City of Chattanooga
Waste Resources Division
Consent Decree Program
Program Management

Transmittal

Date:	10-10-2014	**From:**	Mike Marino, P.E.
Attention:	Mary Helms	**Project:**	Consent Decree Program Management
Firm Name:	Chattanooga Public Library	**Project No.:**	C6A02301
Copies to:	CD Public Website	**File:**	

The following document is attached under a separate cover for submittal to the Public Document Repository.

1. Pump Station Operations Program

Enclosures/Attachments

- ☐ Letter
- ☐ Contract Documents
- ☐ Sketch
- ☐ Modification Drawings
- ☐ Other
- ☐ Sample
- ☐ Clarification Drawings
- ☐ Print
- ☐ Shop Drawings

Action Requested

- ☐ Resubmit
- ☐ For Your Review
- ☐ Information Only
- ☐ Your Information and File
- ☐ Please Comment
- ☐ For Your Approval
- ☐ Reply ASAP
- ☐ For Your Signature

4510 Turntable Road, Suite 110, Chattanooga, Tennessee 37421 USA1.423.894.4175 Fax 1.423.779.3075

JACOBS

City of Chattanooga

Mayor Andy Berke

October 8, 2014

VIA HAND DELIVERY

Ms. Corinne Hill
Library Director
Chattanooga-Hamilton County Public Library
1001 Broad Street
Chattanooga, TN 37402

Subject: ***United States of America et. al. v. City of Chattanooga, No. 1:12-cv-00245***
Consent Decree Public Document Repository
Pump Station (PS) Operations Program

Dear Ms. Hill:

On behalf of the City of Chattanooga, Tennessee ("City"), and in accordance with the consent decree entered by the United States District Court for the Eastern District of Tennessee (Southern Division), on April 24, 2013, in the case styled the *United States of America et. al. v. City of Chattanooga, No. 1:12-cv-00245* ("Consent Decree"), we are providing the Chattanooga-Hamilton County Public Library with the Pump Station ("PS") Operations Program ("PS Operations Program") for submission to the City's Public Document Repository ("PDR"). The purpose of the PS Operations Program is to ensure that the PSs and Combined Sewer Overflow Treatment Facilities ("CSOTFs") are operating properly to convey flows throughout the collection system.

We are providing a copy of the PS Operations Program to the PDR for public review and comment, prior to final submission of the PS Operations Program to the EPA and the State of Tennessee. Thus, we ask that you make this document available to the public for review for thirty (30) days. The public can provide comments to the City by sending comments to the following address:

City of Chattanooga: Waste Resources Divisions
RE: Consent Decree Public Comments
c/o Jacobs Engineering Group
4510 Turntable Road, Suite 110
Chattanooga, TN 37421

An electronic copy of this document is also available for review and comment on the City's Consent Decree website at the following location:

http://www.chattanooga.gov/public-works/waste-resources/consent-decree/44-public-works/1050-consent-decree-document-repository

We look forward to receiving comments from the public on this important document.

Sincerely,

Alice L. Cannella

Alice L. Cannella, P.E.
Director, Waste Resources Division

Enclosure

cc: Donald L. Norris, Administrator, Public Works, City of Chattanooga
Mike Marino, PE, Jacobs
Adam Sowatzka, King & Spalding

Pump Station Operations Program

Prepared for

United States Environmental Protection Agency and Tennessee Department of Environment and Conservation

City of Chattanooga
Waste Resources Division
Consent Decree Program
Case No. 1:12-cv-00245

Prepared by

Brown and Caldwell

Submitted by

Jacobs Engineering Group Inc.
Consent Decree Program Manager

Chattanooga, Tennessee

October 10, 2014

Contents

Appendices

Tables

Figures

Acronyms and Abbreviations

CM	Corrective Maintenance
CMMS	Computerized Maintenance Management System
CMOM	Capacity Management Operations and Maintenance
CSO	Combined Sewer Overflow
CSOTF	Combined Sewer Overflow Treatment Facility
DPW	Department of Public Works
EMRIP	Equipment Maintenance and Reliability Improvement Program
EPA	Environmental Protection Agency
ERP	Emergency Response Plan
ISS	Interceptor Sewer System
KPI	Key Performance Indicator
MBWWTP	Moccasin Bend Wastewater Treatment Plant
O&M	Operations and Maintenance
PER	Preliminary Engineering Report
PM	Preventive Maintenance
PS	PS
SCADA	Supervisory Control and Data Acquisition
SOP	Standard Operating Procedure
SSO	Sanitary Sewer Overflow
SORP	Sewer Overflow Response Plan
TDEC	Tennessee Department of Environment and Conservation
WCTS	Wastewater Collection and Transmission System
WIMS	Water Information Management System
WRD	Waste Resources Division
WWTP	Wastewater Treatment Plan

1.0 Introduction

1.1 Purpose

On April 24, 2013, the City of Chattanooga (City) entered into a consent decree with the United States and the State of Tennessee, in the case styled United States of American et. Al v. City of Chattanooga, No. 1:12-cv-00245 (CD). The City's, Waste Resources Division (WRD) has prepared PS (PS) and Combined Sewer Overflow Treatment Facility (CSOTF) Operations Program for review and approval by the United States Environmental Protection Agency (EPA) and the Tennessee Department of Environment and Conservation (TDEC), as a condition of paragraph 20(e) of the CD.

The purpose of the Pump Station (PS) Operations Program is to ensure that the PSs and CSOTFs in the Interceptor Sewer System (ISS) are operating properly to convey flows throughout the wastewater collection and transmission system (WCTS). The wastewater PSs and CSOTFs that the City has responsibility for can be characterized as:

- Total Wastewater Collection System PSs – 70
- CSOTFs – 8

Wastewater PSs and CSOTFs are generally categorized as a custom station, duplex station, or package station. A description of these categories is as follows:

- Custom Station – A PS designed specifically for the location and particular flow characteristics of the sewer shed it serves, consisting of multiple (more than two) pumps in a dry well with an adjoining wet well. These are generally the larger stations.
- Duplex Station – A PS with only two pumps (normally submersible). These are generally the smaller stations.
- Package Station – A PS provided as a package to the City by a vendor tailored to the flow characteristics of the sewer shed it serves. These are normally the midsize stations. They are sometimes called "Tube Stations" by operations and maintenance personnel.

The categories have been used to standardize documentation where necessary. Many of the components of the City's program are currently facility specific. The City also owns and operates eight (8) stormwater PSs, which use resources from the PSs and Combined Sewer Overflow (CSO) Operations Program and 192 grinder PSs primarily serving residential developments. These stormwater PSs are not within the scope of this document and grinder PSs are automatically operated without City involvement, except for repair and maintenance, which is addressed in the PS Preventive Maintenance Plan, submitted separately to EPA and TDEC pursuant to the CD.

Table 1-1 lists the wastewater PSs and CSOTFs.

Table 1-1.
City of Chattanooga Wastewater PSs and CSOTFs

Name	Type	Location	City, State	Year in Service	Wastewater Type	Pump Nameplate Rating (GPM)	Number of Pumps	Operational Visit Schedule
19th St. CSO	CSOTF	1504 Riverfront Pky.	Chatt, TN	2001	Combined	N/A	N/A	Monthly
19th St. PS	PS	1000 W. 19th St.	Chatt, TN	1966	Domestic, Industrial, and Combined	7,000	3	Weekly
23rd St. PS	PS	299 Poss Dr.	Chatt, TN	1955	Domestic, Industrial, and Combined	18,000	4	Weekly
26th St. PS	PS	2600 Carr St.	Chatt, TN	1979	Domestic	25	2	Monthly
Airport Rd. #1 PS	PS	5801 Rosedale Rd	Chatt, TN	1971	Domestic	800	2	Monthly
Airport Rd. #2 PS	PS	850 Jubilee Dr.	Chatt, TN	2005	Domestic, Industrial	180	2	Monthly
Altamont PS	PS	2406 High Point Dr.	Chatt, TN	1999-2000	Domestic	50/500	4	Monthly
Alton Park PS	PS	3000 E. 34th St.	Chatt, TN	1972	Domestic	265	2	Monthly
Arbor Creek PS	PS	2701 Arbor Creek Way (2543)	Hixson, TN	1989	Domestic	150	2	Monthly
Battery Place PS	PS	501 Battery Place	Chatt, TN	1985	Domestic	300	2	Monthly
Big Ridge No. 1 PS	PS	5816 Lake Resort Dr.	Hixson, TN	1995	Domestic	950	2	Monthly
Big Ridge No. 2 PS	PS	4600 Gann Store Road	Hixson, TN	1995	Domestic	950	2	Weekly
Big Ridge No. 3 PS	PS	4714 Privateer Rd	Hixson, TN	1995	Domestic	80	2	Monthly
Big Ridge No. 4 PS	PS	4736 Privateer Rd	Hixson, TN	1997	Domestic	25	2	Monthly
Big Ridge No. 5 PS	PS	4802 Woodland Circle	Hixson, TN	1995	Domestic	550	2	Weekly
Big Ridge No. 6 PS	PS	1902 Wisteria Dr.	Hixson, TN	1996	Domestic	550	2	Monthly
Big Ridge No. 7 PS	PS	2224 Rambler Ln. (2223)	Hixson, TN	1997	Domestic	25	2	Monthly
Big Ridge No. 8 PS	PS	2226 Wisteria Dr. (2200)	Hixson, TN	1997	Domestic	25	2	Monthly
Big Ridge No. 9 PS	PS	6402 Lake Shadows Circle	Hixson, TN	1997	Domestic	25	2	Monthly
Big Ridge No. 10 PS	PS	4029 Breakwater Dr.	Hixson, TN	1997	Domestic	25	2	Monthly

Table 1-1.
City of Chattanooga Wastewater PSs and CSOTFs

Name	Type	Location	City, State	Year in Service	Wastewater Type	Pump Nameplate Rating (GPM)	Number of Pumps	Operational Visit Schedule
Big Ridge No. 11 PS	PS	5733 Lake Resort Terrace	Hixson, TN	1999	Domestic	150	2	Monthly
Big Ridge No. 12 PS	PS	5530 Lake Resort Terrace	Hixson, TN	1999	Domestic	180	2	Monthly
Big Ridge No. 13 PS	PS	5596 Lake Resort Terrace	Hixson, TN	1999	Domestic	400	2	Monthly
Big Ridge No. 14 PS	PS	1965 Hixson Marina Rd.	Hixson, TN	2003	Domestic	225	2	Monthly
Boy Scout Rd. PS	PS	Boy Scout Rd. 816 (811 W. Boy Scout)	Hixson, TN	1992	Domestic, Industrial	2,570/3,150	3	Weekly
Brainerd Golf Course PS	PS	409 Tacoa Ave.	Chatt, TN	1949	Domestic	500	2	Monthly
Brainerd Manor PS	PS	4600 Ricky Dr.	Chatt, TN	1972	Domestic	100	2	Monthly
Carter St. CSO	CSOTF	West 20th 500 block	Chatt, TN	1998	Combined	N/A	N/A	Monthly
Central Ave CSO	CSOTF	2700 Market St	Chatt, TN	2000	Combined	N/A	N/A	Monthly
Citico CSO	CSOTF	201 Riverside Pky	Chatt, TN	2000	Combined	N/A	N/A	Monthly
Citico PS	PS	1004 Riverside Dr.	Chatt, TN	1999	Domestic, Industrial, and Combined	27,500	4	Weekly
Collegedale PS	PS	5205 Ooltewah Ringgold Rd.	Ooltewah, TN	1975	Domestic, Industrial	1,100	4	Weekly
Davidson Place	PS	1075 Dodie Dr.	Chatt, TN	2009	Domestic	450	2	Monthly
Dupont Industrial Park/North Industrial Park PS	PS	4500 Pinnacle Lane	Chatt, TN	1999	Domestic	25	2	Monthly
Dupont Parkway PS	PS	1610 Elm St.	Hixson, TN	1995	Domestic, Industrial	4,500	3	Monthly
East Brainerd PS	PS	Frawley Rd.	East Ridge, TN	1978	Domestic	2,250	3	Weekly
East Gate #1 PS	PS	5630 Brainerd Rd.	Chatt, TN	1963	Domestic	200	2	Monthly
East Gate #2 PS	PS	220 Cornelison Rd	Chatt, TN	2007	Domestic	500	2	Monthly

Table 1-1.
City of Chattanooga Wastewater PSs and CSOTFs

Name	Type	Location	City, State	Year in Service	Wastewater Type	Pump Nameplate Rating (GPM)	Number of Pumps	Operational Visit Schedule
ESIP / Enterprise	PS	6705 Bonny Oaks Dr.	Chatt, TN	2004	Industrial	795	2	Monthly
Fagan Street PS	PS	3816 Fagan St.	Chatt, TN	1979	Domestic	50	2	Monthly
Friar Branch PS	PS	3910 Juandale Dr.	Chatt, TN	Built 1978	Domestic, Industrial	16,800	3	Weekly
Heritage Green	PS	653 Calloway Court	Chatt, TN	2005	Domestic	60	2	Monthly
Highland Park PS	PS	2331 S. Holtzclaw Ave.	Chatt, TN	1995	Domestic, Industrial	4,500	3	Monthly
Hixson No. 1 PS	PS	4677 Adams Rd.	Hixson, TN	1980	Domestic	7,000	3	Weekly
Hixson No. 2 PS	PS	Adams Rd. and Old Hixson Pike (5401)	Hixson, TN	1980	Domestic	7,000	3	Weekly
Hixson No. 3 PS	PS	5234 Cassandra Smith Rd.	Hixson, TN	1985	Domestic	7,000	3	Weekly
Komatsu PS	PS	400 Runyan Dr.	Hixson, TN	1987	Domestic, Industrial	275	2	Monthly
Lake Vista PS	PS	4537 Peckinpaugh Dr.	Chatt, TN	1985	Domestic	132	2	Monthly
Latta Street PS	PS	1424 Latta St.	Chatt, TN	1973	Domestic	1,000	2	Monthly
Manker Patten PS	PS	Manker Patten/Tennis Courts	Chatt, TN	2002	Domestic	46	2	Monthly
Meadow Trace PS	PS	4905 Meadow Trace	Hixson, TN	1992	Domestic	25	2	Monthly
MLK CSO	CSOTF	1015 Riverfront Pky	Chatt, TN	2000	Combined	N/A	N/A	Monthly
Mountain Creek PS	PS	Baylor School Rd.	Chatt, TN	1971	Domestic, Industrial	4,166	2	Weekly
Murray Hills No. 1 PS	PS	4550 Webb Rd.	Chatt, TN	1994	Domestic	255	2	Monthly
Murray Hills No. 2 PS	PS	4951 Bal Harbor Dr.	Chatt, TN	1994	Domestic	80	2	Monthly
Murray Hills No. 3 PS	PS	4924 Bal Harbor Dr.	Chatt, TN	1994	Domestic	150	2	Monthly
Murray Hills No. 4 PS	PS	3707 Kings Rd.	Chatt, TN	1994	Domestic	80	2	Monthly
Murray Hills No. 5 PS	PS	3820 Kings Rd.	Chatt, TN	1994	Domestic	450	2	Monthly
Orchard Knob WW PS	PS	808 N. Holtzclaw	Chatt, TN	1976	Domestic, Industrial	5,200	3	Weekly
Pineville Rd PS	PS	1138 Pineville Rd.	Chatt, TN	1971	Domestic	250	2	Monthly
Ringgold	PS	75 Christian Rd.	Ringgold, GA	2007	Domestic, Industrial	1,215	2	Weekly

Table 1-1.
City of Chattanooga Wastewater PSs and CSOTFs

Name	Type	Location	City, State	Year in Service	Wastewater Type	Pump Nameplate Rating (GPM)	Number of Pumps	Operational Visit Schedule
River Park 1	PS	4301 Amnicola Hwy	Chatt, TN		Domestic		2	Monthly
River Park 2	PS	4301 Amnicola Hwy	Chatt, TN		Domestic		2	Monthly
Ross Landing CSO	CSOTF	201 Riverfront Pky	Chatt, TN	1992	Combined	N/A	N/A	Monthly
South Chickamauga PS	PS	4000 N. Hawthorne St.	Chatt, TN	1978, Upgraded 1995	Domestic, Industrial	24,000	4	Weekly
Somerville PS	PS	110 Somerville Avenue	Chatt, TN		Domestic		2	*
Spring Creek PS	PS	250 Vero Beach Avenue	Rossville, GA	1999	Domestic, Industrial	5,000	3	Weekly
Summit #1	PS	4238 Old Woodland Dr.	Chatt, TN	2009	Sanitary	350	2	Monthly
Tiftona No. 1 PS	PS	1006 Browns Ferry Rd.	Chatt, TN	1984	Domestic, Industrial	3,030	2	Weekly
Tiftona No. 2 PS	PS	141 Browns Ferry Rd.	Chatt, TN	1984	Domestic, Industrial	2,260	2	Weekly
Tiftona No. 3 PS	PS	248 Aster Avenue	Chatt, TN	1985	Domestic, Industrial	1,760	2	Weekly
Tiftona No. 4 PS	PS	1305 Browns Ferry Rd.	Chatt, TN	1994	Domestic	475	2	Monthly
Tiftona No. 5 PS	PS	Browns Ferry Rd. and 1339 Burgess Rd.	Chatt, TN	1994	Domestic	200	2	Monthly
Tremont CSO	CSOTF	20 Tremont St	Chatt, TN	2000	Combined	N/A	N/A	Monthly
VAAP PS	PS	Hwy 58	Chatt, TN	1998	Domestic, Industrial	780	2	Monthly
Warner Park Storage Facility	CSO / Storage	1254 E. 3rd St.	Chatt, TN	2008	Combined	2,000	2	Monthly
West Chickamauga	PS	241 Lillian Dr.	Fort Oglethorpe, GA	2009	Domestic	999	2	Monthly
Williams St. CSO	CSOTF	2705 Williams St	Chatt, TN	2000	Combined	N/A	N/A	Monthly
Willow Bend PS	PS	1645 Eucalyptus Dr.	Chatt, TN	1981	Domestic	100	2	Monthly

*Somerville PS is a duplex grinder station and is not regularly visited by operations.

