Waterborne Release Monitoring and Surveillance Programs at the Savannah River Site

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WATERBORNE RELEASE

MONITORING AND SURVEILLANCE PROGRAMS

AT THE SAVANNAH RIVER SITE (U)

T.I. Brown, Jr.

March 1999

Classification

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Acronym List

ALARA	As Low As Reasonably Achievable
ANS	Academy of Natural Sciences
BAT	Best Available Technology
CSWTF	Central Sanitary Wastewater Treatment Facility
CWA	Clean Water Act
DCG	Derived Concentration Guide
DMR	Discharge Monitoring Report
DOE	U. S. Department of Energy
EA	Environmental Assessment
EDE	Effective Dose Equivalent
EIS	Environmental Impact Statement
EMS	Environmental Monitoring Section
EPA	U. S. Environmental Protection Agency
EPD	Environmental Protection Department
ERP&CP	Environmental Release Prevention and Control Plan
ERPT	Environmental Release Prevention Taskforce
GDNR	Georgia Department of Natural Resources
NPDES	National Pollutant Discharge Elimination System
O&M	Operations and Maintenance
QA/QC	Quality Assurance/Quality Control
RM	River Mile
SCDHEC	South Carolina Department of Health and Environmental Control
SFSD	Spent Fuel Storage Division
S&HO	Safety and Health Operations
SIRIM	Site Item Reportability and Issue Management
SRS	Savannah River Site
SRTC	Savannah River Technology Center
TEWM	Tritium Effluent Water Monitor
VOC	Volatile Organic Compound
WSD	Water Services Department

1.0 INTRODUCTION

1.1 Purpose

This report documents the liquid release environmental compliance programs currently in place at the Savannah River Site (SRS). Included are descriptions of stream monitoring programs, which measure chemical parameters and radionuclides in site streams and the Savannah River and test representative biological communities within the streams for chemical and radiological uptake. This report also explains the field sampling and analytical capabilities that are available at SRS during both normal and emergency conditions.

1.2 Background

SRS is a 310 square mile facility owned by the United States Department of Energy (DOE) (Figure 1-1). It is located in the South Carolina counties of Aiken, Barnwell, and Allendale and is bordered on the west by the Savannah River. Initially, the site's mission was the production of nuclear materials primarily in support of national defense. Additional uses for the nuclear materials included medical research and other government applications. The end of the Cold War resulted in a change in the site's priorities to nonproliferation, waste management, environmental restoration, and technology development and transfer activities.

SRS conducts both effluent monitoring and environmental surveillance programs to determine what, if any, effects site operations have on the environment and off-site populations. These two programs have different objectives, and by evaluating the data from both programs concurrently, an accurate estimate of SRS impacts can be established. The effluent monitoring program involves the collection and analysis of samples of liquid and gaseous discharges from various processes or process areas for the purpose of identifying and quantifying contaminant levels, assessing radiation exposure to the public, and demonstrating compliance with applicable local, state and federal standards. Environmental surveillance activities are used to determine the levels of radionuclides in various media from on and around SRS, including air, water, soil, foodstuffs, biota, and other media. These data are used to demonstrate compliance with applicable state and federal standards, to assess radiation exposures to off-site populations, and to determine what, if any, effects the site has on the local environment. This report deals exclusively with the monitoring and surveillance programs that involve liquid discharges to site streams and the Savannah River.

Currently, the concentration and quantity of contaminants released from SRS processes to site streams and the Savannah River are determined by analyzing: 1) radiological parameters, 2) chemical and water quality parameters, and 3) biological uptake of radionuclides. First, the radiological monitoring program measures the levels of radionuclides at points of release from processing areas. SRS also conducts radiological surveillance of on-site streams and the Savannah River to monitor ambient radiological conditions and determine the site's contribution to the levels of radioactive materials in the environment. Second, site streams are monitored at the process outfalls in accordance with the National Pollutant Discharge Elimination System (NPDES) for chemical and toxicological parameters that are released as a result of process discharges or storm water runoff. Additionally, the non-radiological surveillance program is

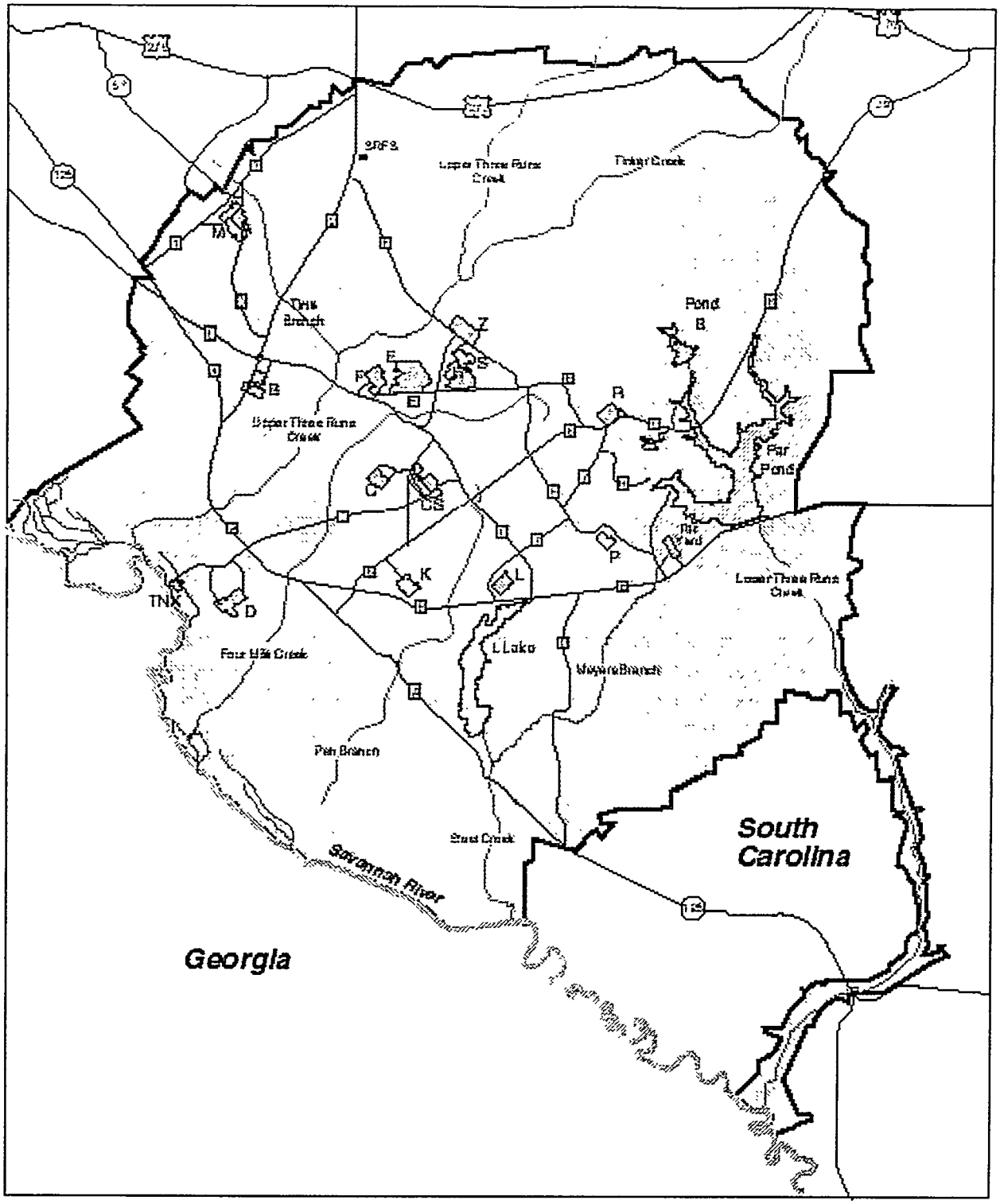

Figure 1-1 Map of the Savannah River Site

used to detect evidence of degradation in stream and river water quality as a result of site discharges. Finally, as part of the biological surveillance program, levels of certain radionuclides in fish on site, upstream, and downstream from SRS to the Atlantic Ocean are measured.

DOE Orders 5400.1 and 5400.5 (Refs 1 and 2) set forth the requirements for environmental monitoring programs. DOE/EH-0173T, *Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance* (Ref. 3), both incorporates and expands on the requirements in the Orders by describing the elements of an acceptable radiological effluent monitoring and surveillance program for DOE facilities. SRS has expanded upon these requirements even further to include non-radiological monitoring and surveillance program requirements. The guide clearly states that it is DOE policy to conduct monitoring and surveillance programs that

- can determine whether the public and the environment are properly protected during operations of DOE facilities
- can determine whether operations of DOE facilities are in compliance with DOE orders and other applicable Federal, State, and local standards and requirements
- are capable of detecting and quantifying unplanned releases
- meet high standards of quality and credibility

The SRS monitoring and surveillance program is designed to meet the requirements of DOE/EH-0173T to address monitoring, sample analysis, data analysis, demonstration of compliance, record-keeping, reporting, and quality assurance (QA).

1.3 Objectives

The objectives of this report are to:

- summarize the liquid release environmental compliance programs at SRS
- describe field sampling and laboratory analysis capabilities on site
- explain how normal and unusual conditions are handled in regards to stream monitoring and surveillance

The objectives of the SRS effluent monitoring program (Ref. 4) are to:

- determine compliance with Federal, State, and local regulations, DOE orders, and commitments made in environmental impact statements (EIS) and environmental assessments (EA)
- identify potential environmental problems and evaluate the need for and/or effectiveness of effluent treatment and control practices
- provide support for permitting activities and compliance

- detect, characterize, and report unplanned releases in support of the SRS Site Item Reportability and Issue Management Program (SIRIM)
- provide information in support of the SRS Environmental As Low As Reasonably Achievable (ALARA) Program, WSRC-3Q – ECM-18.2 (Ref. 5).

The objectives of the SRS environmental surveillance program (Ref. 4) are to:

- verify compliance with commitments made in EISs, EAs, and other documents
- characterize and define trends in the physical, chemical, and biological characteristics of the environment on and surrounding SRS
- establish baselines of environmental quality
- continually assess pollution abatement and effluent control programs and the adequacy of facility operations or containment
- identify and quantify new or existing environmental problems
- verify or refine the predictions of environmental models
- assess actual or potential contaminant exposures to critical groups and populations
- conduct studies aimed at improving knowledge of contaminant transfer in the environment

Inherent in these objectives for both the monitoring and surveillance programs are the following (Ref. 4):

- commitment to notify appropriate officials in the event of unusual or unforeseen conditions that warrant special environmental monitoring
- timely communication of the programs' results to DOE and the public
- maintenance of accurate and continuous records of the effects of SRS on the environment
- assistance in risk assessment and uncertainty analyses for human populations in the vicinity of SRS

1.4 Report Organization

Section 2 of this report presents descriptions of the effluent monitoring programs in place at SRS. Section 3 addresses the environmental surveillance programs associated with surface waters. Section 4 describes the biological surveillance program as it relates to surface waters. Monitoring/surveillance frequency, reporting requirements, and provisions for emergency conditions are also addressed in each of these sections.

Section 5 describes stream sampling capabilities available through the various organizations at SRS. This description includes a brief discussion of the sampling equipment used for each monitoring program. Section 6 summarizes the on-site analytical capabilities available on both a routine and emergency basis for water analysis. Laboratory Quality Assurance/Quality Control (QA/QC) issues and data turn-around times are also discussed briefly in Section 6. Finally, Section 7 documents the programmatic upgrades established since the tritium release from a reactor area occurred in 1991. Appendix A is a description of the liquid release pathways at SRS. This appendix documents the outfalls recommended for initial hydrological modeling. Appendix B identifies the industrial, commercial, and recreational river uses downstream of SRS.

2.0 EFFLUENT MONITORING PROGRAM

A crucial aspect of any liquid effluent monitoring program is ensuring that the samples that are collected and analyzed are indeed representative of the stream conditions. This is accomplished by using effluent monitoring systems at points of release that are appropriate for the type and level of contaminants present, that collect samples at the appropriate frequencies, and that incorporate QA measures in both the collection and analysis phases.

2.1 Radiological Effluent Monitoring

2.1.1 Program Description

Direct measurement (also referred to as continuous monitoring or online monitoring) and/or sample collection and analysis (also referred to as offline monitoring) are used to monitor each liquid discharge point that could potentially contain radionuclides. The type (i.e., online or offline) and frequency of monitoring is based on regulatory and operational requirements and on the risks associated with the effluent stream being monitored. Determination of these factors was made following a 1992 evaluation of liquid effluent streams and assessment of their potential for release of radiological materials (Ref. 11).

The radiological effluent monitoring program is designed to meet the requirements of pertinent DOE orders and guides. Several SRS organizations are responsible for implementing the program and ensuring that all requirements are met. The following subsections provide discussion of the applicable requirements and the SRS organizational responsibilities.

2.1.1.1 Program Requirements

The SRS radiological effluent monitoring program meets the requirements of DOE/EH-0173T, DOE Order 5400.1, and DOE Order 5400.5 (Refs. 1, 2, 3). The program is designed to ensure that the monitoring systems specified for each discharge are based directly on the characterization of the sources, the pollutants expected to be present, the treatment systems in place, and the release point configuration. These monitoring systems are adequate to evaluate compliance with DOE Derived Concentration Guides (DCGs) (Ref. 2).

DCGs are not effluent limits. Instead, they are radionuclide-specific reference values that indicate whether Best Available Technology (BAT) treatment must be applied to further reduce radionuclide concentrations prior to discharge into surface waters. SRS has committed to applying BAT (Ref. 4) to effluents that meet any of the following conditions:

- at the point of discharge to surface waters and prior to dilution, the surface waters otherwise would contain annual average concentrations of radioactive material in excess of the DOE Order 5400.5 DCG values
- the total annual Effective Dose Equivalent (EDE) to the public would otherwise exceed 10 mrem, with the effluent in question contributing a significant portion of that dose
- operators of the facility associated with the effluent are not in compliance with the Groundwater Protection Management Plan for the activity being conducted

For discharges containing multiple radionuclides, the sum of the fractional DCGs is used to determine compliance with DOE Order 5400.5. This is given by the following equation:

$$\sum_{i=1}^{N} C_i / DCG_i \leq 1 \qquad \text{Equation 1}$$

where:

C_i = concentration of radionuclide "*i*"
DCG_i = DCG for radionuclide "*i*"
N = the number of radionuclides present in the effluent

Release limits are not the only requirements set forth in the DOE Orders. Other program requirements are in place to ensure the adequacy of monitoring and analytical equipment. The analytical laboratories and on-line instruments are sufficiently sensitive to provide detection at levels low enough to ensure compliance with regulatory requirements. To ensure reliability, sampling systems and online monitors are calibrated and maintained according to manufacturer's specifications. Some discharge locations are monitored using continuous monitoring systems equipped with recorders and alarms. These output and warning devices are located in areas continuously occupied by operations or security personnel, and are set to alert personnel if releases of radionuclides are approaching DOE standards.

2.1.1.2 Organizational Responsibilities

Environmental Monitoring Section (EMS) personnel collect and analyze most liquid radiological samples and compile the data in both a monthly radioactive release report and an annual environmental report. EMS personnel also assist the operating department in locating the monitoring equipment and in identifying any equipment deficiencies. The operating departments are responsible for the active and passive effluent monitoring systems used on the discharges from their facilities. Operating department personnel also identify non-routine effluent releases and initiate corrective actions to mitigate these releases and prevent recurrences.

2.1.2 Monitoring Locations

Liquid effluents are sampled at or near their discharge point into the receiving stream using automatic sampling equipment or continuous monitoring equipment. A discharge point is defined at SRS as follows:

> the point at which a manmade conveyance (i.e., pipe, ditch, channel, conduit, well or canal) discharges into a naturally occurring body of water (i.e., site stream) or into a manmade pond or lake (i.e. PAR Pond or L Lake) that overflows into a naturally occurring body of water that ultimately is accessible by the general public (Ref. 4).

A total of 21 locations across the site are monitored, as shown in Table 2.1 (Ref. 4). Measurements are taken at these locations to 1) quantify direct discharges to site streams, 2) determine compliance with DCG values, and 3) determine environmental ALARA release

trending. Actinide analyses are used to quantify uranium isotopes (U-234, U-235, U-238), plutonium isotopes (Pu-238, Pu-239), americium (Am-241), and curium (Cm-244).

Table 2.1 Radiological Monitoring Locations and Parameters

	Monitoring Location	Sample Type	Collection Frequency/ Organization	Analyses Performed
A-Area				
Tims Branch-2 (TB-2)	NPDES Outfall A-01 on an unnamed tributary of Tims Branch, east of SRTC, on the northeast side of SRS Rd. 1A and south of Green Pond Rd.	FP	Weekly/ EMS	Gross alpha and beta, actinide, tritium, & gamma spec.
D-Area				
400-D Effluent	In process sewer west of 772-D	FP	Weekly/ EMS	Gross alpha and beta, tritium, total strontium & gamma spec.
F-Area				
F-01	NPDES Outfall F-01; west side of F-Area in an unnamed tributary of Upper Three Runs Creek	FP	Weekly/ EMS	Gross alpha and beta, tritium, total strontium & gamma spec.
F-012	281-8F Retention Basin	FP	As required/ EMS	Gross alpha and beta, tritium, total strontium & gamma spec.
F-013	200-F Cooling Water Basin (241-97F)	FP	As required/ EMS	Gross alpha and beta, tritium, total strontium & gamma spec.
Four Mile Creek–3 (FM-3)	Southeast of F-Area; receives all process effluent discharges from F-Area, as well as runoff from the southern side of F-Area	FP	Weekly/ EMS	Gross alpha and beta, tritium, total strontium, promethium, actinide & gamma spec.
Upper Three Runs-2 (U3R-2)	Northeast of F-Area in an unnamed tributary of Upper Three Runs Creek; receives nonprocess discharges and stormwater runoff from the northeast portion of F-Area	FP	Weekly/ EMS	Gross alpha and beta, tritium, total strontium, promethium, actinide & gamma spec
Upper Three Runs-F3 (U3R-3)	Northwest of F-Area in an unnamed tributary of Upper Three Runs Creek; receives process effluent discharges and runoff from Naval Fuels	FP	During rain/ EMS	Gross alpha and beta, tritium, total strontium, promethium, actinide & gamma spec
H-Area				
Four Mile Creek-1C (FM-1C)	Unnamed tributary of Four Mile Creek, north of SRS Rd. E and downstream of outfall F-18; receives effluent discharges from RBOF, batch discharges from the 241-105H high and moderate basins, and releases monitored by HP-50	FP	Weekly/ EMS	Gross alpha and beta, tritium, total strontium, promethium, & gamma spec.
H-04	NPDES Outfall H-04; discharges into unnamed tributary of Upper Three Runs Creek; receives process effluent from CIF	FP	Weekly/EMS	Gross alpha and beta, tritium, total strontium & gamma spec.

Table 2.1 Radiological Monitoring Locations and Parameters (continued)

	Monitoring Location	Sample Type	Collection Frequency/ Organization	Radionuclides Monitored
H-017	H-Area Retention Basin (281-8H)	FP	As req'd/ EMS	Gross alpha and beta, tritium, total strontium & gamma spec.
H-018	200-H Cooling Water Basin (241-103H)	FP	As req'd/ EMS	Gross alpha and beta, tritium, total strontium & gamma spec.
HP-15	East of H-Area on an unnamed tributary of Upper Three Runs Creek, Tritium facility outfall	FP	Weekly/ EMS	Gross alpha and beta, tritium, total strontium & gamma spec.
HP-52	H-Area Tank Farm, approximately 1600 ft. east of the intersection of SRS Rd. E and Rd. 4; receives process effluent discharge from H-Area (221-H segregated cooling water and H-Area waste management) and runoff from ETF	FP	Weekly/ EMS	Gross alpha and beta, tritium, total strontium & gamma spec.
Upper Three Runs-2A (U3R-2A)	West of F-Area in the process effluent line from ETF, just prior to discharge into Upper Three Runs Creek, at Rd. C	FP	Weekly/ EMS	Gross alpha and beta, tritium, total strontium, promethium & gamma spec.
K-Area				
K-Canal	Southwest of K-Reactor; receives K-Area process sewer discharge	FP	Weekly/ EMS	Gross alpha and beta, tritium, total strontium & gamma spec.
L-Area				
L-07	Southwest corner of 105-L	FP	Weekly/ EMS	Gross alpha and beta, tritium, total strontium & gamma spec.
M-Area				
Tims Branch-3 (TB-3)	Outfall A-014, on an unnamed tributary of Tims Branch, at SRS Rd. D; sample point used for all M-Area liquid effluents	FP	Weekly/ EMS	Gross alpha and beta, actinide & gamma spec.
P-Area				
105-R Sumps	Sumps in 105-R	G	During each sump release/ S&HO	Gross alpha and beta, tritium, total strontium & gamma spec.
S-Area				
S-04	NPDES Outfall S-04; receives process discharge from DWPF	FP	Weekly/ EMS	Gross alpha and beta, tritium, total strontium, actinide & gamma spec.
TNX				
TNX-008	NPDES Outfall X-08	FP	Weekly/ EMS	Gross alpha and beta, tritium, actinide & gamma spec.

FP – Flow proportional sample
G – Grab sample

2.1.3 Reporting Requirements

DOE Orders 5400.1 and 5400.5 specify the requirements for reporting data gathered from effluent monitoring activities, for both routine and unusual conditions. Notification of Unusual Occurrences must be made to the DOE Deputy Assistant Secretary for Environment and the appropriate program office of an unusual occurrence that may cause any of the following conditions:

- a combined dose for all pathways of ≥100 mrem EDE in a year due to DOE and other man-made sources
- an exceedance of or failure to meet any other legally applicable limit, including other DOE Order 5400.5 requirements

Additionally, timely notification must be made if the combined dose from SRS operations and other man-made sources exceeds 100 mrem EDE. The Annual Radioactive Releases Effluent Information Systems/Online Discharge Information System (EIS/ODIS) Report, required by DOE Order 5400.1, provides data for the subject year and a summary of that year's activities.. Also required by that same order is the SRS Environmental Report, an annual publication that summarizes environmental data and highlights significant programs. This report also includes a compliance summary, data from the effluent monitoring program, and the potential doses to the public resulting from SRS operation.

Other drivers apart from DOE Orders require the issuance of reports documenting the results of monitoring activities during routine and unusual conditions. SRS procedures require the issuance of the Monthly Radioactive Releases Report and an annual compilation of these reports, the latter of which is included in the previously mentioned SRS Environmental Report. The monthly report presents the monthly release quantities from each SRS effluent point as well as the year-to-date release quantity and the associated EDE. It also documents 1)a comparison of the year-to-date doses with the site ALARA guide and 2) compliance with DOE DCGs from DOE Order 5400.5. The Radioactive Releases Report presents this information for each area and offers a comparison of the area's EDE with the site's.

