

Sewer Overflow Response Plan

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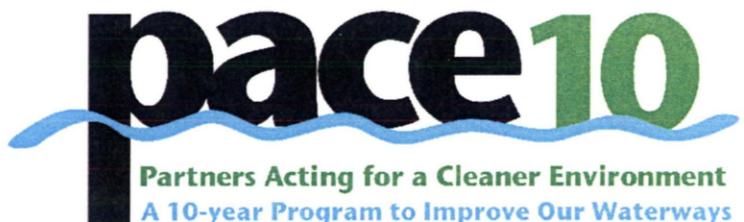
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May 9, 2011

Date



Executive Summary

KUB's Sewer Overflow Response Plan

The Sewer Overflow Response Plan (SORP) outlines the actions KUB will take to reduce the impact of sanitary sewer overflows (SSOs) on our customers and the environment as well as to comply with regulatory requirements.

1. Staff Communication and Duties

To ensure that KUB is made aware of each SSO as expeditiously as possible, there are several methods by which SSOs will be reported. The most common and effective notification comes from individuals who witness the event and call KUB's Customer Information Center (CIC). CIC representatives take reports ranging from manhole overflows to sewage on private property. KUB employees/field crews, city employees, 911, or other agencies may also report SSOs to the CIC or KUB's System Operations Dispatch. Automated systems, such as Supervisory Control and Data Acquisition System (SCADA), also alert KUB that an investigation is warranted. The processes by which SSOs are reported and the actions generated from a report of an overflow are detailed in Sections 4.1, 4.2, and 4.3.1. The responsibilities of KUB employees charged with responding to SSOs are outlined in Sections 3.3-3.6.

2. Prompt Response to SSOs

KUB will make all reasonable efforts to respond to an SSO with qualified and equipped personnel within forty-five (45) minutes of being notified (Section 4.2). Allowances will be made to ensure that the safety of the Responder and the public is the first priority. Records of all SSO responses, including response times, will be maintained (Sections 3.4, 4.3.1, 4.6, and 4.10). The details pertaining to KUB's response to SSOs will be stored in a database that will be used for reporting and to analyze KUB's performance. A log of building backups will be maintained in a database separate from other SSOs (Section 2.3).

3. Assessment of Cause and Impact

An important first step is the identification of the cause of an SSO (Sections 4.3.2 and 4.3.11). The various causes will determine the type of mitigation or remediation that is most appropriate. Wet weather overflows are usually caused by inflow and infiltration (I/I), while dry weather overflows may result from blockages caused by roots or grease. SSOs occurring during rain events are not in themselves considered Wet Weather events. When evaluating the potential impact of an SSO on public health and the environment, sensitive factors will be identified. These factors will determine the level of public notification and clean up activity required. These sensitive factors may include:

- Streams, creeks, and other natural waterways
- Heavy pedestrian areas
- Special facilities to include schools, public parks, walking trails, etc.

The process by which KUB will assess if an SSO has had any adverse impact on human health or the environment is described in Sections 4.3.5, 4.3.6, and 4.3.9. KUB will respond to backups occurring on private property in accordance with the SORP by conducting an investigation to

determine if the cause is due to problems in the KUB system or a failure on the customer's side. The process a property owner will follow to dispute the determination that a building backup is caused by a failure in their private lateral is outlined in Section 4.3.2.

4. Elimination of Cause and Mitigation of Impact

Once the cause of an SSO has been identified, the proper type of remediation can be chosen. Section 4.3.11 summarizes common abatement resolution activities and repairs that can be used independently or combined based on field conditions and television inspection. The KUB resources, including personnel and equipment needed and available to perform these activities and repairs, are listed in Sections 3.5 and 3.6. When possible, flow diversion techniques provide an effective means of conveying the discharge back into the sewer system. This procedure reduces additional potential impact on the immediate area and the possible impact downstream. Flow diversion techniques employed by KUB when practicable are listed in Section 4.3.10. Control zones will be established for every SSO to help prevent public access around the perimeter of the affected surface area using appropriate signs and barricading practices (Section 4.3.6). Other methods for minimizing human contact with overflows can be found in Sections 4.3.9, 4.3.10, 4.3.12, and 4.4. Standard containment procedures for typical SSOs can be found in Section 4.3.9.

5. Clean up of SSOs

After an overflow has occurred, KUB's clean up of the impacted area will be thorough and comprehensive. General practices, depending on the individual situation, are outlined in Section 4.3.12. To minimize any further impact on human health or the environment, follow-up inspections and root cause analyses will be performed to identify the specific cause of the overflow. Methods for determining the causes of SSOs may include television inspection, dyed water testing, visual inspection, etc. (Section 4.3.13). If a building backup is found to be caused by a Wastewater Collection and Transmission Systems (WCTS) failure, KUB notifies its Customer Support Department to dispatch an independent cleaning and restoration contractor to assist in cleaning, sanitizing, and repairing damage (Section 4.3.2).

6. Routine Reports to the Public

KUB will provide an initial notice to TDEC of an SSO within twenty-four (24) hours of the time it becomes aware of an SSO, as required by NPDES permits. The complete reporting process that includes the Immediate, Final, and Monthly Overflow Reports by which KUB notifies TDEC is summarized in Sections 4.2 and 4.5. KUB will continue to post the date, time, volume, and location of each SSO (excluding building backups) on KUB's Web site within twenty-four (24) hours of confirmation of the SSO. Once clean up activities are completed, information will be posted on the same Web site with the date that the clean up is completed. Such postings will remain archived and indexed on the KUB Web site (Section 4.4.8).

The 7 Elements of a Proper MOM Program KUB's Sewer Overflow Response Plan (SORP)

1. Utility-Specific

Based on the needs of our service area and customer base, KUB has developed this Sewer Overflow Response Plan (SORP) to serve as a guide to provide an efficiently maintained and operated sanitary sewer system and to reduce the negative impact on the environment and hazards to public health.

2. Purposeful

This program will reduce the potential negative impact of SSOs on public health and the environment through the implementation of a systematic response to overflows. This program:

- Supports customer service
- Standardizes reporting procedures
- Establishes system performance goals
- Protects system assets
- Protects public health
- Protects water quality.

3. Goal-Oriented

KUB developed this SORP to reduce the impact of SSOs for our customers and the environment and to comply with regulatory requirements. It provides structured guidance for response to overflows, including a range of appropriate and effective field activities KUB can choose from to meet the needs of each situation. KUB will use its discretion and best professional judgment to evaluate each event and choose the appropriate remediation tools.

4. Uses Performance Measures

To measure the performance of the “respond to wastewater trouble” process, KUB will track performance indicators including, but not limited to the following:

- Response time from notification to arrival of a qualified and equipped First Responder on site
- Quality of response
- Safety of personnel and equipment during wastewater trouble response.

5. Periodically Evaluated

KUB will review the SORP annually and amend it as appropriate. The review will include, at a minimum, the following activities:

- Conduct workshop with managers and key personnel to review response activities and gather suggestions for new or revised procedures
- Review all contact lists and update as necessary.

The 7 Elements of a Proper MOM Program KUB's Sewer Overflow Response Plan (SORP), cont.

6. Available in Writing

Hard copies or electronic versions of the SORP and any amendments will be distributed to any employee involved in responding to an overflow.

7. Implemented by Trained Personnel

KUB personnel will conduct training for the appropriate response crews and support staff to ensure their understanding and proper execution of the SORP. Training sessions will be supplemented with a practical hands-on field component to ensure all response personnel are prepared for anticipated situations. Also, KUB will conduct refresher sessions annually or when changes are made to the SORP to ensure the same results. KUB's Regulatory Compliance Department will oversee the SORP to ensure that the established procedures are being followed during implementation and field operation. After each training class, KUB personnel will sign a disclosure form stating they understand the SORP training and their role in the SORP process.

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Section 1

1.0 Definitions

This section is designed to help familiarize readers with common terms and acronyms used in this report. It includes basic definitions of a sanitary sewer system and sanitary sewer overflows, for example, which will give readers an overview to help understand the following sections.

1.1 General Definitions

Basin: Basins are small portions of the sanitary sewer system separated by boundaries of natural topography or system configuration. Separating the system into basins allows KUB to better identify and monitor system performance in those smaller areas.

Building Backup (BBU): A building backup means a wastewater backup into a building that is caused by blockages, malfunctions, or flow conditions in the WCTS. A wastewater backup into a building that is caused by a blockage or other malfunction of a private lateral is not a Building Backup.

Closed-Circuit Television (CCTV): KUB uses closed-circuit television to visually inspect the internal condition of pipes and sub-surface structures.

Customer Information Center (CIC): KUB's Customer Information Center handles requests for service, questions, outage or overflow reports, etc.

Customer Information System (CIS): The Customer Information System maintains records of account numbers, premise details, and other customer information. It also generates work orders and facilitates workflow to other systems, such as MDS, or between departments.

Cleanout: A cleanout is a vertical pipe with a removable cap extending from a private lateral to the surface of the ground. It is used for access to the private lateral for inspection and maintenance.

Combination Cleaners: Combination cleaners are mechanical equipment with flushing and suction capabilities. This equipment is used to clear or collect wastewater and related debris from the sanitary sewer system.

Collection System Improvement (CSI): Collection System Improvement focuses specifically on WCTS issues. CSI team members have diverse backgrounds, including plant operations, engineering, and process improvement.

Collection System Improvement Program (CSIP): The Collection System Improvement Program consists of system assessment, capital improvement projects, maintenance programs, operational standards, and emergency response. KUB began the CSIP shortly after it began operating the wastewater system in 1987. The first steps in the program (upgrading treatment plants and eliminating combined sewers) were completed, and the focus now is on continuing to upgrade and maintain the WCTS and plants.

Discharge: A discharge is any release of treated or untreated wastewater (including that combined with rainfall induced by inflow and infiltration, or I/I) from a sanitary sewer system.

Disruption of Service: A disruption of service is an interruption in customers' sanitary sewer service due to various reasons, such as blockages, pipe failures, etc.

Dry Weather SSO: A discharge of untreated sewage from a sanitary sewer system due to flow restrictions or system disruptions. [See Section 1.2]

Environmental Protection Agency (EPA): United States Environmental Protection Agency.

First Responder: Typically a designated Underground Construction employee, or any other qualified KUB employee with required SORP training, who assumes initial responsibility for an SSO event.

Force Mains: A pressurized line that conveys wastewater from a pump station.

Full Time Equivalent (FTE): An employee working at least forty (40) hours per week and receives full benefits.

Geographic Information System (GIS): KUB's GIS is an ESRI-based system that provides employees with landbase features, aerial photography, and utility information. The City of Knoxville, Knox County, and KUB use the same core software so they are able to merge the data that all three entities maintain into single applications (KGIS).

Gravity or Main Lines: Gravity or main lines represent the largest portion of the KUB system. They use changes in elevation to transport sewage between points.

Inflow and Infiltration (I/I): The total quantity of water from inflow, infiltration, and rainfall-dependent inflow and infiltration, without distinguishing the source. Infiltration is the introduction of groundwater into a sanitary sewer system through cracks, pipe joints, manholes, or other system leaks. Inflow is the introduction of extraneous water into a sanitary sewer system by direct or inadvertent connections with storm water infrastructure, such as gutters and roof drains, uncapped cleanouts, and cross-connections with storm drains.

Impacted Areas: Impacted areas are sites where sanitary sewage has collected or areas that have been affected as the result of a discharge from the sanitary sewer system.

Interactive Voice Response (IVR): KUB's automated Interactive Voice Response system, which gives callers to the Customer Information Center various options to direct their calls appropriately.

KUB: Knoxville Utilities Board.

Lift or Pump Station: A lift or pump station is a mechanical method of conveying wastewater to higher elevations.

Manhole or Junction Box: A manhole/junction box provides a connection point for gravity lines, private laterals, or force mains, as well as an access point for maintenance and repair activities.

Mobile Data System (MDS): MDS is a workforce management system that includes desktop management for dispatchers and GPS for crew location. MDS transmits field orders directly to field crews through laptop computers located in various KUB vehicles to reduce response time.

Monitored Locations: Geographic locations that are monitored for overflows due to wet weather problems or recent SSO modeling information.

Private Lateral: Private lateral shall mean that portion of a sanitary sewer conveyance pipe, including that portion in the public right of way, that extends from the wastewater main to the single-family, multi-family, apartment or other dwelling unit or structure to which wastewater service is or has been provided. Private Laterals do not include connector joints that have been installed by KUB.

Public System: Public system refers to KUB's sanitary sewer system, excluding private laterals and connections with private systems.

Sanitary Sewer Overflow (SSO): SSO shall mean an overflow, spill, or release of wastewater from the WCTS, including: (a) all Unpermitted Discharges; or (b) overflows, spills, or releases of wastewater that may not have reached waters of the United States or the State; and (c) all Building Backups.

Sanitary Sewer System: A sanitary sewer system collects, conveys, and treats residential, commercial, and industrial wastewater through a complex network of infrastructure that includes these components:

- Private laterals
- Gravity or main lines
- Manholes or junction boxes
- Sewer lift or pump stations
- Force mains
- Treatment plants.

Sanitary Sewer Overflow Response Plan (SORP): KUB's Sewer Overflow Response Plan provides structured guidance, including a range of field activities to choose from, for a uniform response to overflows.

SORP Field Manual: KUB's SORP Field Manual was developed to provide guidance to personnel as they respond to an SSO event outlined in KUB's Sewer Overflow Response Plan.

SORP Training Component: KUB's SORP Training Component consists of both computer and field modules, which are used in KUB's annual SORP training.

Supervisory Control and Data Acquisition System (SCADA): SCADA is automated sensory control equipment that monitors the operation of the pump stations. The SCADA system will convey alarms when predetermined conditions occur. Monitoring parameters include, but are not limited to, power failures, high wet well levels, and pump failures that could potentially cause overflows.

Suspicious Substance: Any material not normally found in a wastewater system, including, but not limited to, caustic substances.

TDEC: Tennessee Department of Environment and Conservation and any successor departments or agencies of the State.

Unpermitted Discharge: A discharge of pollutants from any location within the treatment works which reaches waters of the United States or the State, and which is not authorized by an NPDES Permit, including but not limited to any SSO which reaches waters of the United States or State.

Wastewater Collection and Transmission Systems (WCTS): The municipal wastewater collection and transmission systems, including all pipes, force mains, gravity sewer lines, lift stations, pump stations, and manholes and appurtenances thereto, which are owned or operated by KUB.

Waters of the State: Waters of the State shall have the same meaning as "Waters" defined at TCA § 69-3-103 (33).

Wet Weather SSO: A discharge of untreated sewage from a sanitary sewer system due to excessive flows during rain events or elevated ground and surface water conditions. [See Section 1.2]

1.2 Types of Overflows

Sanitary sewer overflow is an encompassing term to describe the discharge of sewage from a sanitary sewer system anywhere except at a permitted discharge point. This SORP is developed to address the two fundamental types of SSOs:

- **Wet Weather Overflows**
Wet weather overflows result from excessive flows during significant rain events or elevated ground and surface water conditions. They can be attributed to a number of factors, including, but not limited to, the following:
 - Downspouts
 - Footing drains
 - Sump pumps
 - Infiltration
 - Flooding from the stormwater system
 - Cross-connections.