This document will outline the City's PS operation procedures and will be used to train staff in implementing the program. This document will also be used to educate the public on the City's PS Operations Program.

1.2 Background

The City developed numerous procedures related to PS operations, but these were not collated into a single document nor did the procedures address all pumps stations, CSOTFs, or grinder PSs. In addition, numerous checklists and log books were used to record and track PS operations. This document collates and updates these existing documents while providing operational procedures for all PSs and CSOTFs. It provides additional guidance based upon requirements of the CD, including the *EPA Region 4 Guide to Collection and Transmission System Management, Operation, and Maintenance Programs*, as set forth in paragraph 20(a) and Appendix B of the CD.

1.3 Re-Evaluation of Existing PS and CSOTF Operations

Based on a re-evaluation of the City of Chattanooga's existing PS and CSOTF operational procedures, the program was found to be sufficient. However, improvements were identified, and these are discussed in detail in Section 5.

1.4 Goals

The goals of this PS and CSOTF Operation Program are to 1) reduce Sanitary Sewer Overflows (SSOs); and 2) make sure that all appropriate staff are aware of the proper operating conditions necessary at each PS and CSOTF; and 3) provide guidance to staff to make operational adjustments, as necessary, to maintain operations.

1.5 Authority

The City's legal authority for the development and implementation of this PS and CSOTF Operations Program is derived from the following federal, state and local laws, ordinances and regulations:

- The U.S. Clean Water Act;
- National Pollution Discharge Elimination System (NPDES) Permit Number TN0024210;
- Tennessee Water Quality Control Act;
- City of Chattanooga Sewer Use Ordinance, City Code Chapter 31; and
- Paragraph 20 (c) of the CD (pages 28-29)

1.6 Description of the Wastewater Collection and Transmission System

As a regional wastewater utility, the City of Chattanooga, a Municipal Corporation, owns, operates, maintains, and manages a network of pipes, manholes, PSs, force mains, CSOTFs,

and associated appurtenances that transport wastewater from homes, businesses, and industries to the Moccasin Bend WWTP. All of this infrastructure is part of the WCTS, as defined in the CD and herein. Property owners own the private service laterals from the served residential, commercial, and industrial structures to the public main line in the street or right-of-way, including the connection.

The City's WCTS currently serves approximately 170,000 people with approximately 61,000 customers within the City including 80 permitted industries. It also provides treatment for eight (8) regional or satellite users comprised of approximately 25,000 customers. The WCTS is composed of:

- 1,263 miles of gravity sewers (approximate), including 70 miles of combined sewers;
- 30,000 manholes (approximate);
- 70 PSs;
- 53 miles of force main;
- Eight (8) CSOTFs;
- One (1) Combined Sewer Storage Facility;
- 192 (approximate) residential/grinder pumps; and
- One (1) Moccasin Bend WWTP

An organizational chart of WRD is provided in Appendix A.

2.0 Program Documentation

Program documentation for the PS and CSOTF Operations Program consists of a description of routine and emergency operations, references to other relevant documentation, and a description of records associated with operational activities. The following sections present the components outlined above.

2.1 Description of Routine Operations

2.1.1 Routine Operations Overview

The City's PSs and CSOTFs are designed to operate using local controls. Wet well set points are maintained by the station pumps using single or variable speed pumps with level controls. PS site visitation is conducted regularly by operational crews. The stations have Supervisory Control and Data Acquisition (SCADA) alarms for unusual situations and telemetry to communicate wet well level, pump on/off, and other related information. There are provisions to manually operate the PSs, if necessary. Example operational forms and checklists used by the operators for site visits and remote verification are described in Section 2.4, "Operational Records and Information Management."

2.1.2 Site Visitation and Checks

In general, routine PS and CSOTF operations consist of operational checks that are scheduled as a PM through CityWorks™ and are either weekly or monthly and are determined by the Plant Operations Supervisor PS and CSOFT referring to the station criticality, travel times, history and consequences of overflow and supervisor discretion. During the operational checks, the operators use the PM to document system status, collect relevant data, and document and report abnormal conditions. Additionally, operators look at physical condition of the PS and CSOTF assets and test for proper operation. Alarms are checked for proper operation and transmission via telemetry, and housekeeping duties are performed.

The City has determined that updating the PMs for operational visitation to the PSs regularly as necessary, as well as the development of PMs for the CSOTFs. Information regarding this continuous improvement item can be found in Section 5, "Continuous Improvement".

Examples of the weekly and the monthly PMs showing Operator Duties and Checklists are included in Appendix B. Relevant data collected during monthly checks includes pump run times to be recorded in the logbook for PSs and flow meter readings for certain stations, which is used for billing purposes. Review of the pump run times is performed by PS Operators when logbook entries are made. Review of pump run times, number of starts and flow meter information from telemetry data is facilitated by the Plant Operations Supervisor PS and CSOTF. Flow meter readings are also used for billing calculations for certain customers.

2.1.3 Remote Verification

In addition to PS and CSOTF site visits, the WWTP operations personnel review PS and CSOTF telemetry data twice per shift for a total of four times daily. The plant operators verify that the pumps are operating as expected and check for alarms in accordance with the Chattanooga WRD Standard Operating Procedure (SOP) LO-006. PS SOPs are explained in more detail in Section 2.3.2, “Standard Operating Procedures”. These checks are recorded on the PS Checklist Sheet. Abnormal conditions are reported to the PS operations group or other work center as necessary. Abnormal conditions are also noted in the WWTP Operations Room Logbook.

Emergency generators installed at the PSs are exercised automatically on a weekly basis. A SCADA alarm has been created to notify PS Operations personnel if any generator has gone more than seven days without running.

2.1.4 Pump Operation

The City provides for rotating lead, lag, and standby pumps automatically under routine operating conditions. For variable speed stations, which may not cycle regularly, the City rotates the pump manually as necessary during the routine operational checks. In general, the City seeks to equally distribute total run time among all of the pumps.

2.1.5 Routes and Schedules

The City visits PSs and CSOTFs on a routine basis according to the monthly schedule listed in Table 2-1. The City has established four Operations and Maintenance (O&M) geographic areas for the crew. The areas are set up to minimize travel time. Each crew is assigned a geographic area and visits PSs according to the weekly and monthly schedules. An overview map of the PS Operational Areas can be seen in Figure 2-1. As part of the continuous improvement process documented in Section 5, “Continuous Improvement”, the City is evaluating the use of O&M technician teams. Currently, the operational routes are accomplished by a single PS Operator.

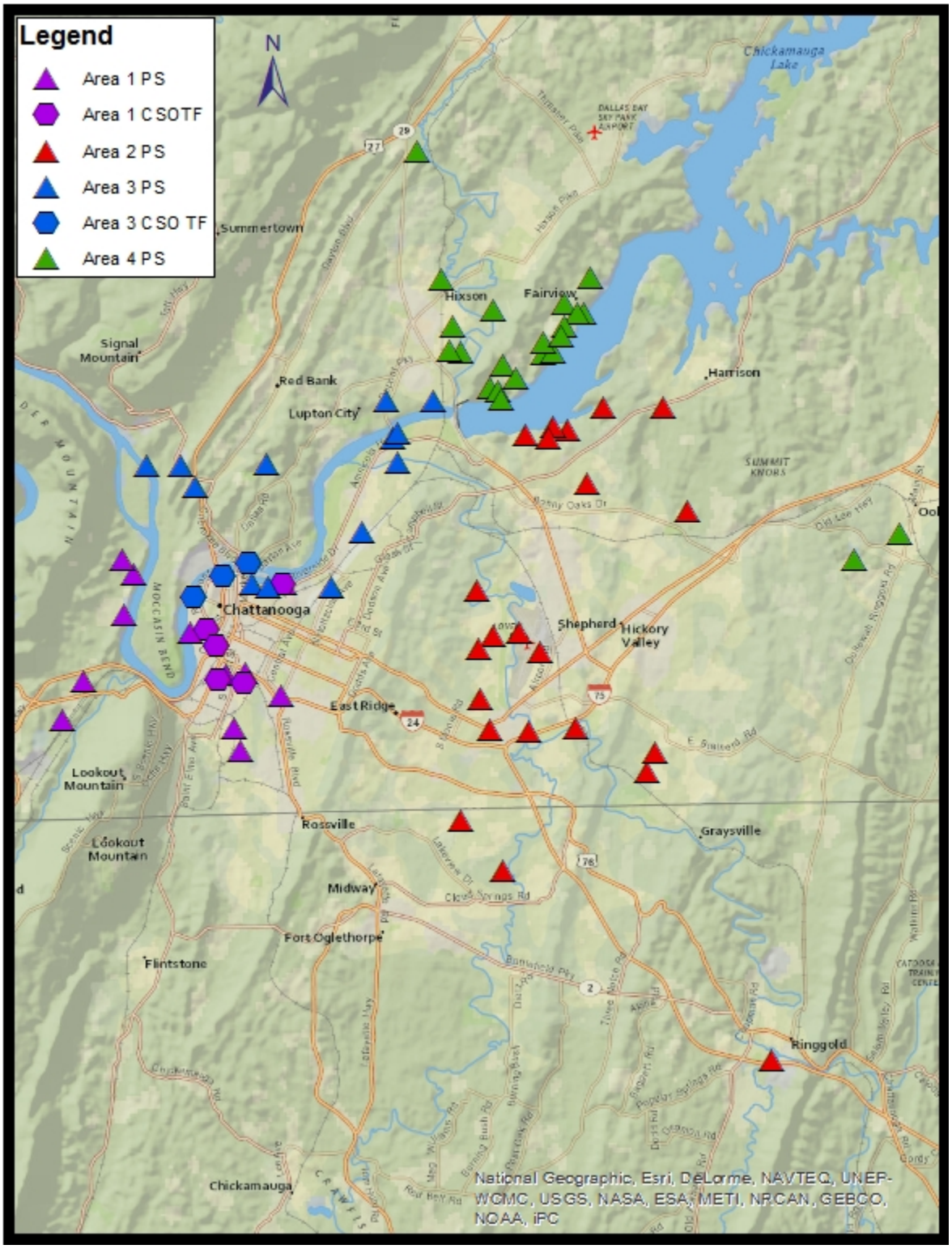
Table 2-1.
PS and CSOTF Operational Visit Schedule

Area 1		Area 2		Area 3		Area 4	
Facility	**Operational Check**	**Facility**	**Operational Check**	**Facility**	**Operational Check**	**Facility**	**Operational Check**
Week 1							
19th St. PS	Weekly	Friar Branch PS	Weekly	Mountain Creek PS	Weekly	Collegedale PS	Weekly
23rd St. PS	Weekly	Ringgold PS	Weekly	Orchard Knob WW PS	Weekly	Big Ridge 2 PS	Weekly
Citico PS	Weekly	Spring Creek PS	Weekly	South Chickamauga PS	Weekly	Big Ridge 5 PS	Weekly
Tiftonia 1 PS	Weekly	East Brainerd PS	Weekly	Dupont Ind. Park PS	Monthly	Boy Scout PS	Weekly
Tiftonia 2 PS	Weekly	Heritage Green PS	Monthly	Dupont Pkwy. PS	Monthly	Hixson 1 PS	Weekly
Tiftonia 3 PS	Weekly	Davidson Place PS	Monthly	River Park 1 PS	Monthly	Hixson 2 PS	Weekly
Tiftonia 4 PS	Monthly	West Chickamauga PS	Monthly	River Park 2 PS	Monthly	Hixson 3 PS	Weekly
Tiftonia 5 PS	Monthly					Summit 1 PS	Monthly
Week 2							
19th St. PS	Weekly	Friar Branch PS	Weekly	Mountain Creek PS	Weekly	Collegedale PS	Weekly
23rd St. PS	Weekly	Ringgold PS	Weekly	Orchard Knob WW PS	Weekly	Big Ridge 2 PS	Weekly
Citico PS	Weekly	Spring Creek PS	Weekly	South Chickamauga PS	Weekly	Big Ridge 5 PS	Weekly
Tiftonia 1 PS	Weekly	East Brainerd PS	Weekly	MLK CSOTF	Monthly	Boy Scout PS	Weekly
Tiftonia 2 PS	Weekly	Murray Hills 1 PS	Monthly	Ross Lndg. CSOTF	Monthly	Hixson 1 PS	Weekly
Tiftonia 3 PS	Weekly	Murray Hills 2 PS	Monthly	Tremont CSOTF	Monthly	Hixson 2 PS	Weekly
19th St. CSOTF	Monthly	Murray Hills 3 PS	Monthly			Hixson 3 PS	Weekly
Carter St. CSOTF	Monthly	Murray Hills 4 PS	Monthly			Meadow Trace PS	Monthly
Citico CSOTF	Monthly	Murray Hills 5 PS	Monthly			Arbor Ck. PS	Monthly
		Vaap PS	Monthly				
Week 3							
19th St. PS	Weekly	Friar Branch PS	Weekly	Mountain Creek Ps	Weekly	Collegedale PS	Weekly
23rd St. PS	Weekly	Ringgold PS	Weekly	Orchard Knob WW Ps	Weekly	Big Ridge 2 PS	Weekly
Citico PS	Weekly	Spring Creek PS	Weekly	South Chickamauga Ps	Weekly	Big Ridge 5 PS	Weekly
Tiftonia 1 PS	Weekly	East Brainerd PS	Weekly	Battery Place PS	Monthly	Boy Scout PS	Weekly