2.1.4 Provisions for Non-routine or Emergency Conditions

Each SRS operating department, with the assistance of Safety and Health Operations (S&HO), is responsible for identifying, investigating, and reporting to the Environmental Protection Department (EPD) any non-routine liquid release. SRS typically separates routine monitoring systems from those installed to monitor under emergency or unusual conditions.

Emergency notification is the mechanism by which events of a reportable occurrence at SRS are reported to state and county emergency management agencies. It establishes mutually agreed upon triggers which warrant courtesy notifications to state agencies within Georgia and South Carolina, and Emergency Management Directors within Aiken, Allendale, Barnwell, Burke, and Richmond Counties. The Savannah River Site Operations Center Operating Procedure Manual SRSOC 305-2 contains the guidance for the onsite protocol for notification of incidents to the

Operation Center and the courtesy notification to state and county emergency management agencies. In addition to regulatory notifications, courtesy notifications which result from an environmental release are required by existing Memorandums of Understanding (MOUs) [DE-MU09-92SR18285 and DE-MU09-92SR18287 respectively].

Courtesy Notifications can be distinguished from Regulatory Notifications in that there are no stringent reporting criteria or guidelines established. However, to ensure state and county emergency management agencies have prior access to any information that may be released to the public, the *as soon as possible* report not-later-than time is synonymous with *immediately*. Although not a regulatory requirement, initial notifications to state, counties, and DOE-HQ must be complete within 30 minutes from the time the event is reported to the onsite Operations Center.

Notification responsibilities in the event of a reportable occurrence at SRS that may present a threat to the health and safety of the surrounding population and environment and result in a potential or actual release of radioactive and/or non-radioactive hazardous materials is defined in a MOU between DOE-SR and the States of Georgia and South Carolina. Should the initial assessment of a spill or release indicate that the incident falls outside emergency classification guidelines, DOE-SR must make additional evaluations to further determine the need for notifications of offsite authorities. Consideration in this determination will include an assessment of the potential/actual level of news media and/or public interest resulting from the incident. Prompt notifications will be made, to the extent practical, prior to issuance of a formal news release or if a significant number of inquiries concerning the incident are received from the media or general public. Georgia and South Carolina are interested in any non-environmental related event that would generate media interest or public inquiry [e.g. hostage situation, bomb threat in a non-process facility/area, etc.]

The following offsite agencies must be notified within 30 minutes when Courtesy Notifications have been directed:

- Georgia Emergency Management Agency (GEMA)
- Georgia Department of Natural Resources/Environmental Protection Division (GA DNR/EPD)
- South Carolina Department Of Health and Environmental Control (SC DHEC)
- South Carolina Emergency Preparedness Division (SC EPD)
- Aiken County Emergency Management Director
- Allendale County Emergency Management Director
- Burke County Emergency Management Director
- Barnwell County Emergency Management Director

- Richmond County Emergency Management Director
- Plant Vogtle
- DOE-HQ

In an effort to minimize the amount of time necessary to perform on and offsite notifications, the Emergency Notification Network (ENN) is used to notify similarly equipped offsite agencies with twenty-four hour warning points. Other on and offsite notification points (e.g. SC DHEC, Richmond County Warning Point) require individual phone calls. A copy of the Courtesy Notification will be faxed to state, county, and local agencies simultaneously with the ENN notification. When directed to implement Courtesy Notifications, Operations Center personnel immediately notify and give an expedient briefing on incident status to the state and county emergency management agencies. The pre-set Allegro Conference, the Offsite Courtesy Notification Conference, will be used if the ENN is unavailable.

2.2 Non-Radiological Effluent Monitoring

2.2.1 Program Description

2.2.1.1 Program Requirements

The Clean Water Act (CWA), passed by Congress in 1972, is the primary federal law protecting the nation's waters. The main goal of the CWA is to restore and maintain the quality of lakes, rivers, aquifers, and coastal areas. The CWA requires a permit to be obtained prior to discharging pollutants into the waters of the U.S. The NPDES program regulates the amount of pollutants that can be discharged by municipal wastewater treatment facilities and industrial facilities, referred to as point sources. Chemical concentrations and physical properties of the effluents leaving SRS facilities must meet NPDES requirements prior to discharge to site streams. Permittees are required to submit monitoring data to the government agency that regulates the permit (either state government or the United States Environmental Protection Agency [EPA]). Failure to comply with the terms of the permit or violations of permit limits could result in enforcement action being taken against the permittee.

The NPDES program regulates the discharge of conventional, non-conventional, and toxic pollutants. Examples of each of these are shown in the Table 2.2.

Table 2.2 Examples of Pollutants

Conventional Pollutants	Non-conventional Pollutants	Toxic Pollutants
Fecal Coliform	Nitrogen	Pesticides
Oil and Grease	Phosphorous	Metals

The NPDES program also has established limits on the discharge of storm water from developed areas. These discharges are permitted separately from the point sources. The storm water permitting program is being implemented under the CWA in two phases. Currently, Phase I is

requiring permits for storm water management systems that serve communities with populations over 100,000 and for run off from areas associated with construction or industrial activities.

SRS has been monitoring its process discharges under an NPDES permit. The South Carolina Department of Health and Environmental Control (SCDHEC) administers the NPDES program in South Carolina under EPA authority. Permits are generally issued for a five-year period, but they may be re-negotiated prior to that time based on changes in processes, effluent limitations, and analytical capabilities. The industrial wastewater permit became effective in January 1998, but plans are to begin the re-negotiation process within a year of its effective date. The utility water permit that governs SRS is a general permit for the state of South Carolina. This means that the terms and conditions of the permit apply to every discharger that is granted coverage under that permit. This particular permit will be re-issued in South Carolina in 1999. The industrial storm water permit is also a general permit, which went into effect February 1, 1998 and will remain so until January 31, 2003.

2.2.1.2 Organizational Responsibilities

EMS personnel collect most NPDES samples and send them to a subcontract laboratory for analysis. Operating Department personnel are responsible for promptly notifying EPD regarding any unusual occurrence or emergency condition in their facility that could result in a permit violation. EPD personnel notify SCDHEC and DOE of any NPDES permit exceedance and corrective actions that are being taken.

2.2.2 Monitoring Locations

SRS currently has four NPDES discharge permits. Table 2.3 shows the permit number, the type of discharges regulated under each permit, and the number of outfall sampling locations associated with each permit.

Table 2.3 NPDES Permits at Savannah River Site

Permit Number	Discharge Type	Number of Outfalls
SC0000175	Industrial Wastewater	36
SCG250162	Utility Water	1
SCR000000	Industrial Storm water	52
SCR100000	Construction Storm water	Varies *

* Storm water monitoring is required at construction sites that disturb 5 acres or more

The permits require different monitoring frequencies and methods, depending on the type of wastewater discharged, the stream being monitored, and the constituents of concern in the effluent. Most outfalls under Permit SC0000175 are monitored once a month. Industrial storm water outfalls, covered under permit SCR000000, must be monitored during significant rainfall events. Construction storm water outfalls are monitored upon request by SCDHEC to address specific discharges.

2.2.3 Reporting Requirements

Appendix A is a list of the outfalls regulated under Permit SC0000175, their effluent limitations, and monitoring requirements. The data from these samples is reported to SCDHEC each month in the form of a Discharge Monitoring Report (DMR). At SRS, EPD interfaces directly with SCDHEC on the regulatory aspects of the site's NPDES permit. Additionally, EPD acts as the liaison between the custodial departments that are responsible for the outfalls and SCDHEC. Part of EPD's responsibilities includes application for permit modifications, negotiation of new permits, submittal of DMRs, and notification of any permit violations.

Requirements for reporting permit violations, unpermitted discharges, or changes in operating conditions are the same as those discussed in Section 2.1.3.

2.2.4 Provisions for Non-routine or Emergency Conditions

The mechanisms for emergency notifications, including courtesy notifications to the state agencies within Georgia and South Carolina, and Emergency Management Directors within Aiken, Allendale, Barnwell, Burke, and Richmond Counties, following a chemical release are identical to those discussed in Section 2.1.4 for radiological releases. If any conditions or limitations of the permit are violated at any time, SRS must notify SCDHEC orally within 24 hours of becoming aware of the violation (Ref. 6). Additionally, within five days of becoming aware of the violation, SRS must submit in writing a description of the discharge, the cause, and the period of the non-compliance, including exact dates and times. If the condition leading to the violation has not been corrected by the time the written notification is submitted to SCDHEC, SRS must estimate the time the non-compliance will cease and identify the actions being taken to reduce, eliminate or prevent recurrence of the discharge.

If a department at SRS knows or anticipates that pending process changes will result in the discharge of a toxic pollutant, they are to notify the appropriate EPD personnel, who will help determine if SCDHEC must be informed of the change based on permit conditions.

If any outfall custodian at SRS, referred to as "the permittee," becomes aware of an activity or condition that will result in either a routine or a non-routine discharge of any toxic pollutant that is not limited in the permit, he/she must notify EPD immediately. If the expected effluent concentrations exceed levels specified in the permit special conditions, EPD will notify SCDHEC. Additionally, if the permittee becomes aware of an activity that will result (or has resulted) in the discharge of any hazardous substance identified under Section 311 of the CWA, he/she must notify EPD immediately. EPD will in turn notify SCDHEC. A list of the hazardous substances that must be reported are shown in Table 2.4.

Table 2.4 Reportable Quantities of Hazardous Substances Designated Pursuant to Section 311 of the Clean Water Act

Material	RQ in pounds	kilograms
Acetaldehyde.	1,000	454
Acetic acid	5,000	2,270
Acetic anhydride	5,000	2,270

Material	RQ in pounds	kilograms
Acetone cyanohydrin	10	4.54
Acetyl bromide	5,000	2,270
Acetyl chloride	5,000	2,270

Material	RQ in pounds	kilograms
Acrolein	1	0.454
Acrylonitrile	100	45.4
Adipic acid	5,000	2,270
Aldrin	1	0.454
Allyl alcohol	100	45.4
Allyl chloride	1,000	454
Aluminum sulfate	5,000	2,270
Ammonia	100	45.4
Ammonium acetate	5,000	2,270
Ammonium benzoate	5,000	2,270
Ammonium bicarbonate	5,000	2,270
Ammonium bichromate	10	4.54
Ammonium bifluoride	100	45.4
Ammonium bisulfite	5,000	2,270
Ammonium carbamate	5,000	2,270
Ammonium carbonate	5,000	2,270
Ammonium chloride	5,000	2,270
Ammonium chromate	10	4.54
Ammonium citrate dibasic	5,000	2,270
Ammonium fluoborate	5,000	2,270
Ammonium fluoride	100	45.4
Ammonium hydroxide	1,000	454
Ammonium oxalate	5,000	2,270
Ammonium silicofluoride	1,000	454
Ammonium sulfamate	5,000	2,270
Ammonium sulfide	100	45.4
Ammonium sulfite	5,000	2,270
Ammonium tartrate	5,000	2,270
Ammonium thiocyanate	5,000	2,270
Amyl acetate	5,000	2,270
Aniline	5,000	2,270
Antimony pentachloride	1,000	454
Antimony Potassium tartrate	100	45.4
Antimony tribromide	1,000	454
Antimony trichloride	1,000	454
Antimony trifluoride	1,000	454
Antimony trioxide	1,000	454
Arsenic disulfide	1	0.454
Arsenic pentoxide	1	0.454
Arsenic trichloride	1	0.454
Arsenic trioxide	1	0.454
Arsenic trisulfide	1	0.454
Barium cyanide	10	4.54
Benzene	10	4.54
Benzoic acid	5,000	2,270
Benzonitrile	5,000	2,270
Benzoyl chloride	1,000	454
Benzylchloride	100	45.4
Beryllium chloride	1	0.454
Beryllium fluoride	1	0.454
Beryllium nitrate	1	0.454
Butyl acetate	5,000	2,270
Butylamine	1,000	454
Butyric acid	5,000	2,270
Cadmium acetate	10	4.54
Cadmium bromide	10	4.54
Cadmium chloride	10	4.54
Calcium arsenate	1	0.454
Calcium arsenite	1	0.454
Calcium carbide	10	4.54
Calcium chromate	10	4.54
Calcium cyanide	10	4.54
Calcium dodecylbenzenesulfonate.	1,000	454
Calcium hypochlorite	10	4.54
Captan	10	4.54
Carbaryl	100	45.4
Carbofuran	10	4.54
Carbon disulfide	100	45.4
Carbon tetrachloride	10	4.54
Chlordane	1	0.454
Chlorine	10	4.54
Chlorobenzene	100	45.4
Chloroform	10	4.54
Chlorosulfonic acid	1,000	454
Chlorpyrifos	1	0.454
Chromic acetate	1,000	454
Chromic acid	10	4.54
Chromic sulfate	1,000	454
Chromous chloride	1,000	454
Cobaltous bromide	1,000	454
Cobaltous formate	1,000	454
Cobaltous sulfamate	1,000	454
Coumaphos	10	4.54
Cresol	100	45.4
Crotonaldehyde	100	45.4
Cupric acetate	100	45.4
Cupric acetoarsenite	1	0.454
Cupric chloride	10	4.54
Cupric nitrate	100	45.4
Cupric oxalate	100	45.4
Cupric sulfate	10	4.54
Cupric sulfate, ammoniated	100	45.4
Cupric tartrate	100	45.4
Cyanogen chloride	10	4.54
Cyclohexane	1,000	454

Material	RQ in pounds	kilograms
2,4-D Acid	100	45.4
2,4-D Esters	100	45.4
DDT	1	0.454
Diazinon	1	0.454
Dicamba	1,000	454
Dichlobenil	100	45.4
Dichlone	1	0.454
Dichlorobenzene	100	45.4
Dichloropropane	1,000	454
Dichloropropene	100	45.4
Dichloropropene-Dichloropropane	100	45.4
(mixture). 2,2-Dichloropropionic acid	5,000	2,270
Dichlorvos	10	4.54
Dicofol	10	4.54
Dieldrin	1	0.454
Diethylamine	100	45.4
Dimethylamine	1,000	454
Dinitrobenzene (mixed)	100	45.4
Dinitrophenol	10	45.4
Dinitrotoluene	10	4.54
Diquat	1,000	454
Disulfoton	1	0.454
Diuron	100	45.4
Dodecylbenzenesulfonate. Kepone	1	0.454
dodecylbenzenesulfonate. Triethylamine	5,000	2,270
Dodecylbenzenesulfonic acid	1,000	454
Endosulfan	1	0.454
Endrin	1	0.454
Epichlorohydrin	100	45.4
Ethion	10	4.54
Ethylbenzene	1,000	454
(EDTA). Ethylene dibromide	1	0.454
Ethylene dichloride	100	45.4
Ethylenediamine	5,000	2,270
Ethylenediamine- acid tetraacetic	5,000	2,270
Ferric Ammonium citrate	1,000	454
Ferric Ammonium oxalate	1,000	454
Ferric chloride	1,000	454
Ferric fluoride	100	45.4
Ferric nitrate	1,000	454
Ferric sulfate	1,000	454
Ferrous Ammonium sulfate	1,000	454
Ferrous chloride	100	45.4
Ferrous sulfate	1,000	454

Material	RQ in pounds	kilograms
Formaldehyde	100	45.4
Formic acid	5,000	2,270
Fumaric acid	5,000	2,270
Furfural	5,000	2,270
Guthion	1	0.454
Heptachlor	1	0.454
Hexachlorocyclopentadiene	10	4.54
Hydrochloric acid	5,000	2,270
Hydrofluoric acid	100	45.4
Hydrogen cyanide	10	4.54
Hydrogen sulfide	100	45.4
Isoprene	100	45.4
Isopropanolamine	1,000	454
Lead acetate	10	4.54
Lead arsenate	1	0.454
Lead chloride	10	4.54
Lead fluoborate	10	4.54
Lead fluoride	10	4.54
Lead iodide	10	4.54
Lead nitrate	10	4.54
Lead stearate	10	4.54)
Lead sulfate	10	4.54
Lead sulfide	10	4.54
Lead thiocyanate	10	4.54
Lindane	1	0.454
Lithium chromate	10	4.54
Malathion	100	45.4
Maleic acid	5,000	2,270
Maleic anhydride	5,000	2,270
Mercaptodimethur	10	4.54
Mercuric cyanide	1	0.454
Mercuric nitrate	10	4.54
Mercuric sulfate	10	4.54
Mercuric thiocyanate	10	4.54
Mercurous nitrate	10	4.54
Methoxychlor	1	0.454
Methyl mercaptan	100	45.4
Methyl methacrylate	1,000	454
Methyl parathion	100	45.4
Mevinphos	10	4.54
Mexacarbate	1,000	454
Monoethylamine	100	45.4
Monomethylamine	100	45.4
Naled	10	4.54
Naphthalene	100	45.4
Naphthenic acid	100	45.4
n-Butyl phthalate	10	4.54
Nickel Ammonium sulfate	100	45.4
Nickel chloride	100	45.4
Nickel hydroxide	10	4.54
Nickel nitrate	100	45.4

Material	RQ in pounds	kilograms
Nickel sulfate	100	45.4
Nitric acid	1,000	454
Nitrobenzene	1,000	454
Nitrogen dioxide	10	4.54
Nitrophenol (mixed)	100	45.4
Nitrotoluene	1,000	454
Paraformaldehyde	1,000	454
Parathion	10	4.54
Pentachlorophenol	10	4.54
Phenol	1,000	454
Phosgene	10	4.54
Phosphoric acid	5,000	2,270
Phosphorus	1	0.454
Phosphorus oxychloride	1,000	454
Phosphorus pentasulfide	100	45.4
Phosphorus trichloride	1,000	454
Polychlorinated biphenyls	1	0.454
Potassium arsenate	1	0.454
Potassium arsenite	1	0.454
Potassium bichromate	10	4.54
Potassium chromate	10	4.54
Potassium cyanide	10	4.54
Potassium hydroxide	1,000	454
Potassium permanganate	100	45.4
Propargite	10	4.54
Propionic acid	5,000	2,270
Propionic anhydride	5,000	2,270
Propylene oxide	100	45.4
Pyrethrins	1	0.454
Quinoline	5,000	2,270
Resorcinol	5,000	2,270
Selenium oxide	10	4.54
Silver nitrate	1	0.454
Sodium	10	4.54
Sodium arsenate	1	0.454
Sodium arsenite	1	0.454
Sodium bichromate	10	4.54
Sodium bifluoride	100	45.4
Sodium bisulfite	5,000	2,270
Sodium chromate	10	4.54
Sodium cyanide	10	4.54
Sodium dodecylbenzenesulfonate	1,000	454
Sodium fluoride	1,000	454
Sodium hydrosulfide	5,000	2,270
Sodium hydroxide	1,000	454
Sodium hypochlorite	100	45.4
Sodium methylate	1,000	454
Sodium nitrite	100	45.4
Sodium phosphate, dibasic	5,000	2,270
Sodium phosphate, tribasic	5,000	2,270

Material	RQ in pounds	kilograms
Sodium selenite	100	45.4
Strontium chromate	10	4.54
Strychnine	10	4.54
Styrene	1,000	454
Sulfur monochloride	1,000	454
Sulfuric acid	1,000	454
2,4,5-T acid	1,000	454
2,4,5-T amines	5,000	2,270
2,4,5-T esters	1,000	454
2,4,5-T salts	1,000	454
2,4,5-TP acid	100	45.4
2,4,5-TP acid esters	100	45.4
TDE	1	0.454
Tetraethyl lead	10	4.54
Tetraethyl pyrophosphate	10	4.54
Thallium sulfate	100	45.4
Toluene	1,000	454
Toxaphene	1	0.454
Trichlorfon	100	45.4
Trichloroethylene	100	45.4
Trichlorophenol	10	4.54
Triethanolamine	1,000	454
Trimethylamine	100	45.4
Uranyl acetate	100	45.4
Uranyl nitrate	100	45.4
Vanadium pentoxide	1,000	454
Vanadyl sulfate	1,000	454
Vinyl acetate	5,000	2,270
Vinylidene chloride	100	45.4
Xylene (mixed)	100	45.4
Xylenol	1,000	454
Zinc acetate	1,000	454
Zinc Ammonium chloride	1,000	454
Zinc borate	1,000	454
Zinc bromide	1,000	454
Zinc carbonate	1,000	454
Zinc chloride	1,000	454
Zinc cyanide	10	4.54
Zinc fluoride	1,000	454
Zinc formate	1,000	454
Zinc hydrosulfite	1,000	454
Zinc nitrate	1,000	454
Zinc phenolsulfonate	5,000	2,270
Zinc phosphide	100	45.4
Zinc silicofluoride	5,000	2,270
Zinc sulfate	1,000	454
Zirconium nitrate	5,000	2,270
Zirconium potassium fluoride	1,000	454
Zirconium sulfate	5,000	2,270
Zirconium tetrachloride	5,000	2,270

SCDHEC expects all wastewater treatment facilities to function in a manner that ensures all discharges meet permit limits. Treatment facilities can be as sophisticated as ion exchange units or as simple as settling ponds. All treatment facilities are designed with a maximum capacity that can be treated effectively. Intentionally bypassing treatment facilities is prohibited except for the following reasons:

- to prevent severe personal injury or loss of life
- to prevent severe property damage
- to avoid damage to treatment facilities caused by excessive storm drainage or run-off, if no alternatives are available (such as auxiliary treatment or retention of waste)

The permit clearly states that severe property damage does not mean economic loss resulting from production delays caused by the conditions that warranted the bypass.

It is the responsibility of the permittee to provide alternative power sources to treatment facilities to ensure uninterrupted operation. In the event the treatment facility is no longer able to discharge water in compliance with the permit limits, the permittee must mitigate, halt, or reduce activity until adequate treatment can be provided.

The permit requires the development and maintenance of Operations and Maintenance (O&M) procedures for all treatment facilities, including corrective actions to be taken during operational upsets.

3.0 ENVIRONMENTAL SURVEILLANCE PROGRAMS

The SRS environmental surveillance program has been developed according to the requirements of DOE Order 5400.1 to accomplish the following (Ref. 4):

- verify compliance with applicable environmental standards and public exposure limits
- establish background levels of contaminants in the environment
- verify compliance with environmental commitments made by SRS in EISs, EAs, and other documents
- determine the location and magnitude of concentrations of pollutants from SRS activities
- continually assess SRS pollution abatement programs
- evaluate the effects of contaminants from SRS activities on the public and the environment
- characterize and define trends in the physical, chemical, and biological condition of environmental media
- identify and quantify new or existing environmental problems
- verify whether any unexpected or undetected releases occur

The samples collected or measurements taken under the environmental surveillance program are divided into two categories: indicator and control. The control sites are used as background locations that are relatively unimpacted by SRS activities. Results from these sites are compared to those from the indicator locations to determine the effects of SRS activities on a particular stream.