- **Dry Weather Overflows**
Overflows during dry weather are most often caused by flow restrictions or system disruptions. Dry weather SSOs can be attributed to a number of factors including, but not limited to, the following:
 - Bottlenecks and/or blockages
 - Grease
 - Roots
 - Debris
 - Mechanical failures
 - System overloads
 - Sewer breaks
 - Treatment facility malfunctions and/or overloads.

The SORP Goals (Section 4.0) discuss the type, location, destination, cause, impact, and containment and remediation requirements of SSOs, as well as prevention measures.

Section 2

2.0 Process Overview

KUB continues to work to provide an efficiently designed, maintained, and operated sanitary sewer system to safely collect and convey sewage to a wastewater treatment plant for appropriate treatment and discharge.

An SSO occurs when sewage escapes from the sanitary sewer system anywhere other than at an approved discharge point. An SSO can result from flow restrictions or system disruptions, or it may also result from excessive flows caused by elevated ground and surface water during significant rain events entering the WCTS.

KUB developed this SORP to reduce the impact of SSOs for our customers and the environment and to comply with regulatory requirements. It provides structured guidance for response to overflows, including a range of appropriate and effective field activities KUB can choose from to meet the needs of each situation. KUB will use its discretion and best professional judgment to evaluate each event and choose the appropriate remediation tools.

2.1 Process Objective

KUB's response to an SSO begins when a customer, KUB employee, internal automated system, or outside party reports a possible overflow. The SORP is intended to

- Protect public health and the environment
- Satisfy regulatory agencies and discharge permit conditions that require procedures for managing sewer overflows.

2.2 Scope and Summary

The SORP entails a series of steps or procedures that begins with a report of a possible SSO in the KUB system. The notification initiates a series of protocols to confirm the report, reduce the impact on the environment, report the occurrence to the appropriate individuals and agencies, and track the occurrence to help reduce or eliminate further incidents.

These are the key components of KUB's SORP:

- Receive, record, and dispatch calls in response to notification of a possible SSO
- Assess the reported occurrence
- Determine if the cause of the SSO falls under KUB's area of responsibility or is a private lateral issue
- Contain the overflow, when practicable, to reduce any further negative impact
- Resolve system disruption
- Advise customers if the overflow is due to a problem on their property
- Implement appropriate notification procedures
- Track SSO occurrences
- Establish procedures to assess adverse impact to human health and the environment
- Develop and implement system improvements.

2.3 Assumptions and Limitations

KUB initiates the SORP promptly after notification of a possible SSO from a customer, passerby, emergency agency, other individual or entity through the Customer Information Center (CIC) or KUB Dispatch, or when alerted directly through Early Warning Monitors or Supervisory Control and Data Acquisition System (SCADA).

The end of the process varies depending on these factors:

- KUB responsibility
- Private customer issues
- Location of SSO
- Environmental impact.

KUB's CIC is the primary contact for customers who have utility questions or need to report problems with their service, such as wastewater trouble. The CIC is staffed 24-hours a day, seven days a week. CIC personnel receive customer calls and enter the information regarding the customer request or concern into the Customer Information System (CIS). Any wastewater trouble calls are immediately transmitted to the dispatch group in System Operations (SYSOPS) to initiate the SORP field response. [Refer to Section 4.1 for additional details of this process.]

Once dispatched, the process varies depending on these factors:

- Determination of responsibility
 - KUB's wastewater system
 - Customer's private lines
- Location of SSO
- Potential impact on health and the environment.

When evaluating the potential impact of an SSO on public health and the environment, sensitive factors will be identified. These factors will determine if additional response activities are required.

Sensitive factors include, but are not limited to

- Streams, creeks, and other natural waterways
- Heavy pedestrian areas
- Special facilities including schools, public parks, walking trails, etc.

A backup caused by failure in the customer's private system is referred to internally as "problem on property." If KUB identifies the problem is on the private portion of the system, we notify the customer. The customer (often through a plumber) is responsible for any repair or clean up required.

KUB will provide the same level of response to a building backup as prescribed for an SSO in the SORP. KUB notifies its Customer Support Department immediately in the event of a building backup to coordinate communication with the customer and contract for any necessary clean up. KUB maintains contractual agreements with plumbers and cleaning agencies that are equipped to address damage caused by the backup.

For backup emergencies, KUB personnel can contact the Customer Support Department staff on call through the hotline number, 558-2233. Refer to Section 4.3.2 for additional clarification of KUB's process for determining the cause of building backups.

KUB is a steward of the environment, and the first priority at an overflow is containing the discharge to minimize possible harmful impacts to the environment and public health to the extent reasonably possible. If the cause of the disruption of service, and ultimately the SSO, is found to be a private issue, then KUB representatives will notify the appropriate parties. Under those circumstances, KUB is not responsible for remediation.

Section 3

3.0 System and Organizational Structures

Implementing the SORP requires these types of coordination among several KUB departments:

- Effective and timely communication
- Well-trained and experienced Responders
- Structured and concise response procedures
- Accurate and comprehensive monitoring procedures
- Continuous and annually scheduled re-evaluations of the plan.

3.1 KUB Wastewater System

Today, KUB's wastewater system serves more than 68,000 customers in a 108-square-mile service area.

The system is composed of:

- Over 1300 miles of main lines
- Over 30,000 manholes
- Over 60 pump stations
- 4 wastewater treatment plants.

WCTS

As the utility provider, KUB owns and maintains the network of pipes, manholes, and associated equipment that transports wastewater from homes and businesses to the treatment plant. That network is referred to as the Wastewater Collection and Transmission System (WCTS). Customers own the private laterals from the served structure to the public main line, excluding the connection.

3.2 KUB Operational and Functional Structure

KUB is a multifaceted organization with a systematic organizational structure in place to provide wastewater service, as well as electric, gas, and water services. In July 2002, KUB formed Collection System Improvement (CSI) within the operations area to focus specifically on managing WCTS issues.

CSI includes professionals from throughout KUB with backgrounds in engineering, wastewater operations, and process improvement. They coordinate with other departments, including Engineering Systems and Underground Construction (UGC), to achieve WCTS goals. [See Appendix F for KUB's Organizational Structure as it pertains to the SORP]

3.3 Resources for Customer Inquiries

KUB's CIC receives, records, and initiates response to customer inquiries or concerns through a dedicated phone number: 524-2911.

A varied number of representatives provide around-the-clock customer service seven days a week. CIC representatives take reports ranging from manhole overflows to sewage on private property.



CIC enters customers' trouble calls into a state-of-the-art CIS, which translates it into a field activity in the MDS.

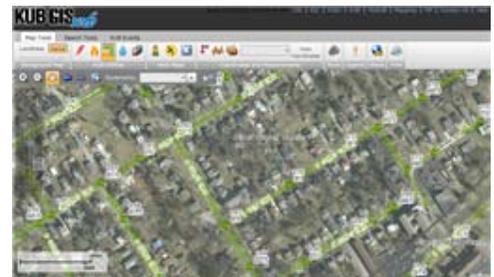
3.4 Resources for Dispatching Work

The System Operations (SYSOPS) Department provides dispatching function 24 hours a day, seven days a week. SYSOPS receives field activities from CIS or other notification systems, such as the SCADA system, and dispatches wastewater trouble orders to the appropriate KUB responder crew.



The MDS allows SYSOPS to electronically send orders to field crews through terminals located in trucks to initiate the field component of the SORP. The MDS tracks the orders a crew has worked, the time spent on the event, and the resolution of the wastewater trouble. Global Positioning System (GPS) tracking provides dispatchers with crew locations.

SYSOPS not only dispatches orders but also serves as a resource to field crews. They can obtain additional assistance from other crews to mitigate or clean up an SSO, as well as provide system information from various KUB databases, such as the Geographic Information System (GIS).



3.5 Resources to Respond to SSO Events at Pump Stations

Station Management Services-Pipes (SMSP), another group within SYSOPS, is responsible for the operations and maintenance of KUB's wastewater pump stations.

Each pump station is equipped with SCADA system that monitors the operation of the stations. The SCADA system will convey alarms when predetermined conditions are present at the station. Monitoring parameters include, but are not limited to, power failures, high wet well levels, and pump failures that could potentially cause overflows.

In addition to the continuous monitoring, each station is inspected on a regular basis. The frequency of these inspections is based on factors such as facility age, operating history, size of facility, and the potential for negative environmental impact. SMSP maintenance personnel perform service and calibration of all instrumentation, such as flow meters, level sensors, alarms, and SCADA equipment, on a periodic basis.

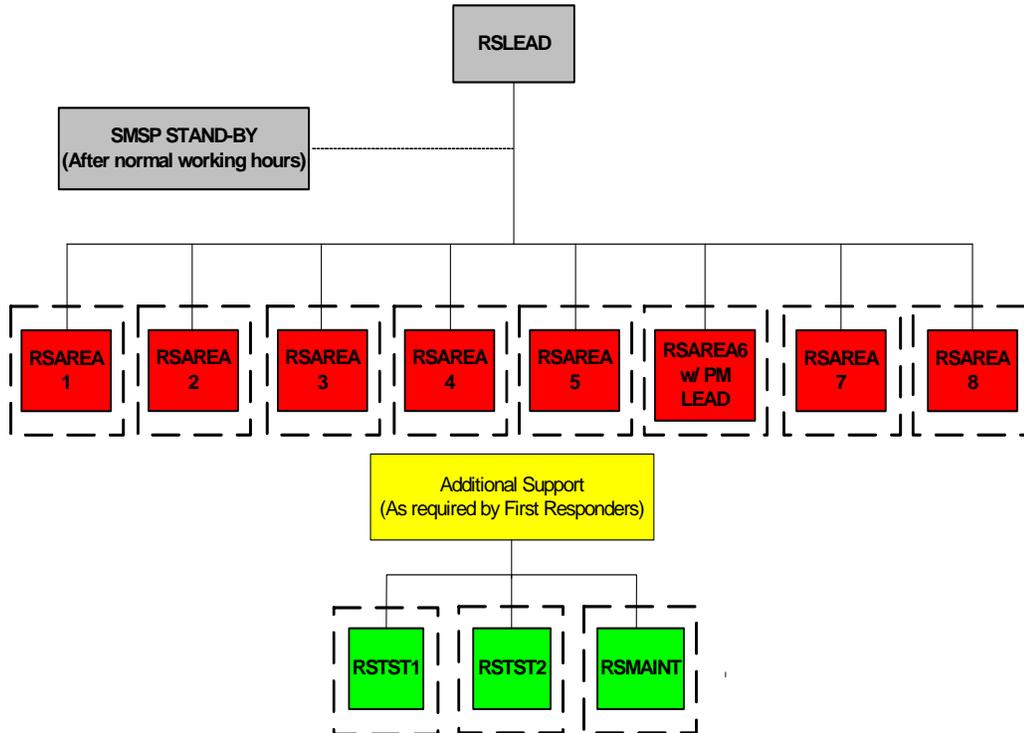
SMSP personnel serve as the First Responders for pump station trouble calls. For any incident that involves an overflow, SMSP executes the requirements of the SORP and takes the appropriate action to contain the overflow. SMSP notifies SYSOPS of any such situation and submits the Initial Overflow Report (IOR). The incident is reported in accordance with the proper reporting procedures. Refer to Section 4.2 for additional information relating to the IOR.

SMSP uses a lift station contingency sheet that includes the proper response for various alarm conditions from the lift station facilities. The severity of the trouble call, the availability of personnel, weather conditions, and the characteristics of the station involved determine the response to such alarms.

SMSP is broken up into different areas of maintenance responsibilities. The following chart identifies which operating section is responsible for routine, preventive, and corrective maintenance.

Figure 1 summarizes the organizational structure of KUB’s response to SSO events at pump stations.

Figure 1: Resources to Respond to SSO Events at Lift Stations



*All Budgeted Positions are
Currently Filled*

RS = Remote Sites

RSLEAD

The RSLEAD are members of Station Management Services (SMS). The RSLEAD manages, coordinates, and supervises the day-to-day work activities, maintenance, repairs, and SSO response for pump stations.

Stand-by

The Stand-by is a member of SMS. This position provides coordination and initial response for SSO events at pump stations after normal working hours.

RSAREA1

The RSAREA1 is a member of SMS. The RSAREA1 provides the initial response to pump station alarms along with the RSLEAD for facilities within the Area 1 geographical location. The secondary response personnel will also support the Area 1 location if additional expertise is required, such as SCADA issues, or if the cause of the SSO remediation requires additional resources.

RSAREA2

The RSAREA2 is a member of SMS. The RSAREA2 provides the initial response to pump station alarms along with the RSLEAD for facilities within the Area 2 geographical location. The secondary response personnel will also support the Area 2 location if additional expertise is required.

RSAREA3

The RSAREA3 is a member of SMS. The RSAREA3 provides the initial response to pump station alarms along with the RSLEAD for facilities within the Area 3 geographical location. The secondary response personnel will also support the Area 3 location if additional expertise is required.

RSAREA4

The RSAREA4 is a member of SMS. The RSAREA4 provides the initial response to pump station alarms along with the RSLEAD for facilities within the Area 4 geographical location. The secondary response personnel will also support the Area 4 location if additional expertise is required.

RSAREA5

The RSAREA5 is a member of SMS. The RSAREA5 provides the initial response to pump station alarms along with the RSLEAD for facilities within the Area 5 geographical location. The secondary response personnel will also support the Area 5 location if additional expertise is required.

RSAREA6 and PM Lead

The RSAREA6 is a member of SMS. The RSAREA6 provides the initial response to pump station alarms along with the RSLEAD for facilities within the Area 6 geographical location. The secondary response personnel will also support the Area 6 location if additional expertise is required. This area also includes the PM Lead who is a member of the SMSP Team and manages, directs, and monitors the Lift Station Preventive Maintenance program. SMSP works closely with other KUB departments, contractors, and consultants as needed.

RSAREA7

The RSAREA7 is a member of SMS. The RSAREA7 provides the initial response to pump station alarms along with the RSLEAD for facilities within the Area 7 geographical location. The secondary response personnel will also support the Area 7 location if additional expertise is required.

RSAREA8

The RSAREA8 is a member of SMS. The RSAREA8 provides the initial response to pump station alarms along with the RSLEAD for facilities within the Area 8 geographical location. The secondary response personnel will also support the Area 8 locations if additional expertise is required.

RSTST1 and RSTST2

The RSTST1 and RSTST2 are members of SMS. They provide SCADA and area support to the primary responding personnel.

RSMaint

The RSMaint is a member of SMS. The RSMaint has similar responsibilities as the RSTST crews. The RSMaint crew provides additional KUB personnel for mitigation situations, such as pump failures requiring replacement or significant repair.

