pollution controls. The progress of this floating pollution initiative will be reported annually throughout the new permit term.

SWMP Task: Standard Maintenance Agreement for On-site Facilities. Status: Ongoing.

Since 1997, Permanent Maintenance Agreements have been required for all new stormwater detention facilities and special pollution abatement devices (i.e. oil/water separators). The Stormwater and Street Ordinance Section 22A-33 requires the owner of the property to sign a covenant and have that covenant recorded on the plat before the construction permit is approved. Although the ordinance may be updated in the next permit term, the requirements for maintenance agreements will remain or be updated, but not removed.

The City will retain the right to inspect and insure that the stormwater facilities are properly maintained, however, the responsibility for the maintenance of stormwater facilities will remain with the property owner unless legally transferred to another person or entity by a properly recorded legal agreement. If the property owner does not maintain the facility properly, the City may authorize the maintenance to be completed and place a lien against the property for double the cost. The standard agreement for underground facilities (i.e. detention or oil/water separators) requires a minimum of quarterly visual inspections, annual cleaning, and annual reporting.

SWMP Task: Require Routine / major maintenance of BMP facilities. Status: Ongoing.

All stormwater facilities constructed since 1997 must have maintenance agreements and must be maintained according to the specific requirements in that agreement. All other stormwater ponds or water quality facilities must be maintained as required by the Stormwater & Street Ordinance Section 22A-33. At a minimum, woody vegetation must be cut annually and sediment must be removed as necessary to maintain proper function of the facility.

As described in the Part II application, the City may continue to investigate the feasibility of assuming direct maintenance responsibility for large regional structural detention ponds that serve multiple upstream developments. The current stormwater funding structure does not allow resources sufficient to maintain all BMP facilities at this time. The City may continue to evaluate the possibility of assisting property owners with maintenance in the future but currently the maintenance responsibility will remain with the property owner.

Sediment from the maintenance of detention/water quality ponds or from stream restoration activities must be removed from the stormwater facility and disposed in a proper classified landfill or used as fill outside the stormwater drainage system. The City does not propose to duplicate TDEC's efforts to regulate contaminated sediments.

RC-2 Planning for New Development

SWMP Task: Revise and Implement Stormwater Detention Ordinance to incorporate water quality considerations and to require water quality BMP's for New Development.

Status: Complete.

► The City of Knoxville adopted a new Stormwater and Street Ordinance during year one and revised in year two. There were no changes during year five. The revised ordinance was included in previous annual reports and may be accessed on the Engineering Department web page at www.ci.knoxville.tn.us/engineering/. A brief summary of the current development requirements for stormwater detention and water quality control is included below.

When a stormwater quantity detention pond is required, the engineer must design the pond to control the runoff from the 1-year, 2-year, 5-year, and 10-year storm events. In First Creek and Whites Creek, the 100-year storm must also be controlled. Quantity ponds may not be mandatory on developments discharging directly into a main stream (i.e. TN River) if the engineer submits supporting hydrologic and hydraulic computations.

Water quality control is required for residential development with five lots and/or five acres, commercial development of one acre or more, or any development or redevelopment that includes one-half acre of impervious surface. The standard management method includes first flush control outlets in the quantity pond or in a separate quality pond. The quality pond must be designed to collect the first one-half inch of direct runoff from the contributing drainage basin or the first 4000 cubic feet of stormwater runoff, whichever is greater, and attenuate that runoff for a minimum 24-hour period. Alternate treatment methods are accepted if they provide equivalent or better pollutant removal efficiencies than the standard first flush detention ponds. The target removal efficiencies for the first flush treatment were estimated from the chart provided by the Metropolitan Washington Council of Governments' 1987 report titled "Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMPs." The target removal efficiencies are as follows: TSS – 76%, Lead – 81%, Zinc – 47%, Total Phosphorus – 44%, COD – 40%, and Total Nitrogen – 33%.

In addition to first flush treatment, Section 22A-36 of the ordinance requires special pollution abatement for certain land uses that are known to contribute a disproportionate amount of stormwater pollution. The typical special pollution abatement requirement has been a minimum of an oil/water separator for large parking lots of 400 spaces or 120,000 square feet of area. Other special land uses include any type of vehicle maintenance, fueling, washing, storage, or scrap facilities. Most of these land uses are expected to have a much higher potential for oil, grease, or other floatable hydrocarbon runoff that will not be collected in a standard first flush pond. However, the City may include other development types when special control is warranted.

SWMP Task: Implement Master Plan pursuant to Part II, Application. Status: Complete

The comprehensive management program submitted for TDEC approval on May 13, 1993 as Section 5 of the Part II Application, has been implemented by the City as required by the

federal regulations except as amended by the NPDES Permit effective on July 1, 1996.

SWMP Task: Plan and site location for regional BMP facilities for areas of new development.

Status: Ongoing

During the term of the permit, the City will target large development projects or strategically located smaller developments that are suitable for siting regional BMPs. Regional BMPs would serve multiple upstream developments and typically have drainage areas ranging from 50 acres to several hundred acres. Currently the City is investigating the possibility of implementing a stormwater fee. If a stormwater utility is implemented, the City may consider offering incentives to developers to site regional BMP facilities. Incentives may include:

- cost share arrangements whereby the City contributes a share of the construction costs and recoups these costs from other upstream developments;
- City maintenance of regional BMPs;
- City provides assistance with design or other in-kind contributions.

Since most development activity within the City is primarily "infill" that occurs on the limited number of remaining vacant parcels, there are limited opportunities for siting regional BMPs without impacting existing developments.

In response to the unusual floods that hit Knoxville in the spring of 1998, the City has contracted a consultant to study the First Creek watershed for possible channel improvements and regional detention locations. The consultants May 1999 report identified five regional detention alternatives in the First Creek and Whites Creek watersheds that may relieve flooding. Future studies will be an ongoing portion of the City's stormwater management program.

SWMP Task: Develop guidance criteria for BMP's. Status: Ongoing

The City has successfully completed the first edition of a comprehensive BMP manual. The manual may be accessed at www.ci.knoxville.tn.us/engineering/ on the Engineering Departments web page. The guidance criteria describe acceptable types of BMPs, design standards, and maintenance requirements for BMPs to be used throughout the City to meet the requirements of the new Stormwater and Street Ordinance. The guidance criteria will be kept on file in the Engineering Department and distributed to developers as the official reference to ensure proper selection, design and maintenance criteria for BMPs.

Because maintenance of BMPs is critical to their long-term effectiveness in reducing pollutant loading from stormwater, the guidance criteria incorporates maintenance considerations with the design criteria to ensure that effective and maintainable BMPs are constructed in the City. The guidance criteria addresses the goals of the NPDES stormwater program by only allowing BMPs which are effective in reducing pollutants targeted by the NPDES stormwater regulations.

This manual is intended to be a live document that changes as new technology or future needs develop. Therefore, the website version is the preferred method of distribution for free while CDs and paper copies will be made available for a fee at a local copy center. The website and BMP content will be updated at least annually.

RC-3 Maintenance Activities for Public Streets, Roads, and Highways

SWMP Task: Street maintenance activities outlined in Part 2 application, p. 5-8.
Status: Ongoing

Street cleaning is performed daily for downtown streets and less frequently for all other streets. Streets with curbing are swept, while streets without curbing are flushed. Mowing is performed on a two to four week schedule between the months of April and September.

Snow removal, anti-icing and de-icing of roadways is performed by the PSD and is an essential program to ensure public safety. Sodium chloride, stored undercover at the Loraine Street facility, mixed with liquid calcium chloride is applied to highways and streets by spreaders as necessary. Application of de-icing/anti-icing materials targets highways and major arteries first, and residential streets secondarily. Priorities follow the adopted Major Roads Plan of the City of Knoxville. Because of the importance of maintaining public safety and public commerce, the City aggressively pursues its road clearing operations.

RC-4 Evaluation of Flood Management Projects

SWMP Task: Evaluate regional BMP facilities for water quality retrofit. Status: Ongoing

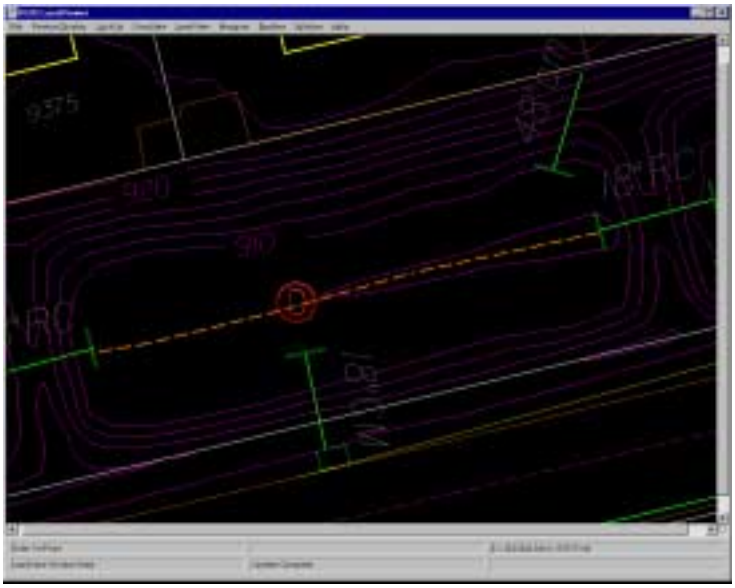
Only two regional detention facilities that were built prior to 1997 still exist today. Those facilities include the detention pond adjacent to Middlebrook Pike and Weisgarber Road at the Acker Place development and the detention pond located at Knoxville Center Mall. Although the regional detention basins were designed for flood control, it may be possible to retrofit these facilities to achieve additional water quality benefits. All ponds built since 1997 were required to comply with the water quality requirements for new development.

The City has studied the feasibility of adding other regional ponds to the First Creek watershed as part of a major flood control project. Any newly constructed regional ponds will address water quality in the design.

The City has assumed the responsibility of continued maintenance and water quality improvements at the large regional pond (Acker Place) in the Fourth Creek Watershed. The City restored a large section of Fourth Creek downstream of the pond in the first permit term. In order to reduce the vast amount of sediment in the stormwater effluent and to prevent future accumulation of sediment down stream, two rock check dams and an 18-inch weir plate were placed in the pond's low flow channel. These velocity dissipaters allow the sediment time to settle out of the stormwater while still in the pond. The sediment is removed annually to prevent migration into Fourth Creek. A riparian zone vegetation farm has been planted in the pond with red osier, silky dogwood, black willow, willow oak, and bank willow in addition to the existing species of white pine, cedar, and red oak trees. This new farm may provide a reliable source of viable cuttings for future bank stabilization and riparian zone projects throughout the area.

SWMP Task: Plan and implement inspection program to inventory on-site facilities.

Status: Complete.



During the last five years, the City has implemented a systematic method of inventorying the existing detention ponds by using a GIS grid of the city. Field crews inspected drainage features in each map grid and recorded the detention facilities in the GIS with a circled D. Since all new development must be certified to confirm that constructed facilities were built as planned, any new stormwater facilities will be properly recorded in the GIS after construction.

Engineering staff will maintain and update the existing inventory of ponds, pipes, water quality facilities and other drainage features as part of an ongoing GIS maintenance program.

RC-5 Monitoring of Solid Waste Facilities

This program is described in the management section IN-3 for industrial facilities.

RC-6 Management Program for Pesticides, Herbicides, and Fertilizer

SWMP Task: Evaluate effect of fertilizers as part of the City's ongoing monitoring program.

Status: Ongoing.

Pesticides, herbicides, and fertilizer used by the City are stored in a building at the Loraine Street Operations Center. This building is in compliance with all regulations regarding the storage of hazardous materials. The PSD Division of Horticulture and Grounds Maintenance is responsible for the application of pesticides, herbicides, and fertilizer. The herbicide "Roundup" is applied annually to City parks and rights-of-way to control unwanted weed growth. PSD personnel, who have been certified and licensed by the University of Tennessee, spray the herbicide. Fertilizer is only used for minor landscaping projects and stormwater runoff from these projects is not considered a threat to receiving water quality.

The City does not currently require registration by commercial applicators; however, commercial applicators must be licensed under State and Federal Regulations. There are no regulations restricting the use of these substances by individual land owners; however, a household hazardous waste collection facility has been opened to collect all types of hazardous wastes including pesticides, herbicides, and fertilizer.

For pesticide, herbicide, and fertilizer pollutants, the control program is difficult to define since the presence of pesticides, herbicides, and fertilizers in urban runoff is not always evident.

Current problems with pesticide, herbicide, and fertilizer pollutants are not believed to be significant. As part of the ongoing stormwater-monitoring program, the City will continue to monitor the significance of these pollutants. Pesticides, PCBs, and nutrients are tested as part of the ongoing monitoring program described in Sections 5.5 and 6.0 of this report. To date, no significant traces of pesticides have been detected in the annual full-suite grab sample.

SWMP Task: Public education program as part of the illicit connection and improper disposal program. Status: Ongoing.

Public education programs for pesticides, herbicides, and fertilizer use have already been implemented in conjunction with City public education programs for collection and recycling of household hazardous waste. In addition to the solid waste and household hazardous waste informational programs, the City has developed a stormwater pollution program that includes helpful information regarding pesticide and fertilizer use.

The HHW collection program, which includes collection of pesticide, herbicide, and fertilizer waste material, was officially implemented when the facility opened on April 22, 1997. More information about the HHW facility is included in the Illicit Discharges and Improper Disposal Program section ILL-6.

5.2 THE ILLICIT DISCHARGES AND IMPROPER DISPOSAL PROGRAM

Program to Detect and Remove Illicit and Improper Discharges to the Municipal Storm Sewer System, 40 CFR 122.26(d)(2)(iv)(B).

ILL-1 Ordinances

SWMP Task: Develop/Implement New City Ordinances Prohibiting Non-stormwater Discharges Status: Complete.

The Stormwater and Street Ordinance was developed and implemented during the first permit term to specifically prohibit non-stormwater discharges, increase penalties for illegal discharges, and to provide water quality regulations for new development. The ordinance may be accessed on the Internet at www.ci.knoxville.tn.us/engineering/.

The ordinance section 22A-52 specifically prohibits illicit discharges and illegal dumping to any portion of the MS4 or any area draining to the MS4. Illicit discharges were defined according to 40 CFR 122.26(b)(2) as any non-stormwater discharge to the MS4. This definition, along with the $5,000 penalty for violations, has formed the cornerstone of our successful enforcement program and will remain in place during the next permit term.

Exemptions to this prohibition were listed in the ordinance in accordance with the list in 40 CFR 122.26(d)(2)(iv)(B)(1). Although most categories in this list were exempted in the first ordinance, the City will reevaluate these exemptions and update the ordinance if necessary.

City Council was advised that the ordinance may need to be updated approximately every five years to accommodate any changes or additional requirements in each new NPDES permit.

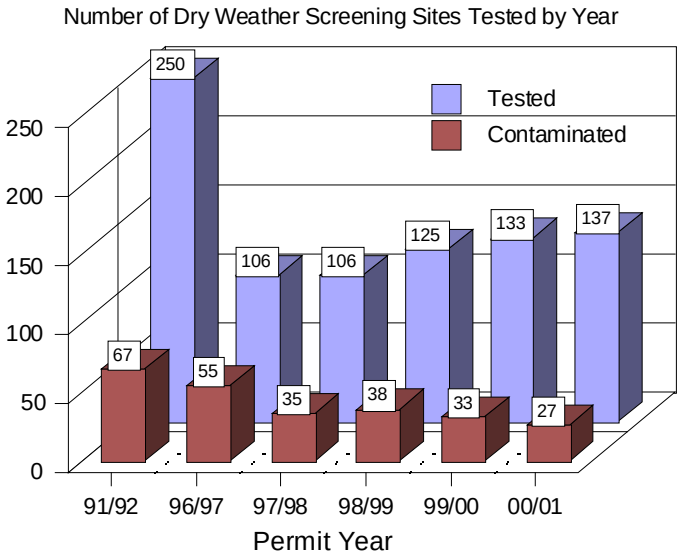
ILL-2 Field Screening

SWMP Task: Perform follow-up analysis at all high-risk field screening sites.

Status: Ongoing.

The Dry-Weather Screening Program was developed and implemented during the first permit term to evaluate both randomly chosen outfalls and high-risk outfalls that were tested the previous year. Each of the high-risk stormwater outfalls was checked for flow after a period of dry weather. If flow was present, the discharge was tested with a Chemetrics colorimetric field test kit for the following parameters: phenols, ammonia, detergents, copper, chlorine, pH, turbidity, color, temperature, and flow rate. If ammonia is greater than one part per million, then a fecal coliform sample is collected for laboratory testing. The outfall test was repeated again between four and forty-eight hours after the first test. After one month, this process was repeated for each outfall to complete a total of four tests each year.

Since this program has successfully identified many illegal dumps and illicit discharges during the first permit term, the City will continue to annually retest all sites that have high parameters or signs of illegal dumping until the outfall is clean during all four annual visits. Once the outfall has tested clean during four site visits in a single year, it will only be retested if randomly selected from the list of inventoried outfalls. The City has previously developed and submitted the standard inspection guidelines for investigating illicit connections or illegal dumping in the first annual report. Any changes to these standard guidelines will be reported as they are implemented. As illustrated by the bar graph, the number of high-risk outfalls continues to decrease each year since the program began in 1996. The number of high-risk outfalls that need to be retested each year will obviously vary depending on the tested results of the previous year.



As required by Part VI(A)(2)(f)(ii) of the NPDES permit, the results of the dry-weather screening are included in the appendix of this report. Of the 2679 outfall visits since the beginning of the program, only 947 outfall visits observed flow from the outfall. The results from each of those 947 screenings are tabulated by outfall identification number, testing date, and visit number.

SWMP Task: Investigate 30 to 40 new field screening sites per year. Status: Ongoing.

To insure that all outfalls are eventually tested, the City will continue to monitor a minimum of 150 outfalls each year in the new permit cycle. The current permit required testing of the original 67 contaminated outfalls plus 40 additional sites. The City met the minimum criteria by testing 137 outfalls during year five. The tested outfalls consisted of the previous year's 27 high-risk outfalls and 110 randomly selected outfalls from the general outfall inventory. The randomly selected sites were selected from areas of primarily industrial use and from areas that had not been previously tested. The City selected outfalls throughout the city with some preference given to the highly developed areas. This method should continue well into the next permit term before all outfalls have been tested.

The Engineering Department has developed an outfall database to maintain the testing data and site information for each outfall in the inventory. This outfall database is linked to the GIS to allow data access geographically for a single point or by report/query functions for many outfalls at a time. By maintaining a history of each outfall, illicit discharge trends may become apparent and therefore be resolved with education or enforcement.

The dry-weather-screening program has been one of the most successful programs in the current permit term and will continue to be a high priority in the new permit cycle.

ILL-3 Investigation of the Storm Drain System

SWMP Task: Develop and implement procedures for mapping, field surveys, and upstream source identification. Status: Complete.

The procedures for mapping, field surveys and upstream source identification were developed and included in the Part II Application section 5.3.5. These procedures were adopted as policy and successfully implemented during the first permit term. The City will continue to utilize and modify these procedures to increase the effectiveness of the Illicit Discharge and Illegal Dumping Program. These updated procedures for the first permit term were included for

the Division's review in monitoring section 6.1.3 of the first annual report. Any updates during the first year of the new permit cycle will be included in the following annual report.

SWMP Task: Implement enforcement procedures and follow-up monitoring/ inspections.

Status: Complete.

The schedule for this task appropriately coincided with the schedule for ordinance revisions. The Stormwater and Street Ordinance defined the existing enforcement procedures. An Enforcement policy was implemented immediately after the ordinance was effective in 1997.

Depending on the violation, a first-time offender is usually educated and asked to remediate the damage or correct the violation if possible. This is usually followed up with a letter to inform the violator of the City's expectations and to provide helpful BMPs to prevent future problems. More severe or repeated violations will merit a Notice of Violation (NOV) which is issued in the field directly to the violator. Copies of the NOV are distributed to the property owner or developer, the City Law Department, and the Engineering Department. The NOV may order specific remedies and require the violator to submit reports and/or pollution prevention plans. Penalties, if any, are only issued after the NOV expires so the violation and remedies may be fully evaluated.

A violator may appeal their penalty before a five-member Environmental Appeals Board. The five volunteer members of the Environmental Appeals Board were appointed by the Mayor and consists of individuals with an expertise as follows:

1) One licensed professional engineer with civil engineering expertise.
2) One licensed professional engineer.
3) One representative of the development or industrial community.
4) One neighborhood representative.
5) One member at large.

Board members will serve a 5-year term and may be reappointed at the end of their term. Follow-up monitoring and inspections will be a combination of City, KUB, and self-inspections by industries. Enforcement actions resulting from the dry-weather screening program will be followed as defined within that program as a minimum. Any outfall that is tested for high parameters or identified as an illicit connection/ illegal dump source, will be tested four times a year, every year, until the outfall is dry or clean on all four visits. Sources of pollution identified by other means will be monitored as needed or specified for the individual situation.

SWMP Task: Coordinate with Knoxville Utility Board (KUB) sanitary sewer inspections.

Status: Ongoing.

The City will continue to coordinate with KUB to identify and correct sanitary sewer discharges. A standard procedure has been developed to insure that each possible contamination source is investigated after a problem is identified during dry weather screening. When high ammonia or fecal coliform levels are detected in the MS4, KUB and City personnel cooperate to identify the contamination source through dye testing or manhole by manhole testing. Once a source has been identified, KUB will correct problems in the main sanitary sewer system while the City will work with property owners to correct problems on private property. KUB has been

reluctant to share their five-year plans and annual reports with the City, but TDEC has been able to provide that information from the field office. The City will try to resolve this issue to allow better coordination and timely resolution of sanitary sewer overflows and cross connections.

The City does coordinate illicit connection investigations with KUB when appropriate. These inspections have identified private residences, industries, and businesses that had plumbing or floor drains connected to the MS4 instead of the sanitary sewer system. This type of close coordination is essential for solving illicit discharges to the MS4.

ILL-4 Spill Response Program

SWMP Task: Coordinate with Knoxville Emergency Response Team (KERT) and TDEC.

Status: Ongoing.

The City of Knoxville Stormwater Quality Section of the Engineering Department will continue to coordinate with both the KERT and TDEC during emergency situations. Each agency has specific roles to play during an emergency event. The City Stormwater Quality Section will assist in information gathering, investigations, GIS support, follow-up monitoring, and enforcement when necessary.

The Knoxville- Knox County Emergency Management Agency coordinates most major spills when they are called in to 911. KEMA also coordinates routine training and simulations for various situations throughout the year. Workshops are provided to simulate real scenarios and allow coordination of the field teams and the Emergency Operations Center (EOC). Engineering Department staff participates in the EOC while the Fire Department, Police Department, and Rural Metro units perform the field exercises.

The City of Knoxville Fire Department and Engineering Department coordinate to respond to small spills and possible hazards as they are reported. The two departments will continue to work closely together to contain and remediate discharges in the street, stormdrain system, creeks or wherever necessary. The Knoxville Fire Department maintains a fire boat downtown on the waterfront to assist with spills discharging into the river. When a responsible party is identified, the Engineering Department staff will follow normal investigation and enforcement procedures to order the containment and remediation at the violator's expense.

Engineering staff will continue to closely coordinate with other emergency personnel at the monthly Local Emergency Planning Committee meetings and by maintaining a supervisor on call after hours and weekends to help respond to water quality emergencies as they occur.

ILL-5 Reporting of Illicit Discharges

SWMP Task: Establish and monitor “Water Quality Hotline” for public reporting.

Status: Ongoing.

The Water Quality Hotline for public reporting of water quality concerns was established as planned during the first permit term. The hotline was operational in November of 1996 but did not receive mass publicity until December 1996. The hotline phone number is a local Greater Knoxville Area number listed in the blue pages as follows:

WATER QUALITY HOTLINE-
To Report Illegal Dumping Into Ditches
Creeks Or Catch Basins 24-Hours/Day……215-4147

The hotline has receives a variety of calls including: industrial discharges, gray water discharges, broken laterals, commercial washing, neighbors dumping, etc. The hotline has been a popular and successful method for callers to anonymously report problems that they have witnessed or created. Common calls are from neighbors or dissatisfied employees of polluters. This program has been very successful and will be continued throughout the new permit term.

The Water Quality Hotline is a dedicated phone line attached to a phone in the Stormwater Quality Section of the Engineering Department. Employees in the section also have the hotline as a linked as a second line on their individual phones so anyone may answer the phone during the day. After hours and on weekends, the messages are recorded and routinely retrieved by the on-call supervisor. If the water quality concern is within the City limits, the Engineering Department investigates the problem. Otherwise, the problem is referred to the Knox County Health Department, TDEC field office, or other appropriate agency.

SWMP Task: Publicize the "Water Quality Hotline". Status: Ongoing.

The objective of this task is to increase the public awareness of the City's role in water quality issues and to create a quick and anonymous method for citizens to report water quality concerns. The publicity of the hotline has already provided a consistent and convenient resource for concerned citizens.

The City currently publicizes the Water Quality Hotline on the Engineering Department's website at www.ci.knoxville.tn.us/engineering/ and annually in the blue pages of the Greater Knoxville Area BellSouth phone book. KUB assisted this program in year five by including the hotline advertisement with the utility bills for several months.

The City includes the hotline number in thousands of mass produced stormwater pollution prevention educational handouts such as magnets, brochures, presentations, and routine correspondence with residents. The hotline is prominently displayed at the bottom of the Second Creek watershed boundary road signs to let travelers know where they may report water quality concerns.

The City will continue to seek out and develop innovative methods to advertise this successful program as a method for citizens to anonymously report complaints. Future opportunities to advertise may include: utility bills, public access TV, radio PSAs, signs on city buses, refrigerator magnets, pamphlets, brochures, BMP manual CDs, permits, etc. The innovative methods of publicity will vary each year as opportunities are developed.

ILL-6 Used Oil & Toxic Materials Program

SWMP Task: Implementation and Coordination of Recycling Program. Status: Ongoing.

The Solid Waste Division manages the City of Knoxville's recycling program. The entire annual report of these programs is included in the appendix of this report.

SWMP Task: Maintain and Operate Household Hazardous Waste Facility. Status: Ongoing.

The City continues to operate the Household Hazardous Waste (HHW) Collection Center, which first opened on April 22, 1997. This is the first permanent HHW Collection Center in the State of Tennessee, which is open five days a week. The center accepts HHW from both Knoxville and Knox County residents. Knox County shares the annual costs of operation. The capital expenditures associated with construction of this facility were paid for through a $500,000 grant from the State of Tennessee. Activities at the center include:

- diverting reusable products;
- collecting, blending and recycling latex paint;
- collecting car batteries, oil and antifreeze;
- diverting selected acid and bases to waste water treatment;
- venting aerosol containers and recycling the empty containers;
- bulking flammable materials;
- packing miscellaneous HHW materials for safe shipment and disposal.

Upon entering the HHW Collection Center, individuals pull into a covered drive-through where staff removes HHW from vehicles. Material that is collected and is still "good" is separated and made available for pickup by the public free of charge. "Good" material includes containers that have never been opened or material that has not exceeded its useful shelf life. The staff then processes materials that are not reusable. This includes testing of unknown materials, diverting selected acids and bases to the wastewater treatment facility, venting aerosols, bulking flammable materials, lab packing, and blending paint. Latex paint is sent to a local firm to be re-manufactured and returned for use by the City. After the material is processed, it is put into 55-gallon drums, which are placed in one of two prefabricated storage units. Each of these units has electronic monitoring and security, fire suppression systems, and drainage/spill containment systems. The hazardous materials are then stored in the units and held until sufficient quantities are collected. The City has hired a chemist and technician to operate the collection center. Due to the capital investment and success of this program, the facility will be maintained and operated throughout the next permit term.

ILL-7 Control Infiltration

SWMP Task: Assess Rehabilitation Study from outside consultant & recommend capital improvements. Status: Complete.

Since the KUB and other small utilities maintain control and operation of the City's municipal sanitary sewer, compliance with the requirement to control infiltration is reflected in the City's maintenance of adequate legal authority over illicit discharges from the KUB and others. Although the City does engage in some communications with KUB to resolve any illicit connections or unauthorized discharges to the MS4, KUB maintains complete control over capital project planning and scheduling. Any suggested changes to the schedule are typically resisted or ignored by KUB unless the City provides project specific funding. The City has recommended and provided funding for several sanitary sewer rehabilitation projects during the permit term.

5.3 THE INDUSTRIAL AND RELATED FACILITIES PROGRAM (IN)

Program to Monitor and Control Runoff from TSD and Industrial Facilities Subject to SARA Title III, Section 313, requirements, 40 CFR 122.26(d)(2)(iv)(C).

IN-1 Ordinances

SWMP Task: Develop/Implement New City Ordinance Prohibiting Non-stormwater Discharges.
Status: Complete.

The Stormwater and Street Ordinance was developed during the year one to specifically prohibit non-stormwater discharges, increase penalties for illegal discharges, and to provide water quality regulations for new development. The ordinance may be accessed on the Engineering Department web page at www.ci.knoxville.tn.us/engineering/.

The ordinance section 22A-52 specifically prohibits illicit discharges and illegal dumping to any portion of the MS4 or any area draining to the MS4. Illicit discharges were defined according to 40 CFR 122.26(b)(2) as any non-stormwater discharge to the MS4. This definition, along with the $5,000 penalty for violations, has formed the cornerstone of our successful enforcement program and will remain in place during the next permit term.

IN-2 Inspection Element

SWMP Task: Collect and analyze NOIs from Industrial Permit applicants. Status: Ongoing.

During year five, the City continued to coordinate with TDEC and industrial facilities to ensure that all Notices of Intent (NOIs) are received by the City. As the NOIs are received, the City reviews and evaluates the NOIs for the potential impact of stormwater runoff to the municipal storm drain system. In the past, the NOIs have been instrumental in locating and removing discharges from local industries. During inspections or enforcement actions with an industry, the City will verify that an NOI has been filed. If an NOI has not been filed, the City will coordinate with TDEC to obtain the NOI. Future NOIs may be obtained annually from TDEC in bulk. This will be coordinated once the new industrial permit rules are finalized.

An electronic database will be completed during the next permit term that should allow geographical linkages to the GIS. The prototype industrial database has been developed and will be converted to the City's new Sierra Permit Tracking system. Since several City Departments are converting databases to this system, there is no way to determine when the industrial database will be completed. The current industrial information is maintained by hard copies on file.

SWMP Task: Collect and analyze KUB inspection reports. Assess impact to the MS4.
Status: Program Terminated.

As part of the sanitary sewer pretreatment program, KUB inspectors did perform industrial facilities inspections every other year. KUB had agreed to provide the City with the one-page inspection reports at the end of the year in which they were collected. This year, KUB

notified the City that the inspection reports would no longer be collected. Since the City was not notified until after year five expired, an alternate inspection could not be conducted. Since the inspection reports had been collected in previous years from the same industries, it is not likely that any significant new information would have been gathered. This program will be replaced during the new permit term.

SWMP Task: Identify potential industrial discharges through Illicit Connection and Improper Disposal Program. (Both stormwater & non-stormwater discharges). Status: Ongoing.

The illicit connection and improper disposal program defined in the City's Part II NPDES stormwater permit application and in the previous section of this reapplication, primarily addresses runoff from industrial facilities. The majority of dry weather screening occurs from areas of industrial use or outfalls indicated by a "300" in the identification number. Illicit connections or improper disposal from industrial facilities which are discovered while inspecting the storm drain system under this program are recorded in the facilities' file in the database. The City contacts the industrial facility directly, along with KUB or TDEC if necessary, to identify the problem and work on an appropriate solution. If enforcement action is necessary, the City will track the situation until the illicit connection is corrected, the illegal dumping stopped, or until the facility receives a valid NPDES permit for the discharge.

In addition to the illicit connection and improper disposal program inspections, the City routinely performs inspections at commercial and industrial sites through a random selection process using the MPC inventory of industrial space and in response to citizen concerns reported to the water quality hotline. Some inspections have occurred as the City gains experience with common sources of pollution. Since areas such as loading docks, food distributors, fuel storage/sales, restaurants, and car lots have become reoccurring areas for enforcement, they are now being targeted for education and inspection to prevent discharges before they occur. Some of these land uses are targeted during the pre-development phase with the new Special Pollution Abatement Permit. This will be an ongoing program in the new permit term.

SWMP Task: Develop inspection program as part of Pollution Prevention Plans for Municipal Industrial Facilities. Conduct annual inspections at MIFs. Status: Ongoing.

During the first permit term, the City developed an inspection and pollution prevention program for municipal industrial facilities. Currently only four municipal industrial facilities are operated in the City. These facilities include:

- the Solid Waste Management Facility (SWMF) on Baxter Avenue, and
- the fleet truck & heavy equipment garage on Loraine Street, and
- the fleet and police garage at Prosser Road, and
- the Knoxville Area Transit (KAT bus station) on Magnolia Avenue.

Each facility has been evaluated and inspected regularly by Engineering personnel during the first permit term and will continue to be inspected at least annually in the future. Since the bus terminal is owned by the City but managed by KAT, they developed their own PPP, which was submitted in the first annual report in 1997.

Some structural pollution control measures have been implemented at several MIF sites. The bus station had two large Stormceptor stormwater treatment devices installed in November 1999. The total project cost was nearly $300,000. A strip of the concrete parking lot along First Creek was removed and replaced with a slope directed away from the creek. The reversed slope and a large curb prevent the runoff from entering First creek directly. The runoff is routed through the two oil/water separators before being discharged. Other measures at KAT include their commitment for ongoing fleet upgrades to new lower pollution buses.

The SWMF has installed some above ground filters and catch basin inserts to mitigate potential pollution. The entire transfer facility is covered and the drain in the loading dock for the transfer trucks is routed to the sanitary sewer system. Both garages have adopted spill protection policies and all mechanical work is done inside. A hydrocarbon absorbent boom is maintained in a trench drain at the police garage as a secondary control for emergency spills.

IN-3 Monitoring Element

SWMP Task: Collect Monitoring Data from permitted industrial stormwater dischargers and/or from TDEC. Assess impacts to the storm drain system. Status: Ongoing.

As part of the NPDES Permit for stormwater discharges associated with industrial activity, applicants are required to monitor, at least annually, all stormwater outfalls identified on the facilities' Pollution Prevention Plans. Applicants must monitor in accordance with TDEC Rule 1200-4-10-.04. The City currently receives copies of the results of the industrial outfall self-monitoring from some of the regulated industries. The City will continue to work with TDEC or directly with the industrial discharger to obtain copies of the information, as it becomes available. The City will maintain this information in the City's industrial files, and will assess the impact of the monitored discharges on the water quality of the storm drain system on an annual basis. If the City determines that additional data needs to be provided in the monitoring program for an industry (reports on additional parameters, etc.), requirements for an expanded program for subsequent monitoring events will be coordinated with TDEC and/or the industrial discharger.

The Stormwater and Street Ordinance authorizes the City to require additional monitoring from industries not covered under the TDEC programs whenever necessary. This will usually be required in conjunction with some enforcement action after a problem has been observed.

SWMP Task: Develop ongoing monitoring program pursuant to 40 CFR 122.26(d)(2)(iv)(c)(2). Identify pollutants/sources as applicable. Status: Ongoing.

In the first permit cycle, the City's Ongoing Monitoring Program, defined in the Part 2 NPDES stormwater permit application, included the monitoring of stormwater runoff from two areas of industrial facilities (e.g. industrial parks). Stormwater samples were collected, analyzed, and recorded for 12 to 15 storms per year per site using flow weighted composites from ISCO monitoring stations. Each of the monitoring locations received runoff from small watersheds approximately 1/4 square mile with several different industries included. Therefore specific pollutants were not easily traced back to a specific industry but the general data did allow implementation of industry wide BMPs.

In addition to the stormwater sampling above, all outfalls from industrial areas have been tested as part of the dry weather field-screening program to identify potential specific sources of the pollutants. Each year the City will continue to choose random outfalls from industrial areas as the primary dry weather screening locations. These outfalls are tested with field screening kits with additional laboratory tests as necessary.

Additional monitoring and reports from TSDs and industrial facilities subject to SARA Title III, Section 313 may be required when a problem has occurred, when the City has reason to believe a pollution problem exists, when TDEC or EPA do not already require sufficient testing, or if the City is mandated to test and report those facilities. The Stormwater & Street Ordinance Section 22A-54 states, *"The Director of Engineering may require any person engaging in any activity or owning any property, building or facility (including but not limited to a site of industrial activity) to undertake such reasonable monitoring of any discharge(s) to the stormwater system operated by the City and to furnish periodic reports of such discharges."* The City will maintain this legal authority to require monitoring from all facilities necessary when the Stormwater & Street Ordinance is updated in the next permit term.

SWMP Task: Analyze results from ongoing monitoring program. Status: Complete.

A summary of the analysis from the ongoing monitoring program is included in the appendix of this report. Some routine parameters associated with industrial activities have been extremely low or non-existent. Phenols were essentially below non-detection limits for the first three years of sampling and were therefore removed from the monitoring program.

Although oil, grease, and hydrocarbons are not routine parameters, analysis and investigation of visual inspections have helped the City trace several problems back to the industrial source. Problems at freight terminals and bulk fuel facilities have been resolved during year five and throughout the permit term.

SWMP Task: Develop, Manage, and Conduct Monitoring Program at MIFs. Status: Ongoing.

The monitoring program for the municipal industrial facilities was developed during the first permit term and was included in the 96/97 annual report. The program specified that the only municipal industries included in the City's monitoring program will be limited to the Knoxville Area Transit station, the Prosser Road fleet and passenger vehicle garage, and the Lorraine Street maintenance and storage facility. However, the City also began monitoring and testing the parking lot runoff from the Solid Waste Management Facility (SWMF) on Elm Street. This monitoring program was developed as a Best Management Practices test site to evaluate the usefulness and effectiveness of catch basin filters on ultra-urban land uses. The City partnered with the University of Tennessee Civil & Environmental Engineering Department and with Remedial Solutions to put two catch basin filters in place. One filter was installed at the SWMF and one was located on Phillip Fulmer Way outside Neyland Stadium.

During year five, each MIF outfall was inspected at least once for non-stormwater flow in dry weather. This monitoring will be conducted at least annually and will be expanded in the new permit term.

5.4 THE CONSTRUCTION SITE RUNOFF PROGRAM (CS)

Program to Implement and Maintain BMP Plans to Reduce Construction Site Runoff to the Municipal Storm Sewer System, 40 CFR 122.26(d)(2)(iv)(D).

CS-1 Site Planning

SWMP Task: Revise City Ordinances to require construction sites greater than 10,000-sq. ft. to submit Erosion and Sediment (E&S) Control Plans. Status: Complete.

The Stormwater and Street Ordinance was developed during the first permit term to specifically require construction sites greater than 10,000 square feet to provide an erosion and sediment control plan according to section 22A-28(4)(c). The ordinance may be accessed on the Internet at www.ci.knoxville.tn.us/engineering/ for review or download.

SWMP Task: Require Site Plans Submittals per Tennessee E & S Control Handbook.
Status: Complete.

The Stormwater and Street Ordinance requires all erosion and sediment control plan submittals and all site development work to comply with the Erosion and Sediment Control Handbook produced by TDEC, dated July 1992, or as amended by TDEC or its successor and any supplemental regulations by the Engineering Department.

SWMP Task: Develop minimum criteria for plan review and checklists. Status: Complete.

Although the TDEC Erosion and Sediment Control Handbook does provide a checklist for review of Erosion and Sediment Control Plans, the City developed a list of minimum criteria to supplement the State checklist for various categories of site plans (residential, commercial, etc.). The City plans review staff uses the minimum criteria and checklists to insure consistency in the plan review process.

SWMP Task: Provide training for City plans review staff. Status: Ongoing.

In an effort to fully train the Stormwater Management staff, the City has participated in several stormwater seminars around the region during year five. Most staff members at the Engineer level will attend at least one, but typically more, seminars or training workshops annually. Typical seminars attended in year five include: SWMM modeling, NAFSMA conference, TMDL updates, NPDES updates, ASCE seminars, Haestad Methods workshops, and others. In addition to the stormwater management seminars attended, the Engineering staff have sponsored, planned, and presented a series of annual workshops/seminars to better educate the staff and development community about the development and plans review processes. Some of the topics of the City sponsored development process training sessions include:

- ***Technical Requirements of the Stormwater & Street Ordinance***

- ***Erosion and Sediment Control on plans and construction sites***.
- ***Site Development Permit Review Seminar***
- ***Performance and Indemnity Agreements, Permanent Maintenance Agreements for Stormwater Facilities***
- ***Plat Review Process and Procedures***

The City will continue to provide training to the Engineering staff by participating in seminars locally and outside the city; in-house training by professional engineers; tuition reimbursement for university engineering classes; cooperating with TDOT, TDEC, TVA, UTK, and other agencies to provide professional training for the staff. Training of the plans review and inspections staff is an ongoing program within the Engineering Department.

CS-2 BMP Requirements

SWMP Task: Require Construction BMPs from the TN E&S Control Handbook.
Status: Complete.

As outlined in the new Stormwater and Street Ordinance Section 22A-28(b)(4), all erosion and sediment control plans must comply with the Erosion and Sediment Control Handbook produced by TDEC, dated July 1992, or as amended by TDEC or its successor and any supplemental regulations by the Engineering Department.

SWMP Task: Require construction site "good housekeeping" practices. Status: Ongoing.

To ensure that construction sites are kept clean and orderly, and to minimize pollutants in stormwater runoff as a result of other construction activities, the City will continue to require good housekeeping measures on all active construction sites. The good housekeeping regulations included in the new BMP manual address the following considerations:

- Designated areas for construction equipment maintenance and repair and prohibiting discharges of oil and grease into the storm drain system or receiving waters.
- Designated areas for construction equipment washing provided with a gravel or rock base and ensuring the wash waters are discharged to a regularly maintained temporary holding basin or sediment control device.
- Provision of storage areas for construction materials and receptacles for liquids (solvents, paints, acids) and solids in accordance with manufacturers recommendations.
- Provision of adequate waste storage areas and ensuring that the locations for collection of waste materials do not receive concentrated runoff.
- Provision of adequate sanitary facilities on construction sites in accordance with Health Department Regulations.

Many of these "good housekeeping" issues will be reviewed with the contractor, engineer, and developer during the pre-construction assistance meeting.

SWMP Task: Evaluate additional BMP requirements and design modifications.

Status: Ongoing.

The Stormwater and Street Ordinance Section 22A-22 entitles the Engineering Department to compose a development design manual as the standard for which the ordinance requirements will be met. The new BMP manual may be accessed on the Engineering Department web site at www.ci.knoxville.tn.us/engineering/.

The guidance criteria in the new manual describes acceptable types of BMPs, design standards, and maintenance requirements for BMPs to be used throughout the City to meet the requirements of the new Stormwater and Street Ordinance. The guidance criteria is maintained on the Internet and distributed to developers as the official reference to ensure proper selection, design and maintenance criteria for BMPs. To ensure that effective and maintainable BMPs are constructed in the City, a standard maintenance covenant is executed before any construction plans are approved. The guidance criteria addresses the goals of the NPDES stormwater program by allowing only BMPs, which are effective in reducing pollutants, targeted in the NPDES stormwater regulations.

CS-3 Inspection / Enforcement

SWMP Task: Expand inspections program to include smaller (single family) construction sites.

Status: Ongoing.

In the first year of the permit term, the City of Knoxville expanded new development construction inspections to include single family residential sites. These single-family residential inspections will continue as an ongoing program during the next permit term.

SWMP Task: Increase penalties for violations to: $5000. Status: Complete

The Stormwater and Street Ordinance, Section 22A-8 Penalties, increased the penalty for violations up to $5,000 per day per violation. This ordinance was effective during year one and was included in that report. The ordinance was revised in year two and may be accessed on the Internet at www.ci.knoxville.tn.us/engineering/.

SWMP Task: Implement Scheduled Site inspections: rough grading, E&S control installation, final grading, and final stabilization. Status: Ongoing.

The Engineering Department continues to implement site inspections for subdivision and commercial developments. These inspections are not a new program and have been occurring since at least 1994. Inspections are performed during rough grading, final grading, and at various other times during the construction process. Although the site inspections are not scheduled with the contractor or developer, the City staff may visit the construction sites approximately every week. The time frame for some project inspections will vary due to the specific project.

These inspections are performed to insure compliance with the erosion and sediment control plan, good housekeeping, and the approved design plan.

CS-4 Training Programs

SWMP Task: Co-Sponsor E&S Control Practice Seminars for City staff, developers, Engineers and contractors. Status: Annually.

The City and other Water Quality Forum members have developed and presented free erosion and sediment control workshops throughout the first permit term. To maximize participation the workshops are typically presented in the early spring or late fall while construction activities are least intense. The workshops have been very successful and will be continued annually. In addition to the City of Knoxville, the Water Quality Forum partners involved with the planning, sponsorship, and presentation of the workshops have included: TVA, TDEC, TDOT, NRCS, Knox County, Ijams Nature Center, UTK, and the UT Water Resources Research Center. Private sponsors have included consulting firms and erosion control product vendors.

During year five, the City assisted UT and TDEC with review, promotion and presentation of the new TDEC erosion control certification program.

SWMP Task: Evaluate training materials from other jurisdictions. Status: Ongoing.

During the first permit term, the City of Knoxville Engineering Department has evaluated training materials and programs from various Federal, State, and local jurisdictions around the country. This program will continue throughout the next permit term in an effort to continuously improve training programs provided and cosponsored by the City. The City will continue to evaluate training programs and materials to incorporate into the SWMP. This ongoing task should allow the City's SWMP to stay comparable with the other MS4's in the region.

In addition to the Tennessee E&S Control Handbook, some of the training materials already compiled, reviewed, and used by the City include but are not limited to:

- ASCE & IECA Soil Erosion & Sediment Control Videos
- Beaufort County Manual for Stormwater Best Management Practices
- California Stormwater Best Management Practices Handbooks
- Caltrans Stormwater Quality Handbook
- Charlotte-Mecklenburg Stormwater Management/ Land Development Manual
- Chattanooga Stormwater Management BMP Manual (1993)
- Fairfax County, Virginia E&S Control Inspector Training Video
- Kentucky Best Management Practices for Construction Activities
- MSD Erosion Prevention and Sediment Control
- Nashville Storm Water Management Manual
- North Carolina Erosion and Sediment Control Practices Video Modules (1991)
- North Carolina Sediment Control Planning and Design Manual (1988)
- Ohio Department of Natural Resources Keeping Soil on Construction Sites Video
- State of Florida Department of Environmental Regulation, The Florida Development Manual: A Guide to Sound Land and Water Management

- State of Maine Stormwater Best Management Practices Manual
- USEPA Developing Pollution Prevention Plans and Best Management Practices for Storm Water Management for Construction Activities (1992)
- USEPA NPDES Best Management Practices Manual (1993)
- Virginia Erosion and Sediment Control Handbook (Third Edition, 1992)

5.5 EDUCATIONAL ACTIVITIES and PUBLIC OUTREACH

Water Quality Education activities at Ijams Nature Center — Status: Ongoing.

Ijams Nature Center facilitates and coordinates several water quality education programs in the Knoxville/Knox County area. Each program has a specific water focus and targets a community-based audience. Ijams is an 80-acre City park and environmental education center located within the city limits of Knoxville, Tennessee. The mission of Ijams Nature center is to increase the knowledge, understanding, and appreciation of the natural world by providing quality educational experiences throughout the region. Throughout the last permit term, the City has sponsored the following programs through an annual contract with Ijams Nature Center.

Adopt-a-Creek

The Adopt-a-Creek program was implemented as a compliment to the annual River Rescue program (see next item) to raise awareness of the state of our waterways in the community and to begin to address the problem through volunteer work in and near the creeks and streams that feed the Tennessee River. The long-term goal of the Adopt-a-Creek program is to have every accessible section of creek adopted by neighborhood, school, business, and civic groups. Adoption responsibilities include:

- a one year commitment to do two cleanups,
- monitoring physical conditions after each cleanup, and
- keeping a record of participants and debris weight from each cleanup.

In the six years since the inception of this volunteer program, eleven miles of stream have been adopted and more than 142 tons of litter and debris have been picked up. Several adopters have performed water testing and population studies to further their knowledge of their adopted section. Adopt-a-Creek is supported by the City of Knoxville and coordinated by Ijams.

River Rescue — Status: Ongoing

The year 2001 was the 12th year for the River Rescue. The spring 2001 River Rescue attracted 835 volunteers who collected 17.7 tons of trash and 167 tires from the shores of the Tennessee River. This annual event is coordinated through Ijams Nature Center in cooperation with the City of Knoxville and Sea Ray Boats and more than 20 other partners, including members of the business community, government agencies, private organizations, and individuals. There are 32 sites or "zones" that stretch from the forks of the river above Knoxville to Fort Loudoun Dam. River Rescue is also held in partnership with Lake User groups on Watts

Bar Lake, Melton Hill Lake, and the Clinch River. Ijams Water Quality Specialists plan for this event throughout the year by recruiting volunteers, surveying river bank conditions, securing additional sponsors, and pinpointing areas in need of cleanup.

Operation Storm Drain — Status: Ongoing

The Blue Thumb Coalition started this ongoing program in 1994. The message "DUMP NO WASTE, DRAINS TO STREAM" has been stenciled on over 10,600 drains. During year five, the City and Ijams has replaced the stenciling program with DAS curb markers. These brightly colored plastic disks are affixed to the curbs and carry the message "Dump no Wastes, Drains to Stream". Operation Storm Drain attempts to educate citizens and reduce the amount of pollutants dumped into our waterways.

Water Quality Forum — Status: Ongoing

The Water Quality Forum was initiated in 1990 by the City of Knoxville as a cooperative network of organizations and agencies charged with monitoring and regulating regional water quality. Currently the Forum consists of 35 participating groups including but not limited to the City, CAC Americorps, TVA, KUB, UTK-WRRC, USGS, NRCS, TDEC, KKB, etc. The Forum meets quarterly as a large group and monthly within the committees.

Adopt-a-Watershed — Status: Ongoing

Currently, ten area high schools are participating in the program. The City of Knoxville has helped provided training, participation, and supplies to the schools and has helped implement the goals of the program and increase public awareness of water quality issues. The primary goals of the program include:

- Characterizing the school's watershed using, at minimum, two AAW characterization tools (e.g., watershed inventory, watershed mapping, windshield survey, stream walk).
- Monitor the school's watershed stream(s), conducting, at minimum, chemical testing twice and a biological (i.e. macroinvertebrate and/or fish) assessment once.
- Conduct at least one water quality improvement activity (e.g., tree planting, storm drain stenciling, stream cleanup, stream bank restoration, presentations to school groups/community organizations on the "state of the watershed" as determined by the students' characterization/monitoring efforts).

The City will continue working with the schools and provide support such as information, solid waste support for cleanups, GIS maps, stencils, testing supplies, training, and etc.

6.0 MONITORING REPORTS SUMMARY

6.1 DRY-WEATHER SCREENING PROGRAM - NEW OUTFALL INVENTORY

During the past Permit year, nine outfalls were added to the City's outfall inventory. Outfall 01-400-0397 is an outlet to a detention pond that collects runoff from a commercial parking lot. Outfalls 01-400-0236 and 01-200-0238 outlet from a commercial parking lot. Outfalls 13-300-0181, 13-300-0182, and 13-300-0184 discharge stormwater collected at the City's maintenance and service center on Loraine Street. Outfalls 13-300-0226, 13-300-0227, and 13-300-0228 discharge stormwater collected at Knoxville's Household Hazardous Waste Disposal Center. All outfalls are clearly marked on the inventory map located in the Appendix of this report.

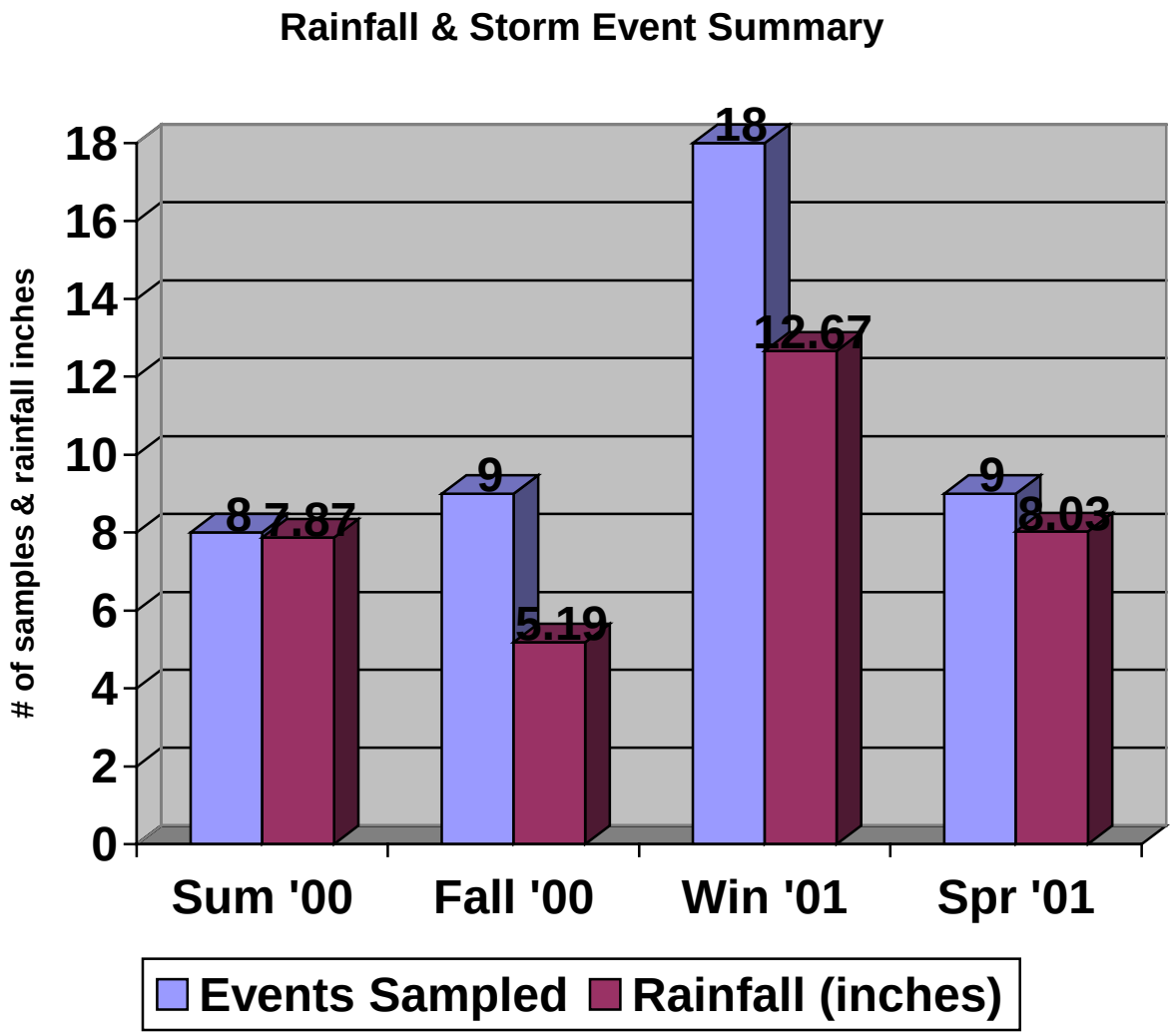
During year five, outfall number 01-900-0216 was removed from First Creek. This outfall was previously reported in the year three report as a confirmed sanitary sewer overflow maintained by KUB near the intersection of Fourth Street and Hoitt Avenue. This outfall was confirmed as a 6" pipe installed to prevent overflows from the sanitary sewer manholes in the street by directing the flow into First Creek. The "900" series of outfalls were added to the outfall inventory numbering system to account for this TDEC regulated discharge pipe. However, with the removal of this sewer overflow pipe, the City no longer has any confirmed "900" series outfalls in the inventory.

The dry weather screening of major outfalls throughout the MS4 did provide some indication on improvements since the baseline data was collected at the outfalls during the permit application process in 1991/1992. Please refer to section 5.2 of this report for details on the program.

6.2 ONGOING STORMWATER MONITORING PROGRAM

6.2.1 Area Rainfall Data & Storm Event Summary.

During the July 1, 2000 to June 30, 2001 monitoring period an average of 33.76 inches of rain was recorded and 44 storm events were sampled from the City's five ISCO monitoring stations. The sampling frequency requirements as described in section V of the NPDES Permit were not met for the year (see noncompliance section 6.2.3). The graph below shows the relationship between the amount of rainfall and the number of events sampled per season. Notice the number of storm events sampled are proportional to the amount of rain and rain events occurring during that quarter. Monitoring data summaries for each of the sampling locations are included for TDEC's review on the following pages.



