



E.O. Lawrence Berkeley National Laboratory

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Sewer System Management Plan

April 2015



*Lawrence Berkeley National Laboratory
Sewer System Management Plan*



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**Lawrence Berkeley National Laboratory
Sewer System Management Plan
Change Log**

Date	SSMP Element/ Section	Description of Change/Revision Made	Change Authorized By:



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0 Executive Summary

SSMP Requirement Background

This Sewer System Management Plan (SSMP) has been prepared for the Lawrence Berkeley National Laboratory (LBNL) in compliance with the requirements of California State Water Resources Control Board (SWRCB) Order No. 2006-0003, dated May 2, 2006. The order requires that all publicly owned wastewater collection system utilities owning more than one mile of pipe prepare a written SSMP to address the proper operation, maintenance, and funding of the system to ensure the prevention of sanitary sewer overflows (SSOs). The LBNL sanitary sewer system only consists of 6.1 miles of gravity sewer line and has no lift stations. All LBNL infrastructures are owned by the DOE, and operated by LBNL Facilities Division Staff.

The SWRCB order established a monitoring and reporting program (MRP No. 2006-0003-DWQ) for all SSOs. This program was recently amended through SWRCB Order No. WQ 2013-0058-EXEC and became effective as of September 9, 2013. The purpose of this program is to characterize and track SSO occurrence for the purpose of future prevention. The MRP defines specific information which must be included with each SSO report that is entered into the online SSO reporting system (California Integrated Water Quality System, or CIWQS). The MRP defines three categories of SSOs:

- A Category 1 SSO is a spill of any volume that reaches surface water. Category 1 SSOs greater than or equal to 1,000 gallons must be reported within 2 hours to the State Office of Emergency Services (OES), and a notification control number must be obtained. Category 1 SSOs must be reported using the online CIWQS system initially within three business days of occurrence. A final SSO report is submitted within 15 calendar days using the CIWQS system when all response and follow-up activities for the SSO event have been closed out. A technical report must be submitted within 45 calendar days of the end date for any Category 1 SSO in which 50,000 gallons or greater are spilled to surface water(s).
- A Category 2 SSO is a spill greater than or equal to 1,000 gallons that does not reach surface water. Category 2 SSOs must be reported using the online CIWQS system initially within three business days of occurrence. A final SSO report is submitted within 15 calendar days using the CIWQS system when all response and follow-up activities for the SSO event have been closed out.
- A Category 3 SSO (formerly Category 2) is a spill less than 1,000 gallons that does not reach a surface water. A final SSO report is submitted within 30 calendar days using the CIWQS system when all response and follow-up activities for the SSO event have been closed out.

Element 0. Introduction / Document Use

Purpose of the SSMP

A prohibited SSO originating from a publicly owned sanitary sewer collection system constitutes a violation of the California Water Code and is subject to enforcement action. The purpose of this document is to ensure that LBNL has a plan in place to reduce or eliminate SSOs and protect public health. The SSMP accomplishes this purpose by defining specific procedures and programs in 11 categories defined by the SWRCB General Waste Discharge Requirements (GWDR). The SSMP procedures and programs are specifically designed to maximize the functionality of LBNL's capital and human resources to manage the sanitary sewer collection system in a way that minimizes SSOs, and to ensure that LBNL is in compliance with the GWDRs.

Document Organization

The SWRCB GWDRs require that the SSMP address 11 specific aspects of the agency's responsibility regarding its management, operation and maintenance of the sanitary sewer collection system. These sections address the following:

- i. Goals
- ii. Organization
- iii. Legal Authority
- iv. Operation and Maintenance
- v. Design and Performance Provisions
- vi. Overflow Emergency Response
- vii. Fats, Oils, and Grease (FOG) Control
- viii. System Evaluation and Capacity Assurance
- ix. Monitoring, Measurement, and Program Modifications
- x. SSMP Program Audits
- xi. Public Communication

This SSMP describes LBNL's actions pertaining to all 11 required sections. Each section of the SSMP begins with the presentation of the specific requirements of that section per the SWCRB GWDRs as well as a narrative providing additional background on the section. Following that, a sub-section exists for each sub-requirement within the section. Each sub-section presents the following:

- a. The exact language of the SWRCB sub-requirement.
- b. A discussion of specific actions performed by LBNL which satisfy the requirement.
- c. A list of related documents in support of the discussion.
- d. Any performance indicator related to the section, if any.

Element 0. Introduction / Document Use

An appendix is included at the end of the SSMP that contains all related documents for that section.

Sanitary Sewer Collection System Overview

LBNL is a member of the national laboratory system supported by the U.S. Department of Energy (DOE) through its Office of Science. LBNL property is owned by UC and leased to the DOE. All LBNL facilities (at the main site), equipment, and supporting infrastructure (including the on-site sanitary sewer collection system) is owned and funded by the DOE. However, day-to-day operation and management of LBNL is conducted by UC through *Contract No. DE-AC02-05CH11231*, also referred to as *Contract 31*.

The East Bay Municipal Utility District (EBMUD), through the City of Berkeley, provides wastewater collection service to LBNL. All wastewater discharged to the LBNL sanitary sewer collection system exits the facility at two outfall locations that connect to the EBMUD (via Hearst Monitoring Station) or UC sanitary sewer collection systems (via Strawberry Monitoring Station). Each of the perimeter outfall locations has a monitoring facility, which is used for continuous flow monitoring and for extraction of samples for chemical and radioisotope analysis as required by the EBMUD and the DOE (refer to SSMP section iii-a). In addition, the Strawberry system carries wastewater from the University of California's Hill Area Buildings that constitute half of the total flow at the Strawberry perimeter outfall.

The 6.1 miles of LBNL's sanitary sewer collection system is completely dependent upon gravity flow and no pumping stations exist at LBNL.

Responsibilities

The representative(s) of LBNL responsible for the maintenance and implementation of this SSMP will be required to perform the following tasks:

- I. Submission and endorsement of all reports required by SWRCB Order No. 2006-0003
- II. Management of LBNL CIWQS SSO reporting system account
- III. Completion of the certification portion of the CIWQS SSO Database Questionnaire
- IV. Completion of biennial program audits
- V. Completion of 5-year SSMP re-certifications

Governing Body SSMP Certification and Re-Certification Requirements

In order to certify the SSMP, LBNL's governing body, the DOE, must review the document and ensure that it fully meets all of the requirements of the GWDR and includes actions and procedures to be taken by LBNL that are generally feasible and acceptable to DOE.

Element 0. Introduction / Document Use

Every 5 years, the SSMP must be reviewed by DOE and re-certified, to ensure that it remains up-to-date with changing management, operation, and maintenance programs and objectives.

Related Documents

- Refer to UC-DOE Prime Contract No. DE-AC02-05CH11231
<http://www.ucop.edu/laboratory-management/contracts/lbnl/index.html>
- Refer to LBNL CIWQS Collection System Questionnaire
- Attachment 0-1: LBNL Facility Sanitary Sewer Collection System Overview Map

Element 0. Introduction / Document Use

Abbreviations and Acronyms

ADWF	Average Dry Weather Flow
ASTM	American Society for Testing and Materials
BACWA	Bay Area Clean Water Agencies
BMP	Best Management Practices
CCR	California Code of Regulations
CCTV	Closed Circuit Television
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CIP	Capital Improvement Plan
CIWQS	California Integrated Water Quality System
CSI	Construction Specifications Institute
COO	Chief Operating Officer
CUPA	Certified Unified Program Agency
DOE	Department of Energy
EBMUD	East Bay Municipal Utility District
ECAAP	Environmental Compliance Audit and Assessment Plan
EHS	Environmental Health and Safety Division
ESG	Environmental Services Group
FOG	Fats, Oils and Grease
gpm	Gallons per minute
GW/I	Groundwater Infiltration and Inflow
GWDR	General Waste Discharge Requirements
I/I	Infiltration and Inflow
ID	Identification
IR	Incident Report
ISDHH	Imminent and Substantial Danger to Human Health
ISM	Integrated Safety Management
LBNL	Lawrence Berkeley National Lab
MGD	Million Gallons per Day
MM	Maintenance Manager
MRP	Monitoring and Reporting Program
NEPA	National Environmental Policy Act
NOI	Notice of Intent
NPDES	National Pollution Discharge Elimination System
OCA	Office of Contract Assurance
OERP	Overflow Emergency Response Plan
OES	Office of Emergency Services
O&M	Operation and Maintenance
OSHA	Occupational Safety and Health Administration
PDWF	Peak Dry Weather Flow
PI	Performance Indicator
PMT	Plant Maintenance Technician

Element 0. Introduction / Document Use

POSM	Pipeline Observation System Management
POTW	Publicly Owned Treatment Works
PWWF	Peak Wet Weather Flow
RDI/I	Rainfall-Dependent Infiltration and Inflow
RP	Responsible Person
RWQCB	Regional Water Quality Control Board
SECAP	System Evaluation and Capacity Assurance Plan
SIU	Significant Industrial User
SOP	Standard Operating Procedure
SSMP	Sewer System Management Plan
SSO	Sanitary Sewer Overflow
SWRCB	State Water Resources Control Board
TM	Technical Memorandum
UC	University of California
UM	Utilities Manager
UPC	Uniform Plumbing Code
WDR	Waste Discharge Requirements
WRC	Work Request Center



i **Goals**

SWRCB Requirement:

*The goal of the SSMP is to provide a plan and schedule to properly manage, operate, and maintain all parts of the sanitary sewer system. This will help **reduce and prevent sanitary sewer overflows (SSOs)**, as well as mitigate any SSOs that do occur.*

Taken from SWRCB GWDR Order No. 2006-0003 adopted May 2, 2006.

Background

This SSMP section describes the goals LBNL has for the management, operation, and maintenance of the sanitary sewer collection system. These broad goals help to shape programs developed within the SSMP and executed by LBNL to meet the objectives of the GWDR. This section fulfills the requirements of the GWDR SSMP mandatory element i.

Element i. Goals

i. Goals

Requirement: The goal of the SSMP is to provide a plan and schedule to properly manage, operate, and maintain all parts of the sanitary sewer system. This will help reduce and prevent sanitary sewer overflows (SSOs), as well as mitigate any SSOs that do occur.

Discussion

This SSMP will guide LBNL's Facilities Division and EHS Division in accomplishing the following 3 goals:

1. Identify, prioritize, and continuously renew and replace sewer system facilities to maintain reliable service now and in the future.
2. Cost-effectively minimize infiltration and inflow.
3. Properly manage and operate the Laboratory's facilities to minimize the number and impact of SSOs.

Related Documents

- None

Related Performance Indicator

- All





ii Organization

SWRCB Requirement:

The SSMP must identify:

- (a) The name of the responsible or **authorized representative** as described in Section J of this Order.*
- (b) The names and telephone numbers for management, administrative, and maintenance positions responsible for implementing specific measures in the SSMP program. The SSMP must identify lines of authority through an **organization chart** or similar document with a narrative explanation; and*
- (c) The **chain of communication** for reporting SSOs, from receipt of a complaint or other information, including the **person responsible** for reporting SSOs to the State and Regional Water Board and other agencies if applicable (such as County Health Officer, County Environmental Health Agency, Regional Water Board, and/or State Office of Emergency Services (OES)).*

Taken from SWRCB GWDR Order No. 2006-0003 adopted May 2, 2006.

Background

This section identifies the individuals responsible for implementation of the SSMP and for signing and certifying all reports and documents required by the GWDRs. The organizational structure for LBNL employees that have responsibility for implementing the SSMP is clearly presented along with essential job functions and contact information for each employee. The chain of command for the identification, reporting, and mitigation of SSOs is established. This section fulfills the requirements of the GWDR SSMP mandatory element ii.

Element ii. Organization

ii-a. Authorized representatives

Requirement: The SSMP must identify the name of the responsible or authorized representative as described in Section J of the GWDR's.

Discussion

The EHS Division Environmental Manager, Wastewater Manager and the SSO Program Manager are LBNL's authorized representatives registered with the SWRCB through the CIWQS system to submit, sign, and certify all reports required by SWRCB Order No. 2006-0003 and MRP No. 2006-0003-DWQ. All amendments to the MRP found in SWRCB Order No. WQ 2013-0058-EXEC will be adhered to as well.

SSMP implementation is a shared responsibility between LBNL's Facilities Division and EHS Division, as described in SSMP section ii-b.

Related Documents

- Refer to LBNL Notice of Intent for GWDR Coverage

Related Performance Indicator

- None



Element ii. Organization

ii-b. Organizational chart

Requirement: Identify the names and telephone numbers for management, administrative, and maintenance positions responsible for implementing specific measures in the SSMP program. The SSMP must identify lines of authority through an organization chart or similar document with a narrative explanation.

Discussion

Compliance with the GWDR is a shared responsibility between two LBNL organizations:

1. LBNL Facilities Division is responsible for sanitary sewer collection system operation, repairs, improvements, modifications, and audits. In addition, it manages the operating budget, secures funding for improvement/repair/survey projects, audits, and maintains records of the underground sanitary sewer collection system infrastructure.
2. LBNL EHS Division manages the SSO compliance oversight program. It is responsible for sampling, testing, and reporting sanitary sewer overflow volume and content as required for the LBNL site. In the event of a sanitary sewer overflow, the EHS Division manages emergency notifications to all regulatory agencies per MRP No. 2006-0003-DWQ and the amendments within SWRCB Order No. WQ 2013-0058-EXEC.

The organization chart for employees responsible for SSMP implementation is included in **Attachment ii-1**. Roles and responsibilities specific to responsible positions are described below:

Utilities Manager (UM):

Reporting to the Operations Department Head, the Utilities Manager (UM) operates a comprehensive operation and maintenance plan to ensure a sufficient and dependable sanitary sewer collection system, minimizing SSOs and meeting the requirements of the DOE. The UM organizes multiple maintenance efforts including: periodic high-pressure water jetting, root control, grease interceptor maintenance, CCTV inspections, condition assessments, capital improvement projects and biannual audits. The UM oversees the maintenance of a detailed sanitary sewer collection system Asset Database which includes pertinent asset physical data, historical maintenance records, and condition assessment data. The UM is also responsible for overseeing hydraulic analysis of the sanitary sewer collection system to ensure that adequate capacity is provided as described in the System Evaluation and Capacity Assurance Plan (see SSMP section viii). The UM secures funding, allocates expenditures, and develops and plans infrastructure projects. The UM annually updates the Collection System Questionnaire and provides responses to the SSO Program Manager for input into the on-line CIWQS database. The UM is involved with monitoring and measuring the performance of specific SSMP programs, and recommending updates to the SSMP as needed as part of the audit process.

Element ii. Organization

Under general direction of the Facilities Division Director, the UM is responsible for the planning and supervision of LBNL's capital project funding activities. Plans, directs and manages site access and emergency response activities.

Utilities Coordinator:

Under general supervision of the UM, the Utilities Coordinator serves as a secondary contact for the UM.

Inspector:

Under general supervision of the UM, the Inspector performs a variety of inspection activities relating to sanitary sewer collection system facility construction to ensure compliance with approved Contract Documents relating to construction of the system. The Inspector may be an employee contracted on a project-specific basis.

Civil Engineer (Infrastructure):

Under general direction of the UM, the Civil Engineer plans, organizes, administers and directs the maintenance, repair, installation and upgrading of LBNL's sanitary sewer collection system infrastructure and is involved with the maintenance of the sanitary sewer collection system Asset Database. The Civil Engineer is responsible for maintaining and periodically updating LBNL design and construction standards and specifications.

Plant Maintenance Technician (PMT):

The PMT is a primary responder to any SSO events that may occur and includes estimating the spill's volume.

Maintenance Manager (MM):

The Maintenance Manager (MM) is responsible for the training of PMTs, and is directly reported to by the PMTs. The MM reports to the Operations Department head.

Environmental Manager:

Plans, directs and manages the environmental protection programs within the LBNL facility. Performs accidental release (SSO) notifications and prepares reports to Federal, State, and local agencies. Monitors and reviews LBNL activities for compliance with environmental laws and regulations. The Environmental Manager is involved with monitoring, testing and measuring the performance of specific SSMP programs, and recommending updates to the SSMP as needed as part of the audit process.

Sanitary Sewer Overflow Manager:

Assist's the Facilities Division management in interpreting and applying Sanitary Sewer Program requirements at the LBNL site. Performs accidental release (SSO) notifications and monthly "no spill" certifications and reporting to Federal, State, and local agencies through the on-line CIWQS database.



Element ii. Organization

The LBNL Division responsible for implementing each SSMP section is shown in **Attachment ii-2**. Names and contact information for key staff responsible for GWDR compliance is also included in **Attachment ii-2**.

Related Documents

- Refer to Overall LBNL Organizational Chart
<http://www.lbl.gov/Workplace/Lab-Support/org-chart.html>
- Attachment ii-1: Organizational Chart for SSMP Implementation Responsibilities
- Attachment ii-2: SSMP Implementation Responsibilities by Division and Contact Information for Key Personnel

Related Performance Indicator

- None

Element ii. Organization

ii-c. SSO reporting chain of communication

Requirement: Identify the chain of communication for reporting SSOs, from receipt of a complaint or other information, including the person responsible for reporting SSOs to the State and Regional Water Board and other agencies if applicable (such as County Health Officer, County Environmental Health Agency, Regional Water Board, and/or State Office of Emergency Services).

Discussion

Chain of Communication for Responding to SSOs

The SSO chain of communication usually begins when the PMT responds to a reported release, assesses the situation, and determines that a SSO has occurred. Within the first 2 hours, the PMT will notify the Facilities Division Work Request Center (WRC) of the SSO so that it can issue an Incident Report (IR) that notifies all pertinent LBNL employees of the SSO through text and email. This IR shall typically include the following information:

- Description of what happened
- Location of release and of threatened or involved waterway(s) or storm drains
- Date and time the unauthorized discharge is known to have started
- Estimated quantity and duration of the unauthorized discharge
- Identity of person reporting the unauthorized discharge

The SSO Notification Procedure flowchart found in **Attachment ii-3** shows the typical chain of communication for SSO response.

Chain of Communication for Reporting SSOs

The initial notification of SSOs to the various regulatory agencies is conducted by the EHS Environmental Services Group.

The following information should be provided to the California Office of Emergency Services (OES) as soon as possible but within the first 2 hours of discovering an SSO greater than or equal to 1,000 gallons that impacts a drainage channel or surface water (per SWRCB Order No. WQ 2013-0058-EXEC):

- Description of what happened
- Location of release and of threatened or involved waterway(s) or storm drains
- Date and time the unauthorized discharge is known to have started
- Estimated quantity and duration of the unauthorized discharge
- Identity of person reporting the unauthorized discharge



Element ii. Organization

If the SSO meets the SWRCB's Category 1 or 2 reporting requirement, then the Environmental Services Group will submit a draft report via CIWQS within 3 business days and certify the report within 15 calendar days of the SSO end date. If the SSO meets the Category 3 reporting requirement, then a certified report will be submitted within 30 calendar days of the end of the calendar month in which the SSO occurs.

A summary of SSO reporting requirements is included in **Attachment ii-4**.

Related Documents

- Attachment ii-3: Appendix A Sanitary Sewer Overflow Notification Procedure
- Attachment ii-4: Reporting Requirements for Sanitary Sewer Overflows

Related Performance Indicator

- None



iii Legal Authority

SWRCB Requirement:

Each Enrollee must demonstrate, through sanitary sewer system use ordinances, service agreements, or other legally binding procedures, that it possesses the necessary legal authority to:

- (a) Prevent **illicit discharges** into its sanitary sewer system (examples may include I/I, stormwater, chemical dumping, unauthorized debris and cut roots, etc.);*
- (b) Require that sewers and connections **be properly designed and constructed**;*
- (c) **Ensure access** for maintenance, inspection, or repairs for portions of the lateral owned or maintained by the Public Agency;*
- (d) Limit the discharge of **fats, oils, and grease** and other debris that may cause blockages, and*
- (e) **Enforce any violation** of its sewer ordinances.*

Taken from SWRCB GWDR Order No. 2006-0003 adopted May 2, 2006.

Background

LBNL's legal authority to perform all of the necessary management, operation, and maintenance functions for the sanitary sewer collection system is derived from the DOE's Prime Contract with the University of California Lawrence Berkeley National Laboratory, Contract No. DE-AC02-05CH11231, also referred to as *Contract 31*, as discussed in section 0 of the SSMP. Section C.3.1.4 of *Contract 31* states that the Consultant (LBNL) shall "manage and operate the Laboratory through best-in-class management practices designed to foster world-class research while assuring the protection and proper maintenance of DOE research and information assets, the health and safety of Laboratory staff and the public, and the environment. The Contractor is expected to operate the Laboratory so as to meet all applicable laws, regulations, and requirements." LBNL does not experience many of the legal authority issues that most municipal utility agencies typically experience, because a majority of the sewage discharged to a municipal sanitary sewer collection system is contributed from private property not owned or operated by the municipality. Therefore, the municipal utility must develop a sanitary sewer system use ordinance to control discharges from private property to the public system to ensure that the utility can comply with applicable regulations. However, all property, facilities, and equipment located at LBNL are managed and operated under the authority of LBNL staff that is able to maintain full control over all discharges to the sanitary sewer collection system at all times. Therefore, LBNL is not in need of a sanitary sewer system use ordinance, but has instead established various management plans and operating procedures to ensure compliance with applicable regulations.

This section fulfills the requirements of the GWDR SSMP mandatory element iii.

Element iii. Legal Authority

iii-a. Authority to prevent illicit discharges

Requirement: Possess the necessary legal authority to prevent illicit discharges into the sanitary sewer system (examples may include I/I, stormwater, chemical dumping, unauthorized debris and cut roots, etc.)

Discussion

Regulations Applicable to LBNL Sewer Collection System

Contract 31 requires compliance with external regulations that govern activities at LBNL. The key regulations specifically applicable to sewage discharges are:

- i. 10 CFR 20, Subpart K, Section 20, 2003 - regulates the discharge of radioactive wastes;
- ii. 40 CFR 403, Subpart N - establishes sewage discharge pretreatment requirements;
- iii. EBMUD Ordinance No. 311A-13 - governs sewage discharge to the EBMUD sewage collection and treatment systems.
- iv. LBNL has in place sewage discharge permits issued under EBMUD's Industrial Waste Water Pretreatment Program.
- v. LBNL has buildings where hazardous wastes are handled or treated, which are regulated by the California Department of Toxic Substances Control (DTSC) under the Wright-Polanco-Lempert Hazardous Waste Treatment Permit Reform Act of 1992.

Related Documents

- Refer to LBNL Contract 31
<http://www.ucop.edu/laboratory-management/contracts/lbnl/index.html>
- Refer to EBMUD Wastewater Control Ordinance NO. 311A-03
http://ebmud.com/sites/default/files/pdfs/ord_no_311a03_2.pdf
- Refer to DOE Order 450.1A
<https://www.directives.doe.gov/directives-documents/400-series/0450.1-BOrder-a>
- Refer to LBNL Health and Safety Manual (Latest Revision)
<http://www2.lbl.gov/ehs/pub3000/pub3000c.html>
- Refer to LBNL Operating Permits
<http://www2.lbl.gov/ehs/esg/Permit%20for%20Table/operatingpermitstable.shtml>

Related Performance Indicator

- None

Element iii. Legal Authority

iii-b. Authority to properly design and construct sewer

Requirement: Possess the necessary legal authority to require that sewers and connections be properly designed and constructed.

Discussion

Established Design and Construction Standards

LBNL has the authority to establish design and construction standards for sanitary sewer collection system infrastructure owned by the DOE as the "Prime Contractor" in control of LBNL property and infrastructure per *Contract 31* with the DOE. LBNL has established a list of applicable State and National infrastructure design and construction standards and codes within *LBNL Construction Standards and Design Requirements - Volume 1 Part 1 – Administrative Requirements*, which are adhered to by LBNL employees and hired subcontractors (refer to Section 1 – General – Codes). Additionally, LBNL has established site-specific design requirements within the *Construction Standards and Design Requirements - Volume 1 Part 2 – Design Requirements, Standard Project Specifications, and Standard Construction Details*, which are adhered to where applicable.

Construction Completed by Licensed Contractors

Per *LBNL Master Specifications* Section 010000 – General Requirements, Section 1.11, contractors are required to hold general licenses, or specialty licenses applicable to the specific work to be completed in compliance with the California Business and Professions Code. LBNL Facilities Division Project Managers confirm appropriate contractor licenses during the bidding and contract award phases of each project.

All New Infrastructure Inspected and Approved

Per *Construction Standards and Design Requirements - Volume 1 Part 1 – Administrative Requirements* – Section 6: Construction Phase, a Project Inspector is assigned by LBNL to each project to verify that construction of the project complies with the contract documents, applicable codes, and LBNL design and construction standards.

Related Documents

- Refer to LBNL Construction Details and Design Guidelines Home
<https://commons.lbl.gov/display/fac/Construction+Details+and+Design+Guidelines>
- Refer to LBNL Construction Standards and Design Guidelines – Volume 1 Admin and Design Guidelines (Latest Revision)
<https://commons.lbl.gov/display/fac/Volume+1+-+Admin+and+Design+Guidelines>

Element iii. Legal Authority

- Refer to LBNL Construction Standards and Design Requirements (Latest Revision)
http://fac.lbl.gov/DandC/CDDG_Home/Volume1-Admin_&_Design_Guidelines/LBNL%20CS&DR%20-%20Design%20requirements_20060502.pdf
- Refer to LBNL Master Specifications
<https://commons.lbl.gov/display/fac/Master+Specifications>
- Refer to LBNL Construction Details and Design Guidelines, Volume 3 Construction Details
http://fac.lbl.gov/DandC/CDDG_Home/Volume3-Construction_Details/

Related Performance Indicator

- None

Element iii. Legal Authority

iii-c. Authority to ensure access

Requirement: Possess the necessary legal authority to ensure access for maintenance, inspection, or repairs for portions of the lateral owned or maintained by the Public Agency.

Discussion

LBNL Facilities Division Staff have full access to all on-site infrastructure, including the sanitary sewer collection system and wastewater pre-treatment works located at various research facility buildings. There is no publicly or privately owned infrastructure at LBNL which could present an access issue. All infrastructure is owned by the DOE, and operated by LBNL Facilities Division Staff.

Related Documents

- None

Related Performance Indicator

- None

Element iii. Legal Authority

iii-d. Authority to limit FOG

Requirement: Possess the necessary legal authority to limit the discharge of fats, oils, and grease (FOG) and other debris that may cause blockages.

Discussion

LBNL is required to comply with EBMUD Ordinance No. 311A-03 Title II Section 3a, which limits the discharge concentration of oil and grease to 100 mg/L to the sanitary sewer collection system. There is one food handling facility at LBNL, which is the on-site cafeteria. The cafeteria has a grease interceptor installed to control the discharge of FOG to the sanitary sewer collection system. This facility has not been required to obtain an EBMUD "Food Handling Facility Wastewater Discharge Permit", as these permits apply only to newly constructed facilities, remodeled facilities, or facilities which have caused or contributed to the cause of sewer blockages or SSOs related to FOG discharge. Currently, LBNL's site-wide discharge permit, as described in SSMP section iii-a, addresses FOG discharges from the cafeteria and other on-site grease producing facilities as a whole.

LBNL ensures that any new food handling facilities are served by Oil and Grease Interceptors conforming to the requirements of the California Plumbing Code (or Uniform Plumbing Code), Chapter 10.

Related Documents

- Refer to EBMUD Commercial Pollution Prevention Program Website
<http://www.ebmud.com/for-customers/for-commercial-customers/commercial-pollution-prevention-program>

Related Performance Indicator

- FOG Control Program

Element iii. Legal Authority

iii-e. Authority to enforce any violation

Requirement: Possess the necessary legal authority to enforce any violation of its sewer ordinances.

Discussion

Self-Monitoring and Corrective Action

Compliance with EHS requirements at LBNL is a line management responsibility. Accordingly, the LBNL Facilities Division must ensure its operations meet these requirements.

LBNL's EHS Division provides compliance assistance pertinent to sanitary sewer collection system waste disposal for all employees and researchers to ensure that Federal, State, and Local (EBMUD) discharge requirements are satisfied. The EHS Division is also responsible for oversight of LBNL's environmental regulatory requirements, and recommends modifications to infrastructure, operation or lab policies or procedures to support compliance.

LBNL personnel are directed to use the online *Corrective Action Tracking System* to report instances of non-compliance, for which appropriate corrective actions are developed, implemented, and documented by LBNL.

LBNL annually publishes a *Site Environmental Report* which summarizes the performance of LBNL's significant environmental management programs and success in achieving regulatory compliance, per DOE Order 231.1A.

External Enforcement

LBNL does not have an established sewer use ordinance, and therefore does not conduct enforcement action. Instead, corrective measures are addressed internally when cases of non-compliance are identified. Enforcement actions by EBMUD (per Ordinance No. 311A-13 Title VI, and Wastewater Discharge Permit Standard Terms and Conditions), RWQCB, or SWQCB may be taken if LBNL fails to comply with sanitary sewer collection system discharge or operation and maintenance regulatory requirements.

Related Documents

- Refer to LBNL Corrective Action Tracking System (CATS) Primer / Database part of the LBNL Issues Management Program
<http://www2.lbl.gov/DIR/OIA/OCA/issues-mgmt.html>
- Refer to DOE Order 231.1A
<https://www.directives.doe.gov/directives-documents/200-series/0231.1-BOrder-a-chg1>

Element iii. Legal Authority

- Refer to LBNL Annual Site Environmental Reports
<http://www2.lbl.gov/ehs/esg/Reports/tableforreports.htm>

Related Performance Indicator

- None



iv Operation and Maintenance Program

SWRCB Requirement:

The SSMP must include those elements listed below that are appropriate and applicable to the Enrollee's system:

- (a) Maintain an **up-to-date map** of the sanitary sewer system, showing all gravity line segments and manholes, pumping facilities, pressure pipes and valves, and applicable stormwater conveyance facilities;*
- (b) Describe routine **preventive operation and maintenance** activities by staff and contractors, including a **system for scheduling regular maintenance** and cleaning of the sanitary sewer system with more frequent cleaning and maintenance targeted at known problem areas. The Preventative Maintenance (PM) program should have a system to document scheduled and conducted activities, such as work orders;*
- (c) Develop a **rehabilitation and replacement plan** to identify and prioritize system deficiencies and implement short-term and long-term rehabilitation actions to address each deficiency. The program should include regular visual and **TV inspections** of manholes and sewer pipes, and a system for ranking the condition of sewer pipes and scheduling rehabilitation. Rehabilitation and replacement should focus on sewer pipes that are at risk of collapse or prone to more frequent blockages due to pipe defects. Finally, the rehabilitation and replacement plan should include a **capital improvement plan** that addresses proper management and protection of the infrastructure assets. The plan shall include a time schedule for implementing the short- and long-term plans plus a schedule for **developing the funds** needed for the capital improvement plan;*
- (d) Provide **training** on a regular basis for staff in sanitary sewer system operations and maintenance, and require contractors to be appropriately trained; and*
- (e) Provide **equipment and replacement part inventories**, including identification of critical replacement parts.*

Taken from SWRCB GWDR Order No. 2006-0003 adopted May 2, 2006.

Background

This SSMP section describes various aspects of LBNL's operation and maintenance (O&M) program for the sanitary sewer collection system, which is designed to reduce the occurrence of SSOs. LBNL's approach to implementing an effective O&M program is to plan for condition assessment of the entire sanitary sewer collection system, and strategically plan both preventative maintenance work and capital improvement projects based on analysis of well-documented field data. This section fulfills the requirements of the GWDR SSMP mandatory element iv.

Element iv. Operation and Maintenance Program

iv-a. Maintain an up-to-date system map

Requirement: Maintain an up-to-date map of the sanitary sewer system showing all gravity segments and manholes, pumping facilities, pressure pipes and valves, and applicable stormwater conveyance facilities.

Discussion

Utility Mapping

In 1995, LBNL Facilities Division had a facility-wide utility survey conducted for the purpose of generating accurate utility maps and a database of utility infrastructure assets. The utility survey resulted in the creation of an AutoCAD Master Utility Map, which includes (but is not limited to) the sanitary sewer collection system, the storm drain pipe network, potable water system, high pressure gas system, compressed air system, and electrical network.

Updating of Utility Mapping

The Facilities Division Utilities Manager is responsible for updating the Master Utility Map. Notes and additional asset data collected by LBNL Staff or maintenance contractors are added continuously as information is collected. Contractors and Architects / Engineers are required to submit as-built AutoCAD files upon the completion of infrastructure projects, as specified in LBNL's *CAD Policies, Procedures and Standards* requirements. The Utilities Manager is responsible for integrating the key elements of new utility infrastructure as-built drawings into the Master Utility Map upon reception from the Contractor, Architect, or Engineer.

Any errors in the horizontal alignment of the sewer system mapping (i.e. missing pipe sections, missing manholes, inaccurate locations of assets) will be noted by CCTV inspection contractors as they use the existing maps to conduct their work or by Facilities Division Staff during the normal course of their work. When errors are discovered, the Utilities Manager will determine how best to collect the necessary data to update the Master Utility Map, which could include field investigations by Facilities Division Staff, additional data collection by CCTV inspection contractors, or ordering a utility survey in a particular location.

A Master Utility Map grid revision layer is maintained by the Facilities Division to denote updates to the system mapping. A revision block reference is maintained for each grid of the Master Utility Map, and all changes to the map are documented, including the individual making the changes, the date, approvals, and a description of the changes made.

Utility System Asset Database

The 1995 LBNL utility survey also resulted in the creation of a utility Asset Database, in the form of an Excel spreadsheet. The information contained in the database helps LBNL comply

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with the requirements of DOE Order 430.1B – Real Property Asset Management. LBNL Facilities Division uses this database to perform tasks such as keeping records of maintenance activities, storing condition assessment data, and calculating pipeline hydraulic capacity, as described in SSMP section iv-b.

Related Documents

- Refer to LBNL’s Master Utility Map AutoCAD File: Site Utilities.DWG
- Refer to LBNL’s Sewer Asset Database File: Sewer_Asset_Database.xls
- Refer to LBNL’s *CAD Policies, Procedures, and Standards*
http://fac.lbl.gov/DandC/CDDG_Home/Volume1-Admin_&Design_Guidelines/Procedures_Standards_AE_CAD_Reqs_01-2005.pdf
- Refer to DOE Order 430.1B – Real Property Asset Management
<https://www.directives.doe.gov/directives-documents/400-series/0430.01-BOrder-b-chg2>

Related Performance Indicator

- Mapping

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iv-b. Routine preventative O&M activities

Requirement: Describe routine preventive operation and maintenance activities by staff and contractors, including a system for scheduling regular maintenance and cleaning of the sanitary sewer system with more frequent cleaning and maintenance targeted at known problem areas. The preventative maintenance (PM) program should have a system to document scheduled and conducted activities, such as work orders.

Discussion

Regular System-Wide Hydro flushing

LBNL Facilities Division has established a schedule to conduct system-wide hydro flushing of the sanitary sewer collection system at a minimum frequency of once every 10 years as a preventative maintenance activity to reduce the probability of an SSO due to a debris blockage. The Facilities Division typically uses a contractor to complete scheduled work, and will aim to complete one of five smaller portions of the system every 2 years based on available year-to-year funding in the operating budget. The Utilities Manager uses the sewer Asset Database to document hydro flushing work completed for each pipeline asset, so that no single asset goes more than 10 years without scheduled maintenance. Additionally, LBNL conducts annual cleaning and maintenance of both the Hearst and Strawberry discharge monitoring stations, also typically through a contractor.

LBNL only plans for and conducts regular hydro flushing of sewer mains with a diameter of 6 inches or greater. Pipes that are 6 inches and larger are considered “sewer mains”, whereas pipes with a diameter of less than 6 inches are considered “sewer laterals”. Laterals do not have manholes upstream of them, and any blockages occurring in laterals will cause a backup inside of a building, which will not cause an SSO that affects the outdoor environment.

Targeted Increased Frequency Hydro flushing

LBNL identifies specific sections of the sanitary sewer collection system which are observed to accumulate debris at a rate which requires hydro flushing more frequently than the standard 10 years to prevent the occurrence of an SSO. If a partial blockage or an SSO occurs, LBNL conducts a post-event CCTV inspection of the area to determine the conditions that caused the event. If a significant amount of debris is observed in the area, the affected area is scheduled for hydro flushing more frequently than every 10 years. The hydro flushing frequency selected for each asset is documented in the sewer Asset Database.

System-Wide Closed Circuit Television (CCTV) Inspection

LBNL Facilities Division has established a schedule to conduct system-wide closed circuit television (CCTV) inspections of the sanitary sewer collection system at a frequency of approximately every 10 years in order to maintain an accurate and up-to-date assessment of the

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condition of the infrastructure. The Facilities Division will aim to complete one of five smaller portions of the system every 2 years based on available year-to-year funding in the operating budget. CCTV inspections of the system will typically occur at the same time hydro flushing is performed. LBNL requires CCTV inspection contractors to employ the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment and Certification Program (PACP) protocol for pipeline condition assessment data collection, as described in SSMP section iv-c.

LBNL only plans for and conducts regular CCTV inspection of sewer mains with a diameter of 6 inches or greater, for similar reasons to those stated with regard to hydro flushing. The smaller diameter of sewer laterals and the common occurrence of bends in the lines without access points make it extremely difficult for CCTV equipment to operate within and navigate these pipes effectively.

LBNL identifies specific sections of the sanitary sewer collection system which have defects that would warrant CCTV inspection more frequently than the standard 10 years. In order to monitor the potential for a known defect to worsen over time, the affected area is scheduled for more frequent CCTV inspection in the sewer Asset Database.

Manhole Inspection and Repair

Sewer manholes are typically visually inspected at the time adjacent pipelines are CCTV inspected. LBNL uses a manhole inspection form to record condition assessment data, an example of which is discussed in SSMP section iv-c.

Work Order Scheduling and Documentation

LBNL requires that contractors performing maintenance activities for the sanitary sewer collection system provide work order invoices that list each asset maintained or serviced using the unique identifier provided on the Master Utility Map, the specific maintenance activity performed for each asset, the date of completion, and any notes or observations particular to the work performed on each asset.

The Facilities Division Utilities Manager uses the sewer Asset Database to document maintenance frequencies and work completed for each asset which is submitted by contractors as invoices, or completed internally by Facilities Division Staff. The Asset Database is used to document the completion of each preventative maintenance work order group, and can be used to quickly review the maintenance history of any given sewer system asset. The Utilities Manager periodically reviews the Asset Database and schedules maintenance for assets which are either overdue, or are nearing the required due date. Data from work order invoices are entered into the Asset Database upon receipt.

Documentation of Un-planned Sanitary Sewer Collection System Maintenance / Repairs

The Asset Database will also be used to document any observations of sanitary sewer collection system deficiencies by Facilities Division Staff, other LBNL personnel, or maintenance

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contractors, and associated un-planned maintenance or repairs by asset that are required as a result of those observations. Observations and associated un-planned repairs or maintenance activity will be documented in the Asset Database, and adequate comments will be entered to describe the deficiency and the repairs or additional actions that were taken to mitigate the deficiency, as stipulated by the record keeping requirements of MRP No. 2006-0003-DWQ and SWRCB Order No. WQ 2013-0058-EXEC. A separate memorandum or other acceptable form of documentation may be required for more complex issues that cannot be adequately documented within the Asset Database as cell entries or comments to comply with the requirements of the MRP.

Related Documents

- Refer to LBNL's Sewer Asset Database File: Sewer_Asset_Database.xls

Related Performance Indicator

- O&M Program

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iv-c. Prioritization program for impaired sewer assets

Requirement: Develop a rehabilitation and replacement plan to identify and prioritize system deficiencies and implement short-term and long-term rehabilitation actions to address each deficiency. The program should include regular visual and TV inspections of manholes and sewer pipes, and a system for ranking the condition of sewer pipes and scheduling rehabilitation. Rehabilitation and replacement (R/R) should focus on sewer pipes that are at risk of collapse or prone to more frequent blockages due to pipe defects. Finally, the R/R plan should include a capital improvement plan that addresses proper management and protection of the infrastructure assets. The plan shall include a time schedule for implementing the short- and long-term plans plus a schedule for developing the funds needed for the capital improvement plan.

Discussion

LBNL conducts regular CCTV inspection of the sanitary sewer collection system to gather condition assessment data for all gravity main and manhole assets, which is used to identify capital improvement projects. LBNL establishes parameters related to asset condition that are used to prioritize capital improvement projects and establish a project schedule.

CCTV Inspection Procedures

LBNL requires that CCTV condition assessment data is collected and documented using the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment and Certification Program (PACP) method, which is a nationally recognized sewer pipeline condition rating system for CCTV inspections. The NASSCO PACP method provides quantitative standardized results that allow for straight-forward prioritization of system deficiencies. LBNL's standard procedure is to hydro flush all sanitary sewer lines prior to CCTV inspection to maximize the operator's ability to capture structural defects. In some instances where debris or root intrusion is a concern, crews may choose to CCTV without pre-cleaning to see the true operating condition of pipe. By requiring the NASSCO method and report format, LBNL can ensure that the results of condition assessments are uniform if various contractors are used to perform work.

LBNL also collects condition assessment data for manholes in order to identify potential capital improvement projects. An example of a manhole inspection form that LBNL may use to perform these condition assessments can be found in **Attachment iv-1**.

Condition Assessment Data Analysis

CCTV inspections conducted using the NASSCO PACP coding interface result in the creation of a standardized report that documents the locations within the pipe at which observations were made. A still picture of each observation is taken, and a live video for the entire inspection is also provided. Every observation made using a PACP code is classified as either a structural

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defect (i.e. cracks, offsets, corrosion, etc.), maintenance defect (i.e. debris, grease, roots, etc.), or a miscellaneous observation (i.e. tap, manhole, end of survey, etc.). Appendix D of the PACP Manual includes a condition grading system that rates the severity of each structural and maintenance defect on a scale from 1-5.

The Utilities Manager is responsible for review of condition assessment data, development of rehabilitation / replacement (R/R) recommendations, and prioritization of short and long term R/R as capital improvement projects that will be scheduled for completion over a 10-year horizon in compliance with DOE Order No. 430.1B – Real Property Asset Management, which governs the methodology used to analyze asset condition and plan for renewal of assets owned by DOE. Use of the NASSCO PACP quick rating condition assessment system meets this requirement by providing an estimated time to failure for each asset. The estimated time to failure is not based on a detailed structural analysis of the asset, but on average prevailing conditions. Typically, the cost to conduct detailed structural analysis of pipes in poor or very poor condition is not an economically favorable method of determining the appropriate timing for R/R actions, and rules of thumb such as the NASSCO recommendations provide a less costly way to make asset renewal decisions.

Pipeline & Manhole Capital Improvement Project Identification and Prioritization

The Utilities Manager uses the sewer Asset Database to store the NASSCO PACP structural and maintenance quick ratings obtained from CCTV inspections. The basic process for determining the need for R/R projects is described below:

1. Sort the Asset Database (pipelines and manholes) by PACP structural quick rating to identify all new (previously un-reviewed) inspections for which severity 5 structural defects were noted. Repairs associated with these defects are “Priority 1” repairs. A relative priority ranking for assets in this category may be assigned in the Asset Database, such as 1-1, 1-2, 1-3, etc. These relative priority rankings may need to be integrated with priority rankings that have already been assigned to assets that were previously inspected and analyzed within the Asset Database (including priorities assigned to assets based on hydraulic capacity deficiencies as described in SSMP section viii-c).
 - It should be noted that if during a routine CCTV inspection, an operator finds that a pipe or manhole has already failed (i.e. crush, collapse, etc.) or is substantially blocked due to a severe maintenance defect that cannot be remedied without excavation, the condition is reported to the Utilities Manager and an emergency repair or maintenance activity is always completed immediately to prevent an imminent SSO.
2. Sort the Asset Database by maintenance quick score to identify all new inspections for which severity 5 maintenance defects were noted. Repairs associated with these defects are “Priority 2” repairs. A relative priority ranking for assets in this category may be assigned in the Asset Database, such as 2-1, 2-2, 2-3, etc.
3. Sort the Asset Database by overall quick score to identify all new inspections for which severity 4 structural or maintenance defects were noted. Repairs associated with these

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defects are “Priority 3” repairs. A relative priority ranking for assets in this category may be assigned in the Asset Database, such as 3-1, 3-2, 3-3, etc.

4. Identify all new inspections for which severity 3 structural or maintenance defects were noted. Repairs associated with these defects are “Priority 4” repairs. A relative priority ranking for assets in this category may be assigned in the Asset Database, such as 4-1, 4-2, 4-3, etc.
5. After assigning an R/R priority ranking to the assets identified above, the CCTV inspection reports, pictures, and videos for each are reviewed in order of the R/R priority ranking to determine an appropriate R/R action for each deficiency. Any defects that can be remedied by a standard maintenance activity (i.e. non-structural repair) are immediately scheduled as work orders. Pipelines that exhibit accumulated debris or roots that result in a severity 3 or greater observation may be placed on increased frequency PM schedules that are set by the Utility Manager through field review and review of the video inspection.
 - It should be noted that in some cases, severity 3 defects do not present a significant risk of near-term asset failure. The need to schedule an R/R action on the 10-year planning horizon, or mitigate the issue through an applicable preventative maintenance activity is at the discretion of the Utilities Manager based on the specific defect. In some cases, action may not be necessary.
6. Bundle identified R/R actions into preliminary capital improvement project groups (i.e. bid packages).
7. Estimate the construction cost of each identified R/R action and preliminary bid package.
8. Schedule tentative completion dates for identified project groups.

Creation of Capital Improvement Project Bid Packages

The result of updating the sewer Asset Database following completion of CCTV inspection work is the assignment of an R/R priority ranking for every asset. Using assigned priority rankings, the Utilities Manager begins the process of developing capital improvement project bid packages that include groups of assets to be repaired or replaced. Steps 5 through 7 above should be completed by a Civil Engineer licensed in the State of California. These tasks may be completed by licensed LBNL Staff, or the services of a contracted Engineer may be procured to select the appropriate R/R method (i.e. typical excavation or trenchless construction methods) for each deficiency.

Bid packages may be assembled according to priority ranking alone, selected construction methodology, coordination with other LBNL infrastructure projects, or other factors deemed appropriate by the Utilities Manager. Within the Asset Database, the Utilities Manager ensures that every asset with a severity 4 or 5 structural or O&M defect is assigned to a preliminary capital improvement project. Typically, the upstream and downstream manholes for rehabilitated or replaced pipelines are also rehabilitated (i.e. manhole lining or patching) or replaced at the same time. When a pipeline is placed into a preliminary capital improvement project bid package, the associated upstream and downstream manholes are also placed into that project if any severity 3 or greater defects have been noted. If there are any manholes with

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severity 4 or 5 defects (i.e. R/R priority ranking 1-3) that are not adjacent to pipelines with similar defects, a separate manhole rehabilitation project may be scheduled to ensure these assets are adequately repaired or replaced.

Preliminary Scheduling of Capital Improvement Project Bid Packages

When the Utilities Manager has finished assigning assets to preliminary capital improvement projects, preliminary cost estimates and construction dates are determined. Per DOE Order No. 430.1B Ch. 2 Section 4.d.4, “the repair costs for deficiencies identified during the condition assessments must be estimated using the DOE Condition Assessment Information System (CAIS) or another nationally recognized cost estimating system. Costs must include overhead/burden.” The Utilities Manager is responsible for ensuring that cost estimates for identified R/R actions are prepared in accordance with acceptable DOE standards.

LBNL uses the following general timelines to schedule capital improvement projects:

Table iv-1: Capital Improvement Project Scheduling Guidelines

Highest Severity	Priority	LBNL Action
5 (Structural)	1	Schedule for immediate emergency repair / replacement, or within next 1-2 years if appropriate. *
5 (O&M)	2	Schedule for immediate emergency repair / replacement, or within next 2-3 years if appropriate. *
4 (any)	3	Schedule for repair / replacement within next 2-5 years. *
3 (any)	4	Schedule as likely for repair / replacement within next 10 years, and/or schedule increased PM or CCTV inspection. *

* May require interim increased frequency O&M activity to mitigate risk prior to R&R.