Table 2-1.
PS and CSOTF Operational Visit Schedule

Area 1		Area 2		Area 3		Area 4	
Facility	**Operational Check**	**Facility**	**Operational Check**	**Facility**	**Operational Check**	**Facility**	**Operational Check**
Tiftonia 2 PS	Weekly	Brain. Man. PS	Monthly	Latta St. PS	Monthly	Hixson 1 PS	Weekly
Tiftonia 3 PS	Weekly	Airport 1 PS	Monthly	Manker Patton PS	Monthly	Hixson 2 PS	Weekly
26th St. PS	Monthly	Airport 2 PS	Monthly	Warner Park Storage	Monthly	Hixson 3 PS	Weekly
Central Ave. CSOTF	Monthly	Enterprise/ESIP PS	Monthly			Big Ridge 1 PS	Monthly
Williams St. CSOTF	Monthly	Lake Vista PS	Monthly			Big Ridge 11 PS	Monthly
		Willlow Bend PS	Monthly			Big Ridge 12 PS	Monthly
						Big Ridge 13 PS	Monthly
						Big Ridge 3 PS	Monthly
						Big Ridge 4 PS	Monthly
Week 4							
19th ST PS	Weekly	Friar Branch PS	Weekly	Mountain Creek PS	Weekly	Collegedale PS	Weekly
23rd ST PS	Weekly	Ringgold PS	Weekly	Orchard Knob WW PS	Weekly	Big Ridge 2 PS	Weekly
Citico PS	Weekly	Spring Creek PS	Weekly	South Chickamauga PS	Weekly	Big Ridge 5 PS	Weekly
Tiftonia 1 PS	Weekly	East Brainerd PS	Weekly	Altamont PS	Monthly	Boy Scout PS	Weekly
Tiftonia 2 PS	Weekly	Brain Golf PS	Monthly	Komatsu PS	Monthly	Hixson 1 PS	Weekly
Tiftonia 3 PS	Weekly	East Gate 1 PS	Monthly	Pineville Rd. PS	Monthly	Hixson 2 PS	Weekly
Alton Park PS	Monthly	East Gate 2 PS	Monthly			Hixson 3 PS	Weekly
Fagan St PS	Monthly					Big Ridge 6 PS	Monthly
Highland Park PS	Monthly					Big Ridge 7 PS	Monthly
						Big Ridge 8 PS	Monthly
						Big Ridge 9 PS	Monthly
						Big Ridge 10 PS	Monthly
						Big Ridge 14 PS	Monthly

Table 2-1
PS and CSOTF Operational Areas



2.1.6 PS Maintenance

In addition to the preventive maintenance (PM) performed by maintenance staff, PS Operations perform some “light” PM. Operator performed maintenance includes exercising and inspection of valves, float checks, draw-down testing and review of flow meter history. Details on PS Maintenance can be found in the separate PS Preventive Maintenance Program, which was also required pursuant to the CD and submitted to EPA in a separate submittal.

Corrective Maintenance (CM) work orders are generated by PS Operators when necessary based on the results of routine and emergency operations. A method for prioritizing CM is included in the PS PM Program repair component.

2.1.7 Needs Determination

As part of the routine operational checks, PS Operators collect sensory (visual, auditory, and vibration) condition related information, which is used to establish the need for corrective maintenance, refurbishment, or repair, as necessary. Most commonly, the condition information is operational in nature and is captured in the comments field of the monthly work orders. Additionally, abnormal pump run times are used for equipment diagnosis by the PS Operators at the stations and the Plant Operations Supervisor via the telemetry system.

The condition information provides justification for corrective action work orders, operational budget expenditures and for capital improvements. Additionally, the City evaluates PS and CSOTF failures and telemetry data to determine if action is required to mitigate future failures. Decisions for PS and CSOTF Capital Improvements depend on three guidelines. Potential projects are evaluated for the following:

- Addresses operational concerns;
- Addresses capacity issues; and
- Addresses recurring overflows.

The City holds an annual meeting with O&M personnel to prioritize PS and CSOTF capital improvement projects. This is normally held in November with the Plant Operations Supervisor, Maintenance Manager, and the Director.

Under the CD, the City also has a formalized Sanitary Sewer Evaluation and Survey (SSES) Program, which includes assessments of the City’s PSs using various methods including SCADA analysis, capacity evaluation, response time evaluation, condition assessment using physical inspection and record review, design evaluation, evaluation of the ability of maintenance personnel to take corrective action within critical response times, a process for setting rehabilitation priorities, an ongoing inventory of rehabilitation and analysis of completed rehabilitation. These activities will be used by the City for a comprehensive needs determination related to PS infrastructure.

2.1.8 Operational Decisions

As part of the Equipment Maintenance Reliability Improvement Program (EMRIP), the City established a PS criticality ranking based on the likelihood and consequence of failure. This

documentation is used as a screening tool by the PS Operations group to set priorities in routine and emergency operations including the operational visit schedule as described in Section 2.1.2, “Site Visitation and Checks.” For emergency operations, there are PS Alarm Sheets (Alarm Sheets), which give a relative urgency of response for each alarm (included in Appendix D). The relative urgency is communicated via a response timeframe protocol. Further details on the documentation related to the Alarm Sheets and Criticality can be found in Section 2.3.6, “Prioritization Guidelines”.

2.2 Description of Emergency Operations

2.2.1 Emergency Operations Overview

The Emergency Operations component of the PS Operations Program facilitates a timely response to atypical situations in the City’s PSs and CSOTFs. PS Operations personnel are available to respond to emergencies during working hours and outside of normal working hours. Outside of normal working hours, there is a standby PS Operator who is available to respond and coordinate with other City standby personnel such as electricians or mechanics. The standby PS operator position rotates weekly. The emergency operations are similar for custom, duplex, and package stations.

2.2.2 Emergency Contact Information

Contact information for personnel responsible for various aspects of emergency response to PSs and CSOTFs is located in the EPA approved Sewer Overflow Response Plan (SORP). The off-duty PS Operator carries a cell phone, which can be used for notification by the Plant Operator on duty.

2.2.3 Contingency Planning

2.2.3.1 Auxiliary Equipment

The City has developed a SOP titled “PS and CSO Power Loss (SOP PS-003)”, which includes an emergency power plan for every facility. This plan lists the back-up power source as secondary feed, fixed generator, portable generator, and/or vacuum truck. Manual operation is possible for some CSOTF sites. For stations requiring portable generators, the SOP lists the required generator. Additionally, each of the portable generators has a list of stations that the generator is capable of operating on the inside of one of access panels. This SOP can be found in Appendix G.

The City owns four portable generators for PS and CSOTF auxiliary power. Table 2-2 lists the location of each piece of portable equipment.

Table 2-2
Portable Emergency Equipment

Equipment	Tracking Number	Rating	Location
Portable Unit #1 (Generator)	W-6685	3 phase 480 V; 175 kW	MBWWTP
Portable Unit #2 (Generator)	W-6686	3 phase 240 V; 175 kW	MBWWTP
Portable Unit #3 (Generator)	W-6687	3 phase 480 V; 175 kW	Big Ridge 1

Table 2-2
Portable Emergency Equipment

Equipment	Tracking Number	Rating	Location
Portable Unit #4 (Generator)	Model = DSHAB-5685127	3 phase 480 V; 175 kW	Eastgate 1 PS

A PM is issued weekly to require PS operators to test and start up all portable generators and note any issues. A copy of the PM template is included in Appendix C. Generators that are permanently installed are regularly started automatically. The City owns three vacuum trucks, which are operated under the direction of the WRD System Engineer. Vacuum trucks can be useful in emergency response for pump and haul operations. These trucks are available for use at both PSs and CSOTFs as necessary, and are prioritized based on need and availability. The City also has a standing contract for vacuum truck services in the event that a City vacuum truck is not readily available and an immediate need exists.

2.2.3.2 Guidance for Initiating Auxiliary Power

The SOP titled “Plant Operations Supervisor PS and CSOTF Generator Set Up and Delivery (SOP PS-004)” provides a procedure for field personnel responsible for initiating auxiliary power at stations using portable generators. This SOP can be found in Appendix G of this document. Fixed generators are coupled with an automatic transfer switch so that the power source switches automatically upon loss of primary power and upon return of primary power. For stations with dual-feed power, guidance for switching the power source is provided by the PS Outage Studies as described in Section 2.3.4, “Outage Studies”.

2.2.3.3 Portable Pump Usage

Portable pumps may be used in various situations including power outages, periods of high flow, PS upgrades, etc. The City maintains a relationship with a local contractor to provide for portable pumping requirements. The local contractor has the necessary capability and equipment to initiate a bypass pumping operation. In the event that portable pumping capability is required, contact information for the contractor is maintained with the Plant Operations Supervisor and is included in Appendix F of this document.

To provide specific guidance for future portable pumping operations, the City has identified a continuous improvement initiative to assess what methods and equipment is required to provide bypass pumping for each station, which may be by station category. Some stations may be identified for station-specific assessment. Information on continuous improvement initiatives can be found in Section 5, “Continuous Improvement”. For the design and construction of new PSs, the City has specified in the Sanitary Sewer System Design and Construction Manual that the station be built with a riser from the force main with rapid connection capabilities to permit the hook-up of portable pumps.

2.2.3.4 Emergency Response Plan

As part of the Capacity Management Operations and Maintenance (CMOM) Program, the City has prepared an Emergency Response Plan (ERP) to address emergencies such as flooding, tornados, earthquakes and other natural events, a serious chemical spill and widespread electrical failure. The ERP addresses emergency actions and activities for the ISS, including

PSs and CSOTFs, as well as notification procedures to the public and regulatory agencies. The ERP is a requirement of the CD and was submitted to EPA and TDEC in a separate submittal by the City.

2.2.3.5 Response Priority

A criticality ranking developed during the EMRIP provides for system-wide prioritization guidelines so that repair and operational resources are directed to the most critical areas first. Consideration is also given to the uniqueness of each situation such as level of degradation and other potential variables. More information on how the criticality is used in conjunction with other information is contained in Sections 2.1.8, “Operational Decisions” and 2.3.6, “Prioritization Guidelines.”

2.2.3.6 Potential Overflow Points

The City has compiled potential overflow points in the event of PS equipment failures within the PS Inventory Book for each PS under the wet well sections. These locations include PS name, address or manhole ID, as appropriate, as well as the receiving water body. These potential overflow points may be monitored, as necessary, to assess the impact of equipment failure and, potentially, as additional pick up points during pump and haul operations. More information on the PS Inventory Book can be found in Section 2.3.1, “PS Inventory Book”.

2.2.3.7 Monitoring System Overview

Station status and alarm conditions are monitored remotely via the telemetry system from the WWTP by plant personnel in addition to the scheduled site visits by PS Operations staff. The City currently utilizes a combination of radio and cellular based communication as well as leased telephone lines to monitor these facilities with various station and plant hardware. SCADA software is used to display status indications and alert operations staff to any alarm conditions at remote sites. The PS Alarm Sheets (Alarm Sheets) described in Section 2.3.3, “PS Alarm Sheets” list the alarms that may occur at each station, an explanation of the alarm, and a response priority. The operator response to alarms is dictated in SOP PS-006 located in Appendix G.

The existing SCADA system requires extensive maintenance and has a lack of manufacturer support. In June 2012, the City completed an Evaluation of Telemetry and SCADA Systems that included alternatives evaluation and recommendations for improvement.

The chosen alternative for improvements includes upgrades to the existing radio and antenna systems at all remote sites. Critical remote sites will also be fitted with capability to use a local fiber network or future wireless network as a redundant communication system.

New software will allow for alarms to be disseminated via email, text message and/or phone call. The addition of a new computer and importing SCADA information into a Structured Query Language database will allow for tracking and trending of information such as PS run times. In general, the speed of the system will be greatly enhanced, producing a significant reduction in polling cycle time (time to verify each connection is working properly) during wet weather events.

As part of the Early Action Capital Improvement Projects in the CD, the City is completing Operations Project 2: SCADA and Communications Overhaul to implement the chosen alternative from the evaluation.

2.2.3.8 Emergency Response Documentation

Emergency response is tracked using work orders generated from the City's Computerized Maintenance Management System (CMMS) CityWorks as well as procedures in the SORP, as appropriate. CMMS work orders are usually entered after the event. Due to the uniqueness of each emergency situation, performance measures are not appropriate for the Emergency Operations Program. Performance of the program can be assessed through overflow tracking and post-emergency debriefs.

2.3 Documentation Available to PS Staff

The City provides personnel responsible for PS Operations with various information including a PS Inventory Book, SOPs, Outage Studies and O&M Manuals. Operations personnel routinely visit each station and also respond to emergency situations. To document operational activities at each PS, operators use various forms, checklists and logs. Table 1-1 lists the wastewater PS operated by the City.

2.3.1 PS Inventory Book

The PS Inventory Book contains overview information available to all PS O&M personnel and includes, but is not limited to:

- Station capacity;
- Number of pumps;
- Type of pumps;
- Pump control information;
- Lead/lag/standby pump level settings for wet wells;
- Wet well size/volumes;
- Alarm capabilities;
- Overflow locations and receiving water bodies;
- Safety and other ancillary equipment;
- Flow meter information;
- Map and driving directions to PS; and
- Photograph of the PS.

The information in the PS Inventory Book is maintained in a spreadsheet administered by the Plant Operations Supervisor PS and CSOTF. Updates to the PS Inventory Book are made according to SOP PS-002 -PS Inventory Book Revisions. In addition a continuous improvement initiative has been identified to update the inventory book annually. Copies of the PS Inventory

Book are located in the WWTP Control Room and the Maintenance Management Center (basement of operations and control building).

2.3.2 Standard Operating Procedures

Five SOPs have been developed for PS Operations and are maintained on the City server. The SOPs include: 1) Citico PS Operation; 2) PS Inventory Book Revisions; 3) PS and CSO Power Loss; 4) Generator Set Up; and 5) Delivery and Control Room Operator and SCADA PS Checks. Copies of the PS Operations SOPs are included in Appendix G. Additionally, there are SOPs related to regulatory reporting, SSO response, information management, complaint management, etc. These SOPs are available under various other CMOM programs.

2.3.3 PS Alarm Sheets

The City has assembled Alarm Sheets for PSs to assist personnel with appropriate response when specific alarms are received. Appropriate responses include following up with field staff, continue monitoring, scheduling a site visit for the next work day or immediate response required. These predetermined responses help personnel prioritize alarms so that the most important activities are completed first. An example Alarm Sheet has been included in Appendix D. As part of the continuous improvement process, the PS Operations group is creating new alarm sheets for CSOTFs and a limited number of PSs that do not currently have Alarm Sheets. Information on continuous improvement initiatives can be seen in Section 5, “Continuous Improvement.”

2.3.4 Outage Studies

Outage studies have been completed for PSs with dual-feed power. These outage studies include a one-line utility power distribution circuit diagram and several possible reasons for failure in the power utility’s distribution system. Each possible outage reason is given an estimated down time and a description of one method, which may be used to restore power to the station for each listed outage reason. These outage studies are available to PS Operational staff to help coordinate with the power utility during activities, which have disrupted or may disrupt power to the stations. An example outage study has been included in Appendix E.

2.3.5 Vendor Operations and Maintenance Manuals

The vendor O&M manuals consist of documentation available from manufacturers and vendors about the equipment installed at each PS. Vendor O&M manuals are located in the Plant Maintenance Building. The City has recently designated the basement of the operations and control building to be the Maintenance Management Center. A planned initiative will consolidate a second copy of all of the existing vendor O&M manuals into the Maintenance Management Center and ensure that all of the PSs and CSOTFs have a vendor O&M manual. Information on continuous improvement initiatives can be seen in Section 5, “Continuous Improvement”.

2.3.6 Prioritization Guidelines

As part of the PS Operations Program, the City has developed a method for establishing priorities for making operational decisions. These prioritization guidelines are based on the equipment criticality developed during the EMRIP, which is a function of the likelihood and

consequence of failure. The EMRIP criticality presents a score to every asset. The asset scores were averaged to give an overall relative station criticality. The Alarm Sheets are used as necessary to assign a relative urgency to each PS alarm in accordance with SOP PS-0005 – Control Room Operator SCADA PS Checks.