6.2.2 Laboratory Analysis Summary - Seasonal Sampling Program
July 1, 2000 thru June 30, 2001

Site	Quarter	pH	# of Events	Average Sampled Volume	Average Rainfall per Event	BOD	COD	TSS	TDS	Nitrate + Nitrite nitrogen	Total ammonia nitrogen	Organic nitrogen + total ammonia	Total Nitrogen	Total recoverable lead	Total recoverable zinc	Dissolved phosphorus	Total phosphorus
Units				cu-ft	inches	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
AP	Sum. '00	9.2	2	154935	0.40	5	20.9	278	159.3	0.3	<0.21	3.4	<0.9	<0.007	0.158	0.033	0.042
	Fall '00	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Wtr. '01	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Spr. '01	7	3	3917	0.30	2.7	50.1	99.3	175	0.5	<0.2	0	<3.35	<0.007	0.108	0.067	0.115
FC	Sum. '00	9	2	363276	0.69	12	13.4	528	180	0.6	<0.2	0.7	2.1	0.1	0.121	0.062	0.059
	Fall '00	6.8	4	228238	0.74	5.3	5.9	249.8	110.3	0.7	<0.2	1.9	0.7	<0.027	0.111	0.189	0.578
	Wtr. '01	7	2	228735	0.50	6.5	13	482	138	0.3	<0.2	1.8	<0.7	0.042	0.163	0.019	0.184
	Spr. '01	7	2	80214	0.25	6.5	49.3	131	168	0.9	<0.2	0	2.4	0.01	0.097	0.074	0.1
LC	Sum. '00	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Fall '00	6.7	3	177957	0.49	2.7	3.5	65.7	218.7	0.6	<0.2	0.9	1	<0.007	0.051	0.055	0.349
	Wtr. '01	7	6	440195	0.46	4.5	3.6	38.5	284.2	0.5	<0.2	1	<0.85	<0.007	0.039	0.012	0.023
	Spr. '01	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SC	Sum. '00	8.2	1	1330380	0.33	8	5	142.0	158	0.5	<0.2	4.20	1.5	0.017	0.138	-	0.055
	Fall '00	7	1	4919728	0.95	11	5	104.0	89	0.8	<0.2	2.80	0.6	0.009	0.065	0.081	0.502
	Wtr. '01	6.8	5	3322455	0.80	5.6	4.1	153.8	137.2	0.5	<0.2	1.1	<0.6	<0.018	0.113	0.047	0.083
	Spr. '01	7	4	695023	0.47	6.8	105.5	137.5	199.5	1.2	<0.2	4.9	8.5	0.03	0.166	0.09	0.138
WD	Sum. '00	9.1	3	548323	0.23	7	11.84	90	201.67	0.53	<0.2	1.68	<0.6	<0.002	0.13	0.03	0.045
	Fall '00	6	1	775250	0.77	6	2.4	188	102	0.4	<0.2	0.84	0.2	<0.007	0.047	0.031	0.071
	Wtr. '01	7	5	609480	0.48	4.8	5.4	137.6	224.2	0.4	<0.2	1	<0.76	<0.011	0.086	0.04	0.065
	Spr. '01	7	1	295602	0.93	5	39.7	590	129	0.287	<0.2	0	<0.6	0.019	0.23	0.17	0.17
National NURP Study Average						11.9	90.8	na	na	na	*****	2.35	3.31	0.18	0.176	0.16	0.46
Characteristics of Urban Stormwater Range						1 - 700	5 - 3,100	2 - 11,300	200 -	na	0.1 - 2.5	0.01 - 4.5	na	0.0 - 1.9	na	0.1 - 10	0.1 - 125

The above chart is comprised of seasonal averages from the data collected from each individual storm event.

- Winter (Jan., Feb., and March); Spring (April, May, and June); Summer (July, Aug., and Sept.); Fall (Oct., Nov., and Dec.)
- The Characteristics of Urban Stormwater and National NURP Study Average data was taken from tables 4-1 and 4-2 of the Stormwater Management for Maine: BMPS

AP = Acker Place Monitoring Station
FC = First Creek Monitoring Station
SC = Second Creek Monitoring Station
LC = Loves Creek Monitoring Station
WD = Walden Drive Monitoring Station

6.2.2 Acker Place Monitoring Site

Quarter	Date and Sample ID #	Type	pH	Flow	Rainfall amount	BOD	COD	TSS	TDS	Nitrate + Nitrate nitrogen	Total ammonia nitrogen	Organic nitrogen + Total nitrogen	Total nitrogen	Total Recoverable lead	Total Recoverable zinc	Dissolved phosphorus	Total phosphorus
Units				cu-ft	inches	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
SUMMER 2000	Ap073100	Composite	9.7	221882	0.47	3	3.30	34.0	152	0.3	0.4	2.52	<0.3	<mdl	0.097	0.028	0.044
	Ap081000	Composite	8.6	87988	0.33	7	38.50	522.0	167	0.3	<.02	4.20	1.5	0.014	0.219	0.037	0.040
Quarter Average			9.2	154935	0.40	5.0	20.9	278.0	159.5	0.3	<0.21	3.4	<0.9	<0.007	0.158	0.033	0.042

***National NURP Study Average**	11.9	90.8	na	na	na	*****	2.35	3.31	0.18	0.176	0.16	0.46
***Characteristics of Urban Stormwater Range**	1 - 700	5 - 3,100	2 - 11,300	200 - 14,600	na	0.1 - 2.5	0.01 - 4.5	na	0.0 - 1.9	na	0.1 - 10	0.1 - 125

Quarter	Date and Sample ID #	Type	pH	Flow	Rainfall amount	BOD	COD	TSS	TDS	Nitrate + Nitrate nitrogen	Total ammonia nitrogen	Organic nitrogen + Total nitrogen	Total nitrogen	Total Recoverable lead	Total Recoverable zinc	Dissolved phosphorus	Total phosphorus
Units				cu-ft	inches	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
SPRING 2001	Ap060601	Composite	7.0	8232	0.31	4	93.50	32.0	112	0.5	<0.2	0.00	3.8	<0.007	0.128	0.020	0.030
	Ap062501	Composite	7.0	2964	0.41	2	32.80	256.0	295	0.7	<0.2	0.00	<0.6	<0.007	0.111	0.100	0.200
	Ap063001	Composite	7.0	554	0.19	2	24.00	10.0	118	0.3	<.02	0.00	6.2	<0.007	0.084	0.080	
Quarter Average			7.0	3917	0.3	2.7	50.1	99.3	175.0	0.5	<0.2	0.0	<3.35	<0.007	0.108	0.067	0.115

***National NURP Study Average**	11.9	90.8	na	na	na	*****	2.35	3.31	0.18	0.176	0.16	0.46
***Characteristics of Urban Stormwater Range**	1 - 700	5 - 3,100	2 - 11,300	200 - 14,600	na	0.1 - 2.5	0.01 - 4.5	na	0.0 - 1.9	na	0.1 - 10	0.1 - 125

* Data was taken from tables 4-1 and 4-2 of the Stormwater Management for Maine: BMPS.

6.2.2 First Creek Monitoring Station

Quarter	Date and Sample ID #	Type	pH	Flow	Rainfall amount	BOD	COD	TSS	TDS	Nitrate + Nitrate nitrogen	Total ammonia nitrogen	Organic nitrogen + Total nitrogen	Total nitrogen	Total Recoverable lead	Total Recoverable zinc	Dissolved phosphorus	Total phosphorus
Units				cu-ft	inches	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
SUMMER 2000	Fc081000	Composite	9.00	660855	0.85	14	17	928.0	172	0.6	<0.2	0.56	2.1	0.057	0.213	0.049	0.056
	Fc092000	Composite	9.00	65697	0.53	10	10	128.0	188	0.6	<0.2	0.84	<0.3	<mdl	0.028	0.074	0.061
Quarter Average			9.0	363276	0.69	12.0	13.4	528.0	180.0	0.6	<0.2	0.70	2.1	0.1	0.121	0.062	0.059
Fall 2000	Fc110800	Composite	7.00	191642	0.78	6	6	134.0	88	0.7	<0.2	3.08	0.3	0.026	0.155	0.080	0.651
	Fc111600	Composite	7.00	120755	0.48	5	6	97.0	117	0.9	<0.2	2.52	0.6	0.027	0.078	0.408	0.962
	Fc121300	Composite	7.00	242268	0.85	5	2	252.0	107	0.6	<0.2	0.84	1.3	<0.007	0.050	0.079	0.122
	Fc121600	Composite	6.00	358286	0.84	5	10	516.0	129		<0.2	1.12		0.047	0.161		
Quarter Average			6.8	228238	0.74	5.3	5.9	249.8	110.3	0.7	<0.2	1.9	0.7	<0.027	0.111	0.189	0.578
***National NURP Study Average**						11.9	90.8	na	na	na	*****	2.35	3.31	0.18	0.176	0.160	0.460
***Characteristics of Urban Stormwater Range**						1 - 700	5 - 3,100	2 - 11,300	200 - 14,600	na	0.1 - 2.5	0.01 - 4.5	na	0.0 - 1.9	na	0.1 - 10	0.1 - 125

Quarter	Date and Sample ID #	Type	pH	Flow	Rainfall amount	BOD	COD	TSS	TDS	Nitrate + Nitrate nitrogen	Total ammonia nitrogen	Organic nitrogen + Total nitrogen	Total nitrogen	Total Recoverable lead	Total Recoverable zinc	Dissolved phosphorus	Total phosphorus
Units				cu-ft	inches	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Winter 2001	Fc021301	Composite	7.00	365921	0.49	5.0	9.5	274.0	160.0	0.3	<0.2	1.40	<0.6	0.029	0.146	0.023	0.027
	Fc031201	Composite	7.00	91549	0.51	8.0	16.5	690.0	116.0	0.3	<0.2	2.24	0.8	0.054	0.180	0.014	0.340
Quarter Average			7.0	228735	0.50	6.5	13.0	482.0	138.0	0.3	<0.2	1.8	<0.7	0.042	0.163	0.019	0.184
Spring 2001	Fc050601	Composite	7.00	91512	0.31	9	96	180.0	178	1.7	<0.2	0.00	0.6	0.007	0.122	0.137	0.129
	Fc060701	Composite	7.00	68916	0.19	4	2	82.0	158	0.2	<0.2	0.00	4.2	0.013	0.072	0.010	0.070
Quarter Average			7.0	80214	0.25	6.5	49.3	131.0	168.0	0.9	<0.2	0.0	2.4	0.010	0.097	0.074	0.100
***National NURP Study Average**						11.9	90.8	na	na	na	*****	2.35	3.31	0.18	0.176	0.160	0.460
***Characteristics of Urban Stormwater Range**						1 - 700	5 - 3,100	2 - 11,300	200 - 14,600	na	0.1 - 2.5	0.01 - 4.5	na	0.0 - 1.9	na	0.1 - 10	0.1 - 125

* Data was taken from tables 4-1 and 4-2 of the Stormwater Management for Maine: BMPS.

6.2.2 Loves Creek Monitoring Station

Quarter	Date and Sample ID #	Type	pH	Flow	Rainfall amount	BOD	COD	TSS	TDS	Nitrate + Nitrate nitrogen	Total ammonia nitrogen	Organic nitrogen + Total nitrogen	Total nitrogen	Total Recoverable lead	Total Recoverable zinc	Dissolved phosphorus	Total phosphorus
Units				cu-ft	inches	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Fall 2000	Lc111600	Composite	6.00	2405	0.49	2	3	18.0	228	1.1	<0.2	0.84	0.6	<0.007	0.042	0.103	0.487
	Lc120300	Composite	7.00	15286	0.33	2	3	1.0	279	0.3	<0.2	0.84	0.1	<0.007	0.088	0.037	0.039
	Lc121300	Composite	7.00	516181	0.65	4	5	178.0	149	0.3	<0.2	1.12	2.3	<0.007	0.022	0.025	0.522
Quarter Average			6.7	177957	0.49	2.7	3.5	65.7	218.7	0.6	<0.2	0.9	1.0	<0.007	0.051	0.055	0.349
***National NURP Study Average**						11.9	90.8	na	na	na	*****	2.35	3.31	0.18	0.176	0.160	0.460
***Characteristics of Urban Stormwater Range**						1 - 700	5 - 3,100	2 - 11,300	200 - 14,600	na	0.1 - 2.5	0.01 - 4.5	na	0.0 - 1.9	na	0.1 - 10	0.1 - 125

Quarter	Date and Sample ID #	Type	pH	Flow	Rainfall amount	BOD	COD	TSS	TDS	Nitrate + Nitrate nitrogen	Total ammonia nitrogen	Organic nitrogen + Total nitrogen	Total nitrogen	Total Recoverable lead	Total Recoverable zinc	Dissolved phosphorus	Total phosphorus
Units				cu-ft	inches	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Winter 2001	Lc010801	Composite	7.00	11285	0.31	4	4	10.0	466	0.4	<0.2	0.84	<0.6	<0.007	0.023	0.025	0.009
	Lc011701	Composite	7.00	10587	0.14	4	4	7.0	310	0.4	<0.2	0.84	<0.6	<0.007	0.030	0.005	<0.001
	Lc021301	Composite	7.00	301463	0.59	5	2	22.0	234	0.3	<0.2	1.40	2.1	<0.007	0.049	<0.001	0.006
	Lc022401	Composite	7.00	2018892	0.71	3	5	126.0	211	0.5	<0.2	2.24	<0.6	<0.005	0.052	<0.001	<0.001
	Lc031201	Composite	7.00	209579	0.43	6	4	41.0	256	0.7	<0.2	0.84	<0.6	<0.007	0.037	<0.413	<0.001
	Lc032901	Composite	7.00	89364	0.57		2	25.0	228	0.5	<0.2	0.00	<0.6	<0.007	0.044	0.007	0.054
Quarter Average			7.0	440195	0.46	4.5	3.6	38.5	284.2	0.5	<0.2	1.0	<0.85	<0.007	0.039	0.012	0.023
***National NURP Study Average**						11.9	90.8	na	na	na	*****	2.35	3.31	0.18	0.176	0.160	0.460
***Characteristics of Urban Stormwater Range**						1 - 700	5 - 3,100	2 - 11,300	200 - 14,600	na	0.1 - 2.5	0.01 - 4.5	na	0.0 - 1.9	na	0.1 - 10	0.1 - 125

* Data was taken from tables 4-1 and 4-2 of the Stormwater Management for Maine: BMPS.

6.2.2 Second Creek Monitoring Station

Quarter	Date and Sample ID #	Type	pH	Flow	Rainfall amount	BOD	COD	TSS	TDS	Nitrate + Nitrate nitrogen	Total ammonia nitrogen	Organic nitrogen + Total nitrogen	Total nitrogen	Total phenols	Total Recoverable lead	Total Recoverable zinc	Dissolved phosphorus	Total phosphorus
Units				cu-ft	inches	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
SUMMER	Sc081000	Composite	8.20	1330380	0.33	8	5	142.0	158	0.5	<0.2	4.20	1.5	0.06	0.017	0.138		0.055
Quarter Average			8.2	1330380	0.33	8	5	142.0	158	0.5	<0.2	4.20	1.5	0.06	0.017	0.138		0.055
Fall 2000	Sc110800	Composite	7.00	4919728	0.95	11	5	104.0	89	0.8	<0.2	2.80	0.6		0.009	0.065	0.081	0.502
Quarter Average			7.00	4919728	0.95	11	5	104.0	89	0.8	<0.2	2.80	0.6		0.009	0.065	0.081	0.502
***National NURP Study Average**						11.9	90.8	na	na	na	*****	2.35	3.31	na	0.18	0.176	0.160	0.460
***Characteristics of Urban Stormwater Range**						1 - 700	5 - 3,100	2 - 11,300	200 - 14,600	na	0.1 - 2.5	0.01 - 4.5	na	0.0 - 0.2	0.0 - 1.9	na	0.1 - 10	0.1 - 125

Quarter	Date and Sample ID #	Type	pH	Flow	Rainfall amount	BOD	COD	TSS	TDS	Nitrate + Nitrate nitrogen	Total ammonia nitrogen	Organic nitrogen + Total nitrogen	Total nitrogen	Total phenols	Total Recoverable lead	Total Recoverable zinc	Dissolved phosphorus	Total phosphorus
Units				cu-ft	inches	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Winter 2001	Sc011701	Composite	6.00	6828343	1.82	6	4	278.0	114	0.4	<0.2	0.00	<0.6		0.058	0.194	0.029	0.021
	Sc021301	Composite	7.00	2495017	1.20	5	2	178.0	118	0.4	<0.2	1.68			0.010	0.086	<0.001	0.003
	Sc022401	Composite	7.00	3961628	0.63	4	5	135.0	129	0.4	<0.2	1.96	<0.6		0.028	0.131	<0.001	0.001
	Sc031201	Composite	7.00	1664012	0.25	7	5	88.0	168	0.4	<0.2	1.96	<0.6		<0.007	0.061	0.080	0.360
	Sc032901	Composite	7.00	1663277	0.10		4	90.0	157	1.0	<0.2	0.00	<0.6		<0.007	0.091	0.031	0.032
Quarter Average			6.8	3322455	0.80	5.6	4.1	153.8	137.2	0.5	<0.2	1.1	<0.6		<0.018	0.113	0.047	0.083
Spring 2001	Sc050601	Composite	7.00	886575	0.32	7	154	102.0	176	1.4	<0.2	0.00	12.8		0.011	0.104	0.040	0.050
	Sc052101	Grab	7.00		0.62	6	80	94.0	183	1.1	0.2	0.00	5.7	<0.01	0.013	0.082	0.140	0.120
	Sc062001	Composite	7.00	564679	0.65	11	81	188.0	168	1.4	<0.2	9.80	3.3		0.048	0.238	0.100	0.100
	Sc062501	Composite	7.00	633815	0.27	3	107	166.0	271	0.8	<0.2	9.80	12.2		0.048	0.238	0.080	0.280
Quarter Average			7.0	695023	0.47	6.8	105.5	137.5	199.5	1.2	<0.2	4.9	8.5	<0.01	0.030	0.166	0.090	0.138
***National NURP Study Average**						11.9	90.8	na	na	na	*****	2.35	3.31	na	0.18	0.176	0.160	0.460
***Characteristics of Urban Stormwater Range**						1 - 700	5 - 3,100	2 - 11,300	200 - 14,600	na	0.1 - 2.5	0.01 - 4.5	na	0.0 - 0.2	0.0 - 1.9	na	0.1 - 10	0.1 - 125

* Data was taken from tables 4-1 and 4-2 of the Stormwater Management for Maine: BMPS.

6.2.2 Walden Drive Monitoring Station

Quarter	Date and Sample ID #	Type	pH	Flow	Rainfall amount	BOD	COD	TSS	TDS	Nitrate + Nitrate nitrogen	Total ammonia nitrogen	Organic nitrogen + Total nitrogen	Total nitrogen	Total Recoverable lead	Total Recoverable zinc	Dissolved phosphorus	Total phosphorus
Units				cu-ft	inches	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Summer 2000	Wd072300	Composite	9.30	419533	0.10	6	4	34	198.00	0.3	<0.2	1.96	<0.5	<mdl	0.052	0.011	0.027
	Wd081000	Composite	9.10	940704	0.46	7	8	175	154.00	0.4	<0.2	0.56	0.3	<mdl	0.178	0.038	0.046
	Wd082000	Composite	9.00	284732	0.14	8	23	61	253.00	0.9	<0.2	2.52	1.0	<0.007	0.161	0.042	0.061
Quarter Average			9.13	548323	0.23	7.00	11.84	90.00	201.67	0.53	<0.2	1.68	<0.6	<.002	0.130	0.030	0.045
Fall 2000	Wd121300	Composite	6.00	775250	0.77	6.0	2.4	188.0	102.00	0.4	<0.2	0.84	0.2	<0.007	0.047	0.031	0.071
Quarter Average			6.00	775250	0.77	6.0	2.4	188.0	102.00	0.4	<0.2	0.84	0.2	<0.007	0.047	0.031	0.071
***National NURP Study Average**						11.9	90.8	na	na	na	*****	2.35	3.31	0.18	0.176	0.16	0.46
***Characteristics of Urban Stormwater Range**						1 - 700	5 - 3,100	2 - 11,300	200 - 14,600	na	0.1 - 2.5	0.01 - 4.5	na	0.0 - 1.9	na	0.1 - 10	0.1 - 125

Quarter	Date and Sample ID #	Type	pH	Flow	Rainfall amount	BOD	COD	TSS	TDS	Nitrate + Nitrate nitrogen	Total ammonia nitrogen	Organic nitrogen + Total nitrogen	Total nitrogen	Total Recoverable lead	Total Recoverable zinc	Dissolved phosphorus	Total phosphorus
Units				cu-ft	inches	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Winter 2001	Wd010801	Composite	7.0	210003	0.28	5	4.0	104	523.0	0.3	<0.2	0.56	0.7	<0.007	0.043	0.013	0.072
	Wd021301	Composite	7.0	1083499	0.52	5	10.0	45	180.0	0.4	<0.2	3.08	<0.6	0.023	0.105	<0.001	<0.001
	Wd022401	Composite	7.0	902234	0.68	3	3.2	314	131.0	0.4	<0.2	1.12	1.3	0.007	0.114	<0.001	0.143
	Wd031201	Composite	7.0	402540	0.42	6	5.1	148	138.0	0.4	<0.2	0.28	<0.6	<0.007	0.079	0.087	0.010
	Wd032901	Composite	7.0	449127	0.48		4.7	77	149.0	0.6	<0.2	0.00	<0.6	0.009	0.089	0.019	0.035
Quarter Average			7.0	609480	0.48	4.8	5.4	137.6	224.2	0.4	<0.2	1.0	<0.76	<0.011	0.086	0.040	0.065
Spring 2001	Wd060601	Composite	7.0	294602	0.93	5	39.7	590	129.0	0.287	<0.2	0.000	<0.6	0.019	0.230	0.170	0.170
Quarter Average			7.0	294602	0.93	5	39.7	590	129.0	0.287	<0.2	0.000	<0.6	0.019	0.230	0.170	0.170
***National NURP Study Average**						11.9	90.8	na	na	na	*****	2.35	3.31	0.18	0.176	0.16	0.46
***Characteristics of Urban Stormwater Range**						1 - 700	5 - 3,100	2 - 11,300	200 - 14,600	na	0.1 - 2.5	0.01 - 4.5	na	0.0 - 1.9	na	0.1 - 10	0.1 - 125

* Data was taken from tables 4-1 and 4-2 of the Stormwater Management for Maine: BMPS.

6.2.2 Seasonal Ambient Grab Samples 2000-2001

Fall 2000	BOD	COD	TSS	TDS	Nitrate + Nitrite Nitrogen	Total Ammonia Nitrogen	Organic Nitrogen + Total Ammonia	Total Nitrogen	Total Recoverable Lead	Total Recoverable Zinc	Dissolved Phosphorus	Total Phosphorus
Acker Place												
First Creek	2	3.2	15	251	0.4	<0.2	5.6	<0.2	<0.007	0.02	0.014	0.069
Loves Creek	2	3.8	15	317	0.5	<0.2	2.52	0.3	0.01	0.012	0.05	0.02
Second Creek	2	3.3	1	305	1.1	<0.2	0	1.2	<0.007	0.021	0.035	0.046
Walden Drive	2	3.1	3	261	0.5	<0.2	0	0.2	<0.007	0.021	0.139	0.069
Average	2	3.4	9	284	0.6	<0.2	2	<0.6	<0.01	0.02	0.06	0.05

Winter 2001	BOD	COD	TSS	TDS	Nitrate + Nitrite Nitrogen	Total Ammonia Nitrogen	Organic Nitrogen + Total Ammonia	Total Nitrogen	Total Recoverable Lead	Total Recoverable Zinc	Dissolved Phosphorus	Total Phosphorus
Acker Place	1	3.7	2	252	0.4	<0.2	0	1.2	<0.005	0.025		0.022
First Creek	1	<1.0	6	267	0.4	<0.2	0	<0.6	0.01	0.036	0.005	<0.001
Loves Creek	1	10.5	5	327	1	<0.2	0	0.9	0.01	0.01	0.004	0.017
Second Creek	2	2	5	284	0.4	<0.2	0.84	0.9	<0.007	0.018	<0.001	0.054
Walden Drive	2	<1.0	5	261	0.4	<0.2	0	5	<0.007	0.022	<0.007	<0.001
Special	1	4	15	310	0.3	<0.2	0	<0.6	<0.007	0.033	0.013	0.034
Average	1	<4.5	6	284	0.5	<0.2	0	<1.5	<0.007	0.02	<0.006	<0.022

Spring 2001	BOD	COD	TSS	TDS	Nitrate + Nitrite Nitrogen	Total Ammonia Nitrogen	Organic Nitrogen + Total Ammonia	Total Nitrogen	Total Recoverable Lead	Total Recoverable Zinc	Dissolved Phosphorus	Total Phosphorus
Acker Place	2	<0.1	2	201	0.4	<0.2	0	<0.6	<0.005	0.04	0.018	0.044
First Creek	2	<0.1	2	255	1.2	<0.2	0	<0.6	<0.005	0.033	0.044	0.034
Loves Creek	2	<0.1	5	285	1	<0.2	0	<0.6	<0.005	0.053	0.05	0.082
Second Creek	2	6.2	3	307	1.2	<0.2	0	<0.6	0.016	0.061	0.07	0.043
Walden Drive	2	<0.1	3	265	0.9	<0.2	0	<0.6	0.013	0.066	0.026	0.053
Average	2	<1.3	3	263	0.9	<0.2	0	<0.6	<0.008	0.05	0.04	0.05

6.2.3 Noncompliance.

The City of Knoxville has complied with all monitoring requirements during year five with the exception of the target number of stormwater samples collected from the monitoring stations. The permit requires sample collection from five monitoring locations for 12 to 15 storm events per year. Due to the unusually low amount of rainfall during year five, only 44 storm samples were collected from all five stations. The following table illustrates the relationship between numbers of storm samples collected and total rainfall for the last four permit years.

Permit Year	Total Yearly Rainfall	Total Samples Collected
2000-2001	33.76 inches	44
1999-2000	41.31 inches	66
1998-1999	42.99 inches	72
1997-1998	54.77 inches	76

The number of samples collected does rely on the amount of rainfall and the distribution of the individual rain events. Although the 1997-1998 rainfall total exceeded the norm by 12 inches, the qualifying rain events did not. Many events were lost due to a lack of a dry period in between events. During year five, the rain events simply did not occur or lacked sufficient duration to provide a valid composite sample.

The KUB did not provide the industrial inspection reports during year five as required by the Industrial and Related Facilities Program IN-2. KUB stopped collecting the industrial inspection reports but did not inform the City until after year five had been completed. The City will replace this program task with an appropriate task in the new permit term. Since the inspection reports had been collected in previous years from the same industries, it is not likely that any significant new information would have been gathered.

6.2.4 Estimated Runoff from Major Watersheds within the MS4 Area.

Part VI (A)(2)(e)(i)(3) of the NPDES permit requires an estimate of the total volume of urban runoff discharged by the City of Knoxville for the year. This estimate is to be based on total rainfall for the year and the estimated imperviousness of different land uses. The total rainfall for year five was determined to be an average of the annual rainfall recorded during year five from the five City of Knoxville monitoring stations located throughout the city and the National Weather Service rain gage at the McGhee Tyson Airport. During year five, the average annual rainfall amount is 33.76 inches.

To estimate the total runoff volume, the City utilized the GIS to determine approximate areas for each watershed within the city limits along with the corresponding land uses. Each land use is assigned an approximated impervious percentage according to the Camp Dresser and McKee Watershed Management Model described in the Part 2 application, pages 4-14 to 4-18.

It was assumed for each watershed that 95 percent of the rainfall from the impervious fraction, and 15 percent of the rainfall from the pervious fraction of each land use was converted to runoff. Therefore the impervious runoff coefficient and the pervious runoff coefficient were assumed to be 0.95 and 0.15, respectively. For example, based upon an average annual rainfall

volume of 42.99 inches/year, the average annual runoff from a single family residential land use (25% impervious) is 15.05 in/yr (42.99*[(0.15*0.75)+(0.95*0.25)]). The runoff coefficient for a single land use is the sum of the impervious percentage multiplied times the impervious runoff coefficient plus the pervious percentage multiplied by the pervious runoff coefficient. For the previous example, the average runoff coefficient for the single family residential land use is 0.35 ([0.15*0.75]+[0.95*0.25]). For a watershed, the average runoff coefficient is an area weighted average of each land use runoff coefficients times the percentage of the area of each land use.

The runoff from the major watersheds within the MS4 area was estimated by a formula in Camp Dresser & Mckee's Watershed Management Module shown below:

$$Qi = P \times Ci \times Ai$$

Where,

P = total precipitation (inches/year) = 33.76 in./yr. = 2.813 ft./yr.

C = land use area weighted runoff coefficient = 0.15*Pervious% + 0.95*Impervious%

A = drainage area (acres) = acres x (4.35E4 ft2/acre) = ft2

Q = ΣQi = total runoff rate / E6 = Mgal

Please find the analysis for the each watershed and for the entire city in table 6.2.4 on the following page.

6.3 IN-STREAM AMBIENT MONITORING PROGRAM

Ambient monitoring has evolved throughout the permit term from field testing at many locations on several creeks to laboratory analysis of grab samples. During year four, the storm event monitoring stations were relocated to in-stream locations to enhance the ambient monitoring program. Beginning in year four and throughout year five, quarterly grab samples were taken at the monitoring station locations and delivered to the KUB laboratory for analysis. The samples were analyzed for all of the routine parameters listed in the seasonal monitoring program requirements. By collecting the ambient samples from the same locations and analyzing them for the same parameters as the storm event samples, a baseline will be established to compare the wet and dry flows. The ambient sampling results from year five are included in the previous section of this report.

6.4 BIOLOGICAL SAMPLING PROGRAM

During year five, the City continued to rely on IBI study data performed by TVA. Two sites were sampled in the city but one was on July 9, 2001 and will be reported next year. The IBI that did occur within the city during year five was on Third Creek near West High School. The IBI score was 20 (very poor). These results will be included with the biological sampling data compiled during year one and maintained in the Engineering Department.
The City has encouraged TVA to continued selecting sites within the urban environment to help track any improvement or degradation of the urban streams. Although TVA will continue to be the primary source of biological testing data, the City of Knoxville will identify opportunities to expand or supplement the existing TVA biological sampling program in the permit term.

6.2.4 ESTIMATED RUNOFF FROM MAJOR WATERSHEDS WITHIN THE MS4

Watershed	Agricul./ Forest/ Vacant, Public Parks	Vacant (>10)	Rural Res.	Single Family Res.	Private Rec., Public Land	Multi-Family Res., Church	Insti-tutional	Mining, Office/ Service	Manu-facturing/ Whole-sale	Commer., Trans./ Utility/ Commun.	Major Roads/ Hwys/ ROWs	Under Const.	Not Loaded	Total Acres in Watershed	Acres in the City Limits	Est. % Imperv-ious	C Value	Rainfall during Permit year 99/00 (in./yr)	Total Runoff for 99/00 (Mgal/yr)
Baker Cr.	412	2	107	640	90	77	32	1	1	3	269	13	27	1,674	1,674	32	0.41	33.76	625
East Fork	313	0	10	475	302	78	73	31	195	235	584	33	180	2,509	2,509	53	0.57	33.76	1315
First Cr.	724	0	300	3,152	544	501	110	157	127	556	1,412	51	116	7,750	7,750	44	0.50	33.76	3541
Fourth Cr.	965	57	423	2,026	468	406	93	206	201	568	881	61	414	6,769	5,920	41	0.48	33.76	2587
Goose Cr.	639	40	126	669	213	67	8	21	77	131	327	34	29	2,381	1,755	35	0.43	33.76	687
Grassy Cr.	2,230	176	561	610	215	24	0	14	31	95	211	39	95	4,301	433	17	0.29	33.76	113
Holston R.	2,362	69	371	1,222	417	45	5	2	219	33	805	32	50	5,632	2,455	28	0.37	33.76	834
Inman Br.	563	33	214	138	4	12	0	0	0	0	145	0	34	1,143	99	21	0.31	33.76	29
Knob Cr.	1,719	195	481	843	125	84	1	19	1	29	296	4	169	3,966	989	19	0.30	33.76	275
Knob Fork	1,659	26	398	675	182	56	5	93	6	124	257	19	252	3,752	823	22	0.33	33.76	247
Love Cr.	1,735	102	505	1,625	311	212	51	94	178	408	1,038	46	103	6,408	5,090	36	0.44	33.76	2055
Second Cr.	443	0	90	1,281	346	247	29	107	140	542	1,161	35	82	4,503	4,498	53	0.57	33.76	2351
Sinking Cr.	1,614	146	459	1,266	284	90	17	33	31	267	881	12	347	5,447	2,434	33	0.41	33.76	925
Swanpond C	3,892	303	833	604	121	36	4	79	240	232	457	65	285	7,151	499	19	0.30	33.76	139
Ten Mile Cr.	1,879	0	638	3,421	165	895	55	115	58	615	1,500	24	641	10,006	3,921	38	0.45	33.76	1617
Third Cr.	1,757	79	436	3,003	406	512	184	124	225	443	1,252	98	220	8,739	8,417	37	0.45	33.76	3442
TN River	7,197	503	2,269	4,681	2,910	403	187	72	170	238	990	121	1,113	20,854	8,232	22	0.33	33.76	2467
Toll Cr.	535	69	154	222	42	26	1	0	37	4	93	42	4	1,229	767	22	0.32	33.76	227
Turkey Cr.	3,353	235	603	2,693	264	343	121	104	91	442	1,161	68	738	10,216	1,677	29	0.38	33.76	590
Whites Cr.	2,733	154	782	1,298	575	59	31	11	49	126	608	51	578	7,055	1,634	23	0.34	33.76	504
Williams Cr.	358	11	47	561	46	96	125	17	10	61	276	3	30	1,641	1,605	37	0.45	33.76	661
Woods Cr.	1,220	106	281	371	0	26	0	2	140	43	261	1	157	2,608	143	23	0.33	33.76	44
Sink-East	1,226	0		728	9	17	0	17	3	27	0	0	0	2,027	91	12	0.24	33.76	20
Beaver Cr	21,174	0	0	21,230	1,292	845	4	259	283	712	0	160	0	45,959	162	16	0.28	33.76	41
Tuckahoe	4,293	0	0	1,829	18	14	0	8	2	1	0	4	0	6,169	229	8	0.22	33.76	46
Fr.Broad riv	8,954	0	0	2,744	73	40	24	24	497	117	0	166	0	12,639	551	11	0.24	33.76	120
COK Total	73,949	2,306	10,088	58,007	9,422	5,211	1,160	1,610	3,012	6,052	14,865	1,182	5,664	192,528	64,357	25	0.35	33.76	25504

The runoff from the major watersheds within the MS4 area was estimated by a formula in Camp Dresser & Mckee's Watershed Management Module. Q = P x C x A

where, P = total precipitation (inches/year) = 33.76 in./yr. = 2.8133 ft./yr.

C = land use area weighted runoff coefficient = 0.15*Pervious% + 0.95*Impervious%

A = drainage area (acres) = acres in watershed x (4.35E4 ft2/acre) = Ai ft2

Q = total runoff rate = sum of each watershed's Qi.

Total estimated runoff for Year Five = 25,504 Mgal

Approximate area and land use for each watershed was determined through the City's GIS. Total yearly rainfall amount was determined by averaging the amount of rain collected from the City's five monitoring stations located throughout the city (refer to map in appendix). Runoff coefficient (C) was calculated by adding 15 % of the pervious fraction to 95% of the impervious fraction in each watershed. This assumes that the fraction of rainfall producing runoff is 15% and 95% from pervious and impervious surfaces respectively. The summary of the runoff calculations are provided in the table above. Calculations for some of the watersheds were left out due to the insignificant amount of runoff that would be produced.

7.0 ASSESSMENT OF CONTROLS: ESTIMATED POLLUTANT LOADING REDUCTIONS FROM THE MS4

During the first five years of the NPDES permit, the City of Knoxville has developed and implemented all of the programs scheduled. The Ongoing Monitoring Program was started in January of 1997 and resulted in the collection of 54 months of storm event data through year five. The dry weather-screening program was implemented in year one and has continued throughout the permit term.

Any quantitative estimates of pollutant loading reductions or groundwater impacts from the MS4 may still be premature or impossible to make at this point in the program. However, as described in the dry weather-screening program (ILL-2), noticeable reductions in contaminated outfalls have been observed in the first five years.

Although no testing data is available to substantiate all the illicit discharges and illegal dumping problems resolved, the qualitative effect on water quality within the MS4 and waters-of-the State is irrefutable. Several industries have removed illicit discharges, sections of leaking or broken sanitary sewers have been repaired and/or replaced, the last known sections of the combined sewers have been separated, unknown combined sewer systems have been located and planned for repair, creek restoration and cleanup activities have begun, and many educational and volunteer programs have been sponsored, conducted, and/or coordinated to reduce dumping.

Recent structural controls include the two Stormceptor oil/water separators installed at the KAT facility on First Creek, trash skimmers near the mouth of First Creek, and two catch basin inserts at the Solid Waste Transfer Station and outside Neyland Stadium. All new development of over ½ acre since 1997 has been required to install some structural controls for water quality control. These water quality facilities must be maintained and/or replaced forever.

All of the programs implemented to improve water quality in the creeks and river throughout the city should provide some quantitative evidence of improvement in future years. This data will be reported, as it becomes apparent. The appendix of this report contains the updated estimate for seasonal pollutant loading and event mean concentrations for each of the major watersheds throughout the city.

8.0 SUMMARY OF MODIFICATIONS TO THE SWMP

Many modifications of the SWMP are planned for year one of the new permit cycle. The updated summary tables of tasks for each of the new permit programs is included in the appendix. These tables reflect the modifications proposed to accommodate the TMDL requirements after the reapplication was submitted last year. The stormwater monitoring parameters, listed in the monitoring table, reflect the latest proposal for the next five years. Future modifications to the new SWMP will be made in accordance with 40 CFR 122.62, 122.63, 124.5 and with Part VIII of the NPDES Permit or as negotiated when the new permit is issued.

During the first year of the new permit, the City plans to relocate one of the five monitoring stations. Four of the five monitoring stations are currently located in major streams throughout the city. Since the remaining station is located in a dry stormwater channel, ambient sampling data can not be collected for direct comparison to the storm event data. In an effort to

improve the Ambient Sampling program and to provide additional data for the TMDL program, the station will likely be relocated to Goose Creek or Third Creek during year one. The new location will be coordinated with the TDEC Knoxville Field Office after some initial site surveys are completed. Maps of the current monitoring sites are included in the appendix of this report.

9.0 FISCAL ANALYSIS

The Fiscal Analysis for the fifth annual report will list the fifth permit year budget sources and amounts along with estimates for year one of the new permit. Sources of funds are listed for each major program. Due to complexity, all of the support activities such as purchasing, payroll, legal support, information systems, fleet management, and human resources are not reflected in the table. Actual funding sources for future years are subject to change in the new permit cycle due to the possibility of implementing a stormwater utility fee.

Program Description	**Fund Source**	**Actual FY 00/01**	**Est. FY 01/02**
Solid Waste Recycling (includes: composting, education, staff, etc.)	General Fund	$ 1,194,000	$ 1,253,000
Household Hazardous Waste Facility & Operation	General & Grant Funds	$ 117,000	$ 120,000
Stormwater Management Operating expenses	501 Fund	$ 656,880	$ 701,390
Service Department Operating/Maint. Maintenance (including: brush, leaf, & litter pickup; street cleaning; curb & gutter repair; catch basin cleaning and repair; ditching; storm drain repair, installation, & cleaning; seed/ sod in R.O.W.; grate replacement; water pumping; tree trimming, removal, and planting.	General Fund	$ 2,854,007	$ 2,997,000
Sequoyah Hills Combined Sewer	Bond Funds	$ 668,021	$ 0
First Creek Flood Improvement Project	Bond Funds	$ 2,871,688	$ 400,000
Other Capital Improvements	Bond Funds	$ 1,326,814	$ 400,000
Total Estimated Stormwater Management Program Costs		**$ 9,688,410**	**$ 5,871,390**

APPENDIX A

Estimated Annual Pollutant Loading and Event Mean Concentrations

Watershed Management Model (WMM) Analysis

APPENDIX A

Estimated Seasonal Pollutant Loadings and Event Mean Concentrations (EMC) Watershed Management Model (WMM) Analysis

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A.1 PURPOSE

This purpose of this appendix is to address the stated requirements mentioned within the 1996 NPDES Permit issued to the City of Knoxville, Tennessee (No. TNS068055). The overall requirements that are addressed in this appendix may be briefly summarized as:

- Estimate the seasonal event mean concentration (EMC) values for the routine parameters normally tested at wet weather monitoring stations. Provide some measure of analysis for seasonal variations. Determine EMC values for each of the major watersheds in the City of Knoxville.
- Estimate the seasonal pollutant loadings for the routine parameters normally tested at wet weather monitoring stations. Provide pollutant loadings for each of the major watersheds in the City of Knoxville. The watershed drainage areas and land uses must be included in the analysis.

The routine parameters are listed in Table V(1) of the 1996 NPDES permit (reproduced below). The parameter "Total phenols" was dropped from the routine laboratory analysis in June 1999, since it had not been detected in any of the routine sampled storms. The parameter "pH" will be included in some analyses, but it does not have a concentration (such as mg/l) or a pollutant loading component (seasonal or annual).

The following paragraphs (in italics) are taken from the 1996 NPDES Permit (No. TNS068055):

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Part V (Monitoring):

2. a. Parameters to be sampled at a minimum are shown below:

TABLE V(1)	
PARAMETERS FOR ROUTINE WET WEATHER MONITORING	
pH	Total ammonia plus organic nitrogen (also called total Kjeldahl nitrogen - TKN)
Biochemical oxygen demand (BOD_5)	Total nitrogen (TN)
Chemical oxygen demand (COD)	Total recoverable lead (Pb)
Total suspended solids (TSS)	Total recoverable zinc (Zn)
Total dissolved solids (TDS)	Dissolved phosphorus (DP)
Nitrate plus nitrite nitrogen (N+NN)	Total phosphorus (TP)
Total ammonia nitrogen (NH3)	Total phenols
SPECIAL ANALYSES	
Fecal coliform (1 storm/year)	Fecal streptococcus (1 storm/year)

3. Estimates of Seasonal Loadings and Event Mean Concentrations

a. The permittee shall provide estimates of the seasonal pollutant load and of the event mean concentration of representative storms for the parameters listed in Table V(1), excluding pH, for each of the 17 major watersheds within the MS4. The permittee shall document the method used to prepare these estimates.

c. The seasonal pollutant load and event mean concentration for each of the 17 major watersheds within the MS4 may be estimated from the representative monitoring locations, from regional NURP or State data, or from pooling results from other Tennessee MS4 monitoring activities and shall take into consideration land uses and drainage areas for the watersheds. The conclusions of the USGS sampling and pollutant loading report shall be used. Reference U.S. Geological Survey (USGS) Open-File Report 94-68 titled "Rainfall, Streamflow, and Water-Quality Data for Five Small Watersheds, Nashville, Tennessee, 1990-92" and USGS Water-Resources Investigations Report 95-4140 (in press).

d. The estimates of seasonal loadings and event mean concentrations shall be included in the Annual Report for the fifth year of the permit.

e. The flow basis of the seasonal loadings shall be reported along with the estimates. In addition, an estimate for total runoff from each of the 17 major watersheds within the City of Knoxville area for the year shall be reported in each Annual Report.

Part VI (Reporting Requirements):

(A)(1)(e)(i)(2) For the Annual Report for year five of the permit, estimates of seasonal pollutant loadings and event mean concentrations (EMC) for each major watershed required by Item V(A)(3) of the permit; the basis for estimates shall be clearly given.

(A)(1)(e)(i)(3) Based on total rainfall for the year, imperviousness of different land uses, etc., an estimate of the total volume of urban runoff discharged in the City of Knoxville for the year.

(A)(1)(j) The following information shall be included as Appendices with the Annual Report for the fifth year of the permit:

i. Analytical data collected from the monitoring program;

==========

A.2 SUMMARY OF NURP SAMPLING DATA (1983)

A primary source of objective stormwater sampling data is the Nationwide Urban Runoff Program (NURP), conducted at 28 metropolitan areas across the United States from 1978 through 1983. This resulted in a comprehensive study published by the U.S. Environmental Protection Agency (EPA) that identifies various types of pollutants and provides some statistics. The City of Knoxville was included as part of the NURP study, and is represented by two sites from the First Creek watershed and two sites from the Second Creek watershed. The four Knoxville sites are described in Table A-1 in order to provide some perspective. Some of the mean EMC stormwater values are tabulated in Table A-2 for the overall NURP program and the four Knoxville sites, in order to allow comparison with other background data.

TABLE A-1
Description of Knoxville NURP Sites

ID	Land Use	Population Density	Storms	Impervious	Area (sq.mi.)	Watershed
CBD	100% commercial	0 persons/acre	15	99%	0.04	1st Creek
SC	Mixed use (Strip)	3 persons/acre	13	43%	0.29	2nd Creek
R1	91% residential	11 persons/acre	11	33%	0.09	1st Creek
R2	96% residential	4 persons/acre	11	13%	0.14	2nd Creek

A.3 SUMMARY OF USGS SAMPLING DATA (1990-1992)

U.S. Geological Survey (USGS) investigated stormwater quality for Tennessee cities that were preparing NPDES permit applications in the early 1990s. This appendix will summarize values for Knoxville and Nashville. Each city investigated three storms each from five representative locations (for a total of 15 storms per city). The USGS sampling data for both cities contains a full suite of pollutant testing for volatile organic compounds, acidic and basic compounds, pesticides, PCBs, trace metals, fecal organisms, conventional pollutants, and physical properties of the stormwater runoff.

The report entitled "Stormwater Data for Knoxville, Tennessee, 1991-92" by Outlaw and Aycock (USGS Open-File Data Report 93-xxx), initially presented within the NPDES Part 2 Permit Application, is summarized in Table A-3 for the 13 pollutants to be analyzed.

The report entitled "Rainfall, Streamflow, and Water-Quality Data for Five Small Watersheds, Nashville, Tennessee, 1990-92" (USGS Open-File Data Report 94-68) is summarized in Table A-4 for the 13 pollutants to be analyzed.

For each city, the arithmetic average is computed for each watershed and for the total data set. The standard deviation is only computed for the total data set. Based on the limited USGS data, Knoxville has lower values for total sediment and for phosphorus (which might be expected due to hard clay soils and less construction growth than Nashville). Knoxville has higher values for oxygen demand and nitrogen.

TABLE A-2
Summary of NURP EMC Sampling Data and Other Values

Description of data source	pH	BOD	COD	TSS	TDS	N+NN	NH3	TKN	TN	Pb	Zn	DP	TP
	---	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Nationwide Urban Runoff Program (EPA, 1983)													
Median EMC values by land use, NURP:													
Commercial	----	9.3	57	69	----	0.57	----	1.18	----	0.104	0.226	0.080	0.201
Mixed Use	----	7.8	65	67	----	0.56	----	1.29	----	0.114	0.154	0.056	0.263
Open / Nonurban	----	----	40	70	----	0.54	----	0.97	----	0.030	0.195	0.026	0.121
Residential	----	10.0	73	101	----	0.74	----	1.90	----	0.144	0.135	0.143	0.383
Coefficient of variation:													
Commercial	----	0.31	0.39	0.85	----	0.91	----	0.43	----	0.68	1.10	0.71	0.67
Mixed Use	----	0.52	0.58	1.10	----	0.67	----	0.50	----	1.40	0.78	0.75	0.75
Open / Nonurban	----	----	0.78	2.90	----	0.91	----	1.00	----	1.50	0.66	2.10	1.70
Residential	----	0.41	0.55	0.96	----	0.83	----	0.73	----	0.75	0.84	0.46	0.69
Knoxville sites, NURP:													
CBD Commercial (central business district)	----	13	73	123	84	0.66	----	0.64	----	0.16	0.32	0.05	0.21
SC Commercial (strip development)	----	15	60	71	63	0.59	----	0.62	----	0.24	0.15	0.20	0.35
R2 Residential, low density	----	8	45	122	59	0.40	----	0.50	----	0.13	0.09	0.13	0.24
R1 Residential, medium density	----	----	121	601	103	0.58	----	1.13	----	0.44	0.41	0.14	0.70
Pollutants in natural rainfall:													
Knozville (1978,Betson) via Wanielista	5.1	----	65	16	----	0.47	----	2.5	----	----	----	----	0.36
Tested rainfall data, NURP, 1983	----	3.3	17	7	----	0.60	----	----	----	0.00	0.11	0.01	0.03
Various EMC values:													
Average, NURP study (1983) via Maine	----	11.9	91	----	----	----	----	2.35	3.31	0.180	0.176	0.16	0.46
General urban median EMC (1983), NURP	----	9	65	100	----	0.68	----	1.50	----	0.14	0.16	0.12	0.33
General coefficient of variation (1983), NURP		0.5 - 1	0.5 - 1	1 to 2	----	0.5 - 1	----	0.5 - 1	----	0.5 - 1	0.5 - 1	0.5 - 1	0.5 - 1
Highway runoff data (1990) via Wanielista	----	24	14.7	1147	261	1.14	----	2.99	----	0.96	0.41	----	0.79
USGS Reports for Knoxville and Nashville (1993, 1994) ……. Taken from Tables A-3 and A-4													
Knoxville, 1991-1992, 15 storms	7.73	68.6	144.7	119.3	96.0	0.83	0.30	1.51	----	0.024	0.161	0.333	0.561
Nashville, 1990-1992, 15 storms	7.71	40.1	126.3	156.9	168.3	0.72	----	1.15	----	0.025	0.148	0.284	1.159
Knoxville + Nashville, 30 storms	7.72	54.3	135.5	133.4	132.1	0.78	0.30	1.33	----	0.024	0.154	0.31	0.86

TABLE A-3
Summary of USGS Report (1993) for 15 Storm Events in Knoxville

Knoxville USGS Report: 1991-1992				pH	BOD	COD	TSS	TDS	N+NN	NH3	TKN	TN	Pb	Zn	DP	TP
Sta.	**Date**	**Year**	**Watershed**	---	**mg/l**	**mg/l**	**mg/l**	**Mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**
FC	April 19	1991	Ftn City - 1st	----	8	77	100	38	0.32	0.19	1.2		0.054	0.110	0.170	0.320
FC	March 06	1992	Ftn City - 1st	8.7	36	92	220	59	0.32	0.11	1.1		0.064	0.130	0.100	0.300
FC	April 15	1992	Ftn City - 1st	7.7	27	130	186	85	1.50	0.40	1.7		0.040	0.090	0.240	0.330
TM	August 14	1991	Ten Mile Cr.	7.7	8	32	1	89	0.99	0.12	0.7		----	0.020	0.050	0.090
TM	July 31	1992	Ten Mile Cr.	7.7	26	84	23	117	1.40	0.17	1.8		0.005	0.050	0.090	0.140
TM	Sept 18	1992	Ten Mile Cr.	8.0	24	37	21	38	0.36	0.05	0.5		0.005	0.050	0.070	0.140
TC	March 12	1992	Tank Farms - 3rd	7.5	72	220	87	129	0.61	0.41	2.2		0.015	0.150	0.910	1.500
TC	April 27	1992	Tank Farms - 3rd	7.9	10	98	143	100	0.46	0.21	1.3		0.023	0.200	0.560	1.000
TC	Feb. 13	1992	Tank Farms - 3rd	8.4	270	250	200	225	1.10	0.67	3.0		0.029	0.210	1.600	2.500
FM	March 27	1991	Acker Place - 4th	8.2	72	89	285	56	0.40	0.15	1.1		0.025	0.350	0.040	0.380
FM	Nov. 20	1991	Acker Place - 4th	7.4	21	100	101	135	0.92	0.37	1.4		0.018	0.240	0.380	0.530
FM	August 20	1992	Acker Place - 4th	----	52	71	281	54	0.50	0.15	0.3		0.014	0.150	0.040	0.100
FW	April 08	1991	Wellington - 4th	7.0	20	130	43	48	0.36	0.25	2.1		0.017	0.170	0.110	0.210
FW	Nov. 01	1991	Wellington - 4th	6.7	370	650	75	157	1.60	0.64	2.7		0.014	0.340	0.520	0.720
FW	March 18	1992	Wellington - 4th	7.6	13	110	23	110	1.60	0.60	1.6		0.012	0.150	0.120	0.160
Area	**Sta.**	**Watershed**														
0.23	FC	Low Density Resid		8.20	23.7	99.7	168.7	60.7	0.71	0.23	1.33		0.053	0.110	0.170	0.317
0.27	TM	High Density Resid		7.80	19.3	51.0	15.0	81.3	0.92	0.11	1.00		0.005	0.040	0.070	0.123
0.55	TC	Heavy Industrial		7.93	117.3	189.3	143.3	151.3	0.72	0.43	2.17		0.022	0.187	1.023	1.667
0.91	FM	Light Industrial		7.80	48.3	86.7	222.3	81.7	0.61	0.22	0.93		0.019	0.247	0.153	0.337
0.58	FW	Commercial		7.10	134.3	296.7	47.0	105.0	1.19	0.50	2.13		0.014	0.220	0.250	0.363
0.508	**AVERAGE :**			**7.73**	**68.6**	**144.7**	**119.3**	**96.0**	**0.83**	**0.30**	**1.51**		**0.024**	**0.161**	**0.333**	**0.561**
0.275	**STD DEV - Sample :**			**0.54**	**105.8**	**151.6**	**95.2**	**51.8**	**0.50**	**0.20**	**0.77**		**0.018**	**0.097**	**0.430**	**0.663**
0.23	Lowest value :			6.7	8	32	1	38	0.32	0.05	0.3		0.005	0.020	0.040	0.090
----	Second highest :			8.4	270	250	281	157	1.60	0.64	2.7		0.054	0.340	0.910	1.500
0.91	Highest value :			8.7	370	650	285	225	1.60	0.67	3.0		0.064	0.350	1.600	2.500

TABLE A-4
Summary of USGS Report (1994) for 15 Storm Events in Nashville

Nashville USGS Report: 1990-1992				pH	BOD	COD	TSS	TDS	N+NN	NH3	TKN	TN	Pb	Zn	DP	TP
Sta.	**Date**	**Year**	**Watershed**	---	**mg/l**	**mg/l**	**mg/l**	**Mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**
SP	June 18	1990	Spring Cr.	8.6	13	90	----	163	0.82		0.6		0.023	0.158	0.23	0.47
SP	March 09	1992	Spring Cr.	7.5	20	76	96	67	0.43		1.3		0.032	0.170	0.15	0.48
SP	Sept. 02	1992	Spring Cr.	7.5	9	57	47	110	0.56		0.9		0.015	0.130	0.17	0.20
BR	Feb. 02	1990	Browns Cr. trib	7.4	28	228	----	178	1.00		1.8		0.065	0.326	0.14	0.20
BR	Feb. 15	1990	Browns Cr. trib	7.2	22	201	----	141	0.50		0.7		0.072	0.378	0.36	4.70
BR	Nov. 05	1990	Browns Cr. trib	----	38	162	----	139	0.70		2.4		0.043	0.301	0.46	1.90
ML	Jan. 17	1990	Mill Cr. trib	8.0	10	89	----	189	1.10		1.8		0.034	0.188	0.20	1.40
ML	Dec. 09	1991	Mill Cr. trib	7.7	5	51	109	137	1.00		0.5		0.027	0.109	0.20	0.57
ML	May 19	1992	Mill Cr. trib	7.6	26	130	82	181	1.30		1.8		0.001	0.130	0.32	1.20
WB	June 03	1992	W.Fk Browns Cr.	8.1	108	240	74	199	0.70		0.9		0.004	0.010	0.27	0.76
WB	Sept. 26	1992	W.Fk Browns Cr.	7.5	14	57	116	165	0.46		1.0		0.005	0.020	0.68	1.40
WB	Nov. 12	1992	W.Fk Browns Cr.	7.5	18	61	81	217	0.43		0.7		0.002	0.020	0.51	0.93
MC	June 18	1990	McCrory Cr.	8.4	17	108	----	198	0.50		0.9		0.043	0.139	0.27	0.77
MC	Dec. 13	1991	McCrory Cr.	7.9	250	260	215	269	0.71		0.7		0.008	0.040	0.15	1.20
MC	June 18	1992	McCrory Cr.	7.1	23	84	592	171	0.60		1.2		0.001	0.100	0.15	1.20
Area	**Sta.**	**Watershed**														
1.02	SP	Commercial / Resid		7.87	14.0	74.3	71.5	113.3	0.60		0.93		0.023	0.153	0.183	0.383
0.48	BR	Industr / Commercial		7.30	29.3	197.0	----	152.7	0.73		1.63		0.060	0.335	0.320	2.267
1.17	ML	Medium Density Resid		7.77	13.7	90.0	95.5	169.0	1.13		1.37		0.021	0.142	0.240	1.057
1.51	WB	Low Density Resid		7.70	46.7	119.3	90.3	193.7	0.53		0.87		0.004	0.017	0.487	1.030
7.31	MC	Undev / Industr / Comm		7.80	96.7	150.7	403.5	212.7	0.60		0.93		0.017	0.093	0.190	1.057
2.30	**AVERAGE :**			**7.71**	**40.1**	**126.3**	**156.9**	**168.3**	**0.72**		**1.15**		**0.025**	**0.148**	**0.284**	**1.159**
2.83	**STD DEV - Sample :**			**0.43**	**63.0**	**73.2**	**169.8**	**47.3**	**0.27**		**0.56**		**0.023**	**0.113**	**0.158**	**1.092**
0.48	Lowest value :			7.1	5	51	47	67	0.43		0.5		0.001	0.010	0.14	0.20
----	Second highest :			8.4	108	240	215	217	1.10		1.8		0.065	0.326	0.51	1.90
7.31	Highest value :			8.6	250	260	592	269	1.30		2.4		0.072	0.378	0.68	4.70

A.4 REVIEW OF EMC FORMULAS

Event mean concentration (EMC) is defined as the total pollutant mass discharge divided by the total runoff volume for a given storm event. It is computed by selective laboratory analysis of many samples taken during the storm event. The proportion of each sample that makes up the composite laboratory sample can not be determined until after the storm event is over. Based on estimated flow volumes during the storm (from a predetermined flow-discharge curve), the composite sample is mixed and then tested.