3.1 Radiological Surveillance Program

3.1.1 Program Description

3.1.1.1 Program Requirements

The surface water surveillance program is divided into two parts, consisting of streams and lakes as one category and the Savannah River as the other. The objectives of the program are the same as those listed in Section 3.0. Surface water surveillance is conducted at a total of 29 on-site and off-site locations (Ref. 7), as described in the following sections.

3.1.1.2 Organizational Responsibilities

EMS personnel manage radiological stream surveillance activities. The data from the radiological surveillance program, in conjunction with data from the monitoring program, are used to quantify the amount of radioactive material being released from SRS to the environment and ultimately to the Savannah River.

3.1.2 Surveillance Locations

Continuous on-site surveillance stations are established at 26 locations within the following SRS streams: Tims Branch, Upper Three Runs Creek, Four Mile Creek, Pen Branch, Steel Creek, and Lower Three Runs Creek. Bi-weekly or monthly composite samples are analyzed for the parameters shown in Table 3.1 (Refs. 5 and 8). This table also shows the rationale for the location of each surveillance location. Figure 3-1, following Table 3.1, shows the location of the surveillance points with respect to the site (Ref. 7).

Table 3.1 On-site Radiological Surveillance Locations and Parameters

Stream	Surveillance Location	Rationale	Analyses Performed
Tims Branch	TB-5 near Rd. C	Last point on Tims Branch prior to entering Upper Three Runs	Gross alpha & beta, tritium
Upper Three Runs	Crouch Branch @ Rd. 4	Stormwater runoff from parts of H-Area	Gross alpha & beta, tritium gamma spec, total strontium
	U3R-1A Treadway Bridge Rd. 8-1	Control location	Gross alpha & beta, tritium
	U3R-3 @ Rd. C	Downstream of confluence of Tims Branch and Upper Three Runs. Also downstream of ETF discharge to Upper Three Runs	Gross alpha & beta, tritium gamma spec, total strontium
	U3R-4 @ Rd. A	Downstream of all SRS discharges to Upper Three Runs prior to its discharge into Savannah River	Gross alpha & beta, tritium gamma spec, total strontium, actinide
Four Mile Creek	Castor Creek – southeast of C-Area	Determine radionuclide concentrations resulting from process discharges, runoff, resuspension and groundwater migration from C-Area. Also includes runoff and discharges form N-Area	Tritium
	C-Canal	Determine radionuclide concentrations resulting from process discharges, runoff, resuspension and groundwater migration from C-Area.	Gross alpha & beta, tritium gamma spec, total strontium
	FM-2 @ Rd 4	Determine radionuclide concentrations resulting from process releases and runoff from H-Area	Gross alpha & beta, tritium gamma spec, total strontium
	FM-2B above F-Area effluent	Determine radionuclide concentrations resulting from process releases and runoff from H-Area. Also used to determine migration of 200-H seepage basin into Four Mile Creek.	Gross alpha & beta, tritium gamma spec, total strontium

Stream	Surveillance Location	Rationale	Radionuclides Currently Analyzed
Four Mile Creek (cont'd)	FM-3A	Determine radionuclide concentrations resulting from process releases and runoff from F-Area; also determine migration from H seepage basin 4 and E-Area into Four Mile Creek.	Gross alpha & beta, tritium, gamma spec, total strontium
	FM-3 F-Area effluent	Determine radionuclide concentrations resulting from process releases and runoff from F-Area	Total strontium
	FM-6 @ Rd. A-12.2	Downstream of all SRS discharges to Four Mile Creek. Last sampling point on Four Mile Creek prior to its discharge into Savannah River.	Gross alpha & beta, tritium, gamma spec, total strontium, actinide
	FM-A7 @ R. A-7	Determine radionuclide concentrations resulting from process releases and runoff from upstream production areas (C-Area, E-Area, F-Area, and H-Area). Also determines migration from F seepage basins into Four Mile Creek.	Gross alpha & beta, tritium, gamma spec, total strontium
	H-008 Outfall	Detect unplanned releases from H-Tank Farm, provide surveillance for runoff from 288-H ash basin and determine environmental trends.	Gross alpha & beta, tritium gamma spec, total strontium
	HP-50 Tritium Facility Outfall	Detect unplanned releases from tritium facility and determine environmental trends.	Gross alpha & beta, tritium, gamma spec
	Twin Lakes – West of C-Area	Determine radionuclide resulting from migration from C seepage basin. However, quantification of C seepage migration is performed using 4M-A7 point.	Tritium
McQueen Branch	McQueen Branch at Rd. F	Detect releases from H-Area	Gross alpha & beta, tritium, gamma spec
Pen Branch	Indian Grave Branch-21 800 ft south of Rd. 6-1	Determine radionuclide concentrations resulting from K seepage basin	Gross alpha & beta, tritium, total strontium
	K-011 Outfall @ Rd. B	Determine radionuclide concentrations resulting from process discharges, runoff, groundwater migration from K-Area	Gross alpha & beta, tritium, gamma spec, total strontium
Pen Branch (cont'd)	Pen Branch-3 @Rd. A-13.2	Downstream of all SRS discharges to Pen Branch. Last sampling point on Pen Branch prior to its discharge into Savannah River.	Gross alpha & beta, tritium, gamma spec, total strontium, actinide

Stream	Surveillance Location	Rationale	Radionuclides Currently Analyzed
Steel Creek	SC-2A 1 mile above Rd. B	Determine radionuclide concentrations resulting from P-Area discharges and groundwater migration from P seepage basin	Gross alpha & beta, tritium, gamma spec, total strontium
	SC-4 Steel Creek @ Rd. A	Downstream of all SRS discharges to Steel Creek. Last sampling point on Steel Creek prior to its discharge into Savannah River.	Gross alpha & beta, tritium, gamma spec, total strontium
Lower Three Runs Creek	L3R-1A @ Rd. B	Determine radionuclide concentrations resulting from discharges from PAR Pond. May contain runoff and groundwater from P-Area and R-Area.	Gross alpha & beta, tritium, total strontium
	L3R-2 Patterson Mill Rd.	Determine radionuclide concentrations resulting from SRS releases upstream (previously monitored by L3R-1A) and any off-site industries in Barnwell, SC area.	Gross alpha & beta, tritium, gamma spec, total strontium, actinide
	L3R-3 @ Hwy. 125	Downstream of all SRS discharges into Lower Three Runs. Last sampling point on Lower Three Runs prior to its discharge into Savannah River.	Gross alpha & beta, tritium, gamma spec, total strontium
	R-Area downstream of R-1	Determine radionuclide concentrations resulting from runoff and releases from R-area, also groundwater migration from R seepage basins.	Gross alpha & beta, tritium, gamma spec,

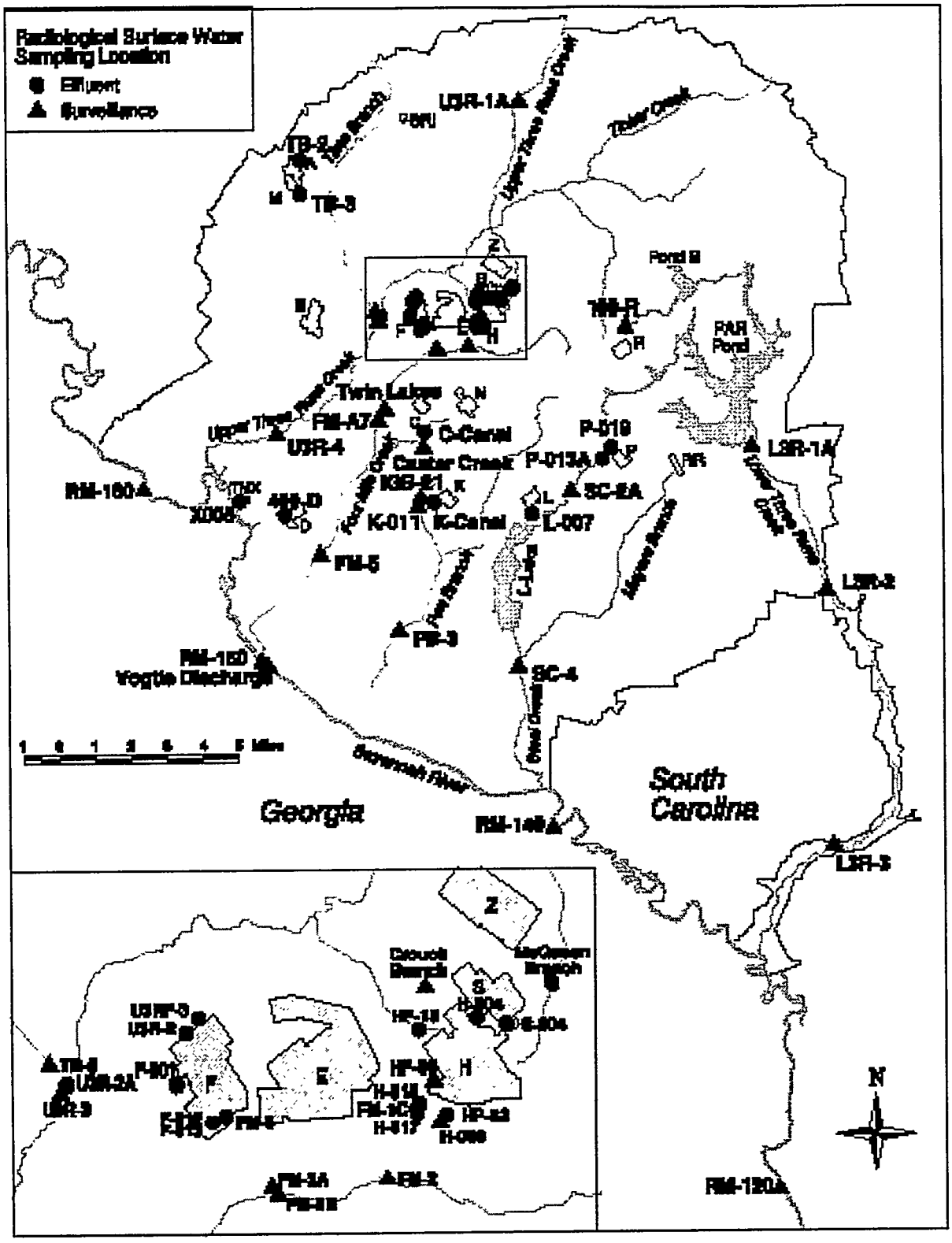

Figure 3-1 Radiological Surface Water Surveillance Sampling Locations

Continuous radiological surveillance is also conducted at five points along the Savannah River. Biweekly composites are analyzed for tritium, cobalt-60, cesium-137, gross beta, and gross alpha at River Miles (RM) 120, 140, 150, 160 (upstream of SRS), and at the discharge from Plant Vogtle. Additionally, an annual analysis for plutonium-238, plutonium-239, and strontium-89,90 is also performed. The RM 160 location is used as the Savannah River control location.

3.1.3 Reporting Requirements

The reporting requirements cited in Section 2.1.3 apply to the radiological surveillance program as well. Notifications of exceedances, the annual Environmental Report, and the EPA monthly and annual radioactive release reports include information from the surveillance program.

3.1.4 Provisions for Non-Routine or Emergency Conditions

DOE Order 5400.1 and DOE/EH-0173T both specifically require the "detection and quantification of unplanned releases to the environment." The radiological surface water surveillance network is designed to comply with this requirement by providing control locations and the appropriate sampling methods and analyses.

3.2 Non-Radiological Environmental Surveillance Program

3.2.1 Program Description

3.2.1.1 Program Requirements

The SRS non-radiological surface water surveillance program involves the sampling and analysis of six on-site streams and the Savannah River (Ref. 7). These activities are conducted to determine if any degradation is occurring that could be attributed to discharges from SRS facilities. Surveillance locations are sampled monthly or quarterly using a grab-sampling technique and analyzed for various chemical and water quality parameters.

3.2.1.2 Organizational Responsibilities

EMS performs the sample collection and analytical activities for the site non-radiological surface water surveillance program according to the WSRC 3Q Manual series, a set of site-level procedures. Individual operating departments may conduct their own surveillance programs for process control purposes. These programs are governed by department-level procedures.

3.2.2 Surveillance Locations

Surface water samples are collected for the non-radiological surveillance program from 11 on-site stream locations and five Savannah River locations. The surveillance locations are given in the following list. Figure 3-2 shows the locations with respect to the site (Ref. 7).

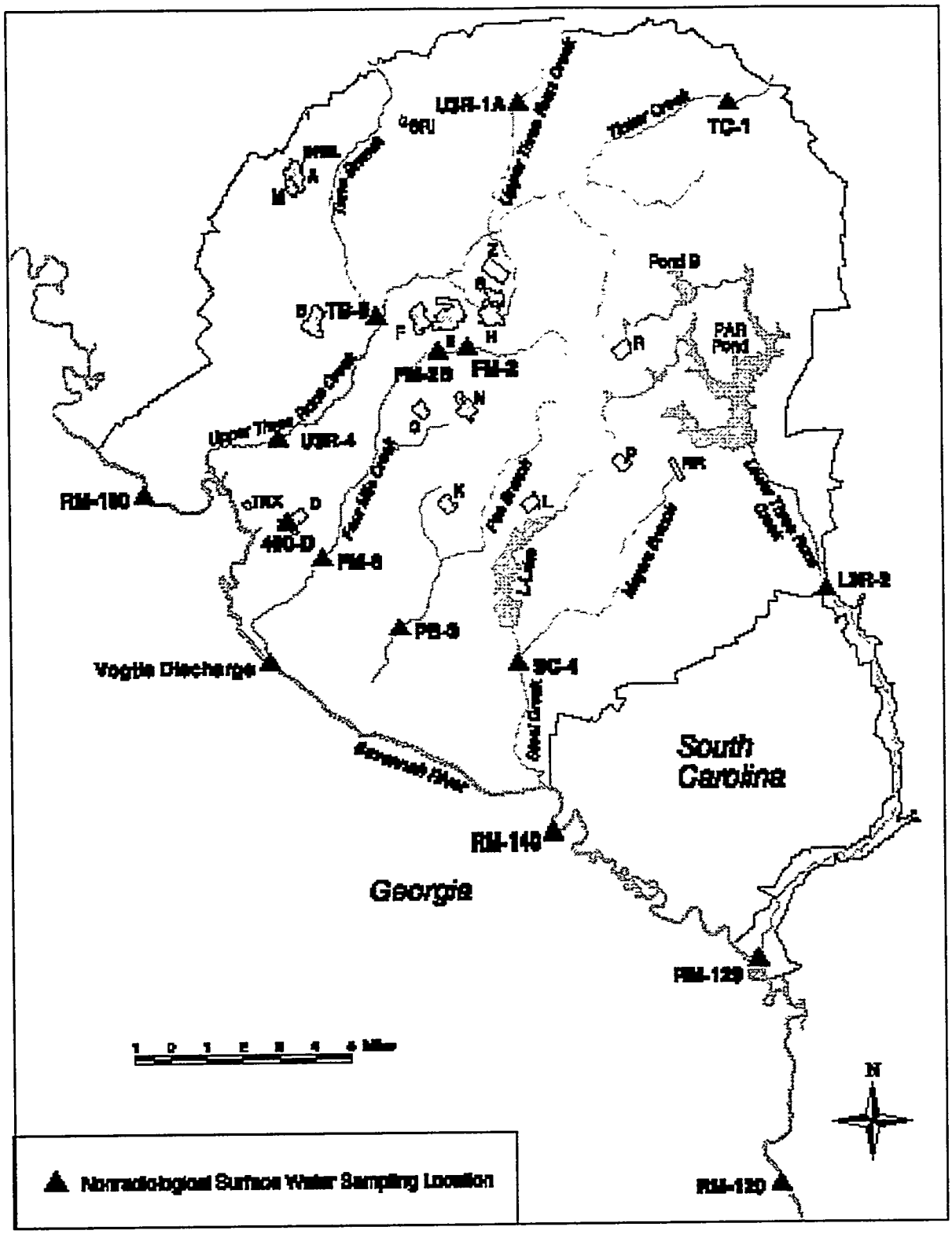

Figure 3-2 Non-Radiological Surface Water Surveillance Sampling Locations

Site Stream Surveillance Locations

- Beaver Dam Creek (400-D)
- Four Mile Creek-2
- Four Mile Creek-2B
- Four Mile Creek-6
- Lower Three Runs-2
- Pen Branch-3
- Steel Creek-4 at Road A
- Tims Branch-5
- Tinker Creek-1
- Upper Three Runs-1A
- Upper Three Runs-4 at Road A

Savannah River Surveillance Locations

- RM-120 (R-10; Below SRS)
- RM-129
- RM-140 (R-8A)
- Vogtle (R-3B; Below Vogtle Electric Generating Plant)
- RM-160 (R-2; Above SRS)

Each location is sampled monthly and analyzed for temperature, pH, dissolved oxygen, conductivity, total suspended solids, nitrates, phosphate, total organic carbon, and metals. Quarterly, additional samples are collected from each location and analyzed for pesticides and herbicides.

3.2.3 Reporting Requirements

The reporting requirements cited in Section 2.1.3 apply to the non-radiological surveillance program as well. Notifications of exceedances and the annual Environmental Report include information from the surveillance program.

3.2.4 Provisions for Non-routine or Emergency Conditions

Since most of the non-radiological surface water surveillance locations are sampled on a weekly or monthly basis, it is unlikely that this program would be used to detect or quantify non-routine or unusual conditions. Data from this program could, however, be used as a baseline for comparison with monitoring conducted during non-routine or emergency conditions.

4.0 BIOLOGICAL SURVEILLANCE AND TESTING PROGRAMS

4.1 Biological Surveillance Program

4.1.1 Program Description

4.1.1.1 Program History and Requirements

The SRS biological surveillance program is used to identify and quantify what, if any, effects routine and non-routine operations have on aquatic and terrestrial food products and animals. As this report pertains to waterborne release monitoring, it will address only the aquatic biological surveillance activities, which includes freshwater and marine fish and shellfish.

The first survey of aquatic life at SRS was conducted June 1951 through May 1952 by the Academy of Natural Sciences of Philadelphia (ANS) (Ref. 9). The purpose of this early study was to "establish an objective measure of the aquatic life of the river between Mile 134-175 and of Upper Three Runs so that any significant effect of the industrial or sanitary wastes could be determined in the future." Concurrent with this study, E. I. DuPont conducted a program to determine the natural radioactive contents of the SRS environs, including fish in the streams. This overall environmental study began at the same time as the ANS study and concluded in January 1953. Since these studies from the 1950's, the ANS has continued to conduct biological monitoring of the aquatic community at SRS. Current areas of study require that they collect specimens of algae and aquatic macrophytes, non-insect macroinvertabrates, aquatic insects, and fish.

Although the ANS study is administered through EMS, the data from that study are not part of the biological surveillance program conducted by EMS personnel. The EMS fish surveillance program is a joint development between WSRC and the Georgia Department of Natural Resources (GDNR) and was formalized in a Memorandum of Agreement (MOA) between these two organizations.

Both the freshwater and marine fish are grouped into three categories, as shown in Table 4.1. These categories were selected because, according to a survey by the Fisheries Management Section of the GDNR, these are the most popular species among Savannah River fishermen (Ref. 7).

Table 4.1 Categories of Fish in Biological Surveillance Program

Origin	Categories	Examples
Freshwater	Bass	Largemouth Bass
	Panfish	Bream, Crappie
	Catfish	Catfish
Marine	Predatory	Sea trout, Spottail bass
	Filter Feeders	Mullet
	Bottom Dwellers	Catfish, Flounder

4.1.1.2 Operational Responsibilities

EMS personnel are responsible for all fish collection and analysis, as well as data reporting. All collection equipment, including boats, shocker units, etc., are also the responsibility of EMS.

4.1.2 Biological Surveillance Locations

A total of 18 locations serve as the collection points for the biological surveillance program (Ref. 7). The nine on-site locations are as follows (see Figure 4-1):

- PAR Pond
- L-Lake
- Pond B
- Lower Three Runs Creek
- Upper Three Runs Creek
- Beaver Dam Creek
- Pen Branch
- Steel Creek
- Four Mile Creek

The nine surveillance points that are located on the Savannah River are at the following locations (see Figure 4-2):

- The Augusta Lock and Dam area, above the site (this serves as the control location)
- Five areas where SRS streams enter the Savannah River (Beaver Dam Creek, Four Mile Creek, Lower Three Runs Creek, Steel Creek, and Upper Three Runs Creek)
- The U. S. Highway 301 bridge area, below the site
- Stokes Bluff Landing, below the site
- The U. S. Highway 17A bridge area, below the site

Fifteen fish from each category are collected at each location and composited, for a total of three composite samples per type per location. Each sample is then separated into edible and non-edible portions. Table 4.2 shows the analyses that are performed on the different portions of freshwater fish (Ref. 7).

The edible portions of marine fish, which are collected at the Highway 17A bridge, are analyzed for gross alpha, gross beta, gamma (which includes cobalt-60, cesium-137) and mercury. Marine invertebrates, oysters and crabs collected on the coast near Savannah are analyzed for strontium-89,90; gross alpha; gross beta; and gamma.