Routine operations such as station visits are prioritized based on the station criticality score as well as other criteria mentioned in Section 2.1.2, “Site Visitation and Checks”. For example, 19th St, 23rd St, Collegedale and Friar Branch have high criticality scores and are scheduled for operational checks on a more frequent basis (i.e. weekly rather than monthly).

Used with the Alarm Sheets, the criticality scores assist operations personnel in emergency or unusual situations with decisions of sequence of response, deployment of portable equipment and deployment of resources. The criticality score is used to determine which PSs need to be addressed with more priority in the event that there are multiple stations requiring immediate attention and the response must be prioritized. The alarm sheets give an indication of the urgency of response with instructions to respond either immediately or during the next regular day shift. The City also recognizes the need to evaluate each situation and respond in the way that the PS Operations team deems most appropriate given the unique circumstances. Unique circumstances are often related to weather, staff availability, site specific conditions, operational history, etc.

2.3.7 Criticality Overview

As part of the EMRIP, a criticality score was developed for PS assets based on likelihood and consequence of failure. The consequence of failure score was developed using the following criteria:

- Proximity to State Waters;
- Design Capacity;
- (Continuous) Service Requirement;
- Critical Customers;
- Upstream Tributary PSs;
- Workplace/Public Safety;
- Difficulty to Repair; and
- System-wide Impact.

The likelihood of failure is the second factor in the criticality score. The following criteria were evaluated to assess likelihood of failure:

- Expected Service Life;
- Year of Installation;
- Current Year;
- Asset Condition Rating; and

- Installed Redundancy.

The overall average equipment criticality for each PS was used as the station criticality score. The PSs have been sorted by descending station criticality score which are maintained with the PS Supervisor on the City server so that notes can be added as stations are upgraded or otherwise have risks mitigated.

2.4 Operational Records and Information Management

2.4.1 Operational Inspections and Checklists

PMs are used for operational checks including visual checks of pumps, grease accumulations, station housekeeping, etc. Example PMs for the weekly operator duties and checklists for the PSs and example PMs for the monthly operator duties and checklists for the PSs are included in Appendix B.

These checklists are scanned and attached to the completed CityWorks work orders. The hard copies are kept on file in the Maintenance Management Center. Corrective Action work orders (CMs) may be scheduled as needed based on the results of these regular inspections.

2.4.2 PS Pump Status

The PS pump status is collected twice per shift at the MBWWTP for a total of four times daily in accordance with SOP LPO-006. SOPs are provided in Appendix G. The PS Checklist Sheet is used to document that a PS's pumps are operating as expected. The PS Checklist Sheets are kept on file at the MBWWTP. Any abnormal issues resulting from the checklists are documented in the plant Operations Room Logbook and are reported to the appropriate work center, often PS Operations. An example PS checklist is located in Appendix H.

2.4.3 Relevant Data Collection

During routine operational visits, PS operators collect flow meter readings and pump runtime readings. Where necessary, flow meter readings are recorded on a form and entered into the Hach-WIMS (Water Information Management System) to assist with billing certain customers. Pump runtime readings are recorded in the station logbook for operator review. An example Flow Meter Readings form is located in Appendix I.

2.4.4 Computerized Maintenance Management System Work Orders

Operator-performed maintenance is currently managed using CityWorks through PM work orders in accordance with the PS Maintenance Program. As part of the continuous improvement process, the City is developing work orders to track routine operational checks.

2.4.5 Logbooks

A PS Logbook is maintained at each station where activities are recorded during operational and maintenance activities, including deficiencies discovered during operational checks. These logs are in place for coordination among personnel visiting the stations and for supervisor review, as necessary. The logs are closed after one year and kept on file at the PS Office for five years.

2.4.6 PS SSOs

PS-related SSOs are tracked in a spreadsheet tool along with other asset classes such as gravity mains and force mains as part of the SORP. The SORP is maintained as a separate section in the CMOM Program.

3.0 Resource Management

3.1 Personnel

The PS Operations Program is managed by the City's WRD. The City assigns a Plant Operations Supervisor to be primarily responsible for PS Operations. There are six Plant Operators that report to the PS Operations Supervisor. Support of the PS Operations Program is the primary responsibility for these employees. See copy of organization chart in Appendix A.

During the 2007 CMOM Program Audit, the City had two personnel assigned to the PS Operations Program. Increased staffing was a recommendation from the audit. Therefore, to increase inspection frequency and readiness, the City has added five additional qualified personnel to the group.

The PS and CSOTF staff is responsible for all operations during day shift hours Monday-Friday. An off-duty PS Operator is rotated on a weekly basis for response to issues during off-shift hours. One mechanic and one electrician/instrumentation technician are on-call on weekends and off-shifts. Additional staff or outside contractors may be called in to assist during extreme rain events or emergencies.

PS Operators hold the title of Plant Operator I, II, or III and are encouraged to obtain Tennessee Collection System Operation Certification or earn a Wastewater Treatment Plant Operator Certification. Duties for the Plant Operators assigned to PSs and CSOTFs include, but are not limited to:

- Recording utility and flow meter readings;
- Cleaning, maintaining and inspecting applicable equipment;
- Checking operational functions;
- Housekeeping duties; and
- PS emergency response.

Further details on the requirements of Plant Operator positions are maintained on the City's website: http://www.chattanooga.gov. For the twice-per-shift telemetry checks, a Plant Operator II or above position is required.

Operations personnel meet with maintenance staff daily to discuss current operation or maintenance issues.

3.2 SCADA

SCADA is used by City personnel to monitor the status of PSs on a routine basis in the WWTP Control Room. Upgrades to the SCADA system have been scheduled with details in Section 2.2.3.7, "Monitoring System Overview."

4.0 Performance Measures

As part of the proactive EMRIP, the City has established performance measures or key performance indicators (KPIs) related to maintenance and work order management for PSs, CSOTFs and the WWTP. To identify successful implementation of the PS Operations Program, the City has identified the KPI in Table 4-1. This KPI is contingent upon successful completion of the continuous improvement initiative to develop routine operational station visit work orders.

Table 4-1
PS and CSOTF KPIs

KPI	Purpose	Target	Frequency
PS Operational Checks	Ensure proper operation of PSs; determine if condition issues are present.	95% Adherence to PS/CSOTF visit schedule	Monthly

5.0 Continuous Improvement

5.1 Periodic Evaluation

The City checks the PS Operations Program KPI on a monthly basis with a more comprehensive self-evaluation done on an annual basis. The self-evaluation is performed with consideration to the Environmental Protection Agency guideline: Guide for Evaluating CMOM Programs at Sanitary Sewer Collection Systems.

5.2 Continuous Improvement Initiatives

The following initiatives are being implemented by the City in order to improve the PS O&M Programs.

5.2.1 SCADA

The City is investing in SCADA system upgrades. The existing SCADA system does not provide optimum reporting speed, and communication failures have resulted in slower response times to SSOs. A Preliminary Engineering Report (PER) was completed in June 2012 to give an evaluation of the communications system and software components to determine the best method to continue communications to all of the City's remote equipment with the goal of improving the system to mitigate sanitary sewer overflows from PS failures.

- Target Timeframe and Responsible Party: Established in Capital Improvement Program

5.2.2 Station Site Visits

The operational visit schedule is currently conducted by a single operator. There may be efficiencies in including maintenance personnel during these checks so that PMs can be coordinated and CMs may be addressed more effectively as issues are discovered. This initiative is to evaluate and implement, if necessary, O&M technician teams.

- Target Timeframe: June 2015
- Responsible Party: Maintenance Manager, Plant Manager, and Plant Operations Supervisor

5.2.3 Operational Tracking

The City is developing PM work orders to help manage the labor effort associated with PS operations. These PM work orders will also provide documentation of operational activities for supervisor review. This initiative is to develop and implement the work order process to track operational activities in CityWorks™.

- Target Timeframe: December 2014
- Responsible Party: Maintenance Manager, Plant Manager, and Plant Operations Supervisor

5.2.4 Staff Level Evaluation

By tracking operational activities in CityWorks, the PS Operations Supervisor and Maintenance Manager will be able to assess personnel utilization and PS readiness to ensure that staffing levels are adequate. This initiative is to evaluate staffing levels for PS Operations once data is available from operational work order tracking.

- Target Timeframe: June2015
- Responsible Party: Maintenance Manager, Plant Manager, and Plant Operations Supervisor

5.2.5 PS Alarm Book Enhancements

This initiative includes developing a CSOTF Alarm Book as well as additions to the PS Alarm Book. The Alarm Sheets are a valuable tool in prioritizing alarm response. As new PSs are added, Alarm Sheets will be developed. Additionally, Alarm Sheets will be developed for CSOTFs and for the limited number of PS, which do not have an Alarm Sheet. Alarm Sheets may alternatively be developed by facility category if practical.

- Target Timeframe: May 2016
- Responsible Party: PS Operations Supervisor and Plant Manager

5.2.6 PS Inventory Book Updates

This initiative includes updates and revisions to the PS Inventory Book. The details for each of the PSs and CSOTFs will be reviewed and modified as appropriate and new stations recently built will be added. The PS Inventory Book will be updated annually.

- Target Timeframe: December 2015 and then annually
- Responsible Party: PS Operations Supervisor and Plant Manager. In addition, checklists must include the following: 1) Read and record instantaneous amperage on pumps; and 2) Inspect wet well and record grease accumulations.

5.2.7 Temporary Emergency Pumping Requirements

The City has determined that temporary emergency pumping installation would be facilitated by creating a list of requirements for each PS. This initiative is to visit or otherwise assess PSs to determine the requirements to initiate emergency pumping. Pumping requirements may be developed by facility category if practical. Implementation of physical improvements will follow the assessment. Specifications for new PSs will include provisions for bypass pumping.

- Target Timeframe: September 2017
- Responsible Party: PS Operations Supervisor, Maintenance Manager, and Plant Manager

5.2.8 Vendor O&M Manual Consolidation

A second copy of Vendor O&M manuals will be collected and organized and placed in the new Maintenance Management Center in the basement of the O&C Building. As part of this effort, the completeness of the information will be verified to make sure that all required O&M

information is available. Information not available will be requested from equipment manufacturers. There is one copy of Vendor O&M manuals in the Plant Maintenance Building currently.

- Target Timeframe: December 2015
- Responsible Party: PS Operations Supervisor PS and CSOTF, Maintenance Manager, and Plant Manager

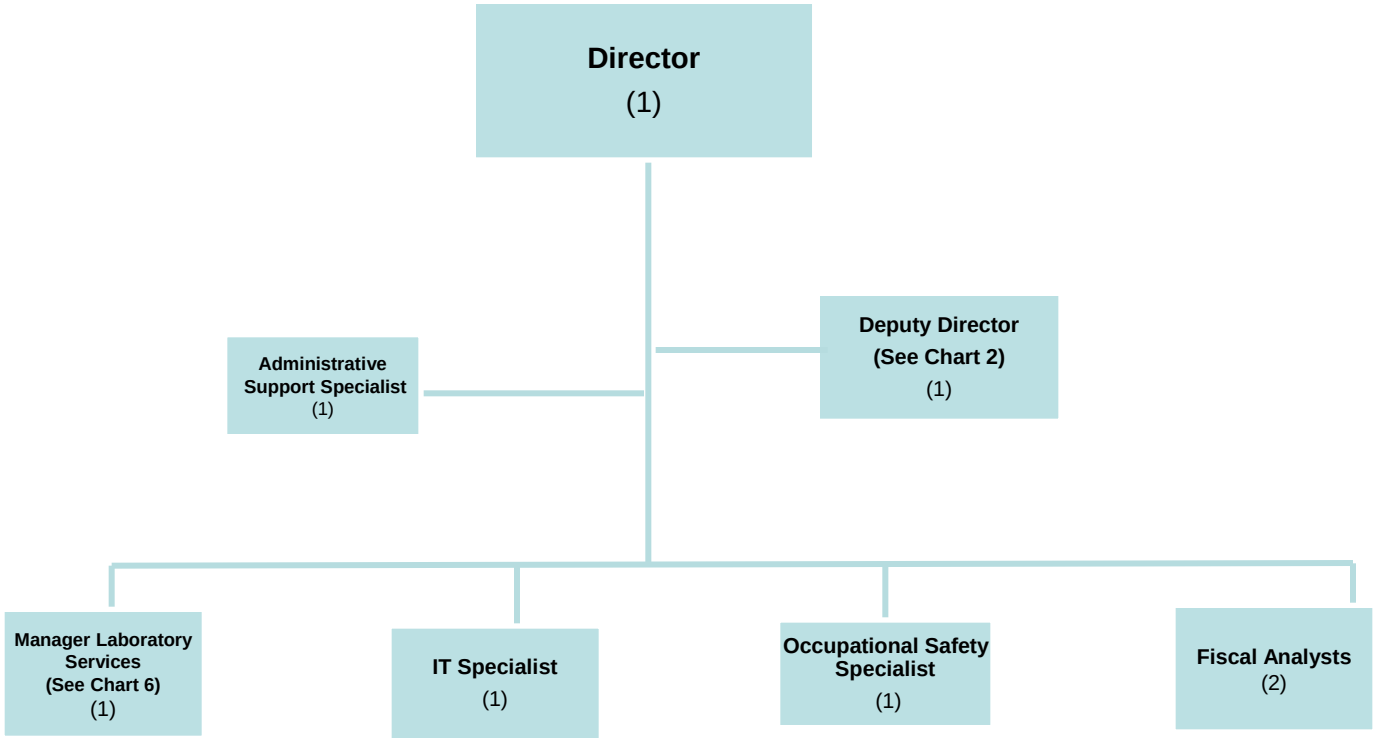
5.2.9 CMOM Development

As part of the initial CMOM development, the City completed the following initiatives:

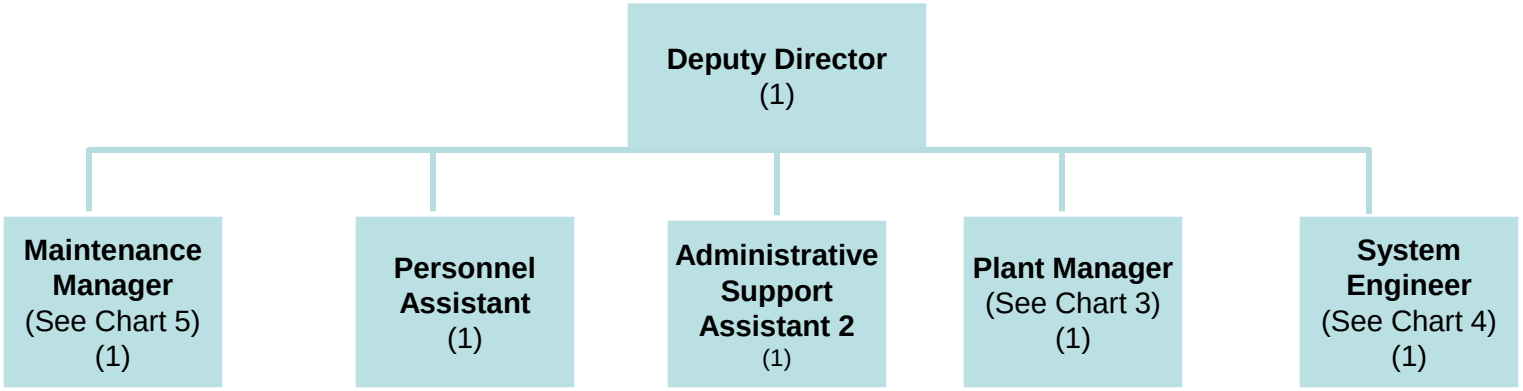
- **Development of a monthly station visit schedule**. As part of the initial CMOM development, the City formalized a PS and CSOTF visit schedule.
- **Developed method to track performance**. As part of the initial CMOM development, the City developed a KPI to track PS and CSOTF operational performance. PS maintenance KPIs were developed during the EMRIP.
- **Developed weekly operational checks for critical PSs**. The City has criteria to screen and select PSs for weekly checks as described in Section 2, “Program Documentation”.