The distribution of EMC values is based on a normal probability distribution of the natural logarithms (the log-normal distribution does not permit negative values). Since the mean value can be highly influenced by an extremely high value, the median value is typically used as the measure of central tendency. The following equations are used on EMC values from the individual storm events. After taking the natural logarithms (X_i) for each of "N" observations, the following statistical transformations are performed.

Mean	$M = \Sigma (X_i)/N$	(mean of the natural logarithms)
Standard deviation	$S = [\Sigma(Xi - M)^2 / (N-1)]^{0.5}$	(sample std dev : N < 50 typically)
Coefficient of variation	$C = S / M$	
Median	$m = M / (1+C^2)^{0.5}$	(median computed from log-mean)
Expected value	$X_{EXP} = \exp (M+ZS)$	

where:
- M = natural logarithm of mean value of the EMC observations
- Xi = natural logarithm of an individual EMC observation
- N = number of EMC observations
- S = standard deviation of the natural logarithms of the EMC observations
- C = coefficient of variation of the natural logarithms of the EMC observations
- m = median value of the natural logarithms of the EMC observations
- Z = standard normal probability deviate to compute expected values
- X_{EXP} = expected actual value (not a logarithm) based on normal probability curve

The following values for Z (standard normal probability deviate) are typically used:

Values for 25% and 75% limits:	± 0.674 standard deviations
Values for 10% and 90% limits:	± 1.282 standard deviations
Values for 5 % and 95% limits:	± 1.645 standard deviations

The total pollutant loading for a given pollutant over a single type of land use can be estimated using the following equation:

Pollutant loading $L = 0.22661 * EMC * (0.15 + 0.80 I_F) * P * A$

where: L = pollution loading for a specific pollutant on a single land use, pounds

EMC = event mean concentration for a specific pollutant, mg/l

I_F = fraction of impervious area

P = Precipitation (rainfall), inches

A = Area of watershed, acres

0.22661 = conversion factor from "*mg-inch-acre per liter*" into "*pounds*"

Pervious areas are considered to have a runoff coefficient of 0.15, and impervious areas have a runoff coefficient of 0.95 under all conditions. The term $(0.15 + 0.80\ I_F) * P * A$ represents the stormwater runoff and will be further discussed in Section A.7.

Total pollutant loading for a specific pollutant is the sum of the pollutant loadings from each type of land use in the watershed. EMC can be either the average value (which is interpreted as being the 50% exceedance level) or a different probability value computed from a standard log-normal probability curve.

According to Debo/Reese (1995):

> *EMC's also did not vary with storm volume. That is, over experienced storm depths or duration the mean concentration of the pollutant over the storm event did not vary significantly with runoff volume. What this implies, and what has been shown by various authors, is that the total volume of pollution (as opposed to the concentration) will vary directly with the volume of runoff. And since the volume of runoff varies directly with the amount of impervious area, the total pollution volume varies directly with impervious area.*

A.5 OVERVIEW OF NPDES STORMWATER MONITORING DATA (1997-2001)

The NPDES permit issued in 1996 required the City of Knoxville to establish a wet weather monitoring program for stormwater pollutants. The City of Knoxville established five sampling stations by January 1997 at locations selected as representative homogeneous watersheds. The five sampling stations contain standardized installed at a location with favorable channel characteristics for estimating flows and water depths. Standardized equipment includes: ISCO Sampler Model 3700, ISCO 3230 Bubbler Flow Meter, ISCO Tipping Bucket Rain Gage, nearby source of AC power, telephone modem and telephone line, etc.

Results from the sampling stations have demonstrated that there is less variability in the concentration of stormwater pollutants per land use than previously suspected. A couple sampling stations have been periodically relocated in the attempt to verify these observations, with the permission of TDEC - Water Pollution Control. A partial explanation is that the Knoxville stream watersheds have multiple land uses at locations which are suitable for sampling. Over the last year, the focus has shifted to locating the monitoring stations to measure an entire watershed (such as Love Creek and Second Creek), rather than attempting to identify differences in residential and commercial land uses.

There are a total of 288 sampled storms, taken from 9 locations on a total of 132 different days. Table A-5 gives the breakdown of the sampled storms with respect to location and the season of the year. The seasons are defined in this appendix as:

Winter	Quarter 01	January 1	to	March 31
Spring	Quarter 02	April 1	to	June 30
Summer	Quarter 03	July 1	to	September 30
Fall	Quarter 04	October 1	to	December 31

A total of 13 stormwater pollutants have been routinely tested for each sample from the monitoring stations over the entire period of 4 1/2 years. The parameter "Total phenols" was dropped from the routine laboratory analysis in June 1999, since it is generally below detection limits. The parameter "Total ammonia nitrogen" (also labeled as NH3) is also generally below detection limits.

TABLE A-5
Number of Sampled Storms During the 5-Year NPDES Time Period

Location of sampling stations (with abbreviation)	1997				1998				1999				2000				2001		TOTAL
	Quarter 01	Quarter 02	Quarter 03	Quarter 04	Quarter 01	Quarter 02	Quarter 03	Quarter 04	Quarter 01	Quarter 02	Quarter 03	Quarter 04	Quarter 01	Quarter 02	Quarter 03	Quarter 04	Quarter 01	Quarter 02	
Acker Place (AP)	3	3	3	4	5	4	3	6	8	3	2	1	1	9	2	0	0	3	60
First Creek (FC)	-	-	3	0	5	6	1	2	2	2	4	2	5	4	2	4	2	2	46
Fountain City (FN)	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
Gallaher View (GV)	4	3	3	0	5	7	0	3	6	3	2	-	-	-	-	-	-	-	36
Loves Creek (LC)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	3	6	0	9
Second Creek (SC)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	5	4	11
Third Creek (TC)	4	3	3	4	4	4	3	4	7	2	2	3	6	2	-	-	-	-	51
Walden Drive (WD)	-	-	-	-	-	-	-	-	-	-	-	3	5	3	3	1	5	1	21
Wellington Drive (WE)	3	3	3	3	4	3	1	8	6	2	3	2	5	2	-	-	-	-	48
TOTAL	17	15	15	11	23	24	8	23	29	12	13	11	22	20	8	9	18	10	288
Different # of storm dates for each quarter:	7	8	10	5	9	11	5	9	8	6	6	4	9	12	5	5	6	7	132
Average # stations per storm date:	2.4	1.9	1.5	2.2	2.6	2.2	1.6	2.6	3.6	2.0	2.2	2.8	2.4	1.7	1.6	1.8	3.0	1.4	2.2

The distribution of the 288 sampled storm events is further shown in Table A-6. The average number of sampled storm events per quarter is 16, and the average number of sampled storm events per year is 65. The average number of storm events which lead to a sampled storm event, however, is computed from Table A-5 as being 29.3 (132 different storm dates divided by 4.5 years).

The three driest months, according to 30-year normals given for UT-Knoxville and for the Knoxville airport (1961-1990), are typically the months of October, September and August (Quarters 03 and 04). Therefore the distribution in Table A-6 seems reasonable.

TABLE A-6
Distribution of Sampled Storm Events

Years	Quarter	# Storms	# storms / quarter	Year	# storms / year
(5)	01 - Winter	109	21.8	1997	58
(5)	02 - Spring	81	16.2	1998	78
(4)	03 - Summer	44	11.0	1999	65
(4)	04 - Fall	54	13.5	2000	59
TOTAL		288	**288 / 18 = 16.0**	-----	**260 / 4 = 65.0**

The individual storm data for the 288 sampled storms in Knoxville is given within Table A-7 on pages A-13 through A-18. This information has been compiled by the City of Knoxville on Excel spreadsheets for each NPDES Annual Report. In addition, the City of Knoxville also keeps the original laboratory analysis reports and other data as part of the permanent records.

The values for NH3 (which is the amount of total ammonia expressed as mg/l of nitrogen) are generally below the 0.2 mg/l threshold limits of detection. Further analysis of the EMC value for NH3 (total ammonia nitrogen) will not be productive. It is proposed that this parameter can be eliminated from routine laboratory analysis on wet weather monitoring stations.

Any values which were not measured or recorded are shown as "----". There are 7 unrecorded values for rainfall, 7 for pH, 12 for BOD, and 5 for COD.

Statistical analysis will be performed in Section A.6 to determine if there are seasonal variations for pollutant EMC values. In addition, the coefficient of variation (CV) will be computed to see trends and variations. However, the value of CV is generally not needed to estimate the seasonal and annual pollutant loads.

TABLE A-7
EMC Values For Individual Storm Events

Acker Place			Rain	pH	BOD	COD	TSS	TDS	N+NN	NH3	TKN	TN	Pb	Zn	DP	TP
Storm event data			inches	----	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Qtr.	Year	Sample														
1	1997	AP020497	0.36	7.7	6.0	15.0	437	110	0.93	<.2	0.28	0.28	0.004	0.179	0.02	0.47
1	1997	AP021497	0.16	8.3	10.0	29.0	122	96	0.81	<.2	0.42	0.42	0	0	0.08	0.27
1	1997	AP030697	0.61	7.6	5.0	11.0	484	188	0.56	<.2	0	0	0.018	0.151	0	0.25
2	1997	AP040797	0.45	7.8	5.0	58.0	314	0	0.15	<.2	0	2	0	0.134	0.01	0.13
2	1997	AP042797	0.47	7.8	4.0	33.0	42	20	0.70	<.2	1.19	2.7	0.007	0.123	0.28	0.53
2	1997	AP050197	0.12	8.1	6.0	42.0	148	100	0.70	<.2	0.42	16.7	0.007	0.141	0.17	0.53
3	1997	AP081397	0.19	8.6	10.0	68.0	208	384	1.40	<.2	1.68	1.8	0.007	0.199	0.27	0.53
3	1997	AP081897	0.76	8.8	5.0	26.0	948	128	0.40	<.2	0.42	0.5	0.021	0.268	0.08	0.22
3	1997	AP092397	----	7.8	9.0	45.0	137	190	0.90	<.2	0.21	3.7	0.001	0.077	0.59	0.59
4	1997	AP110697	0.06	7.9	10.0	54.0	65	56	1.00	<.2	0	10.7	0.006	0.17	0.06	0.14
4	1997	AP111397	0.52	8.2	----	52.0	69	40	0.40	<.2	0	0.6	0.008	0.175	0.01	0.11
4	1997	AP112197	0.22	8.4	----	43.0	97	30	0.60	<.2	0.21	0.8	0.016	0.238	0.01	0.06
4	1997	AP120397	0.31	8.1	7.0	39.0	36	164	0.70	<.2	0.21	1.7	0.014	0.278	0.02	0.11
1	1998	AP010798	0.27	8.2	8.0	52.0	110	248	0.20	<.2	0	0.5	0.017	0.3	0.04	0.23
1	1998	AP012298	0.20	8.7	6.0	35.0	96	100	0.20	<.2	0	0.9	0.012	0.224	0.05	0.16
1	1998	AP011598	0.21	8.2	8.0	50.0	82	80	0.40	<.2	0.42	1.8	0.012	0.208	0.13	0.29
1	1998	AP032398	0.05	8.3	7.0	44.0	78	138	0.50	<.2	0	3.4	0.005	0.253	0.12	0.47
1	1998	AP033198	0.75	8.4	6.0	41.0	356	0	0.80	<.2	0.35	2	<.001	0.211	0.08	0.7
2	1998	AP041498	0.32	8.2	6.0	20.0	244	312	0.70	<.2	0.14	2.1	<.001	0.154	0.13	0.2
2	1998	AP041698	3.03	8.6	5.0	63.0	1238	0	0.40	<.2	0	1	0.021	0.197	0.13	0.44
2	1998	AP042198	0.36	8.6	8.0	15.0	79	101	0.50	<.2	0	3.1	<.001	0.046	0.19	0.15
2	1998	AP050698	0.26	8.9	6.0	49.0	208	80	0.80	<.2	0.35	2.1	0.003	<.001	0.24	0.81
3	1998	AP072398	----	----	7.0	----	56	131	1.60	<.2	0	1.2	<.001	0.163	0.14	0.52
3	1998	AP081698	0.94	7.9	5.0	5.0	620	17	1.60	<.2	1.4	1.7	0.019	0.131	0.21	0.97
3	1998	AP092198	0.45	7.8	13.0	55.0	88	88	0.80	<.2	0	2.8	0.014	0.220	0.29	0.39
4	1998	AP111198	0.57	7.7	2.0	22.0	60	94	0.60	<.2	0	<.6	0.011	0.115	0.42	0.66
4	1998	AP111498	0.23	7.6	3.0	20.0	50	27	0.50	<2	0	<.6	0.005	0.080	0.20	0.44
4	1998	AP120898	0.41	7.9	4.0	23.0	25	71	0.60	<.2	0	<.6	0.005	0.146	0.05	0.10
4	1998	AP121298	2.24	7.6	1.0	16.0	21	72	0.40	<.2	0	0.8	<.001	0.048	0.05	0.11
4	1998	AP122298	0.24	7.8	5.0	38.0	3	132	0.80	0	1.96	0.6	<.001	0.131	0.05	0.12
4	1998	AP122898	0.12	7.8	5.0	35.0	39	107	1.10	0	0.28	0.8	<.001	0.139	0.02	0.09
1	1999	AP010299	0.72	7.6	5.0	15.0	25	109	0.90	<.2	0	<.6	0.002	0.062	0.03	0.09
1	1999	AP011499	0.49	7.7	5.0	26.0	73	100	0.80	<.2	0.28	<.6	0.019	0.121	0.07	0.22
1	1999	AP011999	1.30	7.0	4.0	21.0	1273	144	0.70	<.2	0.84	<.6	0.008	0.118	0.01	0.34
1	1999	AP012399	1.53	7.9	1.0	15.0	24	147	1.10	<.2	0	<.6	0.002	0.082	0.06	0.08
1	1999	AP021799	0.39	7.9	4.0	27.0	34	127	1.40	<.2	0	<.6	0.003	0.116	0.07	0.19
1	1999	AP022899	----	8.0	3.0	10.0	56	103	0.40	<.2	0	2.7	0.002	0.105	0.02	0.14
1	1999	AP030399	0.92	7.9	3.0	9.0	62	88	0.40	<.2	0	1.1	0.002	0.099	0.10	0.34
1	1999	AP032199	0.48	8.1	3.0	6.0	16	82	1.10	<.2	0	<.6	0.002	0.127	0.10	0.11
2	1999	AP040699	0.11	8.3	13.0	4.7	18	168	0.40	<.2	0.28	0.9	0.002	0.127	0.17	0.28
2	1999	AP042899	0.86	8.8	4.0	8.5	34	73	0.40	<.2	0.28	10.6	<.001	0.072	0.11	0.22
2	1999	AP050599	0.31	8.7	6.0	34.0	35	124	0.40	<.2	0	2.7	0.006	0.122	0.17	0.24
3	1999	AP082399	0.29	8.4	12.0	29.8	265	155	1.00	<.2	0	1.3	0.011	0.315	0.07	0.09
3	1999	AP092199	0.32	8.0	----	40.7	180	149	1.30	0.3	0.56	3.5	0.018	0.258	0.036	0.249
4	1999	AP100999	1.08	8.2	3.0	19.9	29	70	0.40	<.2	0.56	1.4	0.009	0.116	0.071	0.08
1	2000	AP031900	----	8.5	2.0	11.0	78	140	0.30	<.2	2.8	<.6	0.007	0.136	<.01	0.04
2	2000	AP041100	----	8.5	4.0	9.0	42	82	0.20	<.2	1.68	2.5	0.008	0.200	0.05	0.02
2	2000	AP041700	0.09	8.5	12.0	7.0	91	167	0.40	<.2	0	0.6	<.007	0.184	0.06	0.03
2	2000	AP042400	0.89	8.6	4.0	5.0	186	98	0.30	<.2	0	0.8	0.007	0.193	0.06	0.10
2	2000	AP042800	0.31	9.0	3.0	3.0	59	64	0.30	<.2	0	3.3	<.007	0.099	0.04	0.06
2	2000	AP050300	0.14	8.1	10.0	7.0	163	96	0.90	<.2	0	2.7	<.007	0.214	0.02	0.07
2	2000	AP052300	0.16	8.8	14.0	10.0	89	122	0.80	<.2	2.8	1.1	<.007	0.116	0.09	0.12
2	2000	AP061500	0.17	8.5	4.0	10.0	121	158	1.30	<.2	1.12	1.7	0.012	0.269	0.10	0.28
2	2000	AP061700	0.15	8.3	6.0	2.5	4	149	0.30	<.2	1.4	2.1	0.013	0.263	0.05	0.07
2	2000	AP062200	0.72	8.8	3.0	3.3	302	126	0.30	0.3	1.96	2.2	0.017	0.228	0.02	0.30
3	2000	AP073100	0.47	9.7	3.0	3.3	34	152	0.30	0.4	2.52	<.3	<.007	0.097	0.028	0.044
3	2000	AP081000	0.33	8.6	7.0	38.5	522	167	0.30	<.2	4.2	1.5	0.014	0.219	0.037	0.04
2	2001	AP060601	0.31	7.0	4.0	93.5	32	112	0.50	<.2	0	3.8	<.077	0.128	0.02	0.03
2	2001	AP062501	0.41	7.0	2.0	32.8	256	295	0.70	<.2	0	<.6	<.007	0.111	0.1	0.20
2	2001	AP063001	0.19	7.0	2.0	24.0	10	118	0.30	<.2	0	6.2	<.007	0.084	0.08	----

TABLE A-7 (continued)
EMC Values For Individual Storm Events

First Creek Storm event data			Rain	pH	BOD	COD	TSS	TDS	N+NN	NH3	TKN	TN	Pb	Zn	DP	TP
			inches	----	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Qtr.	Year	Sample														
3	1997	FC071597	1.12	8.6	10.0	50.0	390	112	1.0	<.2	0.21	1.5	0.008	0.089	0.13	0.42
3	1997	FC072297	0.97	8.2	6.0	30.0	254	112	0.8	<.2	0.7	0.7	0.032	0.075	0.38	0.48
3	1997	FC081997	0.91	8.5	10.0	31.0	138	100	0.9	<.2	0.49	1	0.004	0.046	0.25	0.37
1	1998	FC010798	1.02	8.1	5.0	40.0	1	256	1.4	<.2	0.21	2.3	<.001	0.580	0.33	0.40
1	1998	FC012798	0.28	----	3.0	16.0	40	94	0.3	<.2	0.42	1.2	0.005	0.050	0.30	0.43
1	1998	FC020298	0.50	8.4	4.0	12.0	9	42	1.1	<.2	0.21	2.4	0.001	0.088	0.56	0.59
1	1998	FC030898	0.92	8.3	2.0	35.0	6	351	1.7	<.2	0	2.4	<.001	0.137	0.24	0.28
1	1998	FC032098	0.99	8.3	7.0	46.0	125	52	0.2	<.2	0.63	1.0	0.005	0.116	0.60	0.95
2	1998	FC040998	0.76	8.1	4.0	24.0	33	134	1.1	<.2	0.84	1.1	0.008	0.125	0.62	1.78
2	1998	FC041698	0.44	8.2	3.0	40.0	65	0	0.6	<.2	0	1.9	0.001	0.025	0.73	1.13
2	1998	FC042198	0.52	8.4	6.0	45.0	34	83	0.7	<.2	0	1.9	0.001	0.076	0.56	0.63
2	1998	FC050698	0.49	8.8	2.0	22.0	8	178	1.1	<.2	0.42	1.4	<.001	<.001	1.26	0.79
2	1998	FC060198	2.34	9.1	7.0	39.0	132	71	1.1	<.2	3.6	2.5	<.001	0.066	1.30	1.27
2	1998	FC060998	1.14	8.7	3.0	90.0	32	16	1.4	<.2	0.8	1.9	<.001	0.157	1.27	1.27
3	1998	FC073198	0.51	----	7.0	0.0	50	113	2.0	<.2	0	1.9	0.005	0.185	0.63	0.81
4	1998	FC120898	2.57	7.6	3.0	30.0	19	53	1.3	<.2	1.96	1.5	0.005	0.060	0.28	0.33
4	1999	FC121298	2.46	7.4	1.1	10.0	21	77	0.8	<.2	0	1.5	0.002	0.068	0.19	0.26
1	1999	FC012399	1.50	7.6	3.0	27.0	17	70	0.8	<.2	0	1.5	0.018	0.073	0.19	0.36
1	1999	FC030399	1.33	7.9	2.0	18.0	17	332	2.6	<.2	0	4.3	0.005	0.072	0.35	0.39
2	1999	FC050699	1.69	8.7	4.0	28.0	35	87	0.7	<.2	0	7.0	<.002	0.098	0.12	0.19
2	1999	FC062999	0.69	7.8	5.0	31.9	35	49	0.6	<.2	0	2.1	0.002	0.189	0.17	0.34
3	1999	FC092199	0.20	8.4	----	23.0	125	122	1.0	<.2	0	2.7	0.015	0.106	0.170	0.241
3	1999	FC092999	----	8.7	8.0	16.0	57	214	0.4	<.2	0.84	0.5	0.018	0.226	0.142	0.060
4	1999	FC100999	0.80	8.2	4.0	13.0	22	44	0.6	<.2	0	1.3	0.010	0.114	0.279	0.257
4	1999	FC110299	0.81	8.3	4.0	5.0	103	174	0.5	<.2	0.84	5.5	0.008	0.102	0.04	0.21
1	2000	FC010300	1.02	7.7	7.0	9.0	210	77	0.5	<.2	0.84	2.4	0.018	0.124	0.060	0.37
1	2000	FC010900	1.06	7.4	2.0	6.0	132	91	0.4	<.2	1.12	1.2	0.010	0.122	0.049	0.133
1	2000	FC011700	0.68	----	2.0	7.0	58	122	0.9	<.2	1.40	3.1	0.001	0.045	0.045	0.131
1	2000	FC012000	0.35	----	3.0	7.0	45	149	0.6	<.2	0	0.6	0.002	0.031	0.049	0.148
1	2000	FC021100	0.88	7.9	7.0	6.0	138	151	0.6	<.2	2.52	5.3	0.016	0.060	0.090	0.16
2	2000	FC050400	0.66	8.1	7.0	5.0	1576	158	0.4	<.2	5.32	1.6	<.007	0.035	0.03	0.51
2	2000	FC051000	----	7.8	5.0	5.0	7	224	1.8	<.2	0	1.2	<.007	0.064	0.22	0.35
2	2000	FC052300	0.19	8.2	5.0	6.0	80	221	1.2	<.2	0	1.2	<.007	0.116	0.06	0.14
2	2000	FC060500	0.45	8.1	6.0	4.0	83	151	0.3	<.2	0.28	<.6	0.024	0.139	0.02	0.26
3	2000	FC081000	0.85	9.0	14.0	17.0	928	172	0.6	<.2	0.56	2.1	0.057	0.213	0.049	0.056
3	2000	FC092000	0.53	9.0	10.0	10.0	128	188	0.6	<.2	0.84	<.3	<mdl	0.028	0.074	0.061
4	2000	FC110800	0.78	7.0	6.0	6.0	134	88	0.7	<.2	3.08	0.3	0.026	0.155	0.08	0.651
4	2000	FC111600	0.48	7.0	5.0	6.0	97	117	0.9	<.2	2.52	0.6	0.027	0.078	0.408	0.962
4	2000	FC121300	0.85	7.0	5.0	2.0	252	107	0.6	<.2	0.84	1.3	<.007	0.050	0.079	0.122
4	2000	FC121600	0.84	6.0	5.0	10.0	516	129	----	<.2	1.12	----	0.047	0.161	----	----
1	2001	FC021301	0.49	7.0	5.0	9.5	274	160	0.3	<.2	1.4	<.6	0.029	0.146	0.023	0.027
1	2001	FC031201	0.51	7.0	8.0	16.5	690	116	0.3	<.2	2.24	0.8	0.054	0.180	0.014	0.34
2	2001	FC050601	0.31	7.0	9.0	96.0	180	178	1.7	<.2	0	0.6	0.007	0.122	0.137	0.129
2	2001	FC060701	0.19	7.0	4.0	2.0	82	158	0.2	<.2	0	4.2	0.013	0.072	0.01	0.07

TABLE A-7 (continued)
EMC Values For Individual Storm Events

Gallaher View			Rain	pH	BOD	COD	TSS	TDS	N+NN	NH3	TKN	TN	Pb	Zn	DP	TP
Storm event data			inches	----	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Qtr.	Year	Sample														
1	1997	GV021097	0.49	7.3	2	2	58	59	1.38	<.2	0.0	0.0	0.006	0.050	0.00	0.05
1	1997	GV022797	0.89	7.2	7	54	804	16	0.32	<.2	0.6	0.6	0.035	0.185	0.02	0.38
1	1997	GV030697	0.93	7.2	5	30	232	248	0.82	<.2	0.5	0.5	0.018	0.104	0.02	0.17
1	1997	GV031997	0.80	7.2	3	32	50	112	0.20	<.2	6.3	4.0	0.005	0.039	<.002	0.15
2	1997	GV040797	0.97	7.6	8	53	572	92	0.20	<.2	1.8	4.8	0.022	0.101	0.01	0.09
2	1997	GV042197	0.46	7.2	7	32	94	116	1.40	<.2	1.1	2.0	0.012	0.084	0.01	0.10
2	1997	GV042797	0.47	7.5	5	32	36	42	0.90	<.2	0.6	2.0	0.005	0.057	0.44	0.65
3	1997	GV072297	1.76	8.4	6	30	97	110	1.30	0.4	0.4	3.2	0.001	0.094	0.07	0.19
3	1997	GV082097	0.48	8.5	11	45	86	74	1.00	<.2	0.7	0.6	0.001	0.041	0.17	0.32
3	1997	GV092497	0.55	7.5	5	50	99	142	0.60	<.2	0.7	2.7	<.001	0.014	0.58	0.59
1	1998	GV012798	0.33	8.5	1	21	140	88	0.20	<.2	0.0	1.3	0.378	0.060	0.32	0.41
1	1998	GV012298	0.86	8.1	3	40	80	100	0.20	<.2	0.3	1.3	0.008	0.060	0.34	0.56
1	1998	GV020298	0.58	7.8	2	41	288	84	0.30	<.2	0.0	1.2	0.007	0.166	0.14	0.36
1	1998	GV030898	0.42	8.3	6	143	164	0	0.50	<.2	0.0	1.4	0.009	0.133	0.09	0.51
1	1998	GV033198	0.95	8.0	15	38	270	0	1.20	<.2	0.0	2.9	0.006	0.126	0.35	2.00
2	1998	GV040398	0.59	8.1	----	----	146	124	0.60	<.2	1.0	3.5	0.004	0.119	0.55	0.87
2	1998	GV040898	0.27	7.9	10	53	212	28	1.00	<.2	1.0	5.4	0.004	0.054	0.32	1.66
2	1998	GV041498	0.36	8.0	3	31	33	0	0.90	<.2	0.8	2.7	<.001	0.033	0.47	0.63
2	1998	GV041698	2.03	8.4	6	27	308	0	0.50	<.2	0.0	3.2	0.080	0.069	1.04	1.57
2	1998	GV042198	0.40	8.3	5	84	88	122	0.90	<.2	0.0	2.8	<.001	0.019	8.68	9.67
2	1998	GV050698	0.25	8.8	4	32	65	80	1.00	<.2	0.7	1.1	<.001	<.001	0.02	0.38
2	1998	GV052698	0.60	8.9	7	45	154	70	0.03	<.2	0	1.2	0.005	<.001	0.09	0.44
4	1998	GV100898	0.59	7.8	9	42	110	210	0.4	<.2	0	1.5	0.004	0.125	0.23	1.53
4	1998	GV120898	2.66	7.8	4	24	142	0	0.8	<.2	0	<.6	0.008	0.097	0.05	0.41
4	1998	GV121298	2.31	7.6	2	4	96	80	0.5	<.2	0	<.6	0.007	0.074	0.08	0.29
1	1999	GV010299	0.73	7.5	3	12	58	94	0.9	<.2	0.28	1	0.004	0.04	0.02	0.16
1	1999	GV011499	0.78	7.7	3	18	262	114	0.8	<.2	0	<.6	0.022	0.058	0.02	0.34
1	1999	GV011999	1.34	6.0	5	95	1575	149	0.8	<.2	0	1.5	0.027	0.113	0.02	0.54
1	1999	GV012399	1.61	7.5	3	16	94	108	0.7	<.2	0	<.6	<.001	0.036	0.05	0.28
1	1999	GV022899	1.19	7.7	2	----	55	111	0.4	<.2	0	3.1	0.008	0.064	0.07	0.36
1	1999	GV030399	1.23	7.7	2	19	18	107	0.4	<.2	0	7.5	0.002	0.044	0.09	0.28
2	1999	GV042899	1.16	9.0	4	8	40	101	0.4	<.2	0	2.3	0.009	0.100	0.07	0.19
2	1999	GV050699	1.99	9.3	5	18.1	139	117	0.8	<.2	0	0.4	0.004	0.111	0.04	0.3
2	1999	GV062599	2.45	8.7	8	30.9	425	58	0.8	<.2	0.56	1.2	0.004	0.066	0.07	0.41
3	1999	GV072099	2.01	8.3	9	52.2	798	121	0.9	<.2	0	2.4	0.007	0.130	0.11	0.27
3	1999	GV082599	1.03	8.2	5	21.4	2405	192	0.9	<.2	1.96	4.5	0.023	0.216	0.07	0.46

TABLE A-7 (continued)
EMC Values For Individual Storm Events

Third Creek Storm event data			Rain	pH	BOD	COD	TSS	TDS	N+NN	NH3	TKN	TN	Pb	Zn	DP	TP
			inches	----	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Qtr.	Year	Sample														
1	1997	TC012897	0.84	8.4	2	0	451	136	0.41	<.2	0.63	1.00	0.019	----	0.020	0.130
1	1997	TC021497	0.15	7.8	9	16	152	72	0.74	<.2	0.00	0.00	0.014	0.167	0.020	0.290
1	1997	TC030697	0.98	7.4	7	31	444	160	0.51	<.2	0.63	0.63	0.020	0.130	0.000	0.190
1	1997	TC031997	0.85	7.5	3	35	59	112	0.12	<.2	0.70	4.00	0.011	0.179	0.002	0.170
2	1997	TC042797	0.43	7.6	5	26	56	20	0.60	<.2	0.00	2.00	0.006	0.128	0.390	0.590
2	1997	TC050197	0.14	8.0	5	42	158	4	0.70	<.2	0.84	2.00	0.011	0.099	0.360	0.760
2	1997	TC061797	0.72	7.4	6	35	302	120	0.40	<.2	1.75	0.90	0.018	0.249	0.660	0.800
3	1997	TC071597	1.12	8.6	8	40	950	120	0.80	<.2	0.42	2.00	0.035	0.263	0.020	0.370
3	1997	TC072297	1.04	8.8	4	25	612	92	0.60	<.2	0.00	0.00	0.007	0.152	0.130	0.200
3	1997	TC092397	0.53	7.8	8	38	54	122	1.00	<.2	0.98	2.50	<.001	0.050	0.580	0.590
4	1997	TC110197	0.32	8.0	5	80	48	118	0.80	<.2	0.00	2.70	<.001	0.057	0.650	0.760
4	1997	TC110697	0.05	8.1	16	68	47	156	1.00	<.2	0.77	1.70	0.013	0.117	0.130	0.190
4	1997	TC111397	0.39	8.2	----	21	65	88	0.30	<.2	0.00	0.90	0.014	0.101	0.230	0.370
4	1997	TC120397	0.26	8.5	8	43	20	112	0.80	<.2	0.00	1.60	0.022	0.205	0.240	0.400
1	1998	TC010798	0.90	8.3	4	32	106	184	0.20	<.2	0.00	0.50	0.016	0.149	0.220	0.540
1	1998	TC011598	0.16	8.3	6	50	45	100	0.30	<.2	0.49	1.30	0.012	0.212	0.130	0.290
1	1998	TC012798	1.18	8.4	8	25	91	98	0.10	<.2	0.28	6.50	0.007	0.099	0.360	0.570
1	1998	TC033198	0.89	8.2	6	43	53	78	1.10	<.2	0.35	1.30	0.001	0.138	0.210	0.450
2	1998	TC041698	3.57	8.5	6	28	538	0	0.40	<.2	0.00	2.00	0.018	0.111	0.030	0.350
2	1998	TC042998	0.32	8.8	1	52	53	103	0.50	<.2	0.00	0.90	<.001	0.036	0.220	0.240
2	1998	TC050698	0.30	8.8	6	50	63	106	0.80	<.2	0.98	0.30	0.002	<.001	<.01	0.040
2	1998	TC060998	1.13	9.2	5	30	246	85	0.70	<.2	0.80	3.00	<.001	0.155	0.430	1.820
3	1998	TC072398	0.26	9.6	11	----	74	129	1.80	<.2	0.00	2.20	0.001	0.128	0.250	0.330
3	1998	TC081698	0.83	7.9	4	5	106	46	4.60	<.2	0.00	1.90	0.009	0.099	0.180	0.360
3	1998	TC092198	0.52	7.9	13	80	136	75	0.90	<.2	0.00	2.10	0.016	0.249	0.390	0.470
4	1998	TC100898	0.81	8.1	5	53	63	65	0.90	<.2	0.00	1.20	<.001	0.112	0.370	0.790
4	1998	TC111198	0.57	7.7	5	30	49	134	0.60	<.2	0.00	1.00	<.001	0.075	0.150	0.480
4	1998	TC120898	0.45	8.0	4	114	36	144	0.60	<.2	0.00	<.6	0.005	0.086	0.070	0.160
4	1998	TC121298	2.14	7.8	1	7	24	72	0.60	<.2	0.00	1.10	0.004	0.096	0.040	0.080
1	1999	TC010299	0.74	7.8	3	5	23	98	1.10	<.2	0.00	1.70	0.002	0.045	0.030	0.080
1	1999	TC011499	0.52	7.9	3	15	94	111	0.70	<.2	0.00	<.6	0.008	0.083	0.040	0.200
1	1999	TC011999	1.14	6.5	1	46	410	132	0.80	<.2	0.00	<.6	0.020	0.119	0.030	0.380
1	1999	TC012399	1.29	7.8	2	18	62	99	0.70	<.2	0.00	1.50	0.002	0.065	0.070	0.180
1	1999	TC021799	0.66	8.0	3	13	28	120	1.40	<.2	0.00	1.60	----	----	0.030	0.160
1	1999	TC022899	0.93	7.7	2	7	22	115	0.50	<.2	0.00	1.60	0.009	0.072	0.080	0.110
1	1999	TC030399	1.06	8.0	2	22	40	84	0.40	<.2	0.00	2.80	0.006	0.071	0.160	0.190
2	1999	TC050599	0.30	8.8	10	23.3	196	141	0.90	<.2	0.00	9.40	0.005	0.128	0.100	0.200
2	1999	TC062599	2.33	8.1	4	60.9	133	77	0.80	<.2	0.56	1.70	0.001	0.070	0.060	0.280
3	1999	TC082399	0.40	8.0	4	44	432	145	1.10	<.2	0.00	2.40	0.000	0.192	0.040	0.170
3	1999	TC092199	0.35	8.1	----	47	116	148	1.20	0.30	0.00	2.00	0.010	0.195	0.133	0.249
4	1999	TC100999	0.78	8.3	3	18	11	77	0.40	<.2	0.84	1.00	0.010	0.072	0.091	0.308
4	1999	TC110299	0.81	8.1	4	6	238	88	0.60	<.2	0.00	1.60	0.010	0.193	0.140	0.270
4	1999	TC120599	0.32	7.8	3	6	48	140	0.80	0.50	1.40	1.30	0.010	0.113	0.060	0.290
1	2000	TC010900	0.93	7.6	2	3	99	67	0.40	<.2	0.00	4.40	0.000	0.121	0.034	0.114
1	2000	TC011700	0.55	----	2	11	34	80	1.00	<.2	0.00	<.6	0.010	0.060	0.042	0.107
1	2000	TC012000	0.32	----	5	8	69	87	0.80	<.2	0.00	<.6	0.010	0.080	0.030	0.270
1	2000	TC021100	0.70	7.6	2	3	123	164	0.40	<.2	0.84	2.60	<.002	0.142	0.070	0.310
1	2000	TC022700	0.42	8.5	2	9	56	59	0.50	<.2	5.04	2.90	0.000	0.109	<.01	0.100
1	2000	TC032700	0.60	8.6	5	3	123	119	0.70	<.2	3.08	<.6	0.010	0.158	0.010	0.140
2	2000	TC040200	0.96	8.5	4	2	74	76	0.50	<.2	0.56	<.6	0.010	0.073	<.01	0.130
2	2000	TC041100	0.40	8.5	7	7	68	84	0.30	<.2	1.12	0.60	<.007	0.120	0.040	0.050

TABLE A-7 (continued)
EMC Values For Individual Storm Events

Wellington Drive			Rain	pH	BOD	COD	TSS	TDS	N+NN	NH3	TKN	TN	Pb	Zn	DP	TP
Storm event data			inches	----	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Qtr.	Year	Sample														
1	1997	WE012897	0.96	7.5	3	0	36	58	0.31	<.2	0.49	0.80	0.003	0.455	0.020	0.090
1	1997	WE030697	1.07	7.5	6	27	38	72	0.54	<.2	0.70	0.70	0.012	0.078	0.070	0.060
1	1997	WE031997	0.83	7.6	4	38	14	43	0.31	<.2	0.21	6.00	0.011	0.179	0.002	0.030
2	1997	WE042797	0.49	7.5	6	33	30	0	0.70	<.2	1.54	20.20	0.005	0.081	0.320	0.630
2	1997	WE051397	0.13	7.5	9	62	33	228	1.30	0.60	1.23	1.10	0.005	0.330	0.600	0.910
2	1997	WE060597	0.34	6.9	12	33	73	266	0.80	<.2	0.35	0.50	0.004	0.120	0.350	0.410
3	1997	WE090997	0.16	7.6	15	75	76	264	1.80	<.2	0.70	3.60	0.005	0.181	0.310	0.370
3	1997	WE092397	0.40	7.9	18	30	124	108	1.70	<.2	1.19	2.40	<.001	0.074	0.590	0.580
3	1997	WE092897	0.17	7.5	10	70	82	82	0.50	<.2	0.00	3.70	<.001	0.045	0.340	0.440
4	1997	WE110697	0.11	7.8	11	59	80	80	1.30	<.2	3.57	1.60	0.014	0.135	0.060	0.110
4	1997	WE111397	0.40	8.5	----	33	58	32	0.40	<.2	0.28	0.90	0.016	0.118	0.090	0.190
4	1997	WE120397	0.31	8.2	11	67	46	108	0.70	<.2	0.56	1.30	0.013	0.162	0.140	0.270
1	1998	WE010798	0.20	8.1	5	39	64	268	0.20	<.2	0.00	0.50	0.015	0.157	0.200	0.640
1	1998	WE012298	0.21	8.2	6	45	56	36	0.20	<.2	0.00	1.80	0.017	0.150	0.370	0.710
1	1998	WE030898	1.10	8.8	2	58	97	24	0.40	<.2	0.00	1.20	0.012	0.205	0.110	0.260
1	1998	WE033198	0.40	8.6	7	21	224	26	1.90	<.2	0.35	2.20	0.003	0.135	0.180	1.450
2	1998	WE041498	0.23	8.3	9	67	81	0	0.90	<.2	2.80	1.60	<.001	0.200	0.080	0.160
2	1998	WE042198	0.41	8.7	5	94	126	57	0.50	<.2	0.00	3.90	<.001	0.103	0.060	0.180
2	1998	WE050698	0.28	8.8	6	50	96	63	1.10	<.2	0.00	1.60	<.001	<.001	0.170	0.060
3	1998	WE092898	0.16	8.2	4	43	9	----	0.60	<.2	0.00	1.70	0.002	0.127	1.170	1.220
4	1998	WE100898	0.91	8.0	5	60	15	91	0.50	<.2	0.00	0.80	<.001	0.098	0.130	0.540
4	1998	WE110498	0.08	7.2	13	34	46	239	1.40	<.2	1.96	1.50	0.005	0.161	0.930	1.830
4	1998	WE110698	0.10	7.6	----	----	16	156	1.90	1.70	1.70	1.50	0.006	0.165	0.260	0.460
4	1998	WE111198	0.66	7.5	4	67	29	81	0.50	<.2	0.00	2.20	0.011	0.115	0.180	0.340
4	1998	WE120898	0.42	7.6	5	33	34	26	0.70	<.2	0.00	<.6	0.005	0.144	0.060	0.080
4	1998	WE121298	0.27	7.7	1	10	14	58	0.50	<.2	0.00	<.6	<.001	<.057	0.050	0.080
4	1998	WE122298	0.18	7.6	6	33	39	46	1.00	0.00	0.84	1.60	0.004	0.091	0.020	0.140
4	1998	WE122898	0.13	7.7	8	33	16	69	1.00	0.00	0.56	1.10	<.001	0.096	0.050	0.100
1	1999	WE010299	0.55	7.5	4	12	23	71	1.00	<.2	1.96	1.50	<.001	0.055	0.030	0.100
1	1999	WE011499	0.53	7.6	4	181	36	55	0.60	<.2	0.00	<.6	0.068	0.677	0.030	0.130
1	1999	WE012399	1.40	7.4	3	11	31	58	0.60	<.2	0.00	<.6	0.016	0.216	0.020	0.140
1	1999	WE021799	0.44	7.7	3	34	8	62	1.40	<.2	0.00	1.10	----	----	<.01	0.030
1	1999	WE022899	1.12	7.9	3	13	68	79	0.50	<.2	0.00	2.60	0.011	0.085	0.020	0.200
1	1999	WE030399	0.99	7.7	3	9	12	2	0.40	<.2	0.00	1.30	0.003	0.061	0.060	0.130
2	1999	WE042899	0.90	8.6	3	2	19	70	0.40	<.2	0.00	0.50	0.005	0.045	0.100	0.150
2	1999	WE050599	0.40	8.8	4	41	27	74	0.40	<.2	0.00	7.20	<.002	0.059	0.110	0.130
3	1999	WE082599	1.00	8.2	14	78.3	180	81	0.70	<.2	0.00	0.90	0.017	0.192	0.050	0.120
3	1999	WE092199	0.24	7.9	----	33	56	141	1.30	0.30	1.40	2.20	0.007	0.283	0.191	0.164
3	1999	WE092999	0.28	8.0	7	23.9	24	137	0.30	<.2	0.84	0.60	0.017	0.222	0.087	0.032
4	1999	WE100999	0.82	8.1	3	22.5	35	110	0.40	<.2	0.00	4.00	0.005	0.121	0.355	0.084
4	1999	WE110299	0.79	8.2	6	9	46	72	1.00	<.2	0.56	6.50	0.012	0.190	0.110	0.150
1	2000	WE010300	1.02	7.6	4	4	44	28	0.50	<.2	0.28	2.10	0.005	0.150	0.030	0.110
1	2000	WE010900	1.08	7.5	1	3	26	39	0.30	<.2	0.00	<.6	0.007	0.125	0.060	0.040
1	2000	WE021100	0.86	7.4	2	8	27	88	0.30	<.2	1.12	2.60	0.005	0.107	0.050	0.100
1	2000	WE022700	0.45	8.1	2	7	10	65	0.60	<.2	2.80	1.10	0.002	0.113	<.01	<.01
1	2000	WE032700	0.72	8.1	4	6	12	64	0.60	<.2	3.36	<.6	0.015	0.229	0.020	0.230
2	2000	WE040200	0.21	8.2	7	16	10	27	0.60	<.2	0.00	<.6	0.007	0.243	0.020	0.060
2	2000	WE050300	0.28	7.8	7	6	54	28	0.50	0.50	0.00	1.50	<.007	0.073	0.030	0.030

TABLE A-7 (continued)
EMC Values For Individual Storm Events

Fountain City			Rain	pH	BOD	COD	TSS	TDS	N+NN	NH3	TKN	TN	Pb	Zn	DP	TP
Storm event data			inches	----	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Qtr.	Year	Sample														
1	1997	FN022797	0.77	7.4	6.0	31.0	145	88	0.47	<.2	0	0	0.024	0.068	0.09	0.21
1	1997	FN030697	0.80	7.7	2.0	22.0	116	132	1.03	<.2	0.42	0.42	0.017	0.038	0.04	0.19
1	1997	FN031997	0.90	7.1	3.0	29.0	35	160	0.21	<.2	1.19	4	0.013	0.081	0.10	0.22
2	1997	FN042197	0.84	7.2	6.0	20.0	39	1	1.40	<.2	0.14	2	0.014	0.083	0.10	0.15
2	1997	FN042897	0.62	7.5	5.0	28.0	12	36	0.60	<.2	0	2.1	0.009	0.045	0.42	0.61
2	1997	FN061797	0.44	7.6	5.0	40.0	35	98	0.80	<.2	1.61	1.3	0.010	0.086	0.51	0.55

EMC values for individual storm events

Love Creek			Rain	pH	BOD	COD	TSS	TDS	N+NN	NH3	TKN	TN	Pb	Zn	DP	TP
Storm event data			inches	----	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Qtr.	Year	Sample														
4	2000	LC111600	0.49	6.0	2.0	3.0	18	228	1.10	<.2	0.84	0.6	<.007	0.042	0.103	0.487
4	2000	LC120300	0.33	7.0	2.0	3.0	1	279	0.30	<.2	0.84	0.1	<.007	0.088	0.037	0.039
4	2000	LC121300	0.65	7.0	4.0	5.0	178	149	0.30	<.2	1.12	2.3	<.007	0.022	0.025	0.522
1	2001	LC010801	0.31	7.0	4.0	4.0	10	466	0.40	<.2	0.84	<.6	<.007	0.023	0.025	0.009
1	2001	LC011701	0.14	7.0	4.0	4.0	7	310	0.40	<.2	0.84	<.6	<.007	0.03	0.005	<.001
1	2001	LC021301	0.59	7.0	5.0	2.0	22	234	0.30	<.2	1.4	2.1	<.007	0.049	<.001	0.006
1	2001	LC022401	0.71	7.0	3.0	5.0	126	211	0.50	<.2	2.24	<.6	<.007	0.052	<.001	<.001
1	2001	LC031201	0.43	7.0	6.0	4.0	41	256	0.70	<.2	0.84	<.6	<.007	0.037	0.413	<.001
1	2001	LC032901	0.57	7.0	----	2.0	25	228	0.50	<.2	0	<.6	<.007	0.044	0.007	0.054

EMC values for individual storm events

Second Creek			Rain	pH	BOD	COD	TSS	TDS	N+NN	NH3	TKN	TN	Pb	Zn	DP	TP
Storm event data			inches	----	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Qtr.	Year	Sample														
3	2000	SC081000	0.33	8.2	8.0	5.0	142	158	0.50	<.2	4.2	1.5	0.017	0.138	----	0.055
4	2000	SC110800	0.95	7.0	11.0	5.0	104	89	0.80	<.2	2.8	0.6	0.009	0.065	----	0.502
1	2001	SC011701	1.82	6.0	6.0	4.0	278	114	0.40	<.2	0	<0.6	0.058	0.194	0.029	0.021
1	2001	SC021301	1.20	7.0	5.0	2.0	178	118	0.40	<.2	1.68	----	0.010	0.086	<.001	0.003
1	2001	SC022401	0.63	7.0	4.0	5.0	135	129	0.40	<.2	1.96	<0.6	0.028	0.131	<.001	0.001
1	2001	SC031201	0.25	7.0	7.0	5.0	88	168	0.40	<.2	1.96	<0.6	<.007	0.061	0.080	0.360
1	2001	SC032901	0.10	7.0	----	4.0	90	157	1.00	<.2	0	<0.6	<.007	0.091	0.031	0.032
2	2001	SC050601	0.32	7.0	7.0	154.0	102	176	1.40	<.2	0	12.8	0.011	0.104	0.04	0.05
2	2001	SC052101	0.62	7.0	6.0	80.0	94	183	1.10	0.2	0	5.7	0.013	0.082	0.14	0.12
2	2001	SC062001	0.65	7.0	11.0	81.0	188	168	1.40	<.2	9.8	3.3	0.048	0.238	0.10	0.10
2	2001	SC062501	0.27	7.0	3.0	107.0	166	271	0.80	<.2	9.8	12.2	0.048	0.238	0.08	0.28

EMC values for individual storm events

Walden Drive			Rain	pH	BOD	COD	TSS	TDS	N+NN	NH3	TKN	TN	Pb	Zn	DP	TP
Storm event data			inches	----	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Qtr.	Year	Sample														
4	1999	WD110299	0.86	8.1	5.0	5.0	516	115	0.50	<.2	1.68	1.6	0.013	0.178	0.19	0.68
4	1999	WD120599	0.32	7.8	6.0	18.0	40	1	0.30	<.2	0.56	2.6	0.004	0.102	0.03	0.13
4	1999	WD121099	0.43	6.7	3.0	3.0	241	77	0.40	<.2	0.84	2.2	0.010	0.115	0.01	0.43
1	2000	WD010900	1.03	7.4	2.0	6.0	266	56	0.30	<.2	0.28	0.8	0.001	0.136	0.039	0.274
1	2000	WD011700	0.58	7.4	2.0	6.0	107	116	0.90	<.2	0.28	<0.6	0.002	0.082	0.074	0.093
1	2000	WD021100	0.77	7.8	6.0	8.0	378	150	0.30	<.2	0.56	2.9	0.007	0.13	0.07	0.36
1	2000	WD031000	1.00	8.4	3.0	12.0	230	101	0.60	<.2	3.08	2.3	<.007	0.117	<.01	0.14
1	2000	WD032700	0.65	8.2	4.0	2.0	169	144	0.80	<.2	2.52	<.6	0.017	0.236	<.01	0.02
2	2000	WD040200	0.34	8.5	2.0	2.0	36	158	0.90	<.2	0.56	<.6	<.007	0.028	0.01	0.10
2	2000	WD042400	1.13	7.4	3.0	5.0	104	130	0.40	<.2	0.84	1	0.019	0.189	0.06	0.06
2	2000	WD050300	0.23	7.9	3.0	3.0	133	141	0.60	<.2	0	1.4	<.007	0.033	0.07	0.11
3	2000	WD072300	0.10	9.3	6.0	4.0	34	198	0.30	<.2	1.96	<.5	<mdl	0.052	0.011	0.027
3	2000	WD081000	0.46	9.1	7.0	8.0	175	154	0.40	<.2	0.56	0.3	<mdl	0.178	0.038	0.046
3	2000	WD082000	0.14	9.0	8.0	23.0	61	253	0.90	<.2	2.52	1	<mdl	0.161	0.042	0.061
4	2000	WD121300	0.77	6.0	6.0	2.4	188	102	0.40	<.2	0.84	0.2	<.007	0.047	0.031	0.071
1	2001	WD010801	0.28	7.0	5.0	4.0	104	523	0.30	<.2	0.56	0.7	<.007	0.043	0.01	0.072
1	2001	WD021301	0.52	7.0	5.0	10.0	45	180	0.40	<.2	3.08	<.6	0.023	0.105	<.001	<.001
1	2001	WD022401	0.68	7.0	3.0	3.2	314	131	0.40	<.2	1.12	1.3	0.007	0.114	<.001	0.143
1	2001	WD031201	0.42	7.0	6.0	5.1	148	138	0.40	<.2	0.28	<.6	<.007	0.079	0.087	0.01
1	2001	WD032901	0.48	7.0	----	4.7	77	149	0.60	<.2	0	<.6	0.009	0.089	0.019	0.035
2	2001	WD060601	0.93	7.0	5.0	39.7	590	129	0.29	<.2	1	0.76	0.011	0.23	0.17	0.17

A.6 STATISTICAL COMPUTATIONS FOR EMC VALUES

Statistical analysis will be performed in Section A.6 to determine if there are seasonal variations for pollutant EMC values. In addition, the coefficient of variation (CV) will be computed to see trends and variations. However, the value of CV is generally not needed to estimate the seasonal and annual pollutant loads.

Any values which were not measured or recorded are shown as "----". Of the 4032 values in the data matrix (288 x 14), there are a total of 43 unknown values, which 1.1% of the values. The most frequent data with unrecorded values are: rainfall-7, pH-7, BOD-12, and COD-5.

The values for NH3 (which is the amount of total ammonia expressed as mg/l of nitrogen) are below the 0.2 mg/l threshold limits of detection approximately 95% of the time. Although a mean value for EMC and CV is computed, the analysis is generally unproductive. It is proposed that this parameter can be eliminated from routine laboratory analysis on wet weather monitoring stations, particularly since nitrogen is otherwise represented within the laboratory analysis.

Table A-8 contains the overall watershed descriptions for the nine monitoring stations. The original land uses were chosen to be representative of homogeneous land uses within the city of Knoxville, subject to the needs of a monitoring station. Monitoring stations must have sufficient drainage area in order to provide mixed sampling volumes, allow estimation of flow depths and flows, and delineation of begin/end for storm events. Two of the monitoring stations were recently relocated to provide data for entire watersheds (Love Creek and Second Creek).

TABLE A-8
Watershed Descriptions for Monitoring Stations

Monitoring Station	AP	FC	FN	GV	LC	SC	TC	WD	WE
Predominant Land Use	Industrial	Residential	Residential	Residential	Mixed	Mixed	Industrial	Residential	Commercial
Contributing area	0.91	4.5	0.23	0.35	9.8	6.9	0.55	6.0	0.57
Overall % impervious	44	40	46	37	36	52	34	47	60
Single family residential	10	62	55	36	35	30	14	41	18
Multi-family residential		7	7	36	4	6		7	
Commercial	3	9		6	6	12	9	18	55
Industrial	48	2	22		4	8	18	6	
Public / institutional	8	3			6	8	16	8	16
Streets/ highways		10	16	9	16	26		11	
Open land use	31	7		13	29	10	43	9	11
Same location as USGS?	✓		✓	✓			✓		✓
Starting year:	1	2	1	1	5	5	1	4	1
Ending year:	---	---	1	3	---	---	4	---	4

Table A-9 summarizes the rainfall data over the NPDES sampling period. Each monitoring station has a rain gauge, and the daily rainfall amounts are compared with the reported rainfall amounts at McGhee-Tyson Airport. In most cases, there is very good agreement for the rainfall amounts at the monitoring stations and the airport.

TABLE A-9
Quarterly Rainfall Amounts for Knoxville

Quarter		1	2	3	4	Annual total
(Season)		(Winter)	(Spring)	(Summer)	(Fall)	
Months		Jan - Mar	Apr - June	July - Sept	Oct - Dec	
Year	1997	13.34	15.74	9.38	7.47	45.93
	1998	13.18	24.72	5.94	9.32	53.16
	1999	14.52	13.21	9.21	5.44	42.38
	2000	12.44	14.65	8.14	5.19	40.42
	2001	12.67	8.03	-----	-----	-----
Average		**13.23**	**15.27**	**8.17**	**6.86**	**45.47**
		(inches)	(inches)	(inches)	(inches)	(inches)

Tables A-10 through A-14 contain analysis for the five monitoring stations with a minimum of three years of data. This data probably provides the best opportunity to spot seasonal trends and variations. Overall, there doesn't appear to be too much difference in mean EMC values with respect to location for the various monitoring stations. Table A-15 contains analysis for the other four monitoring stations with shorter amounts of data. Table A-16 contains an overall summary (taken from Tables A-10 through A-15) for mean EMC values. This will be the basis for choosing pollutant EMC values for the WMM analysis in Section A.8 for the individual watersheds.