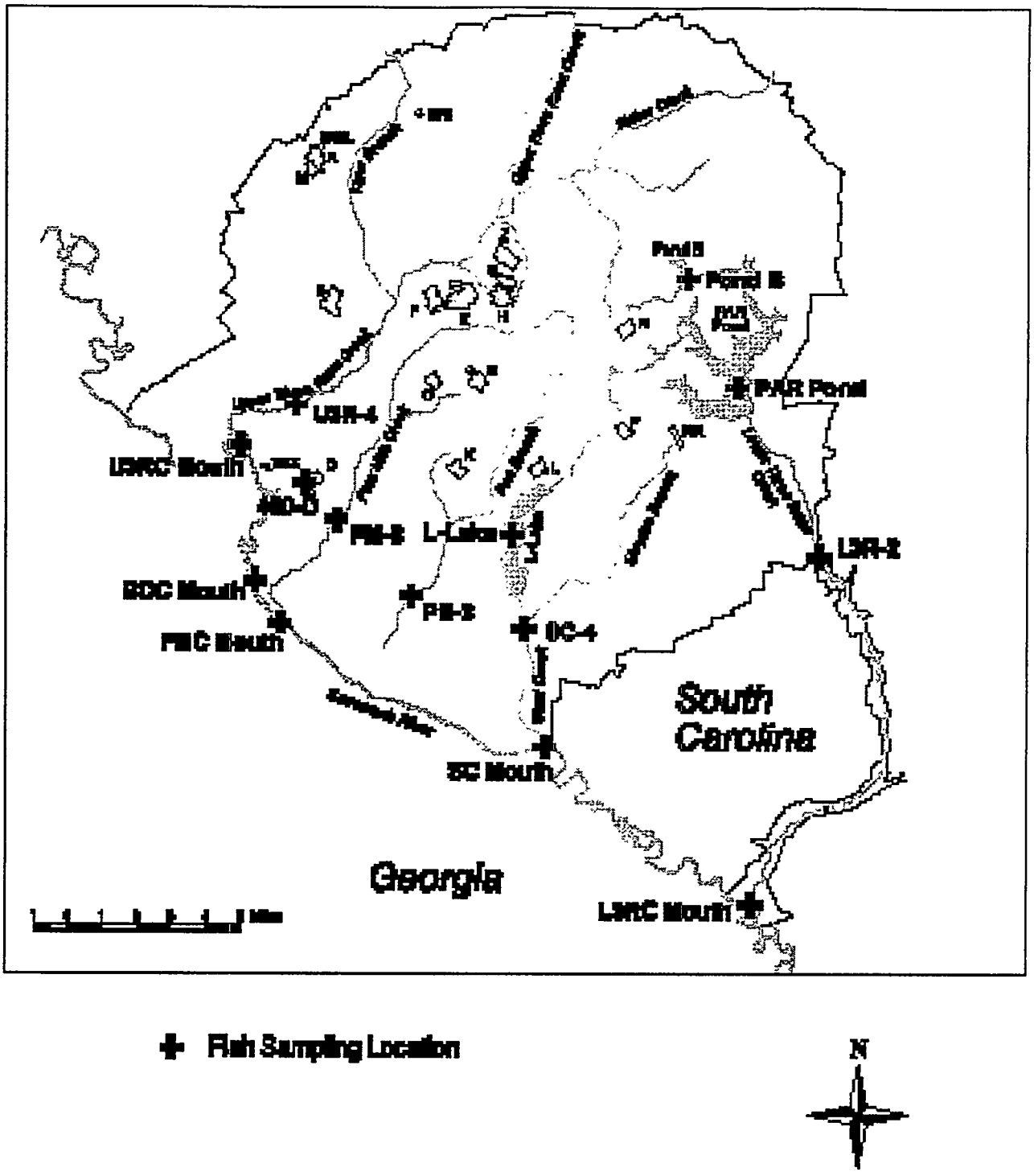

Figure 4-1 On-Site Fish Surveillance Program Sampling Locations

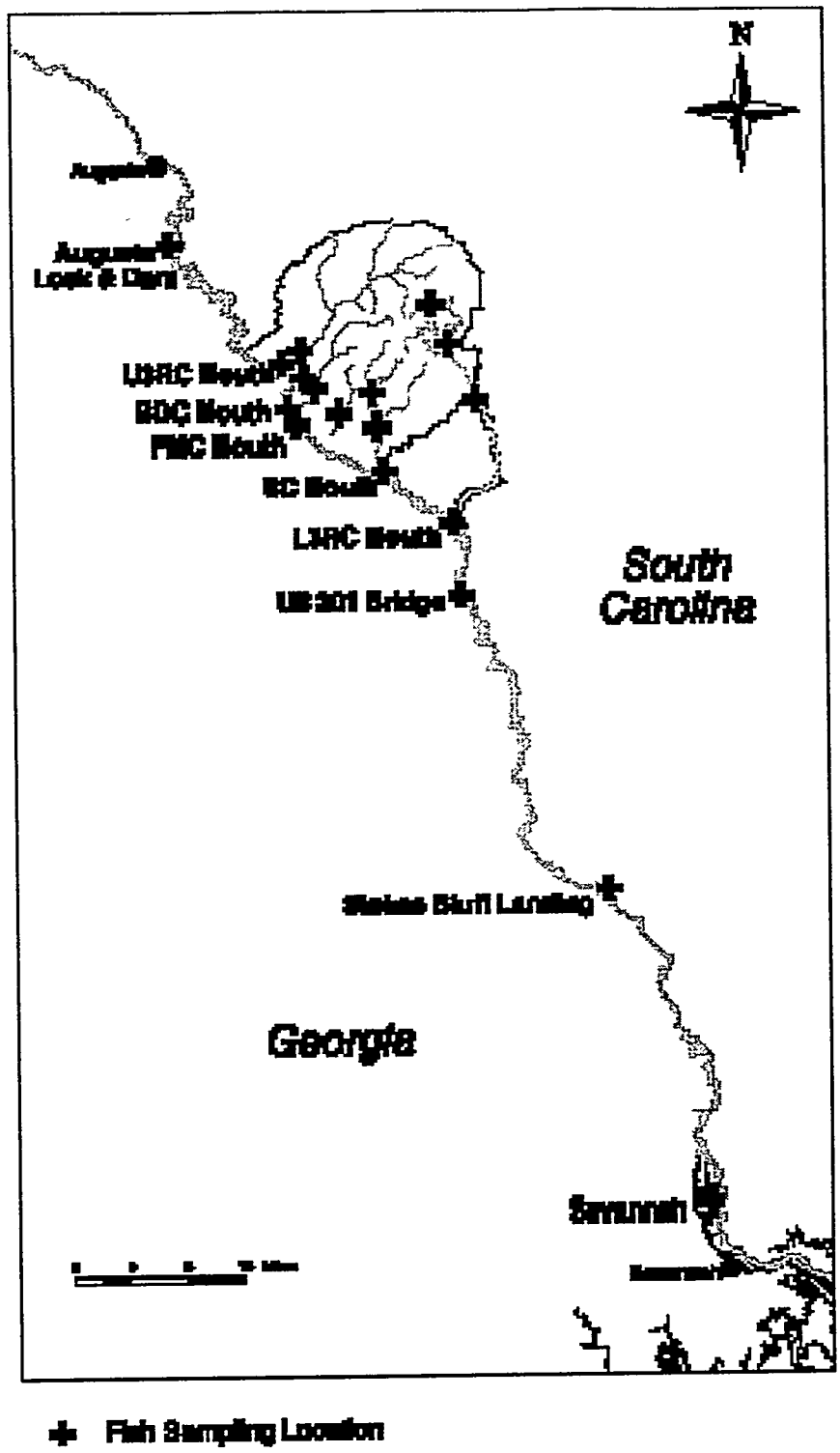

Figure 4-1 Off-Site Fish Surveillance Program Sampling Locations

Table 4.2 Biological Monitoring Parameters

	Gross Alpha	Gross Beta	Gamma Scan	Tritium	Sr-89,90	Pu-238	Pu-239	Mercury
Augusta Lock & Dam	E,N	E,N	E,N	E	E,N	E	E	E
Beaver Dam Creek Mouth	E,N	E,N	E,N	E	E,N	E	E	E
Four Mile Creek Mouth	E,N	E,N	E,N	E	E,N	E	E	E
Hwy. 301 Bridge	E,N	E,N	E,N	E	E,N	E	E	E
Lower Three Runs Mouth	E,N	E,N	E,N	E	E,N	E	E	E
Steel Creek Mouth	E,N	E,N	E,N	E	E,N	E	E	E
Upper Three Runs Mouth	E,N	E,N	E,N	E	E,N	E	E	E
Hwy 17A Bridge	E	E	E	--	--	--	--	E
Stokes Bluff Landing	E	E	E	--	--	--	--	E
Beaver Dam Creek	E	E	E	--	--	--	--	E
Four Mile Creek	E	E	E	--	--	--	--	E
L-Lake	E	E	E	-	--	--	--	E
Lower Three Runs Creek-2	E	E	E	--	--	--	--	E
PAR Pond	E	E	E	--	--	--	--	E
Pen Branch	E	E	E	--	--	--	--	E
Pond B	E	E	E	--	--	--	--	E
Steel Creek-4	E	E	E	--	--	--	--	E
Upper Three Runs Creek-4	E	E	E	--	--	--	--	E

E = Edible portions analyzed for parameters indicated
N = Non-edible portions analyzed for parameters indicated
-- = Not analyzed for the parameter

4.1.3 Reporting Requirements

The reporting requirements cited in Section 2.1.3 apply to the biological surveillance program as well. The annual Environmental Report includes information from the surveillance program.

4.1.4 Provisions for Non-routine or Emergency Conditions

The biological surveillance program does not contain procedural program modifications that must occur in the event of an unusual or emergency event to assist in the quantification of a release. Instead, each event is considered on a case-by-case basis. Sampling and analysis parameters are then adjusted based on technical judgment, management concerns, and interactions with regulatory agencies.

4.2 Biological Testing Programs

4.2.1 Program Description

As part of the site's NPDES permit, chronic and/or acute toxicity testing are required at several outfalls as a means of measuring and controlling chemical discharges that are toxic to aquatic life. For the chronic testing, a 7-day test is conducted to determine the survival and/or reproductive capabilities of the test organism *Ceriodaphnia dubia* in the effluent water. Varying concentrations of effluent water are used for conducting the test, depending on the receiving stream dilution factor. A control test is conducted simultaneously to validate the results of the test. The static test uses the same test organism and a control test, but its duration is only 48 hours. SRS has requested SCDHEC approval to modify the toxicity testing protocol for the site to use a test organism that is indigenous to SRS waters.

4.2.2 Biological Testing Locations

Six NPDES outfalls have toxicity testing requirements, as shown in Table 4.3 (Ref. 6).

Table 4.3 Outfalls with Toxicity Testing Requirements

Outfall	Discharge Description
A-01	Non-contact cooling water, steam condensate, lab waste, cooling tower overflow, well flush water, steam cleaning rack wastewater, groundwater air stripper effluent from Outfall A-1A, and storm water.
A-11	Air stripper effluent from Outfall M-05, LETF process effluent from Outfall M-04, fire station building drains, air conditioner condensate, non-contact cooling water, steam condensate, well flush water, and A and M Area stormwater.
F-01	Non-process cooling water, cooling tower blowdown, and stormwater.
G-10	Central Sanitary Wastewater Treatment Facility
X-08	Non-contact cooling water, domestic well overflow water, treated sanitary wastewater from Outfall X-08A, treated process water from Outfall X-8B, treated groundwater from Outfall X-8C, and stormwater
X-19	Treated groundwater

4.2.3 Reporting Requirements

The results of the toxicity testing are submitted to SCDHEC with the DMRs that are described in Section 2.2.3. Any toxicity test that fails the criteria set forth in the NPDES permit must follow the requirements for identifying and eliminating the toxic discharge(s) (Ref. 6).

4.2.4 Provisions for Non-routine or Emergency Conditions

Although the toxicity testing program is not designed to detect or quantify non-routine releases, the results of the tests can indicate if even extremely small quantities of a toxic pollutant was present at the time of testing. Therefore, the results can be used to determine if an unplanned release occurred. If so, an investigation can then be initiated. The results of this investigation can be used in the identification and elimination of toxics discussed in Section 4.2.3.

5.0 SRS FIELD SAMPLING CAPABILITIES

5.1 Environmental Protection Department

EPD provides the majority of the stream sampling equipment and trained personnel for the SRS stream and river sampling programs discussed in Section 2. Sampling equipment consists of composite sampling instruments (i.e., ISCOs), coolers, collection containers, preservative chemicals, etc. The field sampling personnel are properly trained in EPA sampling protocol and in the operation and maintenance of the composite samplers.

5.2 Safety and Health Operations Department

The S&HO Department plays a major role in the SRS effluent monitoring and environmental surveillance programs. S&HO personnel collect and screen liquid samples from radiologically controlled areas and maintain monitoring equipment at some liquid effluent discharge points. For liquid samples being sent to a subcontractor laboratory, S&HO personnel screen the samples to ensure proper documentation for transporting over public roads.

5.3 Other On-site Organizations

5.3.1 Savannah River Technology Center

The Savannah River Technology Center (SRTC) performs stream and river sampling in the event of an emergency that involves a liquid release. The Environmental Transport Section uses a contaminant fate and transport model known as STREAM with the Water Quality Analysis Simulation Program (WASP5) calculation module. It can be used to model surface waters in one, two, or three dimensions. WASP5 uses a finite difference method to solve the advective transport equation (Ref. 14). The WASP5 code used at SRS has been customized for the site using information obtained from dye studies on various streams. Also, it is calibrated for certain stream segments on site. When used in an emergency condition, either USGS flow data or default flow rates (average flow rates for a stream segment for a particular time of year) are used.

SRTC also runs a mobile laboratory that is normally used for air sampling but can be used for liquid release quantification during an emergency. The equipment in this mobile lab can detect very low concentrations of chemicals and radionuclides. Turn-around time on some analytical results is as little as 10 minutes. This vehicle is discussed more in Section 6.2.

5.3.2 Spent Fuel Storage Division

The Tritium Effluent Water Monitor (TEWM) Systems once used by the Spent Fuel Storage Division (SFSD) to monitor K and L Reactor discharges have been taken out of service with the shut-down of these two facilities. Manual sampling of the process sewer discharge continues in these areas. Grab samples are collected once per shift at the K-Area discharge point and once per day at the L-Area discharge. The SFSD conducts alpha and beta-gamma counts on these samples and sends them to another onsite laboratory for tritium analysis.

In D-Area, the Heavy Water Facility uses a TEWM system to detect tritium discharges. Additionally, a composite sample is collected at the TEWM and analyzed for tritium at least once per shift.

5.3.3 Water Services Department

The Water Services Department (WSD) operates the Central Sanitary Wastewater Treatment Facility (CWSTF), which receives sanitary wastewater from A, B, C, Central Shops, F, H, and S Areas, and package sanitary wastewater plants in P, K, L, D, and TNX Areas. Operators run process control tests and sample the effluent from these facilities. They do not conduct any stream sampling.

WSD laboratory technicians perform the analyses shown in Table 5.1. As indicated, they are SCDHEC certified to perform certain parameters. This certification indicates that a series of QA/QC tests and blind analyses have been successfully completed and the data are acceptable for NPDES reporting. Those parameters limited by the NPDES permit that WSD is not certified to analyze are sent to a subcontracted laboratory.

Table 5.1 WSD Laboratory Analyses

Parameter	Permit Limit?	SCDHEC Certified?
Biochemical Oxygen Demand	Yes	Yes
Total Suspended Solids	Yes	Yes
pH (liquid)	Yes	Yes
pH (solid)	Yes	Yes
Dissolved Oxygen	Yes	Yes
Temperature	No	Yes
Fecal Coliform	Yes	Yes
Alkalinity	No	No
Total Solids	No	No
Volatile Solids	No	No
Ammonia as N	Yes	No
Sludge Volume Index	No	No
Zone Settling Rate	No	No

Due to the constantly changing composition of the discharges reaching the wastewater treatment plants, it is difficult to proceduralize how to deal with unplanned releases. There are, however, operational measures that are taken to detect and mitigate unplanned releases of toxic substances. For example, each treatment plant has an equalization basin that can be used to store wastewater containing hazardous or toxic substances in the event of an unplanned release. The CSWTF equalization basin is divided into two sections that can be isolated, if necessary, to keep harmful influent from reaching the biological organisms in the treatment portion of the facility. Also,

many radiological and hazardous constituents are adsorbed onto the solids, or sludge, from the system. If an unplanned discharge was inadvertently processed through the system, the sludge can be stored for an extensive period of time at the CSWTF sludge storage area until a suitable disposal option is determined. Normally, sludge is tested for metals, nutrients, and pathogens before being applied to a permitted land application site according to permit ND0072125.

6.0 ON-SITE ANALYTICAL CAPABILITIES

There are several laboratories at SRS that provide analysis of water samples for various chemical and radiological constituents. Each laboratory has its own quality assurance/quality control (QA/QC) program, detection limits, turn-around times, and operating procedures.

6.1 Environmental Monitoring Section Laboratories

The EMS laboratories are used for the routine analyses of the environmental monitoring and surveillance programs at SRS. Personnel in EMS laboratories conduct both radiological and non-radiological analyses of environmental samples, including air, water, fish, and vegetation. Routine radiological analyses detect radionuclides such as (Ref. 8):

- Tritium
- Cesium-137
- Uranium-234
- Uranium-235
- Uranium-238
- Plutonium-238
- Plutonium-239
- Strontium-89/90
- Gross Beta
- Gross Alpha

The EMS non-radiological laboratory is certified by SCDHEC for the following parameters (Ref. 7):

- Alkalinity
- Chemical Oxygen Demand
- Chloride
- pH
- Nitrite Nitrogen
- Nitrate Nitrogen
- Orthophosphate Phosphorous
- Sulfate
- Total Suspended Solids
- Total Dissolved Solids
- Specific Conductance

and is in the process of obtaining certification for inorganics, volatile organic compounds (VOCs), and metals. Additionally, field personnel are certified to perform some routine NPDES analyses.

Routinely conducted analyses, in addition to those listed above for which EMS is certified, are as follows (Ref. 8):

Metals

- Aluminum
- Arsenic
- Barium
- Cadmium
- Chromium
- Copper
- Iron
- Lead
- Magnesium
- Manganese
- Mercury
- Nickel
- Selenium
- Silver
- Uranium
- Zinc
- Other metals in Target Analyte List

VOCs

- Acetone
- Benzene
- Carbon tetrachloride
- Chloroform
- Dibromomethane
- Dichloromethane
- Tetrachloroethane
- Trichloroethane
- Trichloroethene
- Tetrachloroethylene
- Toluene
- Xylene
- Other Target Analyte List VOCs

EMS laboratories also conduct analyses of environmental media under emergency conditions, as described in Reference 10. Most of these analyses are for radiological parameters. To ensure the laboratory instruments are not cross-contaminated, the samples being submitted to EMS for analysis must be accompanied by a form that details the number of samples, the matrix (water, soil, etc.), the approximate activities (obtained from H&SO screening), the nuclides of interest, and the required measurement sensitivity. Liquid samples exceeding the following limits must receive written authorization from EMS management before they can be accepted for analysis:

- Tritium 0.1 μCi/ml
- Alpha 5.0 pCi/ml
- Beta 10.0 pCi/ml
- Gamma 10.0 pCi/ml

Table 6.1 is a list of radiological analyses and the turnaround times that could be expected under both routine and emergency conditions. Sample turnaround times are dependent on both the analysis being performed and the required sensitivity. A greater sensitivity will result in a longer turnaround time due to longer processing time. The number of samples being processed at a time can also affect routine turnaround times. Therefore, times are expressed as a range in the table.

Table 6.1 Turnaround Times for Radiological Parameters

Parameter	Routine Turnaround	Emergency Turnaround
Gross Alpha/Beta	2-5 days	1 day
Alpha Spectrometry • Uranium isotopes • Plutonium isotopes • Americium isotopes • Curium isotopes	3-10 days	2 days
Gamma Spectrometry • Beryllium isotopes • Potassium isotopes • Cobalt isotopes • Ruthenium isotopes • Iodine isotopes • Cesium isotopes • Cerium isotopes	1-3 days	12-24 hours
Tritium	1-3 days	12-24 hours
Total Strontium	3-7 days	1 ½-2 days

Shown in Table 6.2 are the detection limits for radiological parameters (Ref. 10). Detection limits for river water samples are considerably lower due to the need to quantify much lower concentrations from these samples. As stated previously, the lower detection limits require longer turnaround times.

Table 6.2 Detection Limits for Radiological Parameters

Parameter	Stream Samples (pCi/l)	River Samples (pCi/L)
Tritium	1.20E+03	4.40E+02
Beryllium-7	4.70E+01	1.10E+01
Potassium-40	1.30E+01	2.50E+01
Cobalt-58	7.40E+00	1.20E+00
Cobalt-60	9.10E+00	1.90E+00
Ruthenium-103	6.70E+00	1.30E+00
Ruthenium-106	5.90E+01	1.10E+01
Iodine-131	1.60E+01	2.30E+00
Cesium-134	5.80E+00	1.30E+00
Cesium-137	7.10E+00	1.40E+00
Cerium-141	8.50E+00	1.50E+00
Cerium-144	2.90E+01	5.90E+00
Strontium-89,90	1.40E+00	1.40E+00
Uranium-234	2.80E-02	---
Uranium-235	1.00E-02	---
Uranium-238	4.60E-02	---
Plutonium-238	7.70E-03	2.00E-02
Plutonium-239	8.00E-03	2.10E-02
Americium-241	7.90E-03	---
Curium-244	7.80E-03	---
Gross Alpha	8.00E-01	8.00E-01
Gross Beta	1.40E+00	1.40E+00

6.2 Savannah River Technology Center

SRTC provides analytical capabilities for emergency releases, both liquid and airborne, at SRS. SRTC and EMS coordinate work loads during emergency situations, and the two laboratories have different specialties. While EMS is more prepared for large numbers of routine analyses, SRTC is more suited to specialty analyses at very high sensitivity. Since SRTC personnel are involved primarily in research and development activities, they have developed a variety of hardware and instrumentation for specific detection needs. Laboratory instruments are state-of-the-art and chiefly employ mass spectrometric and radiometric techniques. Additionally, the following analytical methods are also available:

- Particle and surface analysis
- Noble gas mass spectrometry

- Ultra high resolution (Fourier Transform) mass spectrometry
- Plasma mass spectrometry
- Organic analysis by gas chromatography and infrared spectrometry

In addition to the fixed laboratory, SRTC operates a mobile laboratory known as the TRAC (Tracking Radioactive Atmospheric Contaminants) vehicle. Despite its name, it is highly effective in monitoring and analyzing surface water as well as atmospheric releases. The primary purposes of the TRAC vehicle are emergency response, environmental monitoring, in-field analysis, environmental research, and instrument development. The vehicle is equipped with the detectors shown in Table 6.3 to provide real-time data on surface water releases.

Table 6.3 TRAC Capabilities

Detector	Application
High Purity Germanium	Environmental Sample Analysis
Liquid Scintillation	On-location Tritium Analysis
Surface Barrier	TRU in Water

The TRAC laboratory is maintained to SRS quality program requirements for laboratory equipment.

7.0 PROGRAMMATIC UPGRADES

In December 1991, a tritium release at K-Reactor resulted in a release to the environment and considerable criticism from the public. SRS formed the Environmental Release Prevention Taskforce (ERPT) in January 1992 to review potentially significant environmental releases and the systems, procedures, and practices in place to prevent and/or mitigate their severity (Ref. 11). The ERPT was not only to review current policies and practices, but it also recommended corrective actions where necessary. Most of the effort was focused on assessing potentially significant radioactive releases to streams from either surface water outfalls or groundwater outcrops. Next, the ERPT prioritized the recommendations based on the highest potential for release. The ERPT spent two months researching and compiling information about SRS outfalls, particularly those with potential for radioactive release. In doing this, they accomplished the following:

- collected information on all SRS liquid effluent release points, including 201 outfalls and approximately 400 component streams
- identified 10 facilities/operations with the highest potential for accidental liquid radionuclide release
- observed monitoring and/or sampling practices to ensure procedures were adequate to monitor and control discharges
- reviewed previous accidental radioactive liquid release occurrences to determine if corrective actions had been taken and if they were adequate
- documented monitoring and/or sampling equipment, procedures, and practices for each release point

From these activities, the ERPT made 56 recommendations for improving the prevention and control of radioactive liquid releases from SRS facilities. Based on these recommendations and input from management, 111 action items were developed as part of the Environmental Release Prevention and Control Plan (ERP&CP) (Ref. 12). These action items were actively pursued and tracked. In October 1994, WSRC notified DOE of four action items that had not been completed and explained the status of each. Then, in January 1998, DOE requested updates on the ERP&CP's open action items. All but one item has been closed. The remaining open item is being tracked by the responsible SRS organization, with closure expected in FY99 (Ref 13).