Appendix A
Waste Resources Division Organizational Chart

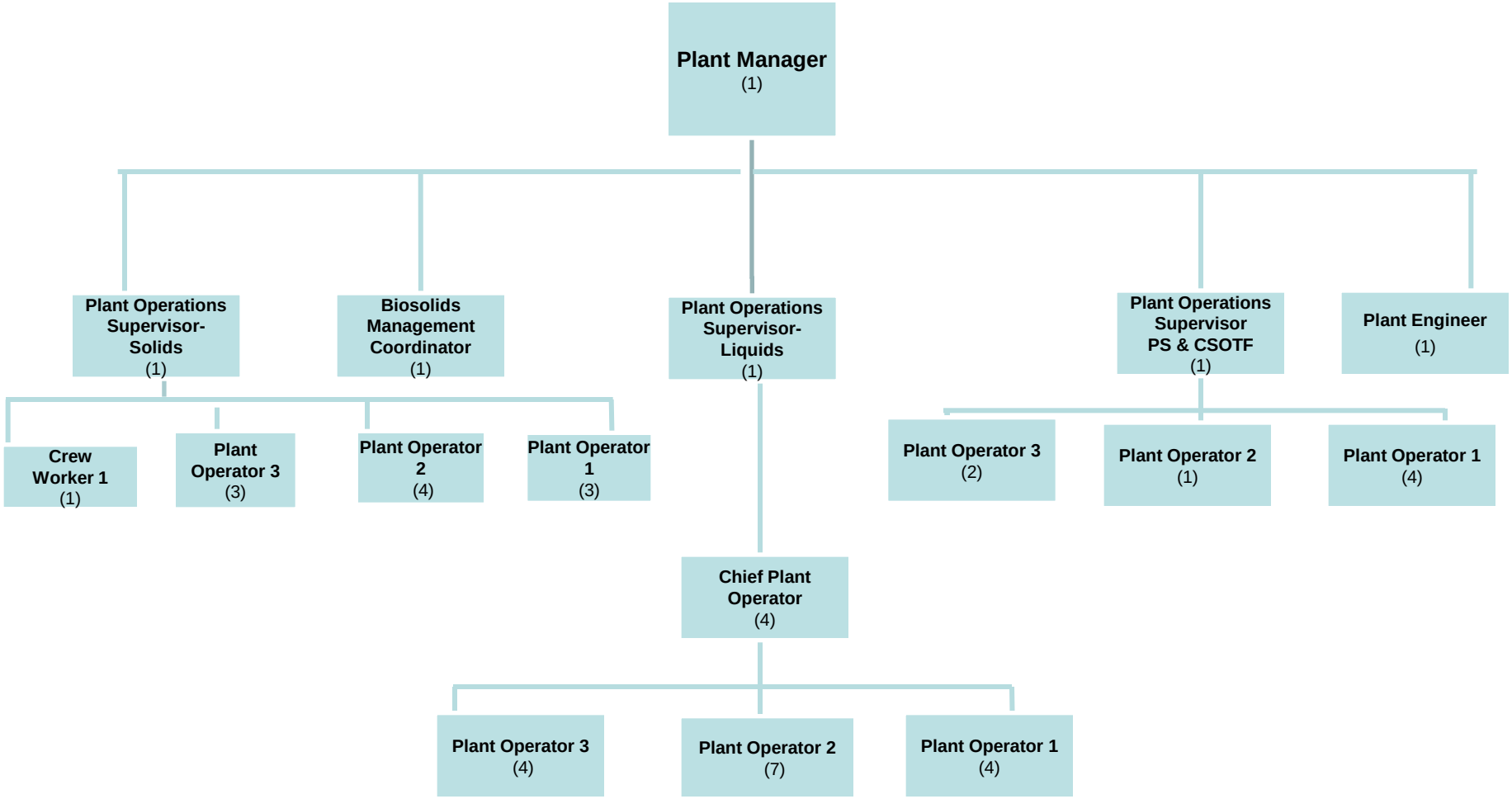
WASTE RESOURCES DIVISION
ORGANIZATIONAL CHART
(September, 2014)



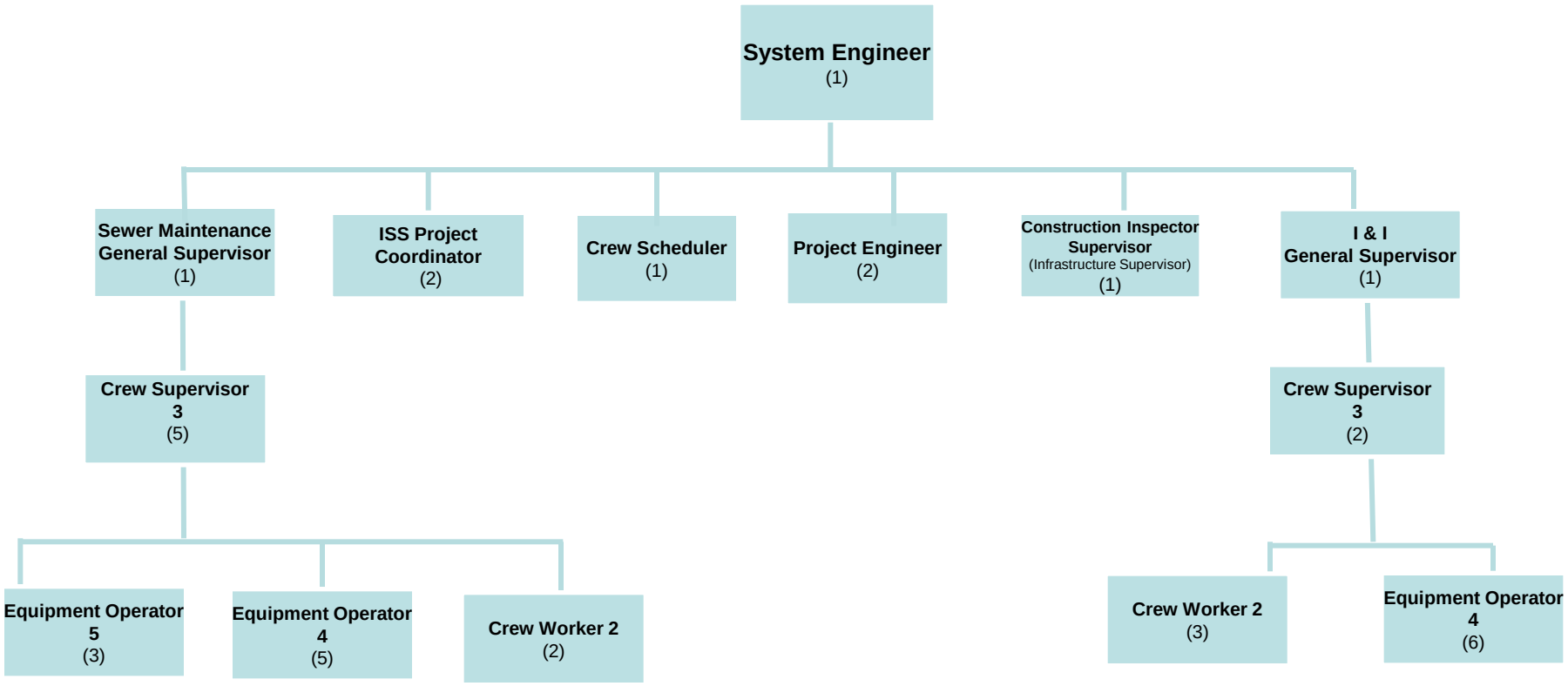
WASTE RESOURCES DIVISION
ORGANIZATIONAL CHART
Chart 2
(September, 2014)



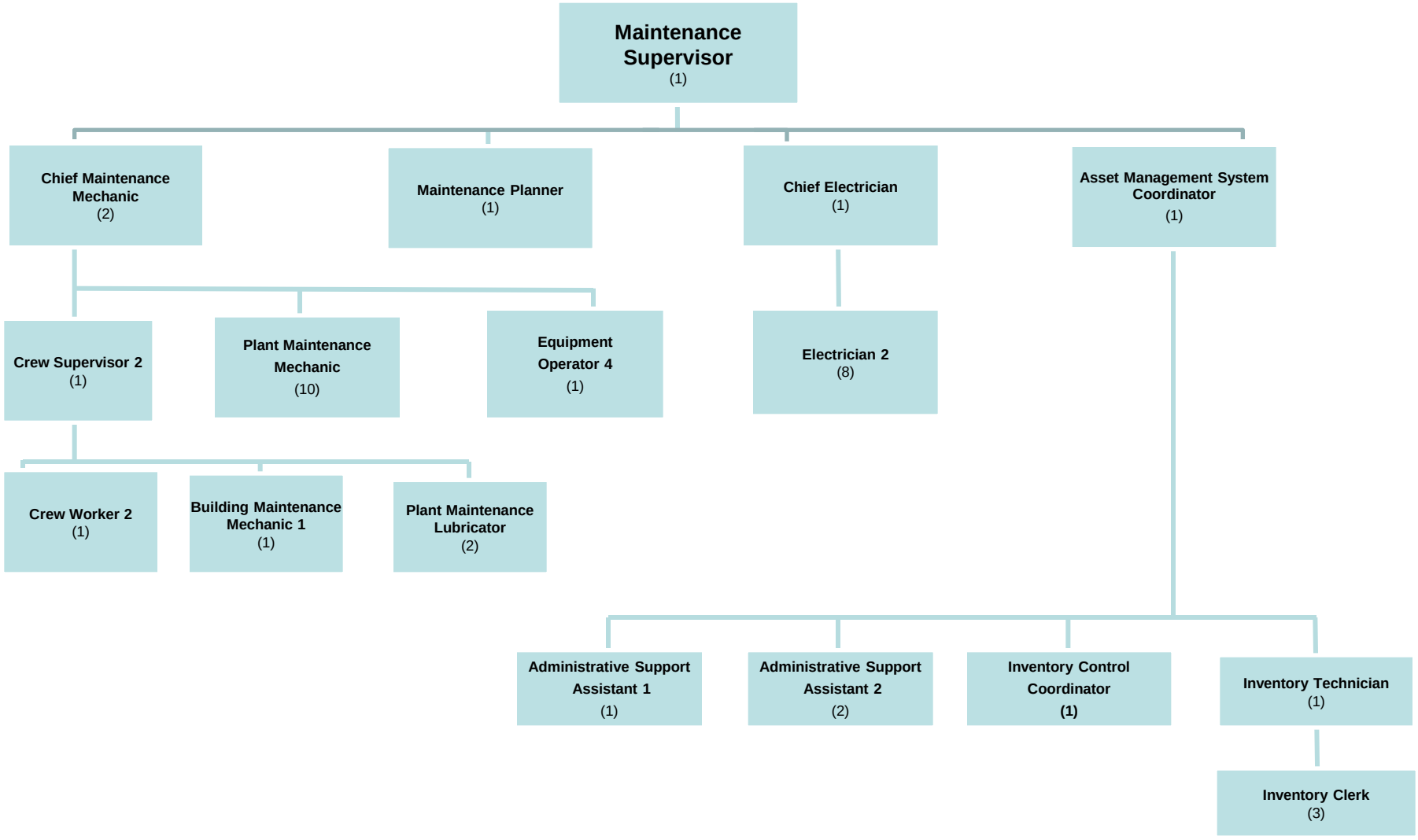
WASTE RESOURCES DIVISION
ORGANIZATIONAL CHART
Chart 3
(September, 2014)



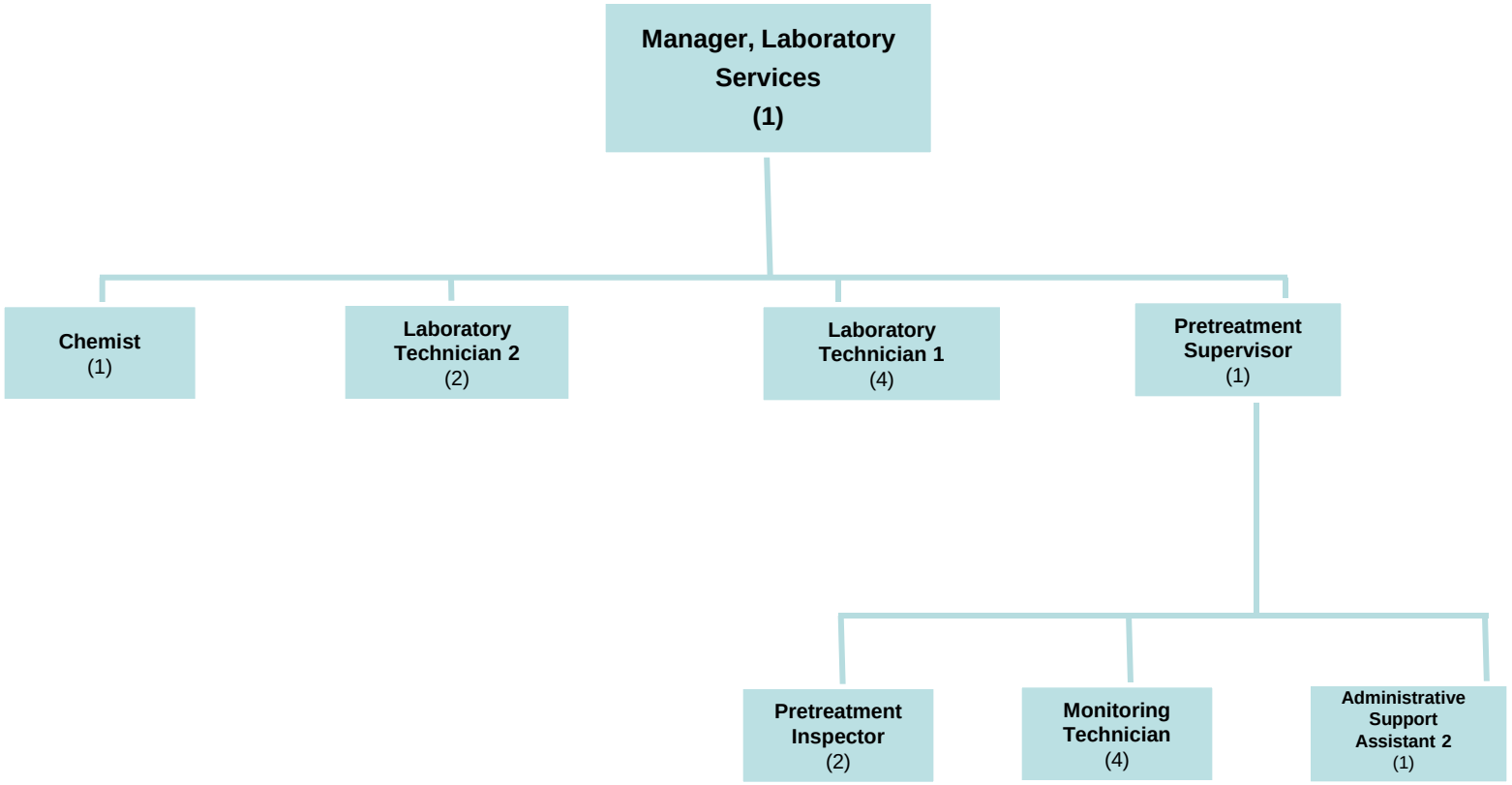
WASTE RESOURCES DIVISION
ORGANIZATIONAL CHART
Chart 4
(September, 2014)



WASTE RESOURCES DIVISION
ORGANIZATIONAL CHART
Chart 5
(September, 2014)



WASTE RESOURCES DIVISION
ORGANIZATIONAL CHART
Chart 6
(September, 2014)



Appendix B
Example Weekly and Monthly PMs for Operator Inspections and Checks

Preventive Maintenance Template

South Chickamauga	Pump Station

PM Description:	• Operationally Check and Inspect South Chickamauga Pump Station Per. Attachment
Frequency of PM:	• Weekly

Safety advisories, general and specific:	• Exercise safety in all performances: Do not ignore any warnings; use only approved methods, materials and tools. Do not permit any function of questionable safety; accidents are caused by unsafe acts and unsafe conditions • Follow Lock-Out Tag-Out procedures • Use appropriate PPE

Specify How to Coordinate with Operations:	• Contact O&C Before Starting And After Completion Of Task

Parts: •	Equipment: • Safety Glasses • Safety Shoes • Ear Protection • Gloves • Gas Monitor As Needed
Consumables: •	Special Tools:
Labor Type: • Pump Station Operator	Labor Amount Average (Hours): • 3

Include reference source and where to locate the reference if more info is needed:	See Attachment

Preventive Maintenance Template

LOCK-OUT TAG-OUT ELECTRICAL DISCONNTCTS AS NEEDED

- Operationally Check and Inspect South Chickamauga Pump Station Per. Attachment
- Report Any Discrepancies Found For CM Generation
- Remove Lock-Out and Restore Power As Needed

Provide specific pass/fail criteria if corrective action is required:	

Comments/Notes:

Other records to update (log book, CMMS, etc.)