The following resources represent KUB's primary response to SSO events at pump stations:

- Standard Pick-up Trucks
- Boom Trucks
- 240 volt 3-phase Portable Generator
- 240 volt single phase Portable Generator
- 120 volt single phase Portable Generator
- 480 volt and 208 volt 3-phase Portable Generator
- 6 inch Godwin portable bypass pump
- Combination Cleaner/Vacuum Trucks are available around the clock through an existing contractual agreement with an outside source for pump stations
- FTEs.

The following resources represent KUB's next level of response to the SSO events at pump stations:

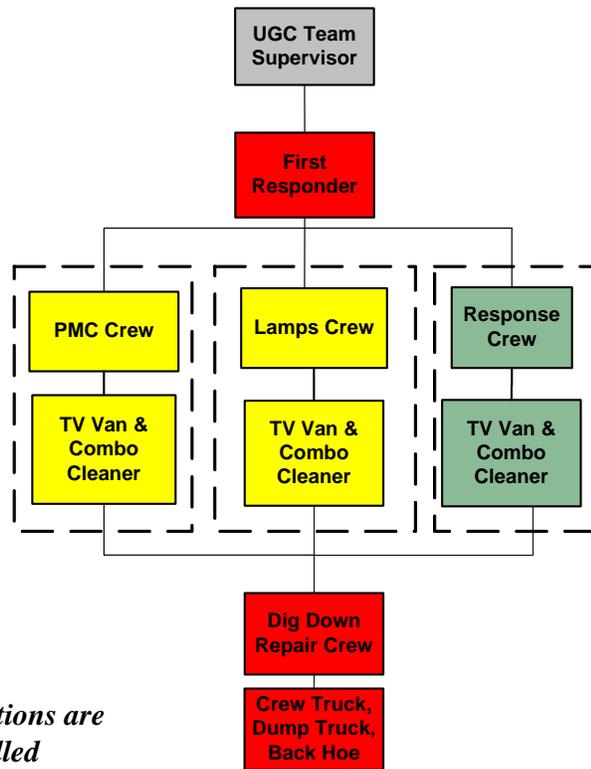
- Standard Pick-up Trucks
- Additional equipment can be obtained from UGC's Equipment Control Center
- FTEs.

KUB can dedicate additional resources to the SSO response component to meet the goals of the SORP.

3.6 Resources to Respond to SSO Events in the Gravity Collection System

Figure 2 summarizes the organizational structure of KUB's response to SSO events in the gravity collection system.

Figure 2
Resources to Respond to SSO Events in Gravity Collection System



All Budgeted Positions are Currently Filled

UGC Team Supervisor (Shaded in Grey)

The UGC Team Supervisor is a member of UGC. The supervisor oversees day-to-day maintenance, repair of sanitary sewers, and response to SSO events.

First Responders (Shaded in Red)

The First Responders are members of UGC. They provide the initial response to SSOs or other unscheduled wastewater trouble. These resources traditionally are the first KUB representatives to arrive at a reported discharge. They will initiate the KUB field response per this SORP. As wet weather events necessitate, other members of the UGC team may serve as First Responders, depending on the severity of the weather event.

Response Crew (Shaded in Green)

The Response Crew is part of UGC. This crew has similar responsibilities as the First Responders, with extended capabilities provided by hydraulic cleaning equipment to

mitigate any blockages and CCTV equipment to perform follow-up inspections. The crew will perform any containment and cleaning activities prescribed by this SORP. The primary goal of this crew is to address unscheduled activities to allow the PMC Crews to remain dedicated to their scheduled activities.



PMC Crew (Shaded in Yellow)

The PMC Crew are members of UGC. They perform scheduled preventive maintenance activities, such as hydraulic cleaning and assessment. They will supplement the Response Crew when additional resources are necessary, such as during severe wet weather events that may have caused numerous SSO events.

Lamps Crew (Shaded in Yellow)

The Lamps Crew are members of UGC. They utilize the launch camera to inspect main lines in response to wastewater trouble calls and private laterals where wastewater trouble calls are determined to be a problem on property.

Dig Down Crew (Shaded in Red)

The Dig Down/Maintenance Crew are members of UGC. The crew performs point repairs and can provide specialized resources during unique clean up activities following an SSO. Typically, this resource is used when the cause of the SSO cannot be resolved by flushing or root cutting and may require excavation.

The following resources represent KUB's primary response to the SSO events in the gravity line system: CCTV Inspection Truck, Combination Cleaner/Vacuum Truck, Standard First Responder Trucks, Pole Camera, FTEs.

The following resources represent KUB's next level of response to the SSO events in the gravity line system:

- CCTV Inspection Truck
- Combination Cleaner/Vacuum Truck
- Hydraulic Flusher
- Dump Truck
- Backhoe and Trailer
- Crew Truck
- Pick-up Truck
- FTEs.



Section 4

4.0 SORP Goals and Procedures

The goal of the SORP is to document KUB's procedure for responding to all SSOs and to ensure a consistent response. These protocols are intended to address all types of events and ensure that every effort is made to reduce the impact on the environment and protect the public from any potential health hazards associated with an overflow or backup. KUB will use its discretion and best professional judgment to evaluate each event and choose the appropriate remediation tools.

The SORP details events from the time KUB receives notification of a possible overflow until the confirmed SSO is contained and the site is remediated. The identification of the responsibilities and responses for typical SSOs are detailed in Appendix D, titled General Sewer Overflow Response Workflow.

Appendix E outlines the actions used in response to SSO events and the responsible parties for each work step.

4.1 KUB Receives Report of Possible SSO

KUB may receive a report of a possible SSO in a variety of ways. The most common and effective notification comes from individuals who witness the event and call the CIC at 524-2911. A varied number of representatives provide around-the-clock customer service seven days a week. CIC representatives take reports ranging from manhole overflows to sewage on private property. Other Customer Service employees, as well as cross-trained employees throughout KUB, can be pulled into CIC during emergencies.

KUB's more than 68,000 wastewater customers (and over 170,000 people who live or work in the service area) can identify a possible problem in the sanitary sewer system and alert KUB, through CIC, to initiate the SORP. When CIC representatives receive reports of potential wastewater problems, they initiate a Field Activity through the CIS as illustrated on page 18 under *Customer Information Center (CIC)*.

Wastewater trouble calls associated with clean up require immediate investigation by the Customer Support Department. Property damage and many other claims related calls are non-emergency situations and can be handled during regular business hours. Examples include yard, driveway, or walkway damage, as long as no personal injury was involved.

Calls from crews or other KUB employees, city employees, 911, or other agencies may go through CIC or go directly to System Operations, KUB's dispatching center. System Operations personnel are highly trained in responding to trouble calls and receive frequent updates from crews by telephone or the MDS on work order status and crew availability.

KUB also uses its many employees in the field for day-to-day operational purposes as a resource. As KUB employees are working throughout the system, they have a duty to observe problems and notify KUB of wastewater trouble issues.

KUB utilizes SSO Early Warning Monitors on manholes that are prone to surcharging.

Early Warning Monitors consist of a device to alert KUB's dispatching system of the potential for a SSO. First Responders can then monitor the sites to determine if a SSO occurs and document beginning and ending times more accurately. Windshield surveys may also be conducted during rain events as needed to identify SSOs that have yet to be reported or where Early Warning Monitors have not been installed.

KUB's Wet Weather Windshield Survey can also be utilized as a proactive inspection of locations in the sanitary sewer system that have demonstrated the likelihood to overflow during heavy rain events. Early Warning Monitors are used in some monitored locations to alert to SSO occurrences. These locations are determined based on previous SSO frequencies and modeling.

Wet Weather Surveys can be initiated under the following conditions:

- Forecasted weather conditions
- Current and/or recent wet weather conditions that are likely to have caused an overflow at monitored locations
- Flow data at key monitoring points that indicate increased likelihood of an overflow at monitored locations
- To verify the performance of Early Warning Monitors.

The initiation of wet weather surveys can be executed by the following:

- Executive Vice President
- Senior Vice President
- Vice President over Plants and Underground Construction
- Vice President over Engineering Systems and Engineering New Service / CSI
- Vice President over Regulatory Compliance and Safety / Technical Services
- Managers
- Supervisor of System Operations
- Supervisors in Underground Construction
- Collection System Improvement Team Lead
- First Responder on Duty.

The decision should be based on information available including, but not limited to, customer notifications, weather information, flow data, and experience.

In addition, automated systems also alert System Operations to possible problems. The SCADA system, for example, is installed on all of KUB pump stations, and it helps predict or identify an event and determine its duration and volume. A SCADA notification prompts dispatchers to contact Station Management Services (SMS), which investigates and remedies problems. [See Appendix A for Information Technology Resources and Descriptions.]

Customer Information Center (CIC)

For all reports of possible sewer overflows, CIC collects the following information:

- Time and date of the call
- Name of person reporting the occurrence
- Location of the event
- Description of the event
- Time noticed
- Name and phone number of the caller
- Observations such as odor and duration
- Any other information to help in response time, containment, and remediation.

When CIC receives a report of wastewater trouble, the data is entered in the CIS wastewater trouble (WWTRBL) panel as a field activity (below) and sent to System Operations. When the customer reports a possible overflow, they are asked if they want a follow-up and their contact information is acquired.

CIS Wastewater Trouble Panel

The screenshot shows a software window titled "Manage Field Orders - Use - Field Activity". The interface includes a menu bar (File, Edit, View, Go, Favorites, Use, Review, Interface, Reports, Help) and a toolbar with various icons. Below the toolbar are tabs for "Main", "Steps", and "FA Characteristics".

The main content area displays the following information:

- Field Activity:** New Field Activity is being added. **ID:** NEW
- Service Point:** Water-Multi Meter / 06 / 2715 Belcourt Dr Knoxville TN 37918-3907 - Unknown. **SP ID:** 5504934264
- Field Activity Status:** Pending (dropdown menu)
- Activity Type:** T-WWTRBL

A table below lists characteristics for the field activity:

Effective Date:	Characteristic Type:	Characteristic Value:
08/05/2004	WWTRBL Type of WasteWater Trouble	
08/05/2004	HAZARD Is this a hazard?	
08/05/2004	WHENOCUR When did problem occur?	
08/05/2004	PROP DMG Has Property Damage Occurred	
08/05/2004	SEVERITY How severe is problem?	
08/05/2004	LOC PROB Where is problem located?	
08/05/2004	1ST CALL Is this the 1st call?	YES Yes

The following figures are the pull down tables used to complete a field order.

Type of Wastewater Trouble List

Valid Values

Characteristic Type: WWTRBL

Characteristic Value:

Char Value	Descr
BROKEN SEWER	Broken Sewer
FLUSH LATRL/MAIN	Flush Lateral/Main
INSPECT LATERAL	Inspect Lateral
INSPECT MAIN	Inspect Main
INSPECT MANHOLE	Inspect Manhole
LOCATE LATERAL	Locate Lateral
LOW PRESSURE SWR	Low Pressure Sewer
LOWER MANHOLE	Lower Manhole
MANHOLE OVRFLW	Manhole Overflowing
OTHER	Other
POINT REPAIR	Point Repair
RAISE MANHOLE	Raise Manhole
REPAIR CLEAN OUT	Repair Clean Out
REPAIR LATERAL	Repair Lateral
REPAIR MANHOLE	Repair Manhole
REPAIR TEE	Repair Tee
REPLACE MNHL LID	Replace Manhole Lid
ROOT CUT LTRL/MN	Root Cut Lateral/Main
SEWAGE BACKED UP	Sewage Backed Up Into Building
SEWER LEAK	Sewer Leak
SEWER ODOR	Sewer Odor
SEWER STOPPED UP	Sewer Stopped Up
SMOKE TEST	Perform Smoke Test
TV LATERAL/MAIN	TV Lateral/Main

Type Hazard List

Valid Values

Characteristic Type: HAZARD

Characteristic Value:

Char Value	Descr
NO	No
PEDESTRIAN HAZRD	Pedestrian Hazard
TRAFFIC HAZARD	Traffic Hazard

OK

Cancel

Search

When Did The Problem Occur List

Valid Values [X]

Characteristic Type: WHENOCUR
Characteristic Value:

OK
Cancel
Search

Char Value	Descr
< 1 WEEK	Less than 1 Week
> 1 WEEK	Greater than 1 Week
TODAY	Today

Property Damage List

Valid Values [X]

Characteristic Type: PROP DMG
Characteristic Value:

OK
Cancel
Search

Char Value	Descr
NO	No
UNSURE	Unsure
YES	Yes



KUB initiates the SORP promptly after notification of a possible SSO.

4.2 System Operations

Receive a Call and Dispatch First Responder

System Operations receives a call or automated notification that initiates the SORP, creates a field activity in the CIS WWTRBL panel, and dispatches a field order by MDS to a First Responder in KUB's UGC Department. A First Responder may not be dispatched if personnel at a plant or facility have required SORP training. KUB system operators will determine the response level needed based on information obtained from the person providing the notification [Refer to the Response Actions table on page 22]. KUB considers all system failures resulting in an overflow or backup to be a high priority.

KUB will make all reasonable efforts to respond to an SSO within forty-five (45) minutes of notification with qualified and equipped personnel. Allowances will be made to ensure that the safety of the Responder and the public is the first priority.

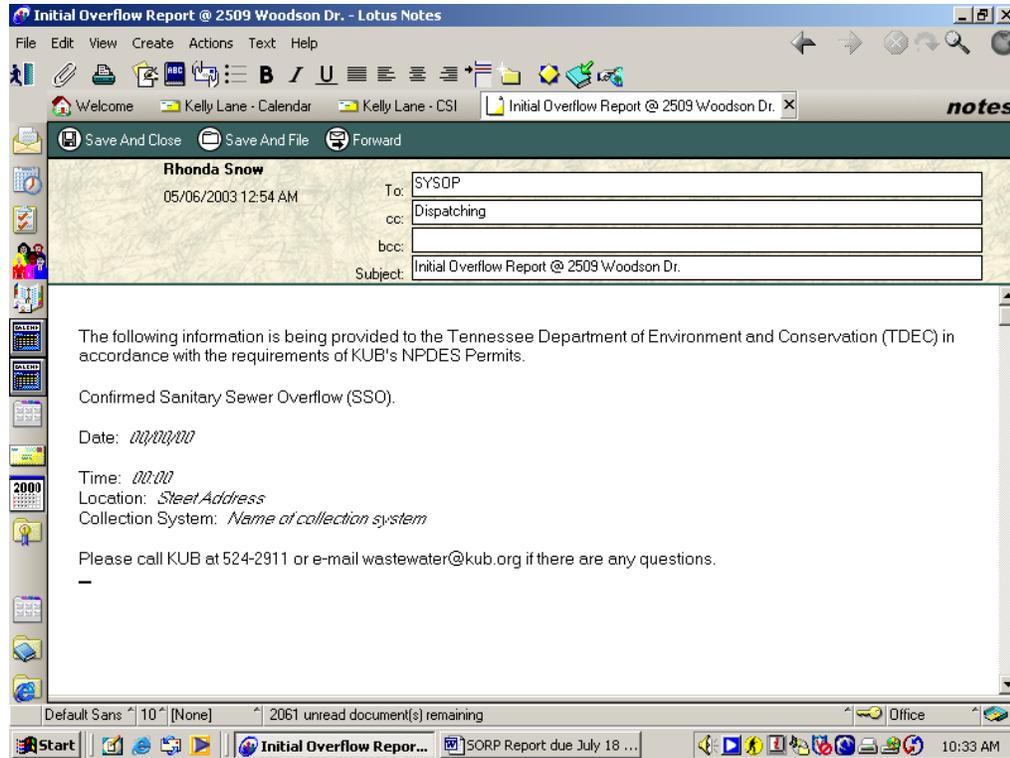
System Operations waits for the First Responder to confirm the SSO report. Until the First Responder confirms there actually is an overflow, the report is not considered an SSO.