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13. F. B. Williams to T. F. Heenan, *Followup to Release Prevention Controls*, May 13, 1998.

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DEFINITIONS

Active monitoring	- continuous online monitoring equipment from which real-time quantification of contaminant releases can be obtained.
Best Available Technology (BAT)	- the preferred technology for a particular activity; it is selected from among others after taking into account factors related to technology, economics, public policy, and other parameters. The BAT is not a specific level of treatment, but is the conclusion of a selection process that includes several alternatives.
Composite sample	- a sample that is comprised of the blending of more than one portion to make a sample for analysis
Continuous effluent monitoring	- 1) characterization of the contaminant of concern by continuous sampling followed by laboratory analysis or 2) measurement by an online detector. A continuous sample can periodically collect an aliquot of the effluent stream.
Control locations	- sampling locations assumed to contain no significant amount of the analyte of interest, but whose measurements are compared with those of other test sites to determine to what extent that analyte is present.
Critical pathway	- the specific route of transfer of contaminants from one environmental component to another that results in the greatest fraction of an applicable dose limit to a population group or to an individual's whole body, organ, or tissue.
Derived Concentration Guide (DCG)	- the concentration of a radionuclide in water that, under conditions of continuous exposure for one year by one exposure mode (i.e., ingestion) would result in an effective dose equivalent (EDE) of 100 mrem (0.1 rem) to a reference human. DCGs do not consider decay products when a parent radionuclide is the cause of the exposure.
Effective Dose Equivalent (EDE)	- the sum of the dose equivalents received by all organs or tissues of the body after each one has been multiplied by an appropriate weighting factor. The EDE includes the committed dose equivalent from internal deposition of radionuclides and the dose equivalent attributable to sources external to the body.
Effluent monitoring	- continuous online measurement of liquid effluents (active monitoring) and the collection and analysis of samples from those effluents (passive monitoring) for the purpose of characterizing and quantifying contaminants in a process stream, assessing radiation exposures of members of the public, and demonstrating compliance with applicable standards.
Environmental medium	- a discrete portion of the total environment, animate or inanimate, that may be sampled or measured directly.
Environmental monitoring	-data collection that involves two major activities (effluent monitoring and environmental surveillance) with the dual purpose of 1) showing compliance with federal, state, local regulations and DOE orders and 2) monitoring any effects of site operations on onsite and offsite natural resources on human health.
Environmental surveillance	- the collection and analysis of samples from environmental media and the measurement of external radiation to demonstrate compliance with applicable standards and to assess the effects, if any, on the site and surrounding environs.
Macroinvertebrates	- size-based classification used for a variety of insects and other small invertebrates; as defined by the EPA, those organisms that are retained by a No. 30 (590 micron) U. S. Standard Sieve.
Macrophyte	- a plant that can be observed with the naked eye.
NPDES	- the National Pollutant Discharge Elimination System (NPDES) is a regulatory

	program for permitting liquid releases from facilities.
Offline measurement	- a sample collected and transported to a laboratory for analysis.
Online measurement	- a measurement made directly in real time.
Passive monitoring	- continuous online sampling equipment from which samples must be collected than analyzed before quantification of release can be determined. A proportional-flow liquid sampler is an example of passive monitoring equipment.
Representative sample	- a sample taken to depict the characteristics of a lot or population as accurately and precisely as possible. It may be a random or stratified sample, depending on the objective of the sampling.
Sampler	- a device used to collect samples from an effluent stream. It can deliver a sample to an online detector or preserve the sample for later laboratory analysis, such as refrigeration for certain chemical parameters.
Turnaround time	- the time required to receive analytical data from a laboratory. This is typically measured beginning at time the sample is received at the laboratory, not the time the sample is collected.

APPENDIX A

SAVANNAH RIVER SITE

LIQUID RELEASE PATHWAYS

INTRODUCTION

Savannah River Site (SRS) facilities have many processes that result in liquid waste discharges. Under normal operating conditions, these liquid discharges are controlled and/or treated to prevent or minimize adverse chemical or radiological impacts to the receiving streams and, ultimately, the Savannah River. However, under unusual or emergency circumstances, a liquid release could potentially reach the Savannah River, affecting river water users downstream of the site.

To determine at which facilities a release that impacts the river could occur, the following information was evaluated:

- the flow pathways for both process wastewater and storm water
- facilities associated with the various processes
- the proximity of receiving streams to the Savannah River

From this evaluation, it was determined which liquid release pathways should be evaluated using various hydrological modeling programs. The modeling data can then be used for emergency preparedness planning. The results of the evaluation are presented in the Conclusions section of this document.

As the site mission has shifted from the production of nuclear materials for defense purposes to environmental remediation, many production facilities have been or are being shut down. Consequently, the associated liquid discharges have been dramatically reduced or are non-existent. The reactors and the majority of the powerhouses are the most notable examples of facility shutdowns.

DISCUSSION

The flow pathways for process and storm water discharges at SRS are shown in *Savannah River Site Area Drainage Systems* maps, issued 12/1/93. Due to construction activities, site mission changes, and facility shutdowns, some of these maps no longer accurately indicate the actual flow path of liquid releases. However, used in conjunction with the SRS National Pollutant Discharge Elimination System (NPDES) Permit and a basic knowledge of recent SRS operating history, the maps were used to recommend which discharges should be considered for hydrological modeling.

Table 1 lists outfalls at SRS that are permitted as process or stormwater discharges and the facilities that comprise the majority of the effluent to these outfalls. This information is based on the previously mentioned 1993 drainage system maps. Prior to pursuing hydrological modeling on the selected outfalls, source verification will be required.

Table 1 SRS Outfalls and Their Major Sources

Outfall	Major Sources	Building Number
A-01	Waste Loading Station	776-6A
	Tech. Transfer Lab	779-A
A-1A	Air Stripper	--
A-3 *	Hypochlorite Feed Bldg.	780-2A
	Cooling Tower	785-A
	Refrigeration Bldg.	789-A
A-05 *	Stores	713-A & 3A
	E&I Motor Shop	722-4A
	Offices and Labs	723-A
	Environmental Research Lab	737-A
A-11	Fire Station	709-A
	Auto Repair Shop	716-A
	Training School/Lab Bldg.	721-A
A-14	Dilute Effluent Treatment Facility	341-M & 1M
A-25	Main SRTC Technical Bldg.	773-A
D-03	Water treatment	---
	Distillation Columns	---
D-06	Powerhouse	484-D
E-01 *	Mixed Waste Storage Bldgs.	643-29E & 43E
	Experimental TRU Acceptance Facility	724-8E
	TRU Pads	---
	Waste Storage Pads	---
	Engineered Low Level Trenches	---
E-02 *	TRU Pads	---
	Engineered Low Level Trenches	---
F-01	F-Canyon	221-F
	Control Lab	772-F
F-02	F-Canyon Auxiliary	221-F
	Special Recovery	221-F
	Pu Storage	221-F
	Laboratory	772-F
	Production Control Facility	772-1F
F-03	Metallurgical Bldg.	235-F
	Equipment Development Facility	246-F
F-05	Metallurgical Bldg.	235-F
F-08	Contaminated Storage (external)	080-2F
	Chemical Feed Bldg.	280-1F
	Area Shops	717-F
	Process Control Lab	772-F
G-10	A, B, C, CS, F, H, and S Sanitary Wastewater	CSWTF
F-9	Delaying Basins inflow	--
F-12 & F-13 *	Stormwater Retention Basins	---
H-02	Manufacturing Bldg.	232-H & 234-H
	Storage and Process Bldg.	237-H
	Reclamation Bldg.	238-H
H-04	Canyon Auxiliaries	211-2H
	Canyon Bldg.	221-H
	Waste Management Maintenance Facility	299-H
	CIF Non-process Wastewater	---
H-06 *	Canyon Stack	291-H
	Canyon Exhaust Fanhouse	292-H
	Canyon Exhaust Filters	294-H
	Additional Canyon Sand Filter	294-1H
H-07	Jumper Storage Pad	080-7H & 8H
	A-Line	221-1H
	Cooling Tower Blowdown	241-49H
H7A *	Wastewater Tanks	241-75H
	Acid/Caustic Tanks	241-61H
H-08	Waste Management Tank Farm	241-H
	Chemical Feed Bldg.	280-1H
H8A	Ash Basin Overflow	---
H10	Receiving Basin for Offsite Fuel	244-H

* - Denotes stormwater outfall

Table 1 SRS Outfalls and Their Major Sources (continued)

Outfall	Major Sources	Building Number
	Return Water Delaying Basin	281-1H
	Waste Storage Tanks *	241-15H
H12	H-Canyon	221-H
H-12 (cont'd)	Manufacturing Bldgs.	232-H & 234-H
	Cooling Tower	241-13H
	ETF Steam Condensate	241-84H
	Retention Basin	241-103H
	Segregated Water Delaying Basin	281-5H
H-16	F/H Effluent Treatment Facility	---
K-10	K-Reactor	105-K
	Deionizers	---
K-12	Sanitary Wastewater Treatment Plant	607-17K
K-18	K-Reactor	105-K
	Containment Basin	106-K
L-07	L-Reactor	105-L
L-7A	Sanitary Wastewater Treatment Plant	607-16L
L-08	L-Reactor	1-5-L
	Engine House	108-1L & 2L
M-04	Canning Bldg.	313-M
	Alloy Bldg.	320-M
	Manufacturing Bldg.	321-M
	Metallurgical Lab	322-M
	Lab Waste Treatment Facility	340-M
	Dilute Effluent Treatment Facility	341-M
M-05	Groundwater Air Stripper	323-M
P-13	P-Reactor	105-P
	Basin Deionizer	105-1P
	Sanitary Wastewater Treatment Plant	607-7P & 23P
P-19	P-Reactor	105-P
PP-1	Transformer Yard	651-6G
	Par Pond Lab *	735-7G

* - Denotes stormwater outfall

Outfall	Major Sources	Building Number
	Backwash from Greensand Filter	---
S-02	Construction Equipment Washdown	S-7
S-04	DWPF Non-process wastewater	---
	Cooling Tower Blowdown	---
	Neutralization wastewater	---
S-05 *	S-Area Operations	704-S
	Operations Service Bldg.	210-S
	Vitrification Bldg.	221-S
	Chemical Receipt Area	422-S
	Chemical Treatment facility	980-S
	Cooling Tower	981-S
X-04	Pilot Plant Bldg.	677-T
X-08	Effluent Treatment Plant	904-T
	Cooling Tower	675-T
	Water from X-8A (Sanitary)	---
	Water From X-8B (ETP)	---
	Water from X-8C (Groundwater Air Stripper)	---
X-8A	Sanitary Wastewater Treatment Plant	607 37T
X-8B	Floor Drains	670-T
	Tank Farm	671-T
	Glass Melter Bldg.	675-T
	Chemical Semiworks Bldg.	678-T
	Cooling Tower	672-1T
	Analytical lab	772-T
	Organics Removal Facility	607-46T
	Effluent Treatment Plant	904-T
X-09	Mock Waste Tank	678-5T
X-19	Treated groundwater	---

Based on the information in Table 1, several outfalls can be eliminated due to the potential pollutant releases associated with them. For example, the sanitary wastewater treatment plants (SWTPs) receive only non-process, sanitary wastewater. Even in the event of an unplanned release that reached the sanitary sewer in any particular area, all SWTPs are equipped with equalization basins that provide the capability for detaining the wastewater until proper disposal options can be determined. Consequently, sanitary wastewater outfalls (G-10, K-12, L-7A, P-13, X-8A) can be eliminated from further consideration for modeling.

Coal-fired powerhouses at SRS once provided steam to facilities across the site. All powerhouses are now out of service except for those in A- and D-Areas. However, even under emergency conditions, the biggest concerns with powerhouse effluents are suspended solids and thermal discharges, neither of which are emergency preparedness concerns. Consequently, outfalls associated with powerhouses can be eliminated (D-06, H-08A, and K-06).

Operation of the powerhouse and associated outfalls in D-Area was taken over by SCE&G. Consequently, D-Area outfalls are no longer covered under the SRS NPDES permit. However, due to the proximity of D-Area to the Savannah River, D-03 outfall will be modeled for tritium releases.

The outfalls associated with Reactor discharges (K-10, K-18, L-07, L-08, P-13, and P-19) can also be eliminated from modeling by virtue of the reactor shutdowns. Additionally, M-Area operations have also ceased; therefore, associated outfalls (A-14, M-04, and M-05) do not require hydrological modeling.

Several other outfalls receive discharges that are not an emergency preparedness concern. For example, A-03, A-05, A-11, and PP-1 do not receive any hazardous chemicals or radionuclides, either under normal or emergency conditions.

One of the largest recent construction activities at SRS is the Defense Waste Processing Facility (DWPF). Now complete, DWPF has resulted in major changes in both the flow paths and the hazardous material release potential for the area. The 1993 maps are now out-dated, but the actual routes that discharges take should be relatively simple to determine. Also, radiological and chemical inventories for DWPF are well documented, making the materials of concern easily determined as well.

CONCLUSIONS

The greatest concern from an emergency preparedness perspective is outfalls that have a potential for receiving significant amounts of hazardous chemicals and/or radionuclides. Another concern is the probability for the release to reach the Savannah River. Process and stormwater discharges from A, D, E, F, H, S, and TNX Areas are considered further for hydrological modeling. Table 2 shows the outfalls recommended for further modeling of specific accident scenarios and the reasons for the recommendations. These outfalls were selected on the basis of potential contaminants and/or proximity to the Savannah River. Additionally, one outfall from each currently operating area is represented in the list. If the results of the modeling indicate particularly severe consequences from an area, other locations from that area may then be selected for additional modeling.

Table 2. Outfalls Recommended for Potential Hydrological Modeling

Outfall	Reason for Recommending Hydrological Modeling
A-01	This outfall receives discharges from SRTC that, under emergency conditions, could potentially contain both radionuclides and hazardous chemicals.
D-03	This outfall receives discharges from the tritium distillation columns. Also, it is particularly close to the Savannah River.
E-01	This stormwater outfall receives runoff from around several radioactive waste and mixed waste storage areas.
F-08	This outfall receives a wide range of discharges that, under emergency conditions, could potentially contain both radionuclides and hazardous chemicals. Additionally, it has the largest average flowrate of the F-Area outfalls, based on the current NPDES permit.
H-12	This outfall receives a wide range of discharges that, under emergency conditions, could potentially contain both radionuclides and hazardous chemicals. Additionally, it has an average flowrate of greater than 1 million gallons/day, based on the current NPDES permit.
S-05	This stormwater outfall receives runoff from around DWPF operating areas and chemical receipt and treatment areas. Under emergency conditions, it could potentially receive both radionuclides and hazardous chemicals.
X-08	This outfall receives discharges that, under emergency conditions, could potentially contain hazardous chemicals. Additionally, this outfall is the closest of the recommended outfalls to the Savannah River.

- It is recommended that initially, outfalls D-03, H-12, and X-08 be modeled. Table 3 shows the rationale for selecting these outfalls and for dismissing the remaining outfalls.

Table 3 Rationale for Selecting and Dismissing Outfalls

	Outfall	Area / Facility	Comments
Outfalls Selected for Hydrological Modeling	D-03	D Area	• Proximity to river; limited mitigation • Heavy Water facility operational through 10/99; will be consolidated in L Area
	H-12	H Area	• H Canyon wastewater • H-Tank Farm runoff; failure of engineered berms would result in release to H-12
	X-08	TNX	• Closest to Savannah River • Potential chemical discharges
Outfalls Not Selected for Hydrological Modeling	A-01	M & A	• Low flow in Tim's Branch; long transport time to Upper Three Run's • Power house shutdown • M Area de-inventoried • A Area is administrative, no process discharges • Waste water plant shut down • Only minor process discharges from SRTC
	E-01	Burial Ground	• No process discharges • Only issue is liquid release from catastrophic coincident with heavy rains • Normally dry creek bed; middle of site, long transport time as worst case
	S-05	DWPF	• No process discharges • Only issue is liquid release from catastrophic coincident with heavy rains
	F-08	F Area	• Modeling H; no reason to model F • No engineered tank berms in F

Appendix B

Industrial, Commercial, and Recreational Uses

Of the Savannah River

Rev. 0

October 1998

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Acronyms

CWA	Clean Water Act
EPA	*Environmental Protection Agency*
GDNR	Georgia Department of Natural Resources
MGD	million gallons daily
NPDES	National Pollutant Discharge Elimination System
PID	Private and Institutional Development
SCDHEC	South Carolina Department of Health and Environmental Control
SRS	Savannah River Site

1.0 INTRODUCTION

Liquid effluents from Savannah River Site (SRS) processes discharge to site streams and, ultimately, to the Savannah River. If an emergency release of hazardous material (either radiological or chemical) to the site stream system were to occur, knowing what river water uses exist downstream of SRS would be valuable in providing the proper notification to prevent or mitigate consequences to the public and the environment. This report documents the industrial, commercial, and recreational uses of the Savannah River. As such, its purpose is to provide input for a separate expanded study of potential waterborne releases from SRS under emergency conditions.

2.0 INDUSTRIAL USES

2.1 Discharges

The National Pollutant Discharge Elimination System (NPDES) was created under the Clean Water Act (CWA) of 1972 to regulate the amount of pollutants that could be discharged into the country's waters. It is administered in South Carolina by the South Carolina Department of Health and Environmental Control (SCDHEC) and in Georgia by the Georgia Department of Natural Resources (GDNR) under U. S. Environmental Protection Agency (EPA) authority. The program requires permitting for the release of effluents into streams, reservoirs and wetlands with the express purpose of protecting surface waters (Ref. 1).

The discharge limits are facility-specific, as are the effluents that are released. To facilitate presentation, the effluents (parameters) are grouped into five broad categories as shown in Table 1:

Table 1 Parameter Groups

Parameter Group	Examples
1 - Conventional/Non-conventional	pH, Oil & Grease, Nitrogen, Phosphorous
2 - Volatile Organic Compounds	Benzene, Toluene, Xylene, Chloroform
3 - Semi-Volatile Organic Compounds	*Anthracene, Naphthalene, Phenol*
4 - Metals	Lead, Copper, Iron, Mercury, Chromium
5 - Pesticides/PCBs/Dioxins	Aldrin; Aroclor 1254; 2,3,7,8-tetrachlorodibenzo-p-dioxin

Table 2 summarizes the NPDES permitted facilities for South Carolina (Ref. 2) and Georgia (Refs. 3 & 4) that discharge into the Savannah River Basin from SRS to the coast. For the purpose of this report, it was determined that only substances that could potentially be discharged in SRS effluents are identified as specific parameters following the parameter group. Furthermore, facilities holding municipal or private and institutional development (PID) permits are not presented as they are only permitted to release conventional pollutants. Conventional pollutants, while presenting a stream health concern, do not pose an immediate severe threat to the public health under emergency conditions.

Table 2 NPDES Permitted Facilities

County	Facility	Permit No.	Type	Parameters	Receiving Stream
Allendale, SC	Clariant Corp	SC0042803	IND	1, 2 (benzene), 3	Savannah River
Jasper, SC	Amoco Service	SC0044385	IND	1, 2 (benzene) 3, 4 (Chromium, Lead)	Savannah River
Burke, GA	Southern Nuclear Operating	GA0026786		1, 4	Savannah River
Chatham, GA	GAF Materials Corp.	GA0003841	IND	1	Dundee Canal & Savannah River
	Georgia Pacific Corp.	GA0047007	IND	1	Savannah River (Port Wentworth)
	Stone Container Corp.	GA0002798	IND	1, 4, 5	Savannah River
	Engelhard	GA0048330		1	Savannah River
	Hercules	GA0026867	IND	1 (pH)	Dundee
	Atlantic Wood Ind.	GA0047783	IND	1, 3 (phenols)	Savannah River
	E M Industries, Inc.	GA0034355	IND	1, 4 (Chromium)	Savannah River
	Sav. Elec.-Pt. Wentworth STM	GA0003816	IND	1, 4 (Copper, Iron, Mercury), Temperature	Savannah River
	Pooler (SWP)	GAS000209		1	Hardin
	Central of Georgia R/R	GA0002381	IND	1	Ogeechee to Savannah River
	Kemira	GA0003646	IND	1 (pH)	Savannah River
	Georgia-Pacific Gypsum	GA0001961		1	Savannah River
	Union Camp Corp.	GA0001988	IND	1 (pH)	Savannah River
	Tybee Island (SWP)	GAS000212		1, 4 (Chromium)	Savannah River
	Pineforest Port Wentworth	GA0034801		1	Black Creek to Savannah River
	Southern States Phosphate & Fertilizer	GA0002437	IND	1	Kayton Canal to Savannah River
	Savannah Sugar Refinery	GA0003611	IND	1 (pH)	Savannah River
	Savannah Pines	GA0022250		1	Black Creek to Savannah River
	Garden City (SWP)	GAS000208		1, 4 (Zinc)	
	Air Liquide America Corp.	GA0046230		1	Savannah River
	Citgo Asphalt Refining Co.	GA0004332	IND	1, 3(phenolics) ,4 (Chromium^{+6}, Chromium)	Savannah River
	Gulfstream Aerospace Corp.	GA0003255	IND	1	Pipemakers Canal

Table 2 NPDES Permitted Facilities (continued)

County	Facility	Permit No.	Type	Parameters	Receiving Stream
Chatham, GA (continued)	Herty Foundation (Savannah)	GA0002402	IND	1	Ditch to Dundee Canal
	USA Hunter AFB STP	GA0027588		1	Forrest River
	PCS Nitrogen Fertilizer, LP	GA0002356	IND	1, 4 (Chromium, Copper, Zinc)	Savannah River
Effingham, GA	Effingham Elem (South)	GA0046990		1	Un-named tributary to Black Creek
	Savannah Elec-Effingham Steam	GA0003883	IND	1, 4 (Copper, Iron), Temperature	Savannah River
	Fort Howard Corp.	GA0046973	IND	1, 2, 4 (Chromium, Lead, Nickel, Zinc, Cyanide, Mercury), 5 (PCB-1242)	Savannah River
Richmond, GA	PCS Nitrogen Fertilizer, L P	GA0002071		1	Savannah River
	USA Ft. Gordon	GA0003484	IND	1	McCoy Creek Trib/Spirit Creek/Savannah River
	International Paper Company	GA0002801		1, 5(2,3,7,8-Tetrachloro dibenzo-p-dioxin)	Savannah River
	Olin Corporation (Augusta)	GA0003719	IND	1, 4 (Mercury)	Savannah River
	DSM Chemicals Augusta, Inc.	GA0002160	IND	1, 2 (Benzene, others), 3, 4 (Cyanide, Chromium, Copper, Lead, Nickel)	Cason's Lake/Beaver Dam Ditch/Butler Creek
	Albion Kaolin Company	GA0002470	IND	1	Grindstone Branch/Spirit Creek/Johnson Branch
Screven, GA	King Finishing Company	GA0003280		1, 3, 4 (Cyanide, Sulfur, Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Zinc, Antimony)	Jackson Branch/Ogeechee
	Newington Pond	GA0050202		1	Ogeechee Creek/ Ogeechee River

Regulatory limits for the parameters determined to be similar to SRS potential discharges are listed in Table 3 (Ref. 4). More information on these and other parameters is given in Attachment 1.