Figures A-1 through A-13 show the seasonal variation for the five monitoring stations with a minimum of three years of data. The following distribution of the various samples may be helpful in interpreting the trends within the figures:

Quarters:	**1**	**2**	**3**	**4**	**Overall**	
AP, FC, GV, TC, WE	82	73	36	36	227	samples
All 9 monitoring stations	109	81	44	54	288	samples

In connection with the rainfall amounts in Table A-9, there is more opportunity to regularly wash pollutants in Quarters 1 and 2, therefore the pollutant EMC values are likely to be lower. Pollutant EMC values are likely to be higher when there is less total rainfall (Quarters 3 and 4).

Figures A-14 through A-17 show the overall EMC values based on the predominant land use; the values are taken from Table A-16.

TABLE A-10

Statistical Analysis For Acker Place Monitoring Station (AP)

MEAN EMC			Rain	pH	BOD	COD	TSS	TDS	N+NN	NH3	TKN	TN	Pb	Zn	DP	TP
			inches	----	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Qtr.	**Year**	**#**	MEAN		**MEAN EMC for Individual Quarters**											
1	1997	3	0.38	7.87	7.0	18.3	347.7	131.3	0.77	----	0.23	0.23	0.007	0.110	0.033	0.330
1	1998	5	0.30	8.36	7.0	44.4	144.4	113.2	0.42	----	0.15	1.72	0.012	0.239	0.084	0.370
1	1999	8	0.83	7.76	3.5	16.1	195.4	112.5	0.85	----	0.14	1.90	0.005	0.104	0.058	0.189
1	2000	1	----	8.50	2.0	11.0	78.0	140.0	0.30	----	2.80	----	0.007	0.136	----	0.040
2	1997	3	0.35	7.90	5.0	44.3	168.0	40.0	0.52	----	0.54	7.13	0.005	0.133	0.153	0.397
2	1998	4	0.99	8.58	6.3	36.8	442.3	123.3	0.60	----	0.12	2.08	0.012	0.132	0.173	0.400
2	1999	3	0.43	8.60	7.7	15.7	29.0	121.7	0.40	----	0.19	4.73	0.004	0.107	0.150	0.247
2	2000	9	0.33	8.57	6.7	6.3	117.4	118.0	0.53	0.30	1.00	1.89	0.011	0.196	0.054	0.117
2	2001	3	0.30	7.00	2.7	50.1	99.3	175.0	0.50	----	0.00	5.00	----	0.108	0.067	0.115
3	1997	3	0.48	8.40	8.0	46.3	431.0	234.0	0.90	----	0.77	2.00	0.010	0.181	0.313	0.447
3	1998	3	0.70	7.85	8.3	30.0	254.7	78.7	1.33	----	0.47	1.90	0.017	0.171	0.213	0.627
3	1999	2	0.31	8.20	12.0	35.3	222.5	152.0	1.15	0.30	0.28	2.40	0.015	0.287	0.053	0.170
3	2000	2	0.40	9.15	5.0	20.9	278.0	159.5	0.30	0.40	3.36	1.50	0.014	0.158	0.033	0.042
4	1997	4	0.28	8.15	8.5	47.0	66.8	72.5	0.68	----	0.11	3.45	0.011	0.215	0.025	0.105
4	1998	6	0.64	7.73	3.3	25.7	33.0	83.8	0.67	0.00	0.37	0.73	0.007	0.110	0.132	0.253
4	1999	1	1.08	8.20	3.0	19.9	29.0	70.0	0.40	----	0.56	1.40	0.009	0.116	0.071	0.080

MEAN EMC			Rain	pH	BOD	COD	TSS	TDS	N+NN	NH3	TKN	TN	Pb	Zn	DP	TP
			inches	----	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Qtr.	**#**		MEAN		**MEAN EMC by Quarter**											
1	17		0.56	8.00	5.1	24.5	200.4	117.6	0.68	----	0.32	1.31	0.007	0.147	0.061	0.258
2	22		0.47	8.27	6.0	24.3	168.9	116.6	0.52	0.30	0.53	3.38	0.009	0.153	0.104	0.229
3	10		0.47	8.40	7.9	34.6	305.8	156.1	0.96	0.35	1.10	2.00	0.013	0.195	0.175	0.364
4	11		0.55	7.93	4.4	32.9	44.9	78.5	0.65	----	0.29	2.18	0.009	0.149	0.087	0.184
Year	**#**		MEAN		**MEAN EMC by Year**											
1997	13		0.35	8.08	7.0	39.6	239.0	115.8	0.71	----	0.39	3.22	0.008	0.164	0.123	0.303
1998	18		0.63	8.13	5.8	34.3	191.8	99.9	0.69	----	0.27	1.65	0.011	0.163	0.141	0.381
1999	14		0.68	8.04	5.1	19.0	151.7	117.1	0.76	0.30	0.20	3.03	0.007	0.131	0.078	0.191
2000	12		0.34	8.66	6.0	9.1	140.9	126.8	0.48	0.35	1.54	1.85	0.011	0.185	0.050	0.098
2001	3		0.30	7.00	2.7	50.1	99.3	175.0	0.50	----	0.00	5.00	----	0.108	0.067	0.115
Total	***60***	**Overall**	**0.51**	**8.15**	**5.8**	**27.5**	**177.9**	**116.5**	**0.66**	**0.20**	**0.52**	**2.49**	**0.009**	**0.157**	**0.101**	**0.252**
Lowest EMC value:			0.05	7.00	1.0	2.5	3.0	0.0	0.15	0.00	0.00	0.00	0.000	0.000	0.000	0.020
Median EMC value:			0.33	8.20	5.0	24.0	78.5	108.0	0.60	0.30	0.07	1.75	0.008	0.139	0.070	0.200
Highest EMC value:			3.03	9.70	14.0	93.5	1273.0	384.0	1.60	0.40	4.20	16.70	0.021	0.315	0.590	0.970
Qtr.			**COEFFICIENT OF VARIATION by Quarter**													
1			0.75	0.05	0.47	0.61	1.56	0.44	0.51	----	2.15	0.86	0.89	0.51	0.64	0.66
2			1.35	0.07	0.57	1.00	1.53	0.66	0.53	----	1.52	1.11	0.72	0.40	0.71	0.89
3			0.55	0.07	0.43	0.62	0.97	0.60	0.53	0.20	1.26	0.55	0.51	0.40	1.00	0.81
4			1.15	0.03	0.62	0.41	0.59	0.55	0.37	----	1.99	1.59	0.45	0.44	1.40	1.03
Year			**COEFFICIENT OF VARIATION by Year**													
1997			0.61	0.05	0.33	0.42	1.08	0.88	0.44	----	1.29	1.53	0.82	0.46	1.39	0.65
1998			1.28	0.05	0.46	0.49	1.57	0.79	0.58	----	1.99	0.56	0.55	0.43	0.74	0.70
1999			0.64	0.06	0.69	0.59	2.18	0.28	0.49	----	1.39	1.06	0.93	0.53	0.63	0.49
2000			0.79	0.05	0.66	1.07	1.03	0.27	0.71	0.20	0.90	0.47	0.35	0.32	0.52	0.96
2001			0.36	0.00	0.43	0.76	1.37	0.59	0.40	----	----	0.34	----	0.21	0.62	1.05
Total	***60***	**Overall**	**1.03**	**0.06**	**0.54**	**0.72**	**1.49**	**0.61**	**0.55**	**0.94**	**1.70**	**1.20**	**0.69**	**0.44**	**1.04**	**0.84**

TABLE A-11

Statistical Analysis For First Creek Monitoring Station (FC)

MEAN EMC			Rain	pH	BOD	COD	TSS	TDS	N+NN	NH3	TKN	TN	Pb	Zn	DP	TP
			inches	----	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Qtr.	Year	#	MEAN		MEAN EMC for Individual Quarters											
1	1998	5	0.74	8.28	4.2	29.8	36.2	159.0	0.94	----	0.29	1.86	0.004	0.194	0.406	0.530
1	1999	2	1.42	7.75	2.5	22.5	17.0	201.0	1.70	----	0.00	2.90	0.012	0.073	0.270	0.375
1	2000	5	0.80	7.67	4.2	7.0	116.6	118.0	0.60	----	1.18	2.52	0.009	0.076	0.059	0.188
1	2001	2	0.50	7.00	6.5	13.0	482.0	138.0	0.30	----	1.82	0.80	0.042	0.163	0.019	0.184
2	1998	6	0.95	8.55	4.2	43.3	50.7	80.3	1.00	----	0.94	1.78	0.003	0.090	0.957	1.145
2	1999	2	1.19	8.25	4.5	30.0	35.0	68.0	0.65	----	0.00	4.55	0.002	0.144	0.145	0.265
2	2000	4	0.43	8.05	5.8	5.0	436.5	188.5	0.93	----	1.40	1.33	0.024	0.089	0.083	0.315
2	2001	2	0.25	7.00	6.5	49.0	131.0	168.0	0.95	----	0.00	2.40	0.010	0.097	0.074	0.100
3	1997	3	1.00	8.43	8.7	37.0	260.7	108.0	0.90	----	0.47	1.07	0.015	0.070	0.253	0.423
3	1998	1	0.51	----	7.0	0.0	50.0	113.0	2.00	----	0.00	1.90	0.005	0.185	0.630	0.810
3	1999	2	0.20	8.55	8.0	19.5	91.0	168.0	0.70	----	0.42	1.60	0.017	0.166	0.156	0.151
3	2000	2	0.69	9.00	12.0	13.5	528.0	180.0	0.60	----	0.70	2.10	0.057	0.121	0.062	0.059
4	1998	2	2.52	7.50	2.1	20.0	20.0	65.0	1.05	----	0.98	1.50	0.004	0.064	0.235	0.295
4	1999	2	0.81	8.25	4.0	9.0	62.5	109.0	0.55	----	0.42	3.40	0.009	0.108	0.160	0.234
4	2000	4	0.74	6.75	5.3	6.0	249.8	110.3	0.73	----	1.89	0.73	0.033	0.111	0.189	0.578

MEAN EMC			Rain	pH	BOD	COD	TSS	TDS	N+NN	NH3	TKN	TN	Pb	Zn	DP	TP
			inches	----	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Qtr.	#		MEAN		MEAN EMC by Quarter											
1	14		0.82	7.78	4.3	18.2	125.9	147.4	0.84	----	0.79	2.19	0.014	0.130	0.207	0.336
2	14		0.76	8.14	5.0	31.3	170.1	122.0	0.92	----	0.80	2.20	0.008	0.099	0.465	0.633
3	8		0.73	8.63	9.3	22.1	258.8	141.6	0.91	----	0.46	1.49	0.020	0.121	0.228	0.312
4	8		1.20	7.31	4.1	10.3	145.5	98.6	0.77	----	1.30	1.71	0.018	0.099	0.194	0.399
Year	#		MEAN		MEAN EMC by Year											
1997	3		1.00	8.43	8.7	37.0	260.7	108.0	0.90	----	0.47	1.07	0.015	0.070	0.253	0.423
1998	14		1.07	8.28	4.1	32.1	41.1	108.6	1.06	----	0.65	1.78	0.004	0.133	0.634	0.780
1999	8		1.00	8.20	4.3	20.2	51.4	136.5	0.90	----	0.21	3.11	0.011	0.123	0.183	0.256
2000	15		0.69	7.71	5.9	7.1	292.3	143.0	0.72	----	1.36	1.74	0.023	0.095	0.094	0.290
2001	4		0.38	7.00	6.5	31.0	306.5	153.0	0.63	----	0.91	1.87	0.026	0.130	0.046	0.142
Total	***44***	**Overall**	**0.86**	**7.96**	**5.3**	**21.6**	**167.7**	**129.4**	**0.87**	**----**	**0.82**	**1.99**	**0.015**	**0.113**	**0.293**	**0.439**
Lowest EMC value:			0.19	6.00	1.1	0.0	1.0	0.0	0.20	----	0.00	0.30	0.001	0.025	0.010	0.027
Median EMC value:			0.79	8.10	5.0	16.0	81.0	116.5	0.70	----	0.46	1.50	0.008	0.098	0.170	0.340
Highest EMC value:			2.57	9.10	14.0	96.0	1576.0	351.0	2.60	----	5.32	7.00	0.057	0.580	1.300	1.780
Qtr.			COEFFICIENT OF VARIATION by Quarter													
1			0.44	0.06	0.51	0.74	1.45	0.67	0.81	----	1.08	0.64	1.13	1.05	0.95	0.69
2			0.82	0.08	0.38	0.96	2.39	0.59	0.54	----	2.01	0.77	1.04	0.49	1.07	0.85
3			0.44	0.03	0.28	0.69	1.13	0.30	0.54	----	0.76	0.54	0.96	0.63	0.85	0.85
4			0.69	0.10	0.37	0.85	1.16	0.43	0.35	----	0.87	1.01	0.91	0.43	0.70	0.75
Year			COEFFICIENT OF VARIATION by Year													
1997			0.11	0.02	0.27	0.30	0.48	0.06	0.11	----	0.53	0.38	1.03	0.31	0.49	0.13
1998			0.75	0.06	0.49	0.68	1.00	0.89	0.48	----	1.55	0.28	0.68	1.06	0.61	0.58
1999			0.52	0.05	0.44	0.44	0.80	0.73	0.79	----	1.85	0.73	0.58	0.45	0.52	0.42
2000			0.37	0.11	0.51	0.49	1.46	0.32	0.54	----	1.07	0.79	0.79	0.60	1.09	0.90
2001			0.41	0.00	0.37	1.41	0.87	0.17	1.15	----	1.21	1.08	0.82	0.35	1.32	0.98
Total	***44***	**Overall**	**0.66**	**0.09**	**0.51**	**0.97**	**1.70**	**0.57**	**0.60**	**----**	**1.38**	**0.73**	**1.03**	**0.79**	**1.14**	**0.88**

TABLE A-12

Statistical Analysis For Gallaher View Monitoring Station (GV)

MEAN EMC			Rain inches	pH ----	BOD mg/l	COD mg/l	TSS mg/l	TDS mg/l	N+NN mg/l	NH3 mg/l	TKN mg/l	TN mg/l	Pb mg/l	Zn mg/l	DP mg/l	TP mg/l
Qtr.	**Year**	**#**	MEAN		**MEAN EMC for Individual Quarters**											
1	1997	4	0.78	7.23	4.3	29.5	286.0	108.8	0.68	----	1.86	1.28	0.016	0.095	0.013	0.188
1	1998	5	0.63	8.14	5.4	56.6	188.4	54.4	0.48	----	0.06	1.62	0.082	0.109	0.248	0.768
1	1999	6	1.15	7.35	3.0	32.0	343.7	113.8	0.67	----	0.05	3.28	0.013	0.059	0.045	0.327
2	1997	3	0.63	7.42	6.7	39.0	234.0	83.3	0.83	----	1.17	2.93	0.013	0.081	0.153	0.280
2	1998	7	0.64	8.34	5.8	45.3	143.7	60.6	0.70	----	0.50	2.84	0.023	0.059	1.596	2.174
2	1999	3	1.87	9.00	5.7	19.0	201.3	92.0	0.67	----	0.19	1.30	0.006	0.092	0.060	0.300
3	1997	3	0.93	8.13	7.3	41.7	94.0	108.7	0.97	0.40	0.60	2.17	0.001	0.050	0.273	0.367
3	1999	2	1.52	8.25	7.0	36.8	1601.5	156.5	0.90	----	0.98	3.45	0.015	0.173	0.090	0.365
4	1998	3	1.85	7.73	5.0	23.3	116.0	96.7	0.57	----	0.00	1.50	0.006	0.099	0.120	0.743

MEAN EMC			Rain inches	pH ----	BOD mg/l	COD mg/l	TSS mg/l	TDS mg/l	N+NN mg/l	NH3 mg/l	TKN mg/l	TN mg/l	Pb mg/l	Zn mg/l	DP mg/l	TP mg/l
Qtr.	**#**		MEAN		**MEAN EMC by Quarter**											
1	15		0.88	7.58	4.1	40.1	276.5	92.7	0.61	----	0.53	2.02	0.038	0.085	0.111	0.437
2	13		0.92	8.28	6.0	37.2	177.8	73.1	0.73	----	0.58	2.51	0.015	0.074	0.908	1.305
3	5		1.17	8.18	7.2	39.7	697.0	127.8	0.94	0.40	0.75	2.68	0.008	0.099	0.200	0.366
4	3		1.85	7.73	5.0	23.3	116.0	96.7	0.57	----	0.00	1.50	0.006	0.099	0.120	0.743
Year	**#**		MEAN		**MEAN EMC by Year**											
1997	10		0.78	7.56	5.9	36.0	212.8	101.1	0.81	0.40	1.27	2.04	0.012	0.077	0.147	0.269
1998	15		0.88	8.15	5.5	44.6	153.1	65.7	0.60	----	0.25	2.27	0.043	0.087	0.851	1.419
1999	11		1.41	7.96	4.5	29.1	533.5	115.6	0.71	----	0.25	2.66	0.011	0.089	0.057	0.326
Total	***36***	**Overall**	**1.01**	**7.93**	**5.3**	**37.5**	**285.9**	**90.8**	**0.69**	**0.40**	**0.54**	**2.31**	**0.024**	**0.085**	**0.421**	**0.766**
Lowest EMC value:			0.25	6.00	1.0	2.0	18.0	0.0	0.03	0.40	0.00	0.00	0.001	0.014	0.000	0.050
Median EMC value:			0.83	7.85	5.0	32.0	124.5	97.0	0.80	0.40	0.00	2.00	0.007	0.072	0.080	0.380
Highest EMC value:			2.66	9.30	15.0	143.0	2405.0	248.0	1.40	0.40	6.30	7.50	0.378	0.216	8.680	9.670
Qtr.			**COEFFICIENT OF VARIATION by Quarter**													
1			0.41	0.08	0.83	0.93	1.48	0.67	0.61	----	3.02	0.98	2.57	0.57	1.16	1.05
2			0.82	0.08	0.34	0.53	0.93	0.61	0.51	----	0.96	0.58	1.58	0.44	2.59	1.96
3			0.60	0.05	0.37	0.34	1.44	0.34	0.27	----	0.98	0.53	1.30	0.80	1.08	0.43
4			0.60	0.01	0.72	0.81	0.20	1.10	0.37	----	----	----	0.33	0.26	0.80	0.92
Year			**COEFFICIENT OF VARIATION by Year**													
1997			0.52	0.07	0.43	0.43	1.23	0.63	0.58	----	1.44	0.80	0.98	0.63	1.47	0.79
1998			0.89	0.05	0.69	0.75	0.54	0.93	0.58	----	1.59	0.57	2.48	0.50	2.56	1.66
1999			0.39	0.11	0.52	0.90	1.46	0.29	0.29	----	2.33	0.83	0.85	0.60	0.52	0.34
Total	***36***	**Overall**	**0.66**	**0.08**	**0.57**	**0.73**	**1.65**	**0.64**	**0.51**	**----**	**2.07**	**0.71**	**2.85**	**0.56**	**3.46**	**2.08**

TABLE A-13

Statistical Analysis For Third Creek Monitoring Station (TC)

MEAN EMC			Rain	pH	BOD	COD	TSS	TDS	N+NN	NH3	TKN	TN	Pb	Zn	DP	TP
			inches	----	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Qtr.	Year	#	MEAN		MEAN EMC for Individual Quarters											
1	1997	3	0.71	7.78	5.3	20.5	276.5	120.0	0.45	----	0.49	1.41	0.016	0.159	0.011	0.195
1	1998	4	0.78	8.30	6.0	37.5	73.8	115.0	0.43	----	0.28	2.40	0.009	0.150	0.230	0.463
1	1999	7	0.91	7.67	2.3	18.0	97.0	108.4	0.80	----	0.00	1.84	0.008	0.076	0.063	0.186
1	2000	6	0.59	8.08	3.0	6.2	84.0	96.0	0.63	----	1.49	3.30	0.006	0.112	0.037	0.174
2	1997	4	0.43	7.67	5.3	34.3	172.0	48.0	0.57	----	0.86	1.63	0.012	0.159	0.470	0.717
2	1998	4	1.33	8.83	4.5	40.0	225.0	73.5	0.60	----	0.45	1.55	0.010	0.101	0.227	0.613
2	1999	2	1.32	8.45	7.0	42.1	164.5	109.0	0.85	----	0.28	5.55	0.003	0.099	0.080	0.240
2	2000	2	0.68	8.50	5.5	4.5	71.0	80.0	0.40	----	0.84	0.60	0.010	0.097	0.040	0.090
3	1997	3	0.90	8.40	6.7	34.3	538.7	111.3	0.80	----	0.47	1.50	0.021	0.155	0.243	0.387
3	1998	3	0.54	8.47	9.3	42.5	105.3	83.3	2.43	----	0.00	2.07	0.009	0.159	0.273	0.387
3	1999	2	0.38	8.05	4.0	45.5	274.0	146.5	1.15	0.30	0.00	2.20	0.005	0.194	0.087	0.210
4	1997	4	0.26	8.20	9.7	53.0	45.0	118.5	0.73	----	0.19	1.73	0.016	0.120	0.313	0.430
4	1998	4	0.99	7.90	3.8	51.0	43.0	103.8	0.68	----	0.00	1.10	0.005	0.092	0.158	0.378
4	1999	3	0.64	8.07	3.3	10.0	99.0	101.7	0.60	0.50	0.75	1.30	0.010	0.126	0.097	0.289

MEAN EMC			Rain	pH	BOD	COD	TSS	TDS	N+NN	NH3	TKN	TN	Pb	Zn	DP	TP
			inches	----	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Qtr.	#		MEAN		MEAN EMC by Quarter											
1	21		0.75	7.91	3.8	18.8	123.0	108.3	0.61	----	0.57	2.15	0.009	0.116	0.079	0.237
2	11		0.96	8.38	5.4	32.4	171.5	74.2	0.60	----	0.60	2.28	0.009	0.117	0.254	0.478
3	8		0.63	8.34	7.4	39.9	310.0	109.6	1.50	0.30	0.18	1.89	0.011	0.166	0.215	0.342
4	11		0.63	8.05	5.4	40.5	59.0	108.5	0.67	0.50	0.27	1.41	0.011	0.112	0.197	0.373
Year	#		MEAN		MEAN EMC by Year											
1997	14		0.56	8.01	6.6	35.7	244.1	102.3	0.63	----	0.48	1.57	0.016	0.146	0.245	0.415
1998	15		0.94	8.37	5.7	42.8	112.2	94.6	0.94	----	0.19	1.81	0.008	0.125	0.218	0.465
1999	14		0.83	7.92	3.4	23.7	132.4	112.5	0.81	0.40	0.20	2.38	0.007	0.109	0.076	0.219
2000	8		0.61	8.22	3.6	5.8	80.8	92.0	0.58	----	1.33	2.63	0.007	0.108	0.038	0.153
Total	***51***	**Overall**	**0.75**	**8.12**	**5.0**	**29.5**	**149.0**	**101.2**	**0.76**	**0.40**	**0.45**	**1.96**	**0.010**	**0.123**	**0.162**	**0.335**
Lowest EMC value:			0.05	6.50	1.0	0.0	11.0	0.0	0.10	0.30	0.00	0.00	0.000	0.036	0.000	0.040
Median EMC value:			0.66	8.10	4.0	25.5	69.0	100.0	0.70	0.40	0.00	1.65	0.010	0.115	0.096	0.270
Highest EMC value:			3.57	9.60	16.0	114.0	950.0	184.0	4.60	0.50	5.04	9.40	0.035	0.263	0.660	1.820
Qtr.			COEFFICIENT OF VARIATION by Quarter													
1			0.42	0.06	0.61	0.81	1.10	0.30	0.56	----	2.15	0.78	0.70	0.39	1.17	0.61
2			1.10	0.07	0.41	0.56	0.86	0.63	0.32	----	0.95	1.15	0.74	0.50	0.86	1.08
3			0.51	0.07	0.49	0.57	1.05	0.33	0.87	----	2.04	0.42	1.06	0.44	0.88	0.41
4			0.89	0.03	0.77	0.87	1.05	0.30	0.31	----	1.80	0.38	0.51	0.42	0.90	0.61
Year			COEFFICIENT OF VARIATION by Year													
1997			0.65	0.06	0.53	0.56	1.14	0.44	0.41	----	1.09	0.70	0.49	0.45	1.00	0.58
1998			0.94	0.06	0.56	0.66	1.16	0.46	1.16	----	1.68	0.85	0.77	0.44	0.60	0.91
1999			0.64	0.06	0.64	0.77	1.06	0.23	0.37	0.35	2.16	0.95	0.75	0.49	0.57	0.37
2000			0.39	0.06	0.53	0.59	0.39	0.37	0.41	----	1.36	0.60	0.77	0.32	0.52	0.59
Total	***51***	**Overall**	**0.80**	**0.06**	**0.62**	**0.81**	**1.23**	**0.38**	**0.83**	**0.35**	**1.94**	**0.84**	**0.74**	**0.45**	**1.05**	**0.87**

TABLE A-14

Statistical Analysis For Wellington Drive Monitoring Station (WE)

MEAN EMC			Rain	pH	BOD	COD	TSS	TDS	N+NN	NH3	TKN	TN	Pb	Zn	DP	TP
			inches	----	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Qtr.	Year	#	MEAN		MEAN EMC for Individual Quarters											
1	1997	3	0.95	7.53	4.3	21.7	29.3	57.7	0.39	----	0.47	2.50	0.009	0.237	0.031	0.060
1	1998	4	0.48	8.43	5.0	40.8	110.3	88.5	0.68	----	0.09	1.43	0.012	0.162	0.215	0.765
1	1999	6	0.84	7.63	3.3	43.3	29.7	54.5	0.75	----	0.33	1.63	0.025	0.219	0.032	0.122
1	2000	5	0.83	7.74	2.6	5.6	23.8	56.8	0.46	----	1.51	1.93	0.007	0.145	0.040	0.120
2	1997	3	0.32	7.30	9.0	42.7	45.3	164.7	0.93	0.60	1.04	7.27	0.005	0.177	0.423	0.650
2	1998	3	0.31	8.60	6.7	70.3	101.0	40.0	0.83	----	0.93	2.37	----	0.152	0.103	0.133
2	1999	2	0.65	8.70	3.5	21.5	23.0	72.0	0.40	----	0.00	3.85	0.005	0.052	0.105	0.140
2	2000	2	0.25	8.00	7.0	11.0	32.0	27.5	0.55	0.50	0.00	1.50	0.007	0.158	0.025	0.045
3	1997	3	0.24	7.67	14.3	58.3	94.0	151.3	1.33	----	0.63	3.23	0.005	0.100	0.413	0.463
3	1998	1	0.16	8.20	4.0	43.0	9.0	----	0.60	----	0.00	1.70	0.002	0.127	1.170	1.220
3	1999	3	0.51	8.03	10.5	45.1	86.7	119.7	0.77	0.30	0.75	1.23	0.014	0.232	0.109	0.105
4	1997	3	0.27	8.17	11.0	53.0	61.3	73.3	0.80	----	1.47	1.27	0.014	0.138	0.097	0.190
4	1998	8	0.34	7.61	6.0	38.6	26.1	95.8	0.94	0.57	0.63	1.45	0.006	0.124	0.210	0.446
4	1999	2	0.81	8.15	4.5	15.8	40.5	91.0	0.70	----	0.28	5.25	0.009	0.156	0.233	0.117

MEAN EMC			Rain	pH	BOD	COD	TSS	TDS	N+NN	NH3	TKN	TN	Pb	Zn	DP	TP
			inches	----	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Qtr.	#		MEAN		MEAN EMC by Quarter											
1	18		0.77	7.82	3.7	28.7	45.9	63.2	0.59	----	0.63	1.82	0.013	0.187	0.080	0.262
2	10		0.37	8.11	6.8	40.4	54.9	81.3	0.72	0.55	0.59	4.23	0.005	0.139	0.184	0.272
3	7		0.34	7.90	11.3	50.5	78.7	135.5	0.99	0.30	0.59	2.16	0.010	0.161	0.391	0.418
4	13		0.40	7.82	6.6	38.4	36.5	89.8	0.87	0.57	0.77	2.09	0.009	0.133	0.187	0.336
Year	#		MEAN		MEAN EMC by Year											
1997	12		0.45	7.67	9.5	43.9	57.5	111.8	0.86	0.60	0.90	3.57	0.009	0.163	0.241	0.341
1998	16		0.36	8.04	5.7	45.8	60.1	82.7	0.83	0.57	0.51	1.66	0.008	0.139	0.251	0.516
1999	13		0.73	7.97	4.8	36.1	43.5	77.8	0.69	0.30	0.37	2.58	0.016	0.184	0.097	0.120
2000	7		0.66	7.81	3.9	7.1	26.1	48.4	0.49	0.50	1.08	1.83	0.007	0.149	0.035	0.095
Total	***48***	**Overall**	**0.52**	**7.89**	**6.1**	**36.9**	**50.0**	**83.7**	**0.75**	**0.52**	**0.65**	**2.48**	**0.010**	**0.159**	**0.180**	**0.308**
Lowest EMC value:			0.08	6.90	1.0	0.0	8.0	0.0	0.20	0.00	0.00	0.50	0.002	0.045	0.002	0.030
Median EMC value:			0.41	7.80	5.0	33.0	36.0	69.0	0.60	0.40	0.25	1.60	0.007	0.135	0.089	0.150
Highest EMC value:			1.40	8.80	18.0	181.0	224.0	268.0	1.90	1.70	3.57	20.20	0.068	0.677	1.170	1.830
Qtr.					COEFFICIENT OF VARIATION by Quarter											
1			0.45	0.05	0.43	1.45	1.10	0.88	0.74	----	1.65	0.76	1.22	0.84	1.21	1.39
2			0.59	0.08	0.39	0.71	0.69	1.13	0.42	0.13	1.63	1.50	0.21	0.70	1.01	1.07
3			0.88	0.03	0.47	0.46	0.75	0.50	0.62	----	1.01	0.56	0.73	0.52	0.99	0.96
4			0.75	0.05	0.56	0.53	0.53	0.63	0.52	1.73	1.37	0.81	0.50	0.24	1.29	1.41
Year					COEFFICIENT OF VARIATION by Year											
1997			0.74	0.05	0.48	0.51	0.53	0.81	0.61	----	1.06	1.54	0.55	0.73	0.87	0.79
1998			0.82	0.06	0.50	0.46	0.93	0.95	0.64	1.73	1.71	0.48	0.66	0.26	1.30	1.05
1999			0.48	0.05	0.67	1.33	1.02	0.46	0.53	----	1.78	0.91	1.18	0.95	0.99	0.41
2000			0.53	0.04	0.62	0.60	0.67	0.50	0.28	----	1.33	0.36	0.64	0.43	0.47	0.77
Total	***48***	**Overall**	**0.68**	**0.06**	**0.63**	**0.87**	**0.87**	**0.82**	**0.61**	**1.22**	**1.45**	**1.31**	**1.08**	**0.70**	**1.32**	**1.24**

TABLE A-15

Statistical Analysis For The Other 4 Monitoring Stations

MEAN EMC				Rain	pH	BOD	COD	TSS	TDS	N+NN	NH3	TKN	TN	Pb	Zn	DP	TP
				inches	----	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
	Qtr.	Year	#	MEAN		MEAN EMC for Individual Quarters											
FN	1	1997	3	0.82	7.40	3.7	27.3	98.7	126.7	0.57	----	0.54	1.47	0.018	0.062	0.077	0.207
FN	2	1997	3	0.63	7.43	5.3	29.3	28.7	45.0	0.93	----	0.58	1.80	0.011	0.071	0.343	0.437
LC	4	2000	3	0.49	6.67	2.7	3.7	65.7	218.7	0.57	----	0.93	1.00	----	0.051	0.055	0.349
LC	1	2001	6	0.46	7.00	4.4	3.5	38.5	284.2	0.47	----	1.03	2.10	----	0.039	0.113	0.023
SC	3	2000	1	0.33	8.20	8.0	5.0	142.0	158.0	0.50	----	4.20	1.50	0.017	0.138	----	0.055
SC	4	2000	1	0.95	7.00	11.0	5.0	104.0	89.0	0.80	----	2.80	0.60	0.009	0.065	----	0.502
SC	1	2001	5	0.80	6.80	5.5	4.0	153.8	137.2	0.52	----	1.12	----	0.032	0.113	0.047	0.083
SC	2	2001	4	0.47	7.00	6.8	105.5	137.5	199.5	1.18	0.20	4.90	8.50	0.030	0.166	0.090	0.138
WD	4	1999	3	0.54	7.53	4.7	8.7	265.7	64.3	0.40	----	1.03	2.13	0.009	0.132	0.077	0.413
WD	1	2000	5	0.81	7.84	3.4	6.8	230.0	113.4	0.58	----	1.34	2.00	0.007	0.141	0.061	0.177
WD	2	2000	3	0.57	7.93	2.7	3.3	91.0	143.0	0.63	----	0.47	1.20	0.019	0.083	0.047	0.090
WD	3	2000	3	0.23	9.13	7.0	11.7	90.0	201.7	0.53	----	1.68	0.65	----	0.130	0.030	0.045
WD	4	2000	1	0.77	6.00	6.0	2.4	188.0	102.0	0.40	----	0.84	0.20	----	0.047	0.031	0.071
WD	1	2001	5	0.48	7.00	4.8	5.4	137.6	224.2	0.42	----	1.01	1.00	0.013	0.086	0.040	0.065
WD	2	2001	1	0.93	7.00	5.0	39.7	590.0	129.0	0.29	----	1.00	0.76	0.011	0.230	0.170	0.170
		#		MEAN		MEAN EMC for Each Station											
FN		6		0.73	7.42	4.5	28.3	63.7	85.8	0.75	----	0.56	1.64	0.015	0.067	0.210	0.322
LC		9		0.47	6.89	3.8	3.6	47.6	262.3	0.50	----	1.00	1.28	----	0.043	0.088	0.186
SC		11		0.65	7.02	6.8	41.1	142.3	157.4	0.78	0.20	2.93	6.02	0.027	0.130	0.071	0.139
WD		21		0.58	7.67	4.5	8.3	188.4	149.8	0.49	----	1.10	1.36	0.010	0.117	0.057	0.152

TABLE A-16

Overall EMC Statistical Analysis

MEAN EMC			Major	Rain	pH	BOD	COD	TSS	TDS	N+NN	TKN	TN	Pb	Zn	DP	TP
			Land	inches	----	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Location		#	Use	MEAN		Overall Mean EMC for Individual Monitoring Stations										
AP	Acker Place	60	Industr	0.51	8.15	5.8	27.5	177.9	116.5	0.66	0.52	2.49	0.009	0.157	0.101	0.252
FC	First Creek	46	Resid	0.86	7.96	5.3	21.6	167.7	129.4	0.87	0.82	1.99	0.015	0.113	0.293	0.439
FN	Fountain City	6	Resid	0.73	7.42	4.5	28.3	63.7	85.8	0.75	0.56	1.64	0.015	0.067	0.210	0.322
GV	Gallaher View	36	Resid	1.01	7.93	5.3	37.5	285.9	90.8	0.69	0.54	2.31	0.024	0.085	0.421	0.766
LC	Love Creek	9	Mixed	0.47	6.89	3.8	3.6	47.6	262.3	0.50	1.00	1.28	----	0.043	0.088	0.186
SC	Second Creek	11	Mixed	0.65	7.02	6.8	41.1	142.3	157.4	0.78	2.93	6.02	0.027	0.130	0.071	0.139
TC	Third Creek	51	Industr	0.75	8.12	5.0	29.5	149.0	101.2	0.76	0.45	1.96	0.010	0.123	0.162	0.335
WD	Walden Drive	21	Resid	0.58	7.67	4.5	8.3	188.4	149.8	0.49	1.10	1.36	0.010	0.117	0.057	0.152
WE	Wellington Drive	48	Commer	0.52	7.89	6.1	36.9	50.0	83.7	0.75	0.65	2.48	0.010	0.159	0.180	0.308
TOTAL		**288**		**0.69**	**7.91**	**5.4**	**28.1**	**156.3**	**115.1**	**0.72**	**0.73**	**2.29**	**0.013**	**0.126**	**0.193**	**0.358**
						Overall Mean EMC for Individual Quarters										
Quarter 01		109		0.73	7.69	4.2	21.7	145.5	122.2	0.62	0.67	1.86	0.016	0.124	0.095	0.254
Quarter 02		81		0.66	8.12	5.7	34.3	152.4	103.0	0.71	0.82	3.07	0.011	0.120	0.333	0.508
Quarter 03		44		0.56	7.99	8.1	32.6	274.0	134.6	0.97	0.75	1.79	0.012	0.145	0.212	0.314
Quarter 04		54		0.70	7.68	5.2	27.8	81.8	99.0	0.70	0.67	1.76	0.011	0.117	0.149	0.348
			#			Overall Mean EMC for Different Types of Land Use										
Commercial			48	0.52	7.89	6.1	36.9	50.0	83.7	0.75	0.65	2.48	0.010	0.159	0.180	0.308
Industrial			111	0.62	8.13	5.4	28.4	164.6	109.5	0.71	0.49	2.25	0.009	0.142	0.129	0.290
Mixed (entire watershed)			20	0.57	6.96	5.4	24.2	99.7	204.6	0.66	2.06	3.88	0.027 **	0.091	0.079	0.160
Residential			109	0.85	7.86	5.1	24.7	205.0	118.2	0.73	0.77	1.95	0.017	0.102	0.285	0.485

** This value for lead (Pb) comes from Second Creek since there are no Pb values from Love Creek.

Figure A-1
Seasonal Storm Event Rainfall Average

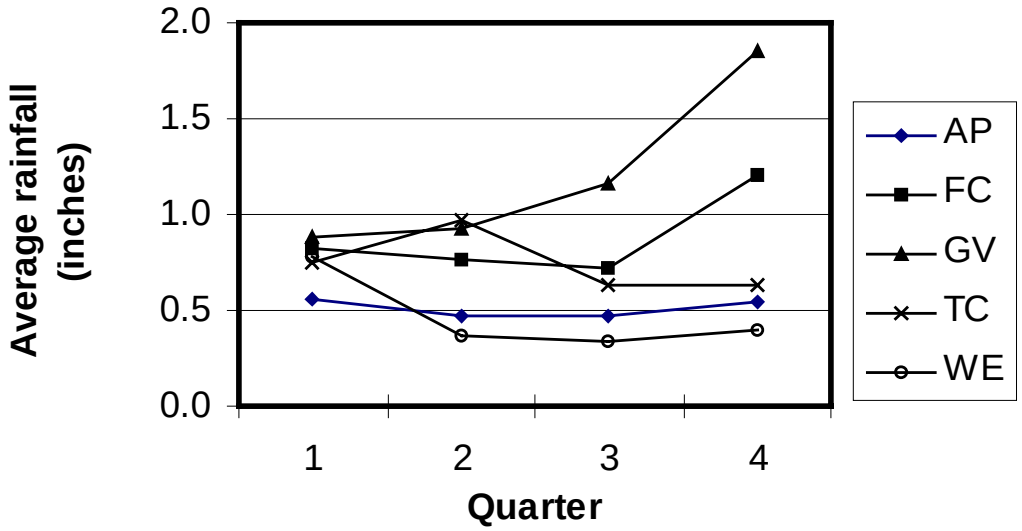
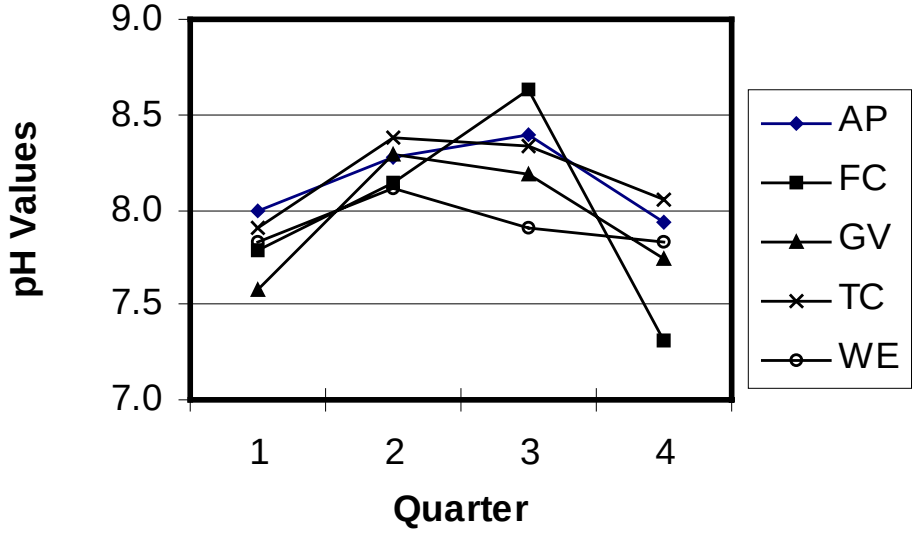


Figure A-2
Seasonal Storm Event pH Average



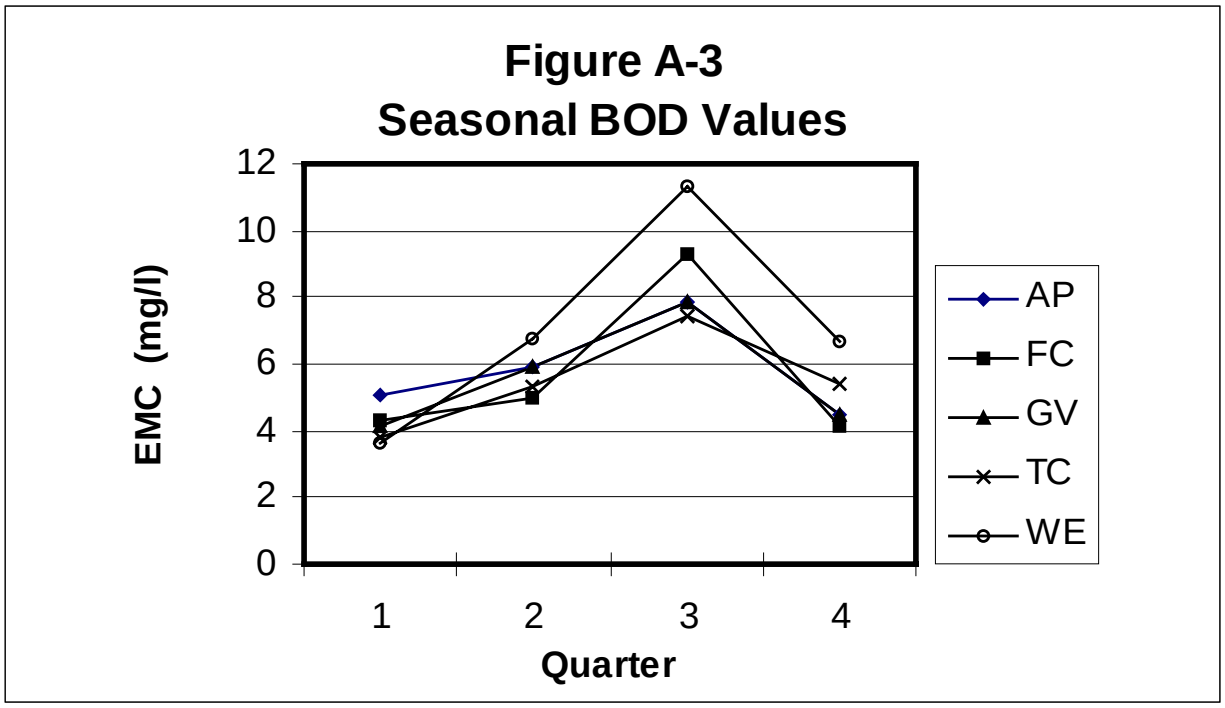


Figure A-3
Seasonal BOD Values
EMC (mg/l)
12
10
8
6
4
2
0
1
2
3
4
Quarter
AP
FC
GV
TC
WE

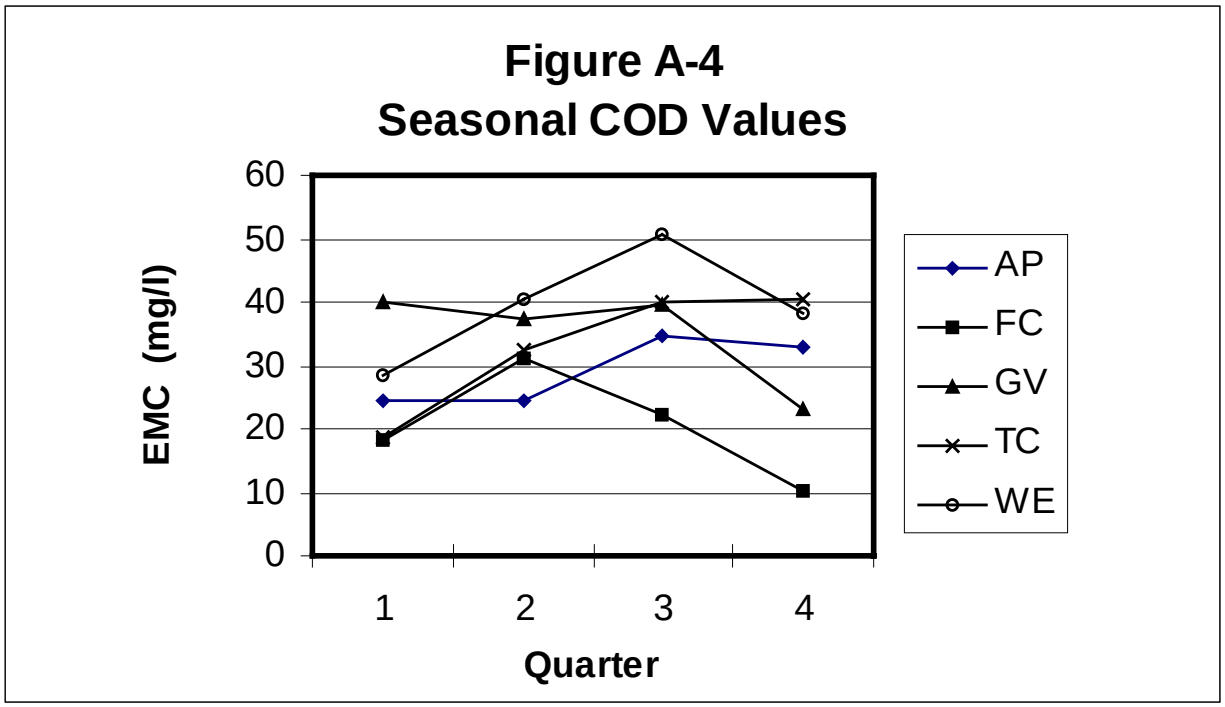


Figure A-4
Seasonal COD Values
EMC (mg/l)
60
50
40
30
20
10
0
1
2
3
4
Quarter
AP
FC
GV
TC
WE

Figure A-5
Seasonal TSS Values

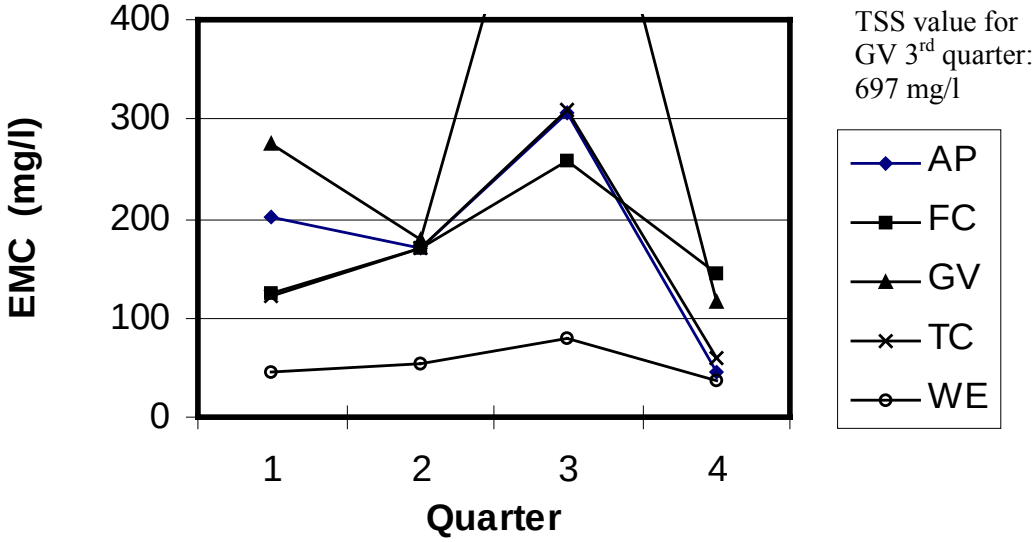
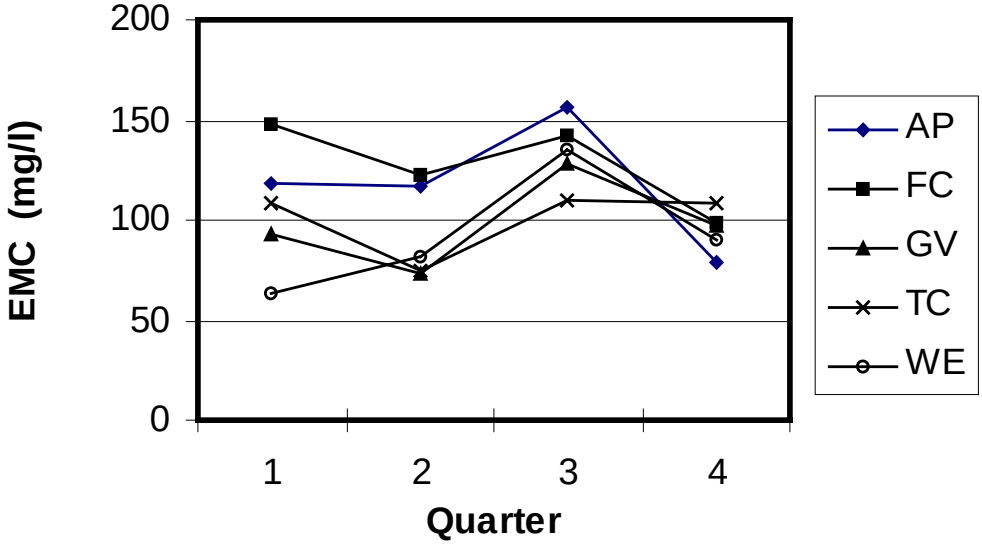


Figure A-6
Seasonal TDS Values



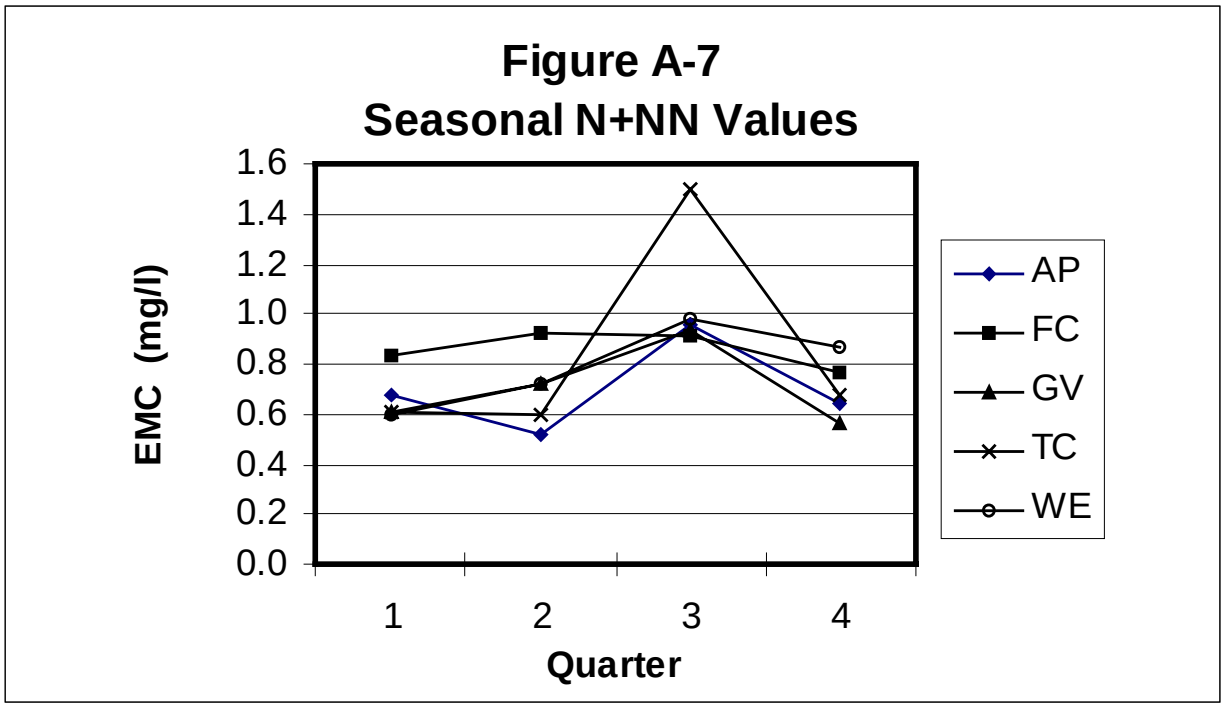


Figure A-7
Seasonal N+NN Values
EMC (mg/l)
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1
2
3
4
Quarter
AP
FC
GV
TC
WE

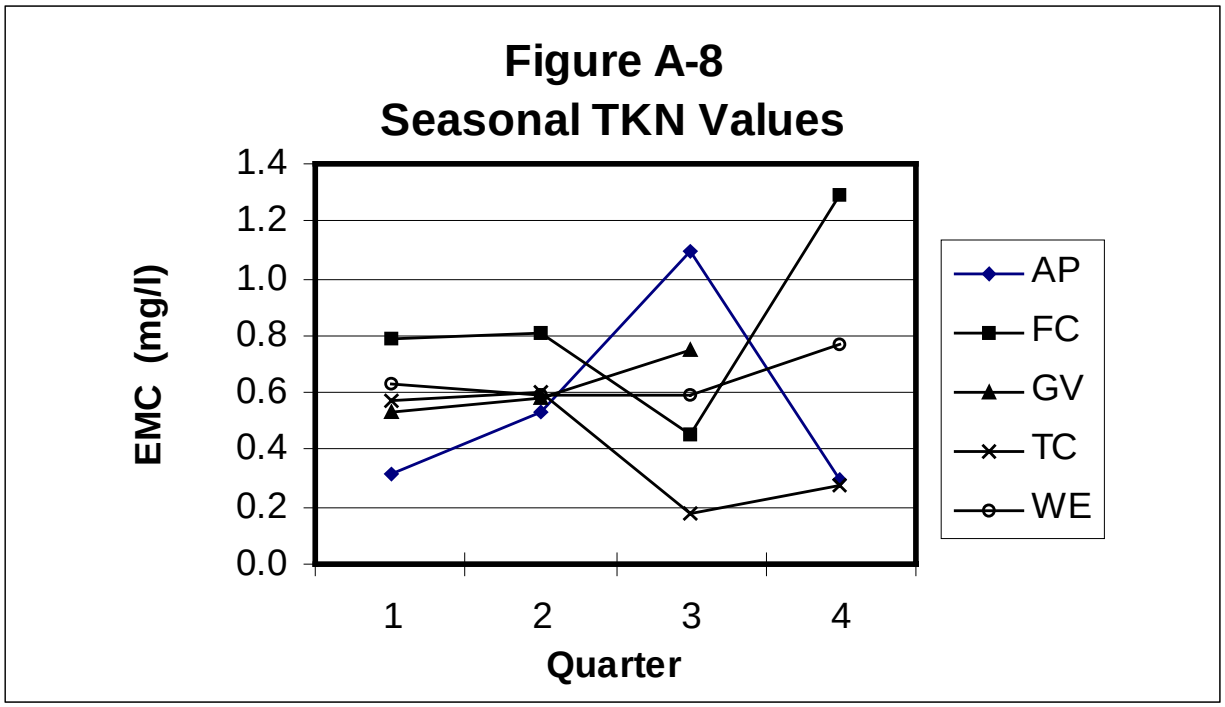


Figure A-8
Seasonal TKN Values
EMC (mg/l)
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1
2
3
4
Quarter
AP
FC
GV
TC
WE