Sanitary Sewer Collection System Capital Improvement Plan and Funding

The sanitary sewer collection system capital improvement plan consists of two project types, which are repairs or replacements for pipelines and manholes in poor condition, and capacity-related improvement projects (i.e. pipe diameter increase by dig and replace, pipe bursting, parallel construction; refer to SSMP section viii-c). The sanitary sewer collection system capital improvement plan refers to the prioritized project schedule and associated cost estimates developed within the sewer Asset Database.

Pipeline and manhole R/R projects identified through the condition assessment process are prioritized and scheduled using the parameters described above. Capacity-related improvements that are required in order to mitigate the possibility of an SSO due to a lack of hydraulic capacity to convey peak design wet weather flows are assigned priority rankings as described in SSMP section viii-c and integrated into the prioritization process. Capacity-related capital improvement projects that are required to provide adequate hydraulic capacity for future improvements at

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LBNL are scheduled concurrently with the expected timing for the related improvements. The sewer system capital improvement plan will have a minimum 10-year horizon to allow for long term financial planning, and the supporting data for this plan will consist of the following:

- NASSCO PACP CCTV inspection reports / condition assessment data
- Sewer Asset Database with assigned R/R Priority Rankings
- Grouped sanitary sewer collection system improvement project “bid packages” with estimated construction costs and construction dates
- Hydraulic capacity analysis of LBNL sanitary sewer main lines, and list of identified deficiencies for existing conditions and future facility build-out
- Analysis of required improvements to address hydraulic capacity deficiencies, including construction methodology, cost, and required construction date

Each year that updates to the 10-year sanitary sewer collection system capital improvement plan (CIP) are made, the Facilities Division (typically the Utilities Manager, and Operations Department Head and / or Facilities Division Director) will present the updates to the Chief Operating Officer (COO) in the form of Project Funding Requests. The COO is responsible for reviewing the Project Funding Requests submitted, and prioritizing those needs versus the need for other LBNL projects that are integrated into the Institutional General Plant Project (IGPP) Plan. If the COO decides that adequate funding to support the current proposals in the sanitary sewer collection system CIP is not currently available, the Utilities Manager will discuss the potential risks of deferring identified improvement projects (which may be based on research of enforcement actions and consequences of SSO events for similarly sized systems), and work with the COO to adjust the proposed project schedule.

The Utilities Manager maintains copies of the original Project Funding Requests (prior to any scheduling modifications due to funding limitations) submitted to the COO for documentation of the sanitary sewer collection system CIP. Once the CIP has been approved and funding becomes available, LBNL typically establishes external contracts with registered Civil Engineering Consultants to prepare bid documents for projects scheduled to be constructed in the next two years. Bid document preparation may also be completed internally by licensed LBNL Staff, where appropriate. It should be noted that when the identified schedule of system repairs for the current fiscal year results in costs that can be accommodated by the current utility operating budget, a detailed presentation to the COO of Project Funding Requests and review of the CIP may not be necessary, as the identified repairs can be completed as needed with the available funding.

Related Documents

- Attachment iv-1: Sample Manhole Inspection Form
- Refer to NASSCO PACP User’s Manual (Latest Edition)
- Refer to DOE Order 430.1B – Real Property Asset Management
<https://www.directives.doe.gov/directives-documents/400-series/0430.01-BOrder-b-chg2>

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- Refer to LBNL's Sewer Asset Database File: Sewer_Asset_Database.xls

Related Performance Indicator

- Capital Improvement Program

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iv-d. Training

Requirement: Provide training on a regular basis for staff in sanitary sewer system operations and maintenance, and require contractors to be appropriately trained.

Discussion

LBNL Required Training

LBNL EHS Division is responsible for administering a safety and training program for all LBNL employees and researchers. Specific requirements in the form of a “Training Profile” are established for each individual.

Preventative Maintenance Training

LBNL utilizes outside Contractors to conduct regular operation and maintenance of the sanitary sewer collection system, which includes hydro flushing and CCTV inspection. Contractors are responsible for maintaining training through current NASSCO and hydro flushing certification.

Required SSO Response Training

LBNL employee positions responsible for direct SSO response are the Facilities Division Plant Maintenance Technicians, Plumbing Shop employees, and EHS Environmental Services Group employees. LBNL has a standard operating procedure (SOP) document which governs responses to and reporting of SSO events, which is:

- *EMRG-051 - Sewage Spill Cleanup: Exterior Emergency Procedure*

SSO Volume Estimation Training

LBNL employees responsible for SSO response must also complete training on SSO volume estimation. LBNL employs a training course that appropriately trains pertinent SSO response personnel on methods for performing SSO volume estimates, which is:

- *EHS0691 – Volume Estimation – Sanitary Sewer Overflow (SSO)*

Other LBNL training courses applicable to work which may be performed with respect to the sanitary sewer collection system include:

- EHS0370, EHS0372, EHS0373 – LockOut / TagOut Training
- EHS0274 – Confined Space Retraining
- EHS0275 – Introduction to Confined Space Hazards

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- EHS0276 – Fall Protection
- EHS0277 – Confined Space – Permit Writer
- Traffic Control Training (Contracted Out)

Required Contractor Training

LBNL's Standard Specification No. 01020 – *Environment, Safety, and Health General Requirements* provide a list of applicable codes and standards for work performed at LBNL for contractors. The California Code of Regulations (CCR) governs a majority of the basic safety and training requirements for contractors:

- Requirement to develop and submit Injury and Illness Prevention Program:
LNBL Standard Specification No. 01020 – Section 1.04
CCR Title 8, Chapter 4, Subchapter 7, Group 1, 3203
- Traffic Control Flagger Training Requirements:
CCR Title 8, Chapter 4, Subchapter 4, Article 11, 1599.
- Construction Safety Orders:
CCR Title 8, Chapter 4, Subchapter 4, Article 6
- Confined Space Entry:
CCR Title 8, Chapter 4, Subchapter 7, Group 16, Article 108
- Emergency Medical Procedures:
CCR Title 8, Chapter 4, Subchapter 4, Article 3, 1512

All hired contractors must identify specific job hazards they will encounter during contracted work and develop appropriate control measures. Ultimately, hired contractors are required to adhere to the same regulations and policies LBNL employees are subjected to when considering job hazards. Section 1.05-D requires that, "Each employee scheduled to work in the activities identified above shall receive safety training in those activities prior to working on them. The Subcontractor shall maintain proof of employee training at the work site and make it available to LBNL Project Manager upon request." LBNL Project Managers review all contractor safety submittals required by Standard Specification No. 01020, and conduct a Work Site Safety Orientation with EHS staff prior to the start of construction projects. For construction projects affecting the sanitary sewer collection system, the standard LBNL SSO response SOPs are distributed and discussed with the subcontractor so that they are aware of the proper procedures and contact information in the event of an SSO.

Related Documents

- Refer to LBNL Monthly Training Schedules and Training Course List
<http://www.lbl.gov/ehs/training/index.shtml>
- Refer to EMRG-051: Exterior Emergency Procedure (Latest Revision)
<http://fac.lbl.gov/Facilities/OpMaint/ppm/doc/EMRG-051.pdf>

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- Refer to LBNL Standard Specification No. 01020 – EH&S General Requirements
http://fac.lbl.gov/DandC/CDDG_Home/Volume2-Construction_Guidelines/Standard_Project_Specifications.html

Related Performance Indicator

- None

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iv-e. Identify equipment and critical replacement parts

Requirement: Provide equipment and replacement part inventories, including identification of critical replacement parts.

Discussion

LBNL maintenance staff (i.e. PMTs, Plumbing Shop employees) conduct limited operation, maintenance, and SSO response activities for the sanitary sewer collection system. LBNL holds blanket contracts with sewer maintenance contractors for regular preventative maintenance activities, inspections, and emergency response to sanitary sewer overflows, and therefore does not have a need to maintain an extensive inventory of maintenance equipment.

LBNL sanitary sewer collection system does not have any lift stations or other mechanical / electrical controls that would require immediate backup replacement parts in the case of a failure to prevent the occurrence of an SSO. Any mechanical or electrical failures within the Hearst and Strawberry Outfall monitoring stations may result in a temporary loss of functionality in the monitoring station in terms of data collection, but would not impeded the flow of sewage that could result in a blockage or SSO. Therefore, the tracking of equipment and replacement parts associated with the outfall monitoring stations is not addressed within the SSMP.

Related Documents

- None

Related Performance Indicator

- None



v Design and Performance Provisions

SWRCB Requirement:

The SSMP must identify:

- (a) **Design and construction standards and specifications** for the installation of new sanitary sewer systems, pump stations and other appurtenances; and for the rehabilitation and repair of existing sanitary sewer systems; and
- (b) **Procedures and standards for inspecting and testing** the installation of new sewers, pumps, and other appurtenances and for rehabilitation and repair projects.

Taken from SWRCB GWDR Order No. 2006-0003 adopted May 2, 2006.

Background

LBNL has developed and maintains its own design and construction standards, specifications, and details in accordance with Department of Energy (DOE) standards and requirements, which allow the Facilities Division to accomplish the following objectives:

- New and rehabilitated sanitary sewer collection system infrastructure is designed and installed in compliance with the latest Federal and State regulations, and in line with general industry standards.
- New and rehabilitated sanitary sewer collection system infrastructure is inspected to ensure high quality and compliance with LBNL standards, which will maximize the operating life of the asset.

This section fulfills the requirements of the GWDR SSMP mandatory element v.

Element v. Design and Performance Provisions

v-a. Design and construction standards and specifications

Requirement: Design and construction standards and specifications for the installation of new sanitary sewer systems, pump stations and other appurtenances; and for the rehabilitation and repair of existing sanitary sewer systems.

Discussion

LBNL maintains established design and construction standards, specifications, and details to ensure infrastructure projects are completed properly and at a high level of quality.

LBNL is owned and regulated by the DOE, a Federal entity, and therefore is not required to adhere to local design and construction standards and ordinances. LBNL has established a list of applicable State and National infrastructure design and construction standards and codes within *LBNL Construction Standards and Design Requirements - Volume 1 Part 1 – Administrative Requirements*, which are adhered to by LBNL employees and hired subcontractors (refer to Section 1 – General – Codes). All LBNL infrastructure project designs are either completed in-house by licensed Facilities Division Civil Engineers or outsourced to contract Design Professionals. A Project Manager from the Facilities Division is assigned to each sanitary sewer collection system expansion or capital improvement project to ensure those LBNL-specific design requirements and other applicable regulations are adhered to throughout the project's duration.

Trenchless Rehabilitation and Replacement

Specifications pertaining to trenchless rehabilitation and construction methods are typically developed by Design Professionals and tailored as needed to each specific project application due to the wide variety of available methods and fast pace with which trenchless rehabilitation technologies are developing. LBNL does have a specification entitled "Protective Coatings for New & Existing Manholes" (Section 02608) that is used for the rehabilitation of corroded or damaged manholes.

Related Documents

- Refer to LBNL Construction Details and Design Guidelines Home
http://fac.lbl.gov/DandC/CDDG_Home/

Related Performance Indicator

- None



Element v. Design and Performance Provisions

v-b. Procedures and standards for inspecting and testing

Requirement: Procedures and standards for inspecting and testing the installation of new sewers, pumps, and other appurtenances and for rehabilitation and repair projects.

Discussion

LBNL employs a detailed infrastructure project design and bid package preparation review procedure that ensures all applicable design and construction requirements are adhered to, including those established by LBNL within standard design requirements, specifications, and details, and those adopted by LBNL as described in *LBNL Construction Standards and Design Requirements - Volume 1 Part 1 – Administrative Requirements*. An overview of the processes described in this document is provided below.

Reviews & Approvals

A breakdown of the deliverables that are expected to be submitted at each milestone of the project design process is provided. At each milestone, excluding the final 100% submittal, the sub-contracted Design Professional will receive comments and mark-ups of drawings for inclusion into the next submittal. All plans and specifications deemed incomplete or incorrect shall be returned to the sub-contracted Design Professional with a request to improve the documents up to compliance with LBNL standards.

Internal LBNL Design Reviews are performed by:

- Facilities D&C Department, A/E Group Team Members
- Subject Matter Experts
- Project Manager
- Client/User
- Fire Marshal
- Environmental Health and Safety Team Members
- Plant Operations/M&O Department

External reviews may be required by:

- CEQA
- NEPA
- DOE/External Independent Review contracted by DOE
- Office of the President
- Third Party for Hazardous Materials



Element v. Design and Performance Provisions

- Third Party for Structural
- Value Engineering
- Third Party for Cost Estimates

Preliminary Design, Final Design, and Construction Document Phase Submittals

For the Preliminary Design Phase, LBNL has specific format requirements for Civil, Structural, Architectural, Mechanical, and Electrical discipline drawings and specifications. These requirements are available on LBNL Facilities Division website and are intended to inform Design Professionals of submittal content and formatting requirements. The Final Design Phase plans and specifications should show in greater detail all of the items discussed and shown within the Preliminary Design Phase submittals. A detailed list of items required to be included in the final set of Construction Documents for each discipline is also provided.

Bidding & Construction Phase

LBNL has established protocols for bidding, contractor selection, and construction management that include contractor pre-qualification, pre-bid site visits, construction meetings, and preparation of record documents. The Construction Phase of infrastructure projects is monitored primarily by an LBNL Project Inspector. The Project Inspector is responsible for conducting periodic spot check inspections to verify compliance with established contract documents and standards, documenting those inspections, reporting instances of noncompliance, assisting the Design Professional in analyzing laboratory results from required materials testing (per project specifications), and monitoring the project for any unsafe practices.

Inspection and Testing of New or Rehabilitated Sanitary Sewer Collection System Infrastructure

LBNL ensures that a Project Inspector is appropriately appointed for every sanitary sewer collection system improvement project, and that they issue a certificate of approval based on the results of their inspections as required by the project specifications and contract documents for all work before final payment is made by LBNL. Inspection and testing requirements for sanitary sewer collection system infrastructure are included within the technical specifications, within a dedicated section based on the CSI MasterFormat. Currently, LBNL standard specifications applicable to the sanitary sewer collection system require deflection testing, air pressure testing, and CCTV inspection for sewer pipeline installation where appropriate.

For sewer manholes, vacuum testing and water exfiltration testing may be required. For manhole coatings and linings, spark testing may be required to verify adequate installation.

Testing and inspection requirements for trenchless rehabilitation, replacement, or installation of sewer pipelines and manholes are developed on a project by project basis and included within the technical specifications as appropriate for the construction methods and technologies selected. The inspection and testing procedures are typically developed by the sub-contracted Design Professional to verify the integrity of the product.

Element v. Design and Performance Provisions

Related Documents

- Refer to LBNL Construction Details and Design Guidelines Home
http://fac.lbl.gov/DandC/CDDG_Home/

Related Performance Indicator

- None





vi **Overflow Emergency Response Plan**

California State Water Resources Control Board (SWRCB) Requirement:

Each Enrollee shall develop and implement an overflow emergency response plan that identifies measures to protect public health and the environment. At a minimum, this plan must include the following:

- (a) Proper **notification procedures** so that the primary responders and regulatory agencies are informed of all SSOs in a timely manner;*
- (b) A program to ensure an **appropriate response** to all overflows;*
- (c) Procedures to ensure **prompt notification** to appropriate regulatory agencies and other potentially affected entities (e.g. health agencies, Regional Water Boards, water suppliers, etc.) of all SSOs that potentially affect public health or reach the waters of the State in accordance with the MRP. All SSOs shall be reported in accordance with this MRP, the California Water Code, other State Law, and other applicable Regional Water Board WDRs or NPDES permit requirements. The SSMP should identify the officials who will receive immediate notification;*
- (d) Procedures to ensure that appropriate staff and contractor personnel are aware of and follow the Emergency Response Plan and are **appropriately trained**;*
- (e) Procedures to address **emergency operations**, such as traffic control and crowd control and other necessary response activities; and*
- (f) A program to ensure that all reasonable steps are taken to **contain and prevent** the discharge of untreated and partially treated wastewater to waters of the United States and to **minimize or correct** any adverse impact on the environment resulting from the SSOs, including such accelerated or additional monitoring as may be necessary to determine the nature and impact of the discharge.*

Source: SWRCB GWDR Order No. 2006-0003 adopted May 2, 2006.

Background

This section of the Sanitary Sewer Management Plan (SSMP) describes the elements of LBNL's Sanitary Sewer Overflow Emergency Response Plan (OERP). (For the current SSMP see: <http://WWW2.lbl.gov/ehs/esg/Reports/tableforreports.shtml>)

The two LBNL organizations with primary SSO emergency response responsibilities are:

1. Facilities Division
2. Environment/Health/Safety (EHS) Division, Environmental Services Group (ESG)

These LBNL organizations have established formal policies and procedures that are followed in the event of an SSO at the facility. The purpose of LBNL's OERP is to support an orderly and effective response to Sanitary Sewer Overflows (SSOs). The OERP provides guidelines for LBNL personnel to follow in responding to, cleaning up, and reporting SSOs.

Element vi. Overflow Emergency Response Plan

This section fulfills the requirements of the California SWRCB Order No. 2006-0003, dated May 2, 2006 and WQ 2013-0058-EXEC, dated September 9, 2013, general waste discharge requirements for the SSMP mandatory element vi.

Element vi. Overflow Emergency Response Plan

vi-a. Proper notification procedures

Requirement: Proper notification procedures so that the primary responders and regulatory agencies are informed of all SSOs in a timely manner

Discussion

SSOs are typically discovered by LBNL Facilities maintenance staff and are reported to Facilities Division and the EHS Division management staff as specified in the procedures listed below. In addition, other LBNL personnel may report an SSO to the Protective Services Department according to the emergency notification information provided in LBNL's *Emergency Guide* or *All Hazard Awareness Employee Pocket Guide*. At LBNL, emergency notifications can be made on a 24/7 basis as follows:

- For life threatening emergency reporting, call extension 7911 from an onsite LBNL phone or call 911 from an offsite or cell phone.
- For non-life-threatening incident emergency reporting, call extension 6999 from an onsite LBNL phone or (510) 486-6999 from an offsite or cell phone.

After an SSO notification has been made, an incident response and investigation is performed by Facilities and EHS staff. Facilities response actions are described in *Sewage Spill Notification and Cleanup: Exterior Emergency Procedure* (Facilities Procedure EMRG - 051). SSO releases are assessed and reported to regulatory agencies by ESG staff as described in *Notification Procedure for Environmental Releases into Storm Drains or Creeks* (ESG Procedure 203).

Related Documents

- Attachment vi-1, *LBNL Emergency Guide*
- Attachment vi-2, *LBNL All Hazard Awareness Employee Pocket Guide* (Pocket Guide)
- Attachment vi-3, *Sewage Spill Notification and Cleanup: Exterior Emergency Procedure* (Facilities Procedure EMRG - 051)
- Attachment vi-4, *Notification Procedure for Environmental Releases into Storm Drains or Creeks* (ESG Procedure 203)
- Attachment vi-5, *LBNL SSO Emergency Rapid Response Packet: Facilities Division*
- Attachment vi-6, *LBNL SSO Emergency Rapid Response Packet: EHS Division*

Plan & Schedule

- No further efforts are projected for this element at the present time.

Element vi. Overflow Emergency Response Plan

vi-b. A program to ensure appropriate response

Requirement: A program to ensure an appropriate response to all overflows.

Discussion

The specific responsibilities of Facilities Division and EHS Division staff involved in an SSO response are described in the division-specific procedures listed below and outlined in Attachments vi-5 and vi-6 for Facilities and EHS Division's respectively.

Upon receiving a report of an SSO, the main response objectives of the Facilities Plant Maintenance Technicians (PMT) are to:

- Determine the cause of the spill
- Contain spilled sewage and return to the sewer system, if possible
- Isolate the area affected by the spill
- Mitigate the cause of the spill
- Clean up the spill
- Adequately document the spill (include photographs)

LBNL Staff will implement clean up and disinfection procedures to reduce the potential for human health issues and adverse environmental impacts that are associated with an SSO event. Facility and EHS Staff will look for any signs of sewage solids and sewage-related materials that may warrant additional cleanup activities. Where cleanup is beyond the capabilities of LBNL staff, a cleanup contractor will be used.

Hard Surface Areas

Collect all signs of sewage solids and sewage-related material either by protected hand or with the use of rakes and brooms. Wash down the affected area with clean water and/or non-toxic biodegradable surface disinfectant until the water runs clear. The flushing volume will be approximately three times the estimated volume of the spill. Take reasonable steps to contain and vacuum up the wastewater. Allow area to dry. Repeat the process if additional cleaning is required.

Landscaped and Unimproved Natural Vegetation

Collect all signs of sewage solids and sewage-related material either by protected hand or with the use of rakes and brooms. Wash down the affected area with clean water until the water runs clear. The flushing volume will be approximately three times the estimated volume of the spill. Allow the area to dry. Repeat the process if additional cleaning is required.

Natural Waterways

The Department of Fish and Wildlife will be notified by CalOES for SSOs greater than or equal to 1,000 gallons.

Wet Weather Modifications

Omit flushing and sampling during heavy storm events (i.e., sheet of rainwater across paved surfaces) with heavy runoff where flushing is not required and sampling would not provide meaningful results.

Element vi. Overflow Emergency Response Plan

In the event of an SSO, the Facilities Division has the ability to suspend water usage in facilities upstream of a sanitary sewer collection system blockage. This strategy is commonly used to prevent the further release of sewage in the event that a blockage cannot be rapidly cleared.

Facilities Division PMT(s) are typically capable of mitigating and cleaning up small spills without the support of additional responders using their standard operating procedures. These procedures address sewage spill mitigation and cleanup for both exterior and interior releases and describe special equipment required, work steps to safely clean up the spill, and references to other procedures for further information. The three Facilities Division procedures are:

- *Sewage Spill Cleanup: Interior Emergency Procedure* (Facilities Procedure EMRG - 050)
- *Sewage Spill Notification and Cleanup: Exterior Emergency Procedure* (Facilities Procedure EMRG - 051)
- *Interior Sanitary Sewer Clearing Safety Operating Procedure* (Facilities Procedure OPER - 075)

Typically, a sewage blockage causing an SSO can be cleared by PMT staff or by Facilities Plumbers using a plumber's snake. For SSOs caused by blockages or other problems within the sanitary sewer collection system that cannot be addressed by Facilities Division staff, an on-call contractor is called in to determine the cause of the blockage (using video inspection equipment if necessary) and to clear it. LBNL maintains a subcontract with a sewer maintenance service capable of responding to SSOs on a 24/7 basis. LBNL's on-call contractor has the capabilities and equipment to appropriately mitigate the most severe possible spills that could occur at LBNL.

The on-call sewer maintenance contractor provides the following equipment and capabilities:

- Hydro-jet equipment
- Vacuum pump truck equipment
- Video inspection equipment

In the event that the SSO discharge enters the storm drain system and is discharged to a creek, ESG is responsible for assessing its impact. A visual examination and/or samples may be collected for chemical and biological analysis. Creek sampling and analysis will be performed according to *Sampling Unauthorized Non-Stormwater Discharges* (ESG Procedure 260).

The specific responsibilities of Facilities Division and EHS Division staff involved in an SSO response are described in the division-specific procedures listed below. The procedures described are for dry weather conditions and will be modified as required for wet weather conditions.

When the spill is large or in a sensitive area the first responders will decide whether to proceed with clearing the blockage to restore the flow or to initiate containment measures. The guidance for this decision is:

- Small spills (i.e., spills that are easily contained) – proceed with clearing the blockage.
- Moderate or large spill where containment is anticipated to be simple – proceed with the containment measures and clearing of blockage.
- Moderate or large spills where containment is anticipated to be difficult – proceed with clearing the blockage; however, whenever deemed necessary, call for additional assistance and implement containment measures.

Element vi. Overflow Emergency Response Plan

The PMT(s) will attempt to contain as much of the spilled sewage as possible using the following steps:

- Determine the immediate destination of the overflowing sewage.
- Plug storm drains using air plugs, sandbags, and/or plastic mats to contain the spill, or new pig storm drain blocker whenever appropriate. If spilled sewage has made contact with the storm drainage system, attempt to contain the spilled sewage by plugging downstream storm drainage facilities.
- Contain/direct the spilled sewage using dike/dam or sandbags.

Related Documents

- Attachment vi - 3, *Sewage Spill Notification and Cleanup: Exterior Emergency Procedure* (Facilities Procedure EMRG – 051)
- Attachment vi - 4, *Notification Procedure for Environmental Releases into Storm Drains or Creeks* (ESG Procedure 203)
- Attachment vi-5, *LBNL SSO Emergency Rapid Response Packet: Facilities Division*
- Attachment vi-6 *LBNL SSO Emergency Rapid Response Packet: EHS Division*
- Attachment vi - 7, *Sewage Spill Cleanup: Interior Emergency Procedure* (Facilities Procedure EMRG - 050)
- Attachment vi - 8, *Interior Sanitary Sewer Clearing Safety Operating Procedure* (Facilities Procedure OPER - 075)
- Attachment vi - 9, *Sampling Unauthorized Non-Stormwater Discharges* (ESG Procedure 260)

Plan & Schedule

- No further efforts are projected for this element at the present time.

Element vi. Overflow Emergency Response Plan

vi-c. Procedures to ensure prompt notification to regulatory agencies and other potentially affected entities

Requirement: The OERP must include procedures to ensure prompt notification to appropriate regulatory agencies and other potentially affected entities (e.g. health agencies, Regional Water Boards, water suppliers, etc.) of all SSOs that potentially affect public health or reach the waters of the State in accordance with the MRP. All SSOs shall be reported in accordance with the MRP, the California Water Code, other State Law, and other applicable Regional Water Board WDRs or NPDES permit requirements. The SSMP should identify the officials who will receive immediate notification.

Discussion

SSO reporting to regulatory agencies, as required by MRP No. 2006-0003-DWQ and SWRCB Order No. WQ 2013-0058-EXEC, is completed as described in LBNL's SSMP, sections ii-c and vi-a. At minimum, the California Office of Emergency Services will be notified of Category 1 SSO's greater than or equal to 1,000 gallons (SSO that reaches surface water). Other agencies that may be notified is described in ESG Procedure 203 and includes the following agencies:

- California Department of Fish and Wildlife
- San Francisco Bay Regional Water Quality Control Board
- City of Berkeley, Toxics Management Division
- Department of Energy, Berkeley Site Office
- University of California, Berkeley, Office of Environment, Health & Safety

Any SSO that enters the LBNL storm drain system can potentially impact the North Fork or South Fork of Strawberry Creek, which are the main surface water drainages from the LBNL site. Both creeks eventually flow onto the UC Berkeley Campus where they join into a single creek. Therefore, SSO's entering the storm drain system may be reported to the UC Berkeley EH&S office so that response activities between LBNL and UC Berkeley are coordinated in a manner to most effectively mitigate a spill.

The table on the following page outlines the SWRCB required notifications.

Element vi. Overflow Emergency Response Plan

ELEMENT	REQUIREMENT	METHOD
NOTIFICATION	Within two hours of becoming aware of any Category 1 SSO greater than or equal to 1,000 gallons discharged to surface water or spilled in a location where it probably will be discharged to surface water, LBNL will notify the California Office of Emergency Services and obtain a notification control number.	Call Cal OES at: (800) 852-7550
REPORTING	<ul style="list-style-type: none"> • Category 1 SSO: LBNL will submit draft report within 3 business days of becoming aware of the SSO and certify within 15 calendar days of SSO end date. • Category 2 SSO: LBNL will submit draft report within 3 business days of becoming aware of the SSO and certify within 15 calendar days of the SSO end date. • Category 3 SSO: LBNL will submit certified report within 30 calendar days of the end of month in which SSO the occurred. • SSO Technical Report: LBNL will submit within 45 calendar days after the end date of any Category 1 SSO in which 50,000 gallons or greater are spilled to surface waters. • “No Spill” Certification: LBNL will certify that no SSOs occurred within 30 calendar days of the end of the month or, if reporting quarterly, the quarter in which no SSOs occurred. • Collection System Questionnaire: LBNL will update and certify every 12 months 	Enter data into the CIWQS Online SSO Database ¹ (http://ciwqs.waterboards.ca.gov/) certified by the Legally Responsible Official(s) ² . All information required by CIWQS will be captured in the Sanitary Sewer Overflow Report. Certified SSO reports may be updated by amending the report or adding an attachment to the SSO report within 120 calendar days after the SSO end date. After 120 days, the State SSO Program Manager must be contacted to request to amend an SSO report along with a justification for why the additional information was not available prior to the end of the 120 days.
WATER QUALITY MONITORING	LBNL will conduct water quality sampling within 48 hours after initial SSO notification for Category 1 SSOs in which 50,000 gallons or greater are spilled to surface waters.	Water quality results will be uploaded into CIWQS for Category 1 SSOs in which 50,000 gallons or greater are spilled to surface waters.
RECORD KEEPING	LBNL will maintain the following records: <ul style="list-style-type: none"> • SSO event records. • Records documenting SSMP implementation and changes/updates to the SSMP. • Records to document Water Quality Monitoring for SSOs of 50,000 gallons or greater spilled to surface waters. • Collection system telemetry records if relied upon to document and/or estimate SSO Volume. 	Self-maintained records shall be available during inspections or upon request.

¹ In the event that the CIWQS online SSO database is not available, LBNL will notify SWRCB by phone and will fax or e-mail all required information to the RWQCB office in accordance with the time schedules identified above. In such an event, LBNL will submit the appropriate reports using the CIWQS online SSO database when the database becomes available. A copy of all documents shall be retained in the SSO file.

² LBNL always has at least one LRO. Any change in the LRO(s) including deactivation or a change to contact information, will be submitted to the SWRCB within 30 days of the change.

Element vi. Overflow Emergency Response Plan

Related Documents

- Attachment vi - 4, *Notification Procedure for Environmental Releases into Storm Drains or Creeks (ESG Procedure 203)*
- Attachment vi - 5, *LBNL SSO Emergency Rapid Response Packet: Facilities Division*
- Attachment vi - 6 *LBNL SSO Emergency Rapid Response Packet: EHS Division*
- Attachment vi - 10, *CIWQS Database Entry Form Sample*

Plan & Schedule

- No further efforts are projected for this element at the present time.

Element vi. Overflow Emergency Response Plan

vi-d. Distribute OERP to all likely users and train

Requirement: The OERP must include procedures to ensure that appropriate staff and contractor personnel are made aware of proper procedures and are appropriately trained.

Discussion

Key LBNL personnel who may have a role in responding to, reporting, and/or mitigating a sewer system overflow will receive training on the contents of this OERP. All new employees will receive training before they are placed in a position where they may have to respond. Current employees will receive annual refresher training on this plan and the procedures to be followed. LBNL will document all training.

SSO Response Protocol Training

Key LBNL staff involved with SSO response and notification actions are properly trained to follow established operating procedures as described in SSMP section iv-d. LBNL Facilities and EHS SSO response staff are required to understand the procedures relevant to their respective organizations as outlined in this document. Copies of SSO response and reporting procedures are attached to this document and are available to:

- Facilities Division staff and on-call sewer maintenance contractors
- EHS Division

Affected key employees will receive annual training on the following topics by knowledgeable trainers:

- LBNL's Overflow Emergency Response Plan and Sanitary Sewer Management Plan
- Sanitary Sewer Overflow Volume Estimation Techniques
- Researching and documenting Sanitary Sewer Overflow Start Times
- Impacted Surface Waters: Response Procedures

LBNL will verify that annual safety training requirements are current for each employee.

SSO Volume Estimation Training

All key LBNL staff involved with SSO response and notification must be properly trained on how to properly perform SSO volume estimates. LBNL's course EHS0691 *Volume Estimation Sanitary Sewer Overflow* trains appropriate Facilities and EHS SSO response personnel on methods for performing SSO volume estimates. In addition, SSO release volume estimation methods are included within ESG Procedure 203.

The ESG Leader (or designee) ensures that the MRP Record Keeping Requirements are satisfied through documentation of the event through CIWQS reporting and standard LBNL Occurrence Reports (including identification of root cause and corrective action, if applicable).

If any significant changes to the SSO Emergency Response Plan are made, the organizations listed above as well as key LBNL personnel will be notified.

Element vi. Overflow Emergency Response Plan

Related Documents

- Attachment vi - 3, *Sewage Spill Notification and Cleanup: Exterior Emergency Procedure (Facilities Procedure EMRG – 051)*
- Attachment vi - 4, *Notification Procedure for Environmental Releases into Storm Drains or Creeks (ESG Procedure 203)*
- Attachment vi-5, *LBNL SSO Emergency Rapid Response Packet: Facilities Division*
- Attachment vi-6 *LBNL SSO Emergency Rapid Response Packet: EHS Division*
- Attachment vi - 7, *Sewage Spill Cleanup: Interior Emergency Procedure (Facilities Procedure EMRG – 050)*
- Attachment vi - 8, *Interior Sanitary Sewer Clearing Safety Operating Procedure (Facilities Procedure OPER – 075)*
- Attachment vi - 10, *CIWQS Database Entry Form Sample*

Plan & Schedule

Task	Responsible Organization	Scheduled Date
LBNL staff involved in SSO volume estimation must complete course no. EHS0691, Volume Estimation Sanitary Sewer Overflow	EHS and Facilities	As Needed
Update SSO response procedures as needed based on results of SSO response evaluations, and notify key LBNL staff involved with SSO response of the update and external organizations, if necessary.	EHS and Facilities	As Needed

Element vi. Overflow Emergency Response Plan

vi-e. Procedures for emergency operations

Requirement: Procedures to address emergency operations, such as traffic and crowd control and other necessary response activities.

Discussion

LBNL has contracted 24/7 on-site emergency response capabilities available through the LBNL Protective Services Department, including fire response and security services. The Protective Services staff is trained to perform traffic control, crowd control, and first responder assistance.

LBNL's onsite emergency response staff is the primary responder for all emergency events including medical, fire, chemical, biological, and radiological releases as described in the Protective Services Master Emergency Program Plan.

For any SSO that may occur on site after normal business hours, Protective Services and Facilities maintenance staff conducts nighttime patrols that increase the likelihood that an SSO would be identified. Also, EHS staff is on call if SSO notifications are required during off-hours.

Related Documents

- Protective Services Master Emergency Program Plan: http://ps.lbl.gov/ps/docs_2/MEP.pdf
- Attachment vi – 1, *LBNL Emergency Guide*
- Attachment vi – 2, *LBNL All Hazard Awareness Employee Pocket Guide*

Plan & Schedule

- No further efforts are projected for this element at the present time.

Element vi. Overflow Emergency Response Plan

vi-f. Program to ensure steps are taken to contain/prevent and/or minimize/correct effects from discharge to waters of the US

Requirement: A program to ensure that all reasonable steps are taken to contain and prevent the discharge of untreated and partially treated wastewater to waters of the United States and to minimize or correct any adverse impact on the environment resulting from the SSOs, including such accelerated or additional monitoring as may be necessary to determine the nature and impact of the discharge.

Discussion

LBNL and UCB have established several strategies for minimizing the effect of potential sewage spills to surface waters. All drainage from LBNL enters either the North Fork or the South Fork of Strawberry Creek, which are perennial streams that flow west through the UCB campus. The North and South Fork join at the west end of the UCB campus, and the creek then flows through a series of culverts into the San Francisco Bay. Strawberry Creek is not a source of drinking water.

UCB maintains real-time water quality monitoring stations on the North and South Fork of Strawberry Creek that may detect the effects of an SSO, which could be identified by a spike in stream temperature or conductivity. The UCB EH&S organization may notify the LBNL EHS organization's Environmental Services Group if spikes in water quality data are observed to trigger an investigation of possible SSOs. Likewise, LBNL's Environmental Service Group EHS staff would notify UCB EHS staff if an SSO enters surface waters, the storm drainage system, or any drainage channels, since all creeks on or below the LBNL site eventually drain into the North or South Fork of Strawberry Creek and through the UCB campus.

To prevent migration of creek water contaminated with sewage, UCB staff may attempt to pump contaminated flows into the sanitary sewer system to stem the flow through campus and into the San Francisco Bay.

Should an SSO affect surface waters, LBNL EHS staff will coordinate with UCB EH&S and the City of Berkeley to post water quality warnings as needed on the UCB campus or within Berkeley. If necessary, creek inspections and sample collections will also be coordinated with UCB and City of Berkeley staff.

Additional water quality sampling and testing will be performed as appropriate to determine the extent and impact of the SSO when spilled sewage enters a water body. Water quality sampling procedures will be implemented within 48 hours following ESG Procedure 260 and include the following:

- When necessary samples will be collected within 48 hours after the discovery and mitigation of the SSO event.
- The water quality samples will be collected from upstream of the spill, from the spill area, and downstream of the spill in flowing water (e.g. creeks). The water quality samples will be collected near the point of entry of the spilled sewage.
- The samples will then be analyzed by either the LBNL onsite lab or at an offsite California ELAP-certified lab.

Element vi. Overflow Emergency Response Plan

A water quality monitoring plan will be written and implemented immediately upon discovery of any Category 1 SSO of 50,000 gallons or more in order to assess impacts from SSOs to surface waters. The SSO water quality monitoring plan will:

1. Contain protocols for water quality monitoring.
2. Account for spill travel time in the surface water and scenarios where monitoring may not be possible (e.g. safety, access restrictions, etc.)
3. Require water quality analyses for ammonia and bacterial indicators to be performed by an accredited or certified laboratory.
4. Require monitoring instruments and devices used to implement the SSO Water Quality Monitoring Program to be properly maintained and calibrated, including any records to document maintenance and calibration, as necessary, to ensure their continued accuracy.
5. Within 48 hours of LBNL becoming aware of the SSO, require water quality sampling for ammonia and fecal coliform.
6. Observe proper chain of custody procedures.

LBNL will submit an **SSO Technical Report** to the CIWQS Online SSO Database within 45 calendar days of the SSO end date for any SSO in which 50,000 gallons or greater are spilled to surface waters. The SSO Manager will supervise the preparation of this report and will certify this report. This report, which does not preclude the Water Boards from requiring more detailed analyses if requested, shall include at a minimum, the following:

Causes and Circumstances of the SSO:

- Complete and detailed explanation of how and when the SSO was discovered.
- Diagram showing the SSO failure point, appearance point(s), and final destination(s).
- Detailed description of the methodology employed and available data used to calculate the volume of the SSO and, if applicable, the SSO volume recovered.
- Detailed description of the cause(s) of the SSO.
- Copies of original field crew records used to document the SSO.
- Historical maintenance records for the failure location.

LBNL's Response to SSO:

- Chronological narrative description of all actions taken by LBNL to terminate the spill.
- Explanation of how the SSMP Overflow Emergency Response Plan was implemented to respond to and mitigate the SSO.
- Final corrective action(s) completed and/or planned to be completed, including a schedule for actions not yet completed.

Water Quality Monitoring:

- Description of all water quality sampling activities conducted including analytical results and evaluation of the results.
- Detailed location map illustrating all water quality sampling points.

Element vi. Overflow Emergency Response Plan

Related Documents

- Attachment vi - 4, *Notification Procedure for Environmental Releases into Storm Drains or Creeks (ESG Procedure 203)*
- Attachment vi - 5, *LBNL SSO Emergency Rapid Response Packet: Facilities Division*
- Attachment vi - 6, *LBNL SSO Emergency Rapid Response Packet: EHS Division*
- Attachment vi - 9, *Sampling Unauthorized Non-Stormwater Discharges (ESG Procedure 260)*
- Attachment vi - 10, *CIWQS Database Entry Form Sample*

Plan & Schedule

- No further efforts are projected for this element at the present time.

vii FOG Control Program

SWRCB Requirement:

Each Enrollee shall evaluate its service area to determine whether a FOG control program is needed. If an Enrollee determines that a FOG program is not needed, the Enrollee must provide justification for why it is not needed. If FOG is found to be a problem, the Enrollee must prepare and implement a FOG source control program to reduce the amount of these substances discharged to the sanitary sewer system. This plan shall include the following as appropriate:

- a) An implementation plan and schedule for a public education outreach program that promotes proper disposal of FOG;*
- b) A plan and schedule for the disposal of FOG generated within the sanitary sewer system service area. This may include a list of acceptable disposal facilities and/or additional facilities needed to adequately dispose of FOG generated within a sanitary sewer system service area;*
- c) The legal authority to prohibit discharges to the system and identify measures to prevent SSOs and blockages caused by FOG;*
- d) Requirements to install grease removal devices (such as traps or interceptors), design standards for the removal devices, maintenance requirements, BMP requirements, record keeping and reporting requirements;*
- e) Authority to inspect grease producing facilities, enforcement authorities, and whether the Enrollee has sufficient staff to inspect and enforce the FOG ordinance;*
- f) An identification of sanitary sewer system sections subject to FOG blockages and establishment of a cleaning maintenance schedule for each section; and*
- g) Development and implementation of source control measures for all sources of FOG discharged to the sanitary sewer system for each section identified in (f) above.*

Taken from SWRCB GWDR Order No. 2006-0003 adopted May 2, 2006.

Background

The only facility at LBNL with the potential to introduce a significant level of fats, oils, and grease (FOG) to the sanitary sewer collection system is LBNL cafeteria. The cafeteria is served by a grease interceptor located within the building. This section fulfills the requirements of the GWDR SSMP mandatory element vii.

Element vii. FOG Control Program

vii-a. FOG public outreach program

Requirement: An implementation plan and schedule for a public education outreach program that promotes proper disposal of FOG.

Discussion

The possible sources of FOG discharge to LBNL sanitary sewer collection system include the on-site cafeteria (food preparation area). LBNL facilities divisions has a standing monthly preventative maintenance work order to clean the cafeteria grease interceptor and periodically clean the line from the building to the interceptor.

Related Documents

- None

Related Performance Indicator

- FOG Control Program

Element vii. FOG Control Program

vii-b. FOG disposal

Requirement: The FOG control program shall include a plan and schedule for the disposal of FOG generated within the sanitary sewer system service area.

Discussion

Grease interceptors should be pumped regularly to remove accumulated grease. If grease is not regularly removed, the internal compartment designed to capture grease fills to maximum capacity, and additional grease is washed downstream into the sanitary sewer collection system.

LBNL staff completes regular maintenance and grease removal for the cafeteria grease interceptor.

Related Documents

- None

Related Performance Indicator

- FOG Control Program

Element vii. FOG Control Program

vii-c. Legal authority

Requirement: The legal authority to prohibit discharges to the system and identify measures to prevent SSOs and blockages caused by FOG.

Discussion

Refer to SSMP section iii-d for discussion on LBNL's legal authority. LBNL is required to comply with EBMUD Ordinance No. 311A-03 Title II Section 3a.

Related Documents

- None

Related Performance Indicator

- FOG Control Program

Element vii. FOG Control Program

vii-d. Grease removal devices

Requirement: The FOG Program shall include requirements to install grease removal devices (such as traps or interceptors), design standards for the removal devices, maintenance requirements, BMP requirements, record keeping and reporting requirements.

Discussion

Grease Interceptor & Grease Trap Installation, Design, and Construction Standards

LBNL has established a list of applicable State and National infrastructure design and construction standards and codes within LBNL's *Construction Standards and Design Requirements - Volume 1 Part 1 – Administrative Requirements*. The California Plumbing Code and the American Society for Testing and Materials (ASTM) Standard are referenced within this document as applicable standards. At the time of installation the cafeteria grease interceptor met the regulations.

Grease Interceptor & Grease Trap Maintenance, BMP, and Record Keeping Requirements

To ensure that FOG discharges from LBNL cafeteria are adequately controlled, the Facilities Division conducts and document regular cleaning and inspections (see SSMP section vii-e) to determine if proper grease interceptor maintenance is being performed.

Related Documents

- Refer to LBNL Construction Standards and Design Requirements – Volume 1 Part 1: Administrative Requirements (Latest Revision)
[http://fac.lbl.gov/DandC/CDDG_Home/Volume1-Admin & Design Guidelines/LBNL%20CS&DR%20-%20Admin%20Requirements%2021706.pdf](http://fac.lbl.gov/DandC/CDDG_Home/Volume1-Admin%20&%20Design%20Guidelines/LBNL%20CS&DR%20-%20Admin%20Requirements%2021706.pdf)

Related Performance Indicator

- FOG Control Program

Element vii. FOG Control Program

vii-e. Inspection

Requirement: Authority to inspect grease producing facilities, enforcement authorities, and whether the Enrollee has sufficient staff to inspect and enforce the FOG ordinance.

Discussion

LBNL conducts monthly inspections of the food preparation / dishwashing area to determine the success with which regular grease interceptor maintenance is implemented.

Related Documents

- None

Related Performance Indicator

- FOG Control Program

Element vii. FOG Control Program

vii-f. Identification of FOG problem areas

Requirement: The FOG control program shall include an identification of sanitary sewer system sections subject to FOG blockages and establishment of a cleaning maintenance schedule for each section.

Discussion

Currently, FOG blockages have not been documented as a problem within LBNL's sanitary sewer collection system. However, if FOG blockages occur in the future, or are discovered through CCTV inspections, Facilities Division and EHS Division staff plan to identify likely sources of FOG discharges through analysis of upstream operations and processes, and implement source control measures to prevent further discharges of FOG. The EHS and Facilities Divisions will use their ability and authority to control discharge sources through process modifications or additional training of LBNL personnel in facilities that may act as a source of FOG to prevent any identified FOG issues.

Related Documents

- None

Related Performance Indicator

- FOG Control Program

Element vii. FOG Control Program

vii-g. Source control measures

Requirement: Development and implementation of source control measures for all sources of FOG discharged to the sanitary sewer system for each section identified in (f) above.

Discussion

As discussed in SSMP section vii-f, any identified FOG problems in the sanitary sewer collection system will be analyzed to determine the potential sources that are contributing to the problem. EHS Division and Facilities Division Staff will implement methods for source control as necessary to prevent future FOG discharges, which may include modifying the use of chemicals or materials in upstream processes, or installing additional pretreatment to capture FOG prior to discharge to the sanitary sewer collection system.

Related Documents

- None

Related Performance Indicator

- FOG Control Program



viii System Evaluation and Capacity Assurance Plan

SWRCB Requirement:

The Enrollee shall prepare and implement a capital improvement plan (CIP) that will provide hydraulic capacity of key sanitary sewer system elements for dry weather peak flow conditions, as well as the appropriate design storm or wet weather event. At a minimum, the plan must include:

- (a) Evaluation: Actions needed to evaluate those portions of the sanitary sewer system that are experiencing or contributing to an SSO discharge caused by **hydraulic deficiency**. The evaluation must provide estimates of peak flows (including flows from SSOs that escape from the system) associated with conditions similar to those causing overflow events, estimates of the capacity of key system components, hydraulic deficiencies (including components of the system with limiting capacity) and the major sources that contribute to the peak flows associated with overflow events;*
- (b) Design Criteria: Where design criteria do not exist or are deficient, undertake the evaluation identified in (a) above to **establish appropriate design criteria**; and*
- (c) Capacity Enhancement Measures: The steps needed to **establish a short- and long-term CIP** to address identified hydraulic deficiencies, including prioritization, alternatives analysis, and schedules. The CIP may include increases in pipe size, I/I reduction programs, increases and redundancy in pumping capacity, and storage facilities. The CIP shall include an implementation schedule and shall identify sources of funding.*
- (d) Schedule: The Enrollee shall develop a **schedule of completion dates** for all portions of the capital improvement program developed in (a)-(c) above. This schedule shall be reviewed and updated consistent with the SSMP review and update requirements as described in Section D. 14.*

Taken from SWRCB GWDR Order No. 2006-0003 adopted May 2, 2006.

Background

LBNL conducts hydraulic analysis of its sanitary sewer collection system to ensure that it has adequate capacity to convey peak wet weather flow without resulting in capacity-related SSOs. LBNL identifies existing hydraulic capacity deficiencies, develops capital improvement projects, and works to obtain funding for enhancements from the DOE. LBNL also analyzes the existing system's capability to accommodate all future campus expansions outlined within LBNL Long Range Development Plan (LRDP) and determines what enhancements must be made to maintain sufficient sanitary sewer collection system hydraulic capacity. LBNL has established procedures for monitoring and evaluating infiltration and inflow (I/I), including guidelines for taking action to limit I/I. This section fulfills the requirements of the GWDR SSMP mandatory element viii.

Element viii. System Evaluation and Capacity Assurance Plan

viii-a. Identify areas of hydraulic deficiency

Requirement: Describe actions needed to evaluate those portions of the sanitary sewer system that are experiencing or contributing to an SSO discharge caused by hydraulic deficiency. The evaluation must provide estimates of peak flows (including flows from SSOs that escape from the system) associated with conditions similar to those causing overflow events, estimates of the capacity of key system components, hydraulic deficiencies (including components of the system with limiting capacity) and the major sources that contribute to the peak flows associated with overflow events.