Required cleanup: Clean up around work area after completion of task.

SOUTH CHICKAMAUGA
OPERATIONAL AND INSPECTION CHECK LIST

UTILITIES
Collect the water meter reading.
Collect the electric meter reading.
Collect flow meter readings
Collect pump hour meter readings

HOUSE KEEPING
Pick up trash on and around the station property.
Pick up trash in the control room and pump room.
Sweep all the floors.
Keep a garbage can in the control room for trash and empty when filled.
Keep a plastic garbage bag in the pump room for trash.
Replace burned out light bulbs.
Replace panel board light bulbs.
Wash down the pump room floor when sewage is present.
Clean the bathroom
Restock toilet paper, paper towels and hand soap.
Clean the wet well
Clean the screening room.
Have the wet well screening bucket moved if ¾ full
Clean up around the dumpster

ELEVATOR ROOM
Check the elevator for proper operation
Check the elevator phone

CONTROL ROOM / MCC ROOM
Read and record instantaneous amperage on pumps.
Change flow chart
Check intrusion alarms.
Check air compressor operations.
Check bubble line back-up nitrogen system bottle pressure.
Drain the air compressor condensations
Check bubble system flow meter for the proper amount of airflow.
Check bubble system for water accumulations.
Manually purge the bubble system
Make sure the phone is operational
Check pump panel for alarms.
Check room temperature.
Check thermostat setting.
Put two pumps in automatic and allow them to start
Record your name, date, time, operational activities and problems in the logbook.
Check the operation of the air scrubber

Collect carbon samples if scheduled

THIRD FLOOR
Check flow meters on each pump

DRYWELL
Test operator's assist alarm in pump room.
Check the sump pump panel for pump status and alarms
Test sump pumps for proper operation with float switches.
Test high drywell alarm.
Check drywell ventilation system
Check pump seal water flow through rotometer
Check pump seal water leakage
Check pump oil level.
Check operating pump suction and discharge pressure
Check pumps for vibration, noise and overheating

WETWELL
Inspect wet well and record grease accumulations.
Start the bar screen
Check for sheared pin
Check chain and rake alignment and wear
Check the ventilation system
Check the conveyor for proper operation

ODOR CONTROL
Record the Bioxide tank level.
Visually check belts for ware and looseness.
Check the Bioxide pumps for proper operation

OTHER DUTIES AS NEEDED
Monitor and operate the pump station as needed during maintenance activities to prevent downstream or upstream problems.
Respond to pump station alarms and troubleshoot the problems.
Report any discrepancies found for CM generation.
Report any problems found in the station's operations or in performing your duties to your supervisor.

Preventive Maintenance Template

DuPont Industrial Park	Pump Station

PM Description:	• Operationally Check and Inspect DuPont Industrial Park Pump Station Per Attachment.
Frequency of PM:	• Monthly

Safety advisories, general and specific:	• Exercise safety in all performances: Do not ignore any warnings; use only approved methods, materials and tools. Do not permit any function of questionable safety; accidents are caused by unsafe acts and unsafe conditions • Follow Lock-Out Tag-Out procedures • Use appropriate PPE

Specify How to Coordinate with Operations:	• Contact O&C Before Starting And After Completion Of Task

Parts: •	Equipment: • Safety Glasses • Safety Shoes • Ear Protection • Gloves • Gas Monitor As Needed
Consumables: •	Special Tools:
Labor Type: • Pump Station Operator	Labor Amount Average (Hours): • 2

Include reference source and where to locate the reference if more info is needed:	See Attachment

Preventive Maintenance Template

LOCK-OUT TAG-OUT ELECTRICAL DISCONNTCT AS NEEDED

- Operationally Check and Inspect DuPont Industrial Park Pump Station Per Attachment.
- Report Any Discrepancies Found For CM Generation
- Remove Lock-Out and Restore Power As Needed

Provide specific pass/fail criteria if corrective action is required:	

Comments/Notes:

Other records to update (log book, CMMS, etc.)

Required cleanup: Clean up around work area after completion of task.

Preventive Maintenance Template

DuPont Industrial Park
OPERATOR DUTIES AND CHECK LIST
VISIT MONTHLY

UTILITIES AS NEEDED
Collect the water meter reading.
Check the backflow preventer for leaks.
Collect the electric meter reading.
Collect pump hour meter readings.
Grounds
Check the grounds for vandalism.
Check the station area for odors.
Pick up trash on and around the station property.
Blow leaves off the area inside the fence.
Remove weeds growing inside the fence.
Remove vines from the fence.
Weed eat around the fence.
WETWELL
Check all the wet well float switches for proper operation.
Test float alarm switches for transmission to the plant.
Check for corrosion in the wet well.
Inspect wet well and record grease accumulations.
Start both pumps manually and establish a flow.
Check the pumps for unusual noises.
Check if pumps are connected to the discharge line correctly.
Pump the wet well level down until the pump(s) stop.
Stroke the discharge isolation valves.
CONTROL PANEL
Read and record instantaneous amperage on pumps.
Test intrusion alarm for transmission to the plant.
Test operator's assist alarm for transmission to the plant.
Replace burned out panel board lights.
Wipe off the pump control panel.
Check pump control panel for rain water leaks.
Record your name, date, time, hour meter readings, operational activities and problems in the logbook.
OTHER DUTIES AS NEEDED
Monitor and operate the pump station as needed during maintenance activities to prevent downstream or upstream problems.
Respond to pump station alarms and troubleshoot the problems.
Respond to and troubleshoot odor complaints in the neighborhood.
Create work orders on any mechanical / electrical problems.
Report any problems found in the station's operations or in performing your duties to your supervisor.

Appendix C
PM for Portable Generator Exercising

Preventive Maintenance Template

All Portable Generators	

PM Description:	• Exercise Portable Generators
Frequency of PM:	• Weekly

Safety advisories, general and specific:	• Exercise safety in all performances: Do not ignore any warnings; use only approved methods, materials and tools. Do not permit any function of questionable safety; accidents are caused by unsafe acts and unsafe conditions • Follow Lock-Out Tag-Out procedures • Use appropriate PPE

Specify How to Coordinate with Operations:	• Contact Operator on duty before starting and after completion of task.

Parts: •	Equipment: • Safety Glasses • Safety Shoes • Ear Protection • Gloves
Consumables: •	Special Tools:
Labor Type: • Pump Station Operator	Labor Amount Average (Minutes): • 120

Include reference source and where to locate the reference if more info is needed:	

- Exercise All Portable Generators
- Report Any Discrepancies Found For CM Generation

Preventive Maintenance Template

Provide specific pass/fail criteria if corrective action is required:	

Comments/Notes:

Other records to update (log book, CMMS, etc.)

Required cleanup: Clean up around work area after completion of task.

Appendix D
Example PS Alarm Sheet

Big Ridge 11 Pump Station

Big Ridge No.11 Pump Station is a duplex pump station with level controlled by float switches. During normal operation, the pumps alternate each time they run. A Motorola MOSCAD RTU monitors this pump station, and transmits pertinent information about the pump station to the Moccasin Bend WWTP using radio telemetry.

Description of Monitored Data and Actions Required

Pump No.X Running - Pump No.X is running. This input is for informational purposes. No action is required.

Pump No.X Failure - This normally indicates that the overload for the pump has tripped. In some cases a common alarm is used for other failures, such as, seal failure, thermal overload, etc. Check pump station ASAP. If both pumps have failed, check immediately.

Pump No.X Low Current - Pump No.X has a low current condition. This normally occurs when a pump shuts down. No action is required unless alarm is received each time the pump is run. Check pump station if alarm occurs repeatedly.

Power Failure - The pump station has lost incoming AC power on one or more phases. Check pump station immediately.

High Wetwell Level - The water level in the pump station has reached a critically high level. In wet weather check to see that all available pumps are running. In dry weather, check pump station immediately.

Low Wetwell Level - The water level in the pump station has reached a critically low level. If pumps are off, notify pump station personnel during normal work hours. If pumps are running, check pump station immediately.

Operator Assist - The emergency switch located at the pump station has been activated. Check with all operations and maintenance personnel to see if someone is at the pump station. If unable to verify, check pump station immediately.

Site Intrusion - The intrusion switch(s) at the pump station has been activated. Check with all operations and maintenance personnel to see if someone is at the station. If not, go to the pump station at the earliest convenient time.

RTU Tamper - The MOSCAD RTU at the pump station has been opened. Check with all operations and maintenance personnel to see if someone is at the station. If not, go to the pump station at the earliest convenient time.

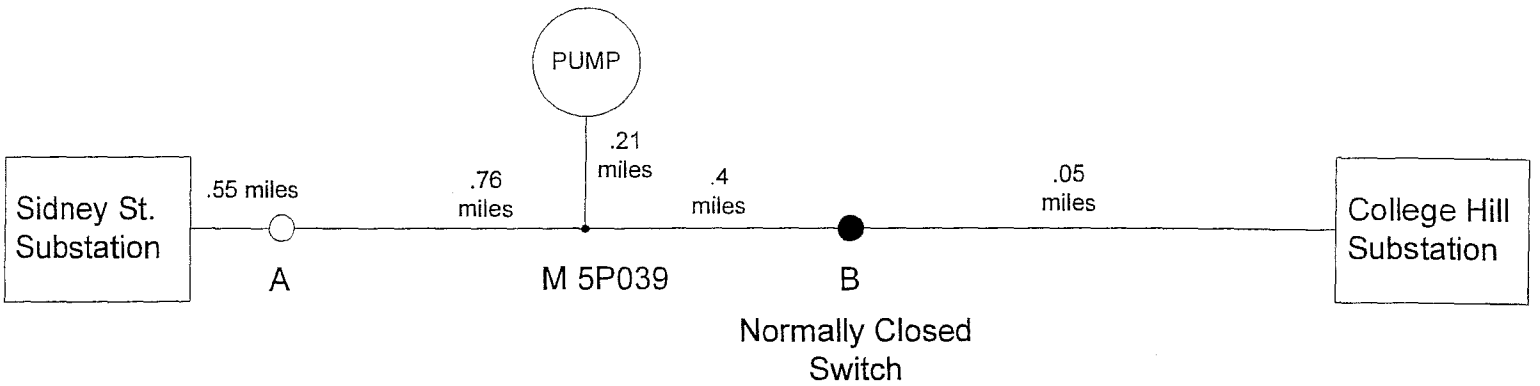
RTU AC Power Failure - The MOSCAD RTU has lost AC power, and is on battery backup power. The entire pump station could also have lost power. Check pump station immediately.

RTU Communications Failure - The MOSCAD Field Interface Unit (FIU) at the WWTP cannot communicate with the pump station. This could be due to a radio equipment malfunction at the pump station. Also this could indicate a loss of AC power at the pump station, if the batteries inside the RTU are defective. Check pump station immediately.

Appendix E
Example PS Outage Study

19th St. Sewer Pumping Station

Outage Study
(June 2005)



Circuit Diagram is not to any Scale

○ Normally Open Switch
● Normally Closed Switch

Mileage denotes 12 kV primary distances between sectionalizing devices

Normal service to 19th St. Pump is from College Hill Substation.
The following details our existing standby capabilities and our estimates of outage time during normal weather conditions.

Outage due to:	Est. outage time	Description of one method to restore power
College Hill Sub Failure	1 hour	Close switch A to Sidney Sub, Open at College Hill Sub
Primary Line Out between College Hill Sub and Switch B	1 hour	Close switch A to Sidney Sub, Open at Switch B
Primary Line Out between Switch B and Open Switch A	6 hours	Call in line crew to repair primary circuit (Worst case would be a broken pole)
Distribution Transformer Bank Failure	12 hours	Replace distribution transformer
Secondary Conductor Failure		Customer call electrician to repair internal problem

**During abnormal weather conditions, the estimates of outage time are very unpredictable. EPB will make an effort to restore power as soon as possible.

**This represents how the 19th St. Pump is presently served. EPB is constantly reviewing the transmission and distribution systems and may make changes at any time without notifying the 19th St. Pumping Station.

Appendix F
Portable Pumping Contractor Contact Information

Portable Pumping Contractor Contact Information

1. Darren DeSautell

Rain for Rent | 678.594.6601

2. Chad Freund

Godwin Pumps | Sales Representative

1320 Lockhart Drive | Kennesaw, GA 30144

Office: 770.420.8920|Cell: 404.557.2085|Fax: 770.420.8930

chad.freund@godwinpumps.com|www.godwinpumps.com

Appendix G
Standard Operating Procedures

- Citico Pump Station Operation
- Pump Station Inventory Book Revisions
- Pump Station and CSO Power Loss
- Generator Set Up and Delivery
- Control Room Operator Response to Pump Station Alarms
- Telemetry Monitoring of High Priority Pump Stations

CITY OF CHATTANOOGA – WASTE RESOURCES DIVISION
Moccasin Bend Wastewater Treatment Plant
Pump Station Operations

Title: Citico Pump Station Operation				
SOP Number **PS-001**	Revision Number **02**	Approval Signature	Effective Date **7/11/08**	Date of Last Review **1/15/14**

Scope: Basic pump operation and control. Starting of pumps and resetting of pump and valve faults. Resetting breakers and restoring power.

Purpose: To protect the environment by assisting personnel on what action to take when manning Citico Pump Station during rain events decreasing the likely hood of an overflow.

Responsibility: Chief Pump Station Operator, Pump Station Operators, Electricians, Mechanics, and Plant Operators.

Frequency: As needed.

Emergency Contacts:
Control Room: 757-5026 Ext.3318
Bill Newell: 304-0278
Charles Thomas: 310-7007
EPB: 648-3563

General Information: Citico Pump Station has four pumps each with a capacity of 40 mgd. Due to discharge line limitations, only three pumps may be ran at the same time. The pumps track a 9' set point, and the following are the levels that the pumps operate at.

On	Off
Lead 9'	Lead at min. spd. for 5 min.
Lag 1 Lead at max. spd. for 30 sec.	Lag 1 at min. spd. for 30 sec
Lag 2 Lag 1 at max. spd for 30 sec.	Lag 2 at min. spd. for 30 sec
HWW 15'	HWW resets 14'
LWW 6'	LWW resets 7'
All pumps on 15'	
All pumps off 5'	

Three of the four pumps are set up as Lead, Lag 1, and Lag 2. If one of the three pumps fail then the fourth pump should come on. If the pump that fails is reset then the fourth pump that came on should shut down and the reset pump should run.

Procedure: When a pump fails follow the following steps. If the pump starts then it is not necessary to do the remaining steps. If the pump does not start then go to the next step. When a pump fails there will usually be a fault light representing that fault on the Station Control Panel that lights up followed by an audible alarm.

1. When a pump fails usually there will be a fault light on the Station Control Panel. Press the acknowledge button to reset.