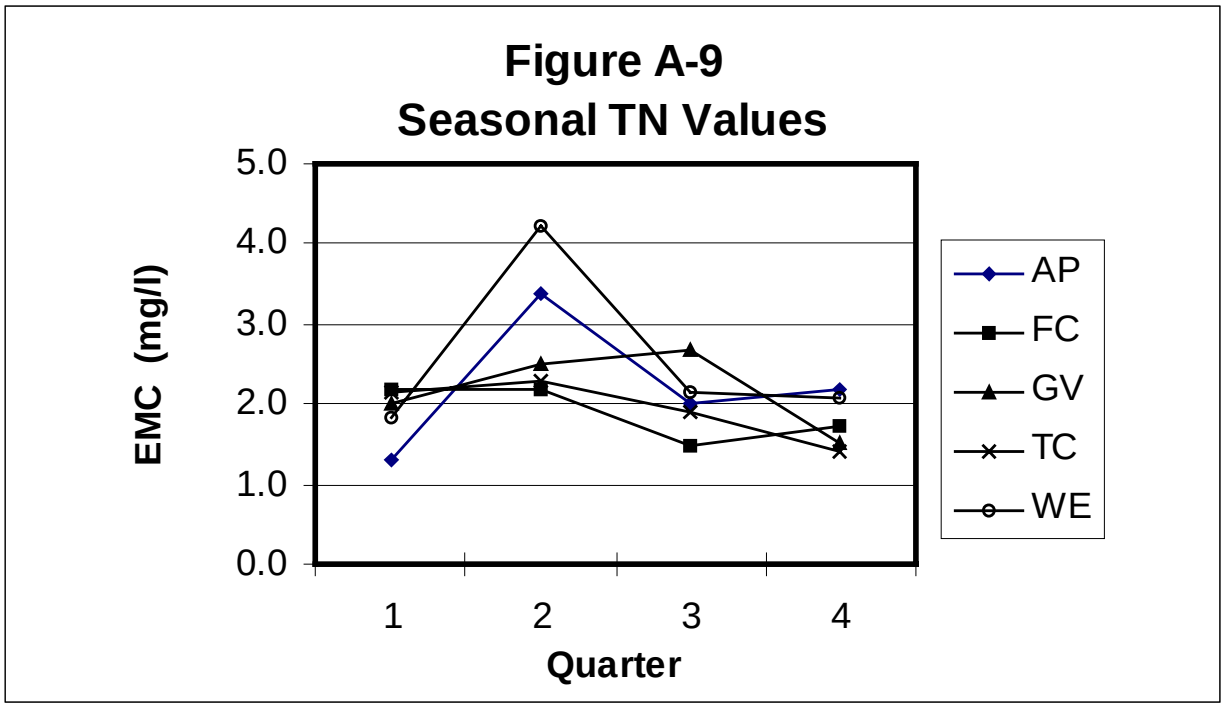


Figure A-9
Seasonal TN Values
EMC (mg/l)
5.0
4.0
3.0
2.0
1.0
0.0
1
2
3
4
Quarter
AP
FC
GV
TC
WE

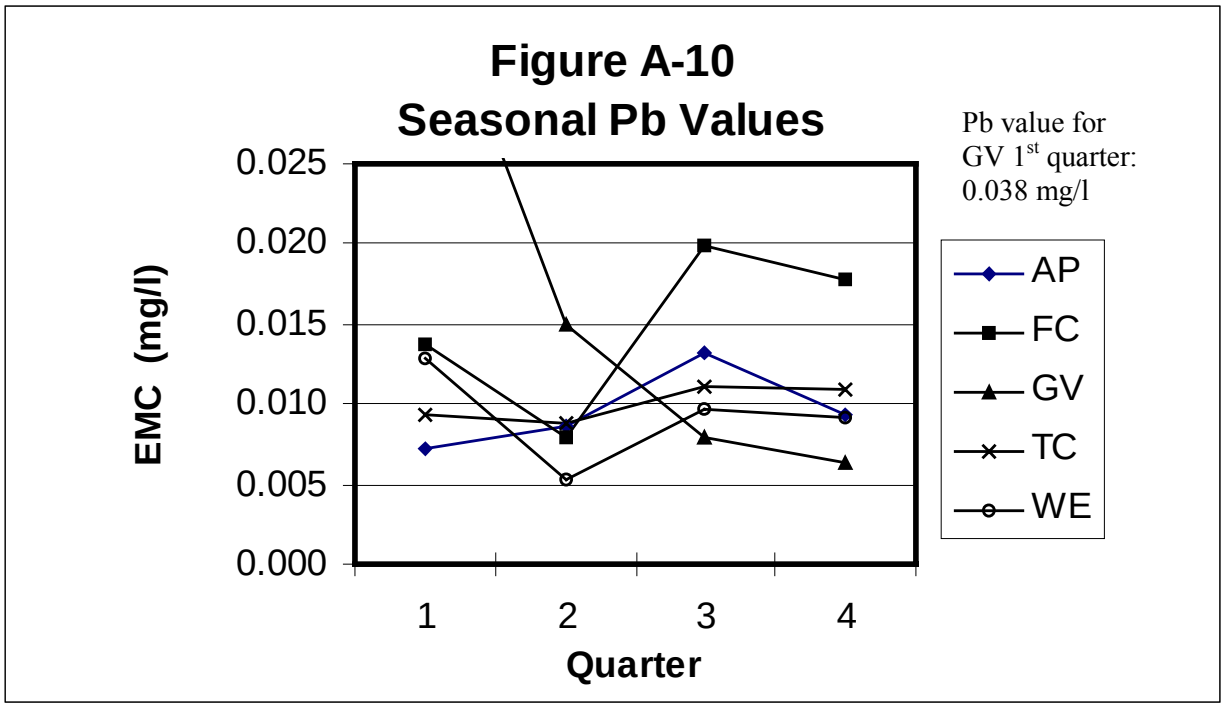


Figure A-10
Seasonal Pb Values
EMC (mg/l)
0.025
0.020
0.015
0.010
0.005
0.000
1
2
3
4
Quarter
AP
FC
GV
TC
WE
Pb value for
GV 1st quarter:
0.038 mg/l

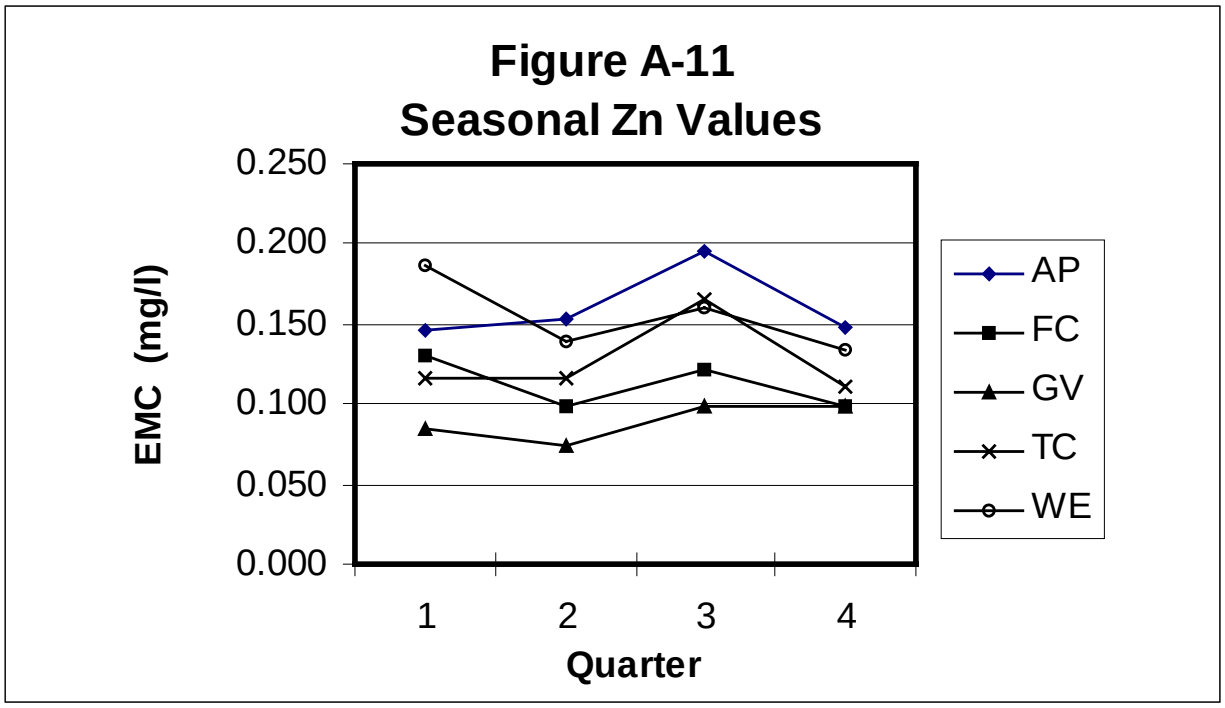


Figure A-11
Seasonal Zn Values
EMC (mg/l)
0.250
0.200
0.150
0.100
0.050
0.000
1
2
3
4
Quarter
AP
FC
GV
TC
WE

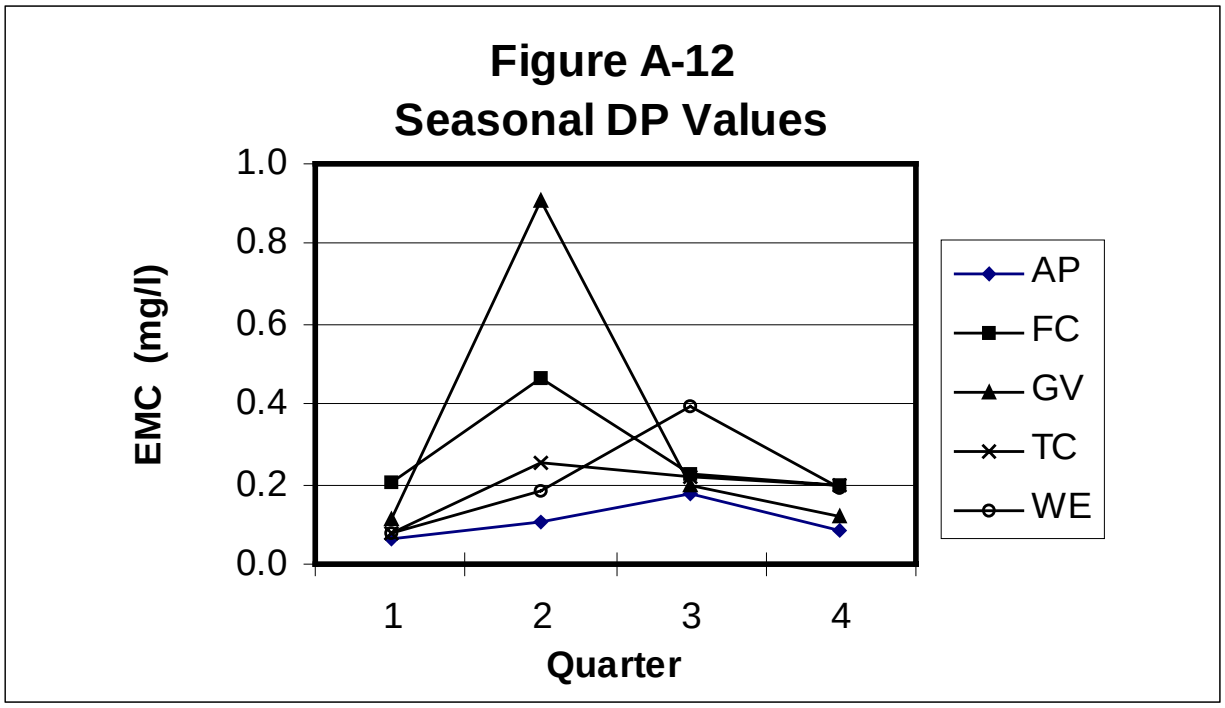


Figure A-12
Seasonal DP Values
EMC (mg/l)
1.0
0.8
0.6
0.4
0.2
0.0
1
2
3
4
Quarter
AP
FC
GV
TC
WE

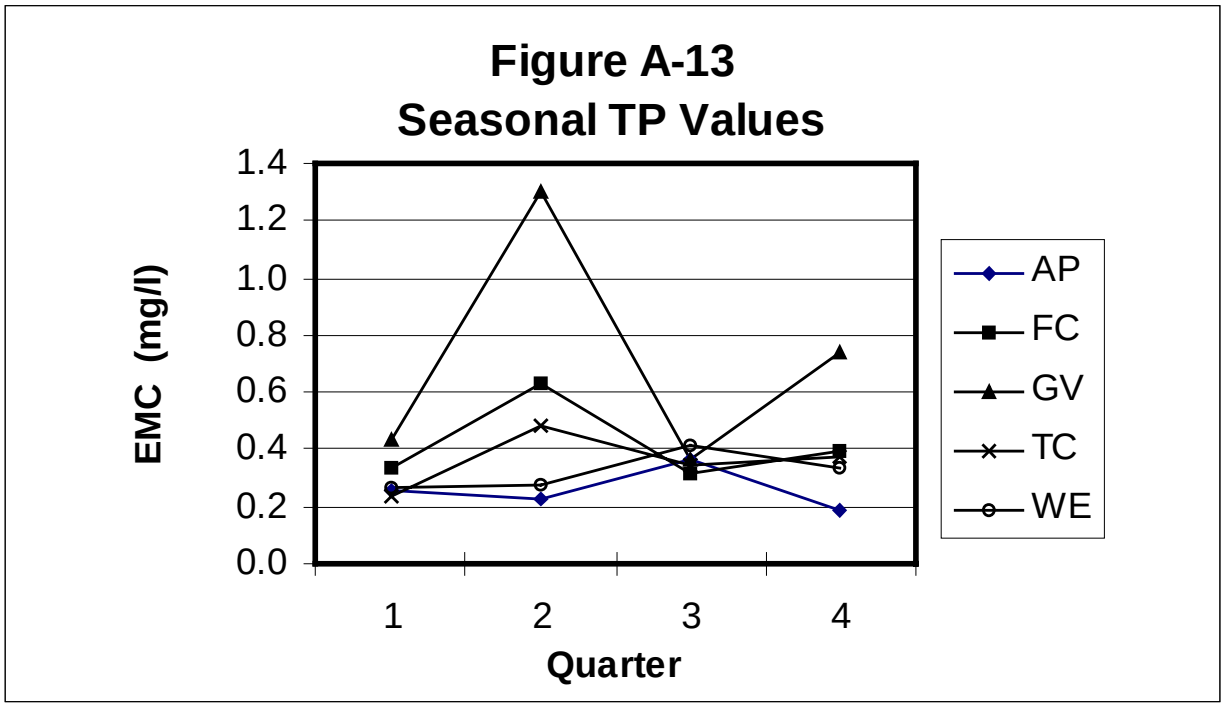


Figure A-13
Seasonal TP Values
EMC (mg/l)
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1
2
3
4
Quarter
AP
FC
GV
TC
WE

Figure A-14
EMCs by Land Use

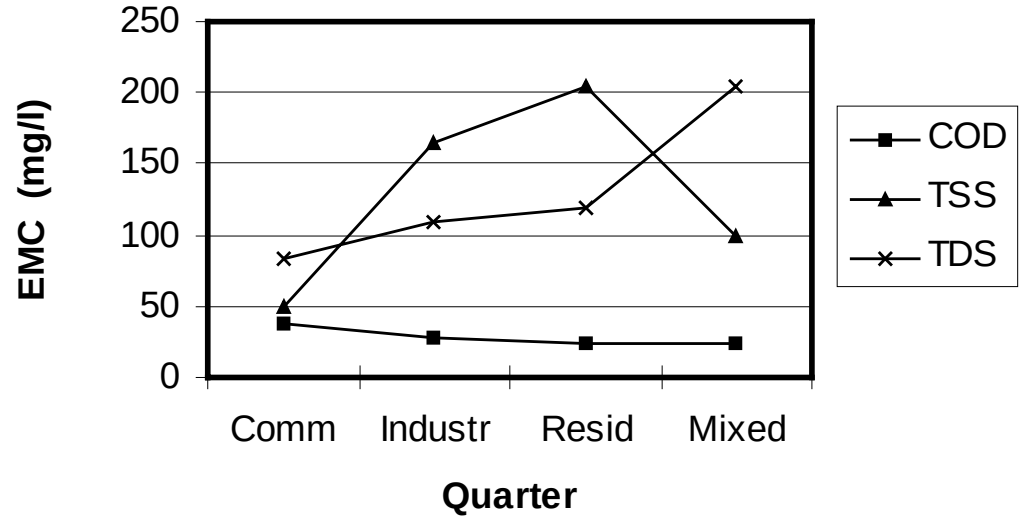


Figure A-15
EMCs by Land Use

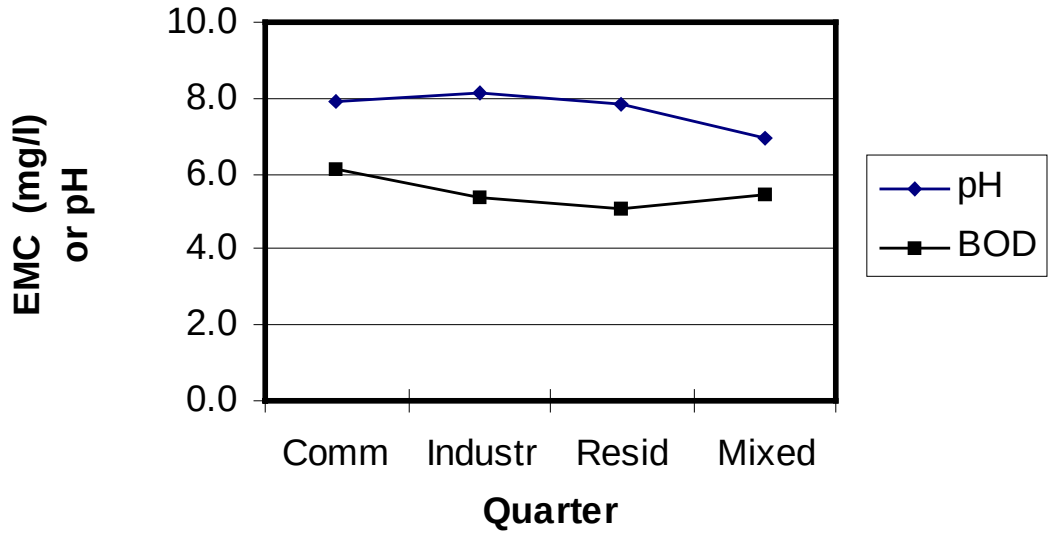


Figure A-16
EMCs by Land Use

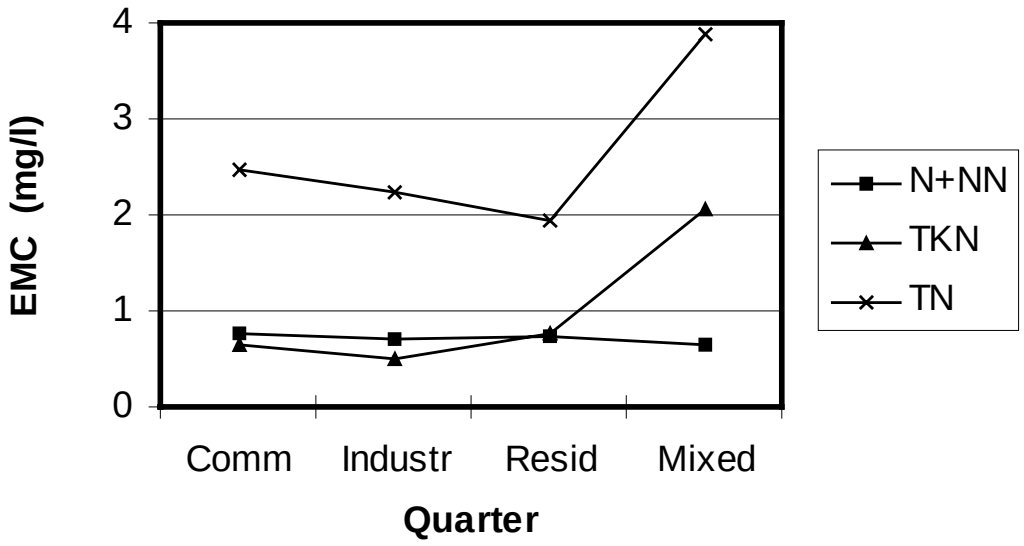
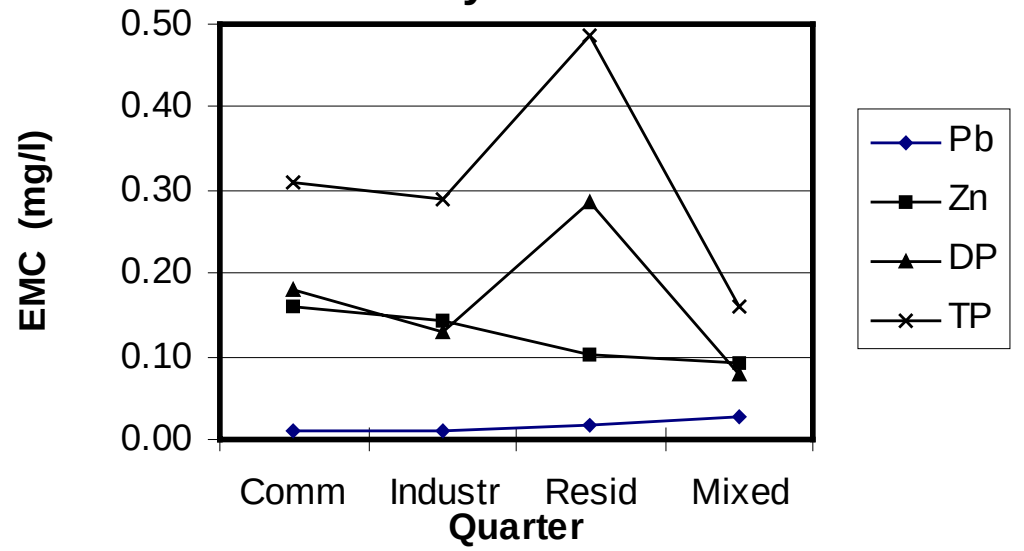


Figure A-17
EMCs by Land Use



A.7 COMPUTATION OF SEASONAL POLLUTANT LOADINGS

For each of the previous four NPDES annual reports, the City of Knoxville has computed an estimate of the total volume of urban runoff within Section 6.2, as required by Part VI (A)(2)(e)(i)(3) of the NPDES permit. The basic formulation for computing the total runoff estimate is described in Chapter 4 of the Part 2 NPDES Application (CDM, 1993),

Seasonal pollutant loadings are computed with the Watershed Management Module (WMM); current edition is WMM for Windows Version 4.17. WMM is a commonly used pollutant loading program, originally developed by CDM for the Rouge River watershed in southeastern Michigan. Each land use is assigned an impervious percentage according to the CDM model described in the Part 2 NPDES Application (pages 4-14 to 4-18). It is assumed for each land use that 95 percent of the rainfall from the impervious fraction, and 15 percent of the rainfall from the pervious fraction, is converted into stormwater runoff over a long-term period.

The City has updated watershed areas using GIS technology to determine approximate areas within the city limits, along with the corresponding land uses. The City of Knoxville has grown over the NPDES time period by a process of annexing property within the core watersheds and also property along the interstates and major roadways. Table A-17 illustrates the changes in city limits for the 26 watersheds that are currently reported for the City of Knoxville.

Table A-18 shows the current watershed areas and land uses for the 26 watersheds. The land use categories are basically the original CDM categories, with a few modifications to more closely match the Knoxville zoning classifications. The data in Table A-18 is used as input to the WMM program.

Table A-19 shows the EMC values that were originally used in the 1993 CDM analysis (essentially the NURP general averages) and the EMC values used to generate new pollutant loadings. The new estimates have lower EMC values for BOD, COD, TSS, TKN, Pb and Zn. However, the new estimates have higher EMC values for N+NN and DP.

Tables A-20 through A-23 contain the reported values from the WMM program using the seasonal rainfall averages. The results are summarized in Table A-24 and represent the best current estimate of seasonal pollutant loadings that are discharged from Knoxville's streams and creeks.

TABLE A-17
Changes to Knoxville Watersheds From 1993 to 2001

Knoxville Watershed		One of 17 major watersheds as listed in Part 2 NPDES Application (CDM, 1993)	Acres Within City Limits		Total Acres Within Stream Watershed	Current Values (Year 5)	
Name	ID #		Year 1 (1997)	Year 5 (2001)		% Within City Limits	Estimated % Impervious
Baker Creek	06	Yes	1674	1674	1674	100.0	32.2
Beaver Creek	71	---	---	162	45959	0.4	16.0
East Fork (Third)	13	***	2509	2509	2509	100.0	52.8
First Creek	01	Yes	7750	7750	7750	100.0	43.6
Fourth Creek	04	Yes	5919	5920	6769	87.5	40.9
French Broad River **	30	---	---	551	12639	0.4	11.1
Goose Creek	05	Yes	1672	1755	2381	73.7	34.7
Grassy Creek	77	---	217	433	4301	10.1	17.0
Holston River **	50	Yes	2455	2455	5632	43.6	27.7
Inman Branch	52	---	99	99	1143	8.7	20.6
Knob Creek	08	Yes	989	989	3966	24.9	19.3
Knob Fork	79	Yes	685	823	3752	21.9	22.2
Love Creek	53	Yes	4906	5090	6408	79.4	36.4
Second Creek	02	Yes	4335	4498	4503	99.9	52.6
Sinking Creek	18	Yes	368	2434	5447	44.7	33.1
Sinking Cr (East)*	---	---	---	91	2027	4.5	11.8
Swanpond Creek	51	---	226	499	7151	7.0	19.2
Ten Mile Creek	10	Yes	3648	3921	10006	39.2	37.6
Third Creek	03	Yes	8087	8417	8739	96.3	37.1
Tennessee River **	00	Yes	8232	8232	20854	39.5	22.2
Toll Creek	09	Yes	735	767	1229	62.4	21.6
Tuckahoe Creek	---	---	---	229	6169	3.7	8.5
Turkey Creek	12	Yes	831	1677	10216	16.4	29.3
Whites Creek	11	***	1543	1634	7055	23.2	23.4
Williams Creek	07	Yes	1598	1605	1641	97.8	37.5
Woods Creek	54	Yes	6	143	2608	5.5	23.0
TOTALS		Originally: 17 Currently: 26	**58,484**	**64,357**	**192,528**	**----**	**24.9**

** For the three main rivers, only a small defined portion of the total river watershed is included for the fifth column (Total Acres Within Stream Watershed).

*** East Fork and Whites Creek were each part of one of the 17 original watersheds (Third & First, respectively).

TABLE A-18 Knoxville Watershed Land Uses

Watershed	Agriculture, Forest, Open, Public Parks	Vacant Land (> 10 acres)	Rural Residential	Single Family Residential	Private Recreation, Public Land	Multi Family Residential, Churches	Institutional	Service Industries, Offices, Mining	Manufacturing, Wholesale	Commercial, Transportation, Utility, Commun	Major Roads, Highways, Right-Of-Ways	Under Construction	Unknown Land Use	Total Acres in the Stream Watershed	Total Acres Within Knoxville City Limits	% Impervious For Entire Watershed
% Impervious	*1*	*5*	*20*	*25*	*35*	*40*	*50*	*60*	*72*	*85*	*95*	*100*	----			
Baker Cr.	412	2	107	640	90	77	32	1	1	3	269	13	27	1,674	1,674	32.25
Beaver Cr	21,174	0	0	21,230	1,292	845	4	259	283	712	0	160	0	45,959	162	16.04
East Fork	313	0	10	475	302	78	73	31	195	235	584	33	180	2,509	2,509	52.84
First Cr.	724	0	300	3,152	544	501	110	157	127	556	1,412	51	116	7,750	7,750	43.64
Fourth Cr.	965	57	423	2,026	468	406	93	206	201	568	881	61	414	6,769	5,920	40.93
Fr.Broad riv	8,954	0	0	2,744	73	40	24	24	497	117	0	166	0	12,639	551	11.08
Goose Cr.	639	40	126	669	213	67	8	21	77	131	327	34	29	2,381	1,755	34.72
Grassy Cr.	2,230	176	561	610	215	24	0	14	31	95	211	39	95	4,301	433	17.02
Holston R.	2,362	69	371	1,222	417	45	5	2	219	33	805	32	50	5,632	2,455	27.66
Inman Br.	563	33	214	138	4	12	0	0	0	0	145	0	34	1,143	99	20.61
Knob Cr.	1,719	195	481	843	125	84	1	19	1	29	296	4	169	3,966	989	19.28
Knob Fork	1,659	26	398	675	182	56	5	93	6	124	257	19	252	3,752	823	22.17
Love Cr.	1,735	102	505	1,625	311	212	51	94	178	408	1,038	46	103	6,408	5,090	36.38
Second Cr.	443	0	90	1,281	346	247	29	107	140	542	1,161	35	82	4,503	4,498	52.63
Sinking Cr.	1,614	146	459	1,266	284	90	17	33	31	267	881	12	347	5,447	2,434	33.12
Sinking (East)	1,226	0		728	9	17	0	17	3	27	0	0	0	2,027	91	11.82
Swanpond Cr.	3,892	303	833	604	121	36	4	79	240	232	457	65	285	7,151	499	19.24
Ten Mile Cr.	1,879	0	638	3,421	165	895	55	115	58	615	1,500	24	641	10,006	3,921	37.56
Third Cr.	1,757	79	436	3,003	406	512	184	124	225	443	1,252	98	220	8,739	8,417	37.09
TN River	7,197	503	2,269	4,681	2,910	403	187	72	170	238	990	121	1,113	20,854	8,232	22.16
Toll Cr.	535	69	154	222	42	26	1	0	37	4	93	42	4	1,229	767	21.58
Tuckahoe	4,293	0	0	1,829	18	14	0	8	2	1	0	4	0	6,169	229	8.46
Turkey Cr.	3,353	235	603	2,693	264	343	121	104	91	442	1,161	68	738	10,216	1,677	29.30
Whites Cr.	2,733	154	782	1,298	575	59	31	11	49	126	608	51	578	7,055	1,634	23.37
Williams Cr.	358	11	47	561	46	96	125	17	10	61	276	3	30	1,641	1,605	37.49
Woods Cr.	1,220	106	281	371	0	26	0	2	140	43	261	1	157	2,608	143	23.01
TOTAL	73,949	2,306	10,088	58,007	9,422	5,211	1,160	1,610	3,012	6,052	14,865	1,182	5,664	**192,528**	**64,357**	**24.86**

TABLE A-19
EMC Values for WMM Analysis

	Imperv %	BOD mg/l	COD mg/l	TSS mg/l	TDS mg/l	N+NN mg/l	TKN mg/l	TN mg/l	Pb mg/l	Zn mg/l	DP mg/l	TP mg/l
Original WMM Analysis - CDM, 1993												
Forest/Open/Agriculture/Pasture/Cropland	5.0	8.0	51	216	100	0.73	1.36	----	0.00	0.00	0.06	0.23
Low Density Single Family (LDSF)	10.0	8.5	54	133	62	0.41	0.57	----	0.17	0.12	0.13	0.28
MDSF / Institutional	25.0	17.4	148	614	107	0.49	1.47	----	0.46	0.42	0.15	0.78
High Density Residential (HDR)	45.0	17.4	148	614	107	0.49	1.47	----	0.46	0.42	0.15	0.78
Commercial	90.0	13.5	74	100	68	0.50	0.83	----	0.29	0.17	0.19	0.45
Office / Light Industrial	65.0	12.6	70	116	90	0.60	0.63	----	0.16	0.30	0.05	0.21
Heavy Industrial	80.0	12.6	70	116	90	0.60	0.63	----	0.16	0.30	0.05	0.21
Water and Wetlands	100.0	9.7	61	91	100	0.63	1.28	----	0.13	0.33	0.10	0.24
Major Highway	90.0	9.7	94	104	30	0.74	1.65	----	0.26	0.24	0.17	0.33
Public Recreation / Public Land	35.0	17.4	148	614	107	0.49	1.47	----	0.46	0.42	0.15	0.78
Updated WMM Analysis - COK, 2001												
Agriculture/Forest/Vacant/Public Parks	1.0	5.1	25	205	118	0.73	0.77	1.95	0.017	0.102	0.285	0.485
Vacant lots, greater than 10 acres	5.0	5.1	25	205	118	0.73	0.77	1.95	0.017	0.102	0.285	0.485
Rural Residential	20.0	5.1	25	205	118	0.73	0.77	1.95	0.017	0.102	0.285	0.485
Single Family Residential	25.0	5.1	25	205	118	0.73	0.77	1.95	0.017	0.102	0.285	0.485
Private Recreation / Public Lands	35.0	5.1	25	205	118	0.73	0.77	1.95	0.017	0.102	0.285	0.485
Multi Family Residential / Churches	40.0	5.1	25	205	118	0.73	0.77	1.95	0.017	0.102	0.285	0.485
Institutional	50.0	6.1	37	50	84	0.75	0.65	2.48	0.010	0.159	0.180	0.308
Office / Service	60.0	6.1	37	50	84	0.75	0.65	2.48	0.010	0.159	0.180	0.308
Manufacturing / Wholesale	72.0	6.1	37	165	110	0.75	0.65	2.48	0.010	0.159	0.180	0.308
Commercial / Utilities / Transportation	85.0	6.1	37	165	110	0.75	0.65	2.48	0.010	0.159	0.180	0.308
Major Roads / Highways / Right-Of-Way	95.0	6.1	37	165	110	0.75	0.65	2.48	0.010	0.159	0.180	0.308
Under Construction	100.0	6.1	37	165	110	0.75	0.65	2.48	0.010	0.159	0.180	0.308

TABLE A-20

Seasonal Pollutant Loadings - Quarter 01 (Winter)

Watershed	Area in City Limits	% Impervious over entire watershed	Flow Volume	(using average quarterly rainfall of **13.23** inches)			
				BOD	COD	TSS	TDS
Baker Creek	1674	32.2	245.3	11,356	61,692	371,740	221,040
Beaver Creek	162	16.0	16.2	703	3,529	26,602	15,165
East Fork (Third)	2509	52.8	516.2	25,242	145,720	707,560	433,380
First Creek	7750	43.6	1389.5	65,623	365,890	2,020,500	1,228,300
Fourth Creek	5920	40.9	1015.3	48,122	268,760	1,456,000	890,190
French Broad River	551	11.1	47.2	2,130	11,040	78,094	46,089
Goose Creek	1755	34.7	269.7	12,748	70,622	398,190	234,230
Grassy Creek	433	17.0	44.5	2,019	10,640	69,964	40,037
Holston River	2455	27.7	327.5	15,263	83,741	491,530	286,140
Inman Branch	99	20.6	11.2	512	2,760	17,704	10,690
Knob Creek	989	19.3	108.1	4,848	25,487	170,660	99,450
Knob Fork	823	22.2	96.8	4,437	23,856	144,820	85,845
Love Creek	5090	36.4	806.5	38,242	213,980	1,185,200	725,060
Second Creek	4498	52.6	922.7	44,706	256,490	1,306,400	810,750
Sinking Creek	2434	33.1	362.8	17,025	94,498	539,400	323,850
Sinking Cr (East)	91	11.8	8.0	345	1,725	13,274	7,735
Swanpond Creek	499	19.2	54.5	2,537	13,824	84,035	50,999
Ten Mile Creek	3921	37.6	634.6	29,622	163,410	962,450	591,720
Third Creek	8417	37.1	1350.7	63,716	353,180	1,993,600	1,220,600
Tennessee River	8232	22.2	967.9	43,300	225,430	1,434,200	755,770
Toll Creek	767	21.6	88.9	4,203	22,673	142,510	84,174
Tuckahoe Creek	229	8.5	17.9	764	3,754	30,470	17,522
Turkey Creek	1677	29.3	231.6	10,809	59,333	349,450	213,350
Whites Creek	1634	23.4	197.8	9,060	48,523	299,370	169,190
Williams Creek	1605	37.5	259.4	12,225	68,225	365,240	233,370
Woods Creek	143	23.0	17.2	797	4,373	26,706	16,372
TOTALS	64,357 Acres	24.9 % Imperv	8064.9 Million gallons	470,354 Pounds	2,603,155 Pounds	14,685,669 Pounds	8,811,018 Pounds

TABLE A-20 (continued)

Seasonal Pollutant Loadings - Quarter 01 (Winter)

Watershed	**Pounds** (using the average quarterly rainfall of **13.23** inches)						
	N+NN	TKN	TN	Pb	Zn	DP	TP
Baker Creek	1,521	1,484	4,467	26	238	498	849
Beaver Creek	99	103	271	2	11	37	64
East Fork (Third)	3,232	2,972	10,109	49	603	912	1,558
First Creek	8,626	8,220	26,011	148	1,507	2,665	4,546
Fourth Creek	6,318	6,011	19,083	105	1,087	1,944	3,316
French Broad River	295	299	827	3	27	106	180
Goose Creek	1,684	1,614	5,043	27	273	528	901
Grassy Creek	276	276	787	4	32	96	164
Holston River	2,030	1,964	6,021	29	300	651	1,109
Inman Branch	69	68	201	1	9	23	39
Knob Creek	664	666	1,890	10	81	232	395
Knob Fork	599	590	1,740	9	81	200	341
Love Creek	5,014	4,762	15,174	77	831	1,536	2,620
Second Creek	5,751	5,324	17,870	91	1,067	1,652	2,820
Sinking Creek	2,245	2,149	6,739	34	357	701	1,196
Sinking Cr (East)	49	51	133	1	4	19	32
Swanpond Creek	339	330	999	4	43	110	188
Ten Mile Creek	3,924	3,777	11,705	66	649	1,243	2,119
Third Creek	8,412	8,060	25,212	138	1,399	2,635	4,493
Tennessee River	5,969	6,034	16,830	99	778	2,121	3,613
Toll Creek	566	556	1,650	8	76	188	320
Tuckahoe Creek	109	115	292	1	8	42	72
Turkey Creek	1,437	1,390	4,265	22	218	460	785
Whites Creek	1,225	1,211	3,550	18	167	413	704
Williams Creek	1,606	1,529	4,847	26	270	495	845
Woods Creek	106	102	314	1	15	34	58
TOTALS	62,165 Pounds	59,657 Pounds	186,030 Pounds	999 Pounds	10,131 Pounds	19,541 Pounds	33,327 Pounds

TABLE A-21

Seasonal Pollutant Loadings - Quarter 02 (Spring)

Watershed	Area in City Limits	% Impervious over entire watershed	Flow Volume	(using average quarterly rainfall of **15.27** inches)			
				BOD	COD	TSS	TDS
Baker Creek	1674	32.2	283.2	13,107	71,204	429,060	255,120
Beaver Creek	162	16.0	18.7	811	4,073	30,703	17,503
East Fork (Third)	2509	52.8	595.8	29,134	168,190	816,660	500,210
First Creek	7750	43.6	1603.8	75,741	422,310	2,332,100	1,417,700
Fourth Creek	5920	40.9	1171.9	55,542	310,200	1,680,500	1,027,500
French Broad River	551	11.1	54.5	2,459	12,742	90,136	53,196
Goose Creek	1755	34.7	311.3	14,714	81,512	459,580	270,350
Grassy Creek	433	17.0	51.4	2,330	12,281	80,752	46,211
Holston River	2455	27.7	377.9	17,616	96,653	567,320	330,260
Inman Branch	99	20.6	12.9	591	3,186	20,434	12,339
Knob Creek	989	19.3	124.8	5,596	29,417	196,980	114,780
Knob Fork	823	22.2	111.7	5,122	27,535	167,150	99,082
Love Creek	5090	36.4	930.8	44,139	246,970	1,367,900	836,860
Second Creek	4498	52.6	1065.0	51,600	296,040	1,507,900	935,770
Sinking Creek	2434	33.1	418.7	19,650	109,070	622,580	373,790
Sinking Cr (East)	91	11.8	9.2	398	1,991	15,320	8,927
Swanpond Creek	499	19.2	62.9	2,928	15,955	96,993	58,863
Ten Mile Creek	3921	37.6	732.4	34,189	188,610	1,110,900	682,960
Third Creek	8417	37.1	1558.9	73,541	407,640	2,301,000	1,408,800
Tennessee River	8232	22.2	1117.2	49,977	260,190	1,655,400	872,310
Toll Creek	767	21.6	102.6	4,851	26,169	164,490	97,153
Tuckahoe Creek	229	8.5	20.7	882	4,332	35,168	20,224
Turkey Creek	1677	29.3	267.3	12,475	68,482	403,330	246,250
Whites Creek	1634	23.4	228.3	10,457	56,005	345,530	195,270
Williams Creek	1605	37.5	229.4	14,110	78,745	421,550	269,350
Woods Creek	143	23.0	19.8	919	5,047	30,824	18,897
TOTALS	64,357 Acres	24.9 % Imperv	9308.4 Million gallons	542,879 Pounds	3,004,549 Pounds	16,950,260 Pounds	10,169,675 Pounds

TABLE A-21 (continued)

Seasonal Pollutant Loadings - Quarter 02 (Spring)

Watershed	**Pounds** (using the average quarterly rainfall of **15.27** inches)						
	N+NN	TKN	TN	Pb	Zn	DP	TP
Baker Creek	1,755	1,713	5,156	30	275	575	980
Beaver Creek	114	119	312	2	13	43	73
East Fork (Third)	3,730	3,430	11,667	57	696	1,053	1,798
First Creek	9,956	9,487	30,021	171	1,740	3,076	5,247
Fourth Creek	7,292	6,938	22,026	121	1,255	2,244	3,828
French Broad River	340	345	954	4	31	122	207
Goose Creek	1,943	1,863	5,821	31	315	610	1,039
Grassy Creek	319	319	909	4	37	111	189
Holston River	2,343	2,267	6,950	34	346	751	1,281
Inman Branch	80	78	232	1	10	26	45
Knob Creek	767	769	2,181	11	94	268	456
Knob Fork	691	681	2,009	10	93	231	394
Love Creek	5,787	5,496	17,513	89	959	1,773	3,024
Second Creek	6,638	6,145	20,626	105	1,232	1,907	3,255
Sinking Creek	2,592	2,480	7,778	39	412	809	1,380
Sinking Cr (East)	56	59	153	1	5	21	36
Swanpond Creek	391	381	1,153	5	50	127	217
Ten Mile Creek	4,529	4,360	13,509	76	749	1,434	2,446
Third Creek	9,709	9,303	29,099	159	1,615	3,041	5,186
Tennessee River	6,890	6,965	19,425	114	897	2,448	4,170
Toll Creek	653	641	1,905	9	88	217	370
Tuckahoe Creek	126	133	337	1	9	49	83
Turkey Creek	1,659	1,604	4,922	25	252	531	905
Whites Creek	1,414	1,398	4,097	21	193	477	813
Williams Creek	1,854	1,765	5,594	30	312	571	975
Woods Creek	122	118	363	2	17	39	67
TOTALS	71,750 Pounds	68,857 Pounds	214,712 Pounds	1,152 Pounds	11,695 Pounds	22,554 Pounds	38,464 Pounds

TABLE A-22

Seasonal Pollutant Loadings - Quarter 03 (Summer)

Watershed	Area in City Limits	% Impervious over entire watershed	Flow Volume	(using average quarterly rainfall of **8.17** inches)			
				BOD	COD	TSS	TDS
Baker Creek	1674	32.2	151.5	7,013	38,097	229,560	136,500
Beaver Creek	162	16.0	10.0	434	2,179	16,427	9,365
East Fork (Third)	2509	52.8	318.8	15,588	89,988	436,940	267,630
First Creek	7750	43.6	858.1	40,524	225,950	1,247,800	758,510
Fourth Creek	5920	40.9	627.0	29,717	165,970	899,120	549,730
French Broad River	551	11.1	29.2	1,315	6,817	48,226	28,462
Goose Creek	1755	34.7	166.5	7,872	43,612	245,890	144,650
Grassy Creek	433	17.0	27.5	1,247	6,571	43,205	24,724
Holston River	2455	27.7	202.2	9,425	51,713	303,540	176,700
Inman Branch	99	20.6	6.9	316	1,704	10,933	6,602
Knob Creek	989	19.3	66.8	2,994	15,739	105,390	61,414
Knob Fork	823	22.2	59.8	2,740	14,732	89,432	53,013
Love Creek	5090	36.4	498.0	23,616	132,140	731,890	447,750
Second Creek	4498	52.6	569.8	27,608	158,390	806,770	500,670
Sinking Creek	2434	33.1	224.0	10,513	58,356	333,100	199,990
Sinking Cr (East)	91	11.8	4.9	213	1,065	8,197	4,776
Swanpond Creek	499	19.2	33.6	1,567	8,537	51,895	31,494
Ten Mile Creek	3921	37.6	391.9	18,293	100,910	594,350	365,410
Third Creek	8417	37.1	834.1	39,347	218,100	1,231,100	753,750
Tennessee River	8232	22.2	597.7	26,739	139,210	885,670	466,720
Toll Creek	767	21.6	54.9	2,596	14,001	88,007	51,981
Tuckahoe Creek	229	8.5	11.1	472	2,318	18,816	10,820
Turkey Creek	1677	29.3	143.0	6,675	36,640	215,800	131,750
Whites Creek	1634	23.4	122.1	5,595	29,965	184,870	104,480
Williams Creek	1605	37.5	160.2	7,550	42,131	225,550	144,110
Woods Creek	143	23.0	10.6	492	2,700	16,492	10,110
TOTALS	64,357 Acres	24.9 % Imperv	4980.3 Million gallons	290,461 Pounds	1,607,535 Pounds	9,068,970 Pounds	5,441,111 Pounds

TABLE A-22 (continued)

Seasonal Pollutant Loadings - Quarter 03 (Summer)

Watershed	**Pounds** (using the average quarterly rainfall of **8.17** inches)						
	N+NN	TKN	TN	Pb	Zn	DP	TP
Baker Creek	939	917	2,759	16	147	308	524
Beaver Creek	61	64	167	1	7	23	39
East Fork (Third)	1,996	1,835	6,242	31	372	563	962
First Creek	5,327	5,076	16,062	92	931	1,646	2,807
Fourth Creek	3,902	3,712	11,785	65	671	1,201	2,048
French Broad River	182	185	511	2	17	65	111
Goose Creek	1,040	997	3,114	16	168	326	556
Grassy Creek	171	171	486	2	20	59	101
Holston River	1,254	1,213	3,718	18	185	402	685
Inman Branch	43	42	124	1	6	14	24
Knob Creek	410	411	1,167	6	50	143	244
Knob Fork	370	364	1,075	5	50	124	211
Love Creek	3,096	2,940	9,370	47	513	949	1,618
Second Creek	3,552	3,288	11,035	56	659	1,020	1,742
Sinking Creek	1,387	1,327	4,162	21	220	433	738
Sinking Cr (East)	30	31	82	1	3	11	19
Swanpond Creek	209	204	617	2	27	68	116
Ten Mile Creek	2,423	2,333	7,228	41	401	767	1,309
Third Creek	5,194	4,978	15,569	85	864	1,627	2,775
Tennessee River	3,686	3,726	10,393	61	480	1,310	2,231
Toll Creek	349	343	1,019	5	47	116	198
Tuckahoe Creek	67	71	180	1	5	26	45
Turkey Creek	887	858	2,634	13	135	284	484
Whites Creek	757	748	2,192	11	103	255	435
Williams Creek	992	944	2,993	16	167	306	522
Woods Creek	65	63	194	1	9	21	36
TOTALS	30,389 Pounds	36,841 Pounds	114,878 Pounds	616 Pounds	6,257 Pounds	12,067 Pounds	20,580 Pounds

TABLE A-23

Seasonal Pollutant Loadings - Quarter 04 (Fall)

Watershed	Area in City Limits	% Impervious over entire watershed	Flow Volume	(using average quarterly rainfall of **6.86** inches)			
				BOD	COD	TSS	TDS
Baker Creek	1674	32.2	127.2	5,888	31,988	192,750	114,610
Beaver Creek	162	16.0	8.4	364	1,830	13,793	7,863
East Fork (Third)	2509	52.8	267.7	13,088	75,559	366,880	224,720
First Creek	7750	43.6	720.5	34,027	189,720	1,047,700	636,890
Fourth Creek	5920	40.9	526.5	24,952	139,360	754,950	461,580
French Broad River	551	11.1	24.5	1,105	5,724	40,493	23,898
Goose Creek	1755	34.7	139.8	6,610	36,619	206,470	121,450
Grassy Creek	433	17.0	23.1	1,047	5,517	36,278	20,760
Holston River	2455	27.7	169.8	7,914	43,421	254,870	148,370
Inman Branch	99	20.6	5.8	265	1,431	9,180	5,543
Knob Creek	989	19.3	56.1	2,514	13,215	88,491	51,567
Knob Fork	823	22.2	50.2	2,301	12,370	75,092	44,512
Love Creek	5090	36.4	418.2	19,829	110,950	614,540	375,960
Second Creek	4498	52.6	478.4	23,181	132,990	677,410	420,390
Sinking Creek	2434	33.1	188.1	8,828	48,999	279,690	167,920
Sinking Cr (East)	91	11.8	4.1	179	894	6,883	4,011
Swanpond Creek	499	19.2	28.3	1,316	7,168	43,574	26,444
Ten Mile Creek	3921	37.6	329.0	15,360	84,730	499,050	306,820
Third Creek	8417	37.1	700.3	33,038	183,130	1,033,700	632,890
Tennessee River	8232	22.2	501.9	22,452	116,890	743,660	391,880
Toll Creek	767	21.6	46.1	2,179	11,756	73,896	43,646
Tuckahoe Creek	229	8.5	9.3	396	1,946	15,799	9,085
Turkey Creek	1677	29.3	120.1	5,605	30,765	181,190	110,630
Whites Creek	1634	23.4	102.6	4,698	25,160	155,230	87,726
Williams Creek	1605	37.5	134.5	6,339	35,376	189,380	121,000
Woods Creek	143	23.0	8.9	413	2,267	13,848	8,489
TOTALS	64,357 Acres	24.9 % Imperv	4181.8 Million gallons	243,888 Pounds	1,349,775 Pounds	7,614,797 Pounds	4,568,654 Pounds

TABLE A-23 (continued)

Seasonal Pollutant Loadings - Quarter 04 (Fall)

Watershed	**Pounds** (using the average quarterly rainfall of **6.86** inches)						
	N+NN	TKN	TN	Pb	Zn	DP	TP
Baker Creek	789	770	2,316	13	123	258	440
Beaver Creek	51	53	140	1	6	19	33
East Fork (Third)	1,676	1,541	5,242	26	313	473	808
First Creek	4,473	4,262	13,487	77	782	1,382	2,357
Fourth Creek	3,276	3,117	9,895	54	564	1,008	1,720
French Broad River	153	155	429	2	14	55	93
Goose Creek	873	837	2,615	14	141	274	467
Grassy Creek	143	143	408	2	17	50	85
Holston River	1,053	1,018	3,122	15	155	337	575
Inman Branch	36	35	104	1	5	12	20
Knob Creek	344	345	980	5	42	120	205
Knob Fork	310	306	902	4	42	104	177
Love Creek	2,600	2,469	7,868	40	431	796	1,359
Second Creek	2,982	2,761	9,266	47	553	857	1,462
Sinking Creek	1,164	1,114	3,494	18	185	364	620
Sinking Cr (East)	25	26	69	0	2	10	16
Swanpond Creek	176	171	518	2	22	57	98
Ten Mile Creek	2,035	1,959	6,069	34	337	644	1,099
Third Creek	4,362	4,180	13,073	72	725	1,366	2,330
Tennessee River	3,095	3,129	8,727	51	403	1,100	1,873
Toll Creek	293	288	856	4	39	97	166
Tuckahoe Creek	57	60	152	1	4	22	37
Turkey Creek	745	721	2,211	11	113	239	407
Whites Creek	635	628	1,841	9	87	214	365
Williams Creek	833	793	2,513	13	140	257	438
Woods Creek	55	53	163	1	8	18	30
TOTALS	32,234 Pounds	30,934 Pounds	96,460 Pounds	517 Pounds	5,253 Pounds	19,133 Pounds	17,280 Pounds

TABLE A-24

Summary of Seasonal Pollutant Loadings

	01 Winter (Jan - March)	02 Spring (April - June)	03 Summer (July - Sept)	04 Fall (Oct - Dec)	TOTAL ANNUAL
Average Rainfall	13.23 inches	15.27 inches	8.17 inches	6.86 inches	43.53 inches
Runoff Volume	8065 Mgal	9308 Mgal	4980 Mgal	4182 Mgal	26,535 Mgal
Pollutants (in pounds)					
BOD	470,534	542,879	290,461	243,888	1,547,762
COD	2,603,155	3,004,549	1,607,535	1,349,775	8,565,014
TSS	14,685,669	16,950,260	9,068,970	7,614,797	48,319,696
TDS	8,811,018	10,169,675	5,441,111	4,568,654	28,990,458
N+NN	62,165	71,750	30,389	32,234	204,538
TKN	59,657	68,857	36,841	30,934	196,289
TN	186,030	214,712	114,878	94,460	612,080
Pb	999	1,152	616	517	3,284
Zn	10,131	11,695	6,257	5,253	33,336
DP	19,541	22,554	12,067	19,133	64,295
TP	33,327	38,464	20,580	17,280	109,651

A.8 REFERENCES

Stormwater Permit Application, Municipal Part 2 Supplement. City of Knoxville. Camp Dresser & McKee, Inc (CDM). May 1993.

NPDES Permit No. TNS068055, City of Knoxville. Tennessee Department of Environment and Conservation (TDEC). July 1, 1996.

Year One Annual Report. City of Knoxville. December 1997.
Year Two Annual Report. City of Knoxville. December 1998.
Year Three Annual Report. City of Knoxville. December 1999.
Year Four Annual Report. City of Knoxville. December 2000.

Techniques for Estimation of Storm-Runoff Loads, Volumes, and Selected Constituent Concentrations in Urban Watersheds in the United States. N Tasker and Gxx Driver, 1990. USGS Water-Supply Paper 2363.

Stormwater Management, Martin Wanielista and Yousef Yousef. John Wiley & Sons, 1993.

Stormwater Data for Knoxville, Tennessee, 1991-92. George Outlaw, Robert Aycock, 1993. USGS Open-File Data Report 93-xxx. (included as Appendix B to the Part 2 Supplement in 1993)

Rainfall, Streamflow, and Water-Quality Data for Five Small Watersheds, Nashville, Tennessee, 1990-1992. George Outlaw, Anne Hoos, John Pankey. USGS Open-File Report 94-68.

Adjustment of Regional Regression Models of Urban-Runoff Quality Using Data for Chattanooga, Knoxville, and Nashville, Tennessee. Anne Hoos and Anant Patel. USGS Open-File Report 95-4140.

Municipal Storm Water Management Thomas Debo and Andrew Reese. Lewis Publishers, 1995.

Stormwater Management for Maine: Best Management Practices (manual) Maine Department of Environmental Protection. November 1995.

User's Manual: Watershed Management Model Version 4.0 September 1998. Technical Memorandum RPO-NPS-TM27.01, Rouge River National Wet Weather Demonstration Project. (Camp Dresser & McKee, Inc.)

WMM For Windows, Version 4.17 Computer program, Rouge River National Wet Weather Demonstration Project. (Camp Dresser & McKee, Inc.)