Table 3 NPDES Regulatory Limits for Parameters of Interest

Facility	Permit No.	Parameters of Interest	Regulatory Limits
Clariant Corp	SC0042803	Benzene Phenol Cyanide	136.0 µg/L 26.0 µg/L 1200 µg/L
Amoco Service	SC0044385	Benzene Chromium Lead	0.005 mg/L 0.016 mg/L 0.050 mg/L
Southern Nuclear Operating co.	GA0026786	Chromium Zinc	0.200 mg/L 1.000 mg/L
Stone Container Corporation	GA0002798	2, 3, 7, 8-Tetrachloro-dibenzo-p-dioxin	0.00068 µg/L
Atlantic Wood Ind.	GA0047783	Phenols	0.2 mg/L
E M Industries, Inc.	GA0034355	Chromium	*
Sav. Elec.-Pt. Wentworth STM	GA0003816	Copper Iron Mercury	1.0 mg/L 1.0 mg/L 0.016 mg/L
Tybee Island (SWP)	GA0020061	Chromium Chromium^{+6}	0.01 mg/L 0.01 mg/L
Garden City (SWP)	GA0031038	Zinc	(1)
Citgo Asphalt Refining Co.	GA0004332	Phenolics	2.02 mg/L
Savannah Elec-Effingham Steam	GA0003883	Copper Iron	1.0 mg/L 1.0 mg/L
Fort Howard Corp.	GA0046973	Chromium Cyanide Lead Nickel Mercury PCB-1242 Zinc	(1) (1) (1) (1) (1) 0.38 µg/L (1)
International Paper Company	GA0002801	2,3,7,8-Tetrachloro-dibenzo-p-dioxin	0.00016 µg/L
DSM Chemicals Augusta, Inc.	GA0002160	Benzene Phenol	10 mg/L 10 mg/L
King Finishing Company	GA0003280	Cyanide Sulfur Cadmium Chromium Copper Mercury Nickel Lead Zinc Antimony	(1) (1) (1) (1) (2) 0.5 µg/L (1) (1) (2) (1)

*- No limit specified on permit. Potential exists for this parameter to be discharged from the facility based on NPDES permit application data, however, under routine conditions it is not in excess of the applicable Water Quality Criteria.

(1) – EPA permit database (Ref. 4) indicates monitoring has been deleted for these parameters.

– EPA permit database (Ref. 4) indicates monitoring is optional for these parameters.

2.2 Intakes

SCDHEC requests facilities with intakes of greater than 100,000 gallons of water per day to register with the Bureau of Water Compliance Assurance Division; however, compliance is voluntary. Currently, two facilities that intake from the Savannah River below the Savannah River Site in South Carolina submit the requested reports. The data for 1997 for these facilities are given in million gallons daily (MGD) and are listed in Table 4 as provided by SCDHEC.

Table 4 SC Savannah River Water Withdrawals

County	Facility	Contact	Phone Number	Monthly Average (MGD)
Allendale	Clariant Corp – Martin Plant	B. G. Hudley	803-584-4321	43.9
Hampton	International Paper/Westinghouse Elec.	B. R. Ulmer	803-943-7200	19.0

The State of Georgia requires permitting of facilities that use greater than 100,000 gallons of water per day. The facilities listed in Table 5 have filed permit applications for surface water withdrawal with the Water Resources Management Program (Ref. 5).

Table 5 GA Savannah River Water Withdrawal Applicants

County	Facility	Associate	Phone Number	Max. Withdrawal (MGD)
Effingham	Savannah Industrial & Domestic Water	Clay Burdette	404-657-6008	75.0
Effingham	The Savannah Group	Clay Burdette	404-657-6008	4.6
Richmond	City of Augusta	Clay Burdette	404-657-6008	87.0

Table 6 contains a complete list of Georgia DNR permitted users in the Savannah River Basin counties of Richmond, Burke, Screven, Effingham, and Chatham. (Obtained via e-mail, GDNR)

Table 6 GA Savannah River Water Withdrawal Permits

County	Facility Name	Source Water	Max Withdrawal (MGD)
Richmond	Augusta-Richmond County*	Augusta Canal	50.00
Richmond	Augusta-Richmond County	Savannah River	37.00
Richmond	DSM Chemicals Augusta, Inc.	Savannah River	7.20
Richmond	Federal Paper Board Company, Inc.	Savannah River	85.00
Richmond	Fort Gordon - Butler Creek	Butler Creek	5.40
Richmond	Fort Gordon - Cow Branch	Cow Branch	0.60
Effingham	Fort James Operating Company	Savannah River	35.00
Chatham	Kemira Inc.	Savannah River	30.00
Richmond	Martin Marietta Aggregates-Augusta Quarry	Sump pit	3.30
Richmond	Olin Corporation	Savannah River	4.00
Richmond	PCS Nitrogen Fertilizer, L.P.	Savannah River	21.60
Richmond	Peridot	Savannah River	5.65
Effingham	Savannah Electric & Power Co-Effingham	Savannah River	130.00
Chatham	Savannah Electric & Power Co-Riverside	Savannah River	174.00
Chatham	Savannah Electric & Power Co-Pt. Wentworth	Savannah River	267.00
Effingham	Savannah Ind. & Domestic Water*	Abercorn Creek	55.00

Table 6 GA Savannah River Water Withdrawal Permits (continued)

County	Facility Name	Source Water	Max Withdrawal (MGD)
Burke	Southern Nuclear Operating Co., Inc.	Savannah River	127.00
Chatham	Stone Container Corporation	Savannah River	30.50
Chatham	Stone Container Corporation	Savannah River	60.00
Chatham	Union Camp Corporation	Savannah River	58.00

* New permit application filed. See Table 5.

Industrial intakes from the Savannah River have the potential to be effected by releases from SRS. For purposes of human health, drinking water intakes from the Savannah River are of utmost concern. For release of contaminant into free flowing surface water or groundwater system, SCDHEC refers to the South Carolina Drinking Water Standards R.61-58.8 (SCDWS). The emergency procedure of the SCDWS establishes the minimum requirements that must be met by all public water systems prior to, during, and after an emergency. Each accidental waterborne release of contaminant into the surface water system would be evaluated on a case by case basis. The Beaufort Jasper Water System is the only South Carolina public water system downstream from SRS. Upon notification of a release of contaminant into the Savannah River that exceeds - or has the potential to exceed - the safe drinking water standards, the public water system will shutdown the intake of water from the river. If the Beaufort Jasper Water System can not remove the contaminant from the water through their water purification process then the intake system from the river would be shutdown until the monitoring of the river indicates that the release has passed. The Beaufort Jasper Water System has the ability to supply the water needs for its customers for several days without acquiring water from the Savannah River. . Other non-drinking water industrial intakes may also be affected by releases into the river. Conversations with SCDHEC personnel indicate that most facilities downstream from SRS will halt intakes from the river following an accidental acute release of radionuclides. At this time concentration levels of radionuclide and or other hazardous substances at which intakes are halted are not available.

3.0 COMMERCIAL USES

Identified commercial uses of the Savannah River include:

- Surface water supply
- Electrical power generation
- Waterborne commerce
- Fishing

Surface water supply and electrical power generation can be identified through permitting/reporting as intake sources, as noted in Table 6 and summarized in Table 7.

Table 7 Savannah River Water Supply and Power Generation

County	Facility Name	Commercial Use	Source Water
Richmond	Augusta-Richmond County	Surface Water Supply	Augusta Canal
Richmond	Augusta-Richmond County	Surface Water Supply	Savannah River
Effingham	The Savannah Group	Surface Water Supply	Savannah River

Effingham	Savannah Ind. & Domestic Water	Surface Water Supply	Abercorn Creek
Effingham	Savannah Electric & Power Co.-Effingham	Electrical Power Generation	Savannah River
Chatham	Savannah Electric & Power Co.-Riverside	Electrical Power Generation	Savannah River
Chatham	Savannah Electric & Power Co.-Pt. Wentworth	Electrical Power Generation	Savannah River

Waterborne commerce, for the purposes of this report, is a minor concern. This is largely due to the fact that there is little to no navigation above the Savannah River Harbor. The only documented commercial navigation identified was barges that are sent to SRS by Chem Nuclear. In 1994, they expected to send 8 to 10 barges (Ref. 10). Further consideration should be given to the pollution capability of this commerce.

In general, the Savannah River cannot support commercial fishing for many species because local testing by various organizations (SRTC, CRESP, SCDHEC, GDNR, and the Academy of Natural Sciences of Philadelphia) severely depletes the fish population. There is, however, some commercial fishing for shad. SCDNR Marine Resources gives limited information due to privacy laws but reports that there are over 1,000 pounds of shad harvested annually by 20 to 50 individuals. GDNR Wildlife Resources Division reports approximately 15,900 shad harvested for 1998, which represents the lowest annual figures in recent years. The peak harvest since 1972 occurred in 1985 totaling 111,631 fish.

Both SCDNR and GDNR suggest that there is some commercial fishing for catfish; however, this activity is not regulated, nor is it believed to occur at a substantial level. Turtle and eel harvesting are also potentials for commercial activities; but neither department was aware of any such activity in the Savannah River.

4.0 RECREATIONAL USES

Recreational uses of the Savannah River include boating, skiing, swimming, and fishing. Since most recreational activities are not conducted under any permit or license (with the exception of fishing), accurate data on these uses is more subjective than that gathered for commercial and industrial uses. However, the states of South Carolina and Georgia have conducted and documented studies (Refs. 6 & 7) on these activities in an effort to fully understand the actual and potential recreational uses of the Savannah River. This information could, in turn, be used to ensure that the state treasuries continue to benefit from recreational river usage. Additionally, Rutgers University has surveyed Savannah River anglers (Ref. 8). All of these studies were used in compiling information for this report.

4.1 Boating

The RiverCare 2000 program evaluated, among other topics, the use of Georgia rivers, streams, swamps, and intracoastal waterways for various types of recreational boating. The data were collected from a survey completed by GDNR law-enforcement officers familiar with the river uses in their jurisdictions. This survey was completed only for those waters that the officers felt had the potential to provide recreational boating opportunities, but lacked public access points. From this information, river segments were assigned point values based on the evaluation criteria and were classified as one of the following:

- Superior recreational boating value is of statewide importance

- Outstanding recreational boating value is of regional importance
- Significant recreational boating value is of local importance

River segments not exceeding the minimum criteria for a "Significant" segment ranking were not classified. Based on this assessment, the Savannah River has 42 miles classified as Superior for boating, 237 miles classified as Outstanding, and 161 miles classified as Significant (Ref. 7).

In addition, boat landings downstream of the Savannah River Site that have been identified by SCDHEC and GDNR Wildlife Resources Division are listed in Table 8.

Table 8 Savannah River Boat Landings

Landing	County	River Mile	Approximate Location
Shell Bluff	Burke, GA	162.0	7 mi. NE of Shell Bluff at end of GA80/CR477
Hancock Landing	Burke, GA	152.0	10.5 mi. E of Shell Bluff off GA23 at end of CR98
GA Power – Vogtle	Burke, GA	149.0	(not given)
Brighams Landing	Burke, GA	144.0	5.5 mi. NE of Girard off GA 23 at end of CR79
Steel Creek Landing	Barnwell, SC	142.0	Off of County Road 493
Little Hell Landing	Barnwell, SC	135.0	Left at Millet Crossing
Stony Bluff	Burke, GA	132.0	10 mi. E of Girard off CR 433 at end of CR60
Johnson's Landing	Allendale, SC	124.0	Highway 321
Burtons Ferry	Screven, GA	119.0	11.5 mi. NE of Sylvania off US301 at end of CR220
Cohens Bluff	Allendale, SC	104.0	Off of CR41
Tuckahoe WMA	Screven, GA	100.0	(not given)
Poor Robin Landing	Screven, GA	87.0	11 mi. SE of Sylvania off GA21 at end of CR105
Blue Springs Landing	Screven, GA	78.0	5 mi. NE of Newington off GA24 at end of CR214
Stokes Bluff	Hampton, SC	63.8	Off of County Road 461
Tuckasee King	Effingham, GA	62.0	3.5 mi. NE of Clyo off GA119, CR84 and CR279
B & C Landing	Jasper, SC	60.0	West on Hwy 19 to CR 201
Ebenezer Creek	Effingham, GA	45.0	9 mi. NE of Rincon of GA21 at end of GA275
Becks Ferry	Jasper, SC	44.0	Off of CR 170
Millstone Landing	Jasper, SC	33.0	Off of CR 34
Abercorn Creek	Effingham, GA	29.0	8 mi. SE of Rincon off GA21, CR133 and CR134
Houlihan Bridge	Chatham, GA	21.0	1.5 mi. NE of Port Wentworth at US17

4.2 Skiing/Swimming

As with recreational boating, skiing and swimming are not permitted activities, making data-gathering particularly difficult. It is assumed that skiing and swimming will occur at the same locations that are deemed acceptable for boating. GDNR reports that there are no public swimming areas below the Savannah River Site. SCDHEC does issue permits for public swimming areas; however, no such areas are located on the South Carolina side of the Savannah River. Private docks provide access for a limited population and information regarding their locale is not readily accessible.

4.3 Fishing

Recreational fishing on the Savannah River is a popular pastime. However, both SCDHEC and GDNR have issued pamphlets, leaflets, etc. detailing the potential hazards associated with eating fish from the river. These warnings cite mercury, cesium, and strontium uptake in the fish as the

Table 8 Savannah River Boat Landings (continued)

primary causes of concern, and they particularly caution children and pregnant or nursing women about the possible dangers of consumption. Crappie, pickerel, and sunfish are recommended for consumption due to lower levels of chemicals. Conversely, largemouth bass and bowfin are advised against. According to the GDNR, the most popular species among Georgia fishermen are sunfish, bluegill, channel catfish, bullheads, and black crappie (Ref. 9).

The Environmental and Occupational Health Sciences Institute from Rutgers University conducted a survey of Savannah River anglers to examine fishing behavior, consumption rates, cooking methods, and potential health hazards associated with consuming fish from the Savannah River (Ref. 8). Other objectives of the study included 1) determining whether people have heard the warnings about fish consumption and 2) whether ethnic background, age, income, or other differences affect fishing behavior, consumption patterns, and exposure. The data from this study have been issued in draft format. Of those surveyed, 61% had heard warnings about fish consumption, and 82% of respondents believe the fish are safe to eat.

5.0 CONCLUSIONS

Many of the uses of the Savannah River were identified through permitting requirements, reporting programs, or studies conducted by various organizations. These forms of documentation were the most useful in determining industrial, commercial, and recreational river water uses. Therefore, most of the downstream river uses are assumed to be included in this document. However, the permits, reports, and studies were by no means all-inclusive. This assessment is echoed in the Savannah River Watershed Project's *Initial Assessment and Prioritization for the Savannah River Basin* (Ref. 10), which repeatedly cites insufficient data on topics such as water quality, economic development, land use, and navigation. Information provided in Reference 10 is, however, extremely useful in understanding the various aspects of Savannah River watershed management issues.

For those activities where no permits or reports were required, or compliance with such programs was voluntary, no method was available to definitively determine these uses. For instance, NPDES permits provide a method of determining effluent discharges to the river, and water withdrawal permits allow tracking of facilities that use greater than 100,000 gallons/day from the river. However, industries that use less than 100,000 gallons/day are not monitored, and the possibility of facilities not participating in voluntary intake registration precludes generation of a complete listing of intake points without physical inspection of that segment of the river. Consequently, commercial uses that depend on surface water intakes may have been overlooked as well. The details of recreational uses are also recognized to be incomplete, due to the nature of these uses, i.e., personal entertainment and/or subsistence. These identified information gaps would have to be recognized and addressed in the event of an emergency release and in associated planning efforts.

REFERENCES

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3. *Memoranda of Understanding with the Georgia Emergency Management Agency; Georgia Department of Natural Resources, Environmental Protection Division; and the United States Department of Energy, Savannah River Site Operations,* DE-MU09-92SR18287, WSRC, Aiken, SC.
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5. *Watershed Water Quality Assessment: Savannah and Salkehatchie River Basins,* Bureau of Water Technical Report No. 003-97, December 1997.
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7. United States Environmental Protection Agency, Envirofacts Warehouse, *Permit Compliance System,* http://www.epa.gov/enviro, October 9, 1998.
8. Georgia Environmental Protection - Department of Natural Resources, *Water Resources Branch,* http://www.ganet.org/dnr/environ/branches/watresource/swpa598.html, September 30, 1998.
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10. Georgia Environmental Protection - Department of Natural Resources, *RiverCare 2000,* http://www.dnr.state.ga.us/dnr/environ/, September 25, 1998.
11. Burger, J., Environmental and Occupational Health Sciences Institute – Rutgers University, *Fishing, Consumption Rates, and Perceptions of People Fishing Along the Savannah River,* CRESP Preliminary Data – September 1997.
12. Georgia Environmental Protection - Department of Natural Resources, *Georgia River Fishing Predictions,* http://www.dnr.state.ga.us/dnr/wild/98rvrpre.htm, September 22, 1998.
13. Management Committee of the Savannah River Basin Watershed Project, *Savannah River Basin Watershed Project, Initial Assessment and Prioritization Report for the Savannah River Basin*, Volume 1 and 2, October 1995.

Attachment 1

NPDES Regulatory Limits

By Permit

Attachment 1
NPDES Regulatory Limits

NPDES #	FACILITY	COUNTY	PARAMETER	MAX	AVG	UNITS
GA0001961	GEORGIA-PACIFIC GYPSUM	CHATHAM	CONDUCTIVITY			UMHO/ CM
GA0001961	GEORGIA-PACIFIC GYPSUM	CHATHAM	PH	9		SU

UMHO/CM	CONDUCTANCE-MICROMHO'S PER CM
SU	STANDARD UNITS

NPDES #	FACILITY	COUNTY	PARAMETER	MAX	AVG	UNITS
GA0001988	UNION CAMP CORPORATION	CHATHAM	PH	9		SU
GA0001988	UNION CAMP CORPORATION	CHATHAM	PH	9		SU

SU STANDARD UNITS (I.E. PH)

NPDES #	FACILITY	COUNTY	Code Expansion for Parameter Code	MAX	AVG	Units
GA0020061	TYBEE ISLAND WPCP	CHATHAM	OXYGEN DISSOLVED (DO)	DELMON	DELMON	MG/L
GA0020061	TYBEE ISLAND WPCP	CHATHAM	BOD 5-DAY (20 DEG. C)	45	30	MG/L
GA0020061	TYBEE ISLAND WPCP	CHATHAM	BOD 5-DAY (20 DEG. C)	45	30	MG/L
GA0020061	TYBEE ISLAND WPCP	CHATHAM	BOD 5-DAY (20 DEG. C)			MG/L
GA0020061	TYBEE ISLAND WPCP	CHATHAM	PH	9		SU
GA0020061	TYBEE ISLAND WPCP	CHATHAM	PH	8.5		SU
GA0020061	TYBEE ISLAND WPCP	CHATHAM	PH	9		SU
GA0020061	TYBEE ISLAND WPCP	CHATHAM	PH	9		SU
GA0020061	TYBEE ISLAND WPCP	CHATHAM	SOLIDS TOTAL SUSPENDED	45	30	MG/L
GA0020061	TYBEE ISLAND WPCP	CHATHAM	SOLIDS TOTAL SUSPENDED	45	30	MG/L
GA0020061	TYBEE ISLAND WPCP	CHATHAM	SOLIDS TOTAL SUSPENDED			MG/L
GA0020061	TYBEE ISLAND WPCP	CHATHAM	NITROGEN AMMONIA TOTAL (AS N)	26.1	17.4	MG/L
GA0020061	TYBEE ISLAND WPCP	CHATHAM	CHROMIUM HEXAVALENT (AS CR)	0.01	DELMON	MG/L
GA0020061	TYBEE ISLAND WPCP	CHATHAM	CHROMIUM TOTAL (AS CR)	0.01	DELMON	MG/L
GA0020061	TYBEE ISLAND WPCP	CHATHAM	CHLORINE TOTAL RESIDUAL	0.5	DELMON	MG/L
GA0020061	TYBEE ISLAND WPCP	CHATHAM	CHLORINE TOTAL RESIDUAL	0.5	DELMON	MG/L
GA0020061	TYBEE ISLAND WPCP	CHATHAM	CHLORINE TOTAL RESIDUAL		DELMON	MG/L
GA0020061	TYBEE ISLAND WPCP	CHATHAM	COLIFORM FECAL GENERAL	400	200	#/100ML
GA0020061	TYBEE ISLAND WPCP	CHATHAM	COLIFORM FECAL GENERAL	200	100	#/100ML
GA0020061	TYBEE ISLAND WPCP	CHATHAM	COLIFORM FECAL GENERAL	400	200	#/100ML
GA0020061	TYBEE ISLAND WPCP	CHATHAM	BOD 5-DAY PERCENT REMOVAL			%
GA0020061	TYBEE ISLAND WPCP	CHATHAM	SOLIDS SUSPENDED PERCENT REMOVAL			%

SU	STANDARD UNITS (I.E. PH)
MG/L	MILLIGRAMS PER LITER
#/100ML	NUMBER PER 100 MILLILITERS

NPDES #	FACILITY	COUNTY	PARAMETER	MAX	AVG	UNITS
GA0002071	PCS NITROGEN FERTILIZER L.P.	RICHMOND	BOD 5-DAY (20 DEG. C)	45	30	MG/L
GA0002071	PCS NITROGEN FERTILIZER L.P.	RICHMOND	PH	9		SU
GA0002071	PCS NITROGEN FERTILIZER L.P.	RICHMOND	PH	9		SU
GA0002071	PCS NITROGEN FERTILIZER L.P.	RICHMOND	SOLIDS TOTAL SUSPENDED	45	30	MG/L
GA0002071	PCS NITROGEN FERTILIZER L.P.	RICHMOND	NITROGEN, ORGANIC TOTAL (AS N)			MG/L
GA0002071	PCS NITROGEN FERTILIZER L.P.	RICHMOND	NITROGEN, AMMONIA TOTAL (AS N)			MG/L
GA0002071	PCS NITROGEN FERTILIZER L.P.	RICHMOND	NITROGEN, NITRATE TOTAL (AS N)			MG/L