Discussion

Previous Sewer System Hydraulic Capacity Assessments

In 2005, Winzler & Kelly Consulting Engineers completed a technical memorandum entitled *East Canyon Sanitary Sewer System Study Report*, which presents alternatives aimed at eliminating surcharging occurring intermittently at manhole locations within the City of Berkeley's (City) sanitary sewer collection system along Dwight Avenue between Prospect Street and Telegraph Avenue. The surcharges are believed to result from a combination of sewer flows originating within the Strawberry section of LBNL sanitary sewer collection system (including UC Berkeley Hill area buildings tributary to the Strawberry system) and private residences within the Panoramic Hill area. The three alternatives proposed by the consultant for addressing surcharging in the City's system were developed on the basis of re-routing flow from LBNL's 8-inch sewer main in Centennial Drive to a different location in an effort to avoid the bottleneck along Dwight Avenue.

The *East Canyon Sanitary Sewer System Study Report* analyzed sewage flow in the Strawberry portion of LBNL's sanitary sewer collection system by gathering flow data from the Strawberry outfall monitoring station, estimating future campus expansion (per the LRDP) design flow demands, and quantifying both existing and future peak wet weather sewage flows. Flow monitoring data from the Strawberry monitoring station was used in the *East Canyon Sanitary Sewer System Study Report* to determine the average dry weather flow (ADWF) and peak dry weather flow (PDWF) rates. The total infiltration and inflow (I/I), which results from groundwater infiltration (GWI/I) and rain dependent infiltration (RDI/I) into the sanitary sewer collection system through manholes and pipe joints or pipe defects was assumed at a rate of twice the calculated PDWF. The maximum flow that the existing sanitary sewer collection system would experience is referred to as the peak wet weather flow (PWWF) and is calculated by summing the PDWF and the total I/I rate.

To determine sewage flows that could be expected in the Strawberry portion of LBNL sanitary sewer collection system in the future, the consultant analyzed LBNL's LRDP, which details planned LBNL campus facility improvements and anticipated population growth through the



Element viii. System Evaluation and Capacity Assurance Plan

year 2024. The *EPA Onsite Wastewater Treatment Systems Manual*, which contains typical wastewater flows for various facility types, was used to estimate future PDWF from new or expanded facilities identified in the LRDP that are served by the Strawberry system. Additional PDWF due to an anticipated 25% population growth at LBNL was also quantified. The future PWWF was determined by adding the additional PDWF due to facility expansions and population growth to the existing calculated PWWF.

Following completion of the *East Canyon Sanitary Sewer System Study Report* by Winzler and Kelley, a hydraulic capacity analysis of the Centennial Drive sewer main was conducted by G.T. Kunzt in a report entitled *Strawberry Canyon Sewer Study* to determine if it has adequate capacity to convey the existing and future PWWF identified. The report analyzed the Centennial Drive sewer main from LBNL SSMH 6S51E (at intersection of Lawrence Road and Centennial Drive) to LBNL SSMH 14S18E (east of Memorial Stadium). Flow line data was available for most of the sewer main from SSMH 6S51E down to the Strawberry monitoring station. Flow line data from the monitoring station to SSMH 14S18E was not available, and the existing ground slope was assumed to represent the sewer main slope. On average, the Centennial Drive sewer main follows the existing ground slope, at a burial depth of approximately 3 to 5 feet. From SSMH 6S51E to the Strawberry monitoring station, the flattest section of pipe is 3.4%, with a calculated hydraulic capacity in excess of the estimated future PWWF. However, downstream of the Strawberry monitoring station, the slope flattens to a minimum of 1.6%, with a calculated hydraulic capacity less than the future PWWF, but slightly above the existing PWWF. Sewer pipes downstream of the Strawberry monitoring station are maintained by UC Berkeley, not by LBNL.

The capacity analysis was only conducted for the Centennial Drive sewer main within the Strawberry system because the hydraulic capacity analysis of the sewer main with respect to future PWWF was proven adequate up to the Strawberry monitoring station. The collector sewers tributary to the Centennial Drive sewer main were not analyzed because they have steep slopes similar to the Centennial Drive sewer main, are generally 6-inch diameter, and any single collector serves less than half of the total tributary area that delivers flow to the Strawberry monitoring station. Additionally, LBNL has never had a capacity-related SSO or observed surcharging in the sanitary sewer collection system during a rainfall event that would warrant additional analysis of collector pipes tributary to the Centennial Drive sewer main. A hydraulic capacity analysis of the Hearst portion of LBNL sanitary sewer collection system has never been completed. However, at this time an analysis is not warranted because a capacity-related SSO has never occurred in the Hearst system, and no surcharging has been observed during rainfall events. Additionally, the system consists mainly of 6-inch and 8-inch diameter sewer lines with steep slopes.

Identified Capacity Enhancement Measures

The *Strawberry Canyon Sewer Study* recommended CCTV inspection of the Centennial Drive sewer main to determine if replacement or rehabilitation of the pipe was necessary upstream of the Strawberry monitoring station. Inspections that were completed in September of 2009 documented only light to moderate (severity 1-2) defects. The *Strawberry Canyon Sewer Study*



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hydraulic analysis indicated that lining of this portion of the sewer main could marginally increase hydraulic capacity by reducing the roughness of the pipe, and could extend the asset service life. The *Strawberry Canyon Sewer Study* recommended pipe bursting the existing 8” sewer main from the Strawberry monitoring station down to SSMH 14S18E, and installing a new 10” line with adequate capacity for future PWWF. The consideration and timing of this project for future completion would be the responsibility of UC Berkeley, since these sections of pipe are downstream of the Strawberry monitoring station, and not managed by LBNL.

Future System Capacity Analysis Measures

The Facilities Division uses the sewer Asset Database to store manhole rim and invert elevation data, as well as pipeline upstream and downstream invert / flowline information. The Asset Database may be used to calculate the maximum full flow capacity of various gravity sewer assets. The hydraulic capacities of key pipelines in the Asset Database will be periodically compared to flow monitoring results obtained at the Strawberry and Hearst monitoring stations to determine if any areas of the system may be at or near maximum hydraulic capacity. Additionally, LBNL maintenance staff will conduct periodic observations of flow conditions in key areas of the sanitary sewer collection system during periods of heavy rainfall to identify any areas where surcharging may be occurring. Additional hydraulic analysis will be conducted for specific areas of LBNL sewer collection system under the following circumstances:

- The percentage of the total estimated PWWF flow (as calculated separately for the Strawberry and Hearst systems) likely to be attributed to a given pipeline shows that an asset may be at or near maximum hydraulic capacity.
- Surcharging is observed in the sanitary sewer collection system where debris accumulation or line blockages were not involved.
- Expansions or improvements to existing LBNL facilities are anticipated that are likely to contribute additional sewage flow to a portion of the sanitary sewer collection system that has not had a hydraulic analysis completed to determine the extent of the potential impacts.

LBNL Facilities Division uses the sewer Asset Database to calculate maximum hydraulic capacities that are compared to flow monitoring data results for the key sewer main lines described below:

- Strawberry sanitary sewer collection system:
 - SSMH 6S51E to SSMH 12S30E: Centennial Drive from Lawrence Road to Strawberry monitoring station (6-inch / 8-inch Centennial Drive main line)
 - Assumed to carry 50% of total Strawberry PWWF
 - SSMH 1N33E to SSMH 12S30E: McMillan Road South to Strawberry monitoring station (6-inch line tributary to Centennial Drive main line)
 - Assumed to carry 50% of total Strawberry PWWF



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- SSMH 12S30E to SSMH 14S18E: Centennial Drive from Strawberry monitoring station to Stadium Rimway (8-inch / future 10-inch Centennial Drive main line)
 - Carries 100% of total Strawberry PWWF
- Hearst sanitary sewer collection system:
 - SSMH 10N18E to SSMH 9N14E: Cyclotron Road from Lawrence Road South (6-inch line tributary to Hearst main line)
 - Assumed to carry 40% of total Hearst PWWF
 - SSMH 2N25E to SSMH 9N14E: Hearst sewer main line from Advanced Light Source Building to Cyclotron Road (8-inch Hearst main line)
 - Assumed to carry 60% of total Hearst PWWF
 - SSMH 9N14E to SSMH 5N9E: Cyclotron Road to Hearst monitoring station (8-inch Hearst main line)
 - Assumed to carry 100% of total Hearst PWWF

The preliminary hydraulic analysis of other gravity sewer assets within LBNL system may be warranted and conducted by the Facilities Division using the Asset Database based on the results of the analysis for the key sections listed above, and at the discretion of the Utilities Manager.

Related Documents

- Refer to the *University of California Berkeley Lab 2006 Long Range Development Plan*
<http://www2.lbl.gov/Community/pdf/env-rev-docs/LRDP-final/LBNL-2006-LRDP-Final-EIR.pdf>
- Refer to *East Canyon Sanitary Sewer System Study Report for the Lawrence Berkeley National Laboratory*, Winzler & Kelly Consulting Engineers, August 2005
- Refer to *Strawberry Canyon Sanitary Sewer Study for the Lawrence Berkeley National Laboratory*, G.T. Kuntz Consulting Engineer, October 2008
- Refer to *EPA Onsite Wastewater Treatment Systems Manual* (Latest Revision)
http://water.epa.gov/aboutow/owm/upload/2004_07_07_septics_septic_2002_osdm_all.pdf

Related Performance Indicator

- System Evaluation and Capacity Assurance



Element viii. System Evaluation and Capacity Assurance Plan

viii-b. Establish appropriate design criteria

Requirement: Where design criteria do not exist or are deficient, undertake the evaluation identified in (a) above to establish appropriate design criteria.

Discussion

Sanitary Sewer Collection System Hydraulic Analysis Criteria

LBNL Facilities Division employs the following basic design criteria when performing hydraulic analysis of the sanitary sewer collection system:

- Existing ADWF and PDWF rates determined by analysis of flow monitoring data from Hearst and Strawberry monitoring stations.
- Future sewage flow determined using *EPA Onsite Wastewater Treatment Systems Manual* for new or modified facilities.
- Hydraulic capacity determined using Manning's Equation with appropriate "n" values for various pipe material types.
- Surcharging of gravity sewer pipelines under PWWF typically not permitted.
- Maximum total design I/I rate is equal to PDWF, or 5-year 24-hour I/I rate if known
- $PWWF = PDWF + I/I$

If a potential hydraulic deficiency is identified through the process of comparing estimated PWWF rates to maximum hydraulic capacities of specific gravity sewer main assets (as described in SSMP section viii-a), a more detailed analysis may be conducted to refine the results of the analysis. Depending on the extent of the potential deficiency identified using the Asset Database, the following additional analysis may be conducted:

- Determine in finer detail total ADWF, PDWF, and PWWF in specific gravity sewer assets due to tributary facilities according to one of the following methods:
 - Calculations of ADWF and PDWF for each tributary facility based on the *EPA Onsite Wastewater Treatment Systems Manual*.
 - Calculations of ADWF and PDWF for each tributary facility based on water use records.
 - Additional flow monitoring at area of concern.
- Analyze hydraulic capacity of specific assets using updated ADWF, PDWF, and PWWF using one or both of the following methods:
 - Hand calculations or spreadsheets using Manning's Equation (similar to analysis conducted in *Strawberry Canyon Sewer Study*).
 - Static / dynamic analysis using computer hydraulic modeling software.

Element viii. System Evaluation and Capacity Assurance Plan

Selection of the appropriate method for determining the PWWF experienced by a specific gravity sewer asset will be made at the discretion of the Utilities Manager or consultant. A hydraulic deficiency is defined as surcharging within a gravity sewer asset, where the full flow capacity (open-channel) is exceeded at PWWF. Due to the relatively shallow burial depth of most sewer lines within LBNL sanitary sewer collection system, surcharging is not typically permitted in design or within a hydraulic analysis. Typically, hand calculations or spreadsheet analysis are sufficient to determine if surcharging will occur, which if confirmed, will be addressed through an appropriate system improvement project. However, static or dynamic computer hydraulic modeling software may be employed to demonstrate through a sensitivity analysis the relative risk of an SSO that minor levels of surcharging present to support either the need for an improvement, or justify that no improvement is needed due to a low risk.

I/I Monitoring

LBNL conducts an analysis of flow monitoring data collected at the Strawberry and Hearst monitoring stations to determine system I/I rates. LBNL monitors I/I to ensure that the hydraulic capacity of the sanitary sewer collection system is not exceeded and to determine if I/I reduction projects should be initiated. Quantifying groundwater infiltration and inflow (GWI/I) and rain-dependent infiltration and inflow (RDI/I) is accomplished as described below:

- I. Groundwater infiltration is typically at its peak towards the end of the winter season in the months of March and April when groundwater tables and soil saturation are high. Average daily flow for days in these months without rainfall is compared to average daily flow for days in the months of August and September, when groundwater tables are typically lowest and soil saturation is low. The difference between the average daily flow for rainless days in March and April and the average daily flow in August and September represents the estimated average GWI/I rate for each system.
- II. 24-hour rainfall totals are collected for various rainfall events throughout the winter. Data may be collected from various sources such as the National Oceanic and Atmospheric Administration website (noaa.gov). The estimated total daily I/I at the monitoring station for each day where rainfall is recorded is calculated as the total daily flow minus the average day flow in the dry months of August and September. The estimated RDI/I for each day with rainfall is calculated as the total I/I minus the average GWI/I rate calculated as described above.
- III. The RDI/I plotted for each day is included in the analysis versus the 24-hour rainfall depth. A best fit curve is then applied to this data. The system response in terms of total RDI/I versus the return period of the 24-hour rainfall event can then be quantified.

Historically, LBNL has designed the sewer collection system for a peak I/I rate equivalent to the PDWF. The analysis described above is used to determine the total peak I/I rate corresponding to the 5-year 24-hour return period rainfall event, which is then compared to the PDWF at the monitoring station. If the 5-year 24-hour I/I is found to be in excess of the PDWF, LBNL Facilities Division may conduct an investigation to determine sources of excess I/I, as described in SSMP section viii-c.



Element viii. System Evaluation and Capacity Assurance Plan

Related Documents

- Refer to *East Canyon Sanitary Sewer System Study Report for the Lawrence Berkeley National Laboratory*, Winzler & Kelly Consulting Engineers, August 2005
- Refer to *Strawberry Canyon Sanitary Sewer Study for the Lawrence Berkeley National Laboratory*, G.T. Kuntz Consulting Engineer, October 2008
- Refer to *EPA Onsite Wastewater Treatment Systems Manual* (Latest Revision)
http://water.epa.gov/aboutow/owm/upload/2004_07_07_septics_septic_2002_osdm_all.pdf
- Refer to *East Canyon Sanitary Sewer System Study Report for the Lawrence Berkeley National Laboratory*, Winzler & Kelly Consulting Engineers, August 2005

Related Performance Indicator

- System Evaluation and Capacity Assurance



Element viii. System Evaluation and Capacity Assurance Plan

viii-c. Capacity Enhancement Measures: Steps needed to establish short and long-term CIP for identified hydraulic deficiencies

Requirement: Define the steps needed to establish a short and long-term CIP to address identified hydraulic deficiencies, including prioritization, alternatives analysis, and schedules. The CIP may include increases in pipe size, I/I reduction programs, increases and redundancy in pumping capacity, and storage facilities. The CIP shall include an implementation schedule and shall identify sources of funding.

Discussion

I/I Source Identification

CCTV inspection results can be used to identify I/I sources within LBNL sanitary sewer collection system, including sources of system infiltration or previously unknown drainage connections. Significant I/I sources are documented using the AutoCAD Master Utility Map notes layer, or the sewer Asset Database. Actions necessary to stop I/I at identified sources are completed based on the severity of I/I and the hydraulic capacity of the downstream system. Other methods of I/I source identification may include smoke testing, dye testing, or additional targeted flow monitoring.

The last LBNL sanitary sewer collection system I/I source identification project was conducted in the early 1990's and included CCTV inspection and dye testing. The outcome of the investigation prompted the removal of several stormwater drainage connections and resulted in several sanitary sewer collection system manholes being sealed by maintenance personnel to reduce the overall system I/I rate.

Capital Improvement Program for Sanitary Sewer Collection System Hydraulic Deficiencies

Capital improvement projects associated with sanitary sewer collection system assets that cannot convey estimated existing PWWF flow are prioritized within the Asset Database in comparison to other identified capital improvement projects required to repair assets in poor physical condition based on the results of CCTV inspections. The following priorities are assigned to capacity-related capital improvement projects for existing hydraulic deficiencies:

- Priority 1: Asset cannot convey PDWF + 3-year 24-hour I/I.
- Priority 2: Asset cannot convey PDWF + 5-year 24-hour I/I or 2 x PDWF.
- Priority 3: Asset maximum hydraulic capacity only marginally greater than PDWF + 5-year 24-hour I/I or 2 x PDWF.
- Priority 4: Other low priority I/I reduction measures or capacity enhancement measures not needed to provide necessary design hydraulic capacity.

Element viii. System Evaluation and Capacity Assurance Plan

The pipe bursting project for the Centennial Drive sewer main from the Strawberry monitoring station to LBNL SSMH 14S18E identified by G.T. Kunst within the *Strawberry Canyon Sanitary Sewer Study* is a project that would be under the administration of UC Berkeley if completed in the future.

Upon identifying a hydraulic deficiency within the sanitary sewer collection system, an improvement method alternatives analysis is conducted either internally within the Facilities Division or by consulting engineers. Alternatives to consider typically include:

- I/I reduction activities:
 - In certain cases, it may be possible to initiate I/I source identification and reduction activities to reduce PWWF to accommodate future capacity demands. The feasibility of cost effectively identifying and removing enough I/I to preclude the need for capacity improvement measures such as pipe upsizing or parallel construction will be evaluated on a case-specific basis.
- Pipe upsizing:
 - In cases where I/I reduction activities will not economically or sufficiently accommodate existing capacity demands, upsizing assets within the sanitary sewer collection system may be the only viable option. The asset's current condition may be a factor in determining if LBNL should upsize or conduct parallel construction activities. Depending on the physical surroundings, open-cut construction or trenchless construction (i.e. pipe bursting) will be selected.
- Parallel construction or diversion:
 - In cases where I/I reduction activities will not economically or sufficiently accommodate existing capacity demands, constructing a new pipeline in parallel to a pipeline that has insufficient hydraulic capacity may be more cost effective and less disruptive than open-cut replacement or pipe bursting of the existing pipe. Additionally, options for diverting flow from one area of the system to another may also be viable.

Funding for Capacity-Related Capital Improvement Projects and I/I Reduction Activities

Small scale projects such as I/I source identification or reduction activities may be funded within the annual utility operating budget. Other capacity-related capital improvement projects are integrated into the sewer capital improvement plan using the prioritization process described in SSMP section iv-c, conducted within the sewer Asset Database. The capital improvement plan for the sewer collection system is presented to the COO for approval and funding.

Related Documents

- Refer to *Strawberry Canyon Sanitary Sewer Study for the Lawrence Berkeley National Laboratory*, G.T. Kuntz Consulting Engineer, October 2008



Element viii. System Evaluation and Capacity Assurance Plan

Related Performance Indicator

- System Evaluation and Capacity Assurance



Element viii. System Evaluation and Capacity Assurance Plan

viii-d. Schedule: Develop a schedule of completion dates for CIP

Requirement: The Enrollee shall develop a schedule of completion dates for all portions of the capital improvement program developed in (a)-(c) above. This schedule shall be reviewed and updated consistent with the SSMP review and update requirements as described in Section D. 14.

Discussion

Scheduling of Near-Term Capacity Related Capital Improvement Projects

Capacity-related capital improvement projects required to be completed within the next 5 years due to hydraulic deficiencies under existing PWWF are scheduled for completion based on the prioritization process described in SSMP section viii-c and iv-c.

Scheduling and Funding for Capacity-Related Capital Improvement Projects Required to Support the LRDP

If hydraulic capacity deficiencies are identified with regard to the existing sanitary sewer collection system's ability to convey PWWF due to additional flow contributed by new facilities, expanded facilities, or population increase based on the LRDP, the timing for construction of necessary sanitary sewer collection system improvements is determined according to the construction schedule for the facilities that create the impact to the existing system. The Facilities Division presents the required sanitary sewer collection system improvements, including project descriptions and cost estimates required to support LRDP projects to the COO as part of the overall capital improvement plan for the system. The cost to construct the identified capital improvement projects are typically included in the overall facility construction project cost (for the project creating the impact) to ensure that improvements in the sanitary sewer collection system required to support LBNL campus improvements are constructed prior to operation of the new or improved facilities.

Related Documents

- Refer to the *University of California Berkeley Lab 2006 Long Range Development Plan*
<http://www2.lbl.gov/Community/pdf/env-rev-docs/LRDP-final/LBNL-2006-LRDP-Final-EIR.pdf>

Related Performance Indicator

- System Evaluation and Capacity Assurance





ix Monitoring, Measurement and Program Modifications

SWRCB Requirement:

The Enrollee shall:

- (a) *Maintain relevant **information** that can be used to establish and prioritize appropriate SSMP activities;*
- (b) *Monitor the **implementation** and, where appropriate, measure the effectiveness of each element of the SSMP;*
- (c) *Assess the success of the preventative maintenance program;*
- (d) ***Update** program elements, as appropriate, based on monitoring or performance evaluations; and*
- (e) *Identify and illustrate **SSO trends**, including: frequency, location, and volume.*

Taken from SWRCB GWDR Order No. 2006-0003 adopted May 2, 2006.

Background

This section of the SSMP describes LBNL's current system for monitoring, scoring, and evaluating the effectiveness of SSMP programs executed by LBNL through the use of performance indicators. Performance indicators (PIs) are quantifiable benchmark goals established by LBNL, and are used to define varying levels of service for specific SSMP programs. Comparing the actual performance of LBNL SSMP programs against goals established in the PIs helps to identify programs or activities that may require more resources or changes to program implementation methodology in order to achieve an acceptable level of service. This section fulfills the requirements of the GWDR SSMP mandatory element ix.

Element ix. Monitoring, Measurement and Program Modifications

ix-a. Maintain relevant information to prioritize SSMP activities

Requirement: The Enrollee shall maintain relevant information that can be used to establish and prioritize appropriate SSMP activities.

Discussion

LBNL Facilities Division and EHS Division maintain records and documentation of sanitary sewer collection system management, operation, and maintenance activities in various forms for the purpose of SSMP program performance evaluation and SSMP auditing. A summary of the documentation maintained for the SSMP is provided below.

Policy Document Updates

A record of revisions is maintained for all major policy documents, to keep track of changes to LBNL and DOE policies and procedures, as well as changes to regulatory requirements which are addressed by the documents.

Mapping System Updates

As discussed in SSMP section iv-a, the Facilities Division maintains a map revision block for each utility grid map that is used to document map updates resulting from additions or revisions based on observations by LBNL staff or contracted utility surveys.

Sanitary Sewer Collection System Operation and Maintenance Activity Tracking and Documentation

As discussed in SSMP section iv-b, the Facilities Division uses a sewer system Asset Database to document the completion of regular preventative maintenance work such as hydro flushing and CCTV inspection. The Asset Database is also used to document SSOs, blockages, system repairs, or other notable occurrences. The Asset Database can be used to review the maintenance history of any individual asset, and set and track maintenance frequencies. In addition to the Asset Database, the Facilities Division maintains a hard copy file of all invoices and work orders provided by contractors who perform sanitary sewer collection system maintenance activities.

CCTV Inspection Data

The Facilities Division receives standard NASSCO PACP reports from contractors performing condition assessment of the sanitary sewer collection system, as well as digital pictures and videos for each inspection. The Facilities Division enters quick rating information into the Asset Database for the initial prioritization of potential capital improvement projects, and maintains an electronic file structure to store the condition assessment data which is reviewed in detail to determine appropriate asset repair or replacement methods.



Element ix. Monitoring, Measurement and Program Modifications

Sanitary Sewer Collection System Capital Improvement Plan

The Asset Database is used to store a summary of condition assessment results (in the form of NASSCO quick ratings), and is a platform for planning sanitary sewer collection system capital improvement projects. The Asset Database stores priority rankings for identified repair or replacement projects, and is used to identify potential capital improvement project bid packages. The Asset Database is used to generate the 10-year capital improvement plan, which is presented by the Facilities Division to the Chief Operating Officer in the form of Project Funding Requests for approval.

Training

LBNL has a program in place to establish EHS training schedules and document completed training using an online database for all LBNL personnel.

SSO Response

LBNL maintains records of all SSO events in compliance with the requirements of MRP No. 2006-0003-DWQ and SWRCB Order No. WQ 2013-0058-EXEC, which include:

- a. All Certified SSO reports, as submitted through CIWQS
- b. All original recordings for continuous monitoring instrumentation:
 - o Any available records from the Strawberry and Hearst sewer outfall monitoring stations, as well as information available from UC Berkeley Strawberry Creek water quality monitoring stations is obtained and documented in the event of an SSO.
- c. Service call records and complaint logs:
 - o All un-planned work in response to identified sanitary sewer collection system deficiencies is documented in the Asset Database.
- d. SSO calls
- e. SSO records
- f. Steps that have been and will be taken to prevent the SSO from recurring and a schedule to implement those steps
- g. Work Orders, work completed, and any other maintenance records from the previous 5 years which are associated with responses and investigations of system problems related to SSOs:
 - o Documented within the Asset Database
- h. A list and description of complaints from the previous 5 years:
 - o Documented within the Asset Database
- i. Documentation of performance and implementation measures for the previous 5 years
 - o Documented through the PI tracking process

Element ix. Monitoring, Measurement and Program Modifications

FOG Control Program

The Facilities Division tracks and maintains records of maintenance activities for LBNL cafeteria grease interceptor by subcontractors (in the form of invoices and work orders) to ensure that excessive amounts of FOG are not discharged to LBNL sanitary sewer collection system. Additionally, the results of regular inspections of the food preparation facility by cafeteria management to ensure the implementation of FOG disposal BMPs are documented using inspection checklists, and are kept by the Facilities Division.

Sanitary Sewer Collection System Capacity Assessments

The results of sanitary sewer collection system capacity assessments are documented within the analysis and technical reports produced either internally by Facilities Division staff or engineering contractors.

Performance Evaluations and SSMP Audits

The results of performance indicator tracking are published in official SSMP audit documents, which are made available and maintained for a minimum of 5 years.

Related Documents

- None

Related Performance Indicator

- All



Element ix. Monitoring, Measurement and Program Modifications

ix-b. Monitor and measure effectiveness of SSMP elements

Requirement: The Enrollee shall monitor the implementation and, where appropriate, measure the effectiveness of each element of the SSMP.

Discussion

LBNL Facilities Division and EHS Division are responsible for assessing the success of sanitary sewer collection system management, operation, and maintenance activities, and refining those activities if they are not successful in minimizing the occurrence of SSOs.

LBNL Performance Evaluation Process and Procedures

Clause H.14 of *Contract 31* requires that LBNL implement a “performance-based management approach which will include the use of objective performance goals and indicators, agreed to in advance of each evaluation period, as standards against which LBNL’s overall performance of the scientific and technical mission obligations under this contract will be assessed”. LBNL already has in place several documents that describe how specific performance measures and goals are established and how performance against the measures and goals is assessed. The major documents governing the process of performance evaluation and auditing include the following:

- *Performance Evaluation and Measurement Plan (PEMP)*
- *EHS Self-Assessment Program*
- *EHS Division Self-Assessment Manual*

Performance Evaluation and Measurement Plan

The *Performance Evaluation and Measurement Plan (PEMP)* is the key metric by which the effectiveness of LBNL’s “performance-based management approach” is evaluated. The *PEMP* measures performance according to 8 core goals which have been established by the DOE Office of Sciences, which are applied to all other DOE national laboratories as well. Goals 1-3 relate to the accomplishment of overall research and technological missions, and performance measures specific to those goals are established by DOE. Core goals 4-8 relate to management and operation of LBNL facilities in support of goals 1-3, and performance measures specific to those goals are established cooperatively by UC, DOE, and LBNL functional managers. Proper execution of the SSMP could be related to goals 5 and 7, as stated below:

- Goal 5: Sustain excellence and enhance effectiveness of integrated safety, health, and environmental protection. (This goal evaluates EH&S procedures)



Element ix. Monitoring, Measurement and Program Modifications

- Goal 7: Sustain excellence in operating, maintaining, and renewing the facility and infrastructure portfolio to meet Laboratory needs.
(This goal evaluates Facility Management Procedures)

Integration of Performance Indicator Tracking for the SSMP

The requirement to monitor the implementation and measure the effectiveness of each element of the SSMP will be integrated into the existing LBNL performance-based management approach described above.

Compliance with the GWDRs (SWRCB Order No. 2006-0003) is tied closely to the Wastewater Discharge Program, since the primary objective of the SSMP is to minimize the occurrence of prohibited SSOs. Therefore, the tracking of SSMP performance indicators will be accomplished in conjunction with the Wastewater Discharge Program assessment conducted. Performance indicator tracking sheets, as discussed in SSMP section ix-c, have been developed which include quantifiable metrics by which the performance of SSMP programs can be measured, similar to the methodology used in the *PEMP*.

Related Documents

- Refer to LBNL Performance Evaluation and Measurement Plan Self-Assessment Report
<http://www.lbl.gov/DIR/OIA/OCA/>
- Refer to LBNL Corrective Action Tracking System (CATS) Primer / Database
<http://eetd.lbl.gov/ehs/docs/cats-primer-eetd.pdf>

Related Performance Indicator

- All



Element ix. Monitoring, Measurement and Program Modifications

ix-c. Assess success of preventative maintenance program

Requirement: The Enrollee shall assess the success of the preventative maintenance program.

Discussion

Specific performance indicators will be developed each year for key SSMP programs and elements for which ongoing activities are occurring. Performance indicator objectives and the metrics used to evaluate performance against those objectives may be changed from year to year by the Utilities Manager and Environmental Manager. The performance indicators established for SSMP implementation are listed below:

Table ix-1: SSMP Performance Indicators

SSMP Element	Responsible Person	Performance Indicator
iv – Mapping	Utilities Manager	Entry of critical asset data in the Asset Database. Completion of AutoCAD map quality assurance.
iv- O&M Program	Utilities Manager	Establishment of asset-specific maintenance frequencies.
		Maintaining a record of all O&M activities and their related costs.
		Percentage of sewer pipe assets with overdue regular maintenance.
iv– Capital Improvement Program	Utilities Manager	Percentage of the system that will be CCTV surveyed by the end of the 10 year cycle at the current rate.
		Average overall NASSCO quick rating for the sewer collection system.
		Prioritization and planning for future capital improvement projects.

Element ix. Monitoring, Measurement and Program Modifications

Table ix-1: SSMP Performance Indicators (Continued)

SSMP Element	Responsible Person	Performance Indicator
vi – SSO Prevention	SSO Manager	Number of SSOs.
vii – FOG Control Program	Utilities Manager	Completion of monthly grease interceptor maintenance.
viii – System Evaluation and Capacity Assurance	Utilities Manager	Pipeline invert/slope data and hydraulic capacity calculations in Asset Database updated.
		Determination of existing peak flow in key sewer main lines.
		Identification of necessary hydraulic capacity improvements.
		Determination of existing GWI/I and RDI/I levels in the system.
MRP	SSO Manager	Completion of unpopulated fields in revised “Collection System Questionnaire”.
		Update of OERP section in SSMP.

Related Documents

- Attachment ix-1: Performance Indicator Tracking Sheets and Evaluation Metrics

Related Performance Indicator

- All

Element ix. Monitoring, Measurement and Program Modifications

ix-d. Update SSMP program elements based on performance evaluations

Requirement: The Enrollee shall update program elements, as appropriate, based on monitoring or performance evaluations.

Discussion

The Facilities Division and EHS Division are responsible for updating the SSMP based on the results of program performance evaluations using the PI tracking process. The process for updating the SSMP generally follows the subsequent procedure that is completed as part of the SSMP audit process (refer to SSMP section x):

1. Responsible persons review the performance indicators they have charge over, assess the success of the elements of the SSMP relative to established benchmark or level of service goals (i.e. metrics), and make recommendations to change SSMP elements or the implementation methods for those elements so that the established goals are reached.
2. The Utilities Manager and Sanitary Sewer Overflow Program Manager review the completed PI tracking sheets for the previous two years from each of the responsible persons.
3. The Utilities Manager and Sanitary Sewer Overflow Program Manager assess the recommendations from the PI tracking sheets, comments received from LBNL employees, CATS database entries, and feedback received from other LBNL divisions.
4. The Utilities Manager and Sanitary Sewer Overflow Program Manager draft updates to various elements of the SSMP based on their review of the performance of the SSMP and recommendations received by various parties.
5. The Utilities Manager and Sanitary Sewer Overflow Program Manager will incorporate the updates into the official version of the SSMP and present it before the Chief Operating Officer (if changes are significant enough or have budgetary impacts) to obtain Department of Energy approval for recertification as required by the GWDR, and described in SSMP section x. The SSMP must be re-certified by the Department of Energy at least every 5 years.

Related Documents

- None

Related Performance Indicator

- All



Element ix. Monitoring, Measurement and Program Modifications

ix-e. Identify and illustrate SSO trends

Requirement: The Enrollee shall identify and illustrate SSO trends, including: frequency, location, and volume.

Discussion

The Environmental Manager will investigate SSO trends utilizing SSO event documentation available through the CIWQS website. Any trends will be noted on the PI tracking sheet for SSO Prevention. Strategies for preventing repeat or recurring SSOs are developed during post SSO event review meetings as discussed in SSMP section vi-d.

Related Documents

- None

Related Performance Indicator

- SSO Prevention



x SSMP Program Audits

SWRCB Requirement:

*As part of the SSMP, the Enrollee shall conduct periodic **internal audits**, appropriate to the size of the system and the number of SSOs. At a minimum, these audits must occur **every two years** and a report must be prepared and kept on file. This audit shall focus on evaluating the effectiveness of the SSMP and the Enrollee's compliance with the SSMP requirements identified in this subsection (D.13), including identification of any deficiencies in the SSMP and steps to correct them.*

Taken from SWRCB GWDR Order No. 2006-0003 adopted May 2, 2006.

Background

The internal audit of the SSMP is based on the SSMP element performance evaluations conducted using the performance indicator process described in SSMP section ix. By conducting an internal audit of the SSMP, LBNL can determine if compliance with the GWDRs is being achieved, and the overall goals of the SSMP as defined in SSMP section i are being fulfilled. This section fulfills the requirements of the GWDR SSMP mandatory element x.

Element x. SSMP Program Audits

x. SSMP program audits

Requirement: As part of the SSMP, the Enrollee shall conduct periodic internal audits, appropriate to the size of the system and the number of SSOs. At a minimum the audits must occur every two years and a report must be prepared and kept on file.

Discussion

SSMP Audit Procedure

The Utilities Manager is responsible for scheduling the internal audit of the SSMP. The purpose of the SSMP audit is to evaluate LBNL's effort to meet the requirements of the GWDRs and implement sewer system management, operation, and maintenance programs as stated in the SSMP. LBNL operates a relatively small sanitary sewer collection system, therefore conducting an audit every two years is sufficient.

Evaluation of established performance indicators (PIs), described in SSMP section ix, forms the basis for the audit process. The PIs are used to determine if programs are being implemented as planned. The PI tracking and evaluation process can be used to determine if the necessary resources are in place for successful execution of key programs and activities. The PI tracking results are reviewed by the auditor with input from the Utilities Manager, and Environmental Services Group staff, as described in SSMP section ix-d. The results are intended to be used by the Utilities Manager to guide decision making regarding modifications and updates to SSMP programs that are necessary.

The SSMP internal audit is designed to evaluate the effectiveness of the SSMP and its Elements and to determine the compliance of LBNL with the SSMP requirements. The audit will review and highlight the PI results and document recommended changes to more effectively attain established level of service goals. The body of the internal audit is made up of the PI tracking sheets, which will be completed during the course of the two year audit period by each responsible person. Audits are kept for a minimum of five (5) years.

The auditor also reviews the entire SSMP as part of the audit, and makes any necessary minor text revisions to reflect current activities, updates reference document hyperlinks, and updates applicable implementation schedules for each SSMP element to reflect completed tasks, extended time schedules, or new tasks. The auditor must also review the PI level of service goals annually to determine if changes to grading metrics are warranted, if any goals should be retired based on previous completion, and if new goals should be developed to track additional areas of SSMP program performance or ongoing compliance efforts.



Element x. SSMP Program Audits

SSMP Update and Re-certification Procedure

As the scope and activities of the SSMP evolve over time, the text of the SSMP is modified as needed to reflect those changes. At a minimum, the SSMP is officially updated once every 5 years if changes are not made during consecutive SSMP audit periods. For each major SSMP update, the document is re-certified by the DOE as required by GWDR section D.14.

Related Documents

- Attachment x-1: FY 2010 / 2011 SSMP Audit, Water Works Engineers, September 2011
- Attachment x-2: FY 2012 / 2013 SSMP Audit, Water Works Engineers, September 2013

Related Performance Indicator

- All





xi **Communication Program**

SWRCB Requirement:

*The Enrollee shall **communicate on a regular basis with the public** on the development, implementation, and performance of its SSMP. The communication system shall provide the public the opportunity to provide input to the Enrollee as the program is developed and implemented.*

*The Enrollee shall also create a plan of **communication with systems** that are tributary and/or satellite to the Enrollee's sanitary sewer system.*

Taken from SWRCB GWDR Order No. 2006-0003 adopted May 2, 2006.

Background

This section of the SSMP outlines the elements of LBNL plan of communication with LBNL personnel on the development, implementation, and performance of the SSMP. Additionally, action taken by LBNL to communicate with the entities that manage the sanitary sewer collection systems to which LBNL's system is tributary is discussed. This section fulfills the requirements of the GWDR SSMP mandatory element xi.

Element xi. Communication Program

xi-a. Plan of communication with public

Requirement: The Enrollee shall communicate on a regular basis with the public on the development, implementation, and performance of its SSMP. The communication system shall provide the public the opportunity to provide input to the Enrollee as the program is developed and implemented.

Discussion

Information Available to the General Public

LBNL makes a wide variety of documents available through the internet via LBNL's website. Documents that are made available to the public include (but are not limited to):

- Published LBNL Policy Documents: *ISM, EMS, PEMP*, etc.
- SSMP
- Standard Infrastructure Design Requirements, Specifications, and Details
- Standard Facility Operating Procedures
- Site Environmental Reports

Related Documents

- LBNL SSMP
<http://www2.lbl.gov/ehs/esg/Reports/assets/2011%20SSMP.pdf>
- EHS Site Environmental Reports
<http://www.lbl.gov/ehs/esg/Reports/tableforreports.htm>

Related Performance Indicator

- None



Element xi. Communication Program

xi-b. Plan of communication with satellite collection systems

Requirement: The Enrollee shall also create a plan of communication with systems that are tributary and/or satellite to the Enrollee's sanitary sewer system.

Discussion

LBNL Facilities Division and EHS Division communicate with UC Berkeley and the City of Berkeley regarding the following key issue:

- SSO Event Communication: As required due to the nature and extent of the event.

Related Documents

- None

Related Performance Indicator

- None

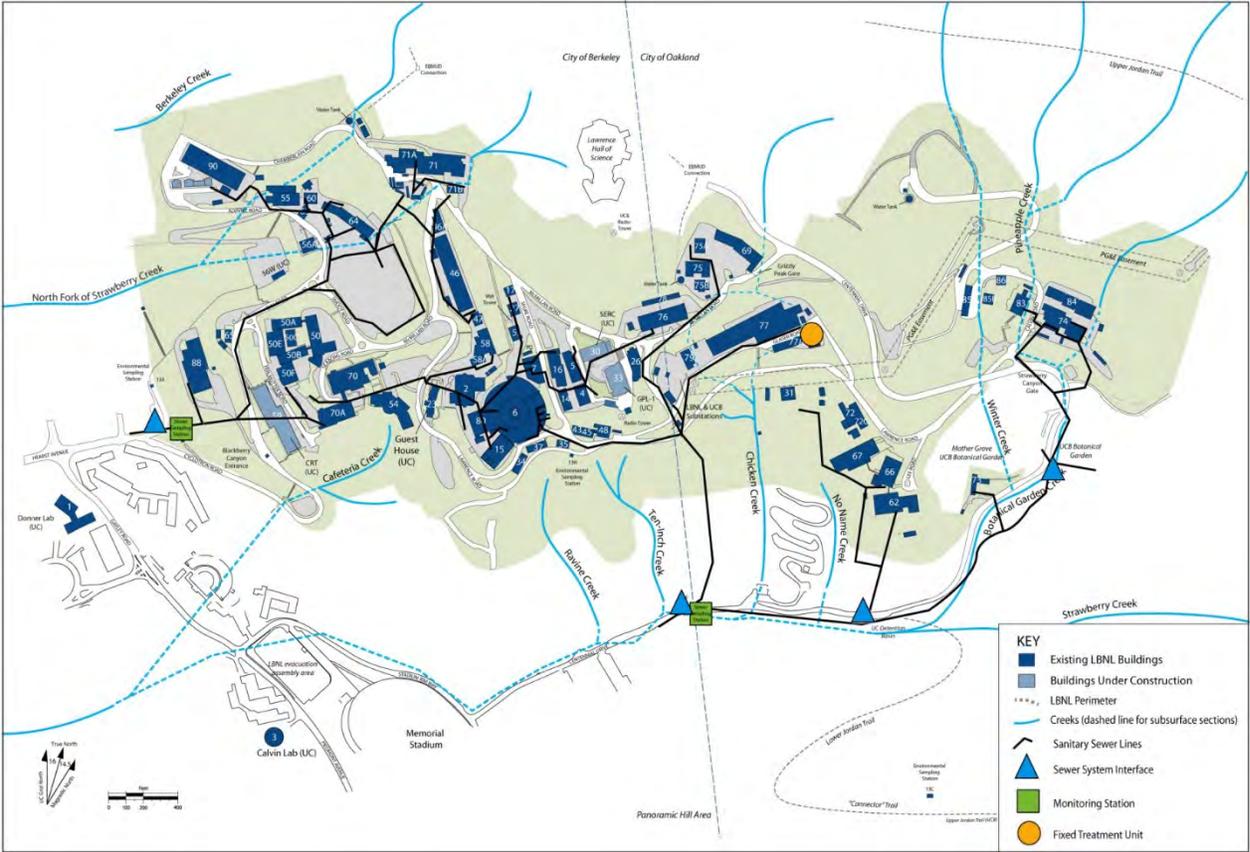


Attachments

- 0 - 1 LBNL Facility Sanitary Sewer Collection System Overview Map
- ii - 1 Organizational Chart for SSMP Implementation Responsibilities
- ii - 2 SSMP Implementation Responsibilities and Contact Information for Key Personnel
- ii - 3 Sanitary Sewer Overflow Off-Hours Notification Procedure
- ii - 4 Reporting Requirements for Sanitary Sewer Overflows
- iv - 1 Sample Manhole Inspection Form
- vi - 1 LBNL Emergency Guide
- vi - 2 LBNL All Hazard Awareness Employee Pocket Guide
- vi - 3 Sewage Spill Notification and Cleanup: Exterior Emergency Procedure
(Facilities Procedure EMRG - 051)
- vi - 4 Notification Procedure for Environmental Releases into Storm Drains or Creeks
(ESG Procedure 203)
- vi - 5 LBNL SSO Emergency Rapid Response Packet: Facilities Division
- vi - 6 LBNL SSO Emergency Rapid Response Packet: EHS Division
- vi - 7 Sewage Spill Cleanup: Interior Emergency Procedure
(Facilities Procedure EMER - 050)
- vi - 8 Interior Sanitary Sewer Clearing Safety Operating Procedure
(Facilities Procedure OPER - 075)
- vi - 9 Sampling Unauthorized Non-Stormwater Discharges (ESG Procedure 260)
- vi - 10 CIWQS Database Entry Form Sample
- ix - 1 Performance Indicator Tracking Sheets and Evaluation Metrics
- x - 1 FY2010/2011 SSMP Audit, Water Works Engineers (September 2011)
- x - 2 FY2012/2013 SSMP Audit, Water Works Engineers (September 2013)

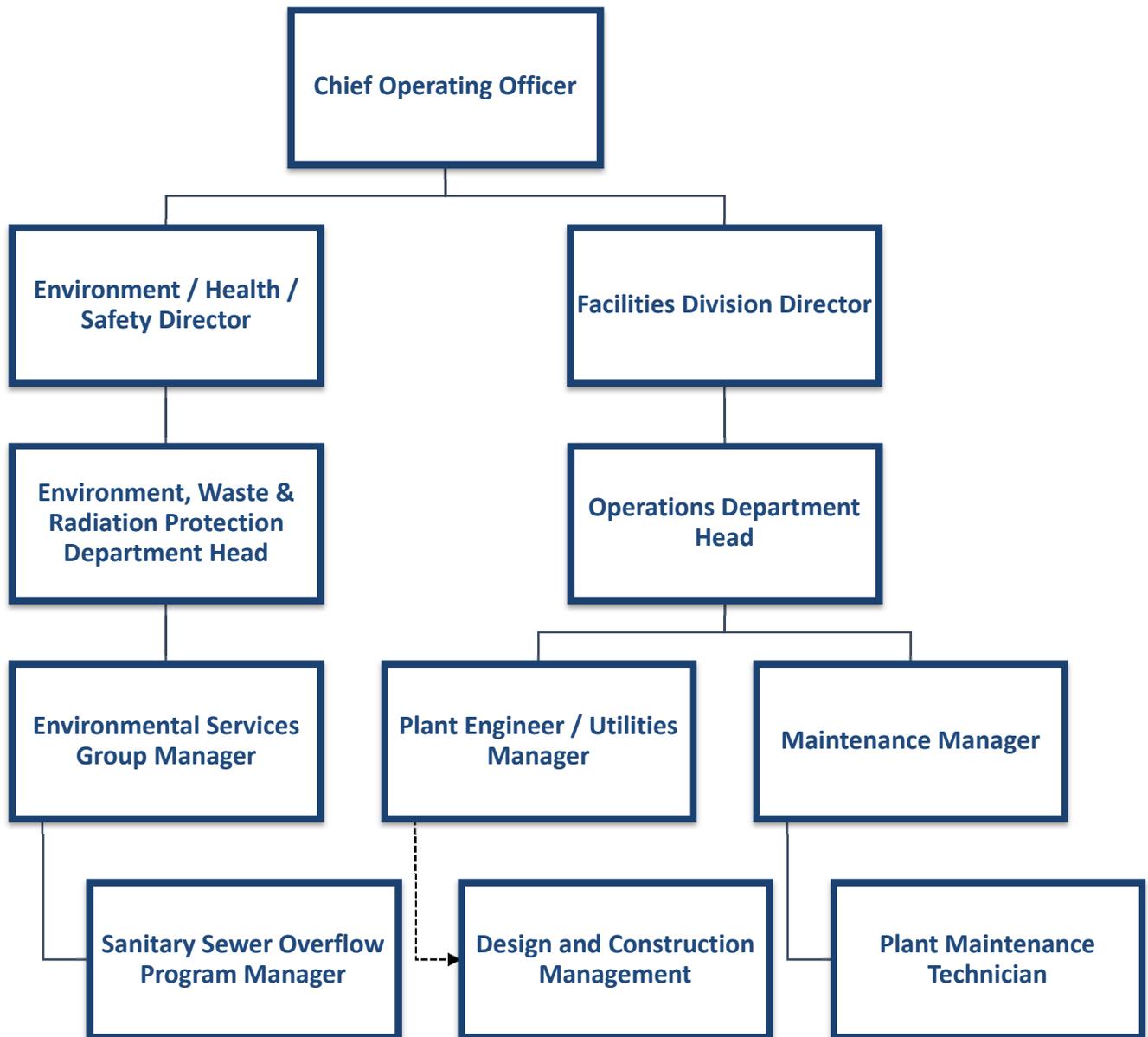
Attachment 0-1:

LBNL Facility Sanitary Sewer
Collection System
Overview Map



Attachment ii-1:

Organizational Chart for SSMP Implementation Responsibilities



Attachment ii-2:

SSMP Implementation Responsibilities and Contact Information for Key Personnel

LBNL SSMP Implementation Responsibility by Division and Contact Information for Key Personnel

SSMP Section	Responsible Division(s)
i – Goals	Facilities
ii – Organization	Facilities / EHS
iii – Legal Authority	EHS
iv – Operation and Maintenance Program	Facilities
v – Design and Performance Provisions	Facilities
vi – Overflow Emergency Response Plan	Facilities
vii – FOG Control Program	Facilities
viii – System Evaluation and Capacity Assurance	Facilities
ix – Monitoring, Measurement and Program Modifications	Facilities / EHS
x – SSMP Audits	Facilities / EHS
xi – Communication Plan	EHS

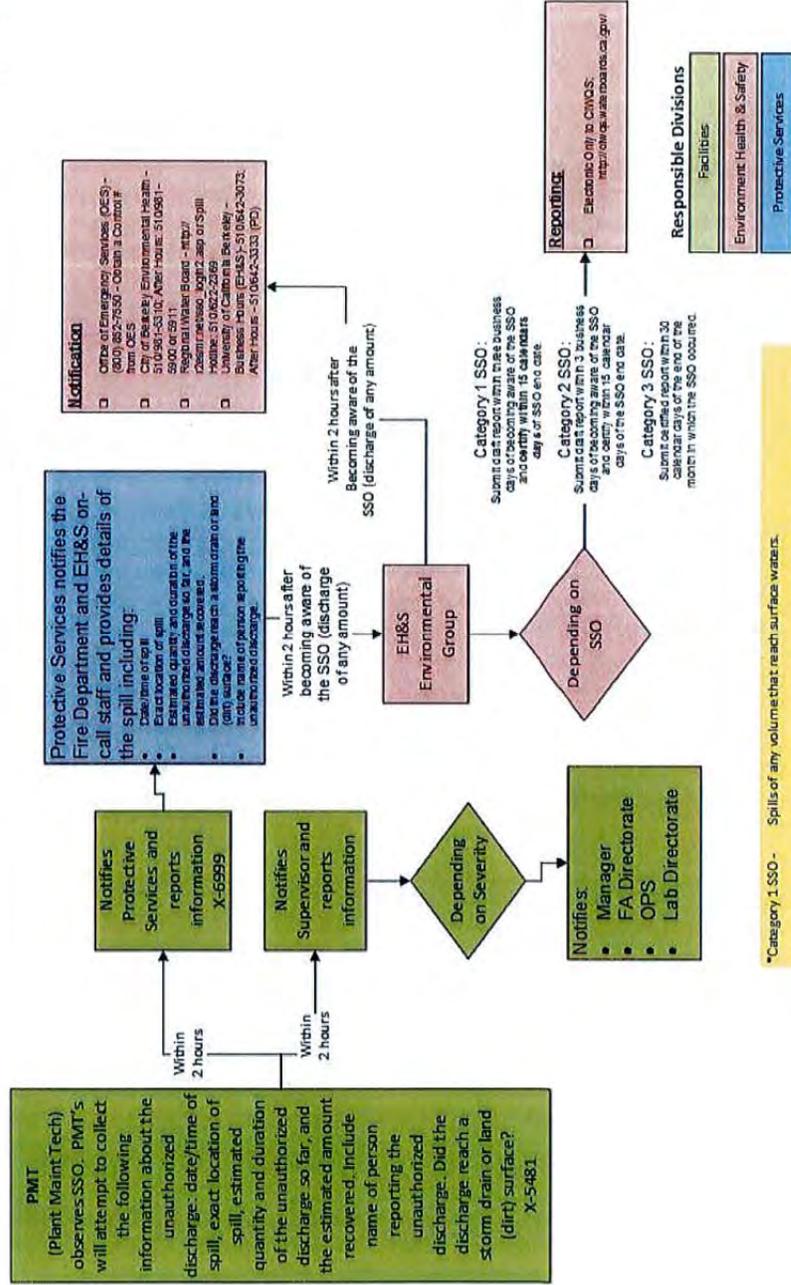
POSITION	NAME	PHONE NUMBER
		OFFICE
FACILITIES DIVISION:		
Utilities Manager	Mike Dong	(510) 486-6458
Utilities Coordinator	Tom Reese	(510) 486-5944
EHS DIVISION:		
Environmental Manager	Ron Pauer	(510) 486-7614
Sanitary Sewer Overflow Program Manager	Ned Borglin	(510) 486-4332

Attachment ii-3:

Sanitary Sewer Overflow Off-Hours Notification Procedure

Appendix A Sanitary Sewer Overflow (SSO) Off Hours Notification Procedure

EMRG-051 Rev. 3



*Category 1 SSO - Spills of any volume that reach surface waters.
 **Category 2 SSO - Spills greater than or equal to 1,000 gallon that do not reach surface waters.
 ***Category 3 SSO - Spills less than 1,000 gallon that do not reach surface waters.