The table below illustrates KUB’s associated response actions.

Response Level	Definition	Response	Actions
Level 1	Pump Station Failure (<i>Mechanical, Electrical, Electronic, or Power Supply</i>) Trunkline Blockage (<i>10 inches and larger</i>) Large Volume Building Backups Severe Storm/Flooding Events	Dispatch First Responders immediately and available crews if necessary	First Responders will assess situation and begin SORP activities. They can request additional resources through dispatch.
Level 2	Collector Line Blockages (<i>8 inches and smaller</i>) Low-Impact Building Backups	Dispatch First Responders	First Responders determine if additional resources are necessary.
Level 3	Normal Wet Weather Events	Initiate Wet Weather Survey	First Responders verify each site and notify dispatch if an SSO is occurring.

After confirmation of the overflow, System Operations stands by to dispatch additional resources as needed or close out field orders. System Operations is also responsible for making the Initial Overflow Report (IOR) to TDEC, which automatically updates the KUB Web site, within 24 hours of confirming an SSO.

Example of an IOR:



4.3 First Responder and Underground Construction Crews

4.3.1 Receive Work Via Mobile Data System

First Responders receive work generated from the CIS WWTRBL panel via MDS units in their vehicles. The mobile units have information on the type of event, location (map included), and additional comments. The First Responders will complete an electronic form to document the actions taken in the field to include confirmation of the SSO. This field process collects information regarding response time, location, cause, and action taken by KUB. This information is stored in KUB's Outage Management System (OMS) for reporting and system evaluation.

Example of MDS S-leak panel:

Manage Field Orders - Use - Service Trouble

File Edit View Go Favorites Use Review Interface Reports Help

Main

Premise ID: 7018473421 Virtual Premise for Reporting Trouble Knoxville TN 37921-0000 - Unknown **Trouble ID:** NEW
Call Date/Time: 01/31/05 12:19:51PM **Previous Call Date/Time:** 12/09/04 4:18:15PM **Operator Id:** MCOX

SP ID: 7018473628 WW-Residential / 01 / Virtual Premise for Reporting Trouble Knoxville TN 37921-
Street #: **Name:** **Cross St:** **County:**

Account ID: No Account Information **Premise Phone:** 865/584-1464
Authorized By: **Contact Phone:**

Current Status
Dispatch Status: **Estimated Restoration Time:** **Disposition:** **FA Id:**

Trouble Information
Trouble Type: SLEAK Sewer Leak

Additional Trouble Information	
Description	
1	<input type="checkbox"/> Is this a hazard? Please select one:
2	<input type="checkbox"/> Not a hazard
3	<input type="checkbox"/> Pedestrian
4	<input type="checkbox"/> Traffic
Description	
5	<input type="checkbox"/> Is there property damage? Please select one:
6	<input type="checkbox"/> No
7	<input type="checkbox"/> Unsure
8	<input type="checkbox"/> Yes
Description	
9	<input type="checkbox"/> When did this occur? Please select one:
10	<input type="checkbox"/> Less than 1 week ago
11	<input type="checkbox"/> More than 1 week ago
12	<input type="checkbox"/> Today
Description	
13	<input type="checkbox"/> Type of leak? Please select one:
14	<input type="checkbox"/> Grinder Pump Problem
15	<input type="checkbox"/> Low Pressure Sewer Pump
16	<input type="checkbox"/> Manhole Overflowing
17	<input type="checkbox"/> Other
18	<input type="checkbox"/> Sewage Backed up
19	<input type="checkbox"/> Sewer Leak/Broken Sewer
Description	
20	<input type="checkbox"/> Sewer Odor
21	<input type="checkbox"/> Sewer Stopped Up
22	<input type="checkbox"/> Is total premise affected? Please select one:
23	<input type="checkbox"/> No - Partial
24	<input type="checkbox"/> Unsure
25	<input type="checkbox"/> Yes - All Plumbing

4.3.2 Investigating A Sanitary Sewer Overflow

The First Responder immediately goes to the scene of a possible overflow. Anyone who has taken the required training on the SORP can confirm an SSO. Until confirmed, the report of a possible overflow is not considered an SSO.

The First Responder is responsible for ascertaining the source of the discharge or origination point of the flow and determining the cause of the discharge. This determination may vary depending on the type of overflow. To illustrate this determination process, a typical SSO originating from a KUB manhole is described.

To determine if a manhole is overflowing, the First Responder will trace either the flow or watermarks indicating the path of flow back to its source. In this example, the manhole would be recorded for the SORP notification practices. The SORP Training Component contains more information relating to the process of confirming an SSO.

Backups in buildings require additional investigation to determine if the wastewater trouble is due to problems on the KUB's system or are a result of a failure on the customer's side. To determine responsibility for a backup, the First Responder will need to ascertain the location of the cause of the backup.

Process for Investigating Building Backups

1. The First Responder will initially inspect the customer cleanout, if present, to determine if the stoppage is between the cleanout and KUB's main.
 - 1a. If the private lateral is not retaining wastewater at the cleanout located at property or easement lines, then the cause of the disruption is probably located on the private lateral, but additional investigation by the First Responder will assist in verifying this conclusion. (Advance to Process 2.)
 - 1b. If the private lateral is retaining wastewater at the cleanout, then the cause of the disruption is downstream from this location toward KUB's main; therefore, additional investigation is required to determine if the blockage is in the main or in the remaining portion of the private lateral. (Advance to Process 2.)
 - 1c. If no cleanout is present, then KUB will verify the proper operation of the main and will request that the customer have a cleanout installed at the property or easement line so that additional investigation can be performed. (Advance to Process 2.)
2. KUB inspects water levels in manholes to determine if the backup may be caused by a blockage in the main. This type of manhole inspection is conducted by inspecting downstream manholes with respect to the blockage location. If no water is flowing in the downstream manhole, or if a significant change in the flow is observed in the manhole, then KUB will flush the upstream line.

3. KUB will physically inspect the main, and private lateral where possible, using CCTV technology. If this investigation process does not reveal a blockage in KUB's WCTS, then KUB will advise the customer to contact a plumber to resolve the disruption on private property. A "Wastewater Customer's Problem Report" door hanger will be left for the customer explaining what was discovered during the investigation. [See Appendix B]
4. During severe wet weather events, or if the blockage is found to be KUB's responsibility, the First Responder will advise the customer and contact Customer Support to assist with clean up and any other property restoration determined to be KUB's responsibility.

If a property owner disputes a determination by KUB that a building backup is due to "problem on property," then they may appeal the First Responder's assessment through the KUB Customer Support Department.

Property Damage

KUB Customer Support uses independent cleaning and restoration contractors to assist in cleaning, sanitizing, and repairing damages caused by SSOs or BBUs that are directly attributed to blockages or structural failures within KUB's WCTS. All restoration contractors are licensed professionals in their area of expertise and are under contract with KUB. Cleaning and restoration contractors are available 24 hours a day and are required to respond to the overflow site as soon as practicable after notice is given by KUB.

KUB goes above and beyond the requirements of the Governmental Tort Liability Act (GTLA) and covers the cost for cleaning, disinfecting, and structural repairs when an overflow event is found to be the result of a WCTS failure. All SSO claims are managed in-house with a KUB Claims Investigator assigned to each incident. The investigator coordinates work tasks between KUB work crews and the independent contractors while keeping the customer informed of progress.

4.3.3 Determine Whether Suspicious Substances May Be Present

The First Responder determines if there are any possible suspicious substances in the discharge while investigating the SSO. If there is an oily sheen to the liquid or a strange odor, for example, then the First Responder should contact SYSOPS to dispatch the Technical Services Department for guidance on proper action and sampling requirements.

If directed, First Responders establish an interim control zone and wait for Technical Services to determine the site is safe to proceed.

4.3.4 Locate Disruption

To determine the total impacted area and the necessary remediation techniques, the Responder must first identify the location of the disruption to the sanitary sewer system and the configuration of the infrastructure.

The First Responder will have either an electronic or paper graphic of the sanitary sewer system to determine the infrastructure configuration and the necessary investigation points to be evaluated, such as downstream manholes and other potential problem areas.

The Process for Investigating Building Backups described in Section 4.3.2 can be used for locating the mainline stoppages. In particular, Steps 2 and 3 describe the process that First Responders will use to determine the location of blockages in KUB's WCTS.

An SSO cannot be confirmed until the location of the disruption is determined.

4.3.5 Identify Impacted Area

After locating the disruption, the First Responder must identify the total impacted area. The Responder will trace the impacted area and determine what environmental impacts and potential hazards to public health are present and take the appropriate steps described in the SORP Training Component to mitigate the problem. Factors to be included in evaluating the impacted or potentially impacted area, include, but are not limited to the following:

- Streams and creeks
- Stormwater infrastructure
- Private property
- Public safety and accessibility.

4.3.6 Establish Control Zone Procedures

When the First Responder identifies the area impacted by the SSO, the next step of the initial overflow response stage is to develop and implement a control zone around the impacted area. The control zone will help prevent public access around the perimeter of the affected surface area using appropriate signs and barricading practices. The purpose of the control zone is to warn those who may enter this area of potential health hazards associated with contact with SSOs. The temporary signs and barricades will warn passersby to avoid contact with this area.

4.3.7 Assess the Site

After the total impacted area has been identified and a control zone installed, the next step for the Responder is assessing the most appropriate response plan.

SSOs can occur anywhere in the sanitary sewer system, including along creeks and within public right-of-ways or dedicated public easements. The Responders understand that each event may require a unique plan of action. Spill Impact Water Quality Monitoring may be necessary depending on the impacted area, the feasibility of containment during the SSO, and the potential for material to reach the waters of the state. Responders should contact the Regulatory Compliance Department if waters could become impacted based on the flow path in the area.

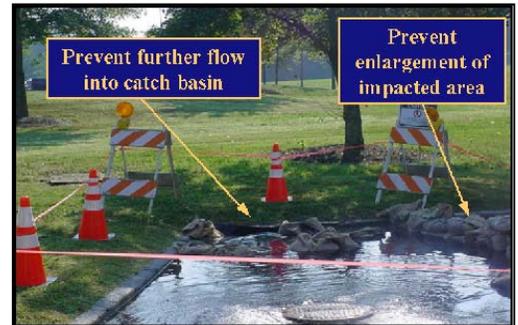
KUB will employ all reasonable means to remediate the site and restore service to customers. The Responder will determine what resources should be used. The Responder should request specific guidance immediately from the UGC Supervisor, CSI, or other designated resources for unusual situations or to ensure the proposed plan of action will meet the goals of the SORP.

4.3.8 Identify Resource and Technique Requirements

KUB will use all necessary response procedures and implement essential methods to ensure that the goals of the SORP are satisfied.

The following resources are available as needed:

- Trained personnel
- Excavation equipment
- Combination cleaner/flusher equipment
- Closed-circuit television equipment
- By-pass pumping equipment
- Other materials, such as sand bags, silt fences, lime, signs, etc.



The Responder will identify the necessary resources and techniques based on site accessibility, location of disruption of service, size of impacted area, and need to minimize the impact on the environment and the risk of hazards to public health.

Refer to Section 3.0 for additional information relating to resources available to achieve the goals of the SORP.

4.3.9 Mitigate Further Impact on the Environment and Hazards to Public Health

KUB will reduce the negative impact on the environment and hazards to public health by employing all reasonable containment activities during discharge events. Refer to the General Sewer Overflow Response Workflow in Appendix D and Table of SORP Actions and Corresponding Responsibilities in Appendix E for procedures.



4.3.9.1 Isolate or Contain SSO Discharges

Containing spills is the concept of establishing a physical barrier to control the further dispersal of sewage, thus reducing the impact on downstream areas such as private property and streams. An appropriately developed and established containment plan will consolidate the escaped sewage into a defined area. The use of combination cleaners to reclaim or vacuum the discharged sewage is now practicable. This collected volume will be estimated and included in our SORP Notification Component.

Containment procedures will vary on a case-by-case situation. The Responders should request specific guidance immediately from the UGC Supervisor, CSI, or other designated resources for unusual situations or to ensure that the proposed plan of action will

meet the goals of the SORP.

KUB will reduce the potential negative impact on the environment and public health by employing all practicable containment activities during discharge events. Typically, the type of overflow event or the size of the overflow is the criteria for deciding if filtration or containment is the most feasible approach. Refer to Section 4.3.9.2 for clarification for determining which practice, if either, is practicable.

Sandbagging or other constricting methods

When site and weather conditions allow, entry points into the stormwater system may be obstructed with various methods that may include sand bags, inflatable plugs, or simply redirecting the flow using construction equipment to “dam-up” areas with available materials.



4.3.9.2 Filtration of SSO Discharges

Filtering spills establishes a physical strainer to reduce the impact of solids, paper, etc., from the flow by stopping or reducing the spread to downstream areas, such as private property and streams.

KUB will reduce the negative impact on the environment by employing all practicable filtration activities during discharge events. Typically, the type of overflow event or the size of the overflow is the criteria for deciding if filtration or containment is the most feasible approach.

Wet Weather Overflows

During Wet Weather Overflows, the volume of the discharge can exceed the ability of the field crews to successfully contain it. For example, containment might not be practical during an intense rain event with a high volume of discharge. Filtration may be the only option until the flow subsides.

Absorption mats and booms

When site and weather conditions allow, filtration devices such as absorption booms can be used to retain solids during SSO events.

Detailed procedures for identifying opportunities to implement containment practices as well as specific procedures for the implementation of sound containment plans are included in the SORP Training Component and the SORP Field Manual.

4.3.10 Determine Whether Flow Diversion Techniques Are Practicable

When possible, flow diversion techniques provide an effective means of conveying the discharge back into the sewer system. This procedure reduces additional potential impact on the immediate area and the possible impact downstream. The flow diversion techniques employed by KUB when practicable include, but are not limited to, the following:

- **By-passing measures**

Portable by-pass pumps can be used in certain situations to collect discharged sewage from the environment and conveys it back into the sanitary sewer system beyond the disruption of service. This method is most effective in bypassing a single identified problem area when the discharge can be directed to the next downstream manhole. It is not appropriate in wet weather overflows. This type of equipment can be used in conjunction with other containment measures or may be used independently.