APPENDIX B

Summary of Dry Weather Screening Results

951 records with flow ≠ zero
& prior to 07/01/01

Dry Weather Screening Data

Outfall / Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
00-100-0300																
1992	2/5/92	1	Yes	44	7.9	0	0	0	< 0.25		Yes 19	0	0	No	No	No
	2/5/92	2	Yes	44	7.9	0	0	0	< 0.25		No	0	10	No	No	No
1997	2/18/97	1	Yes	10	7.0	0.25	0	0	0.20	1.50	Yes 30,000	10	0	No		No
	2/19/97	2	Yes	10	7.8	0.10	0	0	0.30	0.80	No	0	0	No	No	No
	2/27/97	3	Yes	10	7.5	0.25	0	0	0.10	0.50	No	0	0	No	No	No
	2/27/97	4	Yes	10	7.8	0.25	0	0	0	0.70	No	0	0	No	No	No
1998	7/15/97	1	Yes	70	7.0	0	0	0	0.20	0.40	No	20	15	No	No	No
	7/15/97	2	Yes	70	7.1	0	0	0	0.20	0.60	No	20	20	No	No	No
	9/2/97	3	Yes	50	7.3	0	0	0	0.20	0.30	No	20	15	No	No	No
	9/2/97	4	Yes	50	7.1	0	0	0	0.10	0.40	No	20	20	No	No	No
1999	9/24/98	1	Yes	19	7.0	0.05	0	0	0.25	2.00	Yes 240,000	50	5	No	No	No
	9/24/98	2	Yes	19	7.0	0.20	0	0	0.10	3.00	No	20	5	No	No	No
	12/15/98	3	Yes	5	7.7	0.20	0	0	0	0.10	No	0	0	No	No	No
	12/15/98	4	Yes	5	7.7	0.30	0	0	0.10	0.10	No	0	0	No	No	No
2000	7/19/99	1	Yes	5	7.7	0	0	0	0	0	No	0	0	No	No	No
	7/19/99	2	Yes	4	7.7	0.10	0	0	0	0	No	0	0	No	No	No
	8/23/99	3	Yes	60	8.2	0	0	0	0	0	No	0	0	No	No	No
	8/23/99	4	Yes	60	7.8	0	0	0	0	0	No	0	0	No	No	No
2001	7/17/00	1	Yes	13	8.2	0.30	0	0	0	0	No	0	20	No	No	No
	7/17/00	2	Yes	13	8.2	0.40	0	0	0	0.30	No	0	0	No	No	No
	8/17/00	3	Yes	10	8.2	0.30	0	0	0	0.10	No	0	0	No	No	No
	8/17/00	4	Yes	10	7.8	0.40	0	0	0	0.10	No	0	20	No	No	No
00-300-0285																
1997	11/5/96	1	Yes	TRICKLE	6.4	0	0		> 3		Yes 590,000	75	40	CHEMICAL		Yes
	11/6/96	2	Yes	TRICKLE	6.7	0	0		> 3		No	100	38	SEWAGE		Yes
	12/3/96	3	Yes	2	8.0	0	0.10	0	0.20	0.10	No	0	0	No	No	No
	12/4/96	4	Yes	2	7.9	0	0.10	0	0.15	0.10	No	0	0	No	No	No
1998	8/26/97	3	Yes	15	6.5	0	0	0.10	> 3	> 10.00	Yes > 60,000	1,000	50	SEWAGE		No
	8/26/97	4	Yes	20	6.6	0.05	0	0	3	10.00	No	1,000	50	SEWAGE		No
2001	10/17/00	1	Yes	75	7.5	0	0	0	0	0	No	0	0	No	No	No
	10/17/00	2	Yes	75	7.0	0	0	0	0	0	No	0	0	No	No	No
	11/28/00	3	Yes	75	7.0	0.20	0	0	1.50	0	No	0	10	No	No	No
	11/28/00	4	Yes	75	7.0	0	0	0	0	0	No	0	0	No	No	No

Outfall *Permit Year*	*Date*	*Visit #*	*Flow ?*	*Flow Rate (gpm)*	*pH (su)*	*Chlorine (ppm)*	*Copper (ppm)*	*Phenol (ppm)*	*Detergents (ppm)*	*Ammonia (ppm)*	*Fecal Sample (mpn/100ml)*	*Turbidity (ntu)*	*Color*	*Odor?*	*Surface Scum*	*Oil Sheen*
00-300-0385																
1992	2/3/92	1	Yes	4	7.8	0	0	0.25	0.40		No	< 50	40	No	No	No
	2/4/92	2	Yes	4	7.8	0	0	0.15	0.25		Yes > 60,000	< 50	25	No	No	No
1997	10/10/96	1	Yes	SLIGHT	7.6	0	0	0.40	0.20		Yes 460,000	100	20	SEWAGE	No	No
	10/11/96	2	Yes	TRICKLE	7.3	0	0	0.10	0.20		No	50	5	SEWAGE	No	No
	11/20/96	3	Yes	8	7.3	0	0	0.30	0.75	> 10.00	No	75	50	SEWAGE	No	No
	11/22/96	4	Yes	0.80	7.5	0	0	0	0.25	5.00	Yes 21,000	0	10	SEWAGE	No	No
2000	1/12/00	1	Yes	0.63	7.8	0.80	0	0	3	2.00	Yes 54,000	0	0	No	No	No
	1/12/00	2	Yes	0.63	7.8	0.30	0	0	2	2.00	No	0	0	No	No	No
	2/16/00	3	Yes	0.32	7.8	1.50	0	0	3	1.00	Yes 0	0	30	No	No	No
	2/16/00	4	Yes	0.32	7.8	0.80	0	0	3	1.00	No	0	0	No	No	No
00-300-0460																
2000	2/16/00	4	Yes	0.50	7.6	0	0	0	0.50	0	No	50	0	No	No	No
00-400-0330																
1999	12/15/98	4	Yes	0.13		3.50	0	0	0	0	No	0	0	No	No	No
01-100-0155																
1997	5/7/97	1	Yes	15	7.8	0	0	0	0.10	0.50	No	10	0	MUSTY	No	No
	5/7/97	2	Yes	15	7.3	0	0	0	0.10	0.40	No	0	0	No	No	No
	6/24/97	3	Yes	10	7.3	0	0	0	0.10	0.70	No	20	0	DEATH	No	No
	6/24/97	4	Yes	10	7.1	0	0	0	0.10	0.30	No	20	0	DEATH	No	No
1998	5/15/98	1	Yes	LOW	9.0	0.20	0	0	0	0.10	No	0	0	No	No	No
	5/15/98	2	Yes	LOW	8.8	0	0	0	0	0	No	0	0	No	No	No
	6/24/98	3	Yes	0.50	8.2	0.30	0	0	0	0	No	0	0	No	No	No
	6/24/98	4	Yes	0.50	8.1	0	0	0	0	0	No	0	0	No	No	No
1999	10/12/98	2	Yes	0.04	7.2	0.10	0	0	0	0	No	0	20	No	FOAM	No
	12/15/98	3	Yes	0.34	8.9	0.40	0	0	0	0	No	0	0	No	No	No
	12/15/98	4	Yes	0.34		0	0	0	0	0.10	No	0	0	No	No	No
2000	7/19/99	1	Yes	1	8.0	0.30	0	0	0	0	No	0	0	No	No	No
	7/19/99	2	Yes	1	8.0	0.10	0	0	0	0	No	0	0	No	No	No
	8/23/99	3	Yes	0.80	8.0	0.10	0	0	0	0	No	0	0	No	No	No
2001	7/18/00	1	Yes	0.04	8.0	0.30	0	0	0	0	No	0	0	No	No	No
	7/18/00	2	Yes	0.08	8.0	0.30	0	0	0	0	No	0	0	No	No	No
	8/25/00	3	Yes	0.16	8.0	0.10	0	0	0	0	No	0	0	No	No	No
	8/25/00	4	Yes	0.08	8.2	0.20	0	0	0	0	No	0	0	No	No	No

Outfall / Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
01-100-0230																
1998	2/26/98	1	Yes	2	8.4	0	0	0	0.50	2.00	Yes 430,000	100	70	No	GREEN	No
	2/26/98	2	Yes	2	8.3	0	0	0	0.50	1.50	No	100	60	No	GREEN	No
	3/30/98	3	Yes	1	8.2	0	0	0	0.20	0.80	No	100	50	SLIGHT	GREEN	No
	3/30/98	4	Yes	1	8.6	0	0	0	0.50	1.50	No	100	50	SLIGHT	GREEN	No
1999	10/16/98	1	Yes	19	7.5	0.10	0	0	0	0.10	No	0	0	No	No	No
	10/16/98	2	Yes	19	7.5	0.10	0	0	0	0	No	0	0	No	No	No
2000	7/26/99	1	Yes	2	7.6	0.20	0.20	0	0	0.40	No	50	100	No	No	No
	7/26/99	2	Yes	2	7.0	0.20	0	0	0	0.40	No	0	30	No	No	No
	8/30/99	3	Yes	5	7.4	0.30	0.10	0	0.50	5.00	Yes 117,016	0	60	No	No	No
	8/30/99	4	Yes	29	7.4	0	0	0	0	2.00	No	0	0	No	No	No
2001	7/21/00	1	Yes	0.16	7.8	0	0	0	0.50	9.00	Yes	50	60	No	No	No
	7/21/00	2	Yes	0.16	8.0	0.20	0	0	0.75	10.00	No	25	60	SEWAGE	No	No
01-100-0280																
1999	10/21/98	1	Yes	4	7.8	2.00	0	0	0	0	No	0	0	No	No	No
	10/21/98	2	Yes	4	8.0	2.50	0	0	0	0	No	0	0	No	No	No
	1/11/99	3	Yes	4	7.6	0	0	0	0	0	No	0	0	No	No	No
	1/11/99	4	Yes	4	7.7	0	0	0	0	0	No	0	0	No	No	No
2000	7/26/99	1	Yes	60	7.4	0.10	0	0	0	0	No	0	20	No	No	No
	7/26/99	2	Yes	60	7.4	0.10	0	0	0	0	No	0	20	No	No	No
	8/30/99	3	Yes	12	8.2	0	0	0	0	0	No		0	No	No	No
	8/30/99	4	Yes	12	8.2	0	0	0	0	0	No			No	No	No
01-100-0550																
1992	11/14/91	1	Yes	4							No			No	No	No
01-100-0560																
1992	11/14/91	1	Yes	4	8.2	0	0	0	< 0.25		No	0	40	No	No	No
	11/15/91	2	Yes	4	8.4	0.15	0	0	< 0.25		Yes 10	< 50	30	No	No	No

Outfall *Permit Year*	*Date*	*Visit #*	*Flow ?*	*Flow Rate (gpm)*	*pH (su)*	*Chlorine (ppm)*	*Copper (ppm)*	*Phenol (ppm)*	*Detergents (ppm)*	*Ammonia (ppm)*	*Fecal Sample (mpn/100ml)*	*Turbidity (ntu)*	*Color*	*Odor?*	*Surface Scum*	*Oil Sheen*
01-100-0660																
1992	11/14/91	1	Yes	4	8.2	< 0.10	0	0	0		No	0	20	No	No	No
	11/15/91	2	Yes	4	8.2	0	0	0	0		Yes 60	0	20	No	No	No
1997	2/19/97	1	Yes	YES		0.10	0	0	> 3	0.10	No	0	0	No	No	No
	2/19/97	2	Yes	YES		0.30	0	0	0.25	0.10	No	0	0	No	No	No
	4/10/97	3	Yes	YES	7.5	0	0	0	0.25	0	No	0	0	No	No	No
	4/10/97	4	Yes	YES	7.5	0	0	0	< 0.25	0	No	0	1	No	No	No
1998	9/15/97	1	Yes	5	8.5	0	0	0	0.20	0.20	No	50	0	No	No	Yes
	9/15/97	2	Yes	5	8.3	0	0	0	0.75	0.10	No	50	0	No	POLLEN	No
	10/13/97	3	Yes	10	6.8	0	0	0	0.10	0.10	No	100	50	No	No	No
	10/13/97	4	Yes	10	7.1	0	0	0	0.10	0.10	No	75	40	No	No	No
01-100-0775																
1997	2/20/97	1	Yes	STEADY		0	0.10	0.10	0.25	0.20	Yes 2,100	50	45	No		No
	2/20/97	2	Yes	STEADY	8.2	0.20	0	0	0.25	0.20	No	50	20	No		No
01-100-0920																
1992	11/18/91	1	Yes	4	7.3	0.10	< 0.10	0.15	> 3		No	75	20	No	No	No
1997	2/24/97	1	Yes	YES	8.2	0.40	0	0.10	> 3	0.40	Yes 230	0	20	No		No
	2/25/97	2	Yes	YES	8.2	0.10	0.10	0.10	0.25	0.20	No	0	0	No	No	No
	4/3/97	3	Yes	SLOW	7.0	0.10	0	0	> 3		No	25	5	No	No	Yes
	4/3/97	4	Yes	YES	9.0	0.50	0.60	0	3	1.00	No	750	12	SOAP	No	No
1998	9/15/97	1	Yes	MINIMAL	7.0	0.30	0.10	0	> 3	1.00	No	500	80	No	BUBBLES	No
	9/15/97	2	Yes	MINIMAL	7.2	0	0.10	0	> 3	1.20	No	500	80	No	BUBBLES	No
	10/13/97	4	Yes	MINIMAL	7.0	0.40	0	0.20	> 3	3.00	No	1,000	100	DETERGEN		No

Outfall / Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
01-300-0060																
1992	11/13/91	1	Yes	4	8.1	0	< 0.10	0	< 0.25		No	< 50	25	No	No	No
	11/13/91	2	Yes	4	8.5	0	0	0	0.40		Yes 590	0	10	No	No	No
1997	10/24/96	1	Yes	SLIGHT	7.9	0	0	0	0.25		Yes 500	0	0	No	No	No
	10/25/96	2	Yes	SLIGHT	7.9	0	0	0	0.20		No	0	0	No	No	No
	12/3/96	3	Yes	0.40	7.6	0	0	0	0.10	0.80	No	0	0	No		No
	12/4/96	4	Yes	0.40	8.2	0	0	0	0.20	1.00	Yes 73	0	50	SEWAGE		No
2000	10/27/99	1	Yes	0.84	7.6	0	0	0	0	0	No	0	0	No	No	No
	10/27/99	2	Yes	1	7.4	0.20	0	0	0	4.00	No	0	0	No	No	No
	12/2/99	3	Yes	0.95	7.7	0.20	0	0	0	0.20	No	0	20	No	No	No
	12/2/99	4	Yes	0.95	7.7	0	0	0	0	0.80	No	0	0	No	No	No
2001	7/17/00	1	Yes	1	7.8	0	0	0	0	0	No	0	0	No	No	No
	7/17/00	2	Yes	2	7.8	0.40	0	0	0	0.40	No	0	0	No	No	No
	8/17/00	3	Yes	1	7.8	0.30	0	0	0	0	No	0	0	No	No	No
	8/17/00	4	Yes	0.90	8.2	0.30	0	0	0	0	No	0	0	No	No	No
01-300-0070																
1992	11/13/91	1	Yes	942	7.9	0	0	0	0		No	0	15	No	No	No
	11/13/91	2	Yes	942	8.2	< 0.10	0	< 0.10	0		Yes 20	0	0	No	No	No
1997	2/17/97	1	Yes	10	8.4	0.05	0	0	0.10	0.20	Yes 567	0	0	No		No
	2/17/97	2	Yes	10	8.7	0.05	0	0	0.40	1.50	No	0	0	No		No
	3/21/97	3	Yes	10	8.1	1.50	0	0	0	0	No	0	20	No		No
	3/21/97	4	Yes	10	8.1	1.00	0	0	0	2.50	Yes 5	0	20	No		No
2000	10/26/99	1	Yes	50	7.4	0	0	0	0	0.60	No	0	0	No	No	No
	10/26/99	2	Yes	50	7.6	0.60	0	0	0	0	No	0	0	No	No	No
	11/29/99	3	Yes	600	7.8	0.60	0	0	0.50	0	No	0	0	No	No	No
	11/29/99	4	Yes	600	7.4	0	0	0	0	0	No	0	0	No	No	No
2001	7/17/00	1	Yes	100	7.8	0.40	0	0	0	0.60	No	0	0	No	No	No
	7/17/00	2	Yes	100	8.2	0	0	0	0	0.60	No	0	0	No	No	No
	8/17/00	3	Yes	150	7.8	0.20	0	0	0	0.40	No	0	20	No	No	No
	8/17/00	4	Yes	150	8.2	0.30	0	0	0	0.60	No	0	0	No	No	No
01-300-0095																
1992	3/3/92	1	Yes	4	7.0	0	0	3.50	1		Yes 110	200	500	No	No	No
	3/4/92	2	Yes	4	7.4	0	0.05	0.15	0.75		No	75	500	No	No	No

Outfall / Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
01-300-0150																
1992	11/13/91	1	Yes	4	8.1	< 0.10	0	0	> 3		No	0	0	No	No	No
	11/14/91	2	Yes	4	8.4	< 0.10	0	0	1		Yes 1,900	0	10	No	No	No
1997	10/24/96	1	Yes	STEADY	8.4	0	0	0	0.10		Yes 2,000	0	0	No	No	No
	10/25/96	2	Yes	STEADY	8.3	0	0	0	0.20		No	0	0	No	No	No
	12/3/96	3	Yes	50	8.1	0	0.10	0	0.20	0.10	No	0	0	SEWAGE	No	No
	12/4/96	4	Yes	STRONG	8.3	0	0	0	0.10	0.10	No	0	0	No		No
1998	5/15/98	1	Yes	MODER.	9.1	1.00	0	0	0.22	0.10	No	0	0	No	No	No
	5/15/98	2	Yes	MODER.	8.9	0.10	0	0	0	0.10	No	0	0	No	No	No
	6/24/98	3	Yes	2	8.5	0	0	0	0	0.10	No	0	15	No	No	No
	6/24/98	4	Yes	3	8.4	0.10	0	0	0	0	No	0	0	No	No	No
1999	10/12/98	1	Yes	13	7.3	0.20	0	0	0	0	No	0	0	No	No	No
	10/12/98	2	Yes	13	7.4	0	0	0	0.10	0	No	0	0	No	No	No
	12/15/98	3	Yes	11	8.4	0.10	0	0	0	0.20	No	0	0	No	No	No
	12/15/98	4	Yes	11		0	0	0	0	0	No	0	0	No	No	No
2000	7/19/99	1	Yes	6	7.6	0	0	0	0.25	0.20	No	0	30	No	No	No
	7/19/99	2	Yes	2	7.8	0.10	0	0	0	0	No	0	0	No	No	No
	8/23/99	3	Yes	2	8.0	0	0	0	0	0	No	0	0	No	No	No
	8/23/99	4	Yes	2	8.0	0.30	0	0	0	0	No	0	0	No	No	No
2001	7/18/00	1	Yes	0.90	7.8	0	0	0	0	0	No	0	0	No	No	No
	7/18/00	2	Yes	2	7.8	0.10	0	0	0	0	No	0	0	No	No	No
	8/25/00	3	Yes	3	8.2	0.10	0	0	0	0.60	No	0	0	No	No	No
	8/25/00	4	Yes	3	7.8	0.10	0	0	0	0.20	No	0	0	No	No	No
01-300-0160																
2000	10/22/99	1	Yes	5	7.4	1.00	0	0	0	0	No	0	0	No	No	No
	10/27/99	2	Yes	5	7.3	1.00	0	0	0	0	No	0	0	No	No	No
	11/30/99	3	Yes	5	7.4	0.60	0	0	0	0	No	0	0	No	No	No
	11/30/99	4	Yes	5	7.6	0.60	0	0	0	0	No	0	0	No	No	No
2001	7/21/00	1	Yes	5	7.8	0.60	0	0	0	0	No	0	0	No	No	No
	7/21/00	2	Yes	6	7.8	0.60	0	0	0	0	No	0	0	No	No	No
	8/25/00	3	Yes	4	7.8	0.40	0	0	0	0	No	0	30	No	No	No
	8/25/00	4	Yes	4	7.8	0.60	0	0	0	0	No	0	0	No	No	No

Outfall Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)		Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
01-300-0200																	
1992	11/13/91	1	Yes	4	7.7	1.80	0	0	< 0.25		No		< 50	15	No	No	No
	11/14/91	2	Yes	4	7.8	1.80	0	0	< 0.25		Yes	0	0	5	No	No	No
1997	2/18/97	1	Yes	STEADY		2.00	0	0	0.25	0.60	Yes	< 1	0	0	No	No	No
	2/18/97	2	Yes	STEADY		1.00	0	0	0.25	0	No		0	0	No	No	No
	4/8/97	3	Yes	YES	7.0	2.00	0	0	0.25	0	No		0	0	No	No	No
	4/8/97	4	Yes	YES	7.0	3.00	0	0	0	0	No		0	3	No	No	No
1998	5/13/98	1	Yes	SLOW	7.8	0	0	0	0.20	0.30	No		0	25	No	CLOUDY	No
	5/13/98	2	Yes	SLOW	7.8	0	0	0	0	1.00	No		25	35	No	CLOUDY	No
	6/24/98	3	Yes	YES	7.6	0	0	0	0	0.30	No		0	0	No	No	No
	6/24/98	4	Yes	YES	8.3	1.50	0	0	0.25	0	No		0	0	No	No	No
01-300-0350																	
1992	11/14/91	1	Yes	4	12.1	0	0	0	0.40		Yes	0	> 1,000	130	No	No	No
	11/15/91	2	Yes	4							No				No	No	No
2001	10/24/00	1	Yes	20	6.8	0	0	0	0	0	No		0	20	No	No	No
	10/24/00	2	Yes	20	6.5	0	0	0	0	0	No		0	20	No	No	No
	12/5/00	3	Yes	60	6.0	0.40	0	0	0	0	No		0	0	No	No	No
	12/5/00	4	Yes	60	6.0	0	0	0	0	0	No		0	0	No	No	No
01-300-0395																	
1992	3/4/92	1	Yes	4	8.2	0	0	0	0		Yes	20	0	0	No	No	No
	3/4/92	2	Yes	4	8.2	0	0	0	0		No		0	0	No	No	No
01-300-0520																	
1992	3/4/92	1	Yes	4	8.9	0	0	0	0		Yes	9	0	0	No	No	No
	3/4/92	2	Yes	4	8.3	0.05	0	0	0		No		0	0	No	No	No
01-400-0170																	
1999	10/12/98	1	Yes	6	7.8	2.50	0	0	0	0.10	No		0	0	No	No	No
	10/12/98	2	Yes	6	7.8	3.50	0	0	0	0.10	No		0	0	No	No	No

Outfall / Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
01-400-0250																
1999	10/16/98	1	Yes	38	7.2	0.20	0	0	0	0	No	0	0	No	No	No
	10/16/98	2	Yes	38	7.2	0.40	0	0	0	0	No	0	0	No	No	No
2000	7/26/99	1	Yes	150	7.0	0	0	0	0	0	No	0	0	No	No	No
	7/26/99	2	Yes	150	7.0	0.10	0	0	0	0	No	0	20	No	No	No
	8/30/99	3	Yes	95	7.0	0	0	0	0	0	No	0	0	No	No	No
	8/30/99	4	Yes	95	7.0	0	0	0	0	0	No	0	0	No	No	No
2001	7/26/00	1	Yes	5	7.0	0	0	0	0	0	No	0	0	No	No	No
	7/26/00	2	Yes	5	7.0	0	0	0	0	0	No	0	0	No	No	No
	8/30/00	3	Yes	19	7.2	0.20	0	0	0	0	No	0	0	No	No	No
	8/30/00	4	Yes	19	7.2	0	0	0	0	0	No	0	0	No	No	No
01-400-0260																
2001	7/21/00	1	Yes	5	7.8	0.60	0	0	0	0	No	0	0	No	No	No
	7/21/00	2	Yes	5	7.8	0.60	0	0	0	0	No	0	0	No	No	No
01-400-0330																
1999	10/26/98	1	Yes	3	7.7	0.30	0	0	0.10	0	No	25	60	No	No	No
	10/26/98	2	Yes	3	7.3	0.30	0	0	0.10	0	No	0	0	No	No	No
01-400-0485																
2001	2/9/01	1	Yes	DRIPPING	8.0	0	0	0	0	0	No	0	0	No	No	No
	2/9/01	2	Yes	DRIPPING	8.0	0	0	0	1.40	0	No	0	0	No	No	No
	4/5/01	3	Yes	DRIPPING	8.0	0	0	0	0	0.10	No	0	0	No	No	No
	4/5/01	4	Yes	DRIPPING	7.0	0	0	0	0	0.10	No	0	0	No	No	No
01-400-0502																
2001	4/20/01	1	Yes	3	7.0	0	0	0	0	0	No	0	0	No	No	No
	4/20/01	2	Yes	3	7.0	0.80	0	0	0	0	No	0	0	No	No	No
	5/17/01	3	Yes	6	7.5	0.40	0	0	0	0	No	0	0	No	No	No
	5/17/01	4	Yes	6	7.5	0.30	0	0	0	0	No	0	0	No	No	No

Outfall *Permit Year*	*Date*	*Visit #*	*Flow ?*	*Flow Rate (gpm)*	*pH (su)*	*Chlorine (ppm)*	*Copper (ppm)*	*Phenol (ppm)*	*Detergents (ppm)*	*Ammonia (ppm)*	*Fecal Sample (mpn/100ml)*	*Turbidity (ntu)*	*Color*	*Odor?*	*Surface Scum*	*Oil Sheen*
01-400-0665																
1999	12/16/98	3	Yes	26	6.0	0	0	0	0	0.60	No	0	0	No	No	No
	12/16/98	4	Yes	26	6.0	0	0	0	0	0.40	No	0	0	No	No	No
2000	7/27/99	1	Yes	10	7.4	0.10	0	0	0	0.20	No	0	30	No	No	No
	7/27/99	2	Yes	10	7.4	0.10	0	0	0	0.20	No	0	60	No	No	No
	8/31/99	3	Yes	0.50	7.8	0.30	0	0	0	0	No	0	25	No	No	No
	8/31/99	4	Yes	0.50	7.8	0.20	0	0	0	0	No	0	20	No	No	No
2001	7/26/00	1	Yes	TLTM	7.8	0	0	0	0	0	No	0	20	No	No	No
	7/26/00	2	Yes	TLTM	7.8	0	0	0	0	0.40	No	0	25	No	No	No
01-400-0770																
2000	2/17/00	1	Yes	1	7.8	0	0	0	0	0.60	No	50	50	No	No	No
	2/17/00	2	Yes	2	7.8	0	0	0	0	0.40	No	25	40	No	No	No
	3/22/00	3	Yes	2	7.8	0	0	0	0	0.40	No	0	30	No	No	No
	3/22/00	4	Yes	2	7.8	0	0	0	0	0.60	No	0	30	No	No	No
2001	7/26/00	1	Yes	0.80	7.8	0.10	0	0	0	0.40	No	0	40	No	No	No
	7/26/00	2	Yes	0.68	7.8	0.20	0	0	0	0.80	No	0	35	No	No	No
	8/30/00	3	Yes	0.95	7.8	0	0	0	0	0.30	No	0	25	No	No	No
	8/30/00	4	Yes	0.95	7.8	0	0	0	0	0.30	No	0	20	No	No	No
01-400-0930																
1999	12/16/98	3	Yes	TOO LOW	7.0	0.10	0.10	0	0	0.60	No	0	0	No	No	No
	12/16/98	4	Yes	TOO LOW	7.0	0	0	0	0	0	No	0	0	No	No	No
2000	7/27/99	1	Yes	2	8.2	0.10	0	0	0	0	No	0	0	No	No	No
	7/27/99	2	Yes	2	8.2	0.10	0	0	0	0	No	0	0	No	No	No
02-100-0090																
1997	2/25/97	1	Yes	2	8.7	0.20	0.10	0	0	0.80	No	50	0	No	No	No
	2/25/97	2	Yes	4	8.5	0	0.20	0.20	0.50	6.00	Yes 28,000	35	11	SWEET	No	No
	4/4/97	3	Yes	5	9.2	1.00	0	0	0.25	0	No	10	2	CHLORINE	No	No
	4/4/97	4	Yes	0.90	7.5	0.10	0	0	0	2.00	No	10	4	CHLORINE	No	No
1998	9/16/97	1	Yes	0.16	7.5	0	0	0	0.25	0.40	No	20	20	No	No	No
	9/16/97	2	Yes	0.16	6.7	0	0	0	0.50	6.00	No	20	20	No	No	No
	11/18/97	3	Yes	0.09	8.2	0.30	0	0	0.25	6.00	Yes 30	0	0		No	No
	11/18/97	4	Yes	0.09	8.1	0.20	0	0	0.20	4.00	No	0	0		No	No
1999	1/20/99	1	Yes	5	8.1	0.10	0	0	0	0	No	0	0	No	No	No
	1/20/99	2	Yes	5	7.5	0.10	0	0	0	0	No	0	30	No	No	No
	2/22/99	3	Yes	2	7.9	0	0	0	0	0	No	0	0	No	No	No
	2/22/99	4	Yes	2	7.2	0	0	0	0	0	No	0	0	No	No	No

Outfall / Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
02-100-0103																
1999	1/12/99	1	Yes	2	7.6	0	0	0	0.10	3.00	No	0	30	No	No	No
	1/12/99	2	Yes	2	8.3	0.10	0	0	0.10	1.00	No	0	80	No	No	No
	2/15/99	3	Yes	0.60	7.5	0.10	0	0	0	0	No	0	0	No	No	No
	2/15/99	4	Yes	0.50	8.3	0.30	0	0	0	0.60	No	0	25	No	No	No
2000	7/29/99	1	Yes	0.50	7.7	0	0	0	0	0	No	0	0	No	No	No
	7/29/99	2	Yes	0.50	8.0	0.30	0	0	0.25	0.60	No	0	0	No	No	No
	9/3/99	4	Yes	5	7.0	0.20	0	0	0	0.80	No	0	0	No	No	No
02-100-0105																
1992	11/6/91	1	Yes	4	8.0	0.25	0	0	0		Yes 0	0	0	No	No	No
	11/7/91	2	Yes	4	7.9	0.30	0	0	< 0.25		No	0	0	No	No	No
1997	1/29/97	1	Yes	YES	8.6	0	0	0	0.25	0.40	No	50	20	No	No	No
	1/29/97	2	Yes	YES	8.7	0	0	0	0.25	0.30	No	50	80	No	No	No
	2/24/97	3	Yes	YES	8.4	0	0	0		2.00	No	50	20	No	No	No
	2/25/97	4	Yes	2	9.0	0.10	0.10	0.10		2.00	Yes 15,455	0	0	No	No	No
1998	9/16/97	1	Yes	0.56	6.9	0	0	0	2	1.20	Yes 1,545	50	20	No	No	No
	9/16/97	2	Yes	0.56	7.4	0	0	0	0.25	5.00	No	50	20	DEATH	No	No
	10/13/97	3	Yes	0.60	7.2	0.10	0	0	0.10	1.50	Yes 930,000	15	10	RUST	No	No
	10/13/97	4	Yes	0.56	6.9	0	0	0	0.75	6.00	No	0	0	No	No	No
02-100-0375																
1997	1/17/97	1	Yes	SLIGHT	7.8	0	0	0	0	0	No	50	20	No	No	No
	1/17/97	2	Yes	SLIGHT	8.0	0	0	0	0	0	No	50	20	No	No	No
	2/19/97	3	Yes	SLIGHT	7.7	0	0	0.20	0	0	No	0	0	OIL		Yes
	2/20/97	4	Yes	TRICKLE	8.1	0	0	0	0	0.40	No	0	0	OIL		Yes
02-100-0380																
1997	1/17/97	1	Yes	SLIGHT	8.1	0	0	0	0	0	No	50	20	No	No	No
	1/17/97	2	Yes	SLIGHT	8.2	0	0	0	< 0.25	0	No	50	20	No	No	No
	2/19/97	3	Yes	SLIGHT	8.4	0	0	0	0.25	0	No	0	0	No	No	Yes
	2/19/97	4	Yes	SLIGHT	8.4	0	0	0	0	0	No	0	0	OIL	No	Yes
02-100-0385																
1997	12/3/96	3	Yes	0.40	7.3	0	0	0	0.20	0	No	0	0	No	No	No
	12/4/96	4	Yes	SLIGHT	7.0	0	0	0	0.10	0	No	0	0	No	No	No

Outfall *Permit Year*	*Date*	*Visit #*	*Flow ?*	*Flow Rate (gpm)*	*pH (su)*	*Chlorine (ppm)*	*Copper (ppm)*	*Phenol (ppm)*	*Detergents (ppm)*	*Ammonia (ppm)*	*Fecal Sample (mpn/100ml)*	*Turbidity (ntu)*	*Color*	*Odor?*	*Surface Scum*	*Oil Sheen*
02-100-0515																
1992	11/6/91	1	Yes	4	9.0	0.10	0.10	0.10	< 0.25		No	< 25	10	No	No	No
1997	1/7/97	1	Yes	STEADY		0	0	0	0.25	0	No	50	0	No	No	No
	1/7/97	2	Yes	STEADY	7.8	0	0	0	0.25	0	No	50	20	No	No	No
	2/12/97	3	Yes	YES	8.3	0	0	0	0.25	0	No	50	20	No	No	No
	2/12/97	4	Yes	YES	8.2	0	0	0	0.25	0	No	50	20	No	No	No
02-200-0530																
1992	11/6/91	1	Yes	4	8.4	0.60	0.15	0	< 0.25		No	0	10	No	No	No
	11/6/91	2	Yes	4	8.4	0.70	0.10	0	< 0.25		No	0	10	No	No	No
	11/7/91	3	Yes	4	8.4	0.35	0.10	0	< 0.25		No	< 50	10	No	No	No
1997	1/7/97	1	Yes	TRICKLE		2.50	0	0	0.25	0	No	0	0	CHLORINE	No	No
	1/7/97	2	Yes	TRICKLE	8.1	0.60	0	0.20	0.25	0	No	0	15	CHLORINE	No	No
	2/12/97	3	Yes	TRICKLE	8.1	2.50	0	0	1	0.80	No	50	20	CHLORINE	No	No
	2/12/97	4	Yes	TRICKLE	8.6	2.00	0	0	0.25	0	No	50	20	CHLORINE	No	No
1998	9/23/97	1	Yes	0.16	7.2	0.50	0	0	0.10	1.00	Yes	< 1	100	50	No	No	No
	9/23/97	2	Yes	0.16	7.3	1.00	0	0	0.10	0.10	No		100	50	No	No	No
	11/18/97	3	Yes	0.50	8.2	2.50	0	0	0.10	1.50	Yes	< 1	0	0	No	No	No
	11/18/97	4	Yes	0.50	8.1	2.00	0	0	0.10	0.10	No		0	0	No	No	No
1999	1/21/99	1	Yes	120	7.5	0	0	0	0	0	No		0	0	No	No	No
	1/21/99	2	Yes	120	7.4	0	0	0	0	0	No		0	0	No	No	No
	2/23/99	3	Yes	120	7.3	0	0	0	0	0	No		0	0	No	No	No
	2/23/99	4	Yes	120	7.6	0	0	0	0	0	No		0	0	No	No	No

Outfall / Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
02-300-0165																
1992	11/6/91	1	Yes	40	9.0	0	0	0	1.50		No	75	70	No	No	No
	11/7/91	2	Yes	40	7.8	0.10	0	0	0.50		Yes > 600,000	0	15	No	No	No
1997	10/10/96	1	Yes	STEADY	7.2	0	0.15	0.20	0.40		Yes 450,000	25	8	SEWAGE		No
	10/11/96	2	Yes	12	7.1	0	0	0	0.35		No	75	40	No	No	No
	11/20/96	3	Yes	20	7.3	0	0	0	< 0.25	2.00	No	15	10	SEWAGE		Yes
	11/22/96	4	Yes	10	7.5	0	0	0	0.20	0.40	No	0	0	SEWAGE		Yes
1998	5/12/98	1	Yes	STEADY	7.3	0	0	0	0	0.40	No	0	0	No	No	No
	5/12/98	2	Yes	STEADY	7.1	0	0	0	0	0.60	No	0	0	No	No	No
	6/26/98	3	Yes	2	7.4	0.10	0	0	0	0.20	Yes 2,500	5	25	SEWAGE	No	No
	6/26/98	4	Yes	2	7.0	0.20	0	0	0.15	1.50	No	15	18	SEWAGE	No	No
1999	1/20/99	1	Yes	SLOW	7.7	0	0	0	0.10	0	No	0	0	No	No	No
	1/20/99	2	Yes	SLOW	7.4	0.10	0	0	0.25	0.40	No	0	0	No	No	No
	2/22/99	3	Yes	20	7.6	0.40	0	0	0	0.60	No	0	0	No	No	No
	2/22/99	4	Yes	20	7.7	0.10	0	0	0	0.10	No	0	0	No	No	No
	3/23/99	5	Yes	50	8.4	0.05	0	0	0.25	0.35	No	0	0	SEWAGE	POOLING S	No
	3/23/99	6	Yes	50	8.3	0.10	0	0	0.25	0.40	No	0	0	SEWAGE	POOLING S	No
2000	7/30/99	1	Yes	10	7.4	0.30	0	0	0.25	0.60	No	0	0	No	No	No
	7/30/99	2	Yes	10	7.4	0.20	0	0	1.50	2.00	No	0	60	No	No	No
	9/3/99	3	Yes	10	7.0	0.20	0	0	0.50	0	No	0	0	No	No	No
	9/3/99	4	Yes	10	6.0	0.60	0	0	1	2.00	No	0	0	No	No	No
2001	8/4/00	1	Yes	TLTM	7.8	0	0	0	0	0	No	0	30	No	No	No
	8/4/00	2	Yes	TLTM	7.8	0.40	0	0	0.25	1.00	Yes 210	0	20	No	No	No
	9/12/00	3	Yes	12	7.8	0.30	0	0	0.50	0.40	No	0	20	No	No	No
	9/12/00	4	Yes	12	7.6	0.30	0	0	0.25	0.20	No	0	20	No	No	No
	6/12/01	5	Yes	SLOW	7.0	0.50	0	0	0	1.50	Yes 290,000	0	5	No	No	No
02-300-0180																
1992	3/3/92	1	Yes	4	8.9	1.50	0	0	0		Yes 10	0	0	No	No	No
	3/4/92	2	Yes	4	8.8	1.50	0	0	0		No	0	0	No	No	No
1997	1/29/97	1	Yes	TRICKLE	8.0	2.50	0	0	0.25	0	No	50	20	SULPHER	No	No
	1/29/97	2	Yes	TRICKLE	8.4	2.50	0	0	0.25	0	No	50	20	No	No	No
02-300-0190																
1992	11/6/91	1	Yes	94	7.7	0	0	0	0.75		No	< 50	25	No	No	No
	11/7/91	2	Yes	157	7.8	< 0.20	0	0	0.25		Yes > 600,000	< 50	20	No	No	No
1997	10/17/96	2	Yes	SLIGHT	7.2	0	0.20	0	1		No	20	0	No	No	No
	11/13/96	3	Yes	SLIGHT	7.4	0	0	0	0	2.00	No	0	75	MUSTY	No	No
	11/15/96	4	Yes	STEADY	7.4	0	0	0	0	1.00	Yes 460,000	0	25	No		No

Outfall / Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
02-300-0230																
1992	11/7/91	1	Yes	448	8.2	< 0.10	0	0	< 0.25		No	0	5	No	No	No
	11/8/91	2	Yes	448	7.4	0	0	0	0.65		Yes 290	175	70	No	No	No
2000	11/1/99	1	Yes	5	7.4	0	0	0	0	0	No	0	0	No	No	No
	11/1/99	2	Yes	5	7.4	0	0	0	0	0	No	0	0	No	No	No
	12/8/99	3	Yes	150	7.6	0	0	0	0	0	No	0	0	No	No	No
	12/8/99	4	Yes	150	7.4	0	0	0	0	0	No	0	0	No	No	No
02-300-0245																
1997	12/3/96	3	Yes	30	7.9	0	0	0	0.10	0	No	0	0	MUSKY	No	No
	12/4/96	4	Yes	15	8.1	0	0	0	0	0.10	No	0	0	No	No	No
02-300-0270																
1992	11/7/91	1	Yes	4	8.4	< 0.10	0	0	< 0.25		No	< 50	5	No	No	No
	11/8/91	2	Yes	4	7.5	0	0	0	0.65		Yes 230	< 50	75	No	No	No
02-300-0295																
1997	1/17/97	1	Yes	STEADY	8.6	0	0	0	0	0	No	50	20	No	No	No
	1/17/97	2	Yes	STEADY	8.4	0	0	0	0.25	0	No	50	20	No	No	No
	2/19/97	3	Yes	STEADY	8.5	0	0	0	0.25	0.10	No	50	0	No	No	No
	2/19/97	4	Yes	SLIGHT	8.5	0	0	0	0	0	No	50	20	No	No	No
2000	12/8/99	4	Yes	TOO LOW	7.6	0	0	0	0.50	0.50	No	50	0	No	No	No
02-400-0045																
1999	10/27/98	1	Yes	2	7.7	2.00	0	0	0.25	0.40	No	0	10	No	No	No
	10/27/98	2	Yes	2	7.7	0.80	0	0	0.50	0.60	No	0	20	No	No	No
	1/12/99	3	Yes	3	8.0	1.00	0	0	0.25	0	No	0	0	No	No	No
	1/12/99	4	Yes	2	8.0	1.00	0	0	0.75	0	No	0	0	No	No	No
2000	7/29/99	1	Yes	0.05	7.7	0.80	0	0	0	0	No	0	0	No	No	No
	7/29/99	2	Yes	0.05	7.8	1.00	0	0	0	0	No	0	0	No	No	No
	9/2/99	3	Yes	0.27	8.0	0.60	0	0	0	0	No	0	0	No	No	No
	9/2/99	4	Yes	0.27	8.2	0.20	0	0	0	0	No	0	0	No	No	No
2001	7/27/00	1	Yes	0.50	7.6	0.80	0	0	0.25	0.20	No	0	0	No	No	No
	7/27/00	2	Yes	0.50	7.8	1.50	0.20	0	0	0.80	No	0	0	No	No	No
	9/8/00	3	Yes	2	8.2	0.60	0	0	0	0	No	0	0	No	No	No
	9/8/00	4	Yes	2	8.2	0.40	0	0	0		No	0	0	No	No	No

Outfall / Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
02-400-0050																
1999	10/27/98	1	Yes	0.20	7.5	3.00	0	0	0	0	No	0	0	No	No	No
	10/27/98	2	Yes	0.20	7.7	2.50	0	0	0	0	No	0	0	No	No	No
	1/12/99	3	Yes	0.16	7.7	0	0.80	1.00	0	1.00	Yes 0	0	100	No	No	No
	1/12/99	4	Yes	0.16	7.8	0	1.00	1.00	0	1.00	No	0	100	No	No	No
2000	7/29/99	1	Yes	0.05	7.7	0.80	0	0	0	0	No	0	0	No	No	No
	7/29/99	2	Yes	0.05	7.8	1.00	0	0	0	0	No	0	0	No	No	No
	9/2/99	3	Yes	0.07	7.6	1.50	0	0	0	0	No	0	0	No	No	No
	9/2/99	4	Yes	0.05	7.6	2.00	0	0	0	0	No	0	0	No	No	No
2001	7/27/00	1	Yes	0.04	7.8	1.00	0	0	0	0	No	0	0	No	No	No
	7/27/00	2	Yes	0.04	8.2	2.00	0	0	0	0	No	0	0	No	No	No
	9/8/00	3	Yes	0.03	8.2	1.50	0	0	0	0	No	0	0	No	No	No
	9/8/00	4	Yes	0.03	8.2	1.50	0	0	0	0	No	0	0	No	No	No
02-400-0055																
1998	1/12/98	1	Yes	2	8.2	0.10	0	0	0	0.10	No	0	0	No	No	No
1999	10/29/98	2	Yes	2	8.2	0	0	0	0	0	No	0	0	No	No	No
	1/12/99	3	Yes	2	8.2	0	0	0	0	0	No	0	0	No	No	No
	1/12/99	4	Yes	2	8.2	0	0	0	0	0	No	0	0	No	No	No
02-400-0060																
1999	1/12/99	3	Yes	0.40	8.1	0	0	0	0	1.00	Yes 1,727	0	0	No	No	No
	1/12/99	4	Yes	0.40	8.0	1.00	0.40	0	0.25	1.00	No	50	100	No	No	No
02-400-0070																
1999	1/13/99	3	Yes	3	7.7	0	0	0	0	0	No	0	0	No	No	No
	1/13/99	4	Yes	2	7.8	0	0	0	0	0	No	0	0	No	No	No
02-400-0080																
1999	1/13/99	3	Yes	3	7.7	1.00	0	0	0	0	No	0	0	CHLORINE	No	No
	1/13/99	4	Yes	3	7.7	1.00	0	0	0	0	No	0	0	CHLORINE	No	No
2000	7/30/99	1	Yes	2	7.6	3.00	0	0	0	0	No	0	0	No	No	No
	7/30/99	2	Yes	2	7.6	3.50	0	0	0	0	No	0	0	No	No	No
	9/2/99	3	Yes	10	7.8	3.00	0	0	0	0	No	0	0	No	No	No
	9/2/99	4	Yes	10	7.8	2.50	0	0	0	0	No	0	0	No	No	No

Outfall / Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
02-400-0169																
1999	1/20/99	1	Yes	19	7.1	0	0	0	0	1.00	Yes	0	0	No	No	No
	1/20/99	2	Yes	2	7.2	0.10	0	0	0	0.20	No	0	0	No	No	No
	2/22/99	3	Yes	10	7.5	0.30	0	0	0	0.10	No	0	30	No	No	No
	2/22/99	4	Yes	10	7.4	0.10	0	0	0	0.10	No	0	0	No	No	No
2000	8/2/99	1	Yes	19	7.0	0.20	0	0	0	0	No	0	0	No	No	No
	8/2/99	2	Yes	0.40	7.4	0.10	0	0	0	0.40	No	0	0	No	No	No
	9/3/99	3	Yes	0.27	7.0	0.30	0	0	0	0	No	0	0	No	No	No
	9/3/99	4	Yes	0.27	6.5	0.30	0	0	0	0	No	0	0	No	No	No
2001	8/4/00	1	Yes	0.32	7.8	0	0	0	0	0	No	0	0	No	No	No
	8/4/00	2	Yes	0.63	7.6	0	0	0	0	0.10	No	0	0	No	No	No
02-400-0540																
1999	1/21/99	1	Yes	60	7.5	0	0	0	0	0	No	0	0	No	No	No
	1/21/99	2	Yes	60	7.5	0	0	0	0	0	No	0	0	No	No	No
	2/23/99	3	Yes	108	7.3	0	0	0	0	0	No	0	0	No	No	No
	2/23/99	4	Yes	108	7.3	0	0	0	0	0	No	0	0	No	No	No
03-100-0045																
1997	2/12/97	1	Yes	STEADY		0.30	0	0	0.25	3.00	No	0	0	No	No	No
	2/12/97	2	Yes	HEAVY		2.00	0	0	0.25	0.10	No	0	0	No	No	No
	4/10/97	3	Yes	YES	7.5	0.80	0	0	< 0.25	4.00	Yes 59	0	2	CHLORINE	No	No
	4/10/97	4	Yes	YES	7.5	2.50	0	0	0	0.10	No	0	3	CHLORINE	No	No
1998	9/22/97	1	Yes	5	7.0	3.00	0	0	0.35	0.40	No	50	20	No	No	No
	9/22/97	2	Yes	5	6.8	3.00	0	0	2	0.20	No	50	20	No	No	No
	12/2/97	3	Yes	0.08	8.5	0	0	0	> 3	10.00	Yes 903,000	100	0	YES		No
1999	1/21/99	1	Yes	0.24	7.5	0.10	0	0	0	0.10	No	0	0	No	No	No
	1/21/99	2	Yes	0.24	8.3	0.10	0	0	0	0.10	No	0	0	No	No	No
2000	8/2/99	1	Yes	19	8.2	0	0	0	0	0	No	0	0	No	No	No
	8/2/99	2	Yes	1	8.2	1.00	0	0	0	0	No	0	0	No	No	No
	9/3/99	3	Yes	2	7.0	1.00	0	0	0	0	No	0	0	No	No	No
	9/3/99	4	Yes	2	7.0	1.00	0	0	0	0	No	0	0	No	No	No
2001	8/4/00	1	Yes	0.63	8.2	0.30	0	0	0	0.40	No	0	20	No	No	No
	8/4/00	2	Yes	0.95	8.2	0.20	0	0	0.25	1.00	Yes	0	0	No	No	No
	9/12/00	3	Yes	0.50	7.6	0.40	0	0	0	0	No	0	0	No	No	No
	9/12/00	4	Yes	0.50	8.2	0.10	0	0	0	0	No	0	0	No	No	No

Outfall *Permit Year*	*Date*	*Visit #*	*Flow ?*	*Flow Rate (gpm)*	*pH (su)*	*Chlorine (ppm)*	*Copper (ppm)*	*Phenol (ppm)*	*Detergents (ppm)*	*Ammonia (ppm)*	*Fecal Sample (mpn/100ml)*	*Turbidity (ntu)*	*Color*	*Odor?*	*Surface Scum*	*Oil Sheen*
03-100-0090																
1992	11/12/91	1	Yes	4	8.4	0.15	0	0	0.75		Yes > 6,000	0	0	No	No	No
	11/13/91	2	Yes	4	8.4	0	0	0	0.75		No	0	0	No	No	No
1997	10/9/96	1	Yes	SLIGHT	7.6	0	0.05	0	0.10		Yes 5,800	0	0	No	No	No
	10/10/96	2	Yes	SLIGHT	8.1	0	0	0	0.10	0	No	0	0	No	No	No
	11/20/96	3	Yes	SLIGHT	8.0	0	0	0	0.10	0.35	No	0	5	No	No	No
1998	9/22/97	1	Yes	0.50	7.0	0	0	0	0.20	7.00	Yes 1,400	100	50	No		No
	9/23/97	2	Yes	0.50	6.8	0	0	0	0.10	2.00	No	100	50	No		No
03-100-0380																
1992	11/13/91	2	Yes	4	8.1	0.15	0	0	< 0.25		Yes 300	< 50	10	No	No	No
1997	10/9/96	1	Yes	SLIGHT		0	0	0	0		Yes 450	0	0	No	No	No
	10/10/96	2	Yes	STEADY	7.4	0	0	0	0.25		No	0	6	No	No	No
	11/20/96	3	Yes	3	7.5	0	0	0	0.25	0	No	0	0	No		No
	11/22/96	4	Yes	8	6.9	0	0	0	0.25	0.10	No	0	0	No	No	No
1998	5/13/98	1	Yes	0.50	7.7	0	0	0	0.25	0.30	No	0	35	No	No	No
	5/13/98	2	Yes	0.50	8.1	0	0	0	0	0.30	No	0	20	No	No	No
	6/18/98	3	Yes	0.32	7.7	0	0	0	0	0.30	No	0	0	No	ORANGE	No
	6/18/98	4	Yes	0.48	7.5	0	0	0	0	0.20	No	0	0	No	ORANGE	No
1999	2/3/99	1	Yes	5	7.5	0.30	0	0	0	0.10	No	0	0	No	No	No
	2/3/99	2	Yes	5	7.3	0	0	0	0.10	0.30	No	0	0	No	No	No
2000	9/7/99	3	Yes	0.08	7.5	0	0	0	0	0	No	0	0	No	No	No
	9/7/99	4	Yes	0.08	7.0	0	0	0	0	0	No	0	0	No	No	No
03-200-0870																
1992	11/11/91	1	Yes	4	7.5	0	0.10	0	0		No	75	90	No	No	No
	11/11/91	2	Yes	4	8.0	0	0	0	0		Yes 130	75	40	No	No	No
1997	5/7/97	1	Yes	SLIGHT	7.0	0.15	0	0	< 0.25	0	No	0	0	No	No	No
	5/7/97	2	Yes	YES	7.0	0	0	0	0	0	No	0	0	No	No	No
	6/20/97	3	Yes	MODERA	7.0	0	0	0	0	0	No	0	0	No	No	No
	6/20/97	4	Yes	MODERA	7.0	0	0	0	0	0.10	No	0	0	No	No	No
1998	5/21/98	1	Yes	MODER.	7.3	0	0	0	0	0	No	0	30	No	No	No
	5/21/98	2	Yes	MODER.	7.3	0.40	0	0	0	0	No	0	50	No	No	No
	6/18/98	3	Yes	0.79	6.8	0	0	0	0	0.10	No	0	40	No	ORANGE	No
	6/18/98	4	Yes	0.79	6.7	0	0	0	0	0.10	No	0	40	No	No	No
1999	2/16/99	1	Yes	5	7.6	0	0	0	0	0	No	0	0	No	No	No
	2/16/99	2	Yes	5	7.7	0	0	0	0	0	No	0	0	No	No	No
	3/18/99	3	Yes	10	7.7	0	0	0	0	0	No	0	0	No	No	No
	3/18/99	4	Yes	10	7.8	0	0	0	0	0	No	0	0	No	No	No

Outfall *Permit Year*	*Date*	*Visit #*	*Flow ?*	*Flow Rate (gpm)*	*pH (su)*	*Chlorine (ppm)*	*Copper (ppm)*	*Phenol (ppm)*	*Detergents (ppm)*	*Ammonia (ppm)*	*Fecal Sample (mpn/100ml)*	*Turbidity (ntu)*	*Color*	*Odor?*	*Surface Scum*	*Oil Sheen*
03-200-0990																
1992	11/12/91	1	Yes	4	7.9	0	0	0	0		No	0	10	No	No	No
	11/12/91	2	Yes	4	7.9	< 0.10	0	0	0		Yes 150	0	10	No	No	No
1997	5/11/97	1	Yes	YES	7.0	0.20	0	0	< 0.25	0	No	50	10	No	No	No
	5/11/97	2	Yes	YES	7.0	0.10	0	0	< 0.25	0.10	No	50	10	No	No	No
	6/20/97	3	Yes	STRONG	7.0	0.30	0	0	< 0.25	0.10	No	25	0	No	No	Yes
	6/20/97	4	Yes	STRONG	7.0	0.10	0	0	0	0.20	No	0	0	No	No	Yes
1998	5/15/98	1	Yes	STEADY	7.8	0	0	0	0	0.10	No	0	0	No	No	No
	5/15/98	2	Yes	STEADY	8.3	0.30	0	0	0	0.10	No	0	0	No	No	No
	6/18/98	3	Yes	1	7.6	0.15	0	0	0	0.10	No	0	30	No	No	No
	6/18/98	4	Yes	1	7.6	0.05	0	0	0	0.10	No	0	30	No	No	No
03-300-0075																
1992	3/3/92	1	Yes	4	7.7	0	0.10	0	0		Yes 10	0	20	No	No	No
	3/4/92	2	Yes	4	7.7	0	0	0	0		No	0	0	No	No	No
1997	5/22/97	1	Yes	0.20	6.5	0	0	0	< 0.25	0.20	No	0	4	No	No	No
	5/22/97	2	Yes	TRICKLE	7.1	0.10	0	0	< 0.25	0.40	No	0	7	No	No	Yes
03-300-0115																
1992	3/3/92	1	Yes	4	6.9	0.15	0.20	0	0.15		Yes 140	25	35	No	No	No
	3/4/92	2	Yes	4	7.9	0	0	0	0		No	0	0	No	No	No
1997	4/8/97	4	Yes	YES	7.0	5.00	0.10	0.10	< 0.25	1.00	No	50	3	No	No	No
03-300-0385																
1997	11/20/96	1	Yes	0.50	7.1	0	0.10	0.10	0.40	0.60	No	25	5	No		No
	11/22/96	2	Yes	5	7.4	0	0	0	0.20	0.10	No	0	0	No		No
	12/4/96	3	Yes	5	7.7	0.10	0.10	0	0.20	0.40	Yes 110	25	40	SLIGHT		Yes
	12/4/96	4	Yes	3	7.7	0.40	0	0.10	0.20	0.10	No	25	30	No		Yes
1998	5/13/98	1	Yes	0.50	7.4	0	0	0	0.20	0.20	No	0	15	No	No	No
	5/13/98	2	Yes	0.50	7.1	0	0	0	0	0.20	No	0	0	No	No	No
	6/18/98	3	Yes	0.16	6.7	0	0	0	0.20	0	No	0	25	No	No	Yes
	6/18/98	4	Yes	0.16	6.8	0.10	0	0	0.20	0	No	50	35	No		Yes
1999	2/5/99	1	Yes	0.12	8.0	0	0	0	0.10	0.40	No	0	70	No	No	No
	2/5/99	2	Yes	0.10	7.6	0	0	0	0.10	0.40	No	0	70	No	No	No
	3/17/99	3	Yes	4	7.9	0.40	0	0	0	0.10	No	0	0	No	SOME FOA	No
	3/17/99	4	Yes	0.11	7.7	0	0	0	0	0.40	No	25	40	SOUR		Yes
2000	8/2/99	1	Yes	10	7.6	0	0	0	0	0.40	No	0	0	No	No	No
	8/2/99	2	Yes	10	7.6	0	0	0	0	0.20	No	0	0	No	No	No

Outfall *Permit Year*	*Date*	*Visit #*	*Flow ?*	*Flow Rate (gpm)*	*pH (su)*	*Chlorine (ppm)*	*Copper (ppm)*	*Phenol (ppm)*	*Detergents (ppm)*	*Ammonia (ppm)*	*Fecal Sample (mpn/100ml)*	*Turbidity (ntu)*	*Color*	*Odor?*	*Surface Scum*	*Oil Sheen*
03-300-0400																
1999	5/20/99	1	Yes	1	7.0	0.10	0	0	0	0.30	No	0	50	No	No	No
	5/20/99	2	Yes	1	6.5	0.10	0	0	0	0.60	No	0	10	No	No	No
	6/18/99	3	Yes	0.06	7.5	0.30	0	0	0	0.40	No		0	No	No	No
2001	12/26/00	3	Yes	1	6.8	0	0	0	0	0	No	0	0	No	No	No
	12/26/00	4	Yes	1	6.8	0	0	0	0	0	No		0	No	No	No
03-300-0615																
1997	1/29/97	1	Yes	HEAVY	6.5	0.10	0.10	0	0.25	0.10	No	0	0	CHEMICAL	No	No
	1/29/97	2	Yes	YES	6.6	0	0.10	0	0.25	0.10	No	0	0	CHEMICAL	No	Yes
	3/12/97	3	Yes	STEADY	7.9	0.40	0	0.20	0.10	0.40	No	20	6	PETRO.		Yes
	3/12/97	4	Yes	16	7.9	0	0	0	0.15	0.80	No	15	6	PETRO.	No	No
03-300-0640																
2000	12/28/99	3	Yes	150	7.4	0	0	0	0	0	No	0	0	No	No	No
	12/28/99	4	Yes	150	7.4	0	0	0	0	0	No	0	0	No	No	No
03-300-0655																
1992	3/4/92	1	Yes	4	8.1	0	0	0.10	0		No	0	35	No	No	No
	3/4/92	2	Yes	4							Yes 0			No	No	No
1997	1/29/97	1	Yes	YES	6.6	0.10	0	0	0.25	0	No	0	0	No		No
	1/29/97	2	Yes	YES	6.9	0.10	0	0	0.25	0	No	0	0	No		No
	3/12/97	3	Yes	16	8.4	0.15	0	0	0.15	1.50	Yes 10	35	8	No	No	No
	3/13/97	4	Yes	16		0	0	0	0.15	9.00	No	0	0	No		No
1998	10/2/97	1	Yes	5	6.5	0	0	0	1.50	0.10	No	50	20	No	GREEN	No
	10/2/97	2	Yes	7	5.7	0	0	0	0.75	0.10	No	50	50	GASOLINE	SUDS	No
	12/2/97	3	Yes	5	8.1	0	0	0	0.20	0	No	50	0	No	No	No
	12/2/97	4	Yes	5	8.2	0	0	0	0.10	0	No	50	0	No	No	No
1999	3/17/99	3	Yes	2	8.0	0	0	0	0	0.10	No	50	45	No	No	No
	3/17/99	4	Yes	2	8.0	0	0	0	0	0.10	No	0	0	No	No	No