MG/L MILLIGRAMS PER LITER
SU STANDARD UNITS (I.E. PH)

NPDES #	FACILITY	COUNT	PARAMETER	MAX	AVG	UNIT
GA0002160	DSM CHEMICALS AUGUSTA INC	RICHMOND	PH	10.5		SU
GA0002160	DSM CHEMICALS AUGUSTA INC	RICHMOND	PH	9		SU
GA0002160	DSM CHEMICALS AUGUSTA INC	RICHMOND	PH	9		SU
GA0002160	DSM CHEMICALS AUGUSTA INC	RICHMOND	SOLIDS TOTAL SUSPENDED	110	55	MG/L
GA0002160	DSM CHEMICALS AUGUSTA INC	RICHMOND	NITROGEN AMMONIA, TOTAL (AS N)			MG/L
GA0002160	DSM CHEMICALS AUGUSTA INC	RICHMOND	NITROGEN KJELDAHL, TOTAL (AS N)			MG/L
GA0002160	DSM CHEMICALS AUGUSTA INC	RICHMOND	TOLUENE	10	DELMON	MG/L
GA0002160	DSM CHEMICALS AUGUSTA INC	RICHMOND	BENZENE	10	DELMON	MG/L
GA0002160	DSM CHEMICALS AUGUSTA INC	RICHMOND	PHENOL, SINGLE COMPOUND	10	DELMON	MG/L

SU STANDARD UNITS (I.E. PH)
MG/L MILLIGRAMS PER LITER

NPDES #	FACILITY	COUNTY	PARAMETER	MAX	AVG	UNITS
GA0022250	SAVANNAH PINES	CHATHAM	BOD 5-DAY (20 DEG. C)	45	30	MG/L
GA0022250	SAVANNAH PINES	CHATHAM	PH	9		SU
GA0022250	SAVANNAH PINES	CHATHAM	PH	9		SU
GA0022250	SAVANNAH PINES	CHATHAM	SOLIDS, TOTAL SUSPENDED	45	30	MG/L
GA0022250	SAVANNAH PINES	CHATHAM	COLIFORM, FECAL, GENERAL	400	200	#/100ML

MG/L	MILLIGRAMS PER LITER
SU	STANDARD UNITS (I.E. PH)
#/100ML	NUMBER PER 100 MILLILITERS

NPDES #	FACILITY	COUNTY	Parameter	MAX	AVG	Units
GA0002356	PCS NITROGEN FERTILIZER L.P.	CHATHAM	PH	9		SU

SU STANDARD UNITS (I.E. PH)

NPDES #	FACILITY	COUNTY	PARAMETER	MAX	AVG	UNITS
GA0002381	CENTRAL OF GEORGIA R/R	CHATHAM	PH	9		SU
GA0002381	CENTRAL OF GEORGIA R/R	CHATHAM	SOLIDS, TOTAL SUSPENDED	45	30	MG/L
GA0002381	CENTRAL OF GEORGIA R/R	CHATHAM	OIL AND GREASE (SOXHLET EXTR.) TOT.	15	10	MG/L

SU STANDARD UNITS (I.E. PH)
MG/L MILLIGRAMS PER LITER

NPDES #	FACILITY	COUNTY	PARAMETER	MAX	AVG	UNITS
GA0002402	HERTY FOUNDATION (SAVANNAH)	CHATHAM	BOD 5-DAY (20 DEG. C)			MG/L
GA0002402	HERTY FOUNDATION (SAVANNAH)	CHATHAM	PH	9		SU
GA0002402	HERTY FOUNDATION (SAVANNAH)	CHATHAM	SOLIDS, TOTAL SUSPENDED			MG/L

MG/L MILLIGRAMS PER LITER
SU STANDARD UNITS (I.E. PH)

NPDES #	FACILITY	COUNTY	PARAMETER	MAX	AVG	UNITS
GA0002437	SOUTHERN STATES PHOSP	CHATHAM	BOD 5-DAY (20 DEG. C)			MG/L
GA0002437	SOUTHERN STATES PHOSP	CHATHAM	OXYGEN DEMAND CHEM. (HIGH LEVEL) (COD)			MG/L
GA0002437	SOUTHERN STATES PHOSP	CHATHAM	PH	9		SU
GA0002437	SOUTHERN STATES PHOSP	CHATHAM	SOLIDS TOTAL SUSPENDED			MG/L

MG/L MILLIGRAMS PER LITER
SU STANDARD UNITS (I.E. PH)

NPDES #	FACILITY	COUNTY	PARAMETER	MAX	AVG	UNITS
GA0002470	ALBION KAOLIN COMPANY	RICHMOND	TURBIDITY	100	50	NTU
GA0002470	ALBION KAOLIN COMPANY	RICHMOND	PH	9		SU

NTU NEPHELOMETRIC TURBIDITY UNITS
SU STANDARD UNITS (I.E. PH)

NPDES #	FACILITY	COUNTY	PARAMETER	MAX	AVG	UNITS
GA0026786	SOUTHERN NUCLEAR OPERATING CO.	BURKE	BOD 5-DAY (20 DEG. C)	45	30	MG/L
GA0026786	SOUTHERN NUCLEAR OPERATING CO.	BURKE	BOD 5-DAY (20 DEG. C)	45	30	MG/L
GA0026786	SOUTHERN NUCLEAR OPERATING CO.	BURKE	PH	9		SU
GA0026786	SOUTHERN NUCLEAR OPERATING CO.	BURKE	PH	9		SU
GA0026786	SOUTHERN NUCLEAR OPERATING CO.	BURKE	SOLIDS TOTAL	20	15	MG/L
GA0026786	SOUTHERN NUCLEAR OPERATING CO.	BURKE	SOLIDS TOTAL SUSPENDED	100	30	MG/L
GA0026786	SOUTHERN NUCLEAR OPERATING CO.	BURKE	SOLIDS TOTAL SUSPENDED	100	30	MG/L
GA0026786	SOUTHERN NUCLEAR OPERATING CO.	BURKE	OIL AND GREASE (SOXHLET EXTR.)	20	15	MG/L
GA0026786	SOUTHERN NUCLEAR OPERATING CO.	BURKE	OIL AND GREASE (SOXHLET EXTR.)	20	15	MG/L
GA0026786	SOUTHERN NUCLEAR OPERATING CO.	BURKE	CHROMIUM TOTAL (AS CR)	0.2		MG/L
GA0026786	SOUTHERN NUCLEAR OPERATING CO.	BURKE	CHROMIUM TOTAL (AS CR)	0.2	OPTMON	MG/L
GA0026786	SOUTHERN NUCLEAR OPERATING CO.	BURKE	CHROMIUM TOTAL (AS CR)	0.2	DELMON	MG/L
GA0026786	SOUTHERN NUCLEAR OPERATING CO.	BURKE	ZINC, TOTAL (AS ZN)	1		MG/L
GA0026786	SOUTHERN NUCLEAR OPERATING CO.	BURKE	ZINC, TOTAL (AS ZN)	1	DELMON	MG/L
GA0026786	SOUTHERN NUCLEAR OPERATING CO.	BURKE	ZINC, TOTAL (AS ZN)	1	OPTMON	MG/L
GA0026786	SOUTHERN NUCLEAR OPERATING CO.	BURKE	CHLORINE, TOTAL RESIDUAL	OPTMON	OPTMON	MG/L
GA0026786	SOUTHERN NUCLEAR OPERATING CO.	BURKE	CHLORINE, TOTAL RESIDUAL		DELMON	MG/L
GA0026786	SOUTHERN NUCLEAR OPERATING CO.	BURKE	CHLORINE, TOTAL RESIDUAL			MG/L
GA0026786	SOUTHERN NUCLEAR OPERATING CO.	BURKE	CHLORINE,FREE AVAILABLE	0.5	0.2	MG/L
GA0026786	SOUTHERN NUCLEAR OPERATING CO.	BURKE	CHLORINE, FREE AVAILABLE	0.5	0.2	MG/L
GA0026786	SOUTHERN NUCLEAR OPERATING CO.	BURKE	CHLORINE, FREE AVAILABLE	0.5	0.2	MG/L
GA0026786	SOUTHERN NUCLEAR OPERATING CO.	BURKE	CHLORINATION	120		HOURS/DAY
GA0026786	SOUTHERN NUCLEAR OPERATING CO.	BURKE	CHLORINATION , DURATION	120	DELMON	MINUTES
GA0026786	SOUTHERN NUCLEAR OPERATING CO.	BURKE	CHLORINATION , DURATION	120	OPTMON	MINUTES

MG/L MILLIGRAMS PER LITER
SU STANDARD UNITS (I.E. PH)

NPDES #	FACILITY	COUNTY	PARAMETER	MAX	AVG	UNITS
GA0026867	HERCULES	CHATHAM	PH	9		SU
GA0026867	HERCULES	CHATHAM	PH	9		SU

SU STANDARD UNITS (I.E. PH)

NPDES #	FACILITY	COUNTY	PARAMETER	MAX	AVG	UNITS
GA0027588	USA HUNTER AFB STP	CHATHAM	BOD 5-DAY (20 DEG. C)	30	20	MG/L
GA0027588	USA HUNTER AFB STP	CHATHAM	PH	9		SU
GA0027588	USA HUNTER AFB STP	CHATHAM	SOLIDS TOTAL SUSPENDED	45	30	MG/L
GA0027588	USA HUNTER AFB STP	CHATHAM	CHLORINE, TOTAL RESIDUAL		DELMON	MG/L
GA0027588	USA HUNTER AFB STP	CHATHAM	COLIFORM, FECAL GENERAL	400	200	#/100ML

MG/L	MILLIGRAMS PER LITER
SU	STANDARD UNITS (I.E. PH)
#/100ML	NUMBER PER 100 MILLILITERS

NPDES #	FACILITY	COUNTY	PARAMETER	MAX	AVG	UNITS
GA0002798	STONE CONTAINER CORP	CHATHAM	PH	9		SU
GA0002798	STONE CONTAINER CORP	CHATHAM	PH	9		SU
GA0002798	STONE CONTAINER CORP	CHATHAM	LEAD TOTAL (AS PB)		DELMON	MG/L
GA0002798	STONE CONTAINER CORP	CHATHAM	ZINC TOTAL (AS ZN)		DELMON	MG/L
GA0002798	STONE CONTAINER CORP	CHATHAM	COLOR (ADMI UNITS)		DELMON	ADMI UNITS
GA0002798	STONE CONTAINER CORP	CHATHAM	2 3 7 8-TETRACHLORO-DIBENZO-P-DIOXIN	0.00068	DELMON	UG/L
GA0002798	STONE CONTAINER CORP	CHATHAM	2 3 7 8-TETRACHLORO-DIBENZO-P-DIOXIN	DELMON	0.00057	UG/L

SU	STANDARD UNITS (I.E. PH)
MG/L	MILLIGRAMS PER LITER
ADMI UNITS	ADMI UNITCOLOR
UG/L	MICROGRAMS PER LITER

NPDES #	FACILITY	COUNTY	Parameter	MAX	AVG	Units
GA0002801	INTERNATIONAL PAPER COMPANY	RICHMOND	COLOR		DELMON	MG/L
GA0002801	INTERNATIONAL PAPER COMPANY	RICHMOND	PH	9		SU
GA0002801	INTERNATIONAL PAPER COMPANY	RICHMOND	PH	9		SU
GA0002801	INTERNATIONAL PAPER COMPANY	RICHMOND	2 3 7 8-TETRACHLORO-DIBENZO-P-DIOXIN	0.00018	DELMON	UG/L
GA0002801	INTERNATIONAL PAPER COMPANY	RICHMOND	2 3 7 8-TETRACHLORO-DIBENZO-P-DIOXIN	0.0011	DELMON	UG/L
GA0002801	INTERNATIONAL PAPER COMPANY	RICHMOND	2 3 7 8-TETRACHLORO-DIBENZO-P-DIOXIN	DELMON	0.00016	UG/L

MG/L MILLIGRAMS PER LITER
SU STANDARD UNITS (I.E. PH)
UG/L MICROGRAMS PER LITER

NPDES #	FACILITY	COUNTY	Parameters	MAX	AVG	Units
GA0031038	GARDEN CITY WPCP	CHATHAM	OXYGEN DISSOLVED (DO)	DELMON	DELMON	MG/L
GA0031038	GARDEN CITY WPCP	CHATHAM	BOD 5-DAY (20 DEG. C)	30	20	MG/L
GA0031038	GARDEN CITY WPCP	CHATHAM	BOD 5-DAY (20 DEG. C)	45	30	MG/L
GA0031038	GARDEN CITY WPCP	CHATHAM	BOD 5-DAY (20 DEG. C)			MG/L
GA0031038	GARDEN CITY WPCP	CHATHAM	PH	9		SU
GA0031038	GARDEN CITY WPCP	CHATHAM	PH	9		SU
GA0031038	GARDEN CITY WPCP	CHATHAM	SOLIDS TOTAL SUSPENDED	45	30	MG/L
GA0031038	GARDEN CITY WPCP	CHATHAM	SOLIDS TOTAL SUSPENDED			MG/L
GA0031038	GARDEN CITY WPCP	CHATHAM	NITROGEN, AMMONIA, TOTAL (AS N)	26.1	17.4	MG/L
GA0031038	GARDEN CITY WPCP	CHATHAM	ZINC TOTAL (AS ZN)		DELMON	MG/L
GA0031038	GARDEN CITY WPCP	CHATHAM	CHLORINE, TOTAL RESIDUAL	0.5	DELMON	MG/L
GA0031038	GARDEN CITY WPCP	CHATHAM	CHLORINE, TOTAL RESIDUAL		DELMON	MG/L
GA0031038	GARDEN CITY WPCP	CHATHAM	COLIFORM, FECAL GENERAL	400	200	#/100ML
GA0031038	GARDEN CITY WPCP	CHATHAM	BOD, 5-DAY, % REMOVAL			%
GA0031038	GARDEN CITY WPCP	CHATHAM	SOLIDS, SUSPENDED, % REMOVAL			%

MG/L MILLIGRAMS PER LITER
SU STANDARD UNITS (I.E. PH)

NPDES #	FACILITY	COUNTY	PARAMETER	MAX	AVG	UNITS
GA0003255	GULFSTREAM AEROSPACE CORPORATION	CHATHAM	CONDUCTIVITY			UMHO/CM
GA0003255	GULFSTREAM AEROSPACE CORPORATION	CHATHAM	PH	9		SU

UMHO/CM	CONDUCTANCE-MICROMHO'S PER CM
SU	STANDARD UNITS (I.E. PH)

NPDES #	FACILITY	COUNTY	Parameter	MAX	AVG	UNITS
GA0003280	KING FINISHING COMPANY	SCREVEN	BOD 5-DAY (20 DEG. C)	DELMON	DELMON	N/A
GA0003280	KING FINISHING COMPANY	SCREVEN	PH	8.5		SU
GA0003280	KING FINISHING COMPANY	SCREVEN	CYANIDE TOTAL (AS CN)		DELMON	UG/L
GA0003280	KING FINISHING COMPANY	SCREVEN	CADMIUM TOTAL (AS CD)		DELMON	UG/L
GA0003280	KING FINISHING COMPANY	SCREVEN	CHROMIUM TOTAL (AS CR)	DELMON	DELMON	N/A
GA0003280	KING FINISHING COMPANY	SCREVEN	COPPER TOTAL (AS CU)	OPTMON	OPTMON	MG/L
GA0003280	KING FINISHING COMPANY	SCREVEN	COPPER TOTAL (AS CU)		DELMON	UG/L
GA0003280	KING FINISHING COMPANY	SCREVEN	LEAD TOTAL (AS PB)		DELMON	UG/L
GA0003280	KING FINISHING COMPANY	SCREVEN	NICKEL TOTAL (AS NI)		DELMON	UG/L
GA0003280	KING FINISHING COMPANY	SCREVEN	ZINC TOTAL (AS ZN)	OPTMON	OPTMON	MG/L
GA0003280	KING FINISHING COMPANY	SCREVEN	ZINC TOTAL (AS ZN)		DELMON	UG/L
GA0003280	KING FINISHING COMPANY	SCREVEN	ANTIMONY TOTAL (AS SB)		DELMON	UG/L
GA0003280	KING FINISHING COMPANY	SCREVEN	HEXACHLOROCYCLOPENTADIENE		DELMON	UG/L
GA0003280	KING FINISHING COMPANY	SCREVEN	PHENOLS		DELMON	UG/L
GA0003280	KING FINISHING COMPANY	SCREVEN	MERCURY TOTAL (AS HG)	0.5	DELMON	UG/L

SU STANDARD UNITS (I.E. PH)
UG/L MICROGRAMS PER LITER
MG/L MILLIGRAMS PER LITER

NPDES #	FACILITY	COUNTY	Parameter	MAX	AVG	UNITS
GA0034355	E.M. INDUSTRIES INC	CHATHAM	TURBIDITY	120	100	NTU
GA0034355	E.M. INDUSTRIES INC	CHATHAM	PH	9		SU
GA0034355	E.M. INDUSTRIES INC	CHATHAM	PH	9		SU
GA0034355	E.M. INDUSTRIES INC	CHATHAM	SOLIDS, TOTAL SUSPENDED	150	120	MG/L
GA0034355	E.M. INDUSTRIES INC	CHATHAM	CHROMIUM, TOTAL (AS CR)			MG/L

NTU NEPHELOMETRIC TURBIDITY UNITS
SU STANDARD UNITS (I.E. PH)
MG/L MILLIGRAMS PER LITER

NPDES #	FACILITY	COUNTY	PARAMETER	MAX	AVG	UNITS
GA0034801	PINE FOREST S/D-PORT WENTWORTH	CHATHAM	BOD 5-DAY (20 DEG. C)	45	30	MG/L
GA0034801	PINE FOREST S/D-PORT WENTWORTH	CHATHAM	BOD 5-DAY (20 DEG. C)			MG/L
GA0034801	PINE FOREST S/D-PORT WENTWORTH	CHATHAM	PH	9		SU
GA0034801	PINE FOREST S/D-PORT WENTWORTH	CHATHAM	PH	9		SU
GA0034801	PINE FOREST S/D-PORT WENTWORTH	CHATHAM	SOLIDS, TOTAL SUSPENDED	120	90	MG/L
GA0034801	PINE FOREST S/D-PORT WENTWORTH	CHATHAM	SOLIDS, TOTAL SUSPENDED			MG/L

MG/L MILLIGRAMS PER LITER
SU STANDARD UNITS (I.E. PH)

NPDES #	FACILITY	COUNT	PARAMETER	MAX	AVG	UNITS
GA0003484	USA FT GORDON	RICHMOND	OXYGEN DISSOLVED (DO)	DELMON	DELMON	MG/L
GA0003484	USA FT GORDON	RICHMOND	BOD 5-DAY (20 DEG. C)	45	30	MG/L
GA0003484	USA FT GORDON	RICHMOND	PH	9		SU
GA0003484	USA FT GORDON	RICHMOND	SOLIDS, TOTAL SUSPENDED	45	30	MG/L
GA0003484	USA FT GORDON	RICHMOND	NITROGEN, AMMONIA, TOTAL (AS N)			MG/L
GA0003484	USA FT GORDON	RICHMOND	PHOSPHORUS, TOTAL (AS P)			MG/L
GA0003484	USA FT GORDON	RICHMOND	COLIFORM, FECAL, GENERAL	400	200	#/100ML

MG/L	MILLIGRAMS PER LITER
SU	STANDARD UNITS (I.E. PH)
#/100ML	NUMBER PER 100 MILLILITERS

NPDES #	FACILITY	COUNTY	PARAMETER	MAX	AVG	UNITS
GA0003611	SAVANNAH SUGAR REFINERY	CHATHAM	PH	9		SU

SU STANDARD UNITS (I.E. PH)

NPDES #	FACILITY	COUNTY	PARAMETER	MAX	AVG	UNITS
GA0003646	KEMIRA	CHATHAM	PH	9		SU

SU STANDARD UNITS (I.E. PH)

NPDES #	FACILITY	COUNTY	Parameter	MAX	AVG	UNITS
GA0003719	OLIN CORPORATION (AUGUSTA)	RICHMOND	PH	9		SU
GA0003719	OLIN CORPORATION (AUGUSTA)	RICHMOND	SOLIDS, TOTAL SUSPENDED	110	DELMON	MG/L

SU STANDARD UNITS (I.E. PH)
MG/L MILLIGRAMS PER LITER

NPDES #	FACILITY	COUNTY	PARAMETER	MAX	AVG	UNITS
GA0003816	SAV. ELEC-PT WENTWORTH	CHATHAM	TEMP. DIFF.	90	DELMON	DEG.F
GA0003816	SAV. ELEC-PT WENTWORTH	CHATHAM	PH	9		SU
GA0003816	SAV. ELEC-PT WENTWORTH	CHATHAM	PH	OPTMON		SU
GA0003816	SAV. ELEC-PT WENTWORTH	CHATHAM	SOLIDS, TOTAL SUSPENDED	100	30	MG/L
GA0003816	SAV. ELEC-PT WENTWORTH	CHATHAM	SOLIDS, TOTAL SUSPENDED	OPTMON	OPTMON	MG/L
GA0003816	SAV. ELEC-PT WENTWORTH	CHATHAM	OIL AND GREASE (SOXHLET EXTR.)	20	15	MG/L
GA0003816	SAV. ELEC-PT WENTWORTH	CHATHAM	OIL AND GREASE (SOXHLET EXTR.)	OPTMON	OPTMON	MG/L
GA0003816	SAV. ELEC-PT WENTWORTH	CHATHAM	COPPER, TOTAL (AS CU)	1	1	MG/L
GA0003816	SAV. ELEC-PT WENTWORTH	CHATHAM	COPPER, TOTAL (AS CU)	OPTMON	OPTMON	MG/L
GA0003816	SAV. ELEC-PT WENTWORTH	CHATHAM	IRON, TOTAL (AS FE)	OPTMON	OPTMON	MG/L
GA0003816	SAV. ELEC-PT WENTWORTH	CHATHAM	IRON, DISSOLVED (AS FE)	1	1	MG/L
GA0003816	SAV. ELEC-PT WENTWORTH	CHATHAM	CHLORINE, TOTAL RESIDUAL	0.2	DELMON	MG/L
GA0003816	SAV. ELEC-PT WENTWORTH	CHATHAM	CHLORINE, TOTAL RESIDUAL		DELMON	MG/L
GA0003816	SAV. ELEC-PT WENTWORTH	CHATHAM	MERCURY, TOTAL (AS HG)	0.016	DELMON	MG/L
GA0003816	SAV. ELEC-PT WENTWORTH	CHATHAM	METALS, TOTAL	OPTMON	OPTMON	MG/L