Attachment ii-4:

Reporting Requirements for
Sanitary Sewer Overflows

Communication Type (all are required)	Spill Type	Timeframe Requirements	Agency Being Contacted	Method for Contact
1. Notification	Discharges of 1,000 gallons or more: -to a drainage channel or surface water -to a storm drainpipe that was not fully captured	As soon as possible, but not later than 2 hours after becoming aware of the SSO	Office of Emergency Services	Telephone: (800) 852-7550 (obtain a control number from OES)
2. Reporting	Discharges: -of any volume -to a drainage channel and/or surface water -to a storm drainpipe that was not fully captured	Category 1 SSO: draft report within 3 business days, certify report within 15 calendar days after response activities have been completed	State Water Resources Control Board (CIWQS)	Electronic (only) to CIWQS: http://ciwqs.waterboards.ca.gov/
	Discharges: -that equal or exceed 1,000 gallons -that do not reach a drainage channel, surface water, and/or a storm drainpipe unless entire SSO discharged to the storm drainpipe is fully recovered and disposed of properly	Category 2 SSO: draft report within 3 business days, certify report within 15 calendar days after response activities have been completed		
	All other discharges	Category 3 SSO: submit certified report within 30 calendar days of the end of the month in which the SSO occurred		

Attachment iv-1:

Sample Manhole Inspection
Form



Manhole Inspection Form

Name:	Date:	Time:	Street / Building:
MH Asset ID:	Material:	Rim to Invert [inches]:	MH Cover Diameter:
Downstream Pipe		Upstream Pipe 1	
Clock Position: 6		Clock Position:	
Pipe Asset ID:		Pipe Asset ID:	
Upstream Pipe 2		Upstream Pipe 3	
Clock Position:		Clock Position:	
Pipe Asset ID:		Pipe Asset ID:	
Weather		Infiltration	
<input type="checkbox"/> Very Dry <input type="checkbox"/> Dry <input type="checkbox"/> Damp <input type="checkbox"/> Saturated <input type="checkbox"/> Light Rain <input type="checkbox"/> Heavy Rain <input type="checkbox"/> Snow		<input type="checkbox"/> None <input type="checkbox"/> Stain <input type="checkbox"/> Weeping <input type="checkbox"/> Dripping <input type="checkbox"/> Gushing	
		Component Chimney Cone Wall Bench Channel Pipe Inlet / Outlet	
Debris Deposits		Structural Defects	
<input type="checkbox"/> No <input type="checkbox"/> Yes Describe: _____		<input type="checkbox"/> No <input type="checkbox"/> Yes Describe: _____	
Component Chimney Cone Wall Bench Channel Pipe Inlet / Outlet		Component Chimney Cone Wall Bench Channel Pipe Inlet / Outlet Rating: _____	
Defect Priority Ratings			
1: Re-assess the manhole within 5 years; repair within 20 years			
2: Re-assess the manhole within 5 years; repair within 10 years			
3: Re-assess the manhole within 2 years; repair within 5 years			
4: Re-assess the manhole within 2 years; repair within 3 years			
5: Repair the manhole within 1 year			

Comments: _____

Attachment ix-1:

Performance Indicator Tracking Sheets and Evaluation Metrics

Goal: Sewer System Mapping (FY 2014 / 2015)

Responsible Person (RP): Utilities Manager

Description of Performance Indicator(s) (PIs):

LBNL Facilities Division maintains an AutoCAD map of LBNL utility infrastructure, which includes the sanitary sewer collection system. The AutoCAD map was generated based on a survey that was conducted in order to create an inventory of utility infrastructure assets for the purposes of tracking and asset management of DOE real property. The asset inventory generated from the survey was delivered in a spreadsheet format which identified sewer pipelines by length and diameter on each LBNL grid map block. The GWDRs require that work orders are documented for the sanitary sewer collection system, that areas with maintenance problems are identified, and that more frequent maintenance is scheduled in problem areas. In order to meet these requirements, LBNL implemented a spreadsheet database to track work completed for each sanitary sewer system asset (pipeline or manhole). This database is easily referenced to the AutoCAD mapping. The PIs listed below track efforts to ensure that the AutoCAD mapping and Asset Database are up to date.

PIs and Data Analysis Methods:

- Entry of critical asset data items in Asset Database.*

Discussion & Scoring Criteria: Data columns are established for pipelines and manholes for the following critical information: ID, length, diameter, material, upstream / downstream manhole, upstream / downstream invert, slope, and hydraulic capacity. The percentage of pipes that have been CCTV inspected for which all of the above data is entered into the Asset Database will be determined for all asset entries.

- Completion of AutoCAD map quality assurance.*

Discussion & Scoring Criteria: Completion of mapping accuracy review by CCTV contractor, and updates to the AutoCAD maps and Asset Database based on comments provided by the contractor.

PI	Excellent			Good			Acceptable			Below Goal	
	95-100%	90-95%	85-90%	80-85%	75-80%	70-75%	65-70%	60-65%	55-60%	50-55%	<50%
1											
2	Contractor provided map accuracy comments for all CCTV work completed during the current evaluation period, and all recommended map updates provided to date have been completed in the AutoCAD Map.			N/A			Contractor provided map accuracy comments for all CCTV work completed during the current evaluation period, however map updates have not yet been incorporated in the AutoCAD Map.			Contractor did not provide map accuracy comments for CCTV work completed during the current evaluation period.	

Performance Tracking		
PI	Measured Value	Performance Assessment Comments
1		
2		

Recommendations for Programmatic or SSMP Updates
<p>PI 1 – Collection of missing asset data as part of CCTV inspection work. Recommendation:</p> <p>PI 2 – Completion of mapping accuracy reviews as part of CCTV inspection work. Recommendation:</p>

Signature of Responsible Person: (sign when complete)	Date:

Goal:	Operation and Maintenance Program (FY 2014 / 2015)
Responsible Person (RP):	Utilities Manager
<p><u>Description of Performance Indicator(s) (PIs):</u></p> <p>The basis of the operation and maintenance program for the sanitary sewer collection system is the completion of hydroflushing (i.e. pipeline cleaning), CCTV inspection, and chemical root treatment (or mechanical root cutting if necessary) as proactive measures to assess the condition of the system and prevent the occurrence of sanitary sewer overflows. The Facilities Division uses the sewer system Asset Database to record required maintenance frequencies for each asset for the three main activities described above. A standard maintenance frequency is established for each activity for most assets, but higher frequency maintenance should be scheduled for assets that have historically had problems such as debris accumulation or more rapid root growth. The PIs listed below track the usage of the Asset Database to schedule regular maintenance for each sanitary sewer collection system asset, and the determination of an average annual cost to maintain the system that can be accommodated by existing budgetary constraints.</p> <p><u>PIs and Data Analysis Methods:</u></p> <ol style="list-style-type: none"> <li><i>1. Entry of asset-specific maintenance frequencies for major maintenance activities.</i> <p>Discussion & Scoring Criteria: A maintenance frequency in months should be established for each asset for hydroflushing, CCTV inspection, and root treatment. Not every sewer pipe will require root treatment, only those identified as having root problems through CCTV inspection. If there are no identified root problems for a pipe, a frequency of 0 should be entered. The % of non-null values for all sewer pipe assets in the hydroflushing frequency, CCTV inspection frequency, and root control frequency columns will be determined. It should be determined if maintenance frequencies have been reviewed and updated within the current evaluation period based on the review of CCTV data and any unplanned maintenance events.</p> <ol style="list-style-type: none"> <li><i>2. Determination of the average annual cost to operate and maintain the sanitary sewer collection system.</i> <p>Discussion & Scoring Criteria: An average cost for hydroflushing, CCTV inspection, and root control work per foot of sewer pipe should be recorded that corresponds to the costs incurred by LBNL for past work of a similar type. Grading for this PI is dependent upon the general “success” in keeping a record of how much money is spent on each O&M activity.</p> <ol style="list-style-type: none"> <li><i>3. Percentage of sewer pipe assets with overdue regular maintenance.</i> <p>Discussion & Scoring Criteria: The sewer system Asset Database can be used to identify assets with planned maintenance activities that are overdue using conditional formatting. The percentage of sewer pipe assets with any overdue maintenance at the time this PI is analyzed is determined using the Asset Database.</p>	

PI	Excellent			Good			Acceptable			Below Goal	
1	All assets have maintenance frequencies assigned and were updated this evaluation period.			All assets have maintenance frequencies assigned but were not updated this evaluation period.			Greater than 90%, but less than 100% of all assets have maintenance frequencies assigned but were not updated this evaluation period.			Less than 90% of all assets have maintenance frequencies assigned.	
2	A complete record of all O&M activities and their costs was kept.			N/A			N/A			No record of O&M activities exists, or it is incomplete.	
3	0-5%	5-10%	10-15%	15-20%	20-25%	25-30%	30-35%	35-40%	40-45%	45-50%	>50%

Performance Tracking		
PI	Measured Value	Performance Assessment Comments
1		
2		
3		

Recommendations for Programmatic or SSMP Updates
<p>PI 1 – Entry of asset-specific maintenance frequencies for major maintenance activities. Recommendation:</p>
<p>PI 2 – Success of establishing an average annual sewer system maintenance cost within budget. Recommendation:</p>
<p>PI 2 – Percentage of sewer pipe assets with overdue regular maintenance. Recommendation:</p>

Signature of Responsible Person: (sign when complete)	Date:

Goal:	Capital Improvement Program (FY 2014 / 2015)
Responsible Person (RP):	Utilities Manager
<u>Description of Performance Indicator(s) (PIs):</u>	
<p>The Facilities Division analyzes sanitary sewer collection system condition assessment data collected by CCTV inspection contractors using the Asset Database and the methodology described in the SSMP. The purpose of the analysis is to identify assets that are in poor condition (above defined thresholds) and establish capital improvement projects that are funded by DOE and completed in a timely fashion to mitigate the risk of an SSO due to asset failure, and to control un-planned or emergency maintenance costs. The PIs listed below track the timely completion of condition assessments and analysis of condition assessment data.</p>	
<u>PIs and Data Analysis Methods:</u>	
<p>1. <i>Percentage of the system that will be CCTV surveyed by the end of the 10 year cycle at the current rate.</i></p>	
<p>Discussion & Scoring Criteria: The established frequency at which the entire sanitary sewer collection system should be CCTV inspected is approximately every 10 years to maintain an up-to-date assessment of asset condition. The current percentage of sewer system pipes and manholes that have been expected within the current 10 year inspection cycle to keep pace with an average 10% system inspection completion per year will be calculated using the Asset Database with the formula below:</p>	
$\% \text{ CCTV Completion} = (\% \text{ of system inspected in last 10 years}) / (\text{years into cycle} / 10)$	
<p>2. <i>Average overall NASSCO quick rating for the sanitary sewer collection system.</i></p>	
<p>Discussion & Scoring Criteria: The overall NASSCO quick rating summarizes the results of the condition assessment of an asset. Asset defects are ranked on a 1-5 scale for severity, and the quick rating identifies the number of defects in the two highest severity categories. The average overall NASSCO quick rating for the sanitary sewer collection system provides a snapshot of the condition. The average overall quick rating should be determined for both manholes and pipes, and should not include assets for which no quick rating has been established (i.e. has not been inspected yet). The average pipeline quick rating should constitute 80% of the overall system score, and the average manhole quick rating should constitute 20% of the overall system score.</p>	
<p>3. <i>Prioritization and planning for future capital improvement projects.</i></p>	
<p>Discussion & Scoring Criteria: After NASSCO quick ratings have been entered into the Asset Database, assets in poor condition should be prioritized for repair according to the methodology established in the SSMP, and appropriate methods of repair should be identified. The total number of assets (pipelines and manholes) which have an overall NASSCO quick rating in excess of 4000 is quantified. Then, the percentage of those assets for which all of the following have been completed is determined: CCTV inspection results have been reviewed, appropriate repair methodology has been determined, and approximate cost to complete the repairs has been quantified.</p>	

PI	Excellent			Good			Acceptable			Below Goal	
	95-100%	90-95%	85-90%	80-85%	75-80%	70-75%	65-70%	60-65%	55-60%	50-55%	<50%
1	<1000	1000-1500	1500-2000	2000-2500	2500-3000	3250-3500	3500-3750	3750-4000	4000-4500	4500-5000	> 5000
2	95-100%	90-95%	85-90%	80-85%	75-80%	70-75%	65-70%	60-65%	55-60%	50-55%	<50%
3	95-100%	90-95%	85-90%	80-85%	75-80%	70-75%	65-70%	60-65%	55-60%	50-55%	<50%

Performance Tracking

PI	Measured Value	Performance Assessment Comments
1		
2		
3		

Recommendations for Programmatic or SSMP Updates

PI 1 – Percentage of the system that will be CCTV surveyed by the end of the 10 year cycle at the current rate.

Recommendation:

PI 2 – Average overall NASSCO quick rating for the sewer collection system.

Recommendation:

PI 3 – Prioritization and planning for future capital improvement projects.

Recommendation:

Signature of Responsible Person: (sign when complete)	Date:

Goal:	Sanitary Sewer Overflow Prevention (FY 2014/ 2015)
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Responsible Person (RP):	Environmental Manager
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Description of Performance Indicator (PI):
 LBNL’s success in preventing the occurrence of sanitary sewer overflows is a key metric in gauging the overall success of several SSMP programs. The PI listed below tracks SSOs that have occurred over the past 5 years.

PIs and Data Analysis Methods:

1. *Number of SSOs.*

Discussion & Scoring Criteria: Use the CIWQS website to determine the number of SSOs occurring within the past five years.

PI	Excellent	Good	Acceptable	Below Goal	
1	1	2-3	4	5	>5

Performance Tracking		
PI	Measured Value	Performance Assessment Comments
1		

Recommendations for Programmatic or SSMP Updates
PI 1 – Number of SSOs. Recommendation:

Signature of Responsible Person: (sign when complete)	Date:

Goal: **FOG Control Program
(FY 2014/ 2015)**

Responsible Person (RP): Utilities Manager

Description of Performance Indicator(s) (PIs):
 The Facilities Division is implementing a program to control the discharge of FOG from LBNL cafeteria as a preventative measure to reduce the potential for FOG accumulation in the sanitary sewer collection system and to ensure compliance with the local limit for FOG as required by the EBMUD site-wide sewer discharge permit. The PI listed below tracks the completion of FOG control activities at the cafeteria.

PIs and Data Analysis Methods:

1. *Completion of monthly grease interceptor maintenance.*

Discussion & Scoring Criteria: The Utilities Manager shall review monthly grease interceptor maintenance records to confirm that the grease interceptor is cleaned every month.

PI	Excellent	Good	Acceptable	Below Goal
1	12/12 monthly grease interceptor maintenance completed.	10/12 monthly grease interceptor maintenance completed.	8/12 monthly grease interceptor maintenance completed.	No grease interceptor maintenance completed.

Performance Tracking		
PI	Measured Value	Performance Assessment Comments
1		

Recommendations for Programmatic or SSMP Updates

PI 1 – Completion of monthly grease interceptor maintenance.
 Recommendation:

Signature of Responsible Person: (sign when complete)	Date:

Goal:	System Evaluation and Capacity Assurance (FY 2014/ 2015)
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Responsible Person (RP):	Utilities Manager
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Description of Performance Indicator(s) (PIs):

The Utilities Division uses the sewer Asset Database to evaluate the hydraulic capacity of key portions of the sanitary sewer collection system. The hydraulic capacity of these key portions of the system are compared to existing flow monitoring data to determine the potential for SSOs due to the capacity being exceeded during peak wet weather sewer flows. LBNL analyzes flow monitoring data captured at the Strawberry and Hearst monitoring stations to estimate actual I/I rates experienced by the sewer collection system. The PIs listed below track the completion of tasks necessary to conduct analysis of the hydraulic capacity of the sanitary sewer collection system and plan for any identified improvements necessary to provide adequate capacity.

PIs and Data Analysis Methods:

1. *Pipeline invert / slope data and hydraulic capacity calculations in Asset Database updated.*

Discussion & Scoring Criteria: Additional sewer pipeline invert and slope data is collected in conjunction with CCTV inspections. The data collected by the CCTV contractor must be entered into the Asset Database to ensure the completion and accuracy of hydraulic capacity calculations.

2. *Determination of existing peak flow in key sewer trunk lines.*

Discussion & Scoring Criteria: The existing peak flow for each of the main line sections listed below must be identified using the analysis procedures described in SSMP section viii-a. The peak flow estimate must be updated based on flow monitoring and rainfall data from the current evaluation period.

- Strawberry mains: (1) Strawberry East Main: SSMH 6S51E to SSMH 13S30E (2) Strawberry North Main: SSMH 1N33E to SSMH 12S30E (3) Strawberry Main Trunk: SSMH 12S30E to SSMH 14S18E
- Hearst mains: (1) Hearst North Main: SSMH 10N18E to SSMH 5N12E (2) Hearst East Main: SSMH 2N25E to SSMH 5N12E (3) Hearst Main Trunk: SSMH 5N12E to SSMH 5N9E

3. *Identification of necessary hydraulic capacity improvements.*

Discussion & Scoring Criteria: An engineering analysis must be conducted to determine the improvements necessary to provide adequate hydraulic capacity of deficiencies identified. Additionally, the potential impact to the sewer collection system of any confirmed campus expansion projects must be analyzed with respect to available sewer collection system capacity.

4. *Determination of existing groundwater infiltration and rain dependent infiltration levels in the system.*

Discussion & Scoring Criteria: An estimate of the existing GWI/I and RDI/I must be made by analyzing flow monitoring data as described in SSMP section viii-b from the current evaluation period.

PI	Excellent	Good	Acceptable	Below Goal
1	Pipe invert data collected by CCTV contractor and entered	N/A	Pipe invert data collected by CCTV contractor but not yet	Pipe invert data not collected by CCTV

	into Asset Database.		entered into Asset Database.	contractor.	
2	Sewer main line peak flow data updated in Asset Database based on recent flow monitoring data.	N/A	N/A	Sewer main line peak flow data not updated this evaluation period.	
3	Full Analysis Complete	Analysis Nearly Complete	Analysis Underway	Analysis Scheduled	No Action
4	Full Analysis Complete	Analysis Nearly Complete	Analysis Underway	Analysis Scheduled	No Action

Performance Tracking		
PI	Measured Value	Performance Assessment Comments
1		
2		
3		
4		

Recommendations for Programmatic or SSMP Updates
<p>PI 1 – Pipeline invert / slope data and hydraulic capacity calculations in Asset Database updated. Recommendation:</p>
<p>PI 2 – Determination of existing peak flow in key sewer trunk lines. Recommendation:</p>
<p>PI 3 – Identification of necessary improvements existing and future. Recommendation:</p>
<p>PI 4 – Determination of existing GWI/I and RDI/I levels in the system. Recommendation:</p>

Signature of Responsible Person: (sign when complete)	Date:

Goal: **MRP**
(FY 2014 / 2015)

Responsible Person (RP): Environmental Manager

Description of Performance Indicator(s) (PIs):

The State Water Board has recently concluded that the existing Monitoring and Reporting Program must be amended to remain adequate enough to advance the Sanitary Sewer Overflow Reduction Program objectives, assess compliance, and enforce the requirements of the Sanitary Sewer Systems Waste Discharge Requirements. The amended MRP will become effective on September 9, 2013 concurrent with the routine bimonthly CIWQS maintenance release. The EHS Division is responsible for submitting, signing, and certifying all reports required by the SSS WDRs and the amended MRP order. The PIs listed below track the completion of tasks necessary for LBNL to remain compliant with the SSS WDRs.

PIs and Data Analysis Methods:

1. *Completion of unpopulated fields in revised "Collection System Questionnaire"*
Discussion & Scoring Criteria: LBNL has three (3) months after September 9, 2013 to complete all unpopulated fields in the revised "Collection System Questionnaire" before the CIWQS locks you out from all reporting. After the questionnaire is completed, the system will default back to the annual update requirement and lock you out from all reporting only if the questionnaire is not updated at least annually.

2. *Update of OERP section in SSMP*
Discussion & Scoring Criteria: The Overflow and Emergency Response Plan section of LBNL's SSMP must be updated in accordance with the amended MRP by August 2014, when a board review of the SSMP will take place.

PI	Excellent	Good	Acceptable	Below Goal
1	All unpopulated fields completed by December 9, 2013.	N/A	N/A	All or some of the unpopulated fields not completed by December 9, 2013.
2	OERP section fully updated in SSMP before review.	N/A	N/A	OERP section never, or only partially, updated before review.

Performance Tracking		
PI	Measured Value	Performance Assessment Comments
1		
2		

Recommendations for Programmatic or SSMP Updates
<p>PI 1 – Completion of unpopulated fields in revised “Collection System Questionnaire” Recommendation:</p> <p>PI 2 – Update of OERP section in SSMP Recommendation:</p>

Signature of Responsible Person: (sign when complete)	Date:

Attachment vi-1:

LBNL Emergency Guide



EMERGENCY GUIDE

Emergency status information for employees: **1-800-445-5830** or status.lbl.gov

Emergency Reporting

Life-Threatening Event 24/7

Lab Phone
x7911 or 911

Cell or Off Site
911

Non-Life-Threatening Emergency Reporting

24/7 Incident Reporting

Accidents, Hazardous Materials Spills, Environmental, and Security

Lab Phone
x6999

Cell or Off Site
(510) 486-6999

Urgent Radiation Protection Group Assistance

Lab Phone
x7277

Cell or Off Site
(510) 486-7277

FIRE RESPONSE

Fire alarm bells, bell strobes, or horn strobes will be activated by pulling a fire alarm pull station or by automatic detection of smoke, heat, or sprinkler water flow.

If your fire alarm sounds:

- Evacuate the building immediately and proceed to the designated Assembly Area.
- Before opening any door, check the door and the door's handle temperature with the back of your hand.
- Never open doors that are warm to the touch. If a door handle is warm, then use an alternate route.
- If smoke, heat, or flames block your exit routes, stay in the room with doors closed. Place a wet towel under the door, if available.
- Open a window and wave a brightly colored cloth or flashlight to signal for help.
- Avoid smoke or fumes. If unavoidable, crawl low under smoke.

If there is a fire in your workspace:

- Activate nearest fire alarm pull station and alert others in the immediate area.
- Use a fire extinguisher only if trained, comfortable in the effort, and confident that it is safe to fight the fire.
- Always maintain access to an exit. Do not let fire get between you and the exit.
- Avoid smoke or fumes.
- Close doors behind you as you exit.
- Evacuate and proceed to the designated Assembly Area.

Remember:

- **DO NOT USE ELEVATORS!**
- Follow directions from your Building Emergency Team.
- Do not re-enter the building until it is deemed safe to do so by a person of authority (i.e., professional responder, BET member, or Security officer)

WILDLAND-URBAN FIRES

Diablo-wind driven fires in the Berkeley hills are different from a structure or grass fire.

They are windswept blazes during hot, dry weather conditions. Often, they can't be extinguished until weather conditions change. The East Bay hills have experienced 15 major wildland-urban intermix fires since 1923.

How to Prepare and Respond

- Be especially alert on "Red Flag Days" –warm temperature, low humidity, and windy conditions.
- Listen for and follow instructions given over the Lab's public address system.
- Be prepared to evacuate the Lab on foot. Keep a pair of walking shoes in or close to your work area.
- If an evacuation by vehicle is authorized, offer rides to others.
- Understand how to shelter-in-place if advised to do so.
- Follow instructions from traffic and Security personnel.

Additional Site Instructions:

Location of Assembly Area: _____ Location of exit stairwell: _____

Location of fire extinguisher: _____

Comments: _____



**INSERT BUILDING MAPS HERE WITH
ALARM STATIONS HIGHLIGHTED**

FIRE ALARM PULL STATION ACTIVATION

Pull the nearest fire alarm pull station when you:

- Smell smoke and/or see flames.
- Smell fumes that are making you or others ill or might pose a danger (i.e., natural gas or a strong chemical odor).
- Hear an explosion.
- Believe there is imminent danger to yourself or the building occupants.

Remember:

- Know the location of fire alarm pull station nearest your workstation.
- When in doubt, PULL IT!
- You are not allowed to be in a building with a fire alarm sounding.
- Once you are evacuated to the Assembly Area, inform a person of authority (i.e., the Incident Commander or BET member) the reason for pulling the alarm.

Additional Site Instructions:

Location of Assembly Area: _____ Location of exit stairwell: _____

Location of fire extinguisher: _____

Comments: _____



Emergency Reporting & Assistance

Serious or Life-Threatening

Lab Phone

x7911 or 911

Cell Phone or Off-site

911

Non-Life-Threatening Emergency Events

Lab Phone

x6999

Cell Phone or Off-site

(510) 486-6999

POWER OUTAGES

During a sudden, unplanned power outage:

- Leave fume hoods on. Back-up power will keep fume hoods running. If fume hoods stop functioning, pull fire alarm pull station and EVACUATE immediately.
- Shut down experiments and machines safely.
- Turn off ALL electrical equipment (except fume hoods) and heat sources that may come back on automatically (printers, copiers, hot plates, autoclaves, toaster ovens, etc.).
- Be aware of information or instructions.

During a power outage warning (outage is pending or possible):

- Do not use elevators.
- When safe to do so, turn off ALL electrical equipment (except fume hoods) to prevent damage when power returns.
- Have a flashlight or battery-powered lantern in your office.
- Stop work and close, cover, or otherwise contain and secure the materials you were using.
- Stop work in fume hoods or biosafety cabinets as soon as possible, and close the sash, even if the hood appears to be working.
- Make sure cabinet doors and flammable storage cabinets are secure.



Emergency Status Information

Phone

1-800-445-5830

Website

status.lbl.gov

SHELTER IN PLACE

Lab employees may be asked to Shelter-in-Place for many reasons. For example:

- Atmospheric release of materials considered dangerous to public health, where evacuation is NOT a viable option.
- Situations where employees would be safer inside rather than outside a building.

Procedures:

LISTEN

The Public Address (or other warning) system will explain the situation and direct employees to appropriate actions.

SHELTER

Go inside the nearest building or office. An inside room (minimum doors and windows) is best.

SHUT

Close all doors, windows and accessible vents. In some situations it may be prudent to lock all doors (i.e., active shooter).

MONITOR

Email, voice mail, the public address system, the Lab's EMERGENCY STATUS number, and EMERGENCY STATUS website.

DO NOT turn off fume hoods if they are in use.



Emergency Reporting & Assistance

Lab Phone

x7911 or 911

Cell Phone or Off-site

911

THREATS

Telephone Bomb Threats

Attempt to keep the caller on the line as long as possible and note:

- Time and date of call; age and gender of caller.
- Caller's message.
- Distinguishing speech characteristics.
- Background noises.
- Phone number if caller ID available.
- Any other conversation or comments.

When practical:

- Call the EMERGENCY phone number.
- Evacuate yourself and others immediately.
- If possible, take personal items such as purses and briefcases with you.

Violent, Hostile or Suspicious Persons:

Take precautions to protect yourself and others. Actions depend on the events and may include evacuating, hiding, or locking doors. Call the EMERGENCY number as soon as possible.

For NON-LIFE-THREATENING workplace violence issues, call Human Relations at (510) 486-6747.

SUSPICIOUS OBJECTS

What to Look For

- Lack of a return address, or a suspicious return address, on an envelope or package.
- Excessive postage.
- Misspelled words.
- Protruding wires.
- Strange odor.
- Oily stains or discoloration on the outer envelope, wrapper, or material.
- Excessive tape or string.

If Object is Suspicious

- DO NOT TOUCH, handle, or move a suspicious object!
- If you are holding the object, set the object down gently.
- Warn others nearby.
- Evacuate the area.
- Immediately call the EMERGENCY phone number.
- If you have touched the object, if possible, wash your hands with warm water and soap for at least one minute to remove possible contaminants.



Emergency Reporting & Assistance

Serious or Life-Threatening

Lab Phone

x7911 or 911

Cell Phone or Off-site

911

Non-Life-Threatening Emergency Events

Lab Phone

x6999

Cell Phone or Off-site

(510) 486-6999

EARTHQUAKES

DROP

Drop to the floor.

COVER

Seek sturdy overhead protection such as a desk, table, work bench, or room corner away from windows.

HOLD

Hold on to the protection you've chosen and be prepared to move with it until the shaking stops.

Evacuation

- Take car keys and small personal items.
- Evacuate immediately following shaking.
- Follow Building Emergency Team instructions.
- Do not attempt to re-enter buildings.

LANDSLIDES

Response:

- If you suspect imminent danger, evacuate immediately.
- Listen for unusual sounds that might indicate moving debris, such as trees cracking or boulders knocking together.
- If you are near a stream or channel, be alert for any sudden increase or decrease in water flow and notice whether the water changes from clear to muddy. Such changes may mean that debris flow is moving upstream so be prepared to respond quickly.
- Be especially alert when driving— watch for collapsed pavement, mud, fallen rocks, and other indications of possible debris flow.

After a landslide:

- Stay away from the slide area. There may be danger of additional slides.
- Check for injured and trapped persons near the slide, without entering the direct slide area. Direct rescuers to their locations.
- Listen to local radio or television stations for the latest emergency information.
- Note and report broken utility lines to appropriate authorities.
- Stay away from downed power lines.



Emergency Reporting & Assistance

Serious or Life-Threatening

Lab Phone

x7911 or 911

Cell Phone or Off-site

911

Non-Life-Threatening
Illness or Injury Events

**Health Services / Building 26
(510) 486-6266**

PERSONAL INJURY

Reporting and Assistance

For EMERGENCY response to a serious or life-threatening injury or illness, call the EMERGENCY phone number.

For treatment of NON-LIFE-THREATENING injury, illness, or exposure (e.g., small wounds, sprains or strains):

- Between 7:30 AM and 3:30 PM on regular business days, report to Health Services.
- An after hours first aid box is located outside the entrance to B26 and is accessible with your LBNL badge. If the injury is severe, call your personal physician or proceed to the nearest clinic or hospital emergency room. Report all after hours injuries to Health Services during the next regular business day.
- If a laser eye injury has occurred, also report incident to the Laser Safety Officer (510) 486-7277.

All Injuries MUST be reported to Health Services.

Injury Response Procedures

Hazardous Material in Eye or on Body

Hazardous materials may include chemical, biological, or other hazardous materials.

- Rescuers should wear appropriate personal protection equipment (e.g., hand, eye, and body protection).
- Remove contaminated clothing.
- Flush affected body areas with water from nearest safety shower/eyewash unit for at least 15 minutes. Laboratory sinks may be used for hand-only exposures.
- Use soap and water for biological material on the body, but not in the eyes. If the eyes are affected, forcibly hold open the eyes to ensure effective flushing.
- Call the EMERGENCY phone number for emergency medical response, if needed.
- Hydrofluoric acid users require a special exposure kit that is available from Health Services.
- Report incident to Health Services.
- Report incident to your supervisor.

Lacerations, Puncture Wounds, Strains, and Sprains

- Report incident to Health Services.
- Report incident to your supervisor.

Trauma Kits

Trauma kits are located around the Lab to assist trained volunteer employees in providing emergency care to others. Locations of these kits are identified with signage. Consult the Building Manager if you have any questions regarding the locations of these kits.

Hazardous Materials Injected Into the Body

Hazardous materials injected into the body may include piercing the skin barrier through events such as punctures, lacerations, abrasions, or bites.

- Rescuers should wear appropriate personal protection equipment (e.g., hand, eye, and body protection).
- Flush affected body areas with water for at least 5 and up to 15 minutes and wash with soap. DO NOT use strong disinfectants such as household bleach on skin.
- Apply pressure with a clean gauze/bandage to control bleeding.
- Call the EMERGENCY phone number for emergency medical response, if needed.
- Report incident to Health Services.
- Report incident to your supervisor.

Electrical Shock, or Laser/Beam Exposure

- Immediately call the EMERGENCY phone number for emergency medical response.
- De-energize or shut off equipment.
- Secure the area and warn others.
- Report incident to supervisor.

Phenol and Phenol Mixture Users

- Obtain a phenol first aid kit from Health Services.



Emergency Reporting & Assistance

Serious or Life-Threatening

Lab Phone

x7911 or 911

Cell Phone or Off-site

911

Non-Life-Threatening Emergency Events

Environmental Releases, Hazardous Conditions,
Traffic Incidents, Near-miss Events, Security Events

Lab Phone

x6999

Cell Phone or Off-site

(510) 486-6999

Health Services / Building 26

(510) 486-6266

EH&S INCIDENT REPORTING

California state law and the Department of Energy require prompt notification of all work-related EH&S incidents/accidents. Report all such events immediately to your supervisor and the EH&S Division.

Call the EMERGENCY number for response to a serious or life-threatening injury or illness.

Once the emergency is over and for all NON-LIFE-THREATENING incidents:

- Report all events immediately to your supervisor.
- Call Health Services for any injuries and illnesses.
- Call the NON-LIFE-THREATENING EMERGENCY number to report the following non-life-threatening events:
 - Environmental releases,
 - Hazardous conditions,
 - Traffic incidents,
 - Near-miss events,
 - Security events.

Stop Work Policy

All Berkeley Lab employees, contractors, and participating affiliates are responsible for stopping work activities that are considered to be an imminent danger.

An "imminent danger" is defined as any condition or behavior that could reasonably be expected to cause death or serious injury, or environmental harm.

Whenever an employee, contractor, or participating affiliate encounters conditions or practices that appear to constitute an imminent danger, such individuals have the authority and responsibility to:

- Alert the affected employee(s) or contractor(s) engaged in the unsafe work creating an imminent-danger condition and request that the work be stopped.
- Call the NON-LIFE-THREATENING EMERGENCY number to report the incident. An EH&S staff member will investigate.
- Notify the immediate supervisor and/or responsible division/department manager.

Note: When in doubt about a safety condition, contact your supervisor. Refer to "Stopping Unsafe Work" in PUB 3000 for more information.

Do you have an Environment, Health or Safety concern?

If you do, please first communicate with your supervisor. You can also:

- Leave anonymous feedback via the EH&S Safety Concerns form (text only).
- Email safetyconcerns@lbl.gov (if you want to attach an image with your safety concern).
- Email the Environmental Management System contact at ems@lbl.gov for environmental concerns.
- Call EH&S Division at (510) 486-5514 (can be anonymous).
- Contact EH&S Division Director or Deputy Director in person at **Building 75B-0101** (can be confidential).
- Contact the Ombuds Service at (510) 642-7823.
- Contact DOE Employee Concerns Program 24-hour hotline at (800) 701-9966.



Emergency Reporting & Assistance

Serious or Life-Threatening

Lab Phone

x7911 or 911

Cell Phone or Off-site

911

Urgent Radiation Protection Group Assistance

(510) 486-7277

RADIOLOGICAL SPILL/CONTAMINATION – use S.W.I.M.S

S

STOP and THINK. Stop working. Stop the spill, if safe to do so.

Assess the situation:

- If there is a medical emergency or danger to life, health, or the environment, call the EMERGENCY phone number.
- Check yourself for any chemical contamination or reactions (wet clothing, skin or respiratory irritation). Take appropriate actions.
- Has it made contact with your skin, personal clothing, or outside an area posted or delineated for contamination control?
- Determine the extent of the spill.

W

Warn others

- Alert people nearby.
- If there is no medical emergency or danger to life, health, or the environment, call the Radiation Protection Group.

I

Isolate the area

- Restrict access.
- Keep doors closed if possible.
- Tape or rope off the area.

M

Monitor yourself carefully and completely

- Monitor hands, face, head, sleeves, front of body, and shoes (top and bottom).
- Minimize your movements.

S

Stay in or near the area until help arrives

- Have person knowledgeable of incident assist emergency personnel.
- Notify your supervisor.

Spill Categorization

Minor Spill of Radiological Material

A minor spill is one that is contained within area posted or delineated for contamination control. Laboratory staff can initiate cleanup prior to contacting the Radiation Protection Group for the area.

Major Spill of Radiological Material

A major spill is one that has made contact with personal clothing/skin or that spreads outside the area posted or delineated for contamination control.

Immediately call the Radiation Protection Group.



Emergency Reporting & Assistance

Serious or Life-Threatening

Lab Phone

x7911 or 911

Cell Phone or Off-site

911

Non-Life-Threatening Emergency Event

Lab Phone

x6999

Cell Phone or Off-site

(510) 486-6999

CHEMICAL SPILL – use S.W.I.M.S

S

STOP and THINK. Stop working. Stop the spill.

Assess the situation:

- How big is the spill?
- Are there any injuries associated with the spill?
- Has it made contact with your skin or personal clothing?
- Can it be safely cleaned? Note: Follow the Spill Cleanup Requirements listed below to make this decision.

W

Warn others

- Call the EMERGENCY number if there is a medical emergency or danger to life, health, or the environment.
- Alert people nearby.

I

Isolate the area

- Restrict access to those involved in the spill cleanup.
- Keep doors closed.

M

Monitor yourself carefully and completely

- Check yourself for any chemical contamination or signs/symptoms of exposure (e.g., wet clothing, skin or respiratory irritation).
- For medical emergencies follow directions under the PERSONAL INJURY tab.

S

STAY in or near the area until help arrives

- Minimize your movements. Avoid spreading contamination to other areas.
- Have a person who is knowledgeable of the incident available to talk to or assist emergency personnel.
- Notify your supervisor.

Chemical spill cleanup requirements

You can clean up a chemical spill if **ALL** of the following requirements are met:

- You are NOT a high school student, or a participant in an internship program.
- There is no potential for release to the environment. Note: Care must be taken to avoid spreading or tracking chemical contamination to other areas.
- There are no personal injuries resulting from the spill.
- You know what the chemical hazards are.
- The cleanup procedures are known and you have the proper spill cleanup materials.
- You have the proper Personal Protective Equipment (PPE) to protect yourself during the cleanup.
- The spill can be cleaned up safely by two people in one hour or less.
- The spill does NOT involve elemental mercury. Special cleanup and monitoring procedures are required for mercury spills. Moreover, mercury contamination is easily tracked to other areas.

If ALL of the above requirements are not met or if you have any doubts about your ability to safely and effectively clean up the spill, then:

- Leave the immediate area.
- Close the door.
- Stay close by and control access. Post the entrance with a warning such as “Spill—Do Not Enter” and call the NON-LIFE-THREATENING EMERGENCY number for assistance.

Other chemical spill cleanup considerations

- Review these guidelines periodically — you must be familiar with them and know what to do before a spill occurs.
- Understand the hazards of the chemicals you use. Consult the Material Safety Data Sheets (use the A-Z index on LBNL's home page).
- Keep spill cleanup kits in your work area. There are different types for acids, bases, and solvents.
- Consult the Chemical Hygiene and Safety Plan (use the A-Z index on LBNL's home page) for selecting and purchasing spill cleanup kits.
- Wear the proper PPE to protect yourself. The minimum includes a lab coat (or coveralls), chemical goggles, closed-toe shoes and chemically resistant gloves rated for the chemical(s) of concern. Consult the Chemical Hygiene and Safety Plan for selecting and using eye/face protection and gloves.
- Ensure waste materials are properly contained and labeled and are placed in an approved Satellite Accumulation Area.
- Inform your supervisor.
- Take Chemical Hygiene and Safety Training — EHS 348 for people who work in laboratories, or EHS 345 for Facilities personnel.



Emergency Reporting & Assistance

Serious or Life-Threatening

Lab Phone

x7911 or 911

Cell Phone or Off-site

911

Non-Life-Threatening Emergency Event

Lab Phone

x6999

Cell Phone or Off-site

(510) 486-6999

BIOLOGICAL INCIDENTS

Worker Exposure, Injury, or Illness

Response, Treatment, and Reporting

- Call the EMERGENCY phone number for immediate medical response to serious or life-threatening injury, illness, or exposure.
- Request assistance from your supervisor.
- Follow the PERSONAL INJURY procedures in this guide.
- Report all occupational injuries, illnesses, and exposures related to biological materials of concern to your supervisor, Health Services at (510) 486-6266, and EH&S Biosafety Officer at (510) 495-2768.

Biological Exposures of Concern

Biological materials of concern related to exposures include materials or animals that may contain agents or properties that have known, potential, or unknown health risks. Examples of materials include all recombinant genetic materials, viable biological microbes in research, or Risk Group 2 or higher agents or materials. Examples of worker exposures to such biological materials of concern include:

- Biological materials in contact with mucous membranes such as eyes, nose, or mouth
- Biological materials in contact with an open area of skin (e.g., cut or abrasion)
- Cuts or punctures with sharp objects that may be contaminated with biological materials
- Exposures to humans or animals in research in a manner that is known to transmit disease
- Exposure to the blood of other people

Biological Spills and Cleanup

You can cleanup a biological spill if:

- You understand the biological and other hazards and cleanup procedures
- Your work authorization and training sufficiently covers the work to be completed
- There is no potential for personal exposure, injury, or environmental damage
- The appropriate spill cleanup materials and equipment are available
- Two people can clean up the spill thoroughly within an hour

Otherwise:

Request assistance from your supervisor or call the EMERGENCY or NON-LIFE-THREATENING EMERGENCY phone numbers.

Spill Cleanup Procedure

Use the procedural guidelines noted below for biological spills outside of a biosafety cabinet. Consult the online Biosafety Manual for spills inside a biosafety cabinet or involving centrifuges, radiation, chemicals, or animals.

1. If you spilled a Risk Group 1 (RG1) material, or a small dilute amount of a RG2 material, remove any contaminated clothing, wash contaminated body areas with soap and water, and proceed to Step 6.
2. If you spilled a significant amount (e.g., 100 ml or more) of a RG2 or higher material, hold your breath, leave the room immediately, and close the door.
3. Warn others not to enter the contaminated area. Get help as needed and call the LBNL EMERGENCY or NON-LIFE-THREATENING EMERGENCY phone numbers (see above). If you leave the area, post a sign warning others to not enter the area.
4. Remove and put contaminated clothing into a container for biohazardous waste disposal or autoclaving, and thoroughly wash hands and face.
5. Wait 30 minutes before re-entering the area to allow dissipation of airborne biological materials (aerosols) created by the spill. Put on personal protective equipment (PPE) before re-entering the room.
6. Put on the following PPE: lab coat or gown, safety glasses, and double gloves. If the risk of the material or contamination is high, wear additional appropriate PPE such as a respirator, jumpsuit with tight-fitting wrists, or shoe covers.
7. Cover the spill with paper towels or other absorbent material to prevent liquid migration and aerosol production.
8. Gently pour or squirt a freshly prepared solution of 10% household bleach or other appropriate disinfectant around the edges and then into the center of the spill area until the towels are soaked with the disinfectant.
9. Let the disinfectant stay in contact with the spilled material for at least 10 minutes, and up to 20 minutes for larger volumes or RG2 materials.
10. Use paper towels to wipe up the spill, working from the edges into the center of the spill. If sharps or sharp fragments such as glass might be in the spill, do not touch the spill materials with gloved hands. In this case, use a dustpan and squeegee or disposable cardboard to scoop up the spill materials and sharps.
11. Clean the spill areas with paper towels soaked with disinfectant, and then with paper towels wetted with water.
12. Dispose of or autoclave contaminated items. Dispose of contaminated items using biohazardous waste containers, biohazard bags, sharps containers, and other means specified in the Medical and Biohazardous Waste Generator's Guide (PUB-3095). Reusable and autoclavable items may be decontaminated using an autoclave bag and pan in an on-site autoclave.
13. Remove and dispose of PPE, or place coats in lab coat laundry bin. Wash hands with soap and water.
14. Report spill, exposure, and injury incidents to your work lead and supervisor. Also report incidents to Health Services and Biosafety Officer when required as noted in the previous and following sections.