Outfall / Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
03-300-0660																
1997	10/9/96	1	Yes	SLIGHT		0	0	0	0.10		Yes 164	0	0	No	No	No
	10/10/96	2	Yes	STEADY	7.5	0	0.10	0.10	0.25		No	50	10	No	No	No
	11/13/96	3	Yes	FAST	7.6	0	0.10	0	0	0.10	No	50	20	No	No	No
	11/15/96	4	Yes	FAST	7.3	0	0.10	0	0	0.10	No	25	10	No	No	No
2000	11/23/99	1	Yes	TOO LOW	7.8	0	0	0	0.50	0	No	0	0	No	No	No
	11/23/99	2	Yes	TOO LOW	7.8	0	0	0	0.50	0	No	0	0	No	No	No
	12/28/99	3	Yes	0.80	7.6	0	0	0	0	0	No	0	0	No	No	No
	12/28/99	4	Yes	0.80	7.4	0	0	0	0	0	No	0	0	No	No	No
2001	8/8/00	1	Yes	0.99	7.8	0.60	0	0	0	0	No	0	0	No	No	No
	8/8/00	2	Yes	0.99	7.8	0.20	0	0	0	0	No	0	0	No	No	No
	9/27/00	3	Yes	19	7.8	0	0	0	0	0	No	0	20	No	No	No
	9/27/00	4	Yes	10	7.8	0.20	0	0	0	0	No	0	0	No	No	No
03-300-0670																
1992	3/4/92	1	Yes	4	7.4	0	0	0.10	0		No	25	55	No	No	No
	3/4/92	2	Yes	4	7.5	0.15	0	0	0		No	0	0	No	No	No
1997	1/29/97	1	Yes	STEADY	6.3	0	0	0	0.25	0.10	No	0	0	GASOLINE		No
	1/29/97	2	Yes	YES	6.6	0	0	0	0.25	0.10	No	0	0	CHEMICAL		No
	3/12/97	3	Yes	2	8.0	0.10	0	0	0.10	1.50	Yes < 1	15	7			No
	3/12/97	4	Yes	2		0	0	0	0.10	0.50	No	0	0			No
03-400-0570																
2000	4/6/00	3	Yes	12	7.2	0	0	0	0	0	No	0	0	No	No	No
	4/6/00	4	Yes	12	7.2	0	0	0	0	0	No	0	0	No	No	No
03-400-0665																
2000	10/18/99	3	Yes	TOO LOW	8.0	0.60	0	0	0	0	No	25	50	No	No	No
	10/18/99	4	Yes	TOO LOW	8.0	0.30	0	0.20	0	0.60	No	20	45	No	No	No
2001	9/27/00	3	Yes	0.20	7.6	0	0	0	0	0	No	0	0	No	No	No
	9/27/00	4	Yes	16	7.6	0	0	0	0	0	No	0	0	No	No	No
03-500-0540																
2000	3/2/00	1	Yes	100	7.8	0	0	0	0	0	No	0	0	No	No	No
	3/2/00	2	Yes	100	7.4	0	0	0	0	0	No	0	0	No	No	No
	4/6/00	3	Yes	300	7.4	0	0	0	0	0	No	0	0	No	BROWN	No
	4/6/00	4	Yes	300	7.4	0	0	0	0	0	No	0	0	No	No	No

Outfall / Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
04-100-0250																
1992	11/14/91	1	Yes	4	8.2	0	0	0	< 0.25		No	0	0	No	No	No
	11/15/91	2	Yes	4	7.9	< 0.10	0	0	> 3		Yes 1,400	50	100	No	No	No
04-200-0270																
1992	11/13/91	1	Yes	403	8.1	0.10	0	0	< 0.10		No	0	8	No	No	No
	11/14/91	2	Yes	345	8.1	0	0	0	< 0.25		Yes 200	0	0	No	No	No
1997	10/31/96	1	Yes	30	7.4	0	0	0	0.10		Yes 155	0	0	No	No	No
	11/1/96	2	Yes	10	7.3	0	0	0	0.20	0	No	5	15	No	No	No
	12/3/96	3	Yes	HEAVY	7.5	0	0	0	0.10	0	No	0	0	No	No	No
	12/3/96	4	Yes	10	7.2	0	0	0	0.25	0	No	0	0	No	No	No
04-400-0210																
2000	3/29/00	3	Yes	0.18	7.4	0.10	0	0	0	0.20	No	0	0	No	No	No
	3/29/00	4	Yes	0.12	7.4	0	0	0	0	0.20	No	0	0	No	No	No
04-400-0300																
2000	2/29/00	1	Yes	5	7.8	2.00	0	0	0	0	No	0	20	No	No	No
	2/29/00	2	Yes	5	7.8	1.00	0	0	0	0	No	0	15	No	No	No
	3/29/00	3	Yes	3	7.8	1.50	0	0	0	0	No	0	0	No	No	No
	3/29/00	4	Yes	3	7.8	1.50	0	0	0	0	No	0	0	No	No	No
2001	8/8/00	1	Yes	5	7.6	1.50	0	0	0	0	No	0	0	No	No	No
	8/8/00	2	Yes	5	8.2	0.25	0	0	0.25	3.00	Yes 2,376	0	60	No	No	No
	9/27/00	3	Yes	4	8.2	2.00	0	0	0	0	No	0	0	No	No	No
	9/27/00	4	Yes	5	8.2	1.50	0	0	0	0	No	0	0	No	No	No
04-400-0335																
1998	11/24/97	1	Yes	MODER.	7.5	0	0	0	0	0	No	0	0	No	No	No
	11/24/97	2	Yes	MODER.	7.5	0	0	0	0	0.10	No	0	0	No	No	No
	1/29/98	3	Yes	YES	6.6	0	0	0	0	0	No	0	0	No	No	No
	1/29/98	4	Yes	YES	7.3	0	0	0	0	0	No	0	0	No	No	No
04-500-0238																
2001	4/16/01	1	Yes	UNMEASU	8.0	0.60	0.25	0.10	1.50	0.20	No	0	0	No	No	No
	4/16/01	2	Yes	UNMEASU	8.0	0.70	0.20	0	0.10	0.20	No	0	0	No	No	No
	5/16/01	3	Yes	VERY LIG	8.0	1.50	0	0	0	0.80	No	50	0	No	No	No

Outfall / Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
05-100-0165																
1997	2/12/97	1	Yes	0.10	7.7	0	0	0	0	0	No	0	0	No	No	No
	2/12/97	2	Yes	0.10	7.4	0	0	0	0	0	No	0	0	No	No	No
	3/17/97	3	Yes	1	7.2	0	0	0	0	0	No	0	0	No	No	No
	3/17/97	4	Yes	1	6.9	0	0	0	0.10	0.50	No	0	0	No	No	No
1998	10/6/97	1	Yes	3	6.9	0.05	0	0	0.10	0	No	20	20	No	No	No
	10/6/97	2	Yes	3	6.8	0.08	0	0	0.10	0	No	20	20	No	No	No
	12/17/97	3	Yes	1	7.8	0	0	0	0.10	0	No	0	0	No	No	No
	12/18/97	4	Yes	1	8.0	0	0	0	0.10	0	No	50	40	No	No	No
05-100-0200																
1997	2/18/97	1	Yes	SLIGHT	8.1	0	0	0	< 0.25	0	No	0	0	No	No	No
	2/18/97	2	Yes	SLIGHT	8.2	0	0	0	< 0.25	0	No	0	0	No	No	No
	4/4/97	3	Yes	TRICKLE	7.4	0	0	0	0	0	No	0	0	No	No	No
	4/4/97	4	Yes	TRICKLE	7.5	0	0	0	0	0	No	0	0	No	No	No
05-300-0035																
1997	2/12/97	1	Yes	2	7.5	0	0	0	0.15	0.10	No	0	0	No	No	No
	2/12/97	2	Yes	2	7.5	0	0	0	0.10	0	No	0	0	No	No	No
	3/17/97	3	Yes	2	7.1	0	0	0	0.10	0	No	0	0	No	No	No
	3/17/97	4	Yes	2	6.9	0	0	0	0.10	1.10	No	0	0	No	No	No
1998	12/17/97	3	Yes	5	7.9	0	0	0	0.10	0.10	No	0	0	No	GREEN	No
	12/18/97	4	Yes	5	7.6	0	0	0	0.10	0	No	0	0	No	GREEN	No
05-300-0210																
2000	12/29/99	1	Yes	63	6.8	0.40	0	0	0	0	No	0	0	No	No	No
	12/29/99	2	Yes	63	7.0	0.40	0	0	0	0	No	0	0	No	No	No
	2/2/00	3	Yes	100	8.0	0.40	0	0	0	0	No	0	0	No	No	No
	2/2/00	4	Yes	100	7.8	0	0	0	0	0	No	0	0	No	No	No
2001	8/14/00	1	Yes	300	7.8	0.30	0	0	0	0	No	0	20	No	No	No
	8/14/00	2	Yes	300	7.8	0.20	0	0	0	0	No	0	10	No	No	No
	9/29/00	3	Yes	10	7.0	0	0	0	0	0	No	0	0	No	No	No
	9/29/00	4	Yes	10	7.8	0	0	0	0	0	No	0	0	No	No	No
05-300-0240																
1997	2/18/97	1	Yes	SLIGHT	8.1	0	0	0	0	0.30	No	50	20	No		Yes
	2/18/97	2	Yes	SLIGHT	7.9	0	0	0	< 0.25	0.20	No	50	20	No	No	No

Outfall Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
05-400-0045																
1998	1/29/98	1	Yes	1	7.0	2.10	0	0	0	0	No	0	0	CHLORINE	No	No
	1/29/98	2	Yes	1	7.0	2.00	0	0	0	0	No	0	0	CHLORINE	No	No
	4/13/98	3	Yes	2	7.0	3.00	0	0	0.25	0	No	0	0	CHLORINE	No	No
	4/13/98	4	Yes	0.60	7.0	4.00	0	0	0.25	0	No	0	0	CHLORINE	No	No
1999	3/5/99	1	Yes	0.03	7.8	0	0.20	0	0.25	2.00	Yes 54	50	70	No	No	No
	3/5/99	2	Yes	0.03	8.2	0.10	0.20	0	0.10	2.00	No	50	90	No	No	No
	4/5/99	3	Yes	0.01	8.2	0.10	0.10	0.10	0.50	4.00	Yes 12,090	0	40	No	No	No
	4/5/99	4	Yes	0.01	7.5	0.10	0	0	0.25	1.00	No	0	40	No	No	No
05-400-0245																
1998	1/29/98	1	Yes	SLOW	7.0	0	0	0	0	0.10	No	0	45	No	No	No
	1/29/98	2	Yes	SLOW	7.0	0	0	0	0	0.10	No	0	30	No	No	Yes
05-500-0015																
1998	5/6/98	1	Yes	5	8.4	0	0	0	0	0.20	No	20	0	No	SLIGHT	No
	5/6/98	2	Yes	5	8.1	0	0	0	0	0	No	20	0	No	SLIGHT	No
06-100-0200																
1992	11/19/91	1	Yes	4	5.6	0.10	0.20	0.30	3		Yes > 6,000	250	35	No	No	No
	11/20/91	2	Yes	4	4.4	0.30	0.20	0.20	3		No	250	35	No	No	No
1997	12/3/96	3	Yes	0.80	8.0	0	0	0	0.10	0.10	No	0	0	MUSKY	No	No
	12/4/96	4	Yes	0.80	8.2	0	0	0	0.10	0.10	No	0	0	MUSKY	No	No
06-200-0155																
1997	2/19/97	1	Yes	3	8.0	0	0	0	0.10	0.40	No	0	0	No		No
	2/20/97	2	Yes	3	8.3	0.05	0	0	0.10	0.10	No	0	0	No	No	No
	3/27/97	3	Yes	3	7.4	0	0	0	0.30	0	No	0	0	No	No	No
	3/27/97	4	Yes	3	7.8	0	0	0	0.10	0	No	0	0	No		No
06-400-0145																
1999	3/12/99	1	Yes	20	7.8	0.10	0	0	0	0.60	No	0	0	No	No	No
	3/12/99	2	Yes	20	7.5	0.30	0	0	0	0.10	No	0	0	No	No	No
	4/12/99	3	Yes	0.26	6.5	0.10	0	0	0	0	No	25	0	No	No	No
	4/12/99	4	Yes	0.31	6.5	0.10	0	0	0	0	No	0	0	No	No	No
06-400-0170																
1998	1/29/98	1	Yes	0.60		0	0	0	0	0	No	0	0	No	ALGAE	No
	1/29/98	2	Yes	0.60	7.0	0	0	0	0	0.10	No	0	0	No	ALGAE	No

Outfall / Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
06-500-0110																
1992	11/19/91	1	Yes	40	7.9	< 0.10	0	0	0		Yes 10	0	0	No	No	No
	11/20/91	2	Yes	40	7.7	0	0	0	< 0.25		No	0	0	No	No	No
07-100-0055																
1992	11/20/91	1	Yes	27	7.5	0.15	0	0	0.25		Yes 6,000	0	0	No	No	No
	11/20/91	2	Yes	27	7.6	0.15	0	0	0.75		No	0	0	FISH	No	No
1997	5/7/97	1	Yes	HEAVY	7.0	0.10	0	0	0	0.80	Yes 9,091	0	0	No	No	No
	5/7/97	2	Yes	YES	7.0	0	0	0	0	0	No	0	0	No	No	No
	6/20/97	3	Yes	2	7.0	0	0	0	0.10	0.20	No	5	0	No	No	No
	6/20/97	4	Yes	2	6.2	0	0	0	0	0	No	5	5	No	No	No
1998	5/13/98	1	Yes	2	7.5	0	0	0	0.20	0.30	No	0	10	No	No	No
	5/13/98	2	Yes	2	8.3	0	0	0	0.25	0.20	No	0	15	No	No	No
	6/24/98	3	Yes	5	7.0	0	0	0	0	0.20	No	0	0	No	No	No
	6/24/98	4	Yes	3	7.3	0	0	0	0	0.60	No	0	0	No	No	No
1999	3/17/99	1	Yes	150	8.2	0.10	0	0	0	0.40	No	0	0	No	No	No
	3/17/99	2	Yes	150	8.1	0	0	0	0.25	0.40	No	0	0	No	No	No
	4/19/99	3	Yes	60	6.0	0	0	0	0	0	No	0	0	No	No	No
	4/19/99	4	Yes	60	6.0	0	0	0	0.25	0	No	0	0	No	No	No
2000	8/17/99	1	Yes	5	7.6	0	0	0	0	0.30	No	0	0	No	No	No
	8/18/99	2	Yes	5	7.6	0	0	0	0.25	0.60	No	0	0	No	No	No
	9/13/99	3	Yes	0.50	7.0	0	0	0	0	0.20	No	0	0	No	No	No
	9/13/99	4	Yes	0.50	6.5	0	0	0	0	0	No	0	0	No	No	No
2001	8/14/00	1	Yes	200	7.8	0	0	0	0	0	No	0	0	No	No	No
	8/14/00	2	Yes	200	7.8	0	0	0	0	0	No	0	0	No	No	No
	10/3/00	3	Yes	19	8.0	0	0	0	0	0	No	0	0	No	No	No
	10/4/00	4	Yes	19	7.0	0	0	0	0	0	No	0	0	No	No	No
07-100-0090																
1997	10/31/96	1	Yes	2	8.1	0	0	0	0.25		Yes 600,000	10	10	LAUNDRY		No
	11/1/96	2	Yes	3	8.0	0	0	0	0.25		No	0	10	No		No
	12/3/96	3	Yes	FAST	8.0	0	0	0	0.25	1.50	Yes 90,000	0	0	No	No	No
	12/3/96	4	Yes	STEADY	7.7	0	0	0	0.10	0.25	No	0	0	No	No	No
1998	10/6/97	1	Yes	10	7.2	0	0	0	0.25	3.50	Yes 1,360,000	50	50	FECAL		Yes
	10/6/97	2	Yes	10	7.0	0	0	0	1	9.00	No	50	20	FECAL		Yes
	12/17/97	3	Yes	10	8.2	0	0	0	0.25	3.50	Yes 680,000	0	0	FECAL		No
	12/18/97	4	Yes	10	8.2	0	0	0	0.30	3.00	No	50	20	SEWAGE	BROWN	No
1999	3/17/99	1	Yes	60	8.2	0	0	0	0.25	0.30	No	0	15	No	No	No
	3/17/99	2	Yes	60	7.6	0	0	0	0.25	0.20	No	0	0	No	No	No
	4/19/99	4	Yes	TOO LOW	6.0	0.20	0	0	2	0.40	No	0	0	No	No	No

Outfall / Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
07-100-0205																
1997	2/17/97	1	Yes	0.50	7.6	0	0	0	0.10	0.30	No	10	10	SEWER	No	No
	2/18/97	2	Yes	0.25	7.8	0.20	0.10	0	0	0.30	Yes 55	10	10	No	No	No
	3/27/97	3	Yes	2	7.5	0.10	0	0	0.25	0	No	0	20	No	No	No
	3/27/97	4	Yes	2	7.8	0.10	0	0	0.10	0	No	0	20	No		No
07-200-0015																
1997	10/31/96	1	Yes	0.50	7.8	0	0	0	0.10		Yes 100	0	0	No	No	No
	11/1/96	2	Yes	0.50	7.5	0	0	0	0.20		No	0	10	No	No	No
	12/3/96	3	Yes	SLIGHT	8.3	0	0	0	0.10	0	No	0	0	No		No
	12/3/96	4	Yes	SLIGHT	8.2	0	0	0	0.15	0.10	No	0	0	No		No
07-400-0045																
1999	3/17/99	1	Yes	6	7.5	0.10	0	0	0.25	0.10	No	0	40	No	No	No
	3/17/99	2	Yes	6	7.8	0.20	0	0	0.25	0.20	No	0	40	No	No	No
	4/19/99	3	Yes	0.29	6.0	0.10	0	0	0.25	0	No	0	40	No	No	No
	4/19/99	4	Yes	0.29	6.5	0	0	0	2	0	No	0	30	No	No	No
07-400-0070																
2001	12/11/00	1	Yes	0.00	0.0	0	0	0	0	0	No	0	0	No	No	No
	12/11/00	2	Yes	TLTM	7.5	0	0	0.50	3	10.00	Yes	30		SEWAGE	No	No
	1/11/01	3	Yes	5	7.5	0	0	0.20	3	10.00	Yes 1,180,000	50	30	SEWAGE	No	No
	1/11/01	4	Yes	5	7.5	0	0	0.40	3	10.00	No	50	30	SEWAGE	No	No
	6/12/01	5	Yes	SLOW	7.5	0.90	0	0	1	10.00	No	50	45	No	No	No
10-200-0040																
1997	3/21/97	3	Yes	1	7.1	0.20	0	0	0.10	1.50	Yes 5	0	20	No	No	No
	3/21/97	4	Yes	0.00	7.1	0	0	0	0.10	5.00	No	0	0	No	No	No
10-500-0025																
2001	1/3/01	1	Yes	3	7.5	0.20	0	0	0	0.10	No	0	0	No	No	No
	1/3/01	2	Yes	3	7.5	2.00	0	0		0.25	No	0	0	No	No	No
	2/5/01	3	Yes	HEAVY	7.0	0	0	0	0	0	No	0	0	No	No	No
	2/5/01	4	Yes	HEAVY	7.5	0	0	0	0	0	No	0	0	No	No	No
10-500-0035																
2001	12/1/00	3	Yes	0.08	8.0	0.70	0	0	0	0.70	No	0	0	No	No	No
	12/1/00	4	Yes	0.08	8.0	0	0.10	0	0.25	0.70	No	0	0	No	No	No
	2/5/01	6	Yes	DRIPPING	7.0	0	0	0	3	0	No	0	0	No	No	No
	2/5/01	7	Yes	DRIPPING	7.0	0	0	0	3	0	No	0	0	No	No	No

Outfall / Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
11-200-0595																
1997	2/19/97	1	Yes	1	7.2	0	0	0	0.10	0	No	0	0	No		Yes
	2/20/97	2	Yes	0.50	7.6	0	0	0	0.10	0.30	No	0	0	No		Yes
	3/24/97	3	Yes	1	7.6	0	0	0	0.10	0	No	0	0	No		No
	3/25/97	4	Yes	1	6.8	0.10	0	0	0.10	0	No	0	20	No		No
11-400-0585																
1998	5/20/98	1	Yes	0.50	8.9	0	0	0	0.25	0.40	Yes 310	0	0	No	No	Yes
	5/20/98	2	Yes	0.50	8.7	0	0	0	0.25	0.40	No	0	0	No	No	Yes
	6/18/98	3	Yes	0.50	8.3	0	0	0	0.20	0.30	No	0	0	No	No	Yes
	6/18/98	4	Yes	0.50	8.5	0	0	0	0.20	0.40	No	0	0	No	No	Yes
1999	3/19/99	1	Yes	5	7.5	0.10	0	0	0.10	0.10	No	0	0	No	No	No
	3/19/99	2	Yes	5	7.8	0	0	0	0	0	No	0	0	No	No	No
	5/3/99	3	Yes	1	6.5	0	0	0	0	0	No	0	0	No	No	No
	5/3/99	4	Yes	2	6.5	0	0	0	0.25	0.10	No	0	35	No	No	No
11-400-0590																
1997	2/20/97	1	Yes	2	7.6	0	0	0	1	1.00	Yes 410	0	0	No	No	No
	2/21/97	2	Yes	2	7.2	0	0	0	0.40	1.00	No	0	0	No	No	No
	3/24/97	3	Yes	1	7.2	0	0	0	0.10	3.50	No	0	20	No	No	No
	3/25/97	4	Yes	1	6.8	0.30	0	0	> 3	> 10.00	No	20	20	ROTTEN	No	No
1998	1/5/98	1	Yes	10	8.2	0	0	0	0.10	3.00	No	100	100	No	No	No
	1/5/98	2	Yes	10	8.3	0	0	0	0.10	2.00	No	100	100	No	No	No
	3/11/98	3	Yes	8	8.4	0	0	0	0.10	2.00	No	50	100	No	No	No
	3/11/98	4	Yes	8	8.5	0	0	0	0.10	2.00	No	50	70	No	No	No
1999	3/19/99	1	Yes	5	7.4	0	0	0	0	0.10	No	0	0	No	No	No
	5/3/99	2	Yes	2	7.0	0	0	0	0.25	0.15	No	0	0	No	WHITE & D	No
	5/3/99	3	Yes	2	7.0	0	0	0	0.25	0.15	No	0	0	No	WHITE & D	No
	5/3/99	4	Yes	2	6.0	0	0	0	0	0.10	No	0	0	No	WHITE & D	No
12-200-0055																
1992	11/14/91	1	Yes	85	8.5	< 0.10	0	0	0		Yes 20	0	0	No	No	No
	11/15/91	2	Yes	85	8.3	0	0	0	0		No	0	0	No	No	No
12-400-0005																
1997	5/7/97	1	Yes	YES	6.7	0	0	0	0.10	0.10	No	0	0	No	No	No
	5/7/97	2	Yes	YES	7.1	0	0	0	0.10	0	No	0	0	No	No	No
	6/24/97	3	Yes	5	7.0	0	0	0	0.10	0.10	No	0	0	No	No	No
	6/24/97	4	Yes	5	7.1	0	0	0	0.10	0	No	0	0	No	No	No

Outfall *Permit Year*	*Date*	*Visit #*	*Flow ?*	*Flow Rate (gpm)*	*pH (su)*	*Chlorine (ppm)*	*Copper (ppm)*	*Phenol (ppm)*	*Detergents (ppm)*	*Ammonia (ppm)*	*Fecal Sample (mpn/100ml)*	*Turbidity (ntu)*	*Color*	*Odor?*	*Surface Scum*	*Oil Sheen*
12-400-0045																
1998	5/21/98	1	Yes	MODERA	6.5	1.50	0	0	0	0	No	0	10	No	No	No
	5/21/98	2	Yes	MODERA	9.2	0.10	0	0	0	0.30	No	10	25	No	FILMY	No
13-100-0240																
1992	11/12/91	1	Yes	4	8.0	0	0	0	0		No	200	450	No	No	No
	11/13/91	2	Yes	4	7.8	0	0	0	0.35		Yes 330	0	5	No	No	No
1997	11/4/96	1	Yes	TRICKLE	8.3	0	0	0	0.10		Yes 11,000	0	20	No	No	No
	11/5/96	2	Yes	TRICKLE	8.2	0	0	0	0.10		No	0	15	No	No	No
	12/5/96	3	Yes	SLIGHT	7.3	0	0	0	0.20	0.10	No	0	10	No	No	No
	12/5/96	4	Yes	SLIGHT	7.2	0	0	0	0.20	0.10	No	0	10	No	No	No
13-100-0285																
1992	11/12/91	1	Yes	4	8.2	0	0	0	0		No	0	0	No	No	No
	11/13/91	2	Yes	4	8.0	0	0	0	0		Yes 90	0	0	No	No	No
13-200-0340																
1997	4/3/97	1	Yes	MODER.	8.3	0	0	0	< 0.25	2.00	Yes 2	30	20	PETRO		Yes
	4/3/97	2	Yes	MODER.	8.4	0	0	0	< 0.25	2.00	No	30	20	PETRO		Yes
	5/12/97	3	Yes	STEADY	7.7	0	0	0	< 0.25	3.00	Yes 2,200	30	15	PETRO	No	Yes
	5/12/97	4	Yes	STEADY	7.2	0.20	0	0	< 0.25	3.00	No	35	17	PETRO	No	Yes
1998	12/17/97	1	Yes	STEADY	8.2	0	0	0	0	1.00	Yes	20	45	No	BROWN	No
	12/17/97	2	Yes	STEADY	7.9	0	0	0.10	0.50	3.50	No	200	100	OIL/GAS	LOTS	Yes
	1/29/98	3	Yes	LESS	7.2	0	0	0	0	1.00	Yes 20	20	80	No	No	No
	1/29/98	4	Yes	LESS	7.3	0	0	0	0	1.00	No	20	50	UNKNOWN	YELLOWIS	No
1999	11/19/98	3	Yes	2	8.1	0	0	0	0	0.30	No	10	10	No	No	Yes
	11/19/98	4	Yes	2	7.9	0	0	0	0	0.30	No	100	70	No	No	Yes
13-300-0135																
2001	1/16/01	1	Yes	20	7.0	0	0	0	0	7.00	Yes 91	25	20	No	No	No
	1/16/01	2	Yes	20	7.0	0	0	0	0.25	8.00	No	20	30	No	No	No
	3/2/01	3	Yes	5	7.0	0	0	0	0	10.00	No	0	50	No	No	No
	3/2/01	4	Yes	5	7.0	0	0	0	0	10.00	No	0	40		No	No

Outfall *Permit Year*	*Date*	*Visit #*	*Flow ?*	*Flow Rate (gpm)*	*pH (su)*	*Chlorine (ppm)*	*Copper (ppm)*	*Phenol (ppm)*	*Detergents (ppm)*	*Ammonia (ppm)*	*Fecal Sample (mpn/100ml)*	*Turbidity (ntu)*	*Color*	*Odor?*	*Surface Scum*	*Oil Sheen*
13-300-0140																
1992	3/3/92	1	Yes	148	8.1	0.05	0	0	0		Yes 170	0	0	No	No	No
	3/4/92	2	Yes	148	8.2	0	0	0	0.15		No	0	0	No	No	No
2001	1/16/01	1	Yes	19	6.0	0	0	0	0	0	No	0	0	No	No	No
	1/16/01	2	Yes	19	6.0	0	0	0	0	0	No	0	0	No	No	No
	3/2/01	3	Yes	10	7.0	0	0	0	0	0	No	0	0	No	No	No
	3/2/01	4	Yes	10	7.0	0	0	0	0	0	No	0	0	No	No	No
13-300-0150																
1992	11/12/91	1	Yes	4	8.4	< 0.10	0	0	0.35		Yes 50	0	0	No	No	No
	11/13/91	2	Yes	4	8.2	0.30	0	0	0.35		No	0	5	No	No	No
1997	2/25/97	1	Yes	5	8.3	0	0	0.10	0.50	0.80	No	50	4	No	No	No
	2/25/97	2	Yes	STEADY	8.5	0	0	0.20	0.50	0.80	No	20	6	No	No	No
	4/8/97	3	Yes	10	7.4	0	0	0	0.50	1.00	Yes 126	2	3	No	No	No
	4/8/97	4	Yes	10	7.7	0.10	0	0	0.50	2.00	No	10	5	No	No	No
1998	11/10/97	1	Yes	12	7.7	0	0	0	1.50	0	No	0	0	No	No	No
	11/10/97	2	Yes	8	7.7	0	0	0	0.75	0.40	No	10	20	No	No	No
	1/5/98	3	Yes	45	7.4	0			0.75	< 1.00	No	25	30	SLIGHT	No	No
	1/5/98	4	Yes	45	7.8	0	0	0	0.75	2.00	No	20	25	SLIGHT	No	No
2000	2/3/00	3	Yes	1	6.0	0.40	0	0	0.25	0.30	No	0	0	No	No	No
	2/3/00	4	Yes	1	6.5	0.80	0	0	0	0.40	No	0	10	No	No	No
13-300-0155																
2001	1/22/01	1	Yes	30	6.5	0	0	0	0	0	No	0	0	No	No	No
	1/22/01	2	Yes	30	7.0	0	0	0	0	0	No	0	0	No	No	No
	3/26/01	3	Yes	95	7.0	0.20	0	0	0	0	No	0	0	No	No	No
	3/26/01	4	Yes	95	7.0	0	0	0	0	0	No	0	0	No	No	No

Outfall *Permit Year*	*Date*	*Visit #*	*Flow ?*	*Flow Rate (gpm)*	*pH (su)*	*Chlorine (ppm)*	*Copper (ppm)*	*Phenol (ppm)*	*Detergents (ppm)*	*Ammonia (ppm)*	*Fecal Sample (mpn/100ml)*	*Turbidity (ntu)*	*Color*	*Odor?*	*Surface Scum*	*Oil Sheen*
13-300-0185																
1992	11/12/91	1	Yes	44	7.6	0.35	0	0	0		Yes 0	0	0	No	No	No
	11/13/91	2	Yes	44	7.6	0.30	0	0	0		No	0	0	No	No	No
1997	3/12/97	1	Yes	STEADY	8.3	0.10	0	0	< 0.25	> 10.00	Yes < 1	0	1	No	No	No
	3/12/97	2	Yes	STEADY	8.0	0.10	0	0	< 0.25	> 10.00	No	10	1	No	No	No
	4/8/97	3	Yes	STEADY	7.4	0.10	0	0	< 0.25	> 10.00	Yes 14	0	2	No	No	No
	4/8/97	4	Yes	STEADY	7.1	0.10	0	0	< 0.25	> 10.00	No	0	2	No	No	No
1998	10/16/97	1	Yes	60	6.8	0	0	0	0.20	9.00	No	0	0	No	No	No
	10/16/97	2	Yes	60	6.8	0.10	0	0	0.10	7.00	No	0	0	No	No	No
	1/5/98	3	Yes	40	8.2	0	0	0	0.10	8.00	No	0	0	No	No	No
	1/5/98	4	Yes	40	8.3	0	0	0	0.10	10.00	No	0	0	No	No	No
1999	9/10/98	1	Yes	12		0.20	0	0.20	0.10	10.00	No	0	0	No	No	No
	9/10/98	2	Yes	12	7.6	0.15	0	0	0.10	10.00	No	0	0	No	No	No
	12/4/98	3	Yes	10	7.7	0	0	0	0.25	10.00	No	100	70	No	No	No
	12/4/98	4	Yes	10	8.0	0.05	0	0	0	2.00	No	0	40	No	No	No
2000	1/6/00	1	Yes	TRICKLE	7.8	0	0	0	0	0.30	No	0	0	No	No	No
	1/6/00	2	Yes	TRICKLE	8.0	0	0	0	0	0	No	0	0	No	No	No
	2/9/00	3	Yes	3	8.0	2.50	0	0	0	0	No	0	0	No	No	No
13-300-0228																
2001	4/10/01	1	Yes	0.31	7.0	0.80	0	0	0	0	No	0	30	No	No	No
	4/10/01	2	Yes	0.31	7.0	0.40	0	0	0	0	No	0	30	No	No	No
	5/15/01	3	Yes	0.31	7.5	0.60	0	0	0	0	No	0	0	No	No	No
	5/16/01	4	Yes	0.31	7.0	0.80	0	0	1	0.80	No	0	30	No	No	No

Outfall / Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
13-300-0305																
1992	11/11/91	1	Yes	4	7.8	0	0	0	0		No	0	0	No	No	No
	11/12/91	2	Yes	4	7.9	0	0	0	0		Yes 40	0	0	No	No	No
1997	4/3/97	1	Yes	YES	8.5	0.20	0	0	< 0.25	0	No	15	7	No	No	Yes
	4/3/97	2	Yes	STEADY	8.7	0.20	0	0	< 0.25	0	No	10	3	No	No	Yes
	5/12/97	3	Yes	STEADY	7.5	0.10	0	0	< 0.25	2.00	Yes 400	10	5	No	No	No
	5/12/97	4	Yes	STEADY	7.5	0.20	0	0	< 0.25	3.00	No	10	6	No	No	No
1998	12/17/97	1	Yes	INTO PIPE	8.1	0	0	0	0	0	No	0	10	No	No	No
	12/17/97	2	Yes	INTO PIPE	7.9	0.20	0	0	0	0	No	0	10	No	No	No
	1/29/98	3	Yes	MEDIUM	7.2	0	0	0	0	0	No	0	10	No	No	No
	1/29/98	4	Yes	MEDIUM	7.5	0	0	0	0	0	No	0	0	No	No	No
1999	3/19/99	1	Yes	50	8.5	0	0	0	0	0.10	No	0	0	No	No	No
	3/19/99	2	Yes	50	8.5	0	0	0	0	0.10	No	0	0	No	No	No
	4/19/99	3	Yes	50	8.4	0	0	0	0	0.10	No	0		No	No	No
	4/19/99	4	Yes	50	8.6	0	0	0	0	0.10	No	0	0	No	No	No
2001	3/26/01	3	Yes	0.24	6.5	0	0	0	0	0	No	0	0	No	No	No
	3/26/01	4	Yes	0.24	6.5	0.60	0	0	0	0	No	0	0	No	No	No
13-300-0365																
2001	1/22/01	1	Yes	0.06	6.5	0	0	0	0	0	No	0	0	No	No	No
	1/23/01	2	Yes	0.06	7.0	0	0	0	0	0.50	No	0	95	No	No	No
13-400-0160																
2000	3/15/00	1	Yes	0.16	7.2	0.30	0	0	0	0	No	0	30	No	No	No
	3/15/00	2	Yes	0.16	7.2	0	0	0	0	0	No	0	20	No	No	No
	4/19/00	3	Yes	2	7.3	0	0	0	0	0	No	0	0	No	No	No
	4/19/00	4	Yes	2	7.2	0	0	0	0	0	No	0	20	No	No	No
13-400-0225																
1997	2/19/97	1	Yes	0.20	7.4	0	0	0	0	0	No	0	0	No	No	No
	2/20/97	2	Yes	0.20	7.4	0	0	0	0	0	No	0	0	No	No	No
	3/24/97	3	Yes	0.20	7.0	0.20	0	0	0	0.40	No	0	20	No	No	No
	3/25/97	4	Yes	0.20	7.5	0.20	0	0	0.25	5.50	Yes 2	10	20	SEWAGE		No
13-400-0265																
2000	3/15/00	1	Yes	TOO LOW	7.4	0	0	0	0	0	No	0	0	No	No	No
	3/15/00	2	Yes	TOO LOW	7.4	0	0	0	0	0	No	0	0	No	No	No

Outfall / Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
13-400-0315																
2000	10/1/99	1	Yes	HEAVY	6.5	0.10	0	0	0.50	2.00	Yes 7,000	0	0	No	No	No
	11/8/99	3	Yes	5	7.4	0.30	0	0	0.50	1.00	Yes 2,300	0	0	No	No	No
	11/8/99	4	Yes	5	7.7	0.20	0	0	0.25	2.00	No	0	0	No	No	No
	11/10/99	5	Yes	HEAVY	7.4	0	0	0	3	10.00	No	0	0	No	No	No
	11/10/99	6	Yes	HEAVY	7.4	0	0	0	3	10.00	No	50	30	No	No	No
	12/17/99	7	Yes	2	7.4	0.20	0	0	0.75	6.00	Yes 35,000	25	0	No	No	No
	12/17/99	8	Yes	2	7.4	0.10	0	0	0.50	5.00	No	0	0	No	No	No
13-400-0325																
2000	12/17/99	3	Yes	0.32	7.6	0	0	0	0	0	No	0	20	No	No	No
	12/17/99	4	Yes	0.32	7.6	0	0	0	0	0	No	0	0	No	No	No
18-100-0700																
1997	6/16/97	3	Yes	2	7.1	0.20	0	0	0.10	2.00	No	0	4			No
	6/16/97	4	Yes	2	7.2	0	0	0	0.10	0.10	No	0	4			No
51-100-0900																
1997	2/20/97	1	Yes	5	7.8	0	0	0	0.10	0	No	0	0	No	No	No
	2/20/97	2	Yes	5	7.9	0	0	0	0	0.05	No	0	0	No	No	No
	3/24/97	3	Yes	3	7.5	0.20	0	0	0.10	7.50	No	0	0	No		No
	3/25/97	4	Yes	3	7.5	0.30	0	0	0.10	1.50	Yes 20	0	0	No		No
1998	1/20/98	1	Yes	20	8.1	0	0	0	0.10	0	No	50	25	No	No	No
	1/20/98	2	Yes	20	8.3	0	0	0	0.10	0	No	50	30	No	No	No
	2/25/98	3	Yes	25	8.4	0	0	0	0.10	0.10	No	50	20	No	No	No
	2/25/98	4	Yes	20	8.2	0	0	0	0.10	0	No	50	20	No	No	No
1999	3/23/99	1	Yes	18	8.4	0.05	0	0	0	0	No	0	0	No	No	No
	3/23/99	2	Yes	15	8.3	0	0	0	0	0	No	0	0	No	No	No
	5/10/99	3	Yes	30	8.6	0	0	0	0	0	No	0	0	No	No	No
	5/10/99	4	Yes	30	8.7	0	0	0	0	0	No	0	0	No	No	No
2000	9/16/99	1	Yes	2	6.5	0.30	0	0	0	0	No	0	0	No	No	No
	9/16/99	2	Yes	2	6.5	0	0	0	0	0	No	0	0	No	No	No
	10/18/99	3	Yes	2	6.0	0	0	0	0	0	No	0	0	No	No	No
	10/18/99	4	Yes	2	6.0	0	0	0	0	0	No	0	0	No	No	No

Outfall / Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
53-100-0045																
1992	11/20/91	1	Yes	4	8.0	0.15	0	0	0		Yes 130	0	0	No	No	No
	11/20/91	2	Yes	4	7.9	< 0.10	0	0	0		No	0	10	No	No	No
1997	5/7/97	1	Yes	10	7.7	0	0	0	< 0.25	0.10	No	10	4	No	No	No
	5/7/97	2	Yes	10	7.4	0	0	0	< 0.25	0.10	No	10	3	No	No	No
	6/20/97	3	Yes	4	7.5	0	0	0	0	0	No	20	8	No	No	No
	6/20/97	4	Yes	2	7.2	0	0	0	0	0.20	No	10	5	No	No	No
1999	3/22/99	1	Yes	19	7.5	0	0	0	0	0.10	No	0	0	No	No	No
	3/22/99	2	Yes	19	7.6	0	0	0	0	0.10	No	0	0	No	No	No
	5/4/99	3	Yes	3	7.0	0.10	0	0	0	0	No	0	0	No	No	No
	5/4/99	4	Yes	3	6.5	0.10	0	0	0	0	No	0	35	No	No	No
2000	9/16/99	1	Yes	0.80	6.5	0.30	0	0	0	0	No	0	0	No	No	No
	9/16/99	2	Yes	0.80	7.0	0.30	0	0	0	0.30	No	0	0	No	No	No
	10/18/99	3	Yes	1	6.0	0	0	0	0	0	No	0	0	No	No	No
	10/18/99	4	Yes	2	6.0	0	0	0	0	0	No	0	0	No	No	No
2001	8/16/00	1	Yes	2	7.6	0.10	0	0	0	0.60	No	0	0	No	No	No
	8/16/00	2	Yes	1	7.8	0.20	0	0	0	0.30	No	0	0	No	No	No
	10/4/00	3	Yes	4	7.8	0	0	0	0	0	No	0	0	No	No	No
	10/4/00	4	Yes	3	8.0	0.60	0	0	0	0	No	0	0	No	No	No
53-100-0065																
1992	11/20/91	1	Yes	4	7.8	0.25	0	0	0		Yes 0	0	0	No	No	No
	11/20/91	2	Yes	4	7.7	1.00	0	0	0		No	0	0	No	No	No
1997	5/7/97	1	Yes	10	7.7	3.50	0	0	< 0.25	0	No	5	5	No	No	No
	5/7/97	2	Yes	16	7.9	2.50	0	0	0	0	No	15	5	No	No	No
53-100-0075																
1992	11/20/91	1	Yes	4	8.3	< 0.10	0	0	0		Yes 530	0	0	No	No	No
	11/20/91	2	Yes	4	8.4	0	0	0	0		No	0	15	No	No	No
1997	10/31/96	1	Yes	5	8.1	0	0	0	0.10		Yes 36	0	0	No	No	No
	11/1/96	2	Yes	5	8.1	0	0	0	0.10		No	0	10	No	No	No
	12/3/96	3	Yes	STEADY	7.9	0	0	0	0.20	0.10	No	0	0	No	No	No
	12/4/96	4	Yes	STEADY	7.9	0	0	0	0.25	0.10	No	0	0	No	No	No

Outfall / Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
53-100-0085																
1992	11/20/91	1	Yes	4	8.0	0	0	0	0		No	0	10	No	No	No
	11/20/91	2	Yes	4	8.0	0	0	0	0		No	0	0	No	No	No
1997	5/6/97	1	Yes	STEADY	7.3	0	0	0	< 0.25	0.20	No	5	4	No	No	No
	5/6/97	2	Yes	STEADY	7.7	0.20	0	0	< 0.25	0.20	No	5	3	No	No	No
	6/20/97	3	Yes	STEADY	7.4	0	0	0	0	0.10	No	25	7	No		No
	6/20/97	4	Yes	STEADY	7.2	0.30	0	0	0	1.00	No	25	7	No		No
1998	5/14/98	1	Yes	0.10	8.5	0.10	0	0	0	0.30	No	0	20	No	No	No
	5/14/98	2	Yes	0.10	7.7	0.10	0	0	0	0.10	No	0	15	No	No	No
	6/25/98	3	Yes	3	7.6	0	0	0	0	0.10	No	0	12	No	BROWN	No
	6/25/98	4	Yes	3	7.5	0	0	0	0	0.30	No	0	10	No	BROWN	No
53-100-0090																
1997	5/7/97	1	Yes	24	7.8	0	0	0	< 0.25	0	No	15	5	No	No	No
	5/7/97	2	Yes	MODERA	7.7	0.10	0	0		0.20	No	5	3	No	No	No
	6/20/97	3	Yes	MODERA	6.9	0	0	0	0	0.10	No	10	5	No	No	No
	6/20/97	4	Yes	MODERA	7.8	0.30	0	0	0	0.80	No	20	5	No	No	No
1998	5/14/98	1	Yes	0.20	8.2	0.10	0	0.10	0	0.10	No	0	15	MUSTY	No	No
	5/14/98	2	Yes	0.20	8.2	0.10	0	0	0	0.10	No	25	30	MUSTY	No	No
	6/25/98	3	Yes	0.20	7.9	0	0	0	0	0.10	No	10	10	No	No	No
	6/25/98	4	Yes	0.20	7.8	0	0	0	0.20	0.30	No	10	15	No	GRAY	No
53-200-0125																
1992	11/20/91	1	Yes	4	7.5	< 0.10	0	0	0		No	0	0	No	No	No
	11/20/91	2	Yes	4	7.6	< 0.10	0	0	0		No	0	0	No	No	No
53-200-0160																
1992	1/30/92	1	Yes	4	8.3	0	0	0	0		No	0	0	No	No	No
	1/30/92	2	Yes	4	8.4	0	0	0	0		Yes 50	0	0	No	No	No
53-200-0170																
1992	1/30/92	1	Yes	4	7.9	0	0	0	0		No	0	0	No	No	No
	1/30/92	2	Yes	4	7.9	0	0	0	0		Yes 0	0	0	No	No	No

Outfall / Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)		Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
53-200-0240																	
1992	1/30/92	1	Yes	17	7.7	0	0	0	0		No		0	0	No	No	No
	1/30/92	2	Yes	17	8.0	0	0	0	0		Yes	10	< 50	5	No	No	No
1997	2/19/97	1	Yes	0.25	7.6	0	0	0	0	0	No		0	0	No	No	No
	2/20/97	2	Yes	0.25	7.4	0	0	0	0	0.30	No		0	0	No	No	No
	3/24/97	3	Yes	8	7.4	0	0	0	0.10	0.10	No		0	20	No		No
	3/25/97	4	Yes	8	7.3	0.10	0	0	0.10	0	No		0	20	No		No
53-400-0100																	
2000	4/7/00	4	Yes	0.01	7.8	0.55	0	0	0	0	No		0	0	No	No	No
54-500-0005																	
1992	1/30/92	1	Yes	4	7.6	0	0	0	0		No		0	8	No	No	No
	1/30/92	2	Yes	4	7.7	0	0	0	0		Yes	0	0	0	No	No	No
71-400-0600																	
1999	3/22/99	1	Yes	10	7.0	0	0	0	0	0	No		0	0	No	No	No
	3/22/99	2	Yes	10	7.2	0.10	0	0	0	0	No		0	0	No	No	No
	5/4/99	3	Yes	2	7.0	0	0	0	0	0	No		0	40	No	No	No
	5/4/99	4	Yes	2	6.5	0.10	0	0	0	0.30	No		0	10	No	No	No
79-100-0365																	
1997	5/5/97	1	Yes	25	7.0	0	0	0	0.10	1.50	Yes	120	10	0	No	No	No
	5/5/97	2	Yes	30	7.0	0	0	0	0.10	0.40	No		0	0	No		No
	6/20/97	3	Yes	25	7.1	0	0	0	0.10	0.10	No		0	4	No	No	No
	6/20/97	4	Yes	25	7.2	0	0	0	0.10	0	No		0	4	No	No	No
1998	1/21/98	1	Yes	1	8.6	0	0	0	0.10	0	No		0	0	No	No	No
	1/21/98	2	Yes	1	8.4	0	0	0	0.10	0	No		0	0	No	No	No
	2/24/98	3	Yes	10	8.7	0	0	0	0.10	0	No		50	30	No	No	No
	2/24/98	4	Yes	10	8.2	0	0	0	0.20	0	No		50	30	No	No	No

Outfall *Permit Year*	*Date*	*Visit #*	*Flow ?*	*Flow Rate (gpm)*	*pH (su)*	*Chlorine (ppm)*	*Copper (ppm)*	*Phenol (ppm)*	*Detergents (ppm)*	*Ammonia (ppm)*	*Fecal Sample (mpn/100ml)*	*Turbidity (ntu)*	*Color*	*Odor?*	*Surface Scum*	*Oil Sheen*
79-100-0380																
1997	5/5/97	1	Yes	2	7.4	0	0	0	0.10	0.40	No	0	0	No	No	No
	5/5/97	2	Yes	2	7.4	0	0	0	0.10	0	No	0	10	SAWDUST		Yes
	6/20/97	3	Yes	2	6.9	0.10	0	0	0.10	4.00	No	10	10	No		Yes
	6/20/97	4	Yes	2	7.1	0.20	0	0	0.10	0.30	No	0	10	YES		Yes
1998	1/21/98	1	Yes	1	8.3	0	0	0	0.10	0.60	No	0	0	FISH	No	No
	1/21/98	2	Yes	1	8.2	0	0	0	0.10	0.10	No	0	0	FISH	No	No
	2/24/98	3	Yes	5	8.1	0.10	0	0	0.10	0	No	50	5	No		No
	2/24/98	4	Yes	5	8.2	0	0	0	0.10	0	No	50	5	No		No
1999	8/25/98	1	Yes	3	8.1	0	0	0	0.20	0.10	No	0	0	FISH	No	No
	8/26/98	2	Yes	4	8.0	0	0	0	0.20	0.10	No	0	0	FISH	No	No
79-100-0400																
1997	5/2/97	1	Yes	2	8.0	0	0	0	0.10	0	No	0	0	No	No	No
	5/2/97	2	Yes	2	8.1	0	0	0	0.10	0	No	0	0	No	No	No
	6/16/97	3	Yes	3	7.4	0	0	0	0.10	0	No	0	4	No	No	No
	6/16/97	4	Yes	3	7.2	0.10	0	0	0.10	0	No	0	4	No	No	No
79-200-0345																
1997	5/2/97	1	Yes	3	6.4	0	0	0.20	0.10	> 10.00	No	0	0	No	No	No
	5/2/97	2	Yes	3	6.8	0	0	0.10	0.25	> 10.00	No	0	0	No	No	No
1998	1/21/98	2	Yes	1	8.3	0	0	0	0.10	> 10.00	No	0	0	No	No	No
	2/24/98	3	Yes	3	7.7	0	0	0	0.20	> 10.00	No	100	40	No	No	No
	2/24/98	4	Yes	2	8.1	0	0	0	0.20	> 10.00	No	50	30	No	No	No

Outfall / Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)		Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
79-400-0340																	
1997	5/2/97	1	Yes	10	6.7	0	0.20		0.50	> 10.00	Yes	< 1	0	0	No		No
	5/2/97	2	Yes	15	6.8	0	0.10		0.40	> 10.00	No		0	0	No		No
	6/16/97	3	Yes	15	6.5	0.10	0.10	0	0.10	> 10.00	No		0	4	No		No
	6/16/97	4	Yes	10	6.4	0.20	0.10	0	0.25	> 10.00	No		0	4	No		No
1998	1/21/98	1	Yes	25	7.4	0	0	0	0.20	> 10.00	Yes	< 1	0	0	No	No	No
	1/21/98	2	Yes	25	7.8	0	0	0	0.20	> 10.00	No		0	0	No	No	No
	2/24/98	3	Yes	20	7.4	0	0.20	0	0.20	> 10.00	No		50	0	No	No	No
	2/24/98	4	Yes	20	7.8	0	0.10	0	0.20	> 10.00	No		50	0	No	FOAM	No
1999	8/25/98	1	Yes	3	8.0	0.10	0.10	0	0.20	10.00	No		10	0	No	No	No
	8/26/98	2	Yes	3	8.2	0.10	0.10	0	0.20	10.00	No		0	0	No	No	No
	12/4/98	3	Yes	3	6.8	0.20	0.20	0.20	0.25		No		0	0	No	No	No
	12/4/98	4	Yes	3	6.5	0.10	0.20	0.20	0.25		No		0	0	No	No	No
2000	10/1/99	1	Yes	3	6.5	0	0		0.50		No		0	0	No	No	No
	10/1/99	2	Yes	3	7.0	0	0		0.50		No		0	0	No	No	No
	11/8/99	3	Yes	4	7.2	0.20	0.20		0.25		No		0	0	No	No	No
	11/8/99	4	Yes	4	7.2	0.10	0.20		0.25		No		0	0	No	No	No
2001	8/15/00	1	Yes	2	7.0	0	0	0	0	0	No		0	30	No	No	No
	8/15/00	2	Yes	2	7.2	0.40	0.20	0	0	0	No		0	0	No	No	No
	10/4/00	3	Yes	4	7.0	0.40	0.20	0	0.25	0	No		0	20	No	No	No
	10/4/00	4	Yes	3	7.0	0	0	0	0.25	0	No		0	20	No	No	No
79-400-0375																	
1997	5/5/97	1	Yes	10	7.2	0	0	0	0.10	1.00	Yes	36	0	0	SLIGHT		No
	5/5/97	2	Yes	10	7.0	0	0	0	0.25	2.00	No		0	0	No		No
	6/20/97	3	Yes	2	6.5	0	0	0	0.10	10.00	No		50	12	MUSTY		Yes
	6/20/97	4	Yes	2	6.7	0	0	0	0.10	4.00	No		50	12	MUSTY		Yes
1998	1/21/98	1	Yes	3	8.4	0	0	0	0.10	0	No		150	50	No	No	No
	1/21/98	2	Yes	3	8.6	0	0	0	0.10	0	No		50	50	No	No	No
	2/24/98	3	Yes	2	8.2	0	0	0	0.10	0	No		50	15	No	No	No
	2/24/98	4	Yes	2	8.1	0	0	0	0.10	0	No		50	15	No	No	No

Outfall / Permit Year	Date	Visit #	Flow ?	Flow Rate (gpm)	pH (su)	Chlorine (ppm)	Copper (ppm)	Phenol (ppm)	Detergents (ppm)	Ammonia (ppm)	Fecal Sample (mpn/100ml)	Turbidity (ntu)	Color	Odor?	Surface Scum	Oil Sheen
79-400-0385																
1997	5/5/97	1	Yes	5	7.6	0.10	0	0	0.10	0	No	50	0	No		No
	5/5/97	2	Yes	5	7.7	0	0	0	0.10	0	No	0	0	No		No
	6/20/97	3	Yes	5	7.2	0	0	0	0.10	0.10	No	10	10	FISHY		No
	6/20/97	4	Yes	3	7.0	0.30	0	0	0.25	0.30	No	10	10	FISHY		Yes
1998	1/21/98	1	Yes	20	8.3	0	0	0	0.10	0.20	No	0	0	No	No	No
	1/21/98	2	Yes	20	8.5	0	0	0	0.10	0	No	0	0	No	No	No
	2/24/98	3	Yes	3	8.0	0	0	0	0.10	0	No	25	10	No	No	No
	2/24/98	4	Yes	3	8.7	0	0	0	0.10	0	No	25	10	No	No	No
1999	8/25/98	1	Yes	5	8.1	0	0	0	0.20	0	No	0	0	No	No	No
	8/25/98	2	Yes	5	8.2	0	0	0	0.20	0.10	No	0	0	No	No	No
	11/19/98	3	Yes	VERY LO\	7.7	0.10	0	0	0	0	No	0	20	No		No
	11/19/98	4	Yes	VERY LO\	8.3	0.20	0	0	0	0	No	0	40	No	BROWN FC	No
2000	9/23/99	1	Yes	5	7.0	0.40	0	0	0	0	No	0		No	No	No
	9/23/99	2	Yes	5	7.0	0.20	0	0	0	0	No	0		No	No	No
	10/25/99	3	Yes	5	6.0	0	0	0	0	0	No	0	0	No	No	No
	10/25/99	4	Yes	5	6.0	0.40	0	0	0	0	No	0	0	No	No	No

Shaded rows represent samples which contained eleveated levels for at least 1 sampled parameter.

Elevated readings have been underlined.