- **Combination cleaner/flusher procedures**

Combination cleaner/flusher equipment provides an additional resource for collecting discharged sewage and conveying it back into the sanitary sewer system beyond the disruption of service. This equipment can be used in certain situations in conjunction with other containment measures or may be used independently. Like portable by-pass pumps, this equipment is not effective in wet weather situations.

4.3.11 Mitigation/Remediation Solutions

This phase of field activities restores service to KUB wastewater customers.

The type of mitigation and remediation will vary depending on the cause of the SSO. Wet weather SSOs are usually caused by inflow and infiltration (I/I), not by blockages or other problems in the system. Mitigation is not possible until the overflow subsides, but when it does, KUB will implement all necessary steps to clean up and disinfect the overflow site.

Dry weather events may be addressed using several methods. The field professionals should identify the most effective method or combination of methods to return service to the system. Field crews should use television inspection to determine the most effective way to resolve any service disruption. CCTV inspection will identify the cause and location of the blockage and the necessary techniques needed to eliminate it.

The following summarizes common abatement resolution activities. These resolution techniques can be used independently or combined based on field conditions and CCTV inspection.

- **Roots/Grease**

Combination cleaner/flusher equipment is used to remove any grease, roots, or other obstructions from the line. A root cutter attachment may be necessary to remove the obstruction.

- **Collapsed Pipe/Sewer Breaks**

An emergency pipe repair is required to replace the defective or collapsed pipe. A work order will be initiated immediately and necessary containment and diversion procedures will be in place until the appropriate repairs are completed.

- **Mechanical Failures/Treatment Facility Malfunctions**

By-pass pumping or pump around may be used until the mechanical repairs are completed at the pump station or treatment facility. The responding crews should

notify System Operations to acquire additional support from construction crews as soon as the emergency repairs are identified.

- **Remove I/I**

KUB will evaluate wet weather SSOs and implement corrective measures as part of the Corrective Action Plan/Engineering Report.

4.3.12 Begin Clean Up

KUB's clean up of the impacted area will be thorough and comprehensive. The extent and methods employed during clean up will vary. Methods to be used (i.e., wet vacuuming or other removal of spillage, wiping floors with cleaning solution and disinfectant, flushing out and disinfecting plumbing fixtures, carpet cleaning and/or replacement, and other measures to disinfect and/or remove items potentially contaminated) are identified in the contracts with companies KUB utilizes for the clean up process.

KUB follows these general practices, depending on the individual situation:

- **Manual Practices**

Manual clean up techniques use hand tools, such as rakes, shovels, brooms, etc., to remove all readily identifiable material (sewage solids, papers, plastics, etc.) originating from the sewer system and properly dispose of it.

- **Disinfection Practices**

Apply lime or other disinfectant and deodorization agents.

- **Mechanical Practices**

When warranted, KUB will take extra steps (prior to disinfection) to remove contaminated soil. Mechanical clean up techniques, for example, use specialized excavating equipment, combination cleaner/flushers, portable aerators, by-pass pumps, etc., to remove all impacted substances and properly dispose of them. This could include the removal of impacted soil, but the UGC Supervisor, CSI, or other appropriately identified individuals will direct that practice.

The goal of the clean up practices is to restore the site to pre-event conditions. One or more of the practices may be required, depending on the size and duration of the overflow and the area impacted.

Refer to the SORP Training Component for additional information relating to KUB Clean up Practices.

4.3.13 Conduct Follow-Up Inspections

CCTV equipment, along with other investigative tools, should be used after remediation to verify the exact cause of the disruption and the success of the applied procedure or technique. If possible, the follow-up inspection should occur within two working days of remediation. The follow-up inspection tapes or digital records are inventoried and retained. Customer Support will provide guidance if CCTV needs to be completed on a main or private lateral to resolve any ongoing BBU investigation.

4.4 Public Advisory Procedures

This section describes actions KUB takes, with TDEC and other appropriate authorities, to temporarily limit public access to areas potentially impacted by discharges from the WCTS.

Public Notification Decision Matrix

Event	Action
Blockage related overflow greater than 1000 gallons into streams	KUB will place temporary signs along the creek up to 1000 yards at intervals of 200 yards or at public access points. Signs should remain in place for 48 hours after clean up is completed.
Blockage related overflow in a residential or high traffic area, such as a school or public park	KUB will place door hangers on homes or businesses that may be impacted by the overflow.
Severe weather conditions resulting in widespread overflows	KUB will issue a news release warning of potential hazards resulting from flooding, stormwater runoff, and SSOs occurring.
All other SSOs	KUB will post temporary signs and establish a control zone as described above. Control zone will remain in place until clean up is complete and potential exposure to public is removed.

4.4.1 Control Zones

The First Responder will attempt to prevent public access by establishing a control zone around the perimeter of the affected surface area using appropriate signs [see right] and barricading practices. The temporary signs and barricades will warn passersby to avoid contact with this area.

Barricading practices will include, but are not limited to, cones, warning tape, barrels, barricades, etc. The limits, duration, and most appropriate control zone plan will vary on a case-by-case situation.

The control zone does not necessarily prohibit use of recreational areas, unless posted otherwise, but provides a warning of possible public health risks from contact with sewage.

4.4.2 Location of Control Zones

Although the location of temporary signs and barricades will vary for each site, the goal will always be to warn the public to avoid contact until the clean up is complete.



When possible, the control zone will be posted:

- Just beyond the limits of the impacted surface area
- Near high pedestrian and/or vehicular traffic areas
- Other appropriate locations.

Refer to the Section 4.3.6 and the SORP Training Component for additional information relating to KUB clean up practices.

4.4.3 Duration of Control Zones

Signs and barricades will be posted as soon as the overflow is confirmed and they will remain in place until clean up activities are complete. The timeframe may vary depending on the extent of the response activities, which may include significant mitigation and clean up requirements.

4.4.4 Public Information

The UGC Supervisor/Customer Support/other designated staff will answer questions from customers about KUB's response to SSOs and, when necessary, will respond to the customer reporting the SSO to explain KUB's response. The control zone signs also include the dedicated number [524-2911] for the public to call for additional information. In the event property damage has occurred, the Customer Support Department will respond.

4.4.5 Door Hangers [See Appendix B]

Where warranted, KUB may use a "Sanitary Sewer Overflow Alert" door hanger with blanks for the date and location of overflows that can be filled in as needed in the field and left for customers. The door hanger includes ways customers can contact KUB for more information. This door hanger can be used to notify multiple customers of a blockage related SSO occurring in a high traffic area.

KUB also uses a "Wastewater Customer's Problem Report" door hanger. This door hanger has options that can be marked to explain the different stages of KUB's investigation, which alert customers as to what KUB has discovered, how the problem will be remediated if it is on KUB's sewer line, or what the customer must do next. This door hanger is left any time a customer reports a wastewater problem, whether an SSO or BBU occurred or not.

4.4.6 News Release [See Appendix B]

KUB maintains a standard news release on SSOs that can be quickly adapted to the particular situation and issued if KUB determines there is a significant threat to public health.

4.4.7 Customer Letters [See Appendix B]

In situations where a grease blockage has been identified, KUB sends letters to residential and commercial customers in the affected area. The letters ask for the customers' help in alleviating future SSOs by disposing of grease properly and include a brochure on proper disposal and other promotional materials.

4.4.8 KUB Web Site [See www.kub.org]

KUB will continue to post SSOs (excluding building backups) on its Web site within 24 hours of when they occur. The log can be found by going to the Residential Customers page and selecting Sewer Overflows from the menu at the bottom right. The posting will include, at a minimum, the following information:

- Date
- Time
- Location and estimated volume of the overflow
- Status and date of clean up efforts.

This information will remain archived and indexed on the KUB Web site.

4.4.9 Permanent Archiving

KUB will use the KUB Web site (www.kub.org) as an information warehouse for various wastewater programs and records to include the SORP, the SSO Log, SSOER, and CAP/ER etc. Knox County libraries provide computers that are available for public use at no charge.

4.5 Notification Procedures for External Organizations

When an SSO occurs, KUB performs the appropriate notification procedures as specified in its NPDES permit.

Types of Notification of SSO Events:

- **Immediate Notification [See 4.2 above.]**

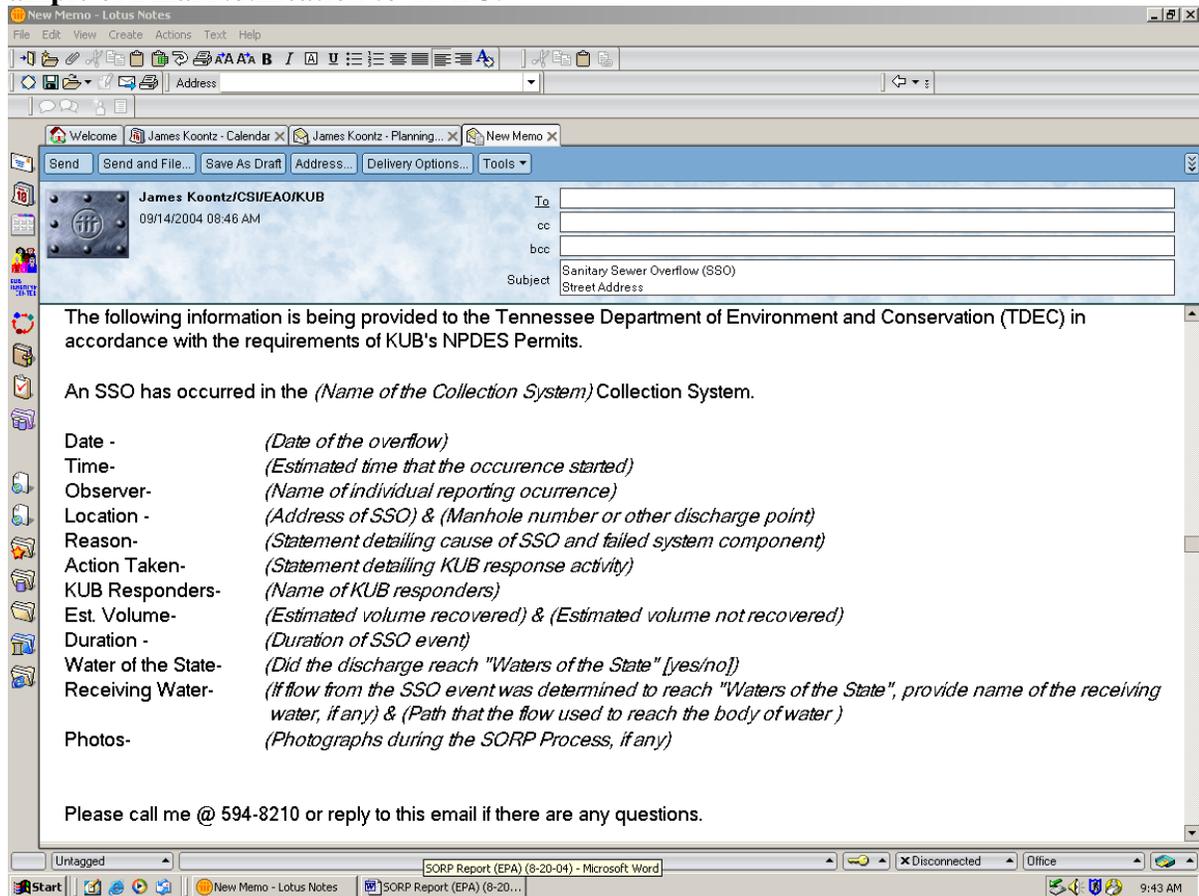
System Operations sends TDEC's Division of Water Pollution Control, Knoxville Environmental Field Office an electronic Initial Overflow Report (IOR) within 24 hours of a confirmed SSO. KUB is also available to reply to any requests for additional information by TDEC.

- **Secondary Notification**

CSI sends TDEC's Division of Water Pollution Control, Knoxville Environmental Field Office an electronic Final Overflow Report within five days of a confirmed SSO. KUB will also be available to reply to any requests for additional information by TDEC.

Key KUB personnel and contacts for the City of Knoxville and the Knox County Health Department are copied on all Immediate and Secondary Notifications. CSI maintains the names and contact information for these people.

Example of Final Notification to TDEC:



- **Monthly Notification**

CSI summarizes the SSOs for the calendar month into a report and attaches the document to its NPDES Discharge Monitoring Report. The information included in the monthly report is the same information conveyed in the Final Overflow Report.

4.6 Required Reporting Information

The collection of necessary information by responding professionals as described in Section 4.1 is crucial to provide accurate reporting.

To facilitate accurate record keeping and notification procedures, KUB collects the following information:

- Date and estimated time of the occurrence
The date and estimated time reported when First Responders or caller first identified the occurrence.
- Name of individual reporting occurrence
- Location and street address of SSO (include KUB manhole number)
- Cause of SSO and failed system component
- KUB response activities
- Name of KUB Responders

- An estimation of the volume recovered and not recovered
- Duration of SSO event
- Did the discharge reach “Waters of the State” (Yes/No)?
- Name of receiving water and path, if applicable

If flow from the SSO event was determined to reach “Waters of the State,” provide the name of the receiving water, if any. Also, provide the path that the flow used to reach this body of water to the extent field conditions or equipment will allow. The following is a list of typical water conveyance components.

Potential path to Waters of the State

- Stormwater Pipe/Catch Basin
 - Ditch or Swale
 - Detention/Retention Basin
 - Creek/River.
- Photos of SSO and after clean up attached.
Digital photographs will be taken when possible during the confirmed SSO and following clean up. Situations that may affect the ability to photograph SSO and responses include time of day, location, and equipment availability.

Estimating overflow volumes is a critical component of the reporting procedures. These basic techniques are available to determine the amount of discharge that has occurred.

- Calculating Rectangular Spill Areas
- Calculating Based on Duration and Number of Residential Services
- Calculating Based on Vent Hole Analysis
- Calculating Based on Gap Around Manhole
- Calculating Based on No Manhole Lid
- Calculating Discharge from Pump station or Pressurized System
- Manhole Flow Excel worksheet
- Surface Area Calculation Excel worksheet

Refer to Appendix C for estimation methods for these techniques. The Manhole Flow and Surface Area Calculation Excel worksheets have pre-filled formulas which calculate flow. The calculations are the same in both the Excel worksheets and the paper forms.

The technique of estimating the volume discharged based on duration and measured flow rate is not the preferred method. The most appropriate application of this technique relates to overflows occurring at pump stations. The flow rate is extremely difficult to measure outside the confinements of the pump station scenario, therefore that technique will not be used in non-pump station scenarios.

4.7 SSO and Building Backup Tracking

Information regarding SSOs and building backups captured during the SORP process is stored in a database that is used for both record keeping and reporting purposes. Monthly reports are generated from the database that illustrate the following information:

- Number of occurrences

- Breakdown by cause
- Month-by-month comparison of occurrences.

4.8 Respond to Trouble Process Management

KUB's "respond to trouble" process for wastewater and other utilities requires several departments throughout the organization. To ensure appropriate response, the Vice President over Operations owns and oversees this process. Using key performance measures, the process owner will monitor response levels and will coordinate with department managers to ensure appropriate resources are available for a timely and correct response to wastewater trouble.