Additional Biosafety Incident Reporting

Report the following biosafety-related incidents to line management and the EH&S Biosafety Officer:

- Worker exposure to biological materials of concern or related injuries or illnesses (see above section, Biological Exposures of Concern).
- Release occurring outside of secondary biosafety containment of medical/biohazardous waste, biohazardous materials, recombinant genetic materials, or other regulated biological materials that have not been inactivated.
- Biosafety-related regulatory inspections or findings.

Release outside of secondary containment includes, for example:

- Spill of a material outside of its laboratory facility and outside of its primary and secondary containers.
- Medical/biohazardous waste that has not been decontaminated but is disposed of in a sanitary sewer or in trash outside the laboratory where the work is conducted.
- Environmental release of a viable agent, animal, plant, or pest material that is regulated against release or may cause damage to humans, plants, animals, or the environment.

BIOLOGICAL INCIDENTS



Please verify the most current information at www.lbl.gov/ehs/ep

Attachment vi- 2:

**LBNL All Hazard Awareness
Employee Pocket Guide**

BERKELEY LAB

All Hazard Awareness Employee Pocket Guide

PRODUCED BY

Emergency Services Program



**Lawrence Berkeley
National Laboratory**

For emergencies dial x7911

911 from cell phones

Employee Emergency Response Expectations

Before an emergency:

- Accept personal responsibility for your own safety.
- Prepare your personal/family emergency plan.
- Review your Building Emergency Plan (BEP) or Emergency Response Guide.
- Know the location of all your building's exits and Assembly Areas.
- Know the specific hazards in your area and the response procedures for each hazard.
- Understand how to report an emergency.
- Be familiar with LBNL emergency notification methods.
- Participate in building and site-wide evacuation drills and exercises.
- Find the location of common emergency equipment (e.g. trauma kits, fire alarm pull stations, fire extinguishers, etc.).
- Identify your Building Manager (BM) and Building Emergency Team (BET) members.

During an emergency:

All employees not directly involved in the emergency response are expected to:

- Follow instructions given either over a public address system, radio, or directly by a person of authority (i.e. professional first responder, BET member, or Security officer). BET members can be recognized by their orange vests and hard hats.
- Shelter-in-Place if instructed to do.
- If the fire alarm sounds, evacuate the building immediately by the nearest safe exit.
- If it is safe to do so, take your personal items with you.
- Report to the nearest Assembly Area.

After an emergency:

- Do not reenter the building unless instructed to do so by a person of authority.
- If leaving the Assembly Area, check with the BET member in charge.



FOR EMERGENCY RESPONSE x7911

911 from cell phones

FOR EMERGENCY RESPONSE x7911

911 from cell phones

Do Not Use Elevators

Note: This information is intended to enhance a person's ability to conduct their own evacuation safely. Every person is solely responsible for their own safety and conduct during an actual emergency or emergency drill. These are guidelines to allow a uniform approach to building evacuations at LBNL.

Earthquake Evacuation Guidelines

Fire Evacuation Guidelines

1. If the fire alarm sounds, immediately evacuate the building by the nearest exit.

2. Collect necessary items

If it is safe to do so, gather your personal items quickly. You may not be allowed to reenter your building for some time.

3. Leave by nearest exit

Evacuate the building immediately by the nearest safe exit or as advised by the **Building Emergency Team (BET)** Members.

4. Walk

When evacuating the building, employees should WALK, not run, grasp handrails, remain QUIET and CALM, and follow emergency instructions.

***Note:** If you meet firefighters coming up, stay next to the outside wall of the stairs in single file.*

Earthquake Evacuation Guidelines cont'd

Fire Evacuation Guidelines cont'd

5. Emergency aid

If requested, assist BET members in the performance of their duties.

6. Assembly Areas

Proceed to the designated Assembly Area and check-in with the BET member in charge.

7. Remain at site

Please **REMAIN** at the Assembly Area until released by a person of authority (i.e., professional responder, BET member, or Security officer).

8. Reentry

Do not reenter an evacuated building until instructed to do so by a person of authority.

***Note:** The Building Manager or BET Lead will be providing relevant information and instructions to all evacuees for their respective Assembly Areas.*

Shelter-in-Place

Lab employees may be asked to Shelter-in-Place for many reasons. For example:

- Atmospheric release of materials considered dangerous to public health, where evacuation is NOT a viable option.
- Situations where employees would be safer inside rather than outside a building.



Procedures:

LISTEN: The Public Address (or other warning) system will explain the situation and direct employees to appropriate actions.

SHELTER: Go inside the nearest building or office. An inside room (minimum doors and windows) is best.

SHUT: Close all doors, windows and accessible vents. In some situations it may be prudent to lock all doors (i.e., active shooter).

MONITOR: Email, voice mail, the public address system, the Lab's emergency 800 number (1-800-445-5830), and emergency status website status.lbl.gov.

DO NOT turn off fume hoods if they are in use.

FOR EMERGENCY RESPONSE x7911

911 from cell phones

Earthquake

DROP: Drop to the floor.

COVER: Seek sturdy overhead protection such as a desk, table, work bench, or room corner away from windows.

HOLD: Hold on to the protection you've chosen and be prepared to move with it until the shaking stops.

Evacuation

- Take car keys and small personal items.
- Evacuate immediately following shaking.
- Follow Building Emergency Team instructions.
- Do not attempt to re-enter buildings.



FOR EMERGENCY RESPONSE x7911

911 from cell phones

Seismic Safety at Work

Non-structural Mitigation

Consult with Facilities Division and your Divisional Safety Officer.

- For bookcases and file cabinets over 3 feet tall, fasten to walls or the floor.
- For open shelves above 4 feet, install lips or chains to prevent contents from falling.
- Store heavy items on floors or no higher than 3 feet on shelving.
- Secure computers, printers, and FAX machines to desktops with velcro fasteners (available through eBuy).



- Fasten storage shelves, bins or racks to the floor or wall.



Safety Measures in Lab Spaces

- Store hazardous chemicals or glassware in base cabinets or braced wall cabinets with secure door latches. Install plexiglass lips or use equivalent means to prevent materials from falling off storage shelves.

General Safety Measures

- Evacuation routes must be kept clear, and materials that could block routes must be removed or braced to prevent movement.

FOR EMERGENCY RESPONSE x7911

911 from cell phones

Fire Response

Fire alarm bells, bell strobes, or horn strobes will be activated by pulling a fire alarm pull station or by automatic detection of smoke, heat, or sprinkler water flow.

If your fire alarm sounds:

- Evacuate the building immediately and proceed to the designated Assembly Area.
- Before opening any door, check the door and the door's handle temperature with the back of your hand.
- Never open doors that are warm to the touch. If a door handle is warm, then use an alternate route.
- If smoke, heat, or flames block your exit routes, stay in the room with doors closed. Place a wet towel under the door, if available.
- Open a window and wave a brightly colored cloth or flashlight to signal for help.
- Avoid smoke or fumes. If unavoidable, crawl low under smoke.



FOR EMERGENCY RESPONSE x7911

911 from cell phones

Fire Response *(continued)*

If there is a fire in your workspace:

- Activate nearest fire alarm pull station and alert others in the immediate area.
- Use extinguisher only if trained and comfortable in doing so.
- Always maintain access to an exit. Do not let fire get between you and the exit.
- Avoid smoke or fumes.
- Close doors behind you as you exit.
- Evacuate and proceed to the designated Assembly Area.

Remember:

- **DO NOT USE ELEVATORS!**
- Follow directions from your Building Emergency Team.
- Do not re-enter the building until it is deemed safe to do so by a person of authority (i.e., professional responder, BET member, or Security officer).

FOR EMERGENCY RESPONSE x7911

911 from cell phones

Fire Alarm Pull Station Activation

Pull the nearest fire alarm pull station when you:

- Smell smoke and/or see flames.
- Smell fumes that are making you or others ill or might pose a danger (i.e., natural gas or a strong chemical odor).
- Hear an explosion.
- Believe there is imminent danger to yourself or the building occupants.

Remember:

- Know the location of fire alarm pull station nearest your workstation.
- When in doubt, PULL IT!
- You are not allowed to be in a building with a fire alarm sounding.
- Once you are evacuated to the Assembly Area, inform a person of authority (i.e., the Incident Commander or BET member) the reason for pulling the alarm.



FOR EMERGENCY RESPONSE x7911

911 from cell phones

Urban-Wildland Fires

Diablo-wind driven fires in the Berkeley hills are different from a structure or grass fire.

They are windswept blazes during hot, dry weather conditions. Often, they can't be extinguished until weather conditions change. The East Bay hills have experienced 15 major urban-wildland intermix fires since 1923.

How to Prepare and Respond

- Be especially alert on "Red Flag Days"—warm temperature, low humidity, and windy conditions.
- Listen for and follow instructions given over the Lab's public address system.
- Be prepared to evacuate the Lab on foot. Keep a pair of walking shoes in or close to your work area.
- If an evacuation by vehicle is authorized, offer rides to others.
- Understand how to shelter-in-place if advised to do so.
- Follow instructions from traffic and Security personnel.



FOR EMERGENCY RESPONSE x7911

911 from cell phones

Hazardous Materials Spill or Release

In the event of a hazardous chemical, biological, radiological spill or release, remember — **S. W. I. M. S.**

S **TOP** all work. Observe and think.

W **ARN** others in the area and report the incident.

I **SOLATE** the area and restrict access.

M **ONITOR** yourself. Check skin, clothing and shoes. Observe physiological reactions.

S **TAY** in the immediate area and notify your supervisor.

FOR EMERGENCY RESPONSE x7911

911 from cell phones

Hazardous Materials Spill or Release *(continued)*

- In the event of a life-threatening emergency or injury, immediately call x7911 (from LBNL phones) or 911 (from cell phones).
- Keep appropriate spill clean up kits in your work area. There are different types for acid, bases and solvents.
- Refer to the red/white wall mounted “Emergency Response Guide,” for more information. Some spills can be cleaned up without outside help. Call your Radiation Control Technician or Industrial Hygienist for more information.

For more information:

- **Radiation Protection Group (RPG) Assistance**
(510) 486-7277
- **To learn more about S.W.I.M.S,** go to
<http://www.lbl.gov/ehs/ep/erg/radiation.shtml>



FOR EMERGENCY RESPONSE x7911

911 from cell phones

Personal Injuries

For EMERGENCY response to a serious or life-threatening injury or illness, call x7911 (from LBNL phones) or 911 (from cell phones).

For treatment of NON-EMERGENCY injuries or illnesses, i.e., small lacerations, small wounds, sprains or strains:

- Between 7:30 AM and 3:30 PM on regular business days, report to Health Services in Bldg. 26.
- After hours or on weekends call your personal physician or proceed to the nearest hospital or clinic emergency room. An after hours first aid box is located in front of Bldg. 26 and is accessible with your LBNL badge. Report all after hours injuries to Health Services during the next regular business day.
- If a laser eye injury has occurred, also report incident to the Laser Safety Officer (510) 486-2544.

All Injuries MUST be reported to Health Services at Bldg. 26 or by calling (510) 486-6266.

FOR EMERGENCY RESPONSE x7911

911 from cell phones

Personal Injuries *(continued)*

Trauma Kits

Trauma kits are located around the Lab to assist trained employees in providing emergency care to others. Locations of these kits are identified with signage. If you have any questions regarding the locations of these kits please consult the Building Manager.

Electrical Shock, or Laser/Beam Exposure

- Call **x7911** (from LBNL phones) or **911** (from cell phones) immediately.
- De-energize or shut off equipment.
- Secure the area and warn others.
- Report incident to supervisor.



FOR EMERGENCY RESPONSE x7911

911 from cell phones

Suspicious Objects (i.e., packages, mail, back-pack or briefcase)

What to Look For

- Lack of a return address, or a suspicious return address, on an envelope or package
- Excessive postage
- Misspelled words
- Protruding wires
- Strange odor
- Oily stains or discoloration on the outer envelope, wrapper, or material
- Excessive tape or string



If Object is Suspicious

- **DO NOT TOUCH**, handle, or move a suspicious object!
- If you are holding the object, set the object down gently.
- Warn others nearby
- Evacuate the area
- Immediately call **x7911** (from LBNL phones) or **911** (from cell phones).
- If you have touched the object, if possible, wash your hands with warm water and soap for at least one minute to remove possible contaminants.

FOR EMERGENCY RESPONSE x7911

911 from cell phones

Threats

Telephone Bomb Threats

Attempt to keep the caller on the line as long as possible and note:

- Time and date of call; age and gender of caller.
- Caller's message.
- Distinguishing speech characteristics.
- Background noises.
- Phone number if caller ID available.
- Any other conversation or comments



When practical:

- Call **x7911** (from LBNL phones) **911** (from cell phones).
- Evacuate yourself and others immediately.
- If possible, take personal items such as purses and briefcases with you.

Violent, Hostile or Suspicious Persons:

Take precautions to protect yourself and others. Actions depend on the events and may include evacuating, hiding, or locking doors. Call **x7911** (from LBNL phones) or **911** (from cell phones) as soon as possible.

For non-emergency workplace violence issues, call Human Relations at **(510) 486-6747**.

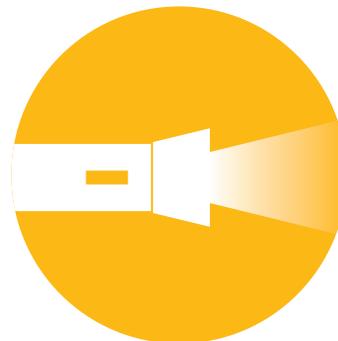
FOR EMERGENCY RESPONSE x7911

911 from cell phones

Power Outages

During a *power outage warning* (outage is pending or possible):

- Do not use elevators.
- When safe to do so, turn off ALL electrical equipment (except fume hoods) to prevent damage when power returns.
- Have a flashlight or battery-powered lantern in your office.
- Stop work and close, cover, or otherwise contain and secure the materials you were using.
- Stop work in fume hoods or biosafety cabinets as soon as possible, and close the sash, even if the hood appears to be working.
- Make sure cabinet doors and flammable storage cabinets are secure.



FOR EMERGENCY RESPONSE x7911

911 from cell phones

Power Outages *(continued)*

During a *sudden, unplanned power outage*:

- Leave fume hoods on. Back-up power will keep fume hoods running. If fume hoods stop functioning, pull fire alarm pull station and EVACUATE immediately.
- Shut down experiments and machines safely.
- Turn off ALL electrical equipment (except fume hoods) and heat sources that may come back on automatically (printers, copiers, hot plates, autoclaves, toaster ovens, etc.).
- Be aware of information or instructions.



Assume that a sudden unplanned power outage has occurred in your building.

Scenario #1:

There *is* evidence of danger (i.e., fire alarm, smell of smoke, fume hoods stop functioning, or the sound of an explosion).

Action: Pull fire alarm pull station if not already activated, and evacuate immediately.

FOR EMERGENCY RESPONSE x7911

911 from cell phones

Scenario #2:

There is *no* evidence of danger (i.e., no fire alarm, smell of smoke, or the sound of an explosion) and you *do not feel* you and others are in danger, and yet the power remains off.

Action:

1. Check the status of the laboratory fume hoods (if applicable). If the laboratory fume hoods are not functioning properly, then pull the fire alarm pull station and evacuate the building immediately.
2. If the building emergency lights come on, as expected, but full power is not restored, then collect your personal belongings, prepare to leave your work space, and await further instructions.
3. If all the lights are off, then use a flash light, cell phone, or ambient light (open doors and window shades), and prepare to leave your work space in an orderly fashion. Be safe and do not rush.

Scenario #3:

Power is fully restored.

Action: Check the operation of the fume hoods (if applicable). If the fume hoods are not functioning properly, then pull the fire alarm pull station and evacuate the building immediately.

FOR EMERGENCY RESPONSE x7911

911 from cell phones

Pandemic Flu

What is a Flu Pandemic?

Pandemic Flu is a world-wide outbreak of flu that occurs when a new form of flu virus infects humans and is easily spread from person-to-person. Because a pandemic flu virus is unique, people have no immunity or resistance to it. The symptoms of pandemic flu are likely to be similar to those of seasonal flu, which are:

- Fever
- Sore throat
- Cough
- Runny or stuffy nose
- Extreme tiredness
- Headache
- Muscle aches and pains
- Stomach problems, such as nausea, vomiting and diarrhea (more common in children)



FOR EMERGENCY RESPONSE x7911

911 from cell phones

Preventative measures:

Influenza is thought to spread mainly person-to-person through coughing or sneezing by infected people. The best way to protect yourself and others is to practice healthy hygiene to keep you well now and during a flu pandemic. These actions include:

- Washing your hands thoroughly and often.
- Covering your cough or sneeze, avoid touching your eyes, nose or mouth.
- Staying home when you are sick to slow the spread of illness.



FOR EMERGENCY RESPONSE x7911

911 from cell phones

Landslides

Landslides

The term landslide describes downhill earth movements that can move slowly and cause damage gradually, or move rapidly, destroying property and taking lives suddenly and unexpectedly. Most landslides are caused by natural forces or events, such as heavy rain, earthquake shaking, and gravity. Areas burned by forest and brush fires are also particularly susceptible to landslides.

Response:

- If you suspect imminent danger, evacuate immediately.
- Listen for unusual sounds that might indicate moving debris, such as trees cracking or boulders knocking together.
- If you are near a stream or channel, be alert for any sudden increase or decrease in water flow and notice whether the water changes from clear to muddy. Such changes may mean that debris flow is moving upstream so be prepared to respond quickly.
- Be especially alert when driving— watch for collapsed pavement, mud, fallen rocks, and other indications of possible debris flow.

After a landslide:

- Stay away from the slide area. There may be danger of additional slides.
- Check for injured and trapped persons near the slide, without entering the direct slide area. Direct rescuers to their locations.
- Listen to local radio or television stations for the latest emergency information.
- Note and report broken utility lines to appropriate authorities.
- Stay away from downed power lines.



FOR EMERGENCY RESPONSE x7911

911 from cell phones

FOR EMERGENCY RESPONSE x7911

911 from cell phones

Personal Preparedness

Emergency Kit

If a major event stranded you here at the lab, you might need the following items. You could keep them under your desk or in the trunk of your car:

- Light source or flashlight with batteries
- Whistle
- Radio (solar/battery/crank operated)
- Notepad/pen/marker
- Water and food
- Prescriptions or personal medications
- Extra pair of glasses, contact lenses, or hearing aids
- Personal care and hygiene items
- Walking shoes, jacket, hat, change of clothes
- Emergency blanket, sleeping bag
- Cash (small bills and coins)
- Duct tape
- Garbage bags
- First aid kit
- Identification papers, contact lists, resources list

Resource Links:

- <http://72hours.org>
- www.redcross.bayarea.org
- www.fema.gov
- <http://www.calema.ca.gov/>
- www.firstvictims.org/resources.html
- www.californiavolunteers.org
- www.cdc.gov
- www.lbl.gov/ehs/ep



FOR EMERGENCY RESPONSE x7911

911 from cell phones

FOR EMERGENCY RESPONSE x7911

911 from cell phones

Non-Emergency Reporting

Non-Life-Threatening Event 24/7

Lab Phone: x6999

Cell Phone: (510) 486-6999

Off Site: (510) 486-6999

Urgent Assist Radiological Lab Event 24/7

Lab Phone: x7277

Cell Phone: (510) 486-7277

Off Site: (510) 486-7277

Security

Blackberry Gate (510) 486-6999

FOR MORE INFORMATION

Emergency Services

Rocky Saunders

(510) 486-7032

RESaunders@lbl.gov

Emergency Status Information for Employees

1-800-445-5830

status.lbl.gov



FOR EMERGENCY RESPONSE x7911

911 from cell phones

Reporting an Incident

Emergency Reporting - Life-Threatening Event 24/7

Lab Phone: **x7911**

Cell Phone: **911** (Be prepared to tell the dispatcher your exact location)

1. Report the following:

- Your name, phone number and location, including building and room.
- The nature and severity of the emergency. For example, gas leak, personnel/personal injury, or spill of hazardous chemicals. In the latter case, give the name of the chemical and how much.
- Other potential dangers, such as the presence of flammable liquids or gases, pressure vessels, exposure of other persons, structure damage, or suspicious object.

2. When appropriate, inform your supervisor or Division Safety Coordinator about the incident.

Supervisor

Name	Phone	Location
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Division Safety Coordinator

Name	Phone	Location
------	-------	----------

Building Manager

Name	Phone	Location
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Attachment vi-3:

Sewage Spill Notification and Cleanup: Exterior Emergency Procedure

(Facilities Procedure EMRG-
051)



LAWRENCE BERKELEY NATIONAL LABORATORY

Facilities Division – LBNL Facilities Division Procedure

Title: Sewage Spill Notification and Cleanup: Exterior Emergency Procedure

Effective Date: 03/10/13

1. Purpose:

This procedure describes the steps for cleaning up an exterior sewage spill at the Lab.

Note: This procedure is intended to be used by a trained, qualified, and experienced Plant Maintenance Technician only.

2. Special Instructions

Follow the process flow found on page three of this document.

3. Work Steps

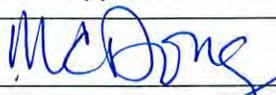
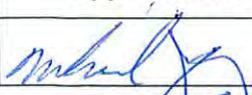
1. Evacuate all people from the affected area.
2. Cordon off the affected area with yellow tape and traffic cones, and post someone to re-route traffic if necessary. (Traffic control assistance can be requested at x6999).
3. Assess the extent of spill and possible damage. Collect the following information: date/time of spill, exact location of spill, estimated quantity and duration of the unauthorized discharge at time of response, estimated amount recovered, the name of the person reporting the unauthorized discharge, and determine if the discharge reached a storm drain or land (dirt) surface.
4. Notify Protective Services of spill (x6999) and provide your name, current location, call back number and the information listed in step 3. (Protective Services personnel will forward incident information to the on-call EH&S staff, the Fire Department and Security.
5. Arrange for a plumber to clear or repair blocked or damaged sewer line. If Facilities plumber is not available, call Roto Rooter for a plumber (483-2324).
6. Contain sewage and keep from spreading.
 - **IF spill is small.** Use absorbent sheets, rolls, or sandbags.
 - **IF spill is major, and tank and pump are available.** Pump sewage into tank.
 - **IF spill is major and tank is not available.** Contain sewage and pump effluent into the nearest working downstream sanitary drain or clean-out.
7. Wash rubber gloves and boots with disinfectant soap and water when done.

4. References

OPER-043, Barricade Use.

Sanitary Sewer Overflow (SSO) Off Hours Notification workflow (attached).

5. Division Approval

Rev.	SME/Title	Approver/Title	Approver/Title	Effective Date
3				03/01/2014

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FA Civil Structural
Engineer

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Manager

Michael Jang
Maintenance Manager

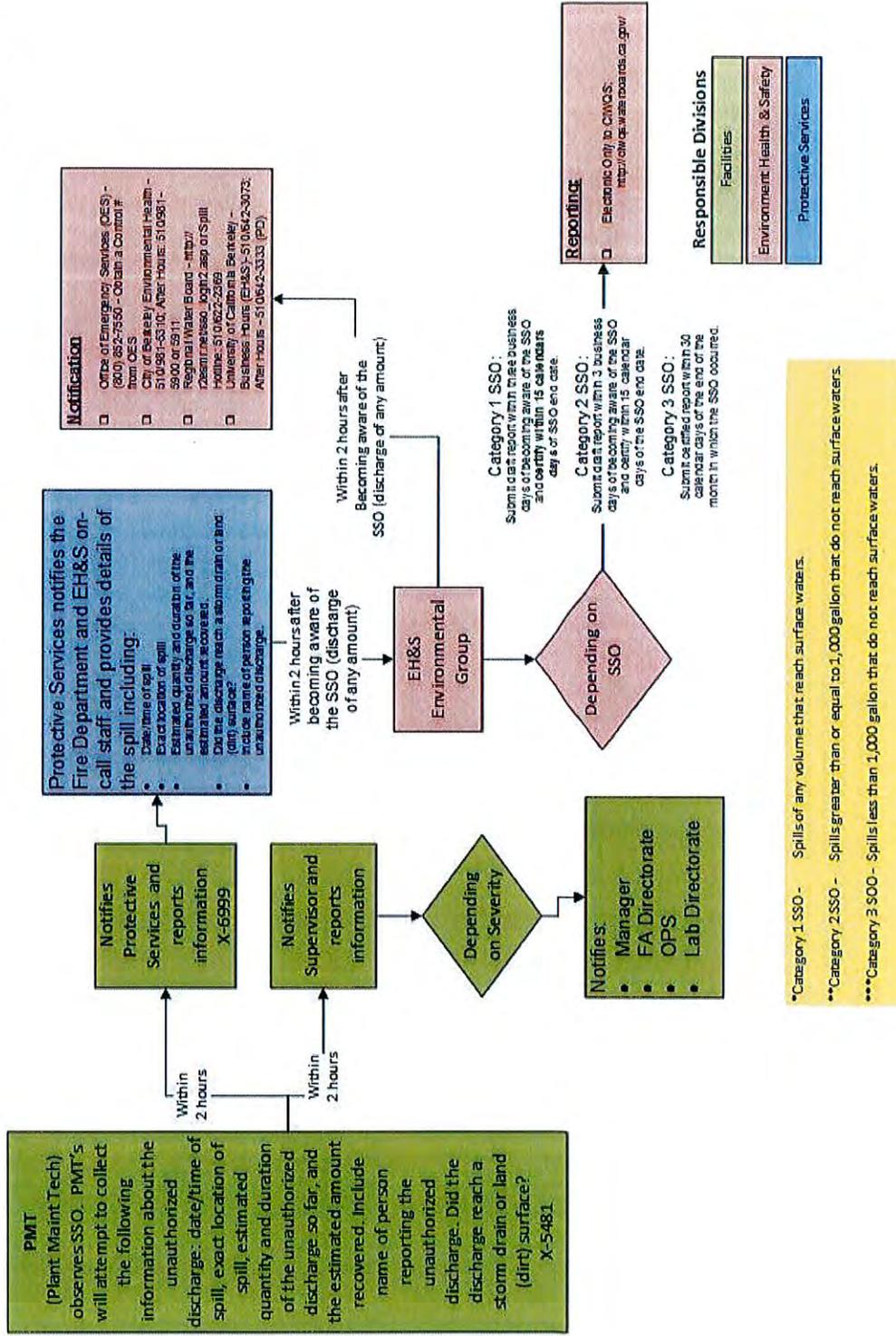
6. Revision History

Rev No.	Rev. Date	Section(s)	Brief Description of Revision	Author
1	5/22/09	All	Administrative updates	Jim Murphy
2	12/20/13	Appendix A	Revision of workflow to incorporate the Protective Services Department, slight changes to the information the PMTs will collect, the addition of the "Category 3" spill, the notifications block is now performed by EH&S, and small editorial changes.	Ned Borclin
3	3/1/14	Section 3 & Appendix A	Administrative edits.	John Braithwaite

Appendix A

Sanitary Sewer Overflow (SSO) Off Hours Notification Procedure

EMRG-051 Rev. 3



Attachment vi-4:

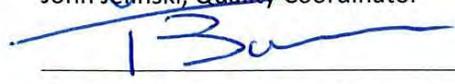
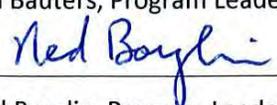
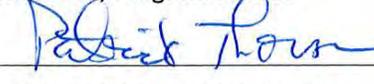
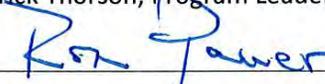
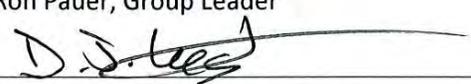
Notification Procedure for Environmental Releases into Storm Drains or Creeks (ESG Procedure 203)



Environmental Services Group (ESG) Notification Procedure for Environmental Releases into Storm Drains or Creeks

ESG Procedure 203
Revision 01 (November 15, 2013)
On the Spot Review (April 15, 2014)

Signature Sheet for Procedure 203 Notification Procedure for Environmental Releases into Storm Drains or Creeks

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**Signature Sheet for Procedure 203 Notification Procedure for
Environmental Releases into Storm Drains or Creeks
(For additional personnel performing work under this procedure)**

Reviewed By: Brendan Mulholland Date: 5/19/2014
Brendan Mulholland, Program Leader /Sub-Contractor

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Reviewed By: _____ Date: _____
Name, Position

Reviewed By: _____ Date: _____
Name, Position

Notification Procedure for Environmental Releases into Storm Drains or Creeks

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Record of Revisions

Revision	Date	Description
01	11/15/2013 04/15/2014	Add new sanitary sewer overflow requirements. Update procedure format, include EHS title and logo, Update Records and References Sections. Added footer note for controlled documents.

1 Overview

1.1 Purpose

The purpose of this procedure is to provide notification instructions to Environmental Services Group (ESG) staff in the event that an accidental release could enter or already entered – the Lawrence Berkeley National Laboratory (LBNL) main site storm drain system and/or neighboring creeks.

1.2 Scope

Releases or discharges to LBNL's storm drain system are strictly controlled as they can flow into surrounding creeks and eventually into the San Francisco Bay. In the event of any accidental release to the storm drain system, a rapid and coordinated response must be carried out that includes notifying potential affected parties and reporting agencies, as well as assessing the release extent and impact.

1.2.1 Authorized Non-stormwater Discharges

Only stormwater and authorized non-stormwater discharges are allowed to enter the storm drain system. Authorized discharges include the following:

- Air conditioning, refrigeration, and compressor condensates
- Fire hydrant and sprinkler flushing water
- Fire suppression runoff
- Hydrauger and spring groundwater discharges (uncontaminated water)
- Landscape watering
- Safety shower/eyewash testing and operation
- Secondary containment pump-outs (if properly evaluated prior to pumping)
- Building and retaining wall subsurface drains
- Utility line/vault pump-outs
- Water line breaks (requires use of dechlorination tablets)

1.2.2 Non-authorized Non-stormwater Discharges

Non-authorized, non-stormwater discharges are subject to environmental release notification requirements. Examples include:

- Accidental chemical spills from laboratories or construction activities
- Major water supply line breaks
- Treated cooling tower water releases
- Sanitary sewer overflows

Sampling of these accidental releases is covered in ESG Procedure 260, *Sampling Unauthorized Non-Stormwater Discharges*.

1.3 Stormwater Drainage System

LBNL's 202 acres is situated within Blackberry and Strawberry Canyons in the East Bay hills. Most of the site is located within the Strawberry Creek Watershed, which encompasses approximately 2,066 acres. The extreme northwest corner of the site (approximately 2 acres) lies within the Lincoln/Schoolhouse Creek Watershed. Flow from this watershed was diverted by the City of Berkeley, however, and now also discharges into the North Fork of Strawberry Creek. The northwest portion of the LBNL site drains to the North Fork of Strawberry Creek, while the majority of LBNL drains to the South Fork of Strawberry Creek.

LBNL manages stormwater flows originating from sources both onsite and upstream of the site through an engineered storm drain system. Most of the existing storm drain system is sized to handle flows from a 100-year storm event. This system discharges into the North Fork of Strawberry Creek watershed on the north side of the site and into tributaries of the South Fork of Strawberry Creek on the south side.

The drainage for the North Fork of Strawberry Creek begins in the University of California Berkeley (UCB) campus hill area located above LBNL. It is captured by a storm drain system that directs the flow in a western direction and emerges as a surface stream at the bottom of Blackberry Canyon north of Building 65. The North Fork then passes through a series of check dams and settlement basins before entering a 60-inch culvert above LeConte Avenue in the City of Berkeley. It then re-emerges as a surface stream on the UCB campus. The North Fork is a perennial creek and is partially supplied by LBNL's hydrauger flows. A few tributary drainages contribute to the North Fork, including Cafeteria Creek, and intermittent creeks that are also partially supplied by hydrauger flows.

The South Fork of Strawberry Creek begins in the eastern end of Strawberry Canyon and flows west, through a retention basin located east of, and above, the UCB Haas Pool complex. It is then diverted through 36-inch and 48-inch diameter concrete pipes before re-emerging as a surface stream in the eastern portion of the UCB campus. Along the way, several tributary drainages below the LBNL site contribute to flows in the South Fork. Above the retention basin, contributing sub-drainages from the LBNL site include Pineapple and Banana creeks (both ephemeral streams). Below the retention basin, contributing sub-drainages include No Name Creek (an intermittent stream), Chick Creek (a perennial stream), and Ten-Inch Creek and Ravine Creek (both ephemeral streams).

After flowing above ground for a short distance on the UCB campus, the North and South Forks of Strawberry Creek converge on the western side of the campus, just east of Oxford Street, where they flow into a series of on-campus retention basins. Upon leaving the basins, flow is diverted underground through the Oxford Culvert and remains underground except for a short day-lighted stretch in West Berkeley. Surface water flows from LBNL, and the rest of Strawberry Creek, ultimately discharge into the San Francisco Bay south of the Berkeley Marina at the terminus of the storm drainage system that conveys Strawberry Creek through the City of Berkeley. Neither fork of Strawberry Creek nor any of its tributaries are used as a source of drinking water by the East Bay Municipal Utility District (EBMUD), which manages the public drinking water supply system in the region.

1.4 Sanitary Sewer System Description

Wastewater is carried via a gravity flow sanitary sewer system and eventually discharged to the City of Berkeley's public sewer system through two monitoring stations, one located at Hearst Avenue west of the site and the other at Centennial Drive in Strawberry Canyon south of the site. Both monitoring stations measure wastewater discharge volume on a continuous basis, and samples of the wastewater are taken at regular intervals and evaluated for radioactivity and other constituents mandated by EBMUD.

The Hearst and Strawberry monitoring stations are located in vaults and receive wastewater from separate areas of the LBNL site. The Hearst station receives wastewater from the northern and western regions of the Lab. The Strawberry vault is located south of Berkeley Lab's border. It receives sewer effluent from the buildings in the southern and eastern regions of the site and from some UCB buildings located above and adjacent to the LBNL site, including the Space Science Laboratory, Lawrence Hall of Science, and the Botanical Gardens. This network connects to campus-owned piping at Centennial Drive and then to the City of Berkeley system on Rim Road. Effluent from both of the sanitary sewers is directed to the EBMUD treatment plant, where it undergoes treatment prior to discharge into the San Francisco Bay.

Blockages in sewer pipes occur when pipes become obstructed. Common causes of obstruction are:

- tree roots penetrating through cracks
- debris from construction activities
- inappropriate disposal of paper towels or other objects in sinks or toilets
- build-up of fats, oils, and grease in the sanitary sewer pipe system

When a blockage occurs, sewage backs up within the sewer system and eventually flows out at an upstream point, such as a manhole or floor drain.

1.5 Potable Water Supply Description

All potable or domestic water for the Laboratory's main site is supplied by EBMUD. The site has no drinking water wells. Domestic water originates in the Sierra Nevada watershed lands and is directed to the Bay Area and ultimately to Berkeley Lab through a system of lakes, aqueducts, treatment plants, and pumping stations.

EBMUD adds chloramine to the water supply in order to meet disinfection standards required by the Safe Drinking Water Act. Chloramine is toxic to fish and other aquatic life and must not enter the storm drain system. Such an unauthorized discharge may occur in the case of a line break in the potable water system, or when water is released in construction or maintenance activities.

1.6 Closed-Loop Process and Low Conductivity Cooling Water Systems

Closed-loop process cooling water systems, such as those used for high energy magnets and power supplies, may contain low concentrations of corrosion inhibitors and biocides. A break in the line of such systems may result in a release onto soils, into the storm drain system, or directly into creeks below the site.

In addition, due to a break in underground transfer piping of low conductivity cooling water system or leakage from an aboveground storage tank, water from the low conductivity cooling water system could also be released onto soils, into the storm drain system, or directly into creeks. This water typically does not contain any chemicals; however, it has lower concentrations of dissolved salts, which can have an adverse effect on aquatic species.

2 Definitions

California Integrated Water Quality System (CIWQS): The State Water Board's regulatory and water quality information management system.

Cooling Tower Water: Water circulated in a cooling tower system (open or closed loop) to lower its temperature by partial evaporation. Cooling tower water often contains added chemical constituents that may be harmful to aquatic organisms.

East Bay Municipal Utility District (EBMUD): The publically-owned company that receives and treats LBNL's wastewater discharges.

Potable Water: Water supplied by EBMUD for public use including consumption. Potable water contains a small amount of disinfectant – chlorine and/or chloramines – both of which are highly toxic to fish and other aquatic organisms.

Sanitary Sewer Overflow (SSO): The discharge of untreated sewage from a sewage conveyance system before it reaches a treatment plant.

Wastewater: Industrial sewage and other treated or untreated wastewater discharged into, or permitted to enter, a community sewer system connected to an EBMUD interceptor for wastewater treatment. LBNL's permit and District Ordinance No. 311A-03 specifies "wastewater" to mean sewage, industrial, and other wastes discharged to a community sewer system.

Workday: The time during a 24-hour period that the system being sampled may operate and discharge wastewater.

3 Responsibilities

Sewage, potable water, and other water releases are detected and reported through a number of channels. Typically, a release report is initiated when a release is reported to LBNL's spill reporting number, extension 6999. Also, the Facilities Division may call when sensors used by Facilities indicate a significant pressure drop in the potable water system. Once reported, swift action is required to assess and minimize the potential public and environmental health impact and risk of the release to the environment.

3.1 Group Leader

- Determines emergency notification requirements with the assistance of LBNL's environmental attorney, if necessary.
- Informs LBNL senior management and the Department of Energy (DOE) Berkeley Site Office of notification requirements.
- Oversees and/or carries out emergency response notifications to regulatory agencies.
- Directs spill response activities and monitors developments.
- Approves reports and submits them to regulatory agencies, the DOE, and public organizations.

3.2 Program Leader

Note: Responsibilities may be shared or split between the various Program Leaders

- Provides backup spill response and notification support to the Group Leader.
- Contacts the Facilities Division to request mobilization of resources to mitigate the release.
- Coordinates response and clean-up efforts involving EHS subcontractors, if necessary.
- Obtains release information required for notifications and reports.
- Prepares initial and follow-up reports for applicable agencies.
- Coordinates creek posting with UCB and City of Berkeley, if necessary.
- Provides backup decision-making support to the Group Leader during a release event.

3.3 Quality Coordinator

- Prepares this procedure.
- Collects information required for release notifications.
- Provides support for sample collection activities as described in ESG Procedure 260.
- Provides back-up spill response.

4 Policy

4.1 Basic Health and Safety Policy

This procedure complies with:

- LBNL's implementation of applicable DOE and University of California (UC) required environment, health, and safety policies as defined in the DOE-UC Management Contract (Contract 31)
- LBNL health and safety policies as described in the LBNL *Requirements and Policies Manual, Environment, Safety, and Health Section*, LBNL/PUB-201 and the Environment/ Health/ Safety (EHS) Division's *Integrated Safety Management Plan*
- The environment, health, and safety measures assessed for the job function and defined in each worker's job hazards analysis (JHA)

Safety risks associated with this procedure have been reviewed and preventative measures have been incorporated into this procedure. Both LBNL employees and subcontractors holding an LBNL badge are required to complete a JHA. The JHA process results in a worker hazard and control description (hazards profile). The JHA constitutes the work authorization document for the activities it covers once it is signed by the worker's supervisor.

4.2 Training Requirements

At a minimum, the following LBNL safety training courses are required for personnel performing this procedure (additional training requirements are needed when performing sampling tasks as described in ESG Procedure 260):

- Overview of ES&H at LBNL (EHS0010)
- Ergonomic Self-Assessment for Computer Users & Refresher (EHS0059 and EHS0058)
- General Employee Radiological Training (EHS0470)
- Worksmart Ergonomics (EHS0062) is required if work activities require the movement of heavy items or awkward positions

Personnel receive job-specific training by reviewing the applicable procedures.

All training courses must be documented in the LBNL training database, and all required documentation must be kept up-to-date. On-the-job training is documented via signatures on specific ESG procedures.

4.3 Spill Notification Reports

Spill notification reports may be prepared and submitted to regulatory agencies and external entities including the following:

- California Emergency Management Agency
- Regional Water Quality Control Board
- City of Berkeley
- Department of Toxic Substances Control
- Department of Energy
- University of California at Berkeley

Any report records will be created, maintained, and archived according to the Records section of this document.

5 Hazard Identification and Controls

5.1 Personnel

This procedure describes the activities related to environmental release notification processes. In the process of containing a spill, and gathering information for proper notification, it is important to identify potential hazards and take appropriate precautions.

Any person entering an area with the following potential hazards must wear all appropriate personnel protective equipment (PPE) and must have completed all required safety training and be in possession of a signed JHA.

5.2 Hazard Identification and Safety Controls

5.2.1 General Hazards

Control general hazards when working in the field by following these basic safety measures whenever necessary.

- Minimize sun exposure by wearing a hat and sunscreen.
- During hot weather avoid heat stress by taking breaks, rehydrating, and avoiding prolonged activity in poorly ventilated areas. Keep – or have access to – an adequate supply of drinking water.
- During rainy weather, wear non-slip shoes and raingear.
- Be aware of your surroundings and try to minimize the amount of time in isolated areas.
- Carry a cell phone while sampling in isolated areas. If you do not have a cell phone let an ESG team member know where you are sampling and when you expect to return.
- Thoroughly wash your hands after returning from field activities.

5.2.2 Chemical and Radiological Hazards

Chemical hazards include potential exposure to:

- Fixed treatment unit influent and contaminated groundwater
- Hazardous chemicals from treated cooling tower water
- Human pathogens and sewer disposable chemicals via raw sewage
- Splashes from sample containers that contain caustic or corrosive preservatives

To mitigate these hazards, eyewash stations are located as follows:

- Hearst sewer: just outside the sampling shack
- Strawberry sewer: inside the sampling shack
- B77 FTU: inside the FTU area near the control panel

To protect against these hazards, it is important to wear all of the required personal protective equipment, including disposable gloves and safety glasses with side shields. Raw sanitary sewage may contain drain disposable chemicals as well, therefore a full face shield or safety goggles are required. The radiological hazards from LBNL's environmental samples have been determined to be minimal; however, if sampling occurs in an area with potential or known radiological contamination, as well as from any area adjacent to a sewer line, sampling must be performed in accordance with RWA 1178.

5.2.3 Biological Hazards

The Hearst sewer (13E) and Strawberry sewer (13F) sampling stations are considered Level II Biosafety technical areas because of potential exposure to bacteria and viruses. Specific requirements and guidelines for Biosafety areas can be found in the Biosafety in Microbiological and Biomedical Laboratories Manual at the following link: <http://www.lbl.gov/ehs/biosafety/manual/index.shtml>

General requirements include:

- Never eat, drink, or smoke in a sampling area.
- Wash your hands after working with any potentially hazardous material. Hands must be thoroughly washed with soap and water prior to exiting any Biosafety Level 2 area.
- Decontaminate sampling equipment after each use.
- Place biohazard postings at the entrance to the Level II Biosafety technical areas.
- Thoroughly disinfect all surfaces exposed to raw sewage; isolate all discarded gloves, PPE or other potentially exposed equipment in a bag and seal it prior to leaving the area.
- When leaving a Level II Biosafety technical area, transport all sample containers, contaminated equipment, and potentially contaminated clothing in secondary containment labeled "Biohazard".

Other biological hazards that may be encountered during sampling include snakes, ticks, spiders, and poison oak. To prevent exposure, follow these precautions when working in grassy or bushy areas:

- Wear light-colored clothes, long pants (gathered around the ankle or tucked into the boots), and protective over-the-ankle footwear.
- Apply insect repellents containing DEET or permethrin to clothes and exposed skin.
- Conduct a thorough examination of your clothes and any exposed body parts upon returning from sample collection activities to remove any ticks or spiders.
- Wash repellent-treated skin and hands after returning from the field.

For field sites located in remote areas with a potential for mountain lion activity, follow these specific precautions:

- Maintain all sampling areas as open as possible by clearing debris and overgrowth that would obstruct your view.
- Avoid working during low light conditions such as dawn or dusk.
- In case of a mountain lion sighting, avoid a confrontation by staying in place, making yourself appear as large as possible and making loud noises or blowing on a whistle. Leave the area immediately once the lion has moved on.
- If possible, make arrangements to go to the area with another person.

5.2.4 Trip and Fall Hazards

Trip and fall hazards occur when activities involve working on steep hillsides, around equipment and piping, and on wet slippery surfaces. Non-slip footwear and clothing appropriate for the weather and site conditions should be worn to minimize the potential for trips and falls. If expected activities involve walking through brush on a hillside, slip resistant footwear should be worn. It is important to be aware of your surroundings when performing these sampling activities in order to avoid potential trip or fall hazards.

5.2.5 Ergonomic Hazards

Activities such as entering sample collection data at computer workstations and lifting samples and sample collection equipment can result in ergonomic injuries. Any signs of muscular-skeletal discomfort must be reported immediately to the ESG Group Leader.

5.3 Personal Protective Equipment (PPE)

Closed-toed shoes and long pants are required when conducting observations at environmental release locations, in addition to any specific PPE requirements specifically posted at each location. If performing any type of sampling activity, refer to ESG Procedure 260, *Sampling Unauthorized Non-Stormwater Discharges* for the appropriate PPE requirements.

5.4 Materials and Equipment

The following equipment may be needed to perform the functions described in this procedure:

- Emergency spill response kits
- Dechlorination tablets
- Disposable gloves
- Cell phone
- Whistle or equivalent device capable of making a loud sound
- Spills Release Inspection Checklist
- Camera (or cell phone with camera/video capability)

6 Response Guidelines

6.1 Onsite Resources

The onsite LBNL Fire Department and Facilities Division are typically the first to respond to a release. Both organizations maintain equipment and supplies needed to respond to most releases.

6.1.1 Sanitary Sewer Overflows (SSOs)

In the event of an SSO, the Facilities Division has the ability to suspend water usage in buildings upstream of a sanitary sewer collection system blockage. This strategy is commonly used to prevent the further release of sewage in the event that a blockage cannot be rapidly cleared. Facilities Division staff are capable of mitigating and cleaning up smaller spills without the support of additional responders.

The Facilities Division keeps up-to-date standard operating procedures (SOPs) for sewage spill mitigation and cleanup for both exterior and interior releases. The SOPs describe special equipment required, work steps to safely clean up the spill, and references to other SOPs for further information. The two SOPs, which are available at

<https://commons.lbl.gov/display/fac/Operations+and+Maintenance+Procedures+Lookup> are:

- EMRG-050 "Sewage Spill Cleanup: Interior"
- EMRG 051 "Sewage Spill Cleanup: Exterior"

For SSOs caused by blockages or other problems within the sanitary sewer collection system that cannot be addressed by Facilities Division Staff, an on-call contractor is called to clear the blockage and determine the cause using video inspection equipment if necessary. LBNL maintains blanket contracts with sewer maintenance contractors capable of responding to SSOs 24/7. LBNL ensures that on-call contractors have the capabilities and equipment to appropriately mitigate the most severe possible spills that could occur at LBNL.

6.1.2 Other Spill Types

ESG also maintains a spill kit used when responding that includes de-chlorination tablets, sampling materials and a release inspection checklist. ESG staff should assess the spill by inspecting the area and determining material(s) involved, amount of the release, location of the release, take pictures and video if possible, and complete the release inspection checklist provided in Appendix A of this procedure.