DEG.F DEGREES FAHRENHEIT
SU STANDARD UNITS (I.E. PH)
MG/L MILLIGRAMS PER LITER

NPDES #	FACILITY	COUNTY	PARAMETER	MAX	AVG	UNITS
GA0003841	GAF MATERIALS CORP.	CHATHAM	BOD 5-DAY (20 DEG. C)			MG/L
GA0003841	GAF MATERIALS CORP.	CHATHAM	PH	9		SU
GA0003841	GAF MATERIALS CORP.	CHATHAM	SOLIDS, TOTAL SUSPENDED			MG/L
GA0003841	GAF MATERIALS CORP.	CHATHAM	COLIFORM, FECAL GENERAL			#/100ML

MG/L	MILLIGRAMS PER LITER
SU	STANDARD UNITS (I.E. PH)
#/100ML	NUMBER PER 100 MILLILITERS

NPDES #	FACILITY	COUNTY	PARAMETER	MAX	AVG	UNITS
GA0003883	SAV. ELEC-EFFINGHAM	EFFINGHAM	TEMP. DIFF.	90	DELMON	DEG.F
GA0003883	SAV. ELEC-EFFINGHAM	EFFINGHAM	BOD 5-DAY (20 DEG. C)	45	30	MG/L
GA0003883	SAV. ELEC-EFFINGHAM	EFFINGHAM	BOD 5-DAY (20 DEG. C)	45	30	MG/L
GA0003883	SAV. ELEC-EFFINGHAM	EFFINGHAM	PH	9		SU
GA0003883	SAV. ELEC-EFFINGHAM	EFFINGHAM	PH	OPTMON		SU
GA0003883	SAV. ELEC-EFFINGHAM	EFFINGHAM	SOLIDS, TOTAL SUSPENDED	45	30	MG/L
GA0003883	SAV. ELEC-EFFINGHAM	EFFINGHAM	SOLIDS, TOTAL SUSPENDED	100	30	MG/L
GA0003883	SAV. ELEC-EFFINGHAM	EFFINGHAM	SOLIDS, TOTAL SUSPENDED	45	30	MG/L
GA0003883	SAV. ELEC-EFFINGHAM	EFFINGHAM	SOLIDS, TOTAL SUSPENDED	OPTMON	OPTMON	MG/L
GA0003883	SAV. ELEC-EFFINGHAM	EFFINGHAM	OIL AND GREASE (SOXHLET EXTR.)	20	15	MG/L
GA0003883	SAV. ELEC-EFFINGHAM	EFFINGHAM	OIL AND GREASE (SOXHLET EXTR.)	OPTMON	OPTMON	MG/L
GA0003883	SAV. ELEC-EFFINGHAM	EFFINGHAM	COPPER, TOTAL (AS CU)	1	1	MG/L
GA0003883	SAV. ELEC-EFFINGHAM	EFFINGHAM	COPPER, TOTAL (AS CU)	OPTMON	OPTMON	MG/L
GA0003883	SAV. ELEC-EFFINGHAM	EFFINGHAM	IRON, TOTAL (AS FE)	1	1	MG/L
GA0003883	SAV. ELEC-EFFINGHAM	EFFINGHAM	IRON, TOTAL (AS FE)	OPTMON	OPTMON	MG/L
GA0003883	SAV. ELEC-EFFINGHAM	EFFINGHAM	CHLORINE, TOTAL RESIDUAL	0.2	DELMON	MG/L
GA0003883	SAV. ELEC-EFFINGHAM	EFFINGHAM	CHLORINE, TOTAL RESIDUAL		DELMON	MG/L

DEG.F DEGREES FAHRENHEIT
MG/L MILLIGRAMS PER LITER
SU STANDARD UNITS (I.E. PH)

NPDES #	FACILITY	COUNTY	PARAMETER	MAX	AVG	UNITS
SC0042803	CLARIANT CORP	ALLENDALE	TEMPERATURE, WATER	98	DELMON	DEG.F
SC0042803	CLARIANT CORP	ALLENDALE	SPECIFIC CONDUCTANCE	ADDMON	ADDMON	UMHO/CM
SC0042803	CLARIANT CORP	ALLENDALE	PH	9	DELMON	SU
SC0042803	CLARIANT CORP	ALLENDALE	PH	ADDMON	DELMON	SU
SC0042803	CLARIANT CORP	ALLENDALE	PH	ADDMON		SU
SC0042803	CLARIANT CORP	ALLENDALE	SOLIDS, TOTAL SUSPENDED	ADDMON	ADDMON	MG/L
SC0042803	CLARIANT CORP	ALLENDALE	NITROGEN, AMMONIA TOTAL (AS N)	ADDMON	ADDMON	MG/L
SC0042803	CLARIANT CORP	ALLENDALE	CARBON, TOT ORGANIC (TOC)	ADDMON		MG/L
SC0042803	CLARIANT CORP	ALLENDALE	CYANIDE, TOTAL (AS CN)	1200	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	SULFATE, TOTAL (AS SO4)	ADDMON	ADDMON	MG/L
SC0042803	CLARIANT CORP	ALLENDALE	CHROMIUM, TOTAL (AS CR)	ADDMON		MG/L
SC0042803	CLARIANT CORP	ALLENDALE	ZINC, TOTAL (AS ZN)	ADDMON		MG/L
SC0042803	CLARIANT CORP	ALLENDALE	CARBON TETRACHLORIDE	38	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	1 2-DICHLOROETHANE	211	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	CHLOROFORM	46	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	PHENOLICS, TOTAL RECOVERABLE	ADDMON		MG/L
SC0042803	CLARIANT CORP	ALLENDALE	TOLUENE	80	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	BENZENE	136	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	ACENAPHTHYLENE	59	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	ACENAPHTHENE	59	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	ACRYLONITRILE	242	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	ANTHRACENE	59	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	BENZO(K)FLUORANTHENE	59	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	BENZO(A)PYRENE	61	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	CHLOROBENZENE	28	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	CHLOROETHANE, TOTAL WEIGHT	268	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	CHRYSENE	59	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	DIETHYL PHTHALATE	203	DELMON	UG/L

NPDES #	FACILITY	COUNTY	PARAMETER	MAX	AVG	UNITS
SC0042803	CLARIANT CORP	ALLENDALE	DIMETHYL PHTHALATE	47	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	ETHYLBENZENE	108	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	FLUORANTHENE	68	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	FLUORENE	59	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	HEXACHLOROETHANE	54	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	METHYL CHLORIDE	190	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	METHYLENE CHLORIDE	89	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	NITROBENZENE	68	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	PHENANTHRENE	59	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	PYRENE	67	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	TETRACHLOROETHYLENE	56	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	1 1-DICHLOROETHANE	59	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	1 1-DICHLOROETHYLENE	25	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	1 1 1-TRICHLORO-ETHANE	54	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	1 1 2-TRICHLORO-ETHANE	54	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	BENZO(A)ANTHRACENE	59	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	1 2-DICHLOROBENZENE	163	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	1 2-DICHLOROPROPANE	230	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	1 2-TRANS-DICHLORO-ETHYLENE	54	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	1 2 4-TRICHLORO-BENZENE	140	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	1 3-DICHLOROPROPENE, TOTAL WEIGHT	44	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	1 3-DICHLOROBENZENE	44	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	2-CHLOROPHENOL	98	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	2-NITROPHENOL	28	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	2-NITROPHENOL	69	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	2 4-DICHLOROPHENOL	112	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	2 4-DIMETHYLPHENOL	36	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	2 4-DINITROTOLUENE	285	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	2 4-DINITROPHENOL	123	DELMON	UG/L

NPDES #	FACILITY	COUNTY	PARAMETER	MAX	AVG	UNITS
SC0042803	CLARIANT CORP	ALLENDALE	2 6-DINITROTOLUENE	641	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	4-NITROPHENOL	124	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	4 6-DINITRO-O-CRESOL	277	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	PHENOL, SINGLE COMPOUND	26	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	NAPHTHALENE	59	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	BIS (2-ETHYLHEXYL) PHTHALATE	279	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	DI-N-BUTYL PHTHALATE	57	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	VINYL CHLORIDE	268	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	TRICHLOROETHYLENE	54	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	HEXACHLOROBENZENE	28	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	HEXACHLOROBUTADIENE	49	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	NITROGEN NITRATE, TOTAL (AS NO3)	ADDMON	ADDMON	MG/L
SC0042803	CLARIANT CORP	ALLENDALE	LENGTH OF LONGEST PH EXCURSION	60	DELMON	MINUTES
SC0042803	CLARIANT CORP	ALLENDALE	% OF TIME EXCEEDING PH LIMITS	1	DELMON	PERCENT
SC0042803	CLARIANT CORP	ALLENDALE	COLIFORM, FECAL GENERAL	400	200	#/100ML
SC0042803	CLARIANT CORP	ALLENDALE	3 4 BENZOFLUORAN-THENE	61	DELMON	UG/L
SC0042803	CLARIANT CORP	ALLENDALE	P/F STATRE 7DAY CHR CERIODAPHNIA	0	DELMON	PASS/ FAIL

DEG.F DEGREES FAHRENHEIT
UMHO/CM CONDUCTANCE-MICROMHO'S PER CM
SU STANDARD UNITS (I.E. PH)
MG/L MILLIGRAMS PER LITER
UG/L MICROGRAMS PER LITER
#/100ML NUMBER PER 100 MILLILITERS
PASS/FAIL PASS=0 FAIL=1

NPDES #	FACILITY	COUNTY	PARAMETERS	MAX	AVG	UNITS
GA0004332	CITGO ASPHALT REFINING CO.	CHATHAM	PH	9		SU
GA0004332	CITGO ASPHALT REFINING CO.	CHATHAM	PHENOLIC COMPOUNDS, TOTAL	2.02	0.48	MG/L

SU STANDARD UNITS (I.E. PH)
MG/L MILLIGRAMS PER LITER

NPDES #	FACILITY	COUNTY	PARAMETER	MAX	AVG	UNITS
SC0044385	AMOCO SERVICE STATION #489	JASPER	BOD 5-DAY (20 DEG. C)	20	10	MG/L
SC0044385	AMOCO SERVICE STATION #489	JASPER	PH	8	DELMON	SU
SC0044385	AMOCO SERVICE STATION #489	JASPER	ARSENIC, TOTAL (AS AS)	0.005	ADDMON	MG/L
SC0044385	AMOCO SERVICE STATION #489	JASPER	CHROMIUM, TOTAL (AS CR)	0.016	0.011	MG/L
SC0044385	AMOCO SERVICE STATION #489	JASPER	LEAD, TOTAL (AS PB)	0.05	ADDMON	MG/L
SC0044385	AMOCO SERVICE STATION #489	JASPER	METHYL TERT-BUTYL ETHER	14.12	7.06	MG/L
SC0044385	AMOCO SERVICE STATION #489	JASPER	TOLUENE	0.35	0.175	MG/L
SC0044385	AMOCO SERVICE STATION #489	JASPER	BENZENE	0.005	ADDMON	MG/L
SC0044385	AMOCO SERVICE STATION #489	JASPER	2 4-DIMETHYLPHENOL	0.0424	0.0212	MG/L
SC0044385	AMOCO SERVICE STATION #489	JASPER	NAPHTHALENE	0.046	0.023	MG/L
SC0044385	AMOCO SERVICE STATION #489	JASPER	FLOW IN CONDUIT			N/A
SC0044385	AMOCO SERVICE STATION #489	JASPER	2-METHYLNAPHTHALENE	0.004	ADDMON	MG/L
SC0044385	AMOCO SERVICE STATION #489	JASPER	4-METHYLPHENOL	0.08	0.04	MG/KG
SC0044385	AMOCO SERVICE STATION #489	JASPER	XYLENE	0.164	0.082	MG/L

MG/L MILLIGRAMS PER LITER
SU STANDARD UNITS (I.E. PH)
MG/KG MILLIGRAMS PER KILOGRAM

NPDES #	FACILITY	COUNTY	PARAMETER	MAX	AVG	UNITS
GA0046230	AIR LIQUIDE AMERICA CORP.	CHATHAM	CONDUCTIVITY	DELMON		UMHO/ CM
GA0046230	AIR LIQUIDE AMERICA CORP.	CHATHAM	PH	9		SU

UMHO/CM CONDUCTANCE-MICROMHO'S PER CM
SU STANDARD UNITS (I.E. PH)

NPDES #	FACILITY	COUNTY	PARAMETER	MAX	AVG	UNITS
GA0046973	FORT HOWARD CORP	EFFINGHAM	COLOR (PT-CO UNITS)		DELMON	PT-CO
GA0046973	FORT HOWARD CORP	EFFINGHAM	PH	9		SU
GA0046973	FORT HOWARD CORP	EFFINGHAM	PH	9		SU
GA0046973	FORT HOWARD CORP	EFFINGHAM	CYANIDE, TOTAL (AS CN)		DELMON	UG/L
GA0046973	FORT HOWARD CORP	EFFINGHAM	CHROMIUM, TOTAL (AS CR)		DELMON	UG/L
GA0046973	FORT HOWARD CORP	EFFINGHAM	LEAD, TOTAL (AS PB)		DELMON	UG/L
GA0046973	FORT HOWARD CORP	EFFINGHAM	NICKEL, TOTAL (AS NI)		DELMON	UG/L
GA0046973	FORT HOWARD CORP	EFFINGHAM	ZINC, TOTAL (AS ZN)		DELMON	UG/L
GA0046973	FORT HOWARD CORP	EFFINGHAM	COLOR (ADMI UNITS)	DELMON	DELMON	ADMI UNITS
GA0046973	FORT HOWARD CORP	EFFINGHAM	COLOR (ADMI UNITS)		DELMON	ADMI UNITS
GA0046973	FORT HOWARD CORP	EFFINGHAM	CHLOROFORM		DELMON	UG/L
GA0046973	FORT HOWARD CORP	EFFINGHAM	TOLUENE		DELMON	UG/L
GA0046973	FORT HOWARD CORP	EFFINGHAM	HEXACHLOROETHANE		DELMON	UG/L
GA0046973	FORT HOWARD CORP	EFFINGHAM	PCB-1242 (AROCHLOR 1242)	0.38	DELMON	UG/L
GA0046973	FORT HOWARD CORP	EFFINGHAM	PCB-1242 (AROCHLOR 1242)	DELMON	0.38	UG/L
GA0046973	FORT HOWARD CORP	EFFINGHAM	PCB-1242 (AROCHLOR 1242)		DELMON	UG/L
GA0046973	FORT HOWARD CORP	EFFINGHAM	MERCURY, TOTAL (AS HG)		DELMON	UG/L
GA0046973	FORT HOWARD CORP	EFFINGHAM	CHLOROETHANE		DELMON	UG/L

PT-CO COLOR - PLATINUM COBALT UNIT
SU STANDARD UNITS (I.E. PH)
UG/L MICROGRAMS PER LITER
ADMI UNIT COLOR - ADMI UNITS

NPDES #	FACILITY	COUNTY	PARAMETER	MAX	AVG	UNITS
GA0046990	EFFINGHAM ELEM (SOUTH)	EFFINGHAM	BOD 5-DAY (20 DEG. C)	45	30	MG/L
GA0046990	EFFINGHAM ELEM (SOUTH)	EFFINGHAM	PH	9		SU
GA0046990	EFFINGHAM ELEM (SOUTH)	EFFINGHAM	SOLIDS, TOTAL SUSPENDED	120	90	MG/L

MG/L MILLIGRAMS PER LITER
SU STANDARD UNITS (I.E. PH)

NPDES #	FACILITY	COUNTY	PARAMETER	MAX	AVG	UNITS
GA0047007	GEORGIA PACIFIC CORPORATION	CHATHAM	OXYGEN DEMAND, CHEM. (HIGH LEVEL) (COD)			MG/L
GA0047007	GEORGIA PACIFIC CORPORATION	CHATHAM	PH	9		SU
GA0047007	GEORGIA PACIFIC CORPORATION	CHATHAM	SOLIDS, TOTAL SUSPENDED	45	OPTMON	MG/L

MG/L MILLIGRAMS PER LITER
SU STANDARD UNITS (I.E. PH)

NPDES #	FACILITY	COUNT	PARAMETER	MAX	AVG	UNITS
GA0047066	POOLER/BLOOMINGDALE	CHATHAM	OXYGEN DISSOLVED (DO)	DELMON	DELMON	MG/L
GA0047066	POOLER/BLOOMINGDALE	CHATHAM	BOD 5-DAY (20 DEG. C)	15	10	MG/L
GA0047066	POOLER/BLOOMINGDALE	CHATHAM	BOD 5-DAY (20 DEG. C)	15	10	MG/L
GA0047066	POOLER/BLOOMINGDALE	CHATHAM	BOD 5-DAY (20 DEG. C)			MG/L
GA0047066	POOLER/BLOOMINGDALE	CHATHAM	PH	9		SU
GA0047066	POOLER/BLOOMINGDALE	CHATHAM	PH	9		SU
GA0047066	POOLER/BLOOMINGDALE	CHATHAM	PH	9		SU
GA0047066	POOLER/BLOOMINGDALE	CHATHAM	SOLIDS, TOTAL SUSPENDED	45	30	MG/L
GA0047066	POOLER/BLOOMINGDALE	CHATHAM	SOLIDS, TOTAL SUSPENDED	45	30	MG/L
GA0047066	POOLER/BLOOMINGDALE	CHATHAM	SOLID, TOTAL SUSPENDED			MG/L
GA0047066	POOLER/BLOOMINGDALE	CHATHAM	NITROGEN, AMMONIA, TOTAL (AS N)	3	2	MG/L
GA0047066	POOLER/BLOOMINGDALE	CHATHAM	NITROGEN, AMMONIA, TOTAL (AS N)	6	4	MG/L
GA0047066	POOLER/BLOOMINGDALE	CHATHAM	NITROGEN, AMMONIA, TOTAL (AS N)	3	2	MG/L
GA0047066	POOLER/BLOOMINGDALE	CHATHAM	NITROGEN, AMMONIA, TOTAL (AS N)	6	4	MG/L
GA0047066	POOLER/BLOOMINGDALE	CHATHAM	COLIFORM, FECAL, GENERAL	400	200	#/100ML
GA0047066	POOLER/BLOOMINGDALE	CHATHAM	COLIFORM, FECAL, GENERAL	400	200	#/100ML
GA0047066	POOLER/BLOOMINGDALE	CHATHAM	BOD ,5-DAY % REMOVAL			%
GA0047066	POOLER/BLOOMINGDALE	CHATHAM	SOLIDS, SUSPENDED, % REMOVAL			%

MG/L	MILLIGRAMS PER LITER
SU	STANDARD UNITS (I.E. PH)
#/100ML	NUMBER PER 100 MILLILITERS

NPDES #	FACILITY	COUNTY	PARAMETER	MAX	AVG	UNITS
GA0047783	ATLANTIC WOOD IND.	CHATHAM	BOD, 5-DAY (20 DEG. C)	240	DELMON	MG/L
GA0047783	ATLANTIC WOOD IND.	CHATHAM	BOD, 5-DAY (20 DEG. C)	30	DELMON	MG/L
GA0047783	ATLANTIC WOOD IND.	CHATHAM	OXYGEN DEMAND, CHEM. (HIGH LEVEL) (COD)	30	DELMON	MG/L
GA0047783	ATLANTIC WOOD IND.	CHATHAM	OXYGEN DEMAND, CHEM. (HIGH LEVEL) (COD)	90	DELMON	MG/L
GA0047783	ATLANTIC WOOD IND.	CHATHAM	OXYGEN DEMAND, CHEM. (HIGH LEVEL) (COD)			MG/L
GA0047783	ATLANTIC WOOD IND.	CHATHAM	PH	9		SU
GA0047783	ATLANTIC WOOD IND.	CHATHAM	PH	9		SU
GA0047783	ATLANTIC WOOD IND.	CHATHAM	SOLIDS, TOTAL SUSPENDED	20	DELMON	MG/L
GA0047783	ATLANTIC WOOD IND.	CHATHAM	OIL AND GREASE (SOXHLET EXTR.) TOT.	30	DELMON	MG/L
GA0047783	ATLANTIC WOOD IND.	CHATHAM	PHENOL, SINGLE COMPOUND	0.2	DELMON	MG/L
GA0047783	ATLANTIC WOOD IND.	CHATHAM	PHENOLS	0.2	DELMON	MG/L
GA0047783	ATLANTIC WOOD IND.	CHATHAM	PHENOLS	0.8	DELMON	MG/L

MG/L MILLIGRAMS PER LITER
SU STANDARD UNITS (I.E. PH)

NPDES #	FACILITY	COUNTY	PARAMETER	MAX	AVG	UNITS
GA0048330	ENGELHARD CORPORATION	CHATHAM	PH	9		SU
GA0048330	ENGELHARD CORPORATION	CHATHAM	SOLIDS, TOTAL SUSPENDED	6000	2000	MG/L

SU	STANDARD UNITS (I.E. PH)
MG/L	MILLIGRAMS PER LITER

NPDES #	FACILITY	COUNTY	PARAMETER	MAX	AVG	UNITS
GA0049506	GARDEN ACRES S/D-POOLER	CHATHAM	BOD, 5-DAY (20 DEG. C)	45	30	MG/L
GA0049506	GARDEN ACRES S/D-POOLER	CHATHAM	PH	9		SU
GA0049506	GARDEN ACRES S/D-POOLER	CHATHAM	SOLIDS, TOTAL SUSPENDED	120	90	MG/L

MG/L MILLIGRAMS PER LITER
SU STANDARD UNITS (I.E. PH)

NPDES #	FACILITY	COUNTY	PARAMETER	MAX	AVG	UNITS
GA0050202	NEWINGTON POND	SCREVEN	BOD 5-DAY (20 DEG. C)	45	30	MG/L
GA0050202	NEWINGTON POND	SCREVEN	BOD 5-DAY (20 DEG. C)			MG/L
GA0050202	NEWINGTON POND	SCREVEN	PH	9		SU
GA0050202	NEWINGTON POND	SCREVEN	SOLIDS, TOTAL SUSPENDED	120	90	MG/L
GA0050202	NEWINGTON POND	SCREVEN	SOLIDS, TOTAL SUSPENDED			MG/L

MG/L MILLIGRAMS PER LITER
SU STANDARD UNITS (I.E. PH)