4.9 Critical Incident Review Process

In the event of a critical system component failure, such as a pump station or a breakdown in response to wastewater trouble, the process owner and/or his designated staff will initiate a critical incident review with the departments involved in response to perform a root-cause analysis and provide recommendations that may prevent future occurrences or improve response.

4.10 Performance Goals

To measure the performance of the "respond to wastewater trouble" process, KUB will track the following performance indicators:

- Response time from notification to arrival of the First Responder on site
- Quality of response
- Safety incident during wastewater trouble response.

4.11 Quality Assurance

To ensure an appropriate response to wastewater trouble events, including SSOs, members of the CSI team will periodically audit the response to evaluate how effectively the crew implemented the requirements of the SORP. CSI team members who have working knowledge of the SORP requirements will evaluate each event using the table in Appendix E. The evaluator will compare the actual response with standards of the SORP listed in the table. If opportunities for improvement are identified, CSI will initiate appropriate resolution.

Section 5

5.1 SORP Training Component

All employees involved in responding to SSO events will have annual training to ensure compliance with the SORP. Key personnel from UGC, CSI, SYSOPS, Plants, Technical Services, Customer Support, and Regulatory Compliance will receive training on the specific SORP activities in which each group is involved. These training sessions will be organized based on the latest SORP, as well as other reference materials. Training sessions will be supplemented with a practical hands-on field component to ensure all response personnel are prepared for all anticipated situations.

KUB's Regulatory Compliance Department will ensure all annual updates are included in the training. Regulatory Compliance will also oversee the SORP to ensure that the established procedures are being followed during implementation and field operation.

5.2 Review and Update SORP

KUB will review the SORP annually and amend it as appropriate. Review shall include, at a minimum, the following activities:

- Conduct workshop with managers and key personnel to review response activities and gather suggestions for new or revised procedures
- Review all contact lists and update as necessary
- Update the SORP when TDEC issues a new or revised NPDES permit.

5.3 Distribution and Availability of SORP

Copies of the SORP and any amendments will be distributed to employees directly responsible for responding to SSOs. An electronic version is maintained in the Public Document Repository on the KUB website and is available to all employees.

Appendices - Supporting Information

Appendix A: Information Technology Resources and Descriptions

- 1.0 Geographic Information System (GIS)
- 1.1 View of the GIS System and Description of Components Shown
- 2.0 Customer Information System (CIS)
- 3.0 Interactive Voice Response System (IVR)
- 4.0 System Control and Data Acquisition System (SCADA)
- 5.0 Mobile Data Systems (MDS)

Appendix B: Public Advisory Procedure Example

- 1.0 Sanitary Sewer Overflow Alert door hanger
- 2.0 Sanitary Sewer Overflow News Release
- 3.0 Wastewater Customer's Problem Report door hanger
- 4.0 Post-Inspection Notification (commercial and residential grease contributors)
- 5.0 Potential Residential Grease Contributor Form Letter
- 6.0 Potential Commercial Grease Contributor Form Letter
- 7.0 Can the Grease Brochure

Appendix C: Estimation Techniques

Appendix D: General Sewer Overflow Response Workflow

Appendix E: Table of SORP Actions and Corresponding Responsibilities

Appendix F: KUB Organizational Chart

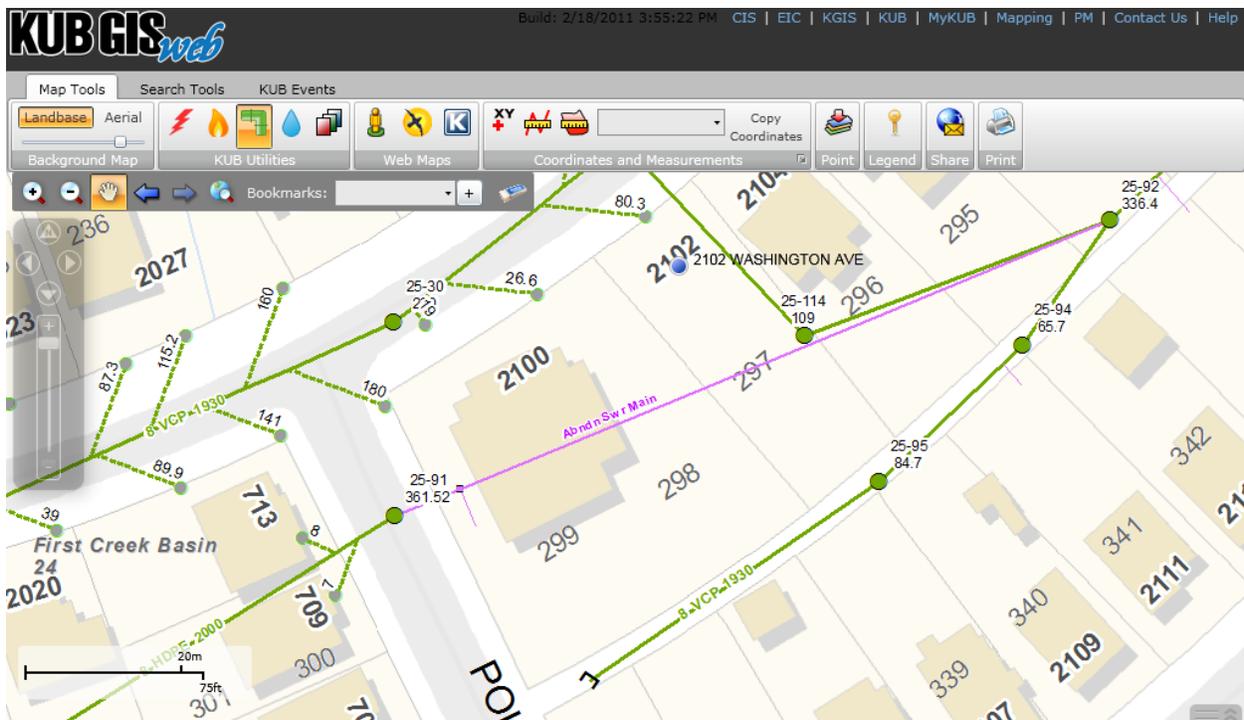
Appendix A: Information Technology Resources and Descriptions

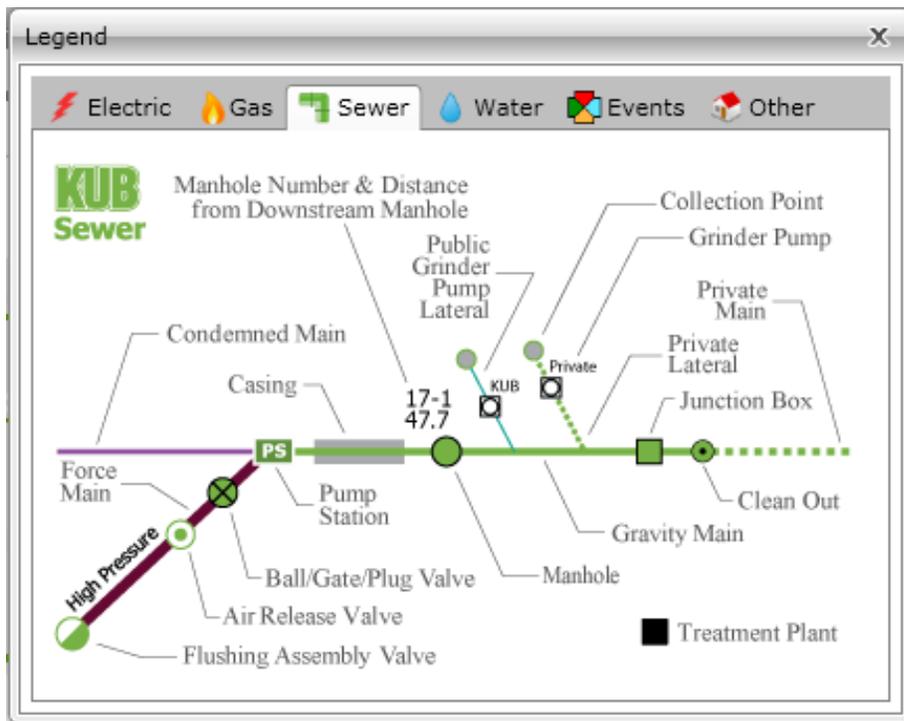
1.0 Geographic Information System (GIS)

KUB's GIS is an ESRI-based system that provides employees with landbase features, aerial photography, and utility information. The City of Knoxville, Knox County, and KUB use the same core software so they are able to merge the data that all three entities maintain into single applications. The City and County maintain all landbase features such as a addressing and property. KGIS routinely updates the aerial photography and provides system, network, and programming support to all three entities. KUB exclusively maintains all utility features in KUB's service area, which extends outside the boundaries of Knox County.

Most GIS users at KUB are accessing GIS data through a web mapping application similar in look and feel to Google Maps. This is available to anyone on KUB's network, including field users with air cards.

1.1 View of the GIS System and Description of Components Shown





2.0 Customer Information System (CIS)

This system maintains records of account numbers, premise details, and other customer information. It also generates work orders and facilitates workflow between departments while keeping a record of activities requested by a particular customer or group of customers.

The CIS system allows requests to be passed from the Customer Information Center to System Operations as a field activity, which is then dispatched to the First Responder and crews as a field order. Information may be received on closure, such as steps taken for remediation, and more specific information about location, such as manhole number.

Requests received from customers as well as internal requests are entered into the CIS in the field activity panel. Information including customer name (if applicable), location, specific problem, and any additional comments that would help in the swift response to the request is recorded.

3.0 Interactive Voice Response System (IVR)

The IVR is the automated system that enables customer calls to be routed to the appropriate KUB representative. This system allows KUB to shorten hold times, provide fewer call transfers to the customer, and ensure that urgent calls are answered before lower priority calls.

Callers choose from options that include reporting an electric, gas, water, or wastewater emergency. Callers may also press 0 at any time to be connected to a customer service representative.

4.0 System Control and Data Acquisition System (SCADA)

The automated SCADA system may also initiate a field order through System Operations. SCADA notifies System Operations if there is a system failure in any of KUB's pump stations. That prompts System Operations to contact Station Management Services (SMS), which investigates the event and remediates the problem. The possible overflow has then either been prevented or is cleaned up. SCADA gives valuable information on the duration and volume of the overflow. SCADA is also used to identify system improvements and the operability of the station and to identify potential SSO events so that measures can be taken to prevent a discharge.

5.0 Mobile Data Systems (MDS)

Field orders are dispatched to First Responders from CIS through the MDS system. MDS refers to the automated dispatching system that includes laptop computers in First Responders' trucks. The GIS system is also used in the field to provide a map of the area to show the location of the sewer line and of the nearest residence or manhole.

Appendix B: Public Advisory Procedure Examples

1.0 Sanitary Sewer Overflow Alert door hanger

Sanitary Sewer Overflow Alert

A sanitary sewer overflow occurred in your area

on _____

at _____

KUB posted temporary signs alerting the public to avoid physical contact with the overflow, and we will clean and sanitize the area as quickly as possible.

If you, your family, or your pets do have contact with the overflow, wash thoroughly with soap and water. Remember: Washing your hands carefully and often is the best defense against illness carried by animal or human waste.

KUB maintains a log of recent overflows and clean up efforts and other wastewater information at www.kub.org. If you have questions please call KUB at 524-2911 or e-mail wastewater@kub.org.



2.0 Sanitary Sewer Overflow news release

NEWS RELEASE

DATE XXXXXXXXXX
For Immediate Release

For More Information
Contact: Pam Jordan
KUB Communications
865-594-7988

KUB Alerts Customers to Sanitary Sewer Overflow

KUB issued an alert today to people in the [\[insert area\(s\)\]](#) concerning a sanitary sewer overflow.

“The overflow occurred as a result of [heavy rain/ a blockage/ or other],” said Bill Elmore, KUB Chief Operating Officer. “KUB responds to overflows in a manner consistent with national standards. We warn passersby to avoid contact by posting signs and using barricades, and we disinfect the area after the overflow stops.”

[\[Note: Use this paragraph if the overflow is in a park/significantly affects a stream/etc.\]](#)

The signs do not necessarily prohibit use of recreational areas, unless posted otherwise. The Tennessee Department of Environment and Conservation (TDEC) determines whether to post nearby waterways that may have been affected if water quality testing indicates a need.

Overflows pose hazards similar to those in public restrooms or even your own bathroom. If you, your family, or your pets do have contact with the overflow, wash thoroughly with soap and water. Remember: Washing your hands carefully and often is the best defense against illness carried by animal or human waste.

KUB maintains a log of recent overflows and clean up efforts and other wastewater information at www.kub.org. If you have questions or need to report an overflow, please call KUB at 524-2911.

#####

3.0 Wastewater Customer's Problem Report door hanger

Wastewater Customer's Problem Report

A KUB crew responded to your report of a possible wastewater problem at your property on ____/____/____. The findings are marked below:

- We found no apparent problem on KUB's sewer main. KUB will investigate further and you will receive additional information as soon as it is available. If you are unable to use your sewer services, you should contact a plumber immediately to restore your service.
- We found a problem on KUB's sewer line.
 - A maintenance crew is responding as soon as possible.
 - The crew cleaned the line/made repairs.
 - KUB will schedule a work crew within _____ days.

Contact Your Plumber

KUB has completed additional investigation and:

- We found no problem on the private lateral* at this time. You may have a problem with your internal plumbing.
- We found a blockage in your private lateral. Contact your plumber to clear the blockage.
- We found a problem on your line that needs attention by your plumber. KUB may contact you with details about additional required repairs.

We may have more information on the problem. If you or your plumber have questions about your lateral, please call us at (865) 594-8270.

**Your lateral connects your property to KUB's sewer. The property owner owns the lateral and is responsible for repairing and maintaining it.*



www.kub.org • (865) 524-2911

WWProbOnProperty-Y11M4-(Green)

4.0 Post-Inspection Notification (commercial and residential grease contributors)

 **Alan Seegraves/LRC/FIN/KUB**
01/18/2011 01:27 PM

To: Thomas Hauck/CS/EAO/KUB@KUB, Randall Skeen/UGC/CST/KUB@KUB, Jason Brooks/CS/EAO/KUB@KUB, Dwayne Frye/CS/EAO/KUB@KUB, Kelly Lane/CCR/CSV/KUB@KUB, Ben Parker/PLT/EAO/KUB@KUB, Doug

cc: Wayne Loveday/CS/EAO/KUB@KUB, Debbie Ailey/PLT/EAO/KUB@KUB, David Obenschain/PLT/EAO/KUB@KUB, Ben Parker/PLT/EAO/KUB@KUB, Mary Brown/ODD/CSV/KUB@KUB, Jeff Holbert/UGC/CST/KUB@KUB, Stats@KUB, Leanne

bcc:

Subject: 2726 Wilson Avenue (MH 8-1) Residential and Commercial SSO

History:  This message has been forwarded.

An SSO has occurred in the Kuwahee Collection System.