6.2 General Response Guidelines

Once a water or sewage release has been detected and reported, ESG staff must complete the following steps:

Step Action

- 1 Report the release. If Facilities staff is not already present, contact LBNL Facilities Dispatch Line (See Table 7.6 for contact numbers).
- 2 Facilities should consider the following actions, depending on the type of release:
 - Locate the point of obstruction in or breakage of the pipe.
 - If possible, divert the released effluent to an alternative sanitary sewer location. This can effectively eliminate or reduce the release to storm drains.
 - Turning off supply water or suspending the discharge of wastewater should also be considered until the release is stopped.
 - Other options include, but are not limited to, the following: 1) Plug catch basin outlets or use rubber mats to cover catch basin inlet. 2) Use sandbags or containment barriers. 3) Excavate

- to establish containment, if necessary. 4) Initiate containment in downstream storm drains and plug downstream storm drain outlet to capture SSO, if possible.
- Divert pedestrian traffic around affected areas: For sanitary sewer overflows, any onsite areas that are accessible by pedestrian traffic should be roped off and the appropriate signs should be posted.
 - For sewage and potable water spills that have the potential to enter storm drains, place dechlorination tablets just downstream of the release and around any affected storm drains.
 - Upon completion of all repairs, all signage posted and materials used for clean-up should be removed from the affected area.
 - Once the release has been stopped, LBNL Facilities or their subcontractor should make the necessary repairs to the system and clean up any affected areas.
- 3 Call for additional backup support as required.
 - 4 Conduct quick volume estimation using a standard template. See Appendix E for a sample volume estimation worksheet.
 - 5 Identify receiving waters and watercourses that may be impacted.
 - 6 Document the release by taking pictures and – if possible – a video of the spill taking place. Position yourself so that the spill can be seen from four different angles, and so that objects or measuring devices are visible to provide “scale”.
 - 7 Take water samples of the release effluent to assess any potential environmental impact following the requirements in ESG Procedure 260, *Sampling Unauthorized Non-Stormwater Discharges*. Note these requirements:
 - When sampling an SSO, three separate sample sets should be collected: 1) one upstream of the discharge location, 2) one at the discharge location, and 3) one downstream of the discharge location.
Samples for pH, total coliform, fecal coliform (bacteria indicators), ammonia, biological oxygen demand (BOD) and nitrate + nitrite analysis should be considered. The collection of bacterial samples will require calling an analytical laboratory prior to sampling to confirm that sample pick-up and/or drop-off and analysis are possible, especially after hours. See Sewage and Water Release Sampling Procedure for specific sampling details.
 - Have any potable water releases tested for residual chlorine, pH and turbidity.
 - 8 Notify LBNL senior management, the DOE Site Office, and external agencies as appropriate: Make notifications as soon as this can be performed without impeding cleanup or other emergency measures. If there is any potential impact to the creeks on campus, the UCB EH&S office should also be notified. Refer to Appendix D for a summary of release reporting requirements.

6.3 Significant Releases Requiring Off-site Support

For significant releases that require additional support, ESG staff must take the following steps:

Step Action

- 1 Contact subcontractors listed in Table 7.6, Key Contacts for Releases into Storm Drains and Creeks. See the section: "Additional Clean-Up Support".
- 2 Provide the following information to the subcontractor's dispatcher:
 - Details regarding the materials released
 - The approximate amount of the release
 - The location of the release
- 3 Arrange for onsite access for the subcontractor through the Blackberry Gate entrance and convey access information to the subcontractor.
- 4 Once the subcontractor arrives, review measures already taken at the release location.

7 Notification Requirements

7.1 Notification Threshold Considerations

State laws and regulations require that sewage and water releases into waterways, such as Strawberry Creek, be reported to local and state agencies. Timely reporting is required to allow agencies to respond quickly to protect public health and the environment through cleanup and posting of warning signs.

Appendix D summarizes release reporting requirements – what, when, and to whom – based on Federal and State laws and regulations.

The ESG Group Leader, or backup, must determine if an immediate notification requirement has been triggered by reviewing the notification criteria in this section as well as the relevant environmental regulations. If sampling results are available, notification decisions should include a review of measured levels and, if available, a comparison to acceptable thresholds for each parameter tested.

LBNL's environmental attorney may be asked to provide legal advice. UC Office of the President's environmental attorney will provide backup support to LBNL's attorney, if needed.

Notifications on releases to surface water must be included in the annual stormwater monitoring report, which is a requirement of the Laboratory's General Industrial Permit.

7.2 Sewage Release Notification and Reporting

Any SSO release that enters or threatens to enter a storm drain or creek must be reported to ESG immediately. Report all SSO releases of any size that reach surface waters to regulatory agencies.

Appendix B contains the Summary of Communication Requirements for SSOs and outlines notification, certification, and reporting requirements.

SSOs must be reported to the CIWQS online SSO system (<https://ciwqs.waterboards.ca.gov/>) as soon as possible, but no later than 3 business days after LBNL is made aware of the release. Refer to the CIWQS SSO system for mandatory information to be included in CIWQS Online SSO Reporting.

To satisfy notification requirements for each applicable SSO, ESG provides the information requested by the California Office of Emergency Services (Cal OES) before receiving a control number. Spill information requested by Cal OES may include:

- Name of person notifying Cal OES and direct return phone number
- Estimated SSO volume discharged (gallons)
- If ongoing, estimated SSO discharge rate (gallons per minute)
- SSO Incident Description:
 - Brief narrative
 - On-scene point of contact for additional information (name and cell phone number)
 - Date and time enrollee became aware of the SSO
 - Name of sanitary sewer system agency causing the SSO
 - SSO cause (if known)
- Indication of whether the SSO has been contained
- Indication of whether surface water is impacted
- Name of surface water impacted by the SSO, if applicable
- Indication of whether a drinking water supply is or may be impacted by the SSO
- Any other known SSO impacts

- SSO incident location (address, city, state, and zip code)
- Sign postings (LBNL onsite, UCB offsite, and city of Berkeley)

Following the initial notification to Cal OES and until ESG certifies the SSO report in the CIWQS Online SSO Database, ESG will provide updates to Cal OES regarding substantial changes to the estimated volume of untreated or partially treated sewage discharged and any substantial change(s) to known impact(s).

In the event that the CIWQS Online SSO Database is not available, ESG must fax or e-mail all required information to the appropriate Regional Water Board office in accordance with the time schedules identified below. In such event, ESG must also enter all required information into the CIWQS Online SSO Database when the database becomes available.

For SSO reporting purposes, if one SSO event results in multiple appearance points in a sewer system asset, ESG shall complete one SSO report in the CIWQS Online SSO Database which includes the GPS coordinates for the location of the SSO appearance point closest to the failure point, blockage or location of the flow condition that caused the SSO, and provide descriptions of the locations of all other discharge points associated with the SSO event.

Spill Reports – All SSOs that meet the above criteria must be reported to the CIWQS Online SSO Database. Reporting time frames and requirements vary by category, as summarized in Appendix B and D.

“No Spill” Certification – If there are no SSOs during the calendar month, LBNL shall certify, within 30 calendar days after the end of each calendar month, a “No Spill” certification statement in the CIWQS Online SSO Database certifying that there were no SSOs for the designated month.

Amended SSO Reports – ESG may update or add additional information to a certified SSO report within 120 calendar days after the SSO end date by amending the report or by adding an attachment to the SSO report in the CIWQS Online SSO Database.

7.3 Potable Water Release Notification and Reporting

Any potable water release that enters or threatens to enter a storm drain or creek (e.g. North or South Fork) must be reported to ESG immediately. ESG staff will determine if the release is a threat to the health of the public or the environment. Note that spills of potable water of sufficient size may result in fish kills due to the chloramine content unless de-chlorination measures are taken. Some typical acceptable benchmarks for potable water releases are listed in Table 7.4 below.

TABLE 7.4 ACCEPTABLE BENCHMARKS FOR POTABLE WATER RELEASE

Measurement	Method	Benchmark	Units
pH	SM-4500 H+B	6.0-9.0 ¹	Standard Units
Residual Chlorine	SM-4500 Cl	0.0 ²	ppm
Turbidity	EPA 0180.1	500 ³	NTU

1 = Federal Register/ Volume 63, No 189, Table 3

2 = San Francisco Water Quality Control Plan (Basin Plan). Table 4.2 Effluent Limitation for Conventional Pollutants

http://www.swrcb.ca.gov/rwqcb2/basin_planning.shtml#2010basinplan

3 = Numeric Action Effluent Limit of 500 Nephelometric Turbidity Units (NTU) pursuant the California Construction General Permit

http://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/constpermits/wqo_2009_0009_complete.pdf

7.4 Closed-Loop Process and Low Conductivity Cooling Water Systems Release Notification

Any cooling water release that enters or threatens to enter a storm drain or creek (e.g. North or South Fork) must be reported to ESG immediately. ESG staff will determine if the release is a threat to the health of the public or the environment.

Report releases from closed-loop process water containing biocides, scale, and/or corrosion inhibitors that entered the storm drain system, independent of discharge volume.

For low conductivity cooling waters releases that occur during business hours, base the decision to report on results from the collected samples gathered from the spill. In case the release occurs after business hours, [Appendix C lists after-hours decision flow chart](#) to assist the ESG Program Leader to determine if the low conductivity cooling water release should be reported.

7.5 Other Reporting

Once it has been determined that notification is required, parties should be contacted in this order (see Table 7.6 for contact information):

1. LBNL Senior Management (EHS Division Director)

2 DOE Site Office

3. External Agencies

- City of Berkeley Toxics Management Division or Environmental Health Division
- San Francisco Bay Regional Water Quality Control Board
- Department of Fish and Wildlife and UCB EH&S if there is significant potential impact to the creeks
- California Office of Emergency Services (Cal OES) hazardous materials reporting information available at: <http://www.calema.ca.gov/HazardousMaterials/Pages/Spill-Release-Reporting.aspx>

Typically during the notification to Cal OES the following information is requested:

- Date and time of incident, including duration (estimated beginning and ending times)
- Location (street address, or nearest address and cross streets; latitude and longitude coordinates to 4 decimal places [use a software program such as Google Earth to obtain coordinates])
- Total volume of spill / release (in gallons), volume that entered storm drain system, and volume captured and returned to the sanitary sewer system
- Surface water bodies impacted
- Any sampling that was conducted, identifying sample tests performed and what agencies received the results
- Source and cause of spill or overflow
- A detailed description of cleanup actions and repairs taken or in process.
- Cal OES will provide a control number after the notification is made.

7.6 Contact List

It is critical that key internal and external personnel have easy access to important contact information critical to efficiently handling a release into the environment. Section 5 identifies the criteria for notifying the regulatory agencies. Phone numbers for each organization are listed in Table 7.6.

TABLE 7.6 KEY CONTACTS FOR RELEASES INTO STORM DRAINS AND CREEKS

Laboratories	
Contact	Phone Number
Alpha Analytical	(925) 828-6226
BC Labs	(661) 852-4215
Cerco Analytical Laboratory	(925) 462-2771
Curtis & Tompkins Analytical Laboratory	(510) 204-2223
Forensic Analytical	(510) 887-8828
Alpha Analytical	(925) 828-6226

DOE	
Contact	Phone Number
BSO Duty Officer	(510) 719-8156

LBNL EHS Division	
Contact	Phone Number
Emergency Reporting	7911 (from LBNL phone system) 911 (from cell phone)
Non-emergency Reporting	Blackberry Gate: (510) 486-6999

LBNL Environmental Services Group (ESG)	
Contact	Contact
Ron Pauer	(510) 486-7614
Patrick Thorson	(510) 486-5852
Ned Borglin	(510) 486- 4332
Robert Fox	(510) 486-7327
John Jelinski	(510) 486-7616
Tom Donovan	(510) 486-7387
Neel Singh	(510) 486-5829

LBNL Facilities Division	
Contact	Contact
Facilities Work Request Center	(510) 486-6027 (M-F, 7 am-3:30 pm)
Facilities Plant Operations Dispatch	(510) 486-5481 (all other hours)
Facilities Deputy Director	(510) 486-5770
Site Infrastructure & Utilities Manager	(510) 486-6458

LBNL "Onsite" RUSH Courier Service	
Contact	Contact
LBNL Transportation	(510) 486-5404 (M-F 7am-2pm) NOTE: \$50/hr - \$75/hr overtime for time after 3:30
IDS Courier Service	(510) 548-3263 (all other hours)

Additional Clean-up Support (for significant releases see Section 4.3)	
Contact	Contact
Veolia (Primary)	(800) 688-4005 Contract No. 6924168
PSC (Secondary)	(877) 577-2669 Contract No. 6924170

University of California Berkeley (UCB)	
Contact	Contact
UCB EH&S Front Desk	(510) 642-3073 (M-F, 8 am- 5 pm)
UC Police Department	(510) 642-3333 (emergency) (510) 642-6760 (non-emergency)
Tim Pine	(510) 643-8542
Karl Hans	(510) 643-9574
David Scrimger	(510) 642-0359
Greg Haet	(510) 642-4848
Rebecca Anderson	(510) 642-6568

Regulatory Agencies	
Contact	Contact
California Office of Emergency Services (Cal OES)	1-800-852-7550
California Department of Fish and Wildlife	(707) 944-5500
San Francisco Bay RWCQB	(510) 622-2333, Mike Chee - Sanitary Sewer Overflow
San Francisco Bay RWQCB	(510) 622-2402, Danny Pham – General Industrial
San Francisco Bay RWQCB +	(510) 622-2369, Spill Hotline
City of Berkeley Environmental Health	(510) 981-7460 , General (510) 981-5261, Manuel Rodriguez
City of Berkeley Toxics Management Division	(510) 981-5310, General (510) 981-7461, Nabil Al-Hadithy
Alameda County Environmental Health Department	(510) 567-6700

8 References

DFK Solutions Group LLC, *Sanitary Sewer Overflow Manual and Reliability Tool (SMART) Sewer Overflow & Backup Response Field Guide*, 2013

Lawrence Berkeley National Laboratory, Environment/Health/Safety Division, *Integrated Safety Management Plan*

Lawrence Berkeley National Laboratory, *Environmental Radiological Protection and Environmental Restoration Programs Records Management Plan*

Lawrence Berkeley National Laboratory, Environmental Services Group, *Sampling Unauthorized Non-Stormwater Discharges*, ESG Procedure 260

Lawrence Berkeley National Laboratory, *Requirements and Policies Manual, Environment, Safety, and Health Section*, LBNL/PUB-201

Lawrence Berkeley National Laboratory, *Requirements and Policies Manual, Information Management Section*, LBNL/PUB-201

9 Records

9.1 Records Created

The following records may be created while carrying out this procedure:

- Sample and composite collection forms
- Chain-of-custody forms
- Shipping documents
- Laboratory analysis results
- Electronic files
- Calibration and maintenance records
- Regulatory reports
- SSO file report

9.2 Records Retention

The Data Manager retains hard copy and electronic records of all the collection and analysis data created by this procedure, including periodic backup and archiving of all records. The Program and/or Group Leaders retain copies of the regulatory reports created by this procedure.

9.3 Records Care, Maintenance and Archiving

The Program Leader and Data Manager are responsible for the care, maintenance, disposition, and archiving of records according to LBNL's record management policies and procedures, as listed in the *LBNL Requirements and Policies Manual, Information Management Section, LBNL/PUB-201*. Records created by this procedure may be transferred to the LBNL Archives and Records Office at the discretion of the Group and/or Program Leaders in accordance with the *Environmental Radiological Protection and Restoration Programs Records Management Plan*.

Appendix A Spills Release Inspection Checklist

See G:\Environment, Waste and Radiation Protection\ESG\Procedures\ESG Procedure Figures\Proc 203



Environmental Services Group Spills Release Inspection Checklist

Inspection		Spill Start Time:		Spill End Time:		1 st Responder Arrival:	
Location <input type="checkbox"/> Vehicle <input type="checkbox"/> Cleanup <input type="checkbox"/> Road <input type="checkbox"/> Building Observed By (Name) Spilled Product:		Describe: Did Spill Reach Any of the following <input type="checkbox"/> Drainage Channel <input type="checkbox"/> Surface Water <input type="checkbox"/> Storm Water System <input type="checkbox"/> Building <input type="checkbox"/> Paved Surface <input type="checkbox"/> Unpaved <input type="checkbox"/> Storm Water <input type="checkbox"/> Surface Water <input type="checkbox"/> Storm System <input type="checkbox"/> Street		East Longitude East Latitude		East Longitude East Latitude	
Spill Destination <input type="checkbox"/> DID SPILL EXCEED 1,000 GALLONS Estimated Spilled Volume (gallons) <input type="checkbox"/> Documentation Included		Describe: No Flow In Channel <input type="checkbox"/> Tickle Flow In Channel <input type="checkbox"/> Flow Depth (Describe how measurement was taken) (gals)		<input type="checkbox"/> Building <input type="checkbox"/> Paved Surface <input type="checkbox"/> Unpaved <input type="checkbox"/> Storm Water <input type="checkbox"/> Surface Water <input type="checkbox"/> Storm System <input type="checkbox"/> Street Estimated Volume of Spill Recovered _____ (gal)			
Did Mainline Blockage Occur? <input type="checkbox"/> YES <input type="checkbox"/> NO If YES, Inspect first MAINLINE DOWNSTREAM of blockage		Describe if other:					
Cause of Spill <input checked="" type="checkbox"/> Roots <input type="checkbox"/> Debris <input type="checkbox"/> Capacity <input type="checkbox"/> Grease <input type="checkbox"/> Vandalism <input type="checkbox"/> Design		Reportable to Cal-OES? (If unauthorized discharges and spill went into the storm drain?) BMP's Implemented? (Anti-Chloramines, Absorbent, etc.)		YES <input type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> Describe:		YES <input type="checkbox"/> NO <input type="checkbox"/> Describe:	
Additional BMP's Necessary? Specific Visual Observations		Color <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/> NO		Floatables <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/> NO		Odor <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/> NO	
Source of the Spill Close to Storm Drain Supporting Documentations ³		Photos @ Source <input type="checkbox"/> YES <input type="checkbox"/> NO Photos @ Drain Inlet <input type="checkbox"/> YES <input type="checkbox"/> NO		pH, Cl Samples <input type="checkbox"/> YES <input type="checkbox"/> NO		Coliform Samples <input type="checkbox"/> YES <input type="checkbox"/> NO	
Clean-Up Operations Ancillary Water Chemistry Measurements <input type="checkbox"/> Documentation Included		Start: _____ Describe: Completed: _____ Describe:		pH _____ T _____ Total Cl _____ SC _____ DO _____ Coliform _____ Describe:		BMP Implementation <input type="checkbox"/> YES <input type="checkbox"/> NO Other (Explain below) <input type="checkbox"/> YES <input type="checkbox"/> NO	
Spill Response & Corrective Actions Other Noteworthy Observations?		Describe:		Describe:		Describe:	

1. Unauthorized discharges = Sewer line breaks, cooling tower spray, closed loop cooling water, low conductivity cooling water, vehicle washing, small repair cleanup, any other chemicals (antifreeze, oil, etc.)
 2. For potable water spill and Sanitary Sewer Overflows refer to ESG Procedure 203, Notification Procedure for Environmental Releases into Storm Drains or Creeks. For Reporting requirements Typically, notifications are done within 2 hours and sampling is performed in accordance with ESG Procedure 260, Sampling Unauthorized Stormwater Discharges.
 3. Supporting files should be attached to complete the documentation of the spill

Appendix B External Communication Requirements for Sanitary Sewer Overflows



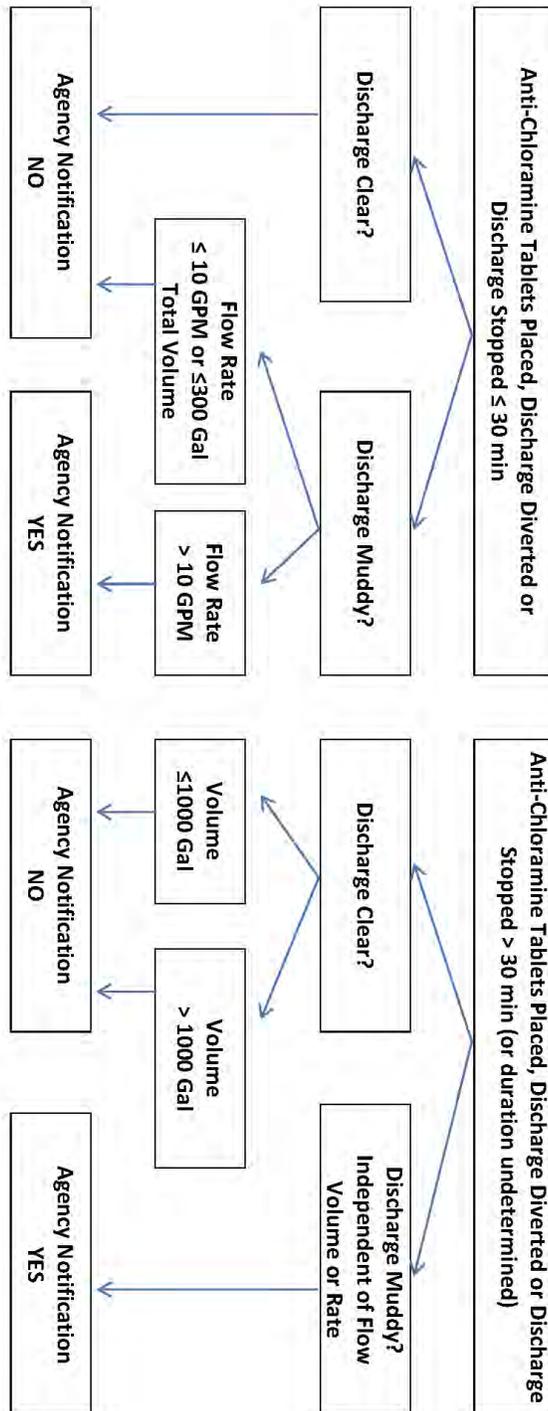
**Environmental Services Group
Summary of External Communication Requirements for Sanitary Sewer Overflows**

Communication	Spill Type	Timeframe Requirements	Agency Being Contacted	Method for Contact
Notification	Discharges of <u>any amount</u> to a drainage channel or surface water or storm drain that was not fully captured.	As soon as possible, but not later than 2 hours after becoming aware of the SSO	Office of Emergency Services	Telephone: (800) 852-7550 (obtain a control number from OES)
			Local health dept. Regional Water Board	City of Berkeley Environmental Health - business hours: 510-981-5310 - after hours: 510-981-5900 or 911 Spill Hotline: 510-622-2369
Reporting & Certification	<p>Category 1 SSO: Spills of any volume that reach surface waters.</p> <p>Category 2 SSO: Spills greater than or equal to 1,000 gal that do not reach surface waters.</p> <p>Category 3 SSO: Spills less than 1,000 gal that do not reach surface waters.</p> <p>SSO Technical Report: any Category 1 SSO in which 50,000 gallons or greater are spilled to surface waters.</p>	<p>Category 1 SSO: Submit draft report within three business days of becoming aware of the SSO and certify within 15 calendar days of SSO end date.</p> <p>Category 2 SSO: Submit draft report within 3 business days of becoming aware of the SSO and certify within 15 calendar days of the SSO end date.</p> <p>Category 3 SSO: Submit certified report within 30 calendar days of the end of month in which SSO the occurred.</p> <p>SSO Technical Report: Submit within 45 calendar days after the end date of any Category 1 SSO in which 50,000 gallons or greater are spilled to surface waters.</p>	UC Berkeley	University of California at Berkeley -business hours: 510-642-3073 (EH&S) -after hours: 510-642-3333 (PD)
			Regional Water Board	Electronic: (only) to CIWQS: https://ciwqs.waterboards.ca.gov/
			Regional Water Board	

Appendix C Off-Hours Decision Flow Chart for Potable Water Discharges



**LBNL Environmental Services Group
Off-Hours Decision Flow Chart for Potable Water Discharges into Storm Drains**



It should be noted that the following written guidelines are still paramount in any potable water release:
 As soon as possible, the potable water release should be contained with the use of sandbags and/or containment booms, or water diverted into the sanitary sewer, or the water source temporarily shut down. In addition, dechlorination tablets should be immediately placed just downstream from the release and around any affected storm drains.
 If at all possible water samples should be taken for assessing the potential environmental impact of the release.
 The flow chart assists in determining the potential environmental impact of the release and consequently if the appropriate agencies need notification.

Appendix D Summary of Release Reporting Requirements

**LBNL Environmental Services Group
Summary of Release Reporting Requirements**

FEDERAL	CERCLA § 103 (a) (reporter is person in charge of facility)	EPCRA § 304 (reporter is owner/operator of facility that produces, uses, stores hazardous materials)	CWA (Clean Water Act) (reporter is person in charge of facility)				TSCA (Toxic Substances Control Act) § 6 (e) (reporter is owner of PCB equipment or facility)	HMTA (Hazardous Materials Transportation Act) (reporter is HM carrier)
WHAT	Release of a reportable quantity of a hazardous substance (40 CFR 302) to env't within 24 hours	Release reportable under CERCLA or release of a reportable quantity of an extremely hazardous substance (40 CFR 355) to env't (offsite) within 24 hours	Discharge of a reportable quantity of a hazardous substance (40 CFR 117) or oil to surface water within 24 hours	Noncompliance with NPDES (stormwater) permit	Discharge that could impact operations or safety at the sewage treatment facility (wastewater discharge permit)	Violation of pretreatment standards (wastewater discharge permit)	PCB spill at more than 50 ppm that exceeds 10 pounds or directly contaminates surface water, sewer, drinking water, grazing land, vegetable gardens (40 CFR 761.125)	Transportation incident causing specified problems (49 CFR 171.15)
WHEN	Immediately (within 2 hours) after discovery of release	Immediately (within 2 hours) after or should be aware of release; follow-up as soon as practicable (within 2 weeks)	Immediately after discovery of discharge	If it may endanger health or env't; within 24 hours, and follow-up within 5 days, after discovery; noncompliance with permit schedule within 14 days after schedule date; other noncompliance in routine reports	Immediately	Within 24 hours after discovery, follow-up within 30 days after repeat sampling	As soon as possible (within 24 hours after discovery)	Earliest practical moment after occurrence; follow-up within 30 days after discovery
TO WHOM	NRC	Cal OES, COB (portions of site in Berkeley), City of Oakland (portions of site in Oakland)	NRC, DFG	RWQCB, COB	EBMUD	EBMUD	EPA Region 9 Office of Pesticides and Toxic Substances Branch	NRC; follow-up to Department of Transportation

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**LBNL Environmental Services Group
Summary of Release Reporting Requirements (continued)**

STATE	HWCL (Hazardous Waste Control Law) (reporter is generator, treatment/storage/disposal facility or transporter)						Hazardous Materials Release Response Law (reporter is hazardous material handler)	Underground Storage Tank (UST) Law (reporter is UST owner/operator)
WHAT	Hazardous waste release that could threaten health or cause fires or explosions outside of a waste facility or accumulation area.	Hazardous waste release that creates imminent/ actual emergency	Incident requiring implementation of contingency plan	Noncompliance with permit	Groundwater monitoring showing contamination requiring corrective action under permit	Vehicle, tank, container involved in spill or in accident that may render it out of compliance	Hazardous material release or threatened release, unless no significant hazard	Unauthorized hazardous substance release from a UST
WHEN	Immediately after release	Immediately after determine response help needed	Within 15 days after occurrence	If it may endanger health or env't, within 24 hours, and follow-up within 5 days, after discovery, noncompliance with permit schedule within 14 days after schedule date; other noncompliance in routine reports	Within 7 days after occurrence	Within 30 days after occurrence	As soon as discovered	within 24 hours after detect or should have detected; follow-up within 5 working days; under certain circumstances, in routine reports
TO WHOM	Cal OES, LBNL Emergency Response (X7911)	State/local agencies whose help is needed	DTSC	Cal OES if may endanger health or environment; otherwise, DTSC	DTSC	DTSC	Cal OES, Fire Department, & City of Berkeley	COB and Cal OES or RWQCB; follow-up to COB

The State Water Resources Control Board (SWRCB) adopted a General Waste Discharge Requirement (WDR) for all publicly owned sanitary sewer collection systems in California with more than one mile of sewer pipe. Effective 1/2/07, if an sanitary sewer overflow occurs, it must be reported to the SWRCB using an online reporting system developed the SWRCB. (Note: All spills greater than 1000 gallons or spills of any amount that enter the storm drain system must be reported to Cal OES and City of Berkeley)

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**LBNL Environmental Services Group
Summary of Release Reporting Requirements (continued)**

STATE	Porter-Cologne Water Quality Control Act (reporter is whoever causes/permits discharge)				California Clean Air Act (reporter is source operator)		Vehicle Code (reporter is whoever causes highway hazardous material/waste release)	
WHAT	Discharge of a reportable quantity of a hazardous substance or petroleum to surface water or groundwater, or to land where it will probably be discharged to water	Noncompliance with NPDES permit	Monitoring at waste management unit indicating contamination requiring corrective action	At waste management unit, failure or breakdown of waste handling facilities or containment systems or discovery of waste or leachate in monitoring facilities	Monitoring showing violation of emission standard	Monitoring system failure for more than 24 hours	Hazardous waste or material release on highway	Hazardous waste or material incident causing specified problems
WHEN	As soon as discharge is discovered	It may endanger health or environment, within 24 hours, and follow-up within 5 days, after aware; noncompliance with permit schedule within 14 days after schedule date; other noncompliance in routine reports	Immediately, follow-up within 7 days	As specified in contingency plan	Within 96 hours after occurrence or next working day, depending on type of monitoring	Next working day	A soon as release is discovered	Within 30 days after discovery
TO WHOM	Cal OES and RWQCB; if discharge is from aboveground petroleum tank, also county & city	RWQCB	RWQCB	RWQCB, local gov't, and down gradient water users (City of Berkeley)	BAAQMD	BAAQMD	CHP	CHP

Reporting agencies:

- BAAQMD (Bay Area Air Quality Management District): 415-749-5000 (general)
- CHP (California Highway Patrol): 911 (emergencies)
- COB (City of Berkeley): 981-7460 (Department of Toxics)
- DFG (California Department of Fish and Game): 916-445-0045
- DTSC (California Department of Toxic Substances Control): 510-540-3972 (Ciriello, Sal), 510-540-3932 (Waqar Ahmad), 1-800-260-3972 (Emer. Response, 8-5), 1-800-852-7550 (after hours)
- EBMUD (East Bay Municipal Utility District): 510-287-1651 (shift supervisor, 8 - 5), 510-287-1458 (after hours)
- EPA (U. S. Environmental Protection Agency): 1-800-300-2193 (emergencies), 415-947-4163 (Max Weintraub, PCBs), 415-947-4172 (Yosh Tokiwa, PCBs)
- NRC (National Response Center): 1-800-424-8802
- Cal OES (California Office of Emergency Services): 1-800-852-7550, 1-916-845-8911
- RWQCB (San Francisco Bay Regional Water Quality Control Board): 510-622-2369 (general), 510-622-2411 (Michael Rochette, groundwater), 510-622-2340 (Rico Duazo, surface water)

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Appendix E Spills Release Volume Estimation Worksheet

See G:\Environment, Waste and Radiation Protection\ESG\Procedures\ESG Procedure Figures\Proc 203



**Environmental Services Group
Spills Release Volume Estimation Worksheet**

Spill Release Information		Spill Release Details			
Date of Spill	Spill Start Date/Time:	Spill End Date/Time:	Duration of Spill (minutes)		
Location	Describe:				
Manhole ID (if applicable)	Describe:				
Spilled Product	Describe:				
Photos Included	<input type="checkbox"/> YES				
Spill Flow Rate/Volume Estimation Method		Spill Volume Estimation Calculation			
Eyeball Estimation Method (fg 4.2)		Total Spill Volume Estimate = _____ Describe: _____ Container Size (L) _____ Time to fill (seconds) _____ Width of Spill _____ (# of containers) _____ Flow Rate (GPM) = _____ Drop Bucket Estimation (fg 4.3) <input type="checkbox"/> YES Duration (minutes) _____ X _____ Flow Rate (GPM) = _____ Total Spill Volume (gallons) _____ Duration & Flow Rate Estimation (fg 4.4) <input type="checkbox"/> YES Total Spill Volume Estimate = _____ Describe: _____ Length of Spill (ft) = _____ Width of Spill (ft) = _____ Depth of Spill (ft) = _____ Radius of Spill (ft) = _____ Base of Spill (ft) = _____ Height of Spill (ft) = _____ Area/Volume Ponded Estimation (fg 4.6) _____ Square/Rectangle Area _____ Circle Area _____ Triangle Area _____ Area/Volume Gutter Estimation (fg 4.8) <input type="checkbox"/> YES Length of Spill (ft) = _____ Depth of Spill (ft) = _____ Width of Spill (ft) = _____ Total Spill Volume Estimate = _____ Other <input type="checkbox"/> YES Describe: _____ Detailed Description of Flow Rate Calculation _____			

Taken from SMART Sewer Overflow & Backup Response Field Guide, DCE Solutions Group, LLC, 2013.

Completed By: _____

Date: _____

Signature: _____



Sewer Overflow & Backup Response Field Guide

Eyeball Estimation Method

FG
4.2**Guidelines:**

The eyeball estimation method is useful for an initial estimate of a smaller spill (i.e., less than 200 gallons). This method requires documented hands-on training to practice visual estimation. Keep in mind that it is difficult to apply this method consistently among different crew members. Also, it is difficult to defend, so use this method only if other methods are not feasible, or use in conjunction with other methods. Photographic evidence is critical using this method.

Basic Procedure:

1. Position yourself so that you have a vantage point where you can see the entire spill.
2. Imagine one or more buckets or barrels of water tipped over. Depending on the size of the spill, select a bucket or barrel size as a frame of reference.
3. Estimate the volume of the sewage spill by comparing it to your knowledge of the appearance of a known quantity of water.
4. If rainfall is a factor in the spill, estimate what amount of the spill is rainwater and subtract that from your initial estimation.

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Sewer Overflow & Backup Response Field Guide

Drop Bucket Estimation Method

FG
4.3**Guidelines:**

Use this method only for small spills where the entire flow stream can be captured in a bucket.

Basic Procedure:

1. Place a bucket under the flow stream.
2. Time how many minutes it takes to fill the bucket.
3. Divide the volume of the bucket by the time it took to fill the bucket. This equals the flow rate in gallons per minute.
4. Multiply the flow rate times the duration of the spill (in minutes) to calculate the total estimated spill volume.

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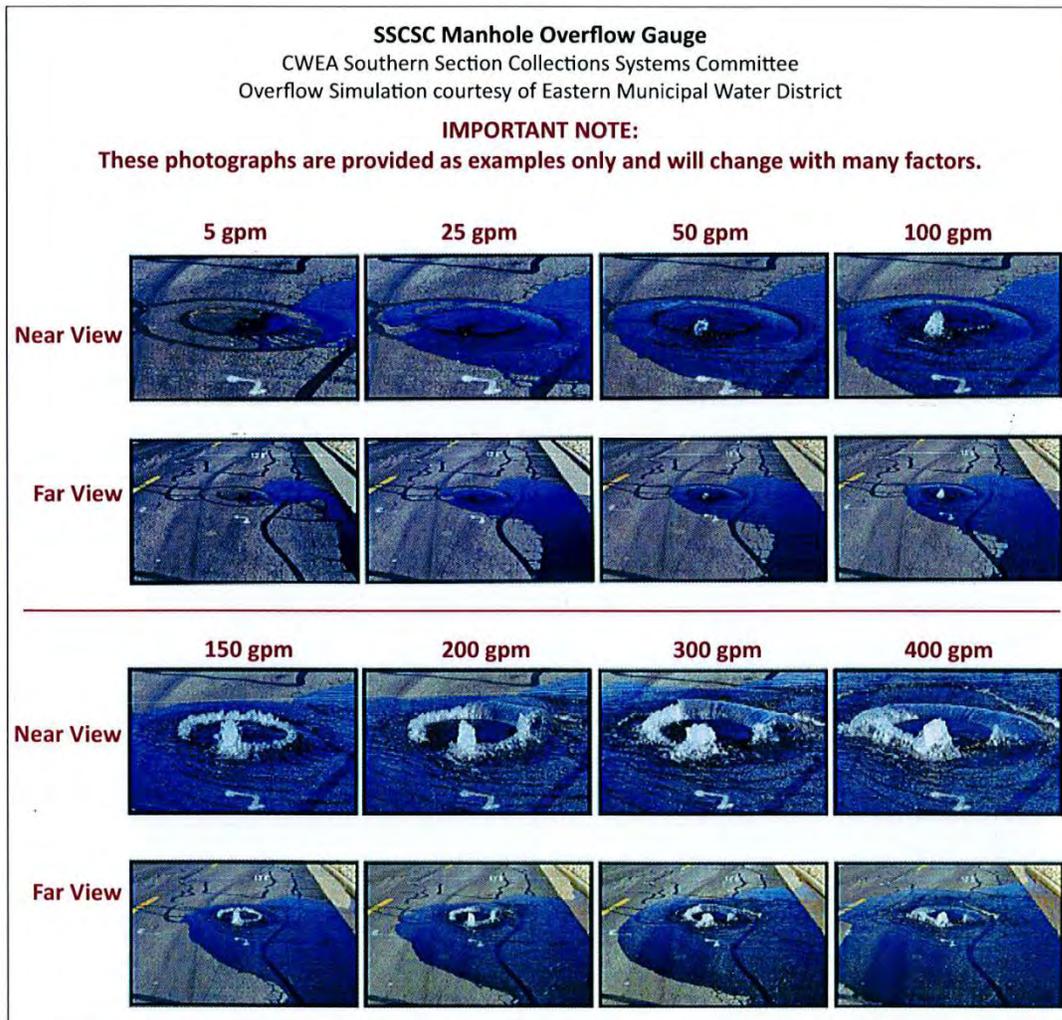
	<p>Sewer Overflow & Backup Response Field Guide</p> <p>Duration & Flow Rate Photo Comparison Estimation Method</p>	<p>FG 4.4</p>
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Guidelines

This estimation method is effective where spill is flowing freely and not ponding, or when the spill area and depth are difficult to measure

Basic Procedure:

1. Compare the spill to reference images below to estimate flow rate of the current overflow.
2. Multiply the spill rate by the spill duration to calculate the estimated spill volume.
3. Adjust the estimation if the spill did not occur during a period of consistent flow.



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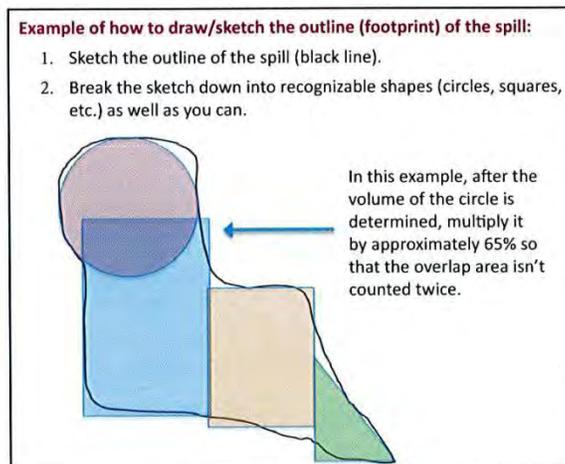
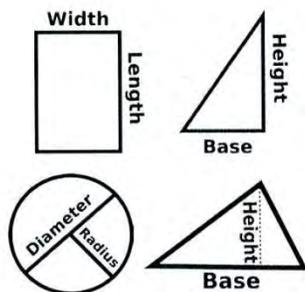
SMART	Sewer Overflow & Backup Response Field Guide Area/Volume: Ponded Sewage Estimation Method	FG 4.6
--------------	---	-----------

Guidelines:

The Area/Volume Estimation Method is effective on dry surfaces where the limits of the spill footprint can be determined. This method can only be used when the spill is contained and it is not effective during rain events and, in some cases, hot weather.

Basic Procedure:

1. Draw the outline (footprint) of the spill, and then break the footprint down into recognizable shapes (squares, circles, etc.)
2. Calculate the area of the footprint by calculating the area of each shape and adding the area calculations together. Be sure not to count overlapping areas twice (see drawing below). Use the following formulas:
 - Square/Rectangle Area = length x width
 - Circle Area = πr^2 (where $\pi \approx 3.14$ and $r = \text{radius} = \frac{1}{2} \text{ diameter}$)
 - Triangle Area = $\frac{1}{2} (\text{base} \times \text{height})$
3. Calculate the volume in cubic feet of the spill that **was not absorbed** into the ground by multiplying the spill area by the average depth of the spill. Convert the volume into gallons by multiplying the volume in cubic feet by 7.48 gallons.
4. To calculate the volume of the spill that was absorbed into the ground it is necessary to know the water content of the soil where the spill occurred. This can be calculated by pouring a known quantity of water into a measurable footprint and calculating the volume of the wetted soil (in gallons). Calculate the water content of the soil by dividing the known quantity of water by the volume of the wet soil and multiplying by 100.
5. Calculate the volume of the spill that **was absorbed** into the ground by multiplying the spill area by the average depth of the spill. Convert the volume into gallons by multiplying the volume in cubic feet by 7.48 gallons. Then multiply that figure by the water content to calculate the volume of absorbed sewage.
6. Add the volume not absorbed to the volume absorbed to calculate the total estimated volume of the spill.



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Sewer Overflow & Backup Response Field Guide

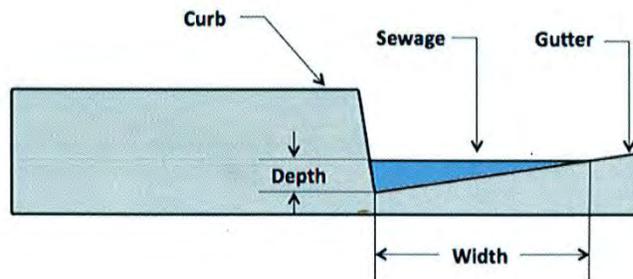
Area/Volume: Contained in Roadway Gutter Estimation Method

FG
4.8**Guidelines:**

This method can only be used for calculating the volume of sewage that is contained in a roadway gutter. See diagram below.

Basic Procedure:

1. Measure the length of the contained spill in feet.
2. Measure the depth and width of the overflow in the gutter in feet.
3. Calculate the overflow volume in cubic feet by multiplying length times depth times width. Convert the volume into gallons by multiplying by 7.48 gallons.



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Attachment vi-5
SSO Emergency Rapid Response Packet
FACILITIES DIVISION

**Attachment vi-5: SSO Emergency Rapid Response Packet FACILITIES DIVISION
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<u>Form</u>	<u>Form Number</u>
Responding to a Sanitary Sewer Overflow: Facilities Division	5-1
Sewer Overflow Report	5-2
Start Time Determination Form	5-3
Volume Estimation Forms	5-4a, 5-4b, 5-4c
CIWQS Database Reporting Sample Form.....	5-5

Purpose:

This procedure describes the emergency rapid response steps that the Facilities Division performs during a sanitary sewer overflow event. Note: This procedure is intended to be used by a trained, qualified, and experience Plant Maintenance Technician (PMT).

Work Steps:

1. Evacuate all people from the affected area.
2. Cordon off the affected area with yellow tape and traffic cones, and post someone to re-route traffic if necessary.
3. Assess the extent of spill and possible damage. Collect the information shown on the SSO Report (5-2).
4. Notify Protective Services of spill (x6999) and provide the information listed on the SSO Report (5-2). (Protective Services personnel notify on-call EH&S staff and the Fire Department, and convey the information provided by the PMTs.)

IMMEDIATE NOTIFICATION REQUIRED: If this SSO has reached a storm drain and is 1,000 gallons or more, contact ESG Leader at (510) 486-7416 office or (510) 289-9324 cell

5. Arrange for a plumber to clear or repair blocked or damaged sewer line. If Facilities plumber is not available, call Maintenance Supervisor to initiate contact of off-site plumbing contractor.
6. Contain the spill & return to system, keep from spreading, if possible.
 - If spill is small. Use absorbent sheets, rolls, or sandbags.
 - If spill is major and tank is not available. Contain sewage and pump effluent into the nearest working downstream sanitary drain or clean-out.
 - Divert away from sensitive areas like storm drains, dirt surfaces, drainage channels, etc.
 - Plug storm drain catch basins or use rubber mats to cover basin inlet and divert flow back to sewer system.
 - Build/excavate a berm to channel flow to downstream sanitary sewer manhole (barricade manhole if left open).
 - Divert to low area of ground where it can be collected later with vacuum truck.

Storm Drain Cleaning

1. Seal or berm the storm drain immediately downstream of point the SSO reached
2. Photograph impacted storm drain catch basins before cleaning
3. Vacuum any visible sewage – Record the volume of sewage recovered
4. Flush impacted sections of storm drain with 3X amount of SSO, if possible – Record volume of flush water
5. Ensure all visible signs of sewage have been removed
6. Return flush water to sanitary sewer – Record volume of flush water recovered
7. Photograph all storm drain catch basins after cleaning is complete

Area Cleanup

1. Remove all signs of gross pollution (toilet paper, solids, grease, etc.)
2. Flush area w/un-chlorinated water or use dechrolTabs – Unless raining (3X amount of SSO, if possible)
 - a. Setup berm/other means to contain all chlorinated flush water so it can be returned to sewer
 - b. Don't use disinfectants if they may enter storm drain system and not be fully recovered or if they may enter a water body
3. Photograph the area when cleanup operations are complete
4. Wash rubber gloves and boots with disinfectant soap and water when done.

**SSO Emergency Rapid Response Packet FACILITIES DIVISION
Sanitary Sewer Overflow (SSO) Report**

5-2

Fill in as much of the information below as possible:

IMMEDIATE NOTIFICATION: If this SSO has reached a storm drain and is 1,000 gallons or more, contact ESG Leader at (510) 486-7416 office or (510) 289-9324 cell

Don't forget photos!



Be sure to take photos before, during and after spill response activities.

Name of the Person filling out this form: _____

A. SSO LOCATION

SSO Location (Nearest Building):

Manhole ID (if known)

B. SSO OCCURRING TIME (complete Start Time Determination Form and then complete information below)

When was the SSO reported to sewer crew? (date and time):

Who reported the SSO (name and telephone number)

What time is the responder(s) arrive at the spill site?

Estimated SSO start date and time (if known):

Who was interviewed to help determine start time?

When was SSO cleared/stopped? (date and time)

C. SSO DESCRIPTION (Complete Volume Estimation Worksheets and/or refer to Field Guide as needed for estimations.)

SSO Appearance Point (check one or more): Gravity Mainline Manhole Lateral Cleanout
 Inside Building or Structure Other Sewer System Structure (specify):

Were there multiple appearance points? No Yes, number of appearance points:Did the SSO reach a storm drain, drainage channel, land (dirt) or water surface? Yes No

If yes, approximately what volume (in gallons):

If the SSO reached a storm sewer, was it fully captured and returned to the Sanitary Sewer? Yes No

Final Spill Destination: Drainage channel Building/structure Separate Storm drain Paved surface
 Unpaved surface Street/curb/gutter Other:

Estimate and document SSO volume using two or more of the worksheets provided (5-4a, 5-4b, 5-4c) and fill in the following information. Contact the Maintenance Supervisor to request additional resources if necessary.

Total Estimated SSO volume: _____ gallons

Estimated amount of SSO recovered: _____ gallons

Flow Rate: _____ gallons per hour

Which method(s) of volume estimation were used? (check all that apply):

 Eyeball Estimation Duration and Flow Rate Photo Comparison Area/Volume (include sketch/photo with dimensions)
Were photos taken? Yes No

Where are photos stored?

ROUTING:

Facilities: Return completed form with the Start time Determination form (5-3) and Volume Estimation Forms (5-4) to your Supervisor.

Supervisor: Review forms and forward to the SSO Manager at (510) 486-6939 (fax) or ekborglin@lbl.gov (email)

SSO Emergency Rapid Response: FACILITIES DIVISION
Start Time Determination Form

SSO Start Date: _____ Location: _____

Accurate start time determination is an essential part of SSO volume estimation. Depending on the flow rate, being even one minute off can have a huge impact on the volume estimation. Be as precise as possible. Do not round to quarter hour increments. Start time must be based on all available information (interviews with neighbors, emergency responders, etc.)

What time was LBNL notified of the SSO? _____ AM PM

Who notified LBNL? _____

Did they indicate what time they noticed the SSO? YES NO If yes, what time? _____ AM PM

Who at LBNL received the notification? _____

What time did the crew arrive at the site of the SSO? _____ AM PM

Who was interviewed regarding the start time of the SSO? Include their name, contact information, and the statement they provided:

Name	Contact Information	Statement

Describe in detail how you determined the start time for this particular SSO:

SSO Start Date: _____ SSO Start Time: _____ AM PM

SSO End Date: _____ SSO End Time: _____ AM PM

SSO Duration: _____ **minutes**

This form completed by:

Name: _____ Signature: _____

Job Title: _____ Date: _____

SSO Emergency Rapid Response: FACILITIES DIVISION
Volume Estimation: Eyeball Estimation Method

5-4a

Use this method only for small SSOs of less than 200 gallons.

SSO Date: _____ Location: _____

STEP 1: Position yourself so that you have a vantage point where you can see the entire SSO.

STEP 2: Imagine one or more buckets or barrels of water tipped over. Depending on the size of the SSO, select a bucket or barrel size as a frame of reference. It may be necessary to use more than one bucket/barrel size.