2. Press the reset on the Cutler-Hammer key pad on the VFD.

3. Check to see if any of the four VFD breakers located at the west end of the control room have tripped. Reset if needed.

4. Ensure that the pump is in inverter mode and in auto.

5. Cycle the two breakers located on the individual pump's drive cabinet.

6. Switch the pump to the off position.

7. Go downstairs at the ball valve controls, and open the half inch ball valve coming off the discharge line of the pump just below the pressure switch.

8. If air blows out of the valve, the pump is air locked and must be back flushed.

9. If water blows out of the valve, the pump is not air locked, but could have a blockage. Back flush the pump to clear any blockage, and by back flushing you will be testing the mechanical operation of the ball valve.

10. If nothing blows out of the line at the half-inch ball valve, then the line is stopped up, and you need to take it apart and flush it out with a water hose.

11. Before returning upstairs to the control room, press the reset on the ball valve control panel.

12. In the control room place the pump back to the auto position. If the pump still does not run, have O&C call an electrician in and notify the Pump Station Chief Operator.

13. All pumps can be run in BYPASS unless otherwise noted. To do this turn the pump off, turn the mode switch from inverter to BYPASS, and the AUTO/OFF/HAND selector to HAND and the pump should come on and run full speed.

14. The station overflow is at 20' and, if the wet well is in high level start a pump in hand to prevent an overflow while troubleshooting pump problems. Do not hesitate if you can't get a pump started to call for help immediately.

15. If station has a loss of power, check the main breaker located at the west end of the control room. Check the power meter in the fenced in area attached to the building. If the LED display is blank, then notify the EPB and the Pump Station Chief Operator. If the display is normal, then have O&C call an electrician and notify the Pump Station Chief Operator.

CITY OF CHATTANOOGA – WASTE RESOURCES DIVISION
Moccasin Bend Wastewater Treatment Plant
Pump Stations

Title: PUMP STATION INVENTORY BOOK REVISIONS				
SOP Number **PS-002**	Revision Number **02**	Approval Signature	Effective Date **12/29/06**	Date of Last Review **1/15/14**

Purpose

To ensure quality management practices the pump station inventory book was created. It was designed to give all operation and maintenance personnel a source to go to for information on equipment located at the stations as well as some of the operational variables that have been set up. The equipment can be modified or replaced and the operational variables will be changed as needed. This creates a need to update our inventory book. This SOP will describe the procedure to accomplish this task.

General Information

All changes in equipment or operational variables should be brought to the attention of the pump station chief operator in a timely manner. The chief operator will make all revisions to the pump station inventory book and make sure that all personnel with a inventory book receive a copy of the revision.

Procedure

Anyone that makes an equipment change or a change in operational variables at a pump station should notify the pump station chief operator immediately. If the pump station chief operator is not available then the computer room operator should be notified and in either case the pump station chief operator should be notified in writing, "EMAIL" within 24 hours. The pump station chief operator will make the necessary changes on the pump station inventory spreadsheet and handle distribution of the revisions to all personnel that have the inventory books. The revisions will be distributed monthly unless the revision is considered to be critical in the operation of the station and in that case it will be distributed within 24hrs. All revisions will be made by email to personnel that have the inventory books and it will be the responsibility of the person in possession of the book to install the revisions in their book. The pump station chief operator will install the revisions at the stations and in the books located in the operations and control building and the plant library.

CITY OF CHATTANOOGA – WASTE RESOURCES DIVISION
Moccasin Bend Wastewater Treatment Plant
Pump Station Operations

Title: Pump Station and CSO Power Loss				
SOP Number **PS-003**	Revision Number **03**	Approval Signature	Effective Date **08/01/08**	Date of Last Review **1/15/14**

Scope: Covers emergency Pump Station and CSO operations during a power loss.

Purpose: To maintain quality management practices an emergency response plan for each Pump Station and CSO has been established to identify what shall be used at each site to restore pumping capabilities.

Responsibility: Pump Station Operations Supervisor, Plant Superintendant, Electrician, Control Room Operator and Liquids Operations Supervisor, I and I Supervisor.

Frequency: As needed.

Emergency Contacts:
Control Room: 757-5026 Ext.3318
Bill Newell: 304-0278
Charles Thomas: 310-7007
EPB: 648-3333

General Information: A preventive maintenance work order shall be generated annually to test the Pump Station Emergency Response Plan. Generators shall be hauled to stations with plugs to test the station under load. Each stations power fail alarm will be checked at this time as well. In the event of a loss of power at a

Pump Station or CSO it will be necessary to provide an alternative power source to continue pump operations and open and close valves as needed. This shall be accomplished with the use of portable generators, onsite generators, vaccon trucks, and a switchable secondary feed supplied by the EPB also to be verified annually.

Procedure: When a station has a loss of power the Pump Station Operations Supervisor or Plant Superintendant shall be notified. They shall decide what action should be taken to restore pumping capabilities to prevent an overflow. The following is a list of all sites and what our current plan is for each site to restore pumping capability.

STATION	SOURCE	GENERATOR
19TH ST.	EPB SECONDARY FEED	
23RD ST.	EPB SECONDARY FEED	
26TH ST.	VACCON/PORTABLE GENERATOR WITH FLYING LEADS	W6866
AIRPORT	PORTABLE GENERATOR	W6686
AIRPORT2	PORTABLE GENERATOR	W6685/W6687
ALTON PARK	PORTABLE GENERATOR	W6686
ALTAMONT	ONSITE GENERATOR	W6685/W6687
ARBOR CRK	VACCON/PORTABLE GENERATOR WITH FLYING LEADS	W6686
BATTERY PL	PORTABLE GENERATOR	W6686
BIG RIDGE 1	PORTABLE GENERATOR	W6685/W6687
BIG RIDGE 2	ONSITE GENERATOR	W6685/W6687
BIG RIDGE 3	PORTABLE GENERATOR	W6685/W6687
BIG RIDGE 4	PORTABLE GENERATOR	W6686
BIG RIDGE 5	PORTABLE GENERATOR	W6685/W6687
BIG RIDGE 6	ONSITE GENERATOR	
BIG RIDGE 7	PORTABLE GENERATOR	W6686
BIG RIDGE 8	PORTABLE GENERATOR	W6686
BIG RIDGE 9	PORTABLE GENERATOR	W6686
BIG RIDGE 10	PORTABLE GERNERATOR	W6686
BIG RIDGE 11	ONSITE GENERATOR	W6685/W6687
BIG RIDGE 12	ONSITE GENERATOR	W6685/W6687
BIG RIDGE 13	PORTABLE GENERATOR	W6686
BIG RIDGE 14	PORTABLE GENERATOR	W6685/W6687
BOY SCOUT	PORTABLE GENERATOR WITH FLYING LEADS	W6685/W6687
BRAIN GOLF	PORTABLE GENERATOR	W6686
BRAIN MANOR	VACCON/PORTABLE GENERATOR WITH FLYING LEADS	W6686
CITICO	EPB SECONDARY FEED	
COLLEGEDALE	ONSITE GENERATOR	
DAVIDSON PLACE	PORTABLE GENERATOR	W6685/W6687

STATION	SOURCE	GENERATOR
DUPONT	PORTABLE GENERATOR	W6685/W6687
DUP IND PKWY	PORTABLE GENERATOR	W6685/W6687
EARL LANE SS	PORTABLE GENERATOR	W6685/W6687
EAST BRAIN	PORTABLE GENERATOR WITH FLYING LEADS	W6685/W6687
EASTGATE	PORTABLE GENERATOR	W6686
EASTGATE 2	PORTABLE GENERATOR	W6685/W6687
ENTERPRISE	PORTABLE GENERATOR	W6685/W6687
FAGAN ST.	VACCON/PORTABLE GENERATOR WITH FLYING LEADS	W6686
FRIAR BR	EPB SECONDARY FEED	
HERITAGE GREEN	PORTABLE GENERATOR	W6686
HIGHLAND PK	PORTABLE GENERATOR	W6685/W6687
HIX NO.1	PORTABLE GENERATOR WITH FLYING LEADS	W6685/W6687
HIX. NO.2	PORTABLE GENERATOR WITH FLYING LEADS	W6685/W6687
HIX. NO.3	PORTABLE GENERATOR	W6685/W6687
KOMATSU	VACCON/PORTABLE GENERATOR WITH FLYING LEADS	W6686
LAKE VISTA	VACCON/PORTABLE GENERATOR WITH FLYING LEADS	W6685/W6687
LATTA ST.	PORTABLE GENERATOR WITH FLYING LEADS	W6685/W6687
MAN PATT	PORTABLE GENERATOR	W6686
MEAD. TR.	VACCON/PORTABLE GENERATOR WITH FLYING LEADS	W6686
MT CREEK	ONSITE GENERATOR	
MUR HILL 1	PORTABLE GENERATOR	W6685/W6687
MUR HILL 2	PORTABLE GENERATOR	W6685/W6687
MUR HILL 3	PORTABLE GENERATOR	W6685/W6687
MUR HILL 4	PORTABLE GENERATOR	W6685/W6687
MUR HILL 5	PORTABLE GENERATOR	W6685/W6687
NORTH TER	PORTABLE GENERATOR	W6685/W6687
ORC. KNOB SS	EPB SECONDARY FEED	
ORCH KNOB WW	EPB SECONDARY FEED	
PINE. RD.	VACCON/PORTABLE GENERATOR WITH FLYING LEADS	W6686
RINGGOLD	ONSITE GENERATOR	
RIVER PARK 1	VACCON/PORTABLE GENERATOR WITH FLYING LEADS	W6686
RIVER PARK 2	VACCON/PORTABLE GENERATOR WITH FLYING LEADS	W6686
SOUTH CHICK	EPB SECONDARY FEED	
SPRING CREEK	ONSITE GENERATOR	
STORM STATION 1	EPB SECONDARY FEED	
STORM STATION 2	PORTABLE GENERATOR	W6685/W6687
STORM STATION 3	PORTABLE GENERATOR	W6685/W6687
TIFTONIA 1	ONSITE GENERATOR	W6685/W6687
TIFTONIA 2	PORTABLE GENERATOR	W6685/W6687
TIFTONIA 3	PORTABLE GENERATOR	W66B5/W6687
TIFTONIA 4	PORTABLE GENERATOR	W6685/W6687
TIFTONIA 5	PORTABLE GENERATOR	W6685/W6687
VAAP	PORTABLE GENERATOR	W6685/W6687

		W6685/W6687
VALLEY BROOK SS.	PORTABLE GENERATOR	

STATION	SOURCE	GENERATOR
WARNER PARK SS.	PORTABLE GENERATOR	W6685/W6687
WEST CHICK.	ONSITE GENERATOR	
WILLOW BEND	VACCON/PORTABLE GENERATOR WITH FLYING LEADS	W6686
19TH ST CSO	ONSITE GENERATOR	
CARTER ST CSO	ONSITE GENERATOR	
CENTRAL CSO	ONSITER GENERATOR	
CITICO CSO	EPB SECONDARY FEED	
MLK CSO	ONSITE GENERATOR	
ROSS LNDG CSO	OPERATE CSO MANUALLY	
TREMONT CSO	OPERATE CSO MANUALLY	
WILLIAMS ST CSO	ONSITE GENERATOR	
SIDNEY ST REG	OPERATE REGULATOR MANUALLY	

SWITCHABLE EPB SECONDARY FEED SUPPLY

Friar's Branch Pump Station

3 Phase underground service tap to EPB owned 750 KVA transformer #R 5POO1
Radial circuit from pole #R 5 042 located at corner of Dogwood Dr. and Juandale Dr, .5 mile W of site
EPB preferred source - McCarty substation (MCC), 1.3 miles SW of site **EPB preferred feeder** - MCC 201
EPB secondary source - Eastdale substation (EDA) feeder 201, switch located 1.5 miles SW of site
Ultimate sources - MCC: TVA Chickamauga substation (CHI), EDA: TVA Ridgedale substation (RID)

South Chickamauga Pump Station

3 Phase underground service tap to EPB owned 1500 KVA transformer #N 2P017
Radial circuit from pole #N 1 032 located on North Hawthorne St., .3 mile E of site
EPB preferred source - Hawthorne substation (HAW), 1 mile SE of site **EPB preferred feeder** - HAW 207

EPB secondary source - HAW feeder 215, switch located .5 miles SE of site **Ultimate sources** - HAW: TVA Chickamauga substation

Dupont Pump Station

3 Phase overhead service tap from EPB owned 3-25 KVA transformer bank on pole

#F 4 727 Pole located on loop circuit at the corner of Elm St. and Memphis St.
EPB preferred source - Fairfax substation (FAI), 1.5 miles W of site **EPB preferred feeder** - FAI 201
EPB secondary source - FAI feeder 202, switch located at site
Ultimate sources - FAI: TVA Moccasin Bend substation (MOC) through EPB Valdeau (VAL) substation

Citico Pump Station

3 Phase underground service tap to EPB owned 2500 KVA transformer #M 2P046
Radial circuit from pole #M 2506 located on Riverside Drive, .12 mile S of site **EPB preferred source** - Riverside substation (RIV), .12 mile SW of site

EPB preferred feeder - RIV 209

EPB secondary source - alternate feeders in RIV substation or Tenth St. substation (TEN) feeder 203, switch located .3 mile E of site
Ultimate sources - RIV: TVA Moccasin Bend substation (MOC), TEN: TVA

Ridgedale substation (RID)

23rd St. Pump Station

3 Phase underground service tap to EPB owned 750 KVA transformer #M 8POO8
Radial circuit from pole #M 8003 located at corner of 25th St. and Alton Park Blvd., .5 mile W of site
EPB preferred source - Sidney St. substation (SID), 1 mile W of site **EPB preferred feeder** - SID 201
EPB secondary source - alternate feeders in SID substation or Long St. substation (LON) feeder 206, switch located .7 mile S of site
Ultimate source - SID & LON: TVA Moccasin Bend substation (MOC)

19th St. Pump Station

3 Phase underground service tap to EPB owned 300 KVA transformer #M 5P039
Radial circuit from pole #M 1 513 located at corner of 19th St. and Riverfront Pky., .3 mile E of site

EPB preferred source - College Hill substation (COL), .7 mile NE of site **EPB**

Orchard Knob Pump Station

277/480V – 3 Phase underground service tap to EPB owned 225 transformer # N8P003
Located at 808 Holtzclaw Ave. N
EPB Preferred Source – Riverside substation (RIV) located 1.1 mile W of site
EPB Preferred Feeder – RIV 209
EPB Secondary Source – alternate feeds in RIV substation or TEN 203, switch located .6 miles W of site
Ultimate Source – TVA Moccasin Bend substation (MOC)

Brainerd Levee Pump Station

46kV – 3 Phase Overhead Transmission circuit at Pole # S3404 located just east of Chickamauga Creek between Moore Rd and Lee Highway
EPB Preferred Source – TPS – TVA Pump Station 1
EPB Secondary Source – Midland Pike


23rd St utageStudy.pdf
Sou kOutageStudy.pdf
Fr anchOutageStudy.pdf
CiticoOutageStudy.pdf
19th StreetOutageStudy.pdf
DupontOutageStudy.pdf

CITY OF CHATTANOOGA – WASTE RESOURCES DIVISION
Moccasin Bend Wastewater Treatment Plant

Pump Station Operations

Title: Generator Set Up And Delivery				
SOP Number **PS-004**	Revision Number **02**	Approval Signature	Effective Date **04/10/08**	Date of Last Review **1/15/14**

Scope: Covers emergency and non emergency delivery and set up of portable generators.

Purpose: To protect the environment by maintaining pump operations during power failures and scheduled maintenance.

Responsibility: Chief Pump Station Operator, Electrician, Control Room Operator and Liquids Operations Supervisor.

Frequency: As needed.