Below is a listing of sample parameters and their elevated reading criteria:

pH	<= 6 or >8 su
Chlorine	>=0.3 ppm
Copper	>=0.1 ppm
Phenol	>=0.1 ppm
Detergents	>=0.25 ppm
Ammonia	>=1 ppm
Fecal Sample	>=200 mpn/100 ml

Record Selection Criteria: SELECT * FROM qryAllData WHERE ((CollectionDate) < #07/01/01#) and (((flow)=Yes))

APPENDIX C

Summary Tables of Proposed Modifications to the SWMP

SCHEDULE FOR DEVELOPMENT AND IMPLEMENTATION OF SWMP ELEMENTS AND PROGRAMS

PROGRAM TO COLLECT QUANTITATIVE DATA TO DETERMINE THE IMPACTS OF URBAN STORMWATER ON THE NATURAL ENVIRONMENT
122.26(d)(2)(iii)(A)

The Comprehensive Monitoring Program (MN)

Code	Activity	Schedule
MN-1	***Seasonal Storm Event Monitoring***	
	- Review and update the Standard Operating Procedures (SOP) for the Seasonal Sampling program (previously submitted with the first annual report during the first permit cycle).	Within 12 months
	- Maintain at least five (5) automatic monitoring stations at locations approved by TDEC.	Ongoing
	- Collect twenty (20) to thirty (30) flow weighted composite samples annually (minimum of one/quarter/station). Test each sample for at least the 13 routine parameters: pH, TSS, TDS, BOD5, COD, total ammonia nitrogen (as N), total ammonia plus organic nitrogen, nitrate plus nitrite nitrogen (as N), total nitrogen, total recoverable lead, total recoverable zinc, dissolved phosphorus, and total phosphorus. Laboratory analysis will be used in accordance with 40 CFR part 136 for all parameters except pH which will be tested in the field during sample collection.	Annually
	- Collect five (5) wet weather bacteria sample (fecal coliform). One sample/station/year.	Annually
	- Collect five (5) full-suite grab samples (One/station/permit term). Tests will include the 13 routine parameters listed above plus: oil & grease, and the pollutants listed in tables II & III of 40CFR Part 122 Appendix D (Volatiles, Pesticides, Acids, Base/Neutrals, Toxic Metals, Cyanide, and Total Phenol.	One Station per year
	- Analyze results from Ongoing Monitoring program.	Ongoing
MN-2	***Dry Weather Screening & Industrial/Commercial Site Monitoring***	
	- Dry Weather Screening as described in ILL-2.	Annually
	- Implement Commercial/Industrial Monitoring Programs as described in IN-3	Varies
MN-3	***Ambient, Biological, & Bacteriological Monitoring***	
	- An ongoing Ambient sampling program will be implemented at the five monitoring station sites at a minimum. The 13 routine parameters will be tested once per quarter per station.	Quarterly
	- Develop a Biological Monitoring program to supplement the current program administered by TVA. This program will focus on habitat assessments, bioassessments, etc.	Within 12 months
	- Implement the Supplemental Biological Monitoring program.	Annually Beginning year two
	- A Bacteriological Monitoring program will be developed and implemented. This program may be conducted by City, KUB, UTK, or volunteer personnel. (May be coordinated with ILL-7).	Full Implementation after 12 months
	- Develop and implement a QA/QC program for the Bacteriological Monitoring program.	Full Implementation after 12 months
MN-4	***Related Programs***	
	- Develop, calibrate, and maintain a water quality model to evaluate urban stormwater loading and transport processes and facilitate planning and additional pollution control strategies.	Within 60 months
	- Develop and Implement Training Program for Staff and/or Volunteers.	Annually
MN-5	***Annual and Public Reporting***	
	- Publish and maintain monitoring data (submitted by KUB/others) for public use on website.	Beginning Year Two
	- Annual reporting to TDEC concerning the progress of this program.	Within 6 Months after end of each year

SCHEDULE FOR DEVELOPMENT AND IMPLEMENTATION OF SWMP ELEMENTS AND PROGRAMS

PROGRAM TO IMPLEMENT AND MAINTAIN BMP PLANS TO REDUCE CONSTRUCTION SITE RUNOFF TO THE MUNICIPAL STORM SEWER 122.26(d)(2)(iv)(D)

The Construction Site Runoff Program (CS)

Code	Activity	Schedule
CS-1	***Site Planning***	
	- Review and update the Stormwater & Streets Ordinance which requires construction sites greater than 10,000 sq.ft. to submit Erosion and Sediment (E&S) Control Plans.	Full implementation after 24 months
	- Require site plan submittals per the City of Knoxville BMP manual.	Immediately
	- Review & update minimum criteria for plan review and inspection checklists.	Full implementation within 12 months
	- Review, update, & continue Preconstruction Assistance Meetings with developer/contractors.	Immediately
CS-2	***BMP Requirements***	
	- Require Construction BMPs from the City of Knoxville BMP manual or equivalent.	Immediately
	- Evaluate additional BMP requirements and design modifications. Maintain the updated BMP requirements on the City's web page.	2nd half of each year.
	- Continue to require construction site "good housekeeping" practices.	Ongoing
CS-3	***Inspection / Enforcement***	
	- Maintain expanded inspections program including smaller construction sites (single family).	Ongoing
	- Implement routine site inspections on commercial and subdivision developments (e.g. rough grading, E&S control installation, final grading, and final stabilization.	Ongoing
	- Continue to require post-construction Development Certifications from licensed professional Engineers before bond release to insure the stormwater facilities were built as planned.	Ongoing
	- Evaluate and update enforcement procedures, policies, and follow-up monitoring / inspections.	Full implementation after 24 months
CS-4	***Training Programs***	
	- Co-sponsor E&S Control Practice Seminars for City staff, designers, developers, engineers, and contractors.	Annually
	- Continue to provide training for City plan review staff and inspectors.	Annually
CS-5	***Annual Reporting***	
	- Annual reporting to TDEC concerning the progress of this program.	Within 6 Months after end of each year

SCHEDULE FOR DEVELOPMENT AND IMPLEMENTATION OF SWMP ELEMENTS AND PROGRAMS

PROGRAM TO DETECT AND REMOVE ILLICIT AND IMPROPER DISCHARGES TO THE MUNICIPAL STORM SEWER SYSTEM
122.26(d)(2)(iv)(B)

The Illicit Discharges and Improper Disposal Program (ILL)

Code	Activity	Schedule
ILL-1	***Ordinances***	
	- Evaluate possible revisions to the prohibitions and exemptions of non-stormwater discharges in the existing Stormwater & Streets Ordinance. Maintain authority for $5,000 penalty.	Complete within 24 months
	- Implement any new revisions to the Stormwater & Streets Ordinance.	Full implementation after 24 months
ILL-2	***Field Screening***	
	- Perform follow-up analysis at all high risk field screening sites.	Ongoing
	- Investigate 150 field sites four times per year (including the repeat high parameter sites above).	Annually
ILL-3	***Investigation of Storm Drain System***	
	- Evaluate & update procedures for mapping, field surveys, and upstream source identification.	Full implementation after 12 months
	- Implement updated procedures for mapping, field surveys and upstream source identification.	Full implementation after 12 months
	- Evaluate and update enforcement procedures, policies, and follow-up monitoring / inspections.	Full implementation after 24 months
	- Coordinate with Knoxville Utility Board (KUB) sanitary sewer inspections.	Ongoing
	- Inspect system-wide stormdrain system and maintain updated/corrected features on GIS.	Ongoing
ILL-4	***Spill Response Program***	
	- Coordinate with Knoxville Emergency Response Team (KERT) and Tennessee Department of Environment and Conservation (TDEC).	Ongoing
ILL-5	***Reporting of Illicit Discharges and Public Education Program***	
	- Continue to maintain, monitor, and publicize "Water Quality Hotline" for public reporting.	Ongoing
	- Post and maintain health hazard warning signs where appropriate on 303(d) listed creeks.	Within 6 months
	- Evaluate and redevelop an ongoing, comprehensive, and innovative public education program.	Full Implementation after 12 months
ILL-6	***Used Oil & Toxic Materials Program***	
	- Implementation and coordination of recycling program (managed by Solid Waste Division).	Ongoing
	- Maintain and operate household hazardous waste facility (managed by Solid Waste Division).	Ongoing
ILL-7	***Control Infiltration***	
	- Develop and implement new policies/ordinances to reduce cross connections between MS4 and sanitary sewer system (i.e. Floor Drain policies, laterals from demolisions and rehabs).	Immediately
	- Monitor KUB's collection system O&M program, ongoing sewer line repair & rehabilitation progress, 5-yr capital improvement plan and creek monitoring data.	Annually
	- Develop mechanisms for reporting illicit connections, breaks, surcharges, and general sanitary sewer system problems with potential to release to the municipal separate storm drain system.	Within 6 months
	- Maintain Legal Authority over KUB and other utilities for unpermitted discharges not otherwise regulated under their separate NPDES permits.	Ongoing
ILL-8	***Annual Reporting***	
	- Annual reporting to TDEC concerning the progress of this program.	Within 6 Months after end of each year

SCHEDULE FOR DEVELOPMENT AND IMPLEMENTATION OF SWMP ELEMENTS AND PROGRAMS

PROGRAM TO MONITOR AND CONTROL RUNOFF FROM TSD AND INDUSTRIAL FACILITIES SUBJECT TO SARA III, SECTION 313 122.26(d)(2)(iv)(C)

The Industrial and Related Facilities Program (IN)

Code	Activity	Schedule
IN-1	***Ordinances***	
	- Evaluate possible revisions to the prohibitions and exemptions of non-stormwater discharges in the existing Stormwater & Streets Ordinance.	Complete within 24 months
	- Implement any new revisions to the Stormwater & Streets Ordinance.	Full implementation after 24 months
IN-2	***Inspection Element***	
	- Develop inspection program for non-permitted commercial facilities (i.e. restaurants, service stations, grocery stores, car lots, etc.)	Full implementation During Year Three
	- Continue to collect and analyze KUB stormwater inspection reports. Assess impact to MS4.	Semi-annually
	- Identify potential industrial discharges through Illicit Connection and Improper Disposal Program. (Both SW and non-SW discharges)	Ongoing
	- Continue to collect and analyze NOIs from Industrial Permit applicants.	Ongoing
	- Review and update inspection program as part of Pollution Prevention Plans for Municipal Industrial Facilities. Conduct annual inspections at municipal industrial facilities.	Full implementation after 12 months
IN-3	***Monitoring Element***	
	- Collect monitoring data from permitted industrial stormwater dischargers and/or from TDEC. Assess impacts to the stormdrain system. (See Part 2 application, pp. 5-66 thru 5-67)	Ongoing
	- Develop ongoing monitoring program at non-permitted commercial facilities using guidelines pursuant to 40 CFR 122.26(d)(2)(iv)(c)(2). Identify pollutants and sources as applicable.	Within 24 months
	- Implement the ongoing monitoring program at non-permitted commercial facilities and analyze the results from ongoing commercial monitoring program.	Annually, beginning year 3
	- Maintain adequate legal authority to require monitoring and reports from TSDs and Industrial Facilities subject to SARA Title III, Section 313. Request monitoring/reports as necessary.	Ongoing
	- Evaluate and update the monitoring program for Municipal Industrial Facilities (MIFs) submitted with the 1st annual report (1997). Include new MIFs in the updated program.	Full implementation after 12 months
	- Manage and conduct monitoring program at Municipal Industrial Facilities.	Ongoing
IN-4	***Annual Reporting***	
	- Annual reporting to TDEC concerning the progress of this program.	Within 6 Months after end of each year

SCHEDULE FOR DEVELOPMENT AND IMPLEMENTATION OF SWMP ELEMENTS AND PROGRAMS

PROGRAM OF STRUCTURAL AND SOURCE CONTROLS FOR REDUCING POLLUTANTS TO THE MUNICIPAL SEPARATE STORM SEWER SYSTEM 122.26(d)(2)(iv)(A)

The Residential and Commercial Program (RC)

Code	Activity	Schedule
RC-1	***Maintenance Activities for Structural Controls***	
	- Continue existing maintenance programs from Part 2 application, pp. 5-5 thru 5-8.	Ongoing
	- Develop improved stream restoration and channel maintenance program.	Complete within 12 months
	- Implement improved stream restoration and channel maintenance program.	Implement beginning in yr. 2
	- Require Standard Maintenance Agreement for on-site facilities.	Ongoing
	- Continue to coordinate with other agencies/organizations to develop, install, and maintain structural controls that prevent floating pollution (litter/oils/foam/etc) from entering the TN River.	Ongoing
	- Require routine / major maintenance of BMP facilities.	Ongoing
RC-2	***Planning for New Development***	
	- Review current Stormwater & Streets Ordinance to evaluate possible improvements to existing water quality and quantity requirements for new development.	Complete within 24 months
	- Require "No Dumping" message cast into all new curb irons and solid stormwater catch basin covers installed on new developments.	Immediately
	- Investigate and/or implement Pilot Master Plan on selected watershed(s). Emphasis will be on limiting impacts of new development/construction (i.e. buffer zones, wet ponds, etc.)	Full implementation within 60 months
	- Plan and site location for regional BMP facilities for areas of new developement.	Ongoing
	- Continue to review, update, and maintain guidance criteria for BMP's on City web page (http://www.ci.knoxville.tn.us/engineering)	Ongoing
RC-3	***Maintenance for Public Streets, Roads, and Highways***	
	- Continue street maintenance activities outlined in Part 2 application, p. 5-8.	Ongoing
	- Investigate benefits/feasibility of upgrading fleet with higher efficiency street sweepers.	Within 24 months
	- Evaluate current deicing program and study alternatives and improvements.	Within 36 months
RC-4	***Evaluation of Flood Management Projects***	
	- Continue to evaluate regional BMP facilities for water quality retrofits.	Ongoing
	- Maintain existing GIS inventory of on-site BMP facilities, including newly constructed facilities.	Ongoing
RC-5	***Monitoring of Solid Waste Facilities***	
	- See Program described in City's new management program for industrial areas.	See Code IN-3
RC-6	***Management of Pesticides, Herbicides, and Fertilizer***	
	- Evaluate possible improvements to existing public education program as part of illicit connection and improper disposal program. Educate City staff, public, etc.	Full implementation after 12 months
	- Reevaluate effect of fertilizers as part of the City's ongoing monitoring program.	Full implementation after 12 months
RC-7	***Annual Reporting***	
	- Annual reporting to TDEC concerning the progress of this program.	Within 6 Months after end of each year

APPENDIX D

City of Knoxville Solid Waste Office 2000 Annual Report

CITY OF KNOXVILLE
SOLID WASTE OFFICE
2000 ANNUAL REPORT

Victor Ashe, Mayor

Bob Whetsel, Public Service Director
Ed Umbach, Solid Waste Manager

Printed on Recycled Paper

INTRODUCTION

In 2000, we continued to show positive progress in the development of our solid waste programs. This year we instituted a residential computer recycling program at the Household Hazardous Waste Facility, continued active enforcement of the solid waste ordinances, had our third full year of operations at the Household Hazardous Waste Facility, and revised the city garbage code with an enhanced bulky trash pickup program. All of these programs have been successful and reflect the continued interest in and growth of our comprehensive solid waste management program.

The following pages summarize our activities for the calendar year 2000.

The last page is a residential waste stream analysis that reflects some notable statistics:

* The total waste stream decreased by 1,364.68 tons or 1%.
* The diversion rate decreased to 54.15% from 54.63% in 1999.
* The recycling rate decreased to 23.29% from 24.21% in 1999.

The total waste stream shows a decrease for a second year, and our efforts to minimize the waste stream through education appear to be having the desired effects. Diversion and recycling rates show a slight decrease from 1999, but remain level over the last four years.

In 2000, the Solid Waste Office issued an RFP for disposal services for our Municipal Solid Waste (MSW). A 10 year contract was awarded to Chestnut Ridge landfill, owned and operated by Waste Management Inc. Our new disposal cost is $20.80 / ton, down from $26.36 / ton. We believe this decrease is a result of re-building our transfer station in 1997 which increased competition and thus drove our cost down. Consideration should be given to other infrastructure needs to help stabilize our cost in the future.

I. RECYCLING

A total of 4849.47 tons of recyclables was collected at the City's twelve drop-off recycling centers in 2000. This number is up almost 2% from 1999. All commodities increased except aluminum, steel and plastic, with paper products showing the largest gains.

Contracts for operating the centers with BFI and Goodwill Industries have been renewed for one year but will have to be re-bid in 2001.

In 2000, the City continued processing and marketing cardboard brought to the Solid Waste Management Facility (SWMF). Businesses, in particular, are encouraged to bring recyclables to the SWMF free of charge. In 2000, these facilities are beginning to be used more heavily and there was a 2 % increase in materials over the previous year.

II. GARBAGE (MSW)

A total of 43,596.86 tons of garbage was collected from Knoxville homes in 2000 as part of the weekly garbage collection service the City offers via its contractor, BFI. This number reflects a 1% decrease from the previous year. The City is currently in a five year contract with BFI that expires in 2001. Current collection costs per this contract are:

- Curbside Collection $3.41 / house/month
- Backdoor Collection $5.57 / house/month
- Central Business District $14,938.18 / month

All garbage is disposed of at the Chestnut Ridge Landfill operated by Waste Management Industries. The City is currently in a 10-year contract with Waste Management that expires in 2010. Disposal costs for 2000 were as follows:

- Jan - Sep. $26.36 / ton
- Oct. - Dec. $20.80 / ton

III. COMPOSTING

A total of 24,5528.54 tons of yard waste was collected by City crews in 2000. This number is down by about 1,700 tons from last year but shows almost no change compared to 1996. The Solid Waste Office suspects this fluctuation is due largely to weather conditions. All yard waste is taken to Shamrock Organic Products where it is turned into mulch and compost products. The City is currently in a 6-year contract with Shamrock that expires in 2006. Costs for disposal in 2000 at Shamrock were:

- Jan. - Dec. $32 / ton

IV. SOLID WASTE MANAGEMENT FACILITY

Transfer Station

When the Transfer Station was redesigned in 1997, one of our goals was to be able to separate construction waste (C&D) from MSW. This would allow us to save money by sending C&D waste to a Class III landfill and also enable us to comply with the State mandate calling for a reduction in the volume of waste placed in Class I landfills. In 2000, we diverted 30,0001.00 tons of C&D waste to a Class III landfill. This was 64% of the waste received at the Transfer Station.

Materials Recovery Facility (MRF) See Recycling (Section I)

Household Hazardous Waste (HHW) Collection Center

In April 1997, the City of Knoxville opened the first permanent site in Tennessee for collecting and disposing of HHW. The initial capital expenditures were provided by a $500,000 grant from the State of Tennessee. The State is also paying half of the operational costs. In addition, an intermunicipal agreement was signed with Knox County that allows county residents to use the facility. The City then bills the County Solid Waste Office based on the number of non-city customers. In 2000, we serviced a total of 4075 cars, with 57% of them being from the City of Knoxville and 43% from Knox County. A total of 101 tons of HHW was processed in 2000.

V. SOLID WASTE INSPECTORS

In an effort to promote cleaner neighborhoods, a Solid Waste Inspection Division was formed in 1998. Their primary focus is enforcing regulations concerning the garbage can ordinance, construction and demolition debris, illegal dumping, and oversight of the recycling drop-off centers. In 2000, forty eight citations were written for solid waste code violations and we have achieved a 98% conviction rate. This program has been well received by the public and is having a noticeable impact on cleaning up neighborhoods. In 1999, a surveillance camera was purchased to enhance the program and improve our conviction rate. City Council adopted a new solid waste ordinance in 2000 with changes that should lead to cleaner neighborhoods. The Inspection Division will be responsible for enforcing this ordinance.

VI. EDUCATION

The Solid Waste Office engaged in many activities and special programs throughout 2000 to educate Knoxvillians about recycling, composting, and other solid waste issues.

America Recycles Day - The City of Knoxville, along with several other organizations, participated in the fourth annual America Recycles Day, a national education campaign aimed at increasing citizens' commitment to recycling and buying recycled goods. Over 600 people in Knoxville/Knox County signed pledges as part of the campaign, promising to step up their current recycling efforts. Staff from the Solid Waste Office also participated on the statewide steering committee for America Recycles Day.

Telephone Book Recycling - Once again this year the Solid Waste Office coordinated the Knoxville/Knox County telephone book recycling program. Fifty-six (56) Knox County schools competed for cash prizes donated by BellSouth and Kroger. Over 178 tons of old books were collected from the schools and 6 City of Knoxville drop-off centers.

Composting Bin Sale - The third annual composting bin sale was held in February, with 500 backyard composters sold.

Earth Day - The Solid Waste Office was a part of a city wide steering committee that developed Earthfest 2000 celebrating the 30th anniversary of Earth Day. Over 4000 people attended the event which had 40 exhibitors from the environmental field.

Other - In 2000, the Solid Waste Office continued to produce and distribute educational information, including the 4th edition of its *WasteWatch* newsletter which was mailed to all property owners in Knoxville. Brochures about recycling, composting, and other solid waste issues are also now available for citizens at City Hall at the Knoxville Center Mall. Members of the Solid Waste Office participated in several educational events in 2000 using the office's exhibit booth display at events including Kids Day America/International, the Dogwood Arts' House and Garden Show, Business Expo., America Recycles Day Events, and First Creek First Cleanup. Over 200 school children toured the SWMF and listened to a presentation at the HHW facility. Solid Waste educational presentations were given to 4 groups/organizations. The first issue of the Business Edition of *WasteWatch* was mailed to 6000 businesses in Knoxville with information and articles about business recycling, audits, landfills, contact names and numbers, and disposal practices.

Drop Off Centers	Aluminum	Steel	Plastic	Clear Glass	Brown Glass	Green Glass	Newspaper	Mixed Paper	Cardboard		Total
2217 Broadway	5680 lbs	15840 lbs	31180 lbs	42700 lbs	43140 lbs	28860 lbs	294160 lbs	202040 lbs	700 lbs	60480 lbs	362.39 tons
4409 Chapman Highway	9010 lbs	24810 lbs	45880 lbs	65340 lbs	55600 lbs	36510 lbs	370640 lbs	296630 lbs	75560 lbs	0 lbs	489.99 tons
9305 Kingston Pike	15520 lbs	23800 lbs	43650 lbs	55860 lbs	38740 lbs	32780 lbs	532600 lbs	498240 lbs	172450 lbs	0 lbs	706.82 tons
4440 NW Western Ave	4640 lbs	9790 lbs	20800 lbs	16580 lbs	12760 lbs	8140 lbs	214180 lbs	151960 lbs	45240 lbs	0 lbs	242.05 tons
5941 Kingston Pike (FC)	305 lbs	695 lbs	2010 lbs	0 lbs	0 lbs	0 lbs	54700 lbs	0 lbs	0 lbs	0 lbs	28.86 tons
2939 Alcoa Highway (FC)	555 lbs	1175 lbs	3170 lbs	0 lbs	0 lbs	0 lbs	60480 lbs	0 lbs	0 lbs	0 lbs	32.69 tons
5003 Broadway	10720 lbs	30880 lbs	50842 lbs	57640 lbs	32760 lbs	28040 lbs	619960 lbs	416620 lbs	10360 lbs	74760 lbs	666.29 tons
8526 Kingston Pike (FC)	12080 lbs	27440 lbs	43640 lbs	61400 lbs	43480 lbs	38620 lbs	473600 lbs	505220 lbs	137200 lbs	0 lbs	671.34 tons
4501 Asheville Highway	5040 lbs	12300 lbs	26880 lbs	33220 lbs	19200 lbs	19460 lbs	319180 lbs	206560 lbs	57860 lbs	0 lbs	349.85 tons
5425 Clinton Highway	9660 lbs	21380 lbs	45140 lbs	28040 lbs	17320 lbs	12080 lbs	411980 lbs	319520 lbs	9900 lbs	69960 lbs	472.49 tons
4918 Kingston Pike	17480 lbs	29240 lbs	56120 lbs	57580 lbs	50520 lbs	49100 lbs	587470 lbs	665020 lbs	140880 lbs	0 lbs	826.71 tons
									325.08 tons	102.60 tons	
Drop Off Center Totals	45.35 tons	98.68 tons	184.66 tons	209.18 tons	156.76 tons	126.80 tons	1,969.48 tons	1,630.91 tons	427.68 tons		4,849.47 tons

KPD / Lorain St. Carboard / Pape	21.08 tons
Downtown Recycling	79.78 tons

Phone Books	178.81 tons

	Leaves	Brush	Total
Compost Site	7,199.22 tons	17,329.32 tons	24,528.54 tons

	Scrap Metal	Cardboard	Rec. Tlr. / Backing	HHW REC.	HHW Divert.	Tires
Transfer Station	437.03 tons	60.19 tons	14.41 tons	40.22 tons	62.06 tons	126.01 tons
						11,358

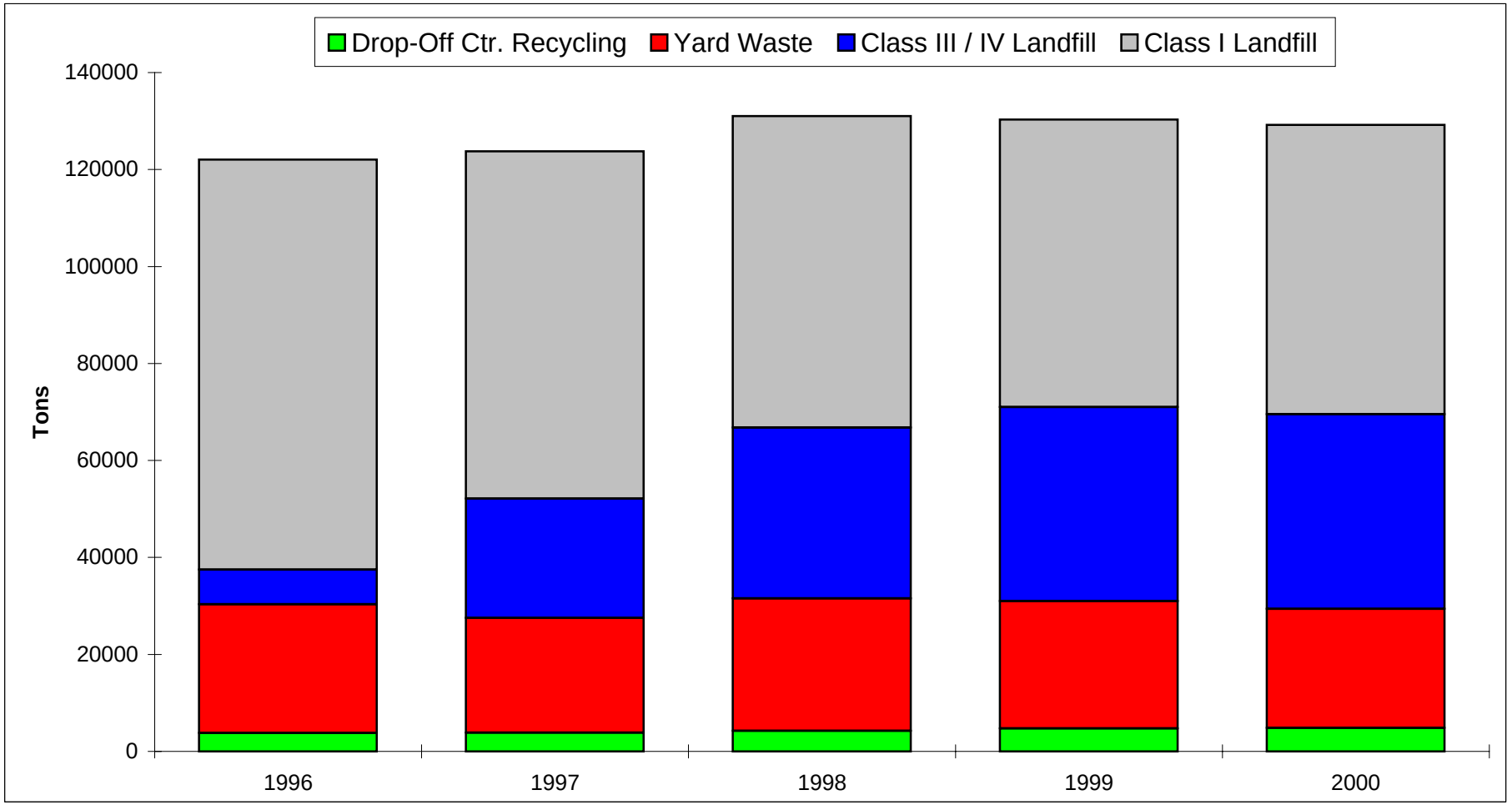
	C&D	Compacted	Shredded	Total
Transfer Station	30,001.00 tons	16,121.34 tons	0.00 tons	46,862.26 tons

	Household Trash
Landfill Class I	43,596.86 tons

	Transfer Station	Construction	Total
Landfill Class III	30,001.00 tons	10,132.57 tons	40,133.57 tons

Total Waste Recycled	30,335.54 tons	*Recycling*	23.29%
Total Waste Diverted, Class III & Recycled	70,531.17 tons	*Diversion*	54.15%
Total Waste Landfilled, Class I	59,718.20 tons		
Total Wastestream	130,249.37 tons		

Destination of Knoxville's Residential Waste Stream, 1996 - 2000



Diversion Rate	**31.04%**	**42.36%**	**51.16%**	**54.83%**	**54.15%**
Recycling Rate	**25.20%**	**22.51%**	**24.42%**	**24.28%**	**23.29%**

WASTE WATCH

Fall 2001 • The Public Service Department

The City of Knoxville • Victor Ashe, Mayor

Codes Enforcement Office Joins Public Service Department

The City of Knoxville Codes Enforcement Office investigates environmental code violations regarding dilapidated buildings, dirty or overgrown lots, illegal dumping and abandoned vehicles. Formerly a part of the Department of Development, the Codes Enforcement Office has joined the Public Service Department to work more closely with the Public Service crews to clean up problem properties.

QUESTIONS AND ANSWERS ABOUT CODES ENFORCEMENT

Q. How do I make a complaint?

A. Call: (865) 215-2118
Visit: City County Building, Room 528, M-F, 8:00 a.m. – 4:30 p.m.
Write: City of Knoxville
Codes Enforcement, P.O. Box 1631, Knoxville TN 37901
E-mail: kflynn@ci.knoxville.tn.us

Q. What constitutes a "Dirty or Overgrown Lot?"

A. Trash and debris that have accumulated on a piece of property, overgrown vines, underbrush or grass over 12 inches high are all violations of city codes.

Q. How long do I have to correct a lot problem? What if I miss the deadline?

A. The owner has 10 days after receipt of a certified letter outlining the code violations to correct them. If violations are not corrected, a City crew will correct the violations by cleaning or mowing the lot and bill the owner. The owner can be cited to Municipal Court, where substantial fines and penalties can be imposed.

Q. How long do I have to correct a building problem? What if I miss the deadline?

A. The owner has 45, 60 or 120 days after receipt of a certified letter outlining code violations to bring the structure up to code, depending on the seriousness of the violations. If the owner does not take care of the problem in that time, the case goes before the Better Building Board, which could order demolition, acquisition or mandatory repair of the structure. Any costs incurred by the City in correcting these violations are charged to the property owner. If not paid, the costs become a lien against the property. Municipal Court fines and penalties are also possible for Housing and Building Code violations.

Q. What is the Better Building Board?

A. A key part of the City's effort to achieve cleaner and safer neighborhoods is the Better Building Board. This board starts action to force property owners to make repairs or to demolish unfit structures through the City's police powers over dangerous structures. A lien can be placed against the property to recover expenses incurred as a part of compelling the property owner to comply with city codes requirements.
The Better Building Board meets the last Thursday of each month, at 3:30 p.m., usually in the Small Assembly Room of the City County Building.

Q. What constitutes an "Abandoned Vehicle"?

A. The vehicle must be:
- Illegally parked on public property for more than 48 hours
- Over 4 years old and left unattended on public property for more than 30 days.
- On private property without consent of the owner for more than 48 hours.

Q. What constitutes an "Inoperable Vehicle"?

A. The vehicle must be:
- Over 4 years old and has no engine or is otherwise totally inoperable.
- Without an engine in running condition, a transmission, four tires or a battery or for any reason is not operable.

Q. How long do I have to move an inoperable vehicle?

A. After an inspector has checked to see if the vehicle is inoperable and has placed a sticker on it, the owner has seven days to make it operable if it is on private property, or 24 hours if it is on public property. If the vehicle is not made operable or towed away within the deadlines set on the sticker, the vehicle will be transported to an impoundment lot and the owner will be billed accordingly. Municipal Court fines and penalties may also be imposed. In a cooperative agreement with the National Kidney Foundation, the Codes Enforcement office will assist any vehicle owner with a clear title in donating any unwanted vehicles to the foundation, allowing them to be towed off at no charge and providing a tax deduction to the owner.

IMPORTANT PHONE NUMBERS

Weekly household garbage and bulky waste collection
BROWNING FERRIS INDUSTRIES (BFI)
522-0078

Yard Waste and Leaf Collection
PUBLIC SERVICE DEPARTMENT OPERATIONS CENTER
215-6000

Dilapidated buildings, overgrown lots, abandoned vehicles
CODES ENFORCEMENT
215-2118

HOUSEHOLD HAZARDOUS WASTE COLLECTION CENTER
215-6700
Tuesday - Friday 8 a.m. - 3:30 p.m.
Saturday 8 a.m. - 12 noon

Information about Garbage, Recycling, Composting
KNOXVILLE SOLID WASTE OFFICE
215-2921
www.knoxvillesolidwaste.org

Illegal Dumping and Garbage Code Violations
SOLID WASTE INSPECTORS
Weekdays • **215-6700**
Nights & Weekends • **215-2496**

Recycling and Residential & Commercial Disposal
SOLID WASTE MANAGEMENT FACILITY (SWMF)
215-6700

Talkin' Trash . . .
Know your garbage terms

HOUSEHOLD GARBAGE
Household garbage is collected weekly by the City's contractor, Browning Ferris Industries (BFI). Per City Ordinance, all garbage must be in cans with lids. Up to four 32-gallon cans will be collected from each household. Garbage cans must be put out no earlier than 6:00 p.m. on the day before or no later than 7:00 a.m. on the day of collection. They must be retrieved no later than 9:00 p.m. on collection day.

BULKY WASTE
Bulky waste is collected weekly by the City's contractor, BFI. It is collected on the same schedule as household garbage. Bulky waste is defined as household items that cannot be put in garbage cans because of size, shape, or weight. Examples include a stove, tires, an old bicycle or carpet that is not more than 5 feet in length and is rolled and tied. (Please note that this does not include building materials.) Up to 5 self-contained or bundled items per household, per week, may be placed next to the street for pickup. Bulky waste must be put out no earlier than 6:00 p.m. on the day before or no later than 7:00 a.m. on the day of collection.

BUILDING MATERIALS
Neither the City of Knoxville nor it's contractor, BFI will pick up remodeling, construction, or demolition debris. It is the responsibility of the individual to dispose of such building materials at private landfills or at permitted sites such as the City's Solid Waste Management Facility (SWMF). The first Saturday of every month is Amnesty Day at the SWMF and there is no charge to City residents on that day. Please note that the facility DOES NOT ACCEPT asbestos, masonry, dirt and rock, dead animals, industrial hazardous waste, hot ashes, liquid waste, medical waste or sludges.

YARD WASTE
City Public Service crews collect brush and other residential yard waste every other week. Yard waste should be placed next to the street and kept separate from other trash. From October through January, the employees concentrate on leaf collection; therefore, during these months, other materials will be collected only as time permits. To facilitate leaf collection by the vacuum truck, leaves should be piled next to the street, unbagged. Bagged leaves require separate collection and will be the last item picked up.

HOUSEHOLD HAZARDOUS WASTE (HHW)
Residents of both the City and Knox County may bring HHW to the Collection Center. Materials such as batteries, paint, automotive fluids, pool chemicals, pesticides, photo chemicals, solvents, cleaning products, and computers (2 systems per resident) will be properly processed and packed for recycling, remanufacture, or disposal by licensed HHW contractors. There is a limit of 100 pounds or 10 gallons of household hazardous waste per vehicle per week. There is no charge for this service.

A Dozen Places to Recycle in Knoxville

Super Drop-Off Centers

There are six residential recycling super drop-off centers operated in association with various food stores across the city. Super Drop-Off Centers have a Goodwill Industries attendant on duty seven days a week from 9 a.m. to 5 p.m. to accept reusable household items.

WHAT YOU CAN RECYCLE:

- **Aluminum cans**
- **Newspaper**
- **Glass: clear, brown, green**
- **Steel cans**
- **Plastics #1 and #2**
- **Cardboard**
- **Mixed paper**
- **Household batteries**
- **Reusable household items**
  (9 a.m. - 5 p.m. only when attendant is on duty)

KROGER SUPER DROP-OFF CENTERS:

- **5003 N. Broadway** (Fountain City)
- **4501 Asheville Highway** (across from Kroger)
- **5425 Merchants Drive** (behind Kroger)
- **4918 Kingston Pike** (Knox Plaza)
- **9305 Kingston Pike** (behind Market Place)

WALKER SPRINGS SUPER DROP-OFF CENTER:

- **8526 Kingston Pike**

Drop-Off Centers

There are five unattended residential recycling drop-off centers operated in association with various food stores across the city.

KROGER DROP-OFF CENTERS

- **2217 N. Broadway** (Broadway Shopping Center)
- **4409 Chapman Highway** (Chapman Square)
- **Western Avenue at Clinton Highway**
  (I-640 Plaza, behind and to the right of stores)

WHAT YOU CAN RECYCLE:

- **Aluminum cans**
- **Newspaper**
- **Glass: clear, brown, green**
- **Steel cans**
- **Plastics #1 and #2**
- **Cardboard**
- **Mixed paper**

FOOD CITY DROP-OFF CENTERS

- **5941 Kingston Pike**
- **2939 Alcoa Highway**

WHAT YOU CAN RECYCLE:

- **Aluminum cans**
- **Newspaper**
- **Plastics #1 and #2**

Solid Waste Management Facility

1033 Elm Street
215-6700

Monday - Friday, 7 a.m. - 3:30 p.m.
Saturday, 8 a.m. - 12 noon

- **Recyclables ..... No Charge**
- **Household Hazardous Waste ..... No Charge**
- **Trash $32/ton***
- **Construction Debris $25/ton***

HOUSEHOLD HAZARDOUS WASTE COLLECTION CENTER
(Located inside the Solid Waste Management Facility)
215-6700

Tuesday - Friday, 8 a.m. - 3:30 p.m.
Saturday, 8 a.m. - 12 noon

***No charge for City Residents on the first Saturday of every month.**

PLEASE NOTE: Facility does NOT accept asbestos, masonry, dirt and rock, dead animals, industrial hazardous waste, hot ashes, liquid waste, medical waste, sludges or yard waste.

City of Knoxville
Public Service Department
P.O. Box 1631
Knoxville, TN 37901
www.knoxvillesolidwaste.org

Dear City Residents:

During my time as mayor, people throughout Knoxville have let me know how important "greener and cleaner" neighborhoods are to them. The Department of Public Service has implemented a number of programs to make all of the streets and sidewalks throughout Knoxville look better. But it's a team effort, and you are an important member of the team.

This newsletter will help residents to become informed about the policies and procedures of disposal. BFI crews have a tight schedule to meet in picking up household garbage, and residents need to place their containers and bulky waste as instructed to minimize time at each stop. Staff at the Solid Waste Management Facility are ready to accept building materials and household hazardous waste. Residents can help cut down on the number of abandoned vehicles along our streets by alerting our code enforcement team, as detailed in this newsletter. Leaf collection will be the number one priority of yard waste pickup in the next months, and residents need to rake the leaves as instructed so that the trucks can maximize their efficiency in vacuuming up the leaves.

The goal of city services is to improve the quality of life in Knoxville; and because of the effort and cooperation of residents throughout our city, we are meeting that goal. Thank you!

Sincerely yours,

Victor Ashe, Mayor

Leaf 'em by the Curb!

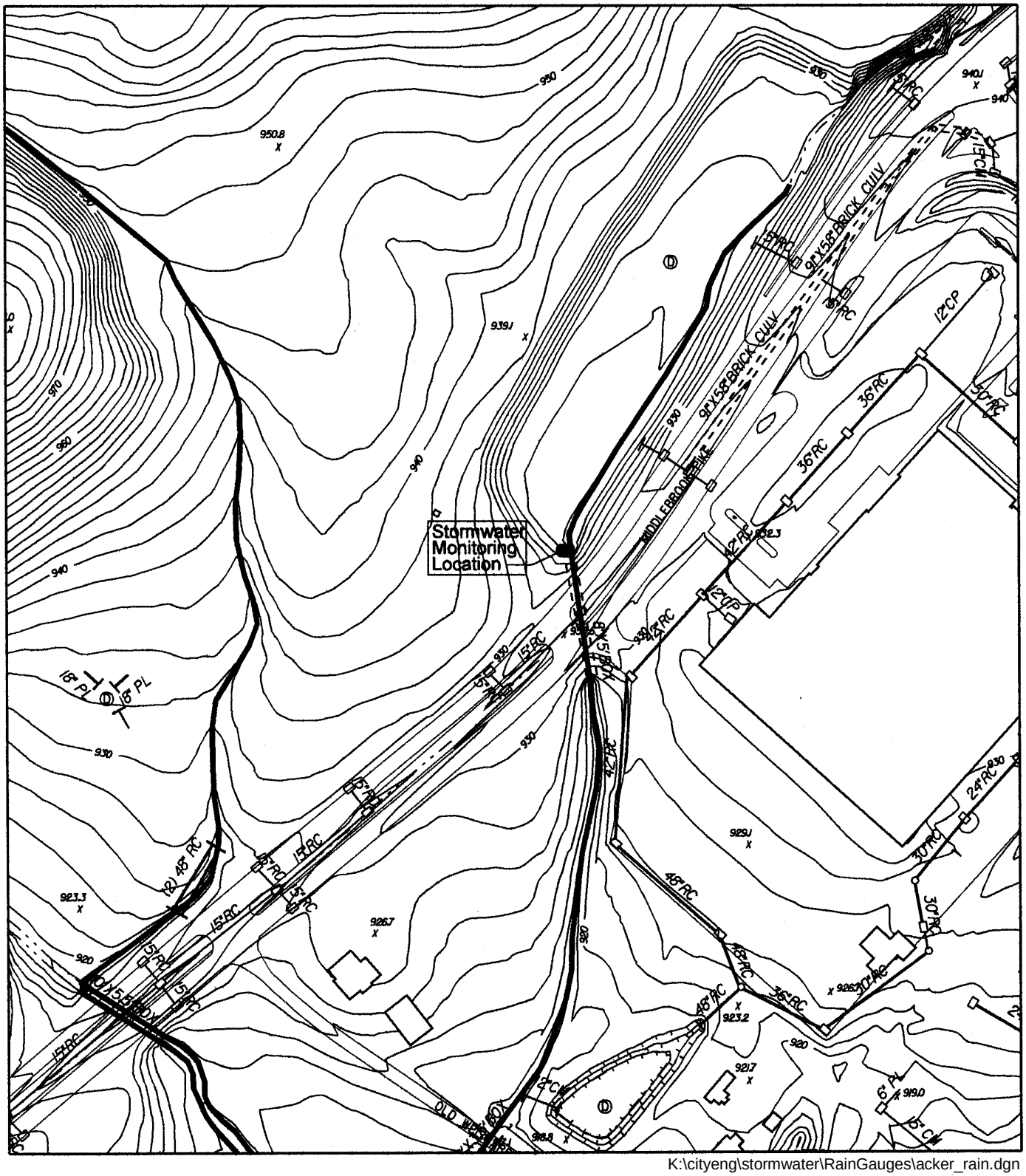
During leaf season, city crews make four rotations through each neighborhood to collect leaves. Residents should rake leaves to the curb and leave them loose instead of putting them in bags. Leaves are collected in trucks with special attachments that vacuum the leaves into the trucks. Bagged leaves cannot be handled through this system. Leaves should be raked to an unobstructed area away from utility poles, fire hydrants, low hanging branches and fences. Leaf piles should not impede the flow of water to storm sewers and should be kept separate from brush and trash to ensure efficient and contaminant-free collection. Call 215-6000 to find out the schedule for your street. In most instances, leaves raked to the alley or bagged will be collected last.

Leaf collection kicks off mid-October for the early bird rakers and runs through January. By November, there is very limited collection of brush or mixed yard waste. Residents should wait until leaf season is over before putting these materials out for collection.

All leaves are taken to Shamrock Organic Products and processed into mulch. Shamrock is a private company and citizens wishing to purchase mulch or compost should contact them directly at 524-0109. Last year, over 7,200 tons of leaves and 17,000 tons of brush were collected by city crews. By the way, did you know that raking leaves burns 225 calories per hour? Happy raking!

APPENDIX E

Monitoring Station Location Maps



K:\cityeng\stormwater\RainGauges\acker_rain.dgn

Stormwater Sampling Locations
Fourth Creek Watershed (Acker Place)
Middlebrook Pike at Old Weisgarber Rd

N

City of Knoxville
Dept. of Engineering
Stormwater Division

Date: October 15, 2001

SCALE: 1" = 200' (AT FULL SCALE)

0 200' 400'

K:\cityeng\stormwater\RainGauges\first_rain.dgn

Stormwater Sampling Locations
First Creek Watershed
N Broadway at Adair Dr

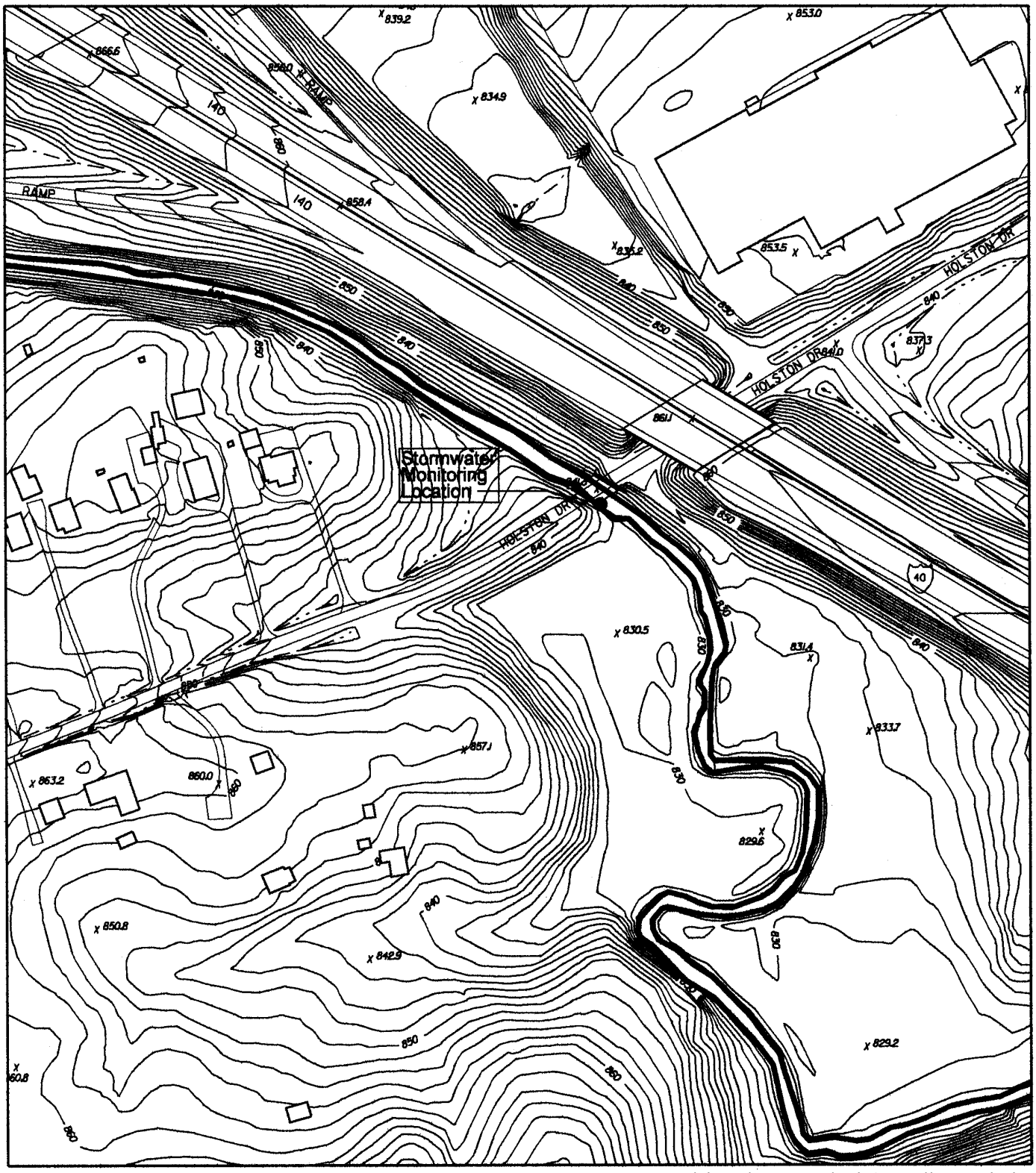
N

City of Knoxville
Dept. of Engineering
Stormwater Division

Date: October 15, 2001

SCALE: 1" = 200' (AT FULL SCALE)

0 200' 400'



K:\cityeng\stormwater\RainGauges\loves_rain.dgn

Stormwater Sampling Locations
Loves Creek Watershed
Holston Dr at I–40

N

City of Knoxville
Dept. of Engineering
Stormwater Division

Date: October 15, 2001

SCALE: 1" = 200' (AT FULL SCALE)

0 200' 400'

K:\cityeng\stormwater\RainGauges\second_rain.dgn

Stormwater Sampling Locations
Second Creek Watershed
Cumberland Ave at Eleventh St

N

City of Knoxville
Dept. of Engineering
Stormwater Division

Date: October 15, 2001

SCALE: 1" = 200' (AT FULL SCALE)

0 200' 400'

K:\cityeng\stormwater\RainGauges\fourth_rain.dgn

Stormwater Sampling Locations
Fourth Creek Watershed
S Northshore Dr at Walden Dr

N

City of Knoxville
Dept. of Engineering
Stormwater Division

Date: October 15, 2001

SCALE: 1" = 200' (AT FULL SCALE)

0 200' 400'

APPENDIX F

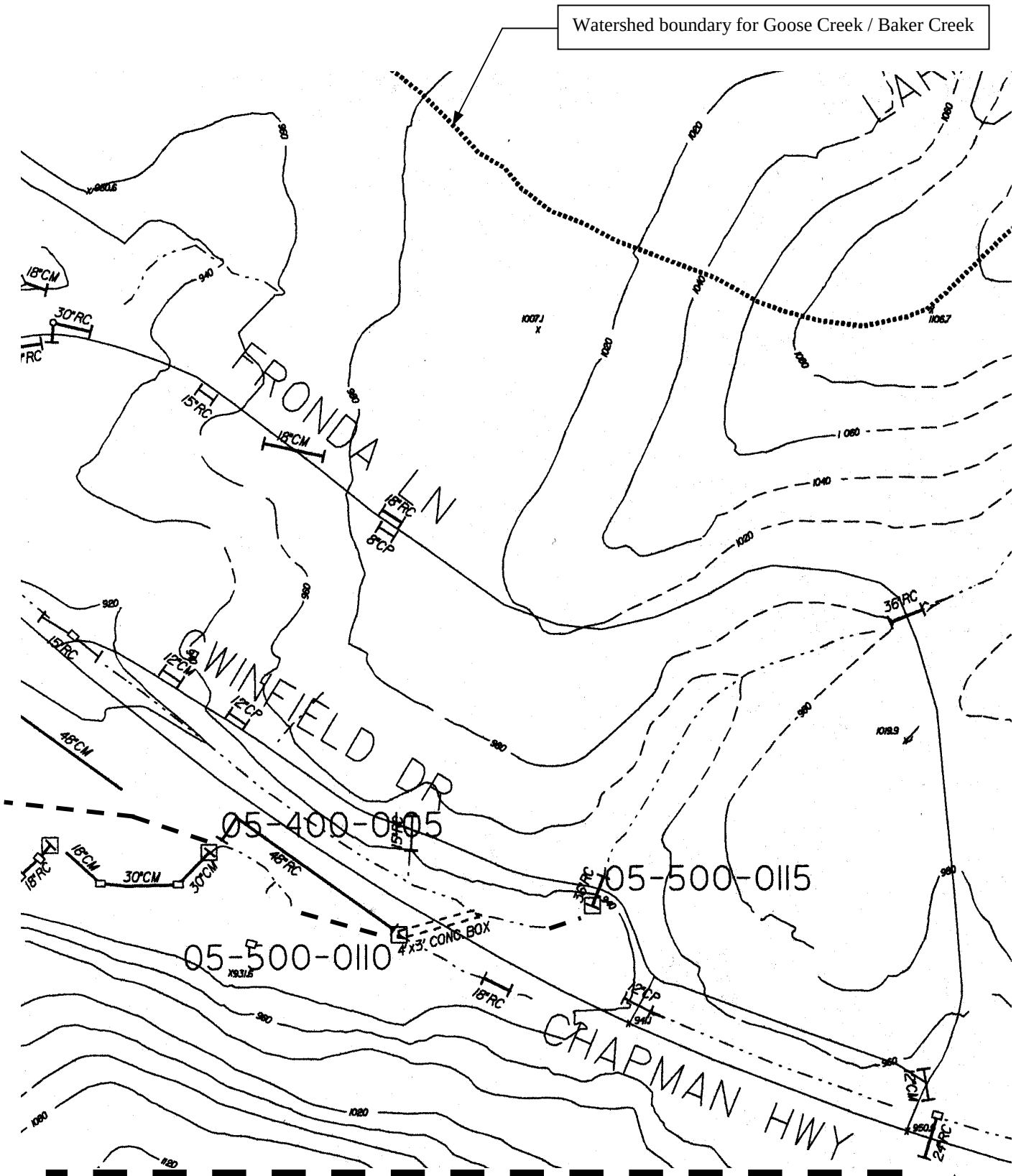
NPDES Permit Program Inventory Map

(Attached separately)

The inventory map is not reproduced as part of the online version of this report (in Adobe Acrobat format). The entire inventory map is approx 66" x 32" (or 33 x 16 miles) at a scale of 1 inch equals 0.5 miles.

The following two pages show typical outfall information on the inventory map:

- ***Closeup of a particular portion of the map (Goose Creek headwaters near Chapman Highway and Fronda Lane) with city permit outfalls shown.***
- ***Description of the outfall numbering system and the NPDES Inventory Map legend (with listings for Watershed ID and Outfall Type).***



Excerpt from the NPDES Permit Program Inventory Map:

This excerpt shows the headwaters for one branch of Goose Creek, with the approximate beginning of the blue-line stream near the 36" RCP underneath Fronda Lane.

(approximate scale: 1" = 230')

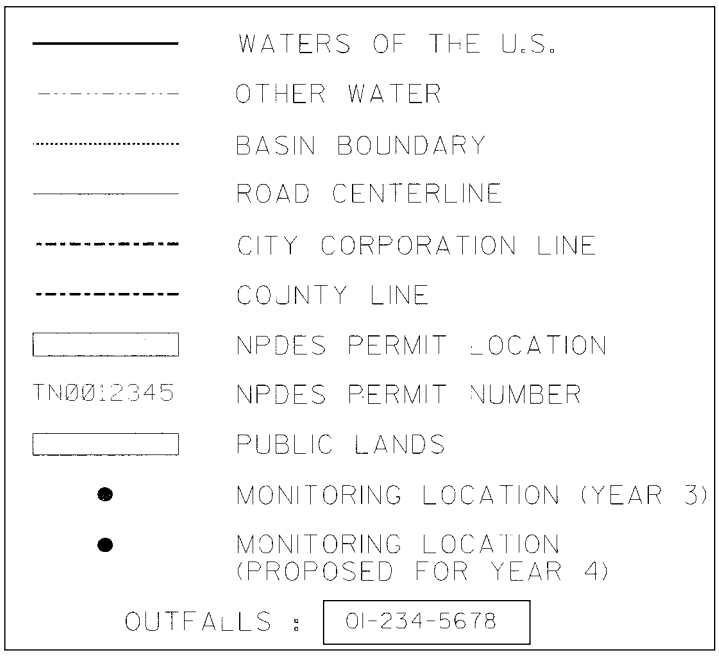
0 115' 230'

N

Watershed ID	Watershed Name
00	Tennessee River
01	First Creek
02	Second Creek
03	Third Creek
04	Fourth Creek
05	Goose Creek
06	Baker Creek
07	Williams Creek
08	Knob Creek
09	Toll Creek
10	Ten Mile Creek
11	Whites Creek
12	Turkey Creek
13	East Fork
15	Spring Creek
16	DeArmond Spring Branch
18	Sinking Creek
30	French Broad River
50	Holston River
51	Swanpond Creek
52	Inman Branch
53	Loves Creek
54	Woods Creek
70	Clinch River
71	Beaver Creek
77	Grassy Creek
79	Knob Fork
90	Little River
91	Stock Creek
99	Unnamed Creek (McClure Ln)

Description of outfall numbers for NPDES Permit Program Inventory Map (Appendix F) within Annual Report - Year 5

LEGEND for NPDES Inventory Map:



Outfall Type	Description	Criteria for Type
100	Major Pipe	Pipe diameter >= 36"
200	Major Channel	Drainage area >= 50 acres
300	Major Industrial	Pipe diameter >= 12" or zoned industrial & drainage area > 2 acres
400	Minor Pipe	Pipe diameter < 36"
500	Minor Channel	Drainage area < 50 acres