STEP 3: Estimate how many of each size bucket or barrel it would take to make an equivalent spill. Enter those numbers in Column A of the row in the table below that corresponds to the bucket/barrel sizes you are using as a frame of reference.

STEP 4: Multiply the number in Column A by the multiplier in Column B. Enter the result in Column C.

	A	B	C
Size of bucket(s) or barrel(s)	How many of this size?	Multiplier	Estimated SSO Volume (gallons)
1 gallon water jug		x 1 gallons	
5 gallon bucket		x 5 gallons	
32 gallon trash can		x 32 gallons	
55 gallon drum		x 55 gallons	
Other: _____ gallons		x _____ gallons	
Estimated Total SSO Volume:			

STEP 5: Is rainfall a factor in the SSO? Yes No

If yes, what volume of the observed spill volume do you estimate is rainfall? _____ gallons

If yes, describe how you determined the amount of rainfall in the observed spill?

STEP 6: Calculate the estimated SSO volume by subtracting the rainfall from the SSO volume:

_____ gallons – _____ gallons = _____ gallons
 Estimated SSO Volume Rainfall **Total Estimated SSO Volume**

Do you believe that this method has estimated the entire SSO? Yes No

If no, you MUST use additional methods to estimate the entire SSO. If yes, it is advisable to use additional methods to support the estimation. Explain why you believe this method has/has not estimated the entire SSO:

This worksheet completed by:

Name: _____ Signature: _____

Job Title: _____ Date: _____

SSO Emergency Rapid Response: FACILITIES DIVISION
Volume Estimation: Duration and Flow Rate Comparison Method

SSO Date: _____ Location: _____

STEP 1: Compare the SSO to reference images on Side 2 to estimate flow rate of the current overflow. Describe which reference photo(s) were used and any additional factors that influenced applying the reference photo data to the actual SSO:

Flow Rate Based on Photo Comparison: _____gallons per minute (gpm)

STEP 2: Complete the **Start Time Determination Form** to provide a detailed description of how start time was determined. Copy the SSO Duration from the Start Time Determination Form here:

SSO Duration: _____minutes

STEP 3: Multiply the flow rate by the SSO duration to calculate the estimated SSO volume.

_____ gpm X _____ minutes = _____ gallons
 Flow Rate SSO Duration Estimated SSO Volume

STEP 4: Did the SSO occur during a period of consistent flow in this portion of the system? Yes No
 If no, explain how, based on this portion of the collection system and its users, you believe it may have impacted the estimated SSO volume:

By what percentage are you adjusting the estimation? increase decrease _____%

Translate the percentage into gallons: _____gallons

STEP 5: Calculate the adjusted SSO volume estimate:

_____gallons + or - _____gallons = _____gallons
 Estimated SSO Volume Adjustment **Estimated SSO volume**

Do you believe that this method has estimated the entire SSO? Yes No

If no, you **MUST** use additional methods to estimate the entire SSO. If yes, it is advisable to use additional methods to support the estimation. Explain why you believe this method has/has not estimated the entire SSO:

This worksheet completed by:

Name: _____ Signature: _____
 Job Title: _____ Date: _____

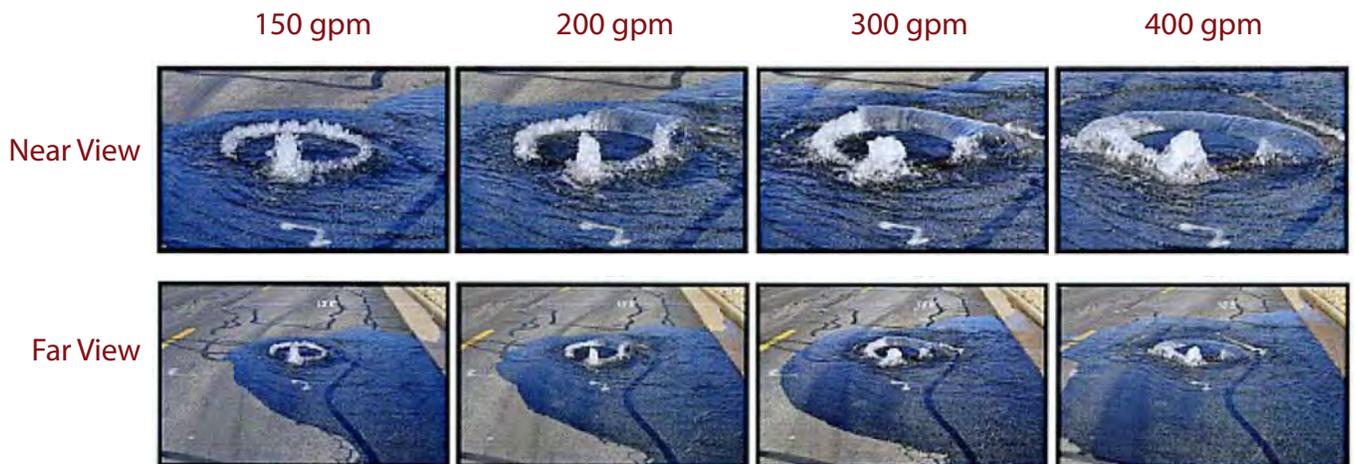
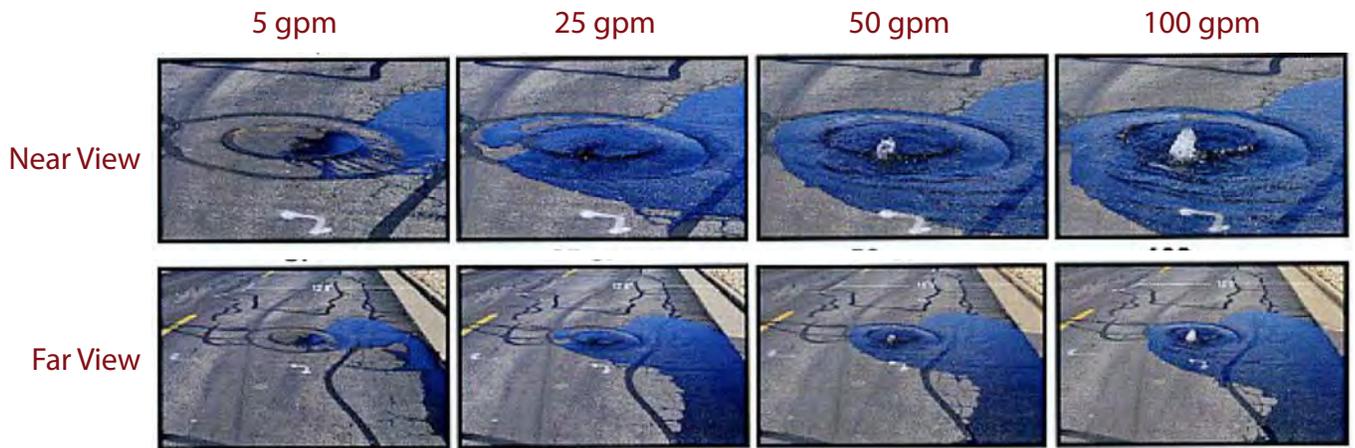
SSO Emergency Rapid Response: FACILITIES DIVISION
Volume Estimation: Duration and Flow Rate Comparison Method

IMPORTANT NOTE:

These photographs are provided as examples only and will change with many factors.

SSCSC Manhole Overflow Gauge

CWEA Southern Section Collections Systems Committee
Overflow Simulation courtesy of Eastern Municipal Water District



SSO Emergency Rapid Response Packet: FACILITIES DIVISION
Volume Estimation: Area/Volume Method

SSO Date: _____ Location: _____

STEP 1: Describe SSO area surface: Asphalt Concrete Dirt Landscape Inside Building
Other: _____

STEP 2: Draw/sketch the outline (footprint) of the SSO. Then break the footprint down into recognizable shapes.

STEP 3: Calculate the area of the footprint. Complete the table below for each shape identified in Step 2. If two shapes overlap, select one of the two shapes and estimate the percentage of that shape that does not overlap. Enter that percentage in the % Not Overlapping column. This will ensure that the overlap area is only counted once.

Rectangles	Length	X	Width	=	Area
	ft	X	ft	=	ft ²
	ft	X	ft	=	ft ²
	ft	X	ft	=	ft ²

Triangles	Base	X	Height	Multi-plier	=	Area
	ft	X	ft	÷ 2	=	ft ²
	ft	X	ft	÷ 2	=	ft ²
	ft	X	ft	÷ 2	=	ft ²

Circles	π	X	Radius	X	Radius	=	Area
	3.14	X	ft	X	ft	=	ft ²
	3.14	X	ft	X	ft	=	ft ²
	3.14	X	ft	X	ft	=	ft ²

Total SSO Area (sum of all three tables above): _____ ft²

GO TO SIDE 2

SSO Emergency Rapid Response Packet: FACILITIES DIVISION
Volume Estimation: Area/Volume Method

STEP 4: Calculate the depth of the SSO area. Do not include what was absorbed into the ground. If the SSO is a wet stain only, then the following depths are recommended: Wet stain on concrete .0313 inches; wet stain on asphalt .0156 inches.

- a. If the spill is of varying depths, take several measurements at different depths and find the average.

$$\frac{\text{inches}}{\text{sum of measurements}} \div \frac{\text{inches}}{\text{\# of measurements}} = \frac{\text{inches}}{\text{average depth in inches}} \div 12 = \frac{\text{feet}}{\text{average depth in feet}}$$

- b. Calculate volume of ponded sewage in cubic feet by multiplying the Total SSO Area in Step 3 by the average depth calculated in Step 4a. Convert from cubic feet to gallons by multiplying by 7.48.

$$\frac{\text{ft}^2}{\text{SSO area (Step 3)}} \times \frac{\text{ft}}{\text{average depth (Step 4a)}} = \frac{\text{ft}^3}{\text{SSO volume in of cubic feet}} \times 7.48 \text{ gal} = \frac{\text{gallons}}{\text{Estimated volume of ponded sewage}}$$

STEP 5: Estimate the volume of the SSO that was absorbed into the ground: _____ gallons

Explain what this estimation is based on:

STEP 6: Add the volume not absorbed (Step 4) plus the volume absorbed (Step 5) to get the total estimated volume:

$$\frac{\text{gallons}}{\text{volume not absorbed}} + \frac{\text{gallons}}{\text{volume absorbed}} = \frac{\text{gallons}}{\text{Estimated SSO volume}}$$

Do you believe that this method has estimated the entire SSO? Yes No

If no, you MUST use additional methods to estimate the entire SSO. If yes, it is advisable to use additional methods to support the estimation. Explain why you believe this method has/has not estimated the entire SSO:

This worksheet completed by:

Name: _____ Signature: _____
Job Title: _____ Date: _____

The following pages are screenshots of the State Water Resources Control Board's CIWQS database entry form. The information you gather on the SSO Report Form is essential to completing the CIQWS reporting. Thank you for your assistance in our reporting of this SSO event.

Insert CIQWS Printout here

Attachment vi-6
SSO Emergency Rapid Response Packet
EHS DIVISION

**Attachment vi-6: SSO Emergency Rapid Response Packet EHS DIVISION
Table of Contents**

<u>Form</u>	<u>Form Number</u>
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EHS SSO Checklist.....	6-2
Immediate Reporting and CIWQS Reporting Schedule.....	6-3
Regional Water Quality Control Board Notification Fax.....	6-4
Sanitary Sewer Overflow Report: EHS Expanded Form	6-5
California Integrated Water Quality System Sample Form	6-6
Collection System Failure Analysis	6-7

**SSO Emergency Rapid Response Packet EHS DIVISION
Responding to a Sanitary Sewer Overflow: EHS Division**Purpose:

This procedure describes the response and reporting steps the EHS Environmental Services group (ESG) performs during a sanitary sewer overflow event.

Work Steps:

Once a call is received reporting a SSO the Environmental Service Group Representative will attempt to collect as much information as possible from the "reporting party". Information will be collected on the Sanitary Sewer Overflow Report (6-5) and includes:

- Estimated SSO volume discharged (gallons)
- If ongoing, estimated SSO discharge rate (gallons per minute)
- SSO Incident Description: a. Brief narrative. b. On-scene point of contact for additional information (name and cell phone number)
- Date and time enrollee became aware of the SSO
- Name of sanitary sewer system agency causing the SSO
- Indication of whether the SSO has been contained
- Indication of whether surface water is impacted
- Name of surface water impacted by the SSO, if applicable
- Indication of whether a drinking water supply is or may be impacted by the SSO
- Any other known SSO impacts
- SSO incident location (Building or manhole number etc.)

Other information needed for the California Integrated Water Quality System (CIWQS) listed below and in Attachment 6-5 and 6-6:

- The date and time the SSO started or was first observed and the name of the person who first reported it.
- What volume was spilled and did it reach a storm drain or drainage channel?
- Was any of the SSO captured and returned to the sewer system?
- Was any of the spill otherwise captured or contained?
- Ongoing investigation taking place?
- Were health warnings posted?
- Were samples of impacted waters collected? If YES, select the analyses performed for: DO, Ammonia, Bacteria, pH, Temperature

For more detailed procedures refer to ESG Procedure 203 Notification Procedure for Environmental Releases into Storm Drains or Creeks.

IMMEDIATE NOTIFICATION:

If this is a Category 1 SSO $\geq 1,000$ gallons, contact CalOES within 2 hours at (800) 852-7550.

Following the initial notification to Cal OES and until such time that an enrollee certifies the SSO report in the CIWQS Online SSO Database, the enrollee shall provide updates to Cal OES regarding substantial changes to the estimated volume of untreated or partially treated sewage discharged and any substantial change(s) to known impact(s).

For any media requests: Contact Public Affairs at (510) 486-6601

For more information refer to: 6-3 "Immediate Reporting and CIWQS Reporting Schedule"
6-5 "Sanitary Sewer Overflow Report: EHS Expanded Form"
6-6 "CIWQS Spill Questionnaire"

- Receive notification of SSO**

- If it is a Category 1 SSO greater than or equal to 1,000 gallons, contact CalOES within two hours at (800) 852-7550**

- Receive information from Facilities Division:**
 - SSO Report: Facilities (5-2)**
 - Start Time Determination Form (5-3)**
 - Volume Estimation Forms (5-4a, -4b, -4c)**
 - Collection System Failure Analysis (5-5)**

- Refer to the Immediate Reporting and CIWQS Reporting Schedule and make all necessary notifications**

- Forward the Failure Analysis Report (6-7) to Facilities Maintenance and request that they complete and return it.**

**SSO Emergency Rapid Response Packet EHS DIVISION
Immediate Reporting and CIWQS Reporting Schedule**

The following table summarizes the immediate reporting and the CIWQS reporting schedule. Refer to *Notification Procedure for Environmental Releases into Storm Drains or Creeks* for additional State and Federal reporting requirements.

Deadline	Category 1 SSO SSO ¹ of any volume that either reaches surface water and/or a drainage channel, or reached an MS4 ² and was not captured and returned or disposed of.	Category 2 SSO SSO ¹ greater than or equal to 1,000 gallons that either does not reach surface water, drainage channel, or MS4 ² , or the entire SSO was fully recovered and disposed of properly.	Category 3 SSO All other SSOs ¹
Immediately	<ul style="list-style-type: none"> Environmental Services Group Representative 	<ul style="list-style-type: none"> Environmental Services Group Representative 	<ul style="list-style-type: none"> Environmental Services Group Representative
2 hours after awareness of SSO	<ul style="list-style-type: none"> If the spill is greater than or equal to 1,000 gallons, notify CalOES³ Notify University of California at Berkeley Campus Notify City of Berkeley Toxics Management Division and Environmental Health Division Notify Department of Energy Site Office 	<ul style="list-style-type: none"> Notify Department of Energy Site Office 	-
48 Hours after awareness of SSO	If 50,000 gal or more were spilled to surface water, begin water quality sampling and initiate impact assessment	-	-
3 Days after awareness of SSO	Submit Draft Spill Report in the CIWQS ⁴ database	Submit Draft Spill Report in the CIWQS ⁴ database	-
15 Days after response conclusion	Certify Spill Report in CIWQS ⁴ . Update as needed until 120 days after SSO end time	Certify Spill Report in the CIWQS ⁴ database. Update as needed until 120 days after SSO end time	-
30 Days after end of calendar month in which SSO occurred	-	-	Certify Spill Report in CIWQS ⁴ . Update as needed until 120 days after SSO end time
45 days after SSO end time	If 50,000 gal or more were spilled to surface water, submit SSO Technical Report using CIWQS ⁴	-	-

¹ The term SSO refers to a discharge of untreated or partially treated wastewater resulting from a sanitary sewer system failure or flow condition.

² MS4 = Municipal Separate Storm Sewer System

³ Note: CalOES will notify San Francisco Bay, San Francisco Regional Water Quality Control Board (SFRWQCB), Department of Fish and Wildlife, and the City of Berkeley Toxics Management Division.

⁴ In the event that the CIWQS online SSO database is not available, make required notifications to the SFRWQCB office using 6-3, and notify the State Water Resources Control Board (SWRCB) by phone or email until the CIWQS database becomes available.

SSO Emergency Rapid Response Packet EHS DIVISION
Immediate Reporting and CIWQS Reporting Schedule**Contact Information**

Refer to Environmental Services Group (ESG), *Notification Procedure for Environmental Releases into Storm Drains or Creeks*, Table 7.6 for additional contact information.

Contact	Telephone/Fax/Email
California Office of Emergency Services (CalOES)	(800) 852-7550
Environmental Services Group Leader	(510) 486-7614 <i>office</i> ; (510) 289-9324 <i>cell</i>
University of California at Berkeley	(510) 642-3073
City of Berkeley Toxics Management Division, Nabil Al-Hadithy	(510) 981-7461
City of Berkeley Environmental Health Division, Manuel Ramirez	(510) 981-5261
Department of Energy Site Office, Kim Abbott	(510) 486-7909
San Francisco Regional Water Quality Control Board (SFRWQCB)	Telephone: (510) 622-2369 Fax: (510) 622-2460
State Water Resources Control Board (SWRCB): Russell Norman, P.E. Victor Lopez, Water Resources Control Engineer	(916) 323-5598 Russell.Norman@waterboards.ca.gov (916) 323-5511 Victor.Lopez@waterboards.ca.gov

Authorized Personnel:

The following are authorized to perform regulatory reporting of SSOs:

Name	Title	Office	Cell	✓ If LRO*
Rob Pauer	EHS Group Leader	(510) 486-7614	(510) 289-9324	✓
Ned Borglin	SSO Manager	(510) 486-7614	(925) 437-9397	✓
Pat Thorson	EMS Manager	(510) 486-5852	(510) 301-0938	
Robert Fox	Wastewater Manager	(510) 486-7327	(510) 367-9623	✓

* Legally Responsible Officials (LROs) are authorized to electronically sign and certify SSO reports in CIWQS.

**SSO Emergency Rapid Response Packet EHS DIVISION
Regional Water Quality Control Board Notification Fax**

NOTE TO LBNL Staff: Only use this form in the event CIWQS online SSO database is not available

FAX TO: San Francisco Regional Water Quality Control Board Date: _____
 Fax Number: (510) 622-2460 # Pages: _____

FROM: Lawrence Berkeley National Laboratory
 Telephone: (510) 486-7614
 Fax: (510) 486-4776

Address of SSO: _____ City: _____

County: _____ Date/Time: _____

SSO Start Time: _____ SSO Stop Time: _____

Volume of SSO: _____ Volume Recovered: _____

Final Disposition: _____

Affected Water Body: _____

Samples Collected? YES NO

Taken to: _____

Crew Members: _____

<u>Agencies Notified</u>	<u>Number(s)</u>		<u>Contact</u>	<u>Time</u>	<u>Date</u>
CalOES	(800) 852-7550	<input type="checkbox"/> YES <input type="checkbox"/> NO	_____	_____	_____
SWRCB Russell Norman or Victor Lopez	(916) 323-5598 (916) 323-5511	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/> NO	_____	_____	_____

OTHER: _____

SSO Emergency Rapid Response Packet: EHS DIVISION
Sanitary Sewer Overflow Report: EHS Expanded Form

Shaded areas should have been completed on the Sanitary Sewer Overflow Report: Facilities Division

SSO Category (check one):

- Category 1: Discharge of untreated or partially treated wastewater of any volume resulting from a sanitary sewer system failure or flow condition that either (1) Reaches surface water and/or drainage channel tributary to a surface water; OR (2) Reached a Municipal Separate Storm Sewer System (MS4) and was not fully captured and returned to the sanitary sewer system or otherwise captured and disposed of properly.
- Category 2: Discharge of untreated or partially treated wastewater greater than or equal to 1,000 gallons resulting from a sanitary sewer system failure or flow condition that either (1) Does not reach surface water, a drainage channel, or an MS4, OR (2) The entire SSO discharged to the storm drain system was fully recovered and disposed of properly.
- Category 3: All other discharges of untreated or partially treated wastewater resulting from a sanitary sewer system failure or flow condition

IMMEDIATE NOTIFICATION: If this is a Category 1 SSO \geq 1,000 gallons, contact CalOES within 2 hours at (800) 852-7550.**A. SSO LOCATION**

SSO Location Name (nearest building):	Manhole ID:
Latitude Coordinates:	Longitude Coordinates:
Street Name and Number:	
Nearest Cross Street:	City: Zip Code:
County:	SSO Location Description:

B SSO OCCURRING TIME (complete Start Time Determination Form and then complete information below)

Estimated SSO start date:	Estimated SSO start time:
Date SSO reported to sewer crew:	Time SSO reported to sewer crew:
Date sewer crew arrived:	Time sewer crew arrived:
Who was interviewed to help determine start time?	
Estimated SSO end date:	Estimated SSO end time:

C. SSO DESCRIPTION (Complete Volume Estimation Worksheets and/or refer to Field Guide as needed for estimations.)

SSO Appearance Point (check one or more): <input type="checkbox"/> Gravity Mainline <input type="checkbox"/> Manhole <input type="checkbox"/> Lateral Cleanout <input type="checkbox"/> Inside Building or Structure <input type="checkbox"/> Other Sewer System Structure (specify):	
Were there multiple appearance points? <input type="checkbox"/> No <input type="checkbox"/> Yes, number of appearance points:	
Did the SSO reach a storm drain, drainage channel, land (dirt) or water surface? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, approximately what volume (in gallons):	
If the SSO reached a storm sewer, was it fully captured and returned to the Sanitary Sewer? <input type="checkbox"/> Yes <input type="checkbox"/> No	
If ongoing, what is the flow rate?(gallons per minute):	
Final Spill Destination: <input type="checkbox"/> Drainage channel <input type="checkbox"/> Building/structure <input type="checkbox"/> Separate Storm drain <input type="checkbox"/> Paved surface <input type="checkbox"/> Unpaved surface <input type="checkbox"/> Street/curb/gutter <input type="checkbox"/> Other:	
Total Estimated SSO volume (in gallons – 1,000gal or more = Category 1):	gallons
Est. volume that reached a separate storm drain that flows to a surface water body:	gal Recovered: gal
Est. volume that reached a drainage channel that flows to a surface water body:	gal Recovered: gal
Est. volume discharged directly to a surface water body:	gal Recovered: gal
Est. volume discharged to land:	gal Recovered: gal
Which method(s) of volume estimation were used? (check all that apply): <input type="checkbox"/> Eyeball Estimation <input type="checkbox"/> Duration and Flow Rate Photo Comparison <input type="checkbox"/> Area/Volume (include sketch/photo with dimensions)	

SSO Emergency Rapid Response Packet: EHS DIVISION
Sanitary Sewer Overflow Report: EHS Expanded Form**D. CAUSE OF SSO**

Where did failure occur? (Check all that apply): Gravity Mainline Lower Lateral Manhole Upper Lateral
 Other:

SSO cause (check all that apply): Construction Diversion Failure CS Maintenance
 Damage by others Debris (specify): Ofrom Construction Ofrom Lateral OGeneral ORags Flow Exceeded Capacity
 FROG (Fats, roots, oil, and grease) Inappropriate Discharge Natural Disaster Operator Error Root Intrusion
 Pipe Structural Problem/Failure Pipe Structural Problem/Failure (Installation) Rainfall Exceeded Design
 Vandalism Non - Dispersible Wipes Other (specify):

Diameter (in inches) of pipe at point of blockage/spill cause (if applicable):

Sewer pipe material at point of blockage/spill cause (if applicable):

Estimated age of sewer asset at the point of blockage or failure (if applicable):

Description of terrain surrounding point of blockage/spill cause: Flat Mixed Steep

E. SSO RESPONSE

SSO response activities (check all that apply): Cleaned-Up Mitigated Effects of Spill Contained All or Portion of Spill
 Restored Flow Returned All Spill to Sanitary Sewer System Returned Portion of Spill to Sanitary Sewer System
 Other Enforcement Agency Notified (specify):
 Other (specify):

SSO response completed (date & time):

Visual inspection result of impacted waters (if applicable):

Any fish killed? Yes No Any ongoing investigation? Yes No

Were health warnings posted? Yes No If yes, provide health warning/beach closure posting/details:

Was there a beach closure? Yes No If yes, name of closed beach(es):

Were samples of impacted waters collected? Yes No

If YES, select the analyses: DO Ammonia Bacteria pH Temperature Other:

Recommended corrective actions: (check all that apply and provide detail)

- Add sewer to preventive maintenance program
 Adjust schedule/method of preventive maintenance
 Enforcement action against FROG source
 Inspect Sewer Using CCTV to Determine Cause
 Plan rehabilitation or replacement of sewer
 Repair Facilities or Replace Defect
 Other (specify)

What major equipment was used in the response?

List all LBNL personnel involved in the response including name, title and their role in the response:

F. NOTES**G. NOTIFICATION DETAILS**

CalOES contacted date and time (if applicable):

CalOES Control Number (if applicable):

Spoke to:

This form prepared by: NAME:

TITLE:

DATE:

The following pages are screenshots of the State Water Resources Control Board's CIWQS database entry form.

Insert CIQWS Printout here

**SSO Emergency Rapid Response Packet: EHS DIVISION
Collection System Failure Analysis**

**6-7
Side A**

The State Water Resources Control Board requires a debriefing to be conducted following every Sanitary Sewer Overflow. This form is to be used as a guide during the process of evaluating the event and determining if actions should be taken to reduce the likelihood of future SSOs.

Incident Report #		Prepared By	
SSO/Backup Information			
Event Date/Time		Building (Location)	
Volume Spilled		Volume Recovered	
Cause			
Summary of Historical SSOs/Backups/Service Calls/Other Problems			
Date	Cause	Date Last Cleaned	Crew
Records Reviewed By:		Record Review Date:	
Summary of CCTV Information			
CCTV Inspection Date		Tape Name/Number	
CCTV Tape Reviewed By		CCTV Review Date	
Observations			

Go to Side B

SSO Emergency Rapid Response Packet: EHS DIVISION
Collection System Failure Analysis

Recommendations					
□	Type	Specific Actions	Who is Responsible?	Completion Deadline	Who Will Verify Completion?
	No Changes or Repairs Required	n/a	n/a	n/a	n/a
	Repair(s)				
	Construction				
	Capital Improvement(s)				
	Change(s) to Maintenance Procedures				
	Change(s) to Overflow Response Procedures				
	Training				
	Misc.				
Comments/Notes:					
List all Participants in the Debriefing/Analysis Process:					
Supervisor Review Date:			Division Manager Review Date:		

Attachment vi-7:

Sewage Spill Cleanup: Interior Emergency Procedure (Facilities Procedure EMRG - 050)

SEWAGE SPILL CLEANUP: INTERIOR EMERGENCY PROCEDURE

APPLICATION

This procedure describes the steps for cleaning up an interior sewage spill at the Lab.

SPECIAL INSTRUCTIONS

- Due to the potential for biological hazards from spilled sewage, it is essential that this procedure be followed carefully and that personnel avoid contact with the spilled material.
- **Special Equipment:** Rubber gloves, eye protection and rubber boots.

WORK STEPS

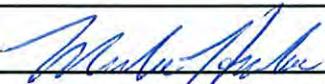
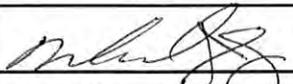
1. Cordon off the affected area with yellow tape, barricades, or wet floor signs.
2. Clean up spill:
 - Use mop and bucket for liquid waste.
 - Use shovel or available dust pan for solid waste.
3. Dispose of sewage in nearest available toilet.
4. Wash all affected floors, walls, and furniture with a 10% bleach, 90% water solution.
5. Clean, disinfect, and rinse cleaning equipment from Step 3.
6. Disinfect, rinse, and dispose of expendable equipment (e.g., cloth rags, rubber gloves, boots).

REFERENCES

None.

RESPONSIBILITIES AND CONTROLS

Provide signature lines as follows:

Rev. No.	Facilities SME/Title	Approved/Title	Date	Effective Date
3			1/15/13	1/15/13
	Mike Hudson Maintenance Supervisor	Michael Jang Maintenance Manager		

Attachment vi-8:

Interior Sanitary Sewer Clearing Safety Operating Procedure

(Facilities OPER – 075)

INTERIOR SANITARY SEWER CLEARING SAFETY OPERATING PROCEDURE

APPLICATION

Safe clearing of a clogged interior sanitary sewer line.

SPECIAL INSTRUCTIONS

1. Wear Nitrite safety gloves under leather safety gloves.
2. Wear eye protection (safety glasses and a full face shield).
3. Drain-opening machine training is required if the job demands it.
4. Face shields and rubber gloves are required for work on chemical hoods and cabinets.
5. Technicians should exercise extreme caution when operating a mechanical drain-opening machine. Whenever possible, there should be two technicians present when using the machine.
6. Under no circumstances should a technician attempt to lift the machine alone or to operate the machine when the cable is difficult to control.
7. Workers must have EHS0735—Bloodborne Pathogen Training.
8. Workers must have current Hepatitis B shot (check with Medical x6266).
9. Workers must wear full Tyvek protective suits.
10. Use hearing protection as necessary.
11. Validate that the building is not subject to hazardous contamination in accordance with EH&S Active Radiological Work Locations Map and Legacy Radioactive Material Locations Buildings With Known or Suspected Radioactive Materials: radiation, mercury, etc.

WORK STEPS

1. Notify building manager that the work is being done and how long it will take.
2. Restrict entry into the area. If it is not practical to restrict entry, cordon off a safe distance from the work being performed.
3. Secure facilities as necessary and post notices. See OPER-045, "Lockout/Tagout."
4. If work is to be performed on a chemical hood or cabinet, refer to OPER-077, "Chemical Hood and Cabinet Safety Procedure," and carefully follow the instructions.
5. If a mechanical drain-opening machine is required, go to Step 7; otherwise, continue.
6. Clear drain with plunger and/or hand auger. Go to Step 13.
7. Ensure that the mechanical drain-opening machine is properly grounded, with a ground fault circuit interrupter (GFCI) installed.
8. Put on Nitrite gloves under leather safety gloves and eye protection (safety glasses and a full face shield).
9. If access to the source of the problem is restricted, or if there is difficulty in controlling the cable, obtain assistance. Remote use of a snake is dangerous, due to the exposed length of the cable.
10. If it is necessary to lift the machine, use a truck-mounted hydraulic crane. If a truck-mounted hydraulic crane is not available or access is not possible, obtain assistance. Do not attempt to lift the machine by yourself.

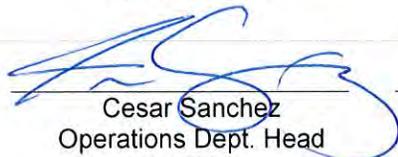
11. Clear the drain with a mechanical drain-opening machine.
12. Clean the machine, and oil the cable.
13. Notify the Building Manager that the work is complete.

REFERENCES

OPER-077 Chemical Hood and Cabinet Safety Procedure.

RESPONSIBILITIES AND CONTROLS

Provide signature lines as follows:

Rev. No.	SME/Title	Approved/Title	Date	Effective Date
1	 Tom Reese Utility Coordinator	 Cesar Sanchez Operations Dept. Head Facilities	012813 1-24-13	

Attachment vi-9:

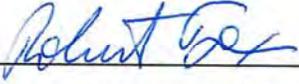
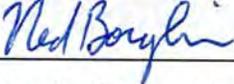
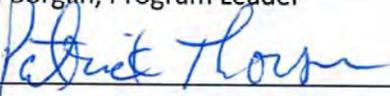
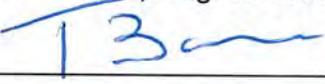
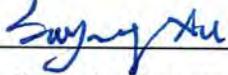
Sampling Unauthorized Non- Stormwater Discharges (ESG Procedure 260)



Environmental Services Group (ESG)
Sampling Unauthorized Non-Stormwater
Discharges

ESG Procedure 260
Revision 01 (October 15, 2013)
On the Spot Revision (April 15, 2014)

**Signature Sheet for Procedure 260
Sampling Unauthorized Non-Stormwater Discharges**

Prepared By:	<u></u>	Date:	<u>10/10/2013</u>
	John Jelinski, Quality Coordinator		
Reviewed By:	<u></u>	Date:	<u>10/10/13</u>
	Tom Donovan, Sample Collector		
Reviewed By:	<u></u>	Date:	<u>10/10/13</u>
	Robert Fox, Program Leader		
Reviewed By:	<u></u>	Date:	<u>10/10/2013</u>
	Ned Borglin, Program Leader		
Reviewed By:	<u></u>	Date:	<u>10/10/13</u>
	Patrick Thorson, Program Leader		
Reviewed By:	<u></u>	Date:	<u>10/16/13</u>
	Tim Bauters, Program Leader /Contractor		
Reviewed By:	<u></u>	Date:	<u>10/10/13</u>
	Suying Xu, Data Manager		
Approved By:	<u></u>	Date:	<u>10/17/13</u>
	Ron Pauer, Group Leader		
Approved By:	<u></u>	Date:	<u>10/17/13</u>
	David Kestell, Department Head		

Signature Sheet for Procedure 260
Sampling Unauthorized Non-Stormwater Discharges
(For additional personnel performing work under this procedure)

Reviewed By:  Date: 5/19/2014
Brendan Mulholland, Program Leader/Sub-Contractor

Reviewed By:  Date: 5/20/2014
Neel Singh, Sample Collector/Sub-Contractor

Reviewed By: _____ Date: _____

Reviewed By: _____ Date: _____

Reviewed By: _____ Date: _____

Sampling Unauthorized Non-Stormwater Water Discharges

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Record of Revisions

Revision	Date	Description
01	10/15/2013 04/15/2014	Update Procedure format, include EHS title and logo. Update references including RMP. Add RWA 1178 references. Added footer note for controlled document.

1 Overview

1.1 Purpose

The purpose of this procedure is to provide sampling guidelines for accidental unauthorized non-stormwater discharges (NSWDs) that potentially enter Lawrence Berkeley National Laboratory's (LBNL's) storm drain system and/or surface waters. The discharges to the storm drain system flow into Strawberry Creek and eventually into the San Francisco Bay.

1.2 Scope

The primary focus of this procedure is sampling of water resulting from a release from the sanitary sewer, potable water sources, or cooling towers.

Release of potable water may be due to pipeline breaks, while release of sewage from a sanitary sewer overflows (SSO) may result from a blockage within the sewer system. Given the number and locations of storm drain inlets (approximately 350) on site, there's a significant potential that an accidental release can result in chlorinated water or raw sewage discharging into the storm drain system.

Non-authorized non-storm water discharges require an immediate response from LBNL's Environmental Services Group (ESG). Response actions include notifying potential affected parties and regulatory agencies, assessing the extent and impact, and coordinating sampling activities. Agency notifications, reporting, emergency response and contact lists are described in ESG Procedure 203, *Notification Procedures for Environmental Releases into Storm Drains or Creeks*.

2 Definitions

Blank Sample: Purified water is provided by an analytical laboratory in order to assess artifacts in the sampling and analysis process. The purified water may be used to prepare the following types of blanks:

- Equipment blanks – also referred to as sampling equipment blanks, as defined by the EPA – are used to check the cleanliness of sampling equipment.
- Travel blanks – also referred to as field blanks, as defined by the EPA – are used to check for background contamination from sampling location and/or site conditions.
- Trip blanks are used to check if sample container, shipping, or handling procedures are contributing to sample contamination.

For EPA definitions for sampling equipment blank, field blank, and trip blank see:

http://www.epa.gov/emap/html/pubs/docs/resdocs/ga_terms.html

Chain of Custody Form (COC): The ESG document that follows the sample from the point of assembly through sample shipment to final disposition. Custody of the sample is indicated on the document by signature and dates of possession.

Composite Collection Form: The ESG document used to record field notes for composited samples. The form includes identifying information that may not be forwarded to an analytical laboratory such as site location, total sample volume, flow through the composite sampler, and total elapsed time.

Cooling Tower Water: Circulated water, either open or closed loop which is used in a cooling tower system. The water is circulated to lower its temperature by partial evaporation. Cooling tower water often contains added chemical constituents which may be harmful to aquatic organisms.

Duplicate Sample: A second sample collected immediately following the collection of a primary sample. A duplicate is handled and processed in an identical manner as the primary sample.

East Bay Municipal Utility District (EBMUD): The publically-owned company that provides waste and wastewater services at the LBNL.

Grab Sample: A single sample collected within a short period of time – usually 15 minutes or less. A grab sample is usually taken when there is an expectation of sample constituents that may decompose, degrade, or evaporate over time (e.g., volatile organics). A grab sample is also necessary when samples must be collected directly (e.g., oil or grease from the surface of a water body).

Potable Water: Water of sufficiently high quality that can be consumed or used with low risk of immediate or long term harm. Potable water contains a small amount of either chlorine or chloramines which is used as a disinfectant. Both chlorine and chloramines are highly toxic to fish and other aquatic organisms.

Representative Sampling: Sample collection that is representative of both the volume and nature of the monitored discharge.

Sample Collection Form: The ESG document used by the sample collection staff to record field notes regarding collected samples. This form contains information about the samples which may not be given to the analytical lab, such as sampling site location and sample collection notes. The Sample Collection Form is used in conjunction with the Composite Collection Form if the collection contains composited samples. If the collection consists solely of grab samples, all information, such as any notes associated with the individual samples, is entered on the Sample Collection Form.

Split Sample: A sample that is divided into two or more equal portions; all steps of the sampling and analytical procedures are carried out in an identical manner for each portion.

Wastewater: Industrial sewage and other treated or untreated wastewater discharged into, or permitted to enter, a community sewer system connected to an EBMUD interceptor for wastewater treatment. As used in LBNL's permit and in District Ordinance No. 311A-03, "wastewater" means sewage, industrial, and other wastes discharged to a community sewer system.

Workday: The time during a 24-hour period that the system being sampled may operate and discharge wastewater.

3 Responsibilities

3.1 Group Leader

- Determines overall strategic direction.
- Establishes ESG policies and procedures.
- Prepares funding requests to obtain necessary resources to support ESG policies and procedures.
- Ensures ESG policies and procedures meet regulatory standards and DOE requirements.
- Oversees and/or performs emergency response notifications.
- Releases results from analytical laboratories in the ESG database.
- Approves reports and submits them to regulatory agencies, DOE and public organizations.

3.2 Program Leader

Note: Responsibilities may be shared or split between the various Program Leaders.

- Directs and/or performs sampling activities.
- Performs emergency response notifications.
- Authenticates sampling results from analytical laboratories in ESG database.
- Assesses procedure implementation.
- Prepares reports submitted to the appropriate agencies.

3.3 Sample Collector

Note: Responsibilities may be shared or split between the various Sample Collectors.

- Collects emergency response samples according to established policies and procedures.
- Generates labels, Chain-of-Custody Forms, Sample and Composite Collection Forms, as appropriate, from the ESG database.
- Measures any water chemistry parameters (pH, conductivity, turbidity and chlorine) required under this procedure
- Processes and ships samples to analytical laboratories.
- Makes all required database entries.
- Inspects, maintains and calibrates equipment.

3.4 Quality Coordinator

- Prepares this procedure.
- Retains all calibration records identified by this procedure.
- Coordinates sample submission to and results received from analytical laboratories.
- Verifies Sample collection paperwork.
- Provides backup sample collection, processing and shipping.

3.5 Data Manager

- Creates and modifies Collection Form templates in the ESG database.
- Maintains electronic and hard copy files of all ESG sample data.
- Resolves any issues requiring modification of collection data after samples have been submitted for analysis.
- Provides backup data entry.
- Uploads analytical labs electronic data deliverables (EDD) into the ESG database.

4 Policy

4.1 Basic Health and Safety Policy

This procedure complies with:

- LBNL's implementation of applicable DOE and University of California (UC) required environment, health, and safety policies as defined in the DOE-UC Management Contract (Contract 31)
- LBNL health and safety policies as described in the LBNL *Requirements and Polices Manual, Environment, Safety, and Health Section*, LBNL/PUB-201 and the Environment/ Health/ Safety (EHS) Division's *Integrated Safety Management Plan*
- The environment, health, and safety measures assessed for the job function and defined in each worker's job hazards analysis (JHA)

Safety risks associated with surface water sampling have been reviewed and preventative measures have been incorporated into this procedure. Both LBNL employees and "guest workers" (contractors holding an LBNL badge) are required to complete a JHA. The JHA process results in a worker hazard and control description (hazards profile). Approval signature of the JHA by the worker's supervisor constitutes the work authorization document for the activities covered by the JHA.

4.2 Training Requirements

At a minimum, the following LBNL safety training courses are required for samplers:

- Overview of ES&H at LBNL (EHS0010)
- Ergonomic Self-Assessment for Computer Users & Refresher (EHS0059 and EHS0058)
- Worksmart Ergonomics (EHS0062)
- Ladder Safety Training (EHS00278)
- General Employee Radiological Training (EHS0470)
- Fire Extinguisher Safety and Refresher (EHS0520, EHS0522 and EHS0531)
- Chemical Hygiene and Safety and Refresher (EHS0348 and EHS0353)

All sampling personnel receive job-specific training by reviewing the appropriate procedures. In addition, on-the-job training includes reviewing sample handling and preparation; operations; and documentation.

All training courses must be documented in the LBNL training database, and all required documentation must be kept up-to-date. On-the-job training is documented via signatures on specific ESG procedures.

4.3 Authorizations

Work performed within the scope of this procedure is done in accordance with Radiological Work Authorization (RWA) 1178, *Environmental Services Site-Wide Air, Water, and Soil Sampling*.

4.4 Analysis Requirements

All offsite analytical laboratories must be California state-certified for the particular analysis that they are performing. In addition, off-site analytical laboratories may be reviewed by the Department of Energy Consolidated Audit Program (DOECAP).

4.5 Equipment Maintenance and Inspection

All equipment used for sampling and analysis must be routinely inspected and maintained to ensure its accuracy. Portions of the sampling equipment that come in contact with the wastewater should be cleaned prior to each use by scrubbing with soapy water and rinsing with de-ionized, distilled or tap water several times. Equipment calibration records are tracked by the Quality Coordinator. Broken or non-functioning equipment needed for this procedure should be repaired or replaced as soon as possible with clean and calibrated, and if necessary, new equipment.

4.6 Reporting

Data from emergency response sampling activities must be reported to the Office of Emergency Services (OES) and may be reported to other regulatory agencies such as, the Regional Water Quality Control Board (RWQCB) and City of Berkeley depending on the quantity and constituents of the release. The University of California at Berkeley (UCB) may also need to be notified if there are potential impacts to creeks that flow through the UCB campus.

4.7 Basic Sampling Policy

Containers, sample methods, sample preservation, holding times, and analytical methods for each sampling parameter must meet applicable sections of the following standards:

- *Standard Methods for the Examination of Water and Wastewater*, latest edition
- EPA 40 CFR Part 136, *Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act*
- EPA SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*

4.8 Sample Containers, Sample Storage, and Equipment Storage

Sample containers prepared in advance for specific analyses must be stored in a secure ESG storage area. Sample containers prepared in advance by an analytical laboratory for specific analyses may contain preservatives. These containers must be stored within secondary containment and handled with care to ensure that the preservatives are not lost and do not injure anyone. The appropriate PPE should be worn when pouring samples into containers which contain preservatives. This includes disposable gloves and safety glasses with side shields.

Ancillary sampling equipment, including sample collection carriers, must be stored in a clean, secure area in the ESG storage area. Samples must be stored in a locked, secure ESG storage area. Samples with preservatives must be stored within secondary containment.

5 Hazard Identification and Controls

5.1 Personnel

Sampling activities can be performed safely by one ESG technician. Only properly trained individuals may perform the activities in this procedure. Minimal PPE requirements are required at all times including long pants, close toed shoes and safety glasses with side shields. A full face shield must be worn if there is potential exposure to raw sewage.

5.2 Hazard Identification and Safety Controls

5.2.1 General Hazards

Control general hazards when working in the field by following these basic safety measures whenever necessary.

- Minimize sun exposure by wearing a hat and sunscreen.
- During hot weather avoid heat stress by taking breaks, rehydrating, and avoiding prolonged activity in poorly ventilated areas. Keep – or have access to – an adequate supply of drinking water.
- During rainy weather, wear non-slip shoes and raingear.
- Be aware of your surroundings and try to minimize the amount of time in isolated areas.
- Carry a cell phone while sampling in isolated areas. If you do not have a cell phone let an ESG team member know where you are sampling and when you expect to return.
- Thoroughly wash your hands after returning from field activities.

5.2.2 Chemical and Radiological Hazards

Chemical and radiological hazards include:

- Fixed treatment unit influent, and contaminated groundwater
- Hazardous chemicals from treated cooling tower water
- Potential exposure to human pathogens and sewer disposable chemicals via raw sewage
- Splashes from sample containers which contain caustic or corrosive preservatives

Note: For Hearst sewer, the eyewash is located just outside the sampling shack. At Strawberry sewer eyewash is located inside the sampling shack. For B77 FTU, the eyewash is located inside the FTU area near the control panel.

To protect against these hazards, it is important to wear all of the required personal protective equipment, including disposable gloves and safety glasses with side shields. Raw sanitary sewage may contain drain disposable chemicals as well, therefore a full face shield or safety goggles are required.

The radiological hazards from LBNL's environmental samples have been determined to be minimal; however, if sampling occurs in an area with potential or known radiological contamination, as well as from any area adjacent to a sewer line, sampling must be performed in accordance with RWA 1178.

5.2.3 Biological Hazards

The Hearst sewer (13E) and Strawberry sewer (13F) sampling stations are considered Level II Biosafety technical areas because of potential exposure to bacteria and viruses. Specific requirements and guidelines for Biosafety areas can be found in the Biosafety in Microbiological and Biomedical Laboratories (BMBL) at the following link: <http://www.lbl.gov/ehs/biosafety/manual/index.shtml>

The following general requirements should be observed

- No eating, drinking or smoking is allowed in the sampling areas.

- Wash your hands after working with any potentially hazardous material. Hands must be thoroughly washed with soap and water prior to exiting any Biosafety Level 2 area.
- Decontaminate sampling equipment after each use.
- Place biohazard postings at the entrance to the Level II Biosafety technical areas and persons entering these must be advised of the potential hazards.
- Thoroughly clean all surfaces that are exposed to raw sewage with disinfectant and place any discarded gloves, PPE or other potentially exposed equipment in sealed bags prior to leaving the area.
- Transport all sample containers, contaminated equipment or potentially contaminated clothing leaving a Level II Biosafety technical area in secondary containment that is labeled "Biohazard".

Other biological hazards that may be encountered during sampling include snakes, ticks, spiders, and poison oak. When working in grassy or bushy areas, the following precautions should be considered:

- Wear light-colored clothes, long pants (gathered around the ankle or tucked into the boots), and protective over-the-ankle footwear.
- Apply insect repellents containing DEET or permethrin to clothes and exposed skin.
- Conduct a thorough examination of your clothes and any exposed body parts upon returning from sample collection activities to remove any ticks or spiders.
- Wash repellent treated skin and hands after returning from the field.

In addition, some of these field sites are located in remote areas where there is potential mountain lion activity. While a mountain lion encounter is not likely, the following specific precautions should be used:

- Maintain all sampling areas as open as possible by clearing debris and overgrowth that would obstruct your view.
- Avoid working during low light conditions such as dawn or dusk.
- In case of a mountain lion sighting, make yourself appear as large as possible, do not run away, make loud noises or use a whistle to avoid a confrontation and leave the area when it is safe.