Date - January 8, 2011
Time - 6:45 PM
Observer - KUB Customer - Mrs. Logan
Location - 2726 Wilson Avenue (Manhole 8-1)
Reason - There was a partial blockage in the sewer main caused by grease.
Action Taken - The sewer main was flushed to clear the blockage.
The area was cleaned.
KUB Responders - Bruce Lett, Bradley Cardwell, Marshall Middlebrook
Est. Recovered Volume - 0 gallons
Est. Not Recovered Volume - 760 gallons
Duration - 1.5 Hours
Water of the State - No
Receiving Water - Pavement to Soil Saturation
Photographs - Copies of photographs are available upon request.

[Follow-up MH Investigation Report \(Residential and Commercial Overflow\) SSO](#)

Initial Investigation Date: January 18, 2011

Results: 225 residential customers and four commercial facilities were identified as potential grease contributors.

Identified Contributor: 225 residential customers and four commercial facilities were identified as potential grease contributors from a Landviewer query.

Comments: 225 residential customers have been mailed or hand-delivered can the grease educational materials. The four commercial facilities will be inspected for proper grease control equipment.

GC Post-SSO Comments:



Alan Seegraves
Program Tech. II
x-8282

5.0 Potential Residential Grease Contributor Form Letter



Dear KUB Customer:

KUB recently experienced a sewer overflow in your neighborhood caused by cooking-grease buildup. We're asking your help to prevent grease-related blockages by disposing of cooking grease properly.

If you pour grease down your drains, it may build up, block your pipes, and cause rancid odors or messy, costly sewage backups in your home. It can also clog KUB's sewer lines and cause overflows, which are a potential threat to our environment.

Contrary to the old wives' tale, running hot water to keep grease from clogging pipes won't help, but the enclosed brochure has simple tips that will. What is the best way to help keep grease from causing problems? Can it.

It's easy to make a grease can out of a metal coffee can with a plastic lid or an empty metal soup or vegetable can. Just insert the enclosed disposable liner, wait for grease to cool slightly, and carefully pour the hot grease into the can. [*Caution: Hot grease can cause burns. Place the can on a stable surface before pouring grease, and do not use the liner without the can.*] After you toss the first liner in the trash, replace it with a heat-resistant oven bag and keep using the can to protect your plumbing and our environment.

In addition to promoting proper grease disposal, we want to help you and your family stay healthy. That's why we post signs and barricades at overflows to warn you to avoid contact until we clean up and disinfect the area. Overflows contain everything that goes down your drains – water from washers, dishwashers, sinks, showers, and toilets. The toilet water is diluted by the other water, but it can still expose you to bacteria and viruses that can cause illness.

The Centers for Disease Control and Prevention (CDC) says skin contact doesn't pose a serious health risk, but there is some risk of disease from swallowing bacteria. So, we urge you to always wash your hands before preparing or eating food, after using the bathroom (or helping someone else use the bathroom, changing diapers, cleaning toilets, etc.), and after handling anything that had contact with floodwater or sewage. [[See www.bt.cdc.gov/disasters/floods/sanitation.asp](http://www.bt.cdc.gov/disasters/floods/sanitation.asp) for more information.]

KUB is dedicated to operating our wastewater system in an environmentally responsible manner and providing cost-effective service to our customers. If you have questions, please call me at (865) 594-8337. You are a valued KUB customer, and we appreciate your help in protecting our environment and ensuring the reliability of our wastewater system.

Sincerely,

A handwritten signature in black ink that reads "Mary Brown". The signature is written in a cursive style.

Mary Brown
Pretreatment Program Coordinator

Electricity • Water • Wastewater • Gas

P.O. Box 59017•Knoxville, TN 37950-9017•(865) 524-2911•www.kub.org

6.0 Potential Commercial Grease Contributor Form Letter

DATE

«CUSTOMER»

«ADDRESS»

«CITY», «STATE» «POSTAL»

Dear «CUSTOMER»:

KUB is dedicated to operating our wastewater system in an environmentally responsible manner and providing cost-effective wastewater service to our customers. To balance those responsibilities, we need your help to alleviate sanitary sewer overflows.

We recently had a grease-related overflow in your area at [Insert Location] on [Date]. When overflows occur, we post signs and barricades to warn everyone to avoid contact until we can clean up and disinfect the area.

We're sending this letter to alert you to the overflow and ask for your help in preventing future overflows by disposing of grease properly. Many overflows occur when fats, oils, and grease build up inside pipes, especially in areas where several facilities provide food service or where there are high concentrations of residential customers.

KUB representatives are also contacting nearby customers to advise them of proper grease control procedures. Our representative will call soon to schedule a convenient time to

collect data on your grease control equipment and practices. (restaurants and hospitals)

assist your tenants with ways to safely dispose of grease. (trailer parks, apartments)

If you have questions or need further details, please call me at (865) 594-8337. You are a valued customer of KUB, and we appreciate your help in protecting our environment and ensuring the reliability of our wastewater system.

Sincerely,



Mary Brown
Regulatory Compliance

MB: [insert initials]

Enclosures

7.0 Can the Grease Brochure

How can you help protect your home's plumbing and our environment?

- Never pour grease down sinks, toilets, or any drains.
- Pour grease into a can for disposal in the trash. You can make your own grease can using any empty metal can (not plastic, which melts) and disposable, heat-resistant oven bags. Just toss the bags in the trash (after grease cools) and reuse the can. [Note: Please use caution when pouring hot grease or wait for it to cool slightly. Hot grease can burn skin.]
- Scrape grease and food scraps into a can or the trash for disposal.
- Use strainers in sinks to catch food scraps, and empty the strainers into the trash.
- Don't rely on a garbage disposal to get rid of grease—it grinds food into smaller pieces, but it doesn't keep grease from going down the drain.
- Wipe cookware and dishes before washing. Commercial additives in detergents only dissolve grease temporarily.
- Clean kitchen exhaust system filters routinely.
- Talk with your friends and neighbors about the grease problem, so that the community is aware of the risk.
- Call KUB at 524-2911 if you have any questions about grease. You may also e-mail wastewater@kub.org if you have questions about sewer system operations and maintenance.

Safety Tip

If you have a grease-related sewer backup or see an overflow outside, avoid contact or wash with soap and water. The Centers for Disease Control and Prevention (CDC) says skin contact isn't a serious health risk, but swallowing bacteria or a virus may cause illness. So always wash your hands before preparing or eating food, after using the bathroom (or helping another as a caregiver), and after touching objects exposed to a backup. For more information, visit the CDC Web site at www.bt.cdc.gov/disasters/floods/sanitation.asp.



P.O. Box 59017
Knoxville, TN 37950-9017
865-524-2911
www.kub.org
wastewater@kub.org

CGYSMS

Don't pour cooking grease down drains.

Cooking grease is a major cause of sewer backups in homes.

Why is cooking grease a problem?

If you pour cooking grease down your drains, it may build up, block your pipes, and cause rancid odors or messy, costly sewage backups in your home.

It can also clog KUB's sewer lines. In fact, grease is a major cause of dry weather sewer overflows, which are a potential threat to our environment.

And don't believe the old wives' tale about running hot water after pouring grease down the drain: It doesn't work. The grease eventually cools, then congeals and coats pipes. When enough grease builds up, it can block your plumbing or KUB's sewer lines.

Where is grease produced?

Restaurants, condominiums, apartment buildings, homes, schools, churches, food-processing plants, shopping malls, hospitals, hotels, and many more locations all produce grease.

Grease is a by-product of cooking and is found in things like these:

- Meat fats
- Lard
- Cooking oil
- Shortening
- Butter and margarine
- Food scraps
- Baking goods
- Sauces
- Dairy products

What problems are caused by grease?

- Clogged drains or toilets.
- Sewage backups into your home.
- Sewer overflows in neighborhood parks, yards, and streets.
- Rancid odors.
- Expensive cleanup, repair, and replacement of damaged property.
- Potential contact with bacteria and viruses that can cause illness.
- Higher operating and maintenance costs, potentially resulting in higher sewer bills for you.

Never pour grease down sink drains or other drains. Scrape grease and food scraps from all cookware and dishes into a can or the trash for disposal.

How can you help Can the Grease? Make your own can.

KUB gives out a limited number of Can the Grease cans to raise awareness about disposing of grease in a way that's good for your plumbing, KUB's sewer system, and our environment.

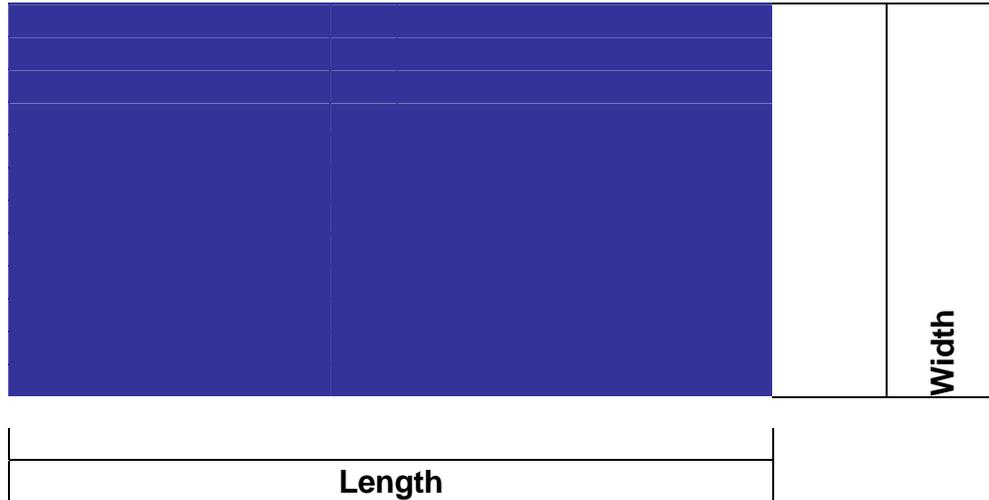
But you don't need an "official" can to get started. A metal coffee can with a plastic lid or empty metal soup or vegetable cans make great grease cans. Line your can with disposable heat-resistant oven bags. Throw the liners away (after grease cools) and reuse the can.

Prevent grease-related sewage overflows: Keep cooking grease out of the sewer system.



Appendix C: Estimation Techniques

Volume Discharge Estimation Calculating Rectangular Spill Areas



Date: _____ Location: _____ Employee #: _____

Length of Spill (Ft): _____ (1)

Width of Spill (Ft): _____ (2)

Area of Spill (Sq. Ft) _____ (3) = (1) x (2)

Depth of Discharge (Feet): _____ (4)

Convert Inches to Feet by Dividing by 12

Estimated Volume of Discharge: _____ (5) = (3) x (4)

Convert Cubic Feet to Gallons: _____ (6) = (5) x 7.48

Report Estimate Discharge Volume: _____ (6)

Example

The approximate spill area is 100 feet by 50 feet and 6 inches deep. What is the Estimated Volume?

Length of Spill (Ft): 100 (1)

Width of Spill (Ft): 50 (2)

Area of Spill (Sq. Ft) 5000 (3) = (1) x (2)

Depth of Discharge (Feet): 6/12 = 0.5 (4)

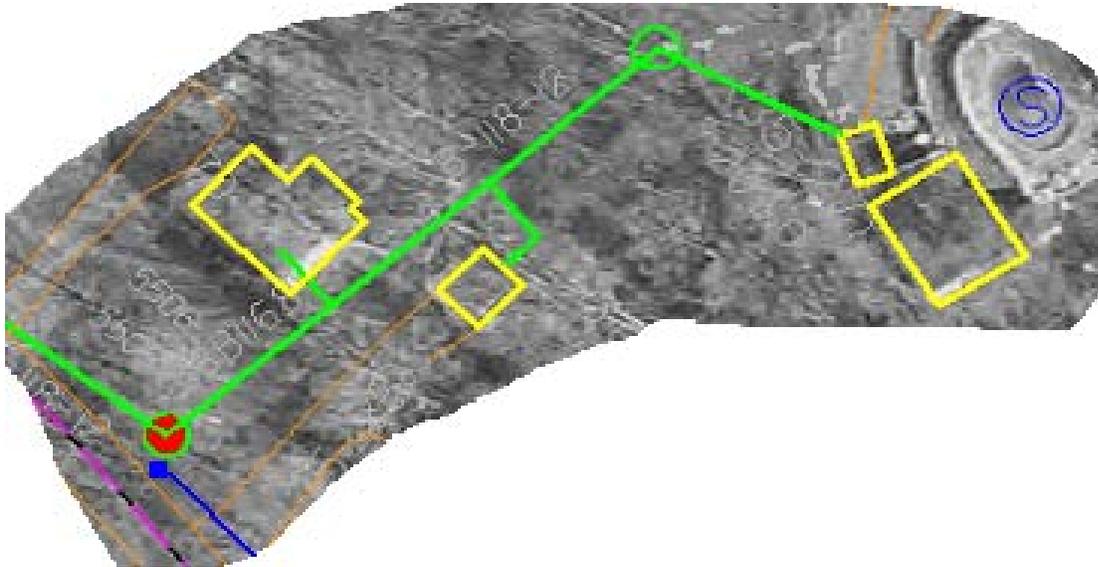
Estimated Volume of Discharge: 2500 (5) = (3) x (4)

Convert Cubic Feet to Gallons: 18,700 (6) = (5) x 7.48

Report Estimate Discharge Volume: 18,700 Gallons (6)

Volume Discharge Estimation

Calculating Based On Duration and Number of Residential Services



Date: _____

Location: _____ Employee #: _____

Duration of Spill (Hours): _____ (1)

Convert Hours to Days: _____ (2)

Convert Hours to Days by Dividing by 24

Number of Upstream Residential Homes: _____ (3)

Calculate Flow: _____ (4) = (2) x (3) x 240

Report Estimate Discharge Volume: _____

----- Note: This method assumes no introduction of I/I and Complete Blockage of System -----

Example

Sewage has been discharging for 18 hours and 3 single-family homes are connected upstream. What is the Estimated Volume?