Emergency Contacts:
Control Room: 757-5026 Ext.3318
Bill Newell: 304-0278
Charles Thomas: 310-7007
EPB: 648-3563

General Information: There are currently three portable generators on hand that are capable of operating pump stations. They are stored inside the industrial monitoring building. There are two trucks that are designated to pull the generators, W6665 and W6664. The generators shall require two people for set up. All pumps station operators shall be trained in the hauling and start up of generators and they shall assist the electrician in onsite set up. If a pumps station operator is not available then a mechanic can be used to haul the generator and assist the electrician as long

as he has had training on pulling the generator. The keys for both trucks, Industrial Monitoring building, and the individual fuel keys are in the Operations and Control Building.

Procedure: When a station has a loss of power the Liquids Operations Supervisor or the Pump Station Chief Operator shall be notified. They shall decide if a generator is needed based on station capacity; location in the collection system, EPB expected repair time, generator availability, and other various factors. If the decision is made to set up a generator the following steps should be taken.

1. The Electrical Supervisor shall be notified that an electrician shall be needed to assist in generator set up. If the Electrical Supervisor is unavailable then the electrician on call shall be notified.

2. The Pump Station Chief Operator shall be notified that he is needed to deliver a generator to the site. If the Pump Station Chief Operator is unavailable then the computer room operator shall call a pump station operator.

3. The person pulling the generator should determine which generator to use by looking on the inside of the generator control panel door. There is a list posted at this location that shows what station that particular generator will run. If additions or changes are made that affect these list the Electrical Supervisor shall notify the Pump Station Chief Operator in writing and the Pump Station Chief Operator shall update all list. This list is also posted in the computer room.

4. The generator shall be tested to insure that it will run before it is pulled to the site. The electrician shall assist with a run test if the person pulling the generator is not familiar with the generator controls.

5. The generator shall be inspected before being pulled to the site to insure that it is full of fuel, tires are properly inflated, trailer lights are working and that there are no other obvious defects.

6. Once the generator is onsite the person pulling the generator shall assist the electrician in set up of the generator.

7. The Pump Station Chief Operator or a relief operator shall remain onsite until normal power is restored, the generator is setup to run in an automatic mode, or approval from the Liquids Operations Supervisor to leave the generator unattended has been received.

8. When normal power is restored, the person pulling the generator with assistance from the Electrician shall disconnect and return the generator to the Industrial Monitoring building. The generator shall be filled with fuel before parking it and care taken that it is parked in a manner so that nothing can be placed in front of the generator that would hinder the next deployment. All keys shall be returned to the Operations and Control Building.

9. If the generator needs to be refueled onsite Fleet Maintenance shall be notified at 757-5162 before 1:00 pm if possible.

CITY OF CHATTANOOGA – WASTE RESOURCES DIVISION
Moccasin Bend Wastewater Treatment Plant
LIQUIDS HANDLING
ONSITE OPERATION

Title: Control Room Operator Response To Pump Station Alarms

SOP Number	Revision Number	Approval Signature	Effective Date	Date of Last Review
PS-0006	**01**		**11/28/2011**	**1/15/14**

Scope: Covers the response of the Control Room Operator to a Pump Station Alarm.

Purpose: To maintain regulatory compliance through prevention and/or minimizing an overflow from a pump station which is an NPDES violation that could result in a fine.

Responsibility: Chief Operators, Computer Room Operators

Frequency: Monitored

Emergency Contacts: Pump Station Operations Supervisor-Pump Stations, Plant Operations Supervisor-Liquids, Plant Superintendent

General Information: The objective of this SOP is to instruct the Chief and Computer Room Operators on what personnel to use to respond to Alarms. Most conditions are covered below but the Chief/Computer Room Operator shall use their best reasonable judgment when the exception occurs. The priority will be to prevent any and all overflows and plant violations.

Procedure:

When an alarm is received on the SCADA system the computer room operator shall look up that particular alarm in the Pump Station Alarm Response Book.

The Computer Room Operator will then determine with the assistance of the book on what action shall be taken. If it is required to send an operator to the pump station then the computer room operator will notify his Chief Operator if one is on shift. The Chief or the Computer Room Operator in his absence will determine if an in Plant Operator (Primary Operator) or a Pump Station Operator is needed to visit the pump station. It is not acceptable to ignore any alarms that the Pump Station Alarm Book calls for a response. If an alarm is found to be a nuisance alarm it should be reported to the Pump Station Supervisor immediately.

During pump station operations normal hours all alarms shall be responded to by Pump Station Operators. If an alarm is not recognized until the end of a shift and it will require overtime for the pump station operator to respond, it shall then be treated as an after hour response. An in plant operator shall be used to prevent overtime in this case as long as one is available. For this reason the computer room operator shall check all stations for the second time on their shift before 2:00pm.

1. If plant operations are normal the Chief or Computer Room Operator will send an operator from his shift to visit the site if his shift has a 4 or 5 man crew.

2. If plant operations are not normal and the shift has a 4 man crew then a Pump Station Operator shall be called in.

3. If it is raining and the plant is not in wet weather and operations are normal the Chief or Computer Room Operator will send an operator from his shift to visit the site if his shift has a 4 or 5 man crew.

4. If the plant is in wet weather, IRPS and wet weather clarifiers in operation, and flow above 110 MGD, a pump station operator **shall always** be called in to handle any alarms.

5. If a Pump Station Operator cannot be contacted then the Pump Station Supervisor shall be notified.

CITY OF CHATTANOOGA – WASTE RESOURCES DIVISION
Moccasin Bend Wastewater Treatment Plant
LIQUIDS OPERATIONS
ONSITE OPERATION

Title: Telemetry Monitoring of High Priority Pump Stations				
SOP Number LO-006	Revision Number 00	Approval Signature	Effective Date 8/22/14	Date of Last Review 8/22/14

Scope: Covers the status monitoring of High priority pump stations on the telemetry system in the O&C building control room.

Purpose: To ensure that pump stations designated with a high priority status are monitored properly for abnormal operations and all alarm parameters reported from each site.

Responsibility: Computer Room Operator, Relief Computer Room Operator, and Chief Operator

Frequency: Twice per twelve hour shift.
(7:00 am – 12:00 pm)
(12:00 pm – 7:00 pm)
(7:00 pm – 12:00 am)
(12:00 am – 7:00 am)

Emergency Contacts: Pump Station Operations Supervisor, Liquids Operations Supervisor, Plant Manager, and Occupational Safety Specialist

General Information: The ISS is comprised of 71 pump stations, 8 storm water stations, and 8 CSO treatment facilities. The Computer Room Operator monitors the stations and facilities on a telemetry system and checks each station or facility at least twice per 12 hour shift during dry weather periods and more frequently during all wet weather events. If there are any alarms or abnormal activity detected, the Computer Operator will take appropriate actions, make necessary notifications, and properly document each situation as needed.

Procedures: The Computer Room Operator will check all pump stations, CSOs`, and storm water stations on telemetry between the hours of:

7:00 am - 12:00 pm
12:00 pm – 7:00 pm
7:00 pm – 12:00 am
12:00 am – 7:00 am

The computer operator will record any pump activity on the **Pump Station Checklist Sheet**. If there are no pumps running on the main pump station page you should go to **Site Stat Page** for that station. Log in the hour that a pump started at that station. The **Trend Screen** should be checked if there has been no pump activity at a designated major station. If there are any alarms, they should refer to the **Pump Station Alarm Book**, located in the Computer Room. If there is no pump activity for at least two hours at a major pump station indicated below with a (*) next to the name, the computer operator will notify the chief operator on duty, on-call pump station operator immediately and the Pump

Station Operations Supervisor in a timely manner if a problem is verified.

NOTE: Stations indicated with (**) should have a pump operating at all times due to VFD control and station flows. No pump activity at these stations demands immediate notifications and dispatching of personnel.

Major Pump Stations and stations that could have an impact on a State body of water and aquatic life that have been deemed High Priority include:

19th Street*
23rd Street**
Big Ridge 2
Big Ridge 5
Boy Scout Road*
Citico**
Colledgedale*
East Brainerd*
Friars Branch**
Hixson 1
Hixson 2
Hixson 3
Mountain Creek
Orchard Knob
South Chickamauga**
Tiftonia 1
Tiftonia 2
Tiftonia 3
Springcreek
Ringgold

Appendix H
Example PS Pump Status Checklist

PUMP STATION PUMP STATUS

DAY SHIFT OPERATOR_____ DATE_____ NIGHT SHIFT OPERATOR_____

	7:00 AM TO 12:00 PM				HWW	TIME START	12:00 PM TO 7:00 PM				HWW	TIME START	7:00 PM TO 12:00 AM				HWW	TIME START	12:00 AM TO 7:00 AM				HWW	TIME START
17TH ST.	1	2	3				1	2	3				1	2	3				1	2	3			
23RD ST.	1	2	3	4			1	2	3	4			1	2	3	4			1	2	3	4		
26TH ST.	1	2					1	2					1	2					1	2				
17TH ST PLAZA	1	2					1	2					1	2					1	2				
AIRPORT	1	2					1	2					1	2					1	2				
AIRPORT2	1	2					1	2					1	2					1	2				
ALT. PK.	1	2					1	2					1	2					1	2				
ARBOR CK.	1	2					1	2					1	2					1	2				
ALTAMONT	1	2	3	4			1	2	3	4			1	2	3	4			1	2	3	4		
BAT. PL.	1	2					1	2					1	2					1	2				
BIG RIDGE 1	1	2					1	2					1	2					1	2				
BIG RIDGE 2	1	2					1	2					1	2					1	2				
BIG RIDGE 3	1	2					1	2					1	2					1	2				
BIG RIDGE 4	1	2					1	2					1	2					1	2				
BIG RIDGE 5	1	2					1	2					1	2					1	2				
BIG RIDGE 6	1	2					1	2					1	2					1	2				
BIG RIDGE 7	1	2					1	2					1	2					1	2				
BIG RIDGE 8	1	2					1	2					1	2					1	2				
BIG RIDGE 9	1	2					1	2					1	2					1	2				
BIG RIDGE 10	1	2					1	2					1	2					1	2				
BIG RIDGE 11	1	2					1	2					1	2					1	2				
BIG RIDGE 12	1	2					1	2					1	2					1	2				
BIG RIDGE 13	1	2					1	2					1	2					1	2				
BIG RIDGE 14	1	2					1	2					1	2					1	2				
BIRCHWOOD	1	2					1	2					1	2					1	2				
BOYSCOUT	1	2	3				1	2	3				1	2	3				1	2	3			
BRAIN GOLF	1	2					1	2					1	2					1	2				
BRAIN. MAN.	1	2					1	2					1	2					1	2				
COLLEGEDALE	1	2	3				1	2	3				1	2	3				1	2	3			
CITICO	1	2	3	4			1	2	3	4			1	2	3	4			1	2	3	4		
DUP IND PK	1	2					1	2					1	2					1	2				
DUP PKW PS	1	2	3				1	2	3				1	2	3				1	2	3			
DADE COUNTY	1	2					1	2					1	2					1	2				
EAST BRAIN	1	2	3				1	2	3				1	2	3				1	2	3			
STGATE	1	2					1	2					1	2					1	2				
STGATE 2	1	2					1	2					1	2					1	2				
ENTERPRISE	1	2					1	2					1	2					1	2				
FAG. ST.	1	2					1	2					1	2					1	2				
FT OGLE	1	2					1	2					1	2					1	2				
FRIAR BR	1	2	3				1	2	3				1	2	3				1	2	3			
HERITAGE GREE	1	2					1	2					1	2					1	2				
HIGHLAND PK	1	2	3				1	2	3				1	2	3				1	2	3			
HIX NO.1	1	2	3				1	2	3				1	2	3				1	2	3			
HIX. NO.2	1	2	3				1	2	3				1	2	3				1	2	3			
HIX. NO.3	1	2	3				1	2	3				1	2	3				1	2	3			
KOMATSU	1	2					1	2					1	2					1	2				
LAKE VISTA	1	2					1	2					1	2					1	2				
LATTA ST.	1	2					1	2					1	2					1	2				
LOOKOUT MT.	1	2					1	2					1	2					1	2				
MEAD TR.	1	2					1	2					1	2					1	2				
MAN PATT	1	2					1	2					1	2					1	2				
MT CREEK	1	2					1	2					1	2					1	2				
MUR HILL 1	1	2					1	2					1	2					1	2				
MUR HILL 2	1	2					1	2					1	2					1	2				
MUR HILL 3	1	2					1	2					1	2					1	2				
MUR HILL 4	1	2					1	2					1	2					1	2				
MUR HILL 5	1	2					1	2					1	2					1	2				
ORCH KNOB WW	1	2	3				1	2	3				1	2	3				1	2	3			
ORC. KNOB SS	1	2	3				1	2	3				1	2	3				1	2	3			
PINE. RD.	1	2					1	2					1	2					1	2				
RINGGOLD	1	2	3				1	2	3				1	2	3				1	2	3			
RIVER PARK 1	1	2					1	2					1	2					1	2				
RIVER PARK 2	1	2					1	2					1	2					1	2				
SOUTH CHICK	1	2	3	4			1	2	3	4			1	2	3	4			1	2	3	4		
SPRINGCREEK	1	2	3				1	2	3				1	2	3				1	2	3			
SUMMITT 1	1	2					1	2					1	2					1	2				
SUMMITT 2	1	2					1	2					1	2					1	2				
TIFT 1	1	2					1	2					1	2					1	2				
TIFT 2	1	2					1	2					1	2					1	2				
T 3	1	2					1	2					1	2					1	2				
T 4	1	2					1	2					1	2					1	2				
IFT 5	1	2					1	2					1	2					1	2				
VAAP	1	2					1	2					1	2					1	2				
WILL BEND	1	2					1	2					1	2					1	2				
NORTH TER	1	2	3	4			1	2	3	4			1	2	3	4			1	2	3	4		
HIXSON SS	1	2					1	2					1	2					1	2				
VALLEYBROOK	1	2					1	2					1	2					1	2				

PUMP STATION PUMP STATUS

DAY SHIFT OPERATOR_____ DATE_____ NIGHT SHIFT OPERATOR_____

STORM STATION	1	2	3	4	5							1	2	3	4	5							1	2	3	4	5							1	2	3	4	5	
STORM STATION	1	2	3									1	2	3									1	2	3									1	2	3			
ORM STATION	1	2										1	2										1	2										1	2				

Appendix I
Example Flow Meter Readings Form

MONTH_____ PUMP STATION FLOW METER READINGS YEAR_____

CERTIFICATION: *By my initials in the "Data collected" column and the "Data entered" column below, I certify that the associated readings were collected and recorded and entered into OPS as indicated to the best of my knowledge and ability. I am aware that there are significant penalties for submitting false information, such as disciplinary action up to and including termination of my job.

FACILITY	METER READINGS	VAR NO.	DATE DATA	DATA COLLECT BY	DATE PUT IN OPS	DATA PUT IN OPS BY
MAJOR STATIONS						
CITICO		3				
MOUNTAIN CREEK		8				
23RD ST.		20				
SOUTH CHICK		28				
FRIAR BRANCH		32				
19TH ST.		788				
HIXSON						
HIXSON NO.1		74				
HIXSON NO.2		78				
DUPONT FORCE MAIN		107				
DUPONT GRAVITY LINE		892				
BRAINERD						
ENTERPRISE		850				
AIRPORT 2		893				
EASTGATE 2		906				
DOWNTOWN						
ALTON PARK		980				
REDBANK AREA						
ALTAMONT LARGE 1&2		817				
ALTAMONT SMALL 3&4		818				
EAST BRAINERD						
EAST BRAIN.		62				
BIG RIDGE						
BIG RIDGE NO.1		845				
BIG RIDGE NO.2		846				
BIG RIDGE NO.5		847				
BIG RIDGE NO.6		848				
BIG RIDGE NO. 14		849				
TIFTONIA						
TIFTONIA 1		970				
REVENUE STATIONS						
LOOKOUT MT		782				
VAAP		790				
FORT OGLE		792				
SPRING CREEK		794				
COLLEGEDALE		807				
DADE COUNTY		891				
RINGGOLD		905				