Duration of Spill (Hours): 18 (1)

Convert Hours to Days: 18/24 = 0.75 (2)

Convert Hours to Days by Dividing by 24

Number of Upstream Residential Homes: 3 (3)

Calculate Flow: 540 Gallons (4) = (2) x (3) x 240

Report Estimate Discharge Volume: 540 Gallons

Volume Discharge Estimation
Calculating based on Vent Hole Analysis



Date: _____

Location: _____

Employee #: _____

Size of vent holes overflowing _____

Duration of event (Minutes): _____ (1)

Convert hours to minutes by multiplying by 60

Height of discharge of vent hole (Inches): _____

Refer to Overflow Table 1 for flow (gpm) _____ (2)

Number of vent holes overflowing: _____ (3)

Calculate total flow (gpm): _____ (4) = (2) x (3)

Calculate volume (gallon): _____ (5) = (1) x (4)

Report Estimate Discharge Volume: _____ (5)

Note: Overflow Table 1 is located in the SORP Field Manual

Example

Size of vent holes overflowing 0.75"

Duration of event (Minutes): 60 min (1)

Convert hours to minutes by multiplying by 60

Height of discharge of vent hole (Inches): 1"

Refer to Overflow Table 1 for flow (gpm) 2.0 gpm/vent hole (2)

Number of vent holes overflowing: 3 (3)

Calculate total flow (gpm): 2.0 x 3 = 6 gpm (4) = (2) x (3)

Calculate volume (gallon): 60 x 6 = 360 gal (5) = (1) x (4)

Report Estimate Discharge Volume: 360 Gallons (5)

Volume Discharge Estimation
Calculating based on Gap Around Manhole



Date: _____ Location: _____ Employee #: _____

Width of the gap around the manhole (Inches): _____

Height of the discharge (Inches): _____

Duration of event (Minutes): _____ (1)

Convert hours to minutes by multiplying by 60

Refer to Overflow Table 2 for flow (gpm): _____ (2)

Calculate volume (gallon): _____ (3) = (1) x (2)

Report Estimate Discharge Volume: _____ (3)

Note: Overflow Table 2 is located in the SORP Field Manual

Example

Sewage has been discharging for 6 hours from around a partially seated manhole lid. The width of the sewer discharging from around the lid is 1/2". The height of the discharge from the top of the manhole riser is 2".

What is the Estimated Volume of discharge to be reported?

Width of the gap around the manhole (Inches): 0.50"

Height of the discharge (Inches): 2"

Duration of event (Minutes): 6 x 60 = 360 min (1)

Convert hours to minutes by multiplying by 60

Refer to Overflow Table 2 for flow (gpm): 9 gpm (2)

360 x 9 = 3,240

Calculate volume (gallon): gal (3) = (1) x (2)

Report Estimate Discharge Volume: 3,240 gallons (3)

Volume Discharge Estimation

Calculating based on No Manhole Lid



Date: _____ Location: _____ Employee #: _____

Diameter of manhole opening: _____

Height of the discharge (Inches): _____

Duration of event (Minutes): _____ (1)

Convert hours to minutes by multiplying by 60

Refer to Overflow Table 3 for flow (gpm) _____ (2)

Calculate volume (gallon): _____ (3) = (1) x (2)

Report Estimate Discharge Volume: _____ (3)

Note: Overflow Table 3 is located in the SORP Field Manual

Example

The lid of a 36" manhole is missing and sewage has been discharging for about an hour and a half. The height of the discharge is approximately 6". What is the estimated volume to be reported?

Diameter of manhole opening _____ 36" _____

Height of the discharge (Inches): _____ 6" _____

Duration of event (Minutes): _____ 1.5 x 60 = 90 min _____ (1)

Convert hours to minutes by multiplying by 60

Refer to Overflow Table 3 for flow (gpm) _____ 1,586 gpm _____ (2)

Calculate volume (gallon): _____ 90 x 1,586 = 142,740 gal _____ (3) = (1) x (2)

Report Estimate Discharge Volume: _____ 142,740 gallons _____ (3)

Volume Discharge Estimation

Calculating discharge from Pump station or Pressurized System



Pump station flow rate during overflow event (gpm): _____ (1)

Duration of event (Minutes): _____ (2)

Convert hours to minutes by multiplying by 60

Calculate volume (gallon): _____ (3) = (1) x (2)

Report Estimate Discharge Volume: _____ (3)

Note: The flow rate during the event will be acquired from SMS.

Example

A 4" force main breaks and discharges for 2 hours until field crews are able to disengage the pump station. From records, SMS reports that the flow rate during the discharge was 79 gpm. What is the estimated volume to be reported?

Pump station flow rate during overflow event (gpm): 79 gpm (1)

Duration of event (Minutes): 2 x 60 = 120 min (2)

Convert hours to minutes by multiplying by 60

Calculate volume (gallon): 79 x 120 = 9,480 gal (3) = (1) x (2)

Report Estimate Discharge Volume: 9,480 gallons (3)

Volume Discharge Estimation

Calculating based on Manhole Flow

A	B	C	D	E	F	G	H	I	J	K	L	M	N		
2 For calculating volume based upon manhole discharge, fill in the appropriate boxes as indicated:											DO NOT SAVE WHEN CLOSING				
3															
4 VENT HOLES															
5		(Inches)	5		(Inches)	(gpm)	5		(Number)	(Minutes)	5			(Gallons)	
6		Width of Hole		Height		Flow	$=(0.6*3.1416*C6/12*C6/12/4*(64.4*(E6/12)*0.5)*448.8$		# of Holes		Duration		Volume	=K6'16'G6	
7		(0.5, 0.75 or 1.0)													
8													Hours =	=19*60	Minutes
9															
10															
11															
12 GAP AROUND MANHOLES															
13		(Inches)	13		(Inches)	(gpm)	13		(Minutes)	13					
14		Width of Gap		Height		Flow	$=((3.33*(2*C14/12)*((E14/12)^1.5))*448.48)$		Duration		Volume	=114'G14			
15													Hours =	=117*60	Minutes
16															
17															
18															
19															
20 MISSING MANHOLE LIDS															
21		(Inches)	21		(Inches)	(gpm)	21		(Minutes)	21					
22		Diameter of Manhole		Height		Flow	$=((3.33*C22/12*((E22/12)^1.5))*448.8)$		Duration		Volume	=122'G22			
23		(24, 36 or 48)													
24													Hours =	=125*60	Minutes
25															
26															
27															
28															
29															
30															

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Ready

Volume Discharge Estimation

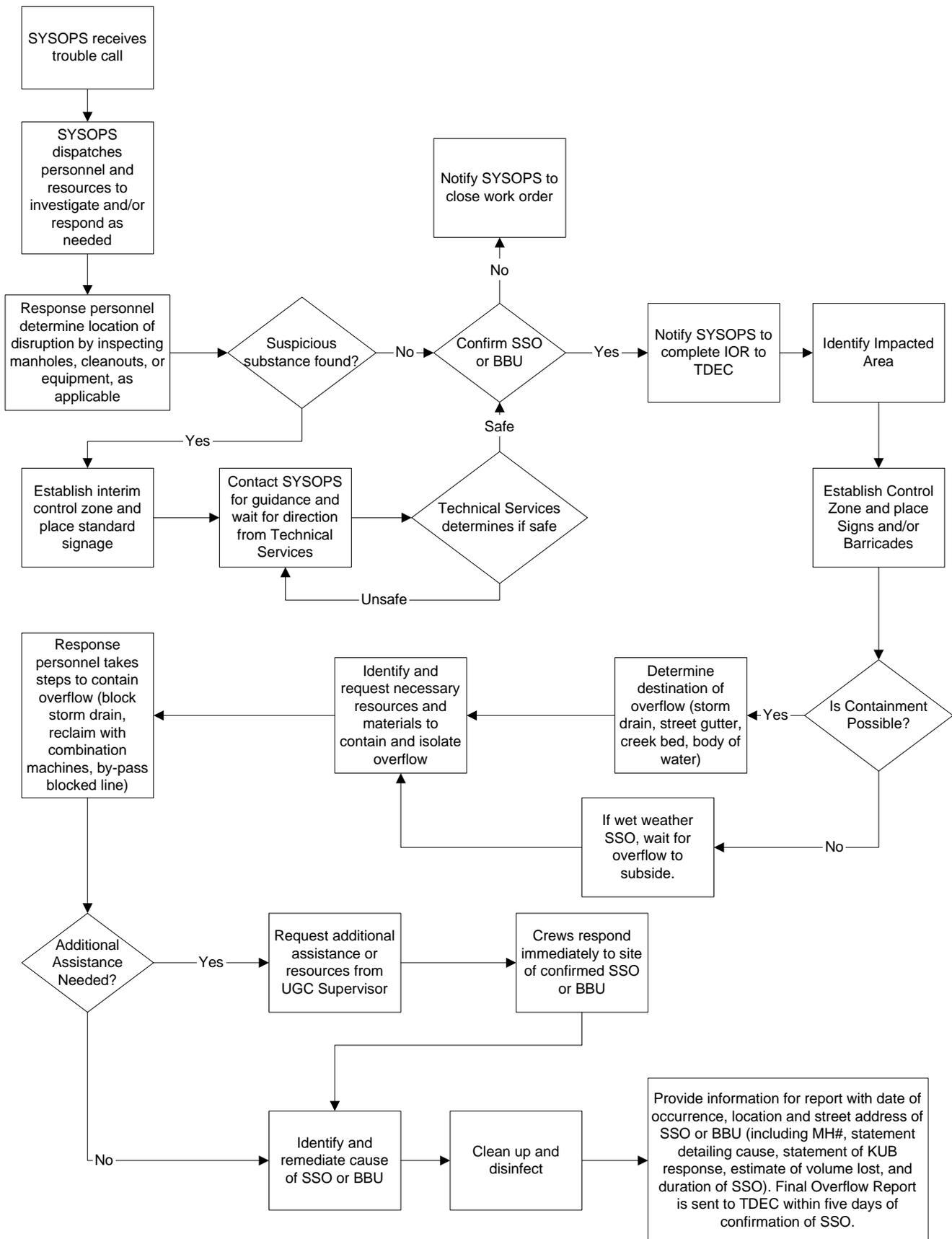
Calculating based on Surface Area

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
2		Surface Area Calculations Page										DO NOT SAVE WHEN CLOSING				
4		For calculating volume based upon rectangular surface area, fill in the boxes as indicated:														
6			(Feet)			(Feet)			(Inches)			(Gallons)				
7	1	Width	<input type="text"/>	Length	<input type="text"/>	Depth	<input type="text"/>	Volume	$= (C7 * F7 * I7 / 12) * 7.481$							
9	2	Width	<input type="text"/>	Length	<input type="text"/>	Depth	<input type="text"/>	Volume	$= (C9 * F9 * I9 / 12) * 7.481$							
11	3	Width	<input type="text"/>	Length	<input type="text"/>	Depth	<input type="text"/>	Volume	$= (C11 * F11 * I11 / 12) * 7.481$							
13	4	Width	<input type="text"/>	Length	<input type="text"/>	Depth	<input type="text"/>	Volume	$= (C13 * F13 * I13 / 12) * 7.481$							
15	5	Width	<input type="text"/>	Length	<input type="text"/>	Depth	<input type="text"/>	Volume	$= (C15 * F15 * I15 / 12) * 7.481$							
17								Rectangular Volume	$= \text{SUM}(L7:L15)$							
20		For calculating volume based upon circular surface area, fill in the boxes as indicated:														
22						(Feet)			(Inches)							
23			Diameter	<input type="text"/>	Depth	<input type="text"/>	Volume	$= 3.1416 * (F23 / 2) * (F23 / 2) * I23 / 12 * 7.481$								
27												TOTAL VOLUME	$= L23 + L17$			

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Appendix D: General Sewer Overflow Response Workflow



Appendix E: Table of SORP Actions and Corresponding Responsibilities*

Action	Responsibilities	References
A First Responder will be dispatched by SYSOPS to investigate the overflow.	System Operations Dispatcher (SYSOPS)	SORP Sections 4.2 & 4.3.1 Field Manual Sections 1 & 2
Confirm the discharge is an SSO or BBU.	First Responder	SORP Sections 4.2 & 4.3.2 Field Manual Sections 1 & 2
Complete the Initial Overflow Report (IOR) to TDEC within 24 hours after confirmation of SSO.	SYSOPS	SORP Section 4.2 Field Manual Sections 1 & 2
If the SSO involves a force main, contact SMS to evaluate turning off the station.	First Responder/SYSOPS Dispatcher/SMS	SORP Sections 3.5, 4.0, & 4.1
Contain any sanitary sewer overflow using a berm, mats, sandbags, etc.	First Responder/Response Crew	SORP Sections 4.3.9 & 4.3.10 Field Manual Sections 1, 2, & 5
Block any nearby storm grates or catch basins with sandbags or berms (if necessary)	First Responder/Response Crew	SORP Section 4.3.9 Field Manual Sections 1 & 2
Install control zone and standard signage around impacted area.	First Responder/Response Crew	SORP Sections 4.3.3, 4.3.6, & 4.4 Field Manual Sections 1, 2, & 5
Contact Technical Services if a suspicious substance is found.	First Responder/Response Crew	SORP Section 4.3.3 Field Manual Sections 1, 2, & 5
Request additional assistance, if necessary, from SYSOPS or radio crews directly to assist with SSO (i.e., repair broken pipe, pump station outage, etc.)	First Responder/Response Crew	SORP Sections 4.2 & 4.3.8 Field Manual Sections 1 & 2
Notify UGC Supervisor/SYSOPS of situation status.	First Responder/Response Crew	SORP Section 4.3.8 Field Manual Sections 1 & 2
Initiate appropriate repairs, cleaning, vacuuming, etc., as required.	First Responder/Response Crew/UGC Maintenance Crew	SORP Section 4.3.11 Field Manual Sections 1, 2, & 5
Place SSO door hanger on residences and/or facilities where inhabitants could be affected by the SSO. If door hangers cannot be used, place a public notice posting(s) in an area notifying the public of the SSO occurrence.	First Responder/Response Crew	SORP Section 4.4 & Appendix B Field Manual Section 1
Thoroughly clean site using appropriate manual practices such as rakes, brooms, shovels, etc. and, if needed, mechanical practices such as excavating equipment, vacuums, flushers, aerators, etc.	First Responder/Response Crew	SORP Section 4.3.12 Field Manual Section 1, 2, & 5

Disinfect site by applying lime to the ground within the impacted area and apply deodorizing agents when needed. UGC Supervisor must approve the use of chlorine.	First Responder/Response Crew	SORP Section 4.3.12 Field Manual Section 1, 2, & 5
Determine volume of SSO and complete KUB Sanitary Sewer Overflow Report in MDS and forward to UGC Supervisor. Include a system map copy of the area of the occurrence and a copy of the work order.	First Responder/Response Crew	SORP Section 4.6 & Appendix C Field Manual Sections 1, 2 & 3
<p>During a dry weather event or a wet weather event that poses a significant health hazard, the following will be required:</p> <ol style="list-style-type: none"> 1. A public notice posting(s) will be required in the immediate area of the SSO. If signs were not placed by a First Responder, place an SSO sign(s) along the creek up to 1000 yards at intervals of 200 yards or at location(s) where users of the body of water can be easily notified of the SSO occurrence 2. Obtain proper sampling bottles from the lab, use rubber gloves and obtain sample near location of SSO entry into body of water 3. Transport sample to the Lab within 4 hours 4. Contact Lab to obtain results of testing 5. When samples are determined to not contain fecal coliform bacteria, remove posted signs and notify TDEC (if required). 	Regulatory Compliance Program Technician	SORP Sections 4.3.7 & 4.4 Field Manual Section 5
If deemed necessary, contact Senior Management for initiation of public notification plan of SSO. Follow procedures as described in the SORP.	Responsible Basin Owner	SORP Section 4.4 Field Manual Section 1

*The Field Manual and Training Component will be updated following EPA approval of this document.

Appendix F: KUB Organizational Chart as it pertains to the SORP