5.2.4 Trip and Fall Hazards

Trip and fall hazards occur when activities involve working on steep hillsides, around equipment and piping, using ladders, and on wet slippery surfaces. Non-slip footwear and clothing appropriate for the weather and site conditions should be worn to minimize the potential for trips and falls. If expected activities involve walking through brush on a hillside, slip resistant footwear should be worn. It is important to be aware of your surroundings when performing these sampling activities in order to avoid potential trip or fall hazards.

5.2.5 Ergonomic Hazards

Activities such as entering sample collection data at computer workstations and lifting samples and sample collection equipment can result in ergonomic injuries. Any signs of musculoskeletal discomfort must be reported immediately to the ESG Group Leader.

5.3 Personal Protective Equipment

Wear the following personal protective equipment when collecting wastewater samples:

- Properly fitted full-face shield with chin guard (when working with sewer samples) or safety goggles
- Disposable surgical-type gloves. Use one set of gloves for each location, to avoid cross-contamination of samples

- Coveralls or lab coats with long sleeves
- Lug or crepe-patterned rubber or composite-soled over the ankle protective toed footwear

5.4 Materials

The following equipment may be needed to perform the sampling described in this procedure (this is in addition to the standard PPE requirements of long pants, close-toed shoes and safety glasses):

- Disposable surgical-type gloves
- Plastic trash bag
- Sample containers
- Dip sampler
- Full-face shield with chin guard and/or safety goggles
- Portable pH, conductivity, chlorine or turbidity meter
- Cooler chest with blue ice (required for non-radiological samples)
- Protective clothing such as coveralls, lab coat or lab apron
- Kim Wipes™ or equivalent
- Sample and Composite Collection Forms and Chain of Custody Forms
- Water chemistry worksheets
- Prepared sample labels
- Cell phone with camera
- Whistle or equivalent device capable of making a loud sound

6 Sampling Guidelines for Unauthorized Non-Stormwater Water Releases

This section covers sampling guidelines for accidental releases from sanitary sewer lines, potable water supplies and cooling towers. For accidental spills or releases not listed above, the same general sampling guidelines apply (section 6.6); however, the specific sampling requirements and analysis may need to be modified. It is at the discretion of the Group and/or Program Leader to determine which requirements and analysis are needed.

6.1 Sampling Locations

Sampling locations depend on whether the spill has potential to enter either the North or South Fork of Strawberry Creek. For spills that reach offsite surface waters, samples may be taken at the following locations:

- At the source of the release
- Where the release enters the storm drain or surface water location (prior to any treatment)
- Where the release enters the storm drain or surface water location (after any treatment)
- At the closest discharge location into a creek, such as the South Fork of Strawberry Creek, Chicken Creek, or the North Fork of Strawberry Creek, depending on which drainage area is affected

For larger spills of more than 1,000 gallons, additional samples may be taken at or near each of the following locations:

- Eastern edge of the UC Berkeley campus
- Western edge of the UC Berkeley campus
- West of the UC Berkeley campus, either at Strawberry Creek Park or near the Strawberry Creek outfall into the San Francisco Bay

Table 6.1 contains a listing of common sample locations and brief descriptions, while Appendix A places each sampling location on a map of the Strawberry Creek watershed.

TABLE 6.1 POTENTIAL OFFSITE LOCATIONS FOR EMERGENCY RESPONSE SAMPLING

Drainage Basin	Ref #	Site Name	Description of Site Location
South Fork of Strawberry Creek Sub-watershed Area	1	SFSC-DB	UC Berkeley Detention Basin parking area on Centennial Drive
	2	SFSC-CC	LBNL's Chicken Creek (at storm water sampling location)
	3	SFSC-UCB-E	UC Berkeley campus, north of the Men's Faculty Club
	4	SFSC-UCB-W	UC Berkeley campus, east of Oxford and Allston Streets
North Fork of Strawberry Creek Sub-watershed Area	5	NFSC-88	LBNL, below Bldg. 88 at the stormwater monitoring location
	6	NFSC-LeRoy	Under the bridge next to 1755 LeRoy Avenue
	7	NFSC-UCB-N	UC Berkeley campus, southwest of Euclid and Hearst Streets
Strawberry Creek	8	NFSC-UCB-W	UC Berkeley campus, east of Oxford and Allston Streets
	9	SC-UCB-OSC	UC Berkeley Campus, before Oxford Street culvert
	10	SC-SCP	Strawberry Creek Park on 2100 West Street
	11	SC-BO	University Avenue, below frontage road at outfall to SF Bay

6.2 Sampling Requirements for Sanitary Sewer Releases

When sampling a Sanitary Sewer Overflow a minimum of three separate sample sets must be collected; one upstream of the discharge location, one at the discharge location and one downstream of the discharge location. Samples for pH, total coliform, fecal coliform (bacteria indicators), ammonia, biological oxygen demand (BOD) and nitrate + nitrite analysis should be considered; see Table 6.2. pH has a 15 minute hold time requirement and should be measured immediately. This can be done “in house” by a trained ESG technician. Total and fecal coliform analysis has a 6-hour hold time limit; therefore the analytical laboratory must be contacted immediately to schedule the analysis

For sanitary sewer releases, pH, total coliform and fecal coliform analysis should be considered; see Table 6.2. pH has a 15 minute hold time requirement and should be measured immediately. This can be done “in house” by a trained ESG technician. Total and fecal coliform analysis has a 6-hour hold time limit; therefore the analytical laboratory must be contacted immediately to schedule the analysis.

TABLE 6.2 SAMPLE METHODS SUMMARY FOR SANITARY SEWER RELEASES

Measurement	Method	LBNL Method ¹	Container	Preservation
pH	SM-4500 H+B	pH-aq:SM4500H+B	100-ml plastic	Cold 4°C
Total Coliform ²	SM9221B	SM9221:ALL	100-ml plastic	Cold, Na2S2O3
Fecal Coliform ²	SM9221E	SM9221:ALL	100-ml plastic	Cold, Na2S2O3
Ammonia	EPA 350.1, SM4500NH3	Ammonia(asN):MULT	0.5-L plastic	Cold, H2SO4
Nitrate + Nitrite	EPA 300.00, 353.2	NO3+NO2(asN):MULT	0.5-L plastic	Cold, H2SO4
BOD	SM5210B	NA	1.0-L plastic	Cold 4°C

¹Analytical test code referenced by the appropriate bid package in the analytical laboratory contract

²Sample bottles for analysis can be combined

6.3 Sampling Requirements for Potable Water Releases

For potable water releases, samples may be taken for pH and total chlorine analysis (see Table 6.3 for details). pH and total chlorine have a 15 minute hold time limit which requires immediate analysis. This can be done “in house” by a trained ESG technician. If ESG cannot analyze the samples, then an outside analytical laboratory should be contacted and the samples should be couriered immediately for analysis.

TABLE 6.3 SAMPLE METHODS SUMMARY FOR POTABLE WATER RELEASES

Measurement	Method	LBNL Method ¹	Container	Preservation
pH	SM-4500 H+B	pH-aq:SM4500H+B	100-ml plastic	Cold 4°C
Total Chlorine	SM-4500Cl	Chlorine:SM4500Cl	100-ml plastic	Cold 4°C

¹Analytical test code referenced by the appropriate bid package in the analytical laboratory contract

6.4 Sampling Requirements for Cooling Tower Water Releases

For cooling tower water releases, samples are taken for the analytes listed in Table 6.4. Basic water quality parameters including temperature, pH, conductivity, turbidity and dissolved oxygen can be measured “in house” by a trained ESG technician. If ESG cannot analyze the samples, then an outside analytical laboratory should be contacted and the samples should be couriered immediately for analysis. Any additional analytes of concern from the accidental release should also be collected and analyzed by a contracted analytical laboratory

TABLE 6.4 SAMPLE METHODS SUMMARY FOR COOLING TOWER WATER RELEASES

Measurement	Method	LBNL Method ¹	Container	Preservation
pH ²	SM-4500 H+B	pH-aq:SM4500H+B	100-ml plastic	Cold 4°C
Temperature ²	SM-2550B	NA	100-ml plastic	Cold 4°C
Turbidity	SM-2130B	E180.1	100-ml plastic	Cold 4°C
Specific Conductance ²	SM-2510B	Conductivity:SM2510B	100-ml plastic	Cold 4°C
Dissolved Oxygen	SM-500OG	DO:SM4500OG	100-ml plastic	Cold 4°C
Analyte of Concern	TBD	TBD	TBD	TBD

¹Analytical test code referenced by the appropriate bid package in the analytical laboratory contract

²Sample bottles for analysis can be combined

6.5 Sampling Requirements for Other types of Water Releases

For unauthorized water releases not listed in the above sections, sampling requirements are to be determined by the Group and/or Program Leader. Any of the basic water quality parameters listed in Table 6.5 can be done “in house” by a trained ESG technician. Any known analytes of concern from the accidental release should be analyzed by a contracted analytical laboratory.

TABLE 6.5 SAMPLE METHODS SUMMARY FOR GENERAL TYPES OF WATER RELEASES

Measurement	Method	LBNL Method ¹	Container	Preservation
pH	SM-4500 H+B	pH-aq:SM4500H+B	100-ml plastic	Cold 4°C
Temperature	SM-2550B	NA	100-ml plastic	Cold 4°C
Turbidity	SM-2130B	E180.1	100-ml plastic	Cold 4°C
Specific Conductance	SM-2510B	Conductivity:SM2510B	100-ml plastic	Cold 4°C
Dissolved Oxygen	SM-500OG	DO:SM4500OG	100-ml plastic	Cold 4°C
Analyte of Concern	TBD	TBD	TBD	TBD

¹Analytical test code referenced by the appropriate bid package in the analytical laboratory contract

6.6 General Sampling Guidelines

For samples that will be reported in the ESG database, the Data Manager must be notified to set up a non-routine collection. These collections should fall under the “Surface Water Monitoring” program and should be titled “Surface Water Monitoring- Date, Description”. Ideally, the collection should be set up in the database prior to sampling; however, in emergency response situations this can be done after the samples have been collected.

Sampling is performed by following these steps:

Step Action

- 1 If the collection can be set up immediately, print out the collection forms and any blank worksheets. If this cannot be done prior to sampling, use a notepad. Start at the location of the spill or accidental release and record any unusual or significant sampling conditions on the appropriate form.
- 2 Put on appropriate personal protective equipment.
- 3 Obtain a representative sample for each required analysis (See tables 6.1 to 6.4) by using a clean dipper or equivalent sampling device at the point of greatest water flow and pouring the contents of the dipper into the appropriate bottle.
- 4 Wipe the exterior of the sample bottle clean after filling it.
- 5 Screw the lid tight and record sample location, date and time sampled, and sampler identification on the bottle and the collection form (or notepad).
- 6 Place the sample containers in an ice chest with blue ice.
- 7 Document any unusual or significant post-sampling conditions, such as broken sample containers or problems encountered in the field, on the appropriate collection form (or notepad).

- 8 Repeat steps 2-7 for the remainder of the sampling locations.
- 9 Upon completing all sampling activities, place the samples in the Bldg. 75-131 sample refrigerator. The sample refrigerator is used exclusively for the storage of samples that require a storage temperature of less than 6° Celsius. Bldg. 75-131 should remain locked at all times.
- 10 If “in house” water chemistry measurements are required, complete these as soon as possible. Refer to appendix B for specific instructions and worksheets.

Note: ESG water chemistry worksheets are located on LBNL’s G drive and set-up for electronic signature. These worksheets can be directly filled out via a computer or smart phone. If the worksheets are filled in by hand, or if a notepad is used to record any information, then the data will need to be transcribed to an electronic file. Both the analyst and a reviewer should sign each completed worksheet.

- 11 For samples requiring analysis by an external laboratory, enter the sample and composite collection notes into ESG’s electronic database and generate the electronic collection forms and chain(s) of custody.
- 12 Verify samples collected and entries on sample collection and chain-of custody forms for correctness and completeness.
- 13 Process, package, and ship the samples to the appropriate analytical laboratory as outlined in ESG Procedure 254, “Sample Processing, Packaging, and Transportation”.
- 14 Once the sampling and “in house” water chemistry measurements (if applicable) are completed, contact the Group Leader and Program Leader to inform them of sampling conditions and any preliminary results.

7 Quality Control

7.1 Quality Control Sample Collection

Quality Control samples are taken at the discretion of the Program Leader. General recommendations suggest at least 5% of the total number of samples collected should be slated for duplicate or split sample analysis. In addition, it is recommended to include at least one blank sample per collection.

7.2 Sample Acceptance Criteria

The Program Lead determines sample acceptance with the assistance of the Sample Collector and Quality Coordinator. Any sample that is considered suspect should be investigated. A sample may be considered suspect for any of the following reasons:

- Broken chain-of-custody or incomplete chain-of-custody documentation
- Unlabeled, mislabeled, or incompletely labeled samples
- Sampler failed to operate correctly, producing an incomplete sample (that is, less than 80 percent of the expected volume was sampled)
- Insufficient volume for analysis. Other conditions that indicate that the sample is not representative of the discharge and nature of the effluent

8 Water Chemistry Meter Calibration

Several different types of meters are used by ESG technicians to measure the various water quality parameters in the field or “in house”. Calibration of these portable meters is performed by trained ESG staff prior to each use. Field measurement guidelines are included with each meter and used to prepare the meter for field measurements. Records of each calibration are maintained by the Quality Coordinator and stored in hard copy form and on a secured network drive specifically for ESG. Copies of the various Calibration and Measurement Worksheets are included in Appendix B.

8.1 pH Calibration

The HACH HQ40d, Eutech pH Tester2, and EXTECH EX900 meters are currently used to measure pH. All of these meters have a temperature compensation feature. Calibrations of these meters are performed by the ESG staff as per the manufacturer’s instructions included with each meter. Either a two point (pH 7 & pH 10) or three point (pH 4, pH 7, and pH 10) calibration is performed.

8.2 Chlorine Meter Calibration

The EXTECH EX900 meter is used to measure chlorine. Calibration of the chlorine meter is performed using a slightly modified version of the manufacturer’s instructions wherein three calibration standards (0.05 parts per million [ppm], 0.1 ppm, and 1.0 ppm) are prepared from a stock solution and used to verify the meter’s operation.

8.3 Specific Conductivity (SC) Meter Calibration

The EXTECH EC400 meter is used to measure conductivity. Calibration of the conductivity meter is performed as per the manufacturer’s instructions included with each meter. A two point calibration (84 microsiemens per centimeter [uS/cm] and 1413 uS/cm) is performed.

8.4 Turbidity Meter Calibration

The Oakton T-100 meter is used to measure turbidity. Calibration of the turbidity meter is performed as per the manufacturer’s instructions included with each meter. A four point calibration (0.02 nephelometric Turbidity Units [NTU], 20 NTU, 100 NTU, and 800 NTU) is performed.

8.5 Dissolved Oxygen (DO) Meter Calibration

The EXTECH DO600 meter is used to measure dissolved oxygen. Calibration of the DO meter is performed as per the manufacturer’s instructions included with each meter. A two point calibration (0 milligrams per liter [mg/L] and saturated) is performed.

9 References

American Public Health Association, *Standard Methods for the Examination of Water and Wastewater*, latest edition

Lawrence Berkeley National Laboratory, Environment/Health/ Safety Division, *Integrated Safety Management Plan*

Lawrence Berkeley National Laboratory, Environmental Services Group, *Environmental Sample Tracking and Data Management*, ESG Procedure 268

Lawrence Berkeley National Laboratory, Environmental Services Group, *Notification Procedure for Environmental Releases Into storm drains or Creeks*, ESG Procedure 203

Lawrence Berkeley National Laboratory, Environmental Services Group, *Sample Processing, Packaging, and Transportation*, ESG Procedure 254

Lawrence Berkeley National Laboratory, Radiation Protection Group, *Radiological Work Authorization 1178 Environmental Services Site-Wide Air, Water, and Soil Sampling*

Lawrence Berkeley National Laboratory, *Requirements and Policies Manual, Environment, Safety, and Health Section*, LBNL/PUB-201

Lawrence Berkeley National Laboratory, *Requirements and Policies Manual, Information Management Section*, LBNL/PUB-201

U. S. Environmental Protection Agency, *Guidelines Establishing Test Procedures for the Analysis of Pollutants under the Clean Water Act, 40 CFR Part 136*

U. S. Environmental Protection Agency, *Handbook for Sampling and Sample Preservation of Water and Wastewater*, EPA-600/4-82-029

U. S. Environmental Protection Agency, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, EPA SW-846

10 Records

10.1 Records Created

The following records may be created by this procedure:

- Sample and Composite Collection Forms
- Chain-of-custody forms
- Shipping documents
- Laboratory analysis results
- Electronic files
- Calibration and maintenance records
- Regulatory reports

For examples of sample collection, composite collection, and chain-of-custody forms, refer to ESG Procedure 268.

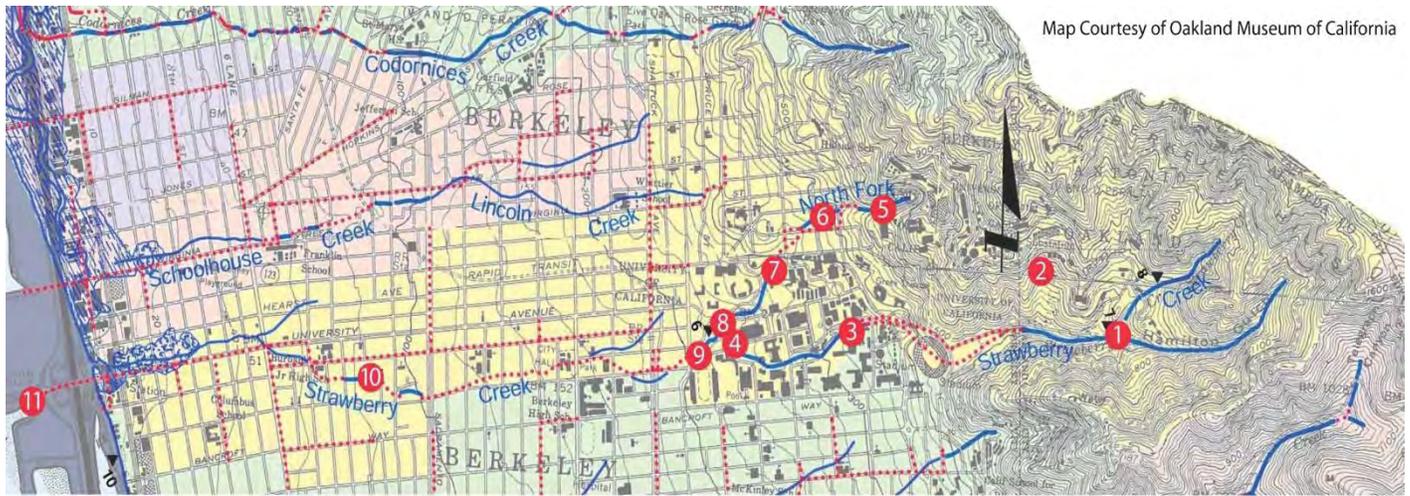
10.2 Records Retention

The Data Manager retains hard copy and electronic records of all the collection and analysis data created by this procedure, including periodic backup and archiving of all records. The Quality Coordinator retains all calibration records created by this procedure. The Program or Group Leader retains copies of the regulatory reports created by this procedure.

10.3 Records Care, Maintenance and Archiving

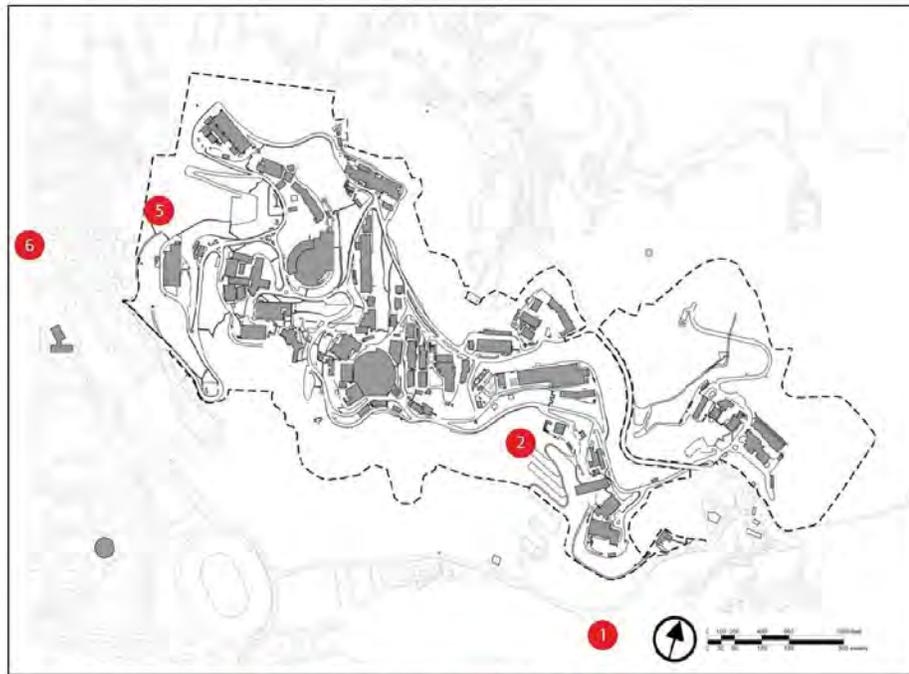
The Program Leader and Data Manager are responsible for the care, maintenance, disposition, and archiving of records according to LBNL's record management policies and procedures, as listed in the *LBNL Requirements and Policies Manual, Information Management Section, LBNL/PUB-201*. Records created by this procedure may be transferred to the LBNL Archives and Records Office at the discretion of the Group and/or Program Leaders.

Appendix A Detailed Sampling Maps



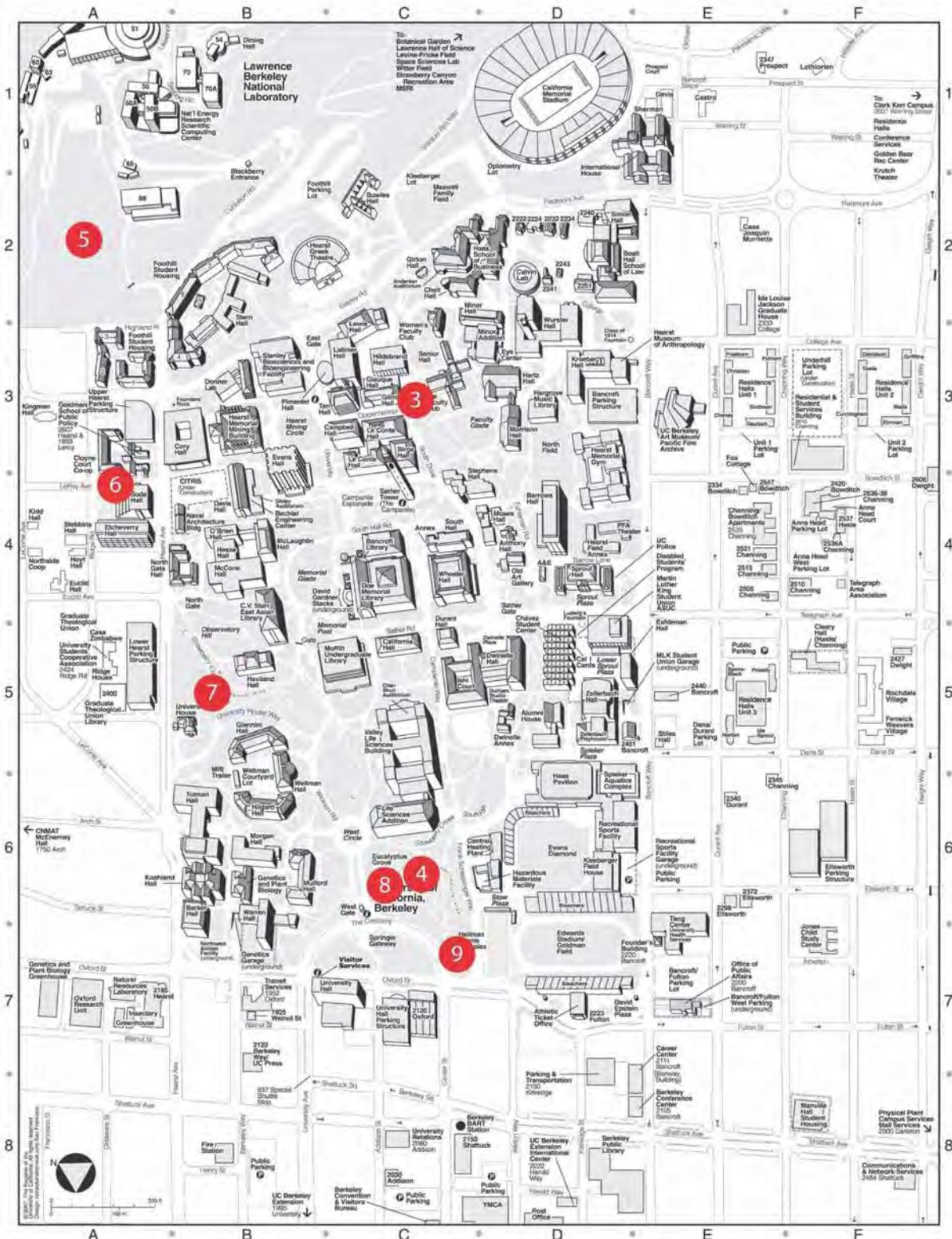
Strawberry Creek Sampling Point Designations

- | | | | |
|--------------|--------------|--------------|-----------|
| 1 SFSC-DB | 4 SFSC-UCB-W | 7 NFSC-UCB-N | 10 SC-SCP |
| 2 SFSC-CC | 5 NFSC-88 | 8 NFSC-UCB-W | 11 SC-BO |
| 3 SFSC-UCB-E | 6 NFSC-LeRoy | 9 SC-UCB-OSC | |



Strawberry Creek Sampling Point Designations on or near LBNL Site

- | | |
|-----------|--------------|
| 1 SFSC-DB | 5 NFSC-88 |
| 2 SFSC-CC | 6 NFSC-LeRoy |



Strawberry Creek Sampling Point Designations on or near UC Berkeley Campus

- 3 SFSC-UCB-E
- 5 NFSC-88
- 7 NFSC-UCB-N
- 9 SC-UCB-OSC
- 4 SFSC-UCB-W
- 6 NFSC-LeRoy
- 8 NFSC-UCB-W



Environmental Services Group
Dissolved Oxygen Calibration & Measurement Worksheet

Analytical Method:
 Instrument ID: Serial #
 Analyst:

Analysis Date:
 Time of Analysis:
 Analysis Units:

Program Name: Collection #

Calibration Standard Measurement and Analysis Results

Standard	Manufacturer	Lot #	Exp. Date	Value (as found)	Calibration Value ^{±1}	Value (as left)	% Error	Pass/Fail
0 mg/L								
Standard	Manufacturer	Temperature		Value (as found)	Calibration Value ^{±1}	Value (as left)	% Error	Pass/Fail
Saturated DO	In House (meter)							
Saturated DO	In House (DI water)							

^{±1} = Value is Saturated DO value from table below (based on temperature reading)

Measurement Results

Saturated DO vs Temperature Table

Sample ID	Location	Sample Date	Result (mg/L)	Comments	Temp (°F)	DO (mg/L)
					60	10.0
					62.5	9.7
					65	9.5
					67.5	9.1
					70	8.9
					72.5	8.6
					75	8.4
					77.5	8.2
					80	7.9
					82.5	7.8
					85	7.5

Quality Assurance Quality Control Analysis Results

QAQC	Sample Result / ID	Duplicate Result / ID	RPD	Pass/Fail	Comments
Dup QAQC					
Field Dup QAQC					

QAQC	Spike Amount	Spike Sample Result / ID	RPD	% Recovery	Pass/Fail	Comments
LCS ^{±1}						

LCS Manufacture: LCS Lot # Exp. Date

Notes:

- RPD = (Sample Result - Dup Result) / (Mean of Result Pair). RPD (intra-laboratory) must be less than 0.3 to pass QAQC criteria
- % Error = Calibration Value - Value (as left). The "as left" pH value must be within 0.5 pH units of the Calibration Value in order to pass.
- % Recovery = (Spike Result / Result) * 100. % Recovery must be between 90 to 110 % to pass QAQC criteria



Analytical Method: Standard Method 4500-CL-1 (electrode)
 Instrument ID: EXTECH CL200 Serial # 78027
 Analyst: _____

Analysis Date: _____
 Time of Analysis: _____
 Analysis Units: ppm

Program Name: _____ Collection # _____

Calibration Standard Measurement and Analysis Results

Standard #	Measured Value (ppm)	Theoretical Value	% Error	Pass/Fail	Comments
2.00ppm (WS)		2.00			
1.00ppm		1.00			
0.10ppm		0.10			
0.05ppm		0.05			Criteria is $\pm 10\%$ plus 0.01.

Cl Free Water Manufacturer: Absolute Grade Lot Number: _____ Exp. Date: _____
 1,000ppm Standard Manufacturer: Absolute Grade Lot Number: _____ Exp. Date: _____

Measurement Results

Sample ID	Location	Sample Date	Result (ppm)	Comments
DUP-CLXXXXXX				
LCS-CLXXXXXX	LCS			
DI-CLXXXXXX	DI Water			
TW-CLXXXXXX	Tap Water			

Quality Assurance Quality Control Analysis Results

QAQC	Sample Result / ID	Duplicate Result / ID	RPD	Pass/Fail	Comments
Internal Dup			NA	PASS	
Field Dup					
DI Blank			NA	NA	
Tap021314			NA	NA	

QAQC	Spike Amount	Spike Sample Result / ID	RPD	% Recovery	Pass/Fail	Comments
LCS						

Notes:

RPD = (Sample Result - Dup Result) / (Mean of Result Pair). RPD (intra-laboratory) must be less than 0.3 to pass QAQC criteria
 % Error = Calibration Value - Value (as left). The "as left" pH value must be within 0.5 pH units of the Calibration Value in order to pass.
 % Recovery = (Spike Result / Result)*100. % Recovery must be between 90 to 110% to pass QAQC criteria

The controlled version of this document is located on the Environment/Health/Safety Division (EHS) webpage in the Environmental Services Group Section. Printed or electronically transmitted copies are not official. Users are responsible for working with the latest approved revision.

Attachment vi-10:

CIWQS Database Entry Form
Sample



Spill - General Information [?](#)

[SSO Menu](#)

Spill Event ID: 807889 **Regional Water Board:** Region 2 - San Francisco Bay
Spill Location Name: Manhole Over Flow at B48 **Agency:** Lawrence Berkeley National Lab
WDID: 2SSO11445 **Sanitary Sewer System:** Lawrence Berkeley National Laboratory CS

[General Info](#) [Spill Related Parties](#) [Attachments](#)

Spill - General Information, Screen 2

You have 59:54 minutes to save your report before your session expires.

Note: Questions with "*" are required to be answered for 'Save Work in Progress'.

Questions with "*" are required to be answered for 'Submit Draft'.

Questions with "***" are required to be answered for 'Ready to Certify'.

Submit Draft On: 07/24/2014

Original Certified On:

Last Updated By: [Edgar Borglin](#)

1 - Spill Type: Category 1
Version: 1.2

*** 2 - Estimate Spill Volumes**

a) Estimated spill volume that reached a separate storm drain that flows to a surface water body? gallons

b) Estimated spill volume recovered from the separate storm drain that flows to a surface water body? (Do not include water used for clean-up) gallons

c) Estimated spill volume that directly reached a drainage channel that flows to a surface water body? gallons

d) Estimated spill volume recovered from a drainage channel that flows to a surface water body? gallons

e) Estimated spill volume discharged directly to a surface water body? gallons

f) Estimated spill volume recovered from surface water body? gallons

g) Estimated spill volume discharged to land? (Includes discharges directly to land, and discharges to a storm drain system or drainage channel that flows to a storm water infiltration/retention structure, field, or other non-surface water location. Also, includes backups to building structures) gallons

h) Estimated spill volume recovered from the discharge to land? (Do not include water used for clean-up) gallons

Estimated Total spill volume to Reach Surface Water (a-b+c+e)	Estimated Total spill volume to Reach Land (g)	Estimated Total spill volume Recovered (b+d+f+h)	Estimated Total spill volume (a+c+e+g)
<input type="text" value="100.0"/>	<input type="text" value="0.0"/>	<input type="text" value="0.0"/>	<input type="text" value="100.0"/>

* 3 - Did the spill discharge to a drainage channel and/or surface water?

* 4 - Did the spill reach a storm drainpipe that is not part of a combined sewer system?

* 5 - If spill reached a separate storm drainpipe, was all of the wastewater fully captured from the separate storm drain and returned to the sanitary sewer system?

Physical Location Details

* 6 - Spill location name:

* 7 - Latitude of spill location: deg. min. sec. OR decimal degrees

[\[Map \]](#)

* 8 - Longitude of spill location: deg. min. sec. OR decimal degrees

[\[Map \]](#)

Example only

*** 9 - County:**

*** 10 - Regional Water Quality Control Board:**

11 - Spill location description:
(Use attachment if location description is more than 2000 charaters)

Spill Details

*** 12 - Number Of appearance points:**

*** 13 - Spill appearance point:**
(Hold Ctrl key to Select Multiple answers from the list)
 Lower Lateral (Private)
 Lower Lateral (Public)
 Manhole

*** 14 - Spill appearance point explanation:**
(Required if spill appearance point is "Other" and/or multiple appearance points are selected)

**** 15 - Final spill destination:**
(Hold Ctrl key to Select Multiple answers from the list)
 Drainage Channel
 Other (specify below)
 Paved Surface

16 - Explanation of final spill destination:
(Required if final spill destination is "Other")

*** 17 - Estimated spill start date/time:** : Date Format: MM/DD/YYYY

*** 18 - Date and time sanitary sewer system agency was notified of or discovered spill:** : Date Format: MM/DD/YYYY

*** 19 - Estimated Operator arrival date/time:** : Date Format: MM/DD/YYYY

**** 20 - Estimated spill end date/time:** : Date Format: MM/DD/YYYY

*** 21 - Spill cause:**

22 - Spill cause explanation:
(Required if spill Cause is "Other")

**** 23 - Where did failure occur?**

24 - Explanation of Where Failure Occurred:
(Required if Where Failure Occurred is "Other")

**** 25 - Was this spill associated with a storm event?**

26 - Diameter of sewer pipe at the point of blockage or failure: inches

27 - Material of sewer pipe at the point of blockage or failure:

28 - Estimated age of sewer asset at the point of blockage or failure: (Years)

**** 29 - Spill response activities:**
(Hold Ctrl key to Select Multiple answers from the list)
 Cleaned-Up
 Mitigated Effects of Spill
 Contained all or portion of spill

30 - Explanation of spill response activities:
(Required if spill response activities is "Other", use attachment if the text is more than 1700 characters)

**** 31 - Spill response completion date:** : Date Format: MM/DD/YYYY

**** 32 - Spill corrective action taken:**
(Hold Ctrl key to Select Multiple answers from the list)
 Enforcement action against FOG source
 Inspected Sewer Using CCTV to Determine Cause
 Other (specify below)

33 - Explanation of spill corrective action taken:
(Required if spill corrective action is "Other")

**** 34a - Is there an ongoing investigation?**

34b - Reason for ongoing investigation?

35 - Visual inspection results from impacted receiving water:

Example only

****36 - Health warnings posted?**

****37 - Did the spill result in a beach closure (If YES, answer questions 38)?**

****38 - Name of impacted beach(es) (enter NA if None):**

****39 - Name of impacted surface water(s) (enter Un-named Tributary to XXXXX where XXXXX is the name of first named downstream tributary if receiving surface water body is un-named):**

****40 - Water quality samples analyzed for:**
(Hold Ctrl key to Select Multiple answers from the list)

41 - Explanation of water quality samples analyzed for:
(Required if water quality samples analyzed for is "Other chemical indicator(s)", "Biological indicator(s)", or "Other")

****42 - Water quality sample results reported to:**
(Hold Ctrl key to Select Multiple answers)

43 - Explanation of water quality sample results reported to:
(Required if water quality sample results reported to is "Other")

****44 - Explanation of volume estimation methods used:**
(Describe how you developed spill volume estimates for this spill)

Notification Details

45 - Cal OES Control Number
(Required for Category 1 greater or equal to 1,000 gallons - see SSO Monitoring and Reporting Program Requirements):

46 - Cal OES Called Date/Time
(Required for Category 1 greater or equal to 1,000 gallons - see SSO Monitoring and Reporting Program Requirements): : Date Format: MM/DD/YYYY

***47(a) - Name and Title (Contact person who can answer specific questions about this SSO)**

***47(b) - Contact Person Phone Number**

Example only

Attachment x-1: FY2010/2011
SSMP Audit, Water Works
Engineers (September 2011)



Memorandum

To: Mike Dong, LBNL Utilities Manager

From: Dan Fleege, E.I.T.
Joe Ziemann, P.E.
Mike Fisher, P.E.

Date: September 23, 2011

Subject: 2-Year SSMP Audit Cover Letter for FY 2010 and FY 2011

Objectives

This memorandum summarizes the results of the required Sewer System Management Plan (SSMP) internal audit process for the FY 2010 / 2011 audit period. The purpose of the SSMP is to provide a written framework for sanitary sewer collection system management, operation, and maintenance programs executed by the LBNL, with the ultimate goal of minimizing sanitary sewer overflows (SSOs) and achieving compliance with California State Water Resources Control Board (SWRCB) Order No. 2006-0003. The SSMP audit is based on a review of performance indicators established to evaluate the LBNL's success in achieving compliance with various requirements of SWRCB Order No. 2006-0003 and implementing programs as stated in the SSMP. The SSMP audit process allows the SSMP document to evolve over time through the identification of deficiencies in the management, operation and maintenance of the sanitary sewer collection system and the implementation of changes to the SSMP to address any deficiencies. This memorandum summarizes the following information:

1. SSO history, describing the number and nature of SSOs over the past five years.
2. Summary of progress made implementing SSMP elements.
3. Summary of the effectiveness of the implemented SSMP elements based on performance indicator (PI) evaluation.
4. Specific identification of performance areas in need of improvement, including a summary of proposed modifications to SSMP elements and programs over the next audit period to address all identified areas of past poor performance.
5. Summary of proposed SSMP modifications (i.e. new programs, new performance indicators, etc.) not tied to poor performance, but tied to a desire to change or increase the scope of management, operations, and maintenance activities.



SSO History

LBNL has not experienced an SSO event during the current audit period. The generally steep slopes of the collection system pipelines help reduce the buildup of solids in the system and reduce the occurrence of SSOs, but adequate operation and maintenance is required to ensure future overflow events are avoided.

The only two SSOs that have occurred at LBNL in the past 5 years occurred in 2007 due to sewer line blockages caused by debris and roots.

- 6/21/2007 SSO Event:
 - Affected Asset: Spill out of MH 6N37E, blockage in SS-U107-02
 - Category: 1 (spill reached Chicken Creek)
 - Spill Volume: 15,000 gallons
 - Cause: debris blockage
 - Corrective Action: line cleared with hydrojet, asset placed on 2 year cleaning schedule
- 6/27/2007 SSO Event:
 - Affected Asset: Spill out of MH 14N15E, blockage in SS-U059-01
 - Category: 1 (spill reached Strawberry Creek)
 - Spill Volume: 200 gallons
 - Cause: debris and root blockage
 - Corrective Action: line cleared with hydrojet, asset placed on 2 year cleaning schedule

These incidents occurred prior to full implementation of a preventative inspection and sewer line maintenance program, and since the adoption of LBNL's SSMP, no SSOs have occurred at LBNL.



SSMP Element Implementation Progress

This section of the SSMP Audit lists the tasks identified in the “Plan and Schedule” section of each SSMP element that were required to complete initial implementation of SSMP programs that had discrete completion dates assigned. The progress made with respect to completion of each task is summarized below. Additionally, actions with respect to non-discreet tasks that are periodic or ongoing are also described.

Section	Task	Responsible Party	Scheduled Date	Action
SSMP Section iv	Print and make available to maintenance staff all sewer system / storm drain system overall facility maps and utility grid maps.	Utilities Manager	October 2009	Completed - Facility maps have been produced and made available to all maintenance staff.
	Include sewer pipeline unique identifiers from Asset Database on Master Utility Map.	Utilities Manager	May 2010	Completed - All pipe segments have unique identifiers in both the Asset Database and the Master Utility Map. A separate AutoCAD layer containing all unique identifies for pipelines was created for coordination with the Sewer System Asset Database.
	Include upstream / downstream manhole identification, invert, slope, and installation date in Asset Database.	Utilities Manager	May 2010	Completed - The upstream / downstream manholes have been identified in the Asset Database, and all available pipeline invert and slope data has been entered.
	Create an Asset Database table for sewer manholes.	Utilities Manager	May 2010	Completed - An Asset Database table has been created for all sewer manholes.
	Identify data missing from Asset Database, and determine the most cost-effective way to obtain that data.	Utilities Manager	As-Needed	Completed - It has been determined that the most efficient way to collect any missing invert data is during CCTV inspections, and therefore all invert data will be collected within the next 4 years as CCTV inspection of the entire collection system is completed. It has also been determined that installation dates for sewer collection system assets are not readily available, and will not be collected and entered into the Asset Database given that condition assessment data is far more valuable in the assessment of an asset’s remaining service life than its current time in service.
	Make updates to the Master Utility Map and Asset Database based on necessary corrections noted in the field, and due to improvements made in the system as documented in as-built plans. Document updates using CAD revision blocks.	Utilities Manager	As Needed	Updates to the Master Utility Map are made as part of the engineering process for campus utility projects. The Utilities Manager will continue to ensure that updates to sewer pipe and sewer manhole Asset IDs are made at the time that mapping is updated, and corresponding changes are made in the sewer Asset Database. Additionally, mapping will be updated as-needed based on comments provided by CCTV contractors during field work.
	Assign maintenance frequencies for hydroflushing, CCTV inspection, and root treatment (only for assets with known root growth) to each sewer pipeline asset.	Utilities Manager	November 2009	Completed - All maintenance frequencies have been assigned in the Asset Database for each individual asset.
	Assign higher hydroflushing frequencies to assets in areas where blockages have occurred previously or other areas of concern.	Utilities Manager	November 2009	Completed – Hydroflushing and root control frequencies have been adjusted for specific assets where blockages have occurred in the past, and based on the results of CCTV inspections that give reason for concern, such as evidence of root infiltration, and offset joints.
	Review Asset Database and schedule contracted maintenance for assets for which regular maintenance is due.	Utilities Manager	Periodically (Minimum Annually)	CCTV inspection and hydroflushing projects were completed in 2009 and 2010. Additional preventative maintenance projects have been planned for FY 2012 through FY 2015 that will continue to be executed.
	Record data from maintenance work order invoices provided by contractors in the Asset Database.	Utilities Manager	Periodically (Minimum Annually)	All data from the 2009 and 2010 CCTV inspection and hydroflushing projects was entered into the Asset Database.
Document unscheduled maintenance or event response activities in the Asset Database.	Utilities Manager	As Needed	No unscheduled maintenance occurred during the current audit period.	



Section	Task	Responsible Party	Scheduled Date	Action
SSMP Section iv	Collect CCTV inspection condition assessment data from contractors following completion of scheduled work, enter pertinent data from inspection reports into sewer Asset Database, and file inspection reports, pictures, and video for later reference.	Utilities Manager	As Needed (Per Established CCTV Inspection Frequencies and Schedules)	Completed for 2009 and 2010 CCTV inspection projects.
	Prioritize the repair of identified deficiencies using the NASSCO quick rating methodology for all severity 3, 4, and 5 defects.	Utilities Manager	No Later Than 3 Months Following Reception of New CCTV Data	Repair and preventative maintenance actions for the sewer collection system based on the 2009 and 2010 CCTV inspection projects were developed by Water Works Engineers within the Sewer System CCTV Data (2009-2010) Analysis Technical Memorandum (Water Works Engineers, August 2011).
	Review CCTV inspection video, pictures, and reports for severity 3, 4, and 5 defects and determine appropriate rehabilitation / repair methods, or appropriate preventative maintenance activities to address deficiencies.	Licensed LBNL Staff Or Contracted Engineer	No Later Than 6 Months Following Reception of New CCTV Data	Repair and preventative maintenance actions for the sewer collection system based on the 2009 and 2010 CCTV inspection projects were developed by Water Works Engineers within the Sewer System CCTV Data (2009-2010) Analysis Technical Memorandum (Water Works Engineers, August 2011).
	Assemble sanitary sewer collection system improvement project bid packages, estimate cost, and assign preliminary construction date. Update sanitary sewer collection system CIP.	Licensed LBNL Staff Or Contracted Engineer	No Later Than 9 Months Following Reception of New CCTV Data or Hydraulic Analysis	As of September 2011, the Utilities Manager is working on procuring contracts for the repair and preventative maintenance actions recommended by Water Works Engineers within the Sewer System CCTV Data (2009-2010) Analysis Technical Memorandum (Water Works Engineers, August 2011). These repair and preventative maintenance actions constitute the current CIP, as there is no backlog of previously identified repairs.
	Present changes to sanitary sewer collection system CIP to LBNL Chief Operating Officer in the form of Project Funding Requests. Maintain documentation of Project Funding Request submittals.	Utilities Manager	No Later Than 1 Year Following Reception of New CCTV Data or Hydraulic Analysis	The repair and preventative maintenance actions recommended by Water Works Engineers within the Sewer System CCTV Data (2009-2010) Analysis Technical Memorandum (Water Works Engineers, August 2011) will require approval by the Chief Operating Officer, and Project Funding Requests will be submitted to the Chief Operating Officer prior to project bidding.
	Initiate design / construction of approved sewer system capital improvement projects.	Utilities Manager	In Compliance With Project Completion Dates in Approved CIP	As of September 2011, the Utilities Manager is working on procuring contracts for the repair and preventative actions recommended by Water Works Engineers within the Sewer System CCTV Data (2009-2010) Analysis Technical Memorandum (Water Works Engineers, August 2011). These repairs will be completed within FY 2012.
SSMP Section v	Lead post-construction reviews of specifications and details used for sanitary sewer collection system infrastructure projects for the purpose of updating the standards if appropriate.	Utilities Manager	Within 3 Months of Completing Sanitary Sewer Collection System Infrastructure Projects	No major sanitary sewer collection system infrastructure projects completed during the evaluation period that warranted a review of specifications and details.
	Conduct general review of standard design requirements, specifications, and details by comparison with nationally recognized "industry standards".	Utilities Manager	Typically Every 5 Years	No general review completed, general review of standard design requirements, specifications, and details anticipated in 2014.



Section	Task	Responsible Party	Scheduled Date	Action
SSMP Section vi	Hold a SSO response evaluation meeting with all staff involved in response to an SSO (including UC Berkeley Staff if applicable). Implement any necessary additional or ongoing operation and maintenance activities to prevent future SSOs in the same location.	Environmental Services Group Leader	If Deemed Necessary -Within 1 Week After an SSO Event	No SSOs occurred during the audit period. Sewer system assets which have experienced SSOs in the past have been placed on increased frequency maintenance schedules as identified in the Asset Database.
	Update the Emergency Response Protocol or SSO response SOPs as needed based on results of SSO response procedure evaluations, and notify external agencies and key LBNL Staff involved with SSO response of the update.	Environmental Services Group Leader / Utilities Manager	As Needed	No SSOs occurred during the audit period, no updates to SSO response SOPs necessary.
SSMP Section vii	Discuss FOG control practices and provide EBMUD FOG control guidance documents to cafeteria managerial staff.	Utilities Manager	January 2010	Completed - A meeting was held with LBNL cafeteria management on August 24 th , 2011 to review the implementation of FOG control BMPs recommended by EBMUD, and to discuss cafeteria grease interceptor cleaning practices. LBNL cafeteria management confirmed that staff are periodically trained to collect and recycle or dispose of waste cooking oil, and that signs are posted in appropriate areas to reduce the amount of grease disposed of in sinks and drains. LBNL cafeteria management stated that the cleaning frequency required for the cafeteria grease interceptor is every 6 months by a grease hauler, and that quarterly cleanings, as typically required by EBMUD, are not necessary. Therefore, a 6 month cleaning schedule is adopted, and cleanings will be documented by cafeteria management as part of the semi-annual inspection that is conducted and reported to the Utilities Manager.
	Complete waste discharge awareness flyer / sink labeling distribution and inspections, and disseminate waste discharge awareness communications.	Waste Discharge Program Manager	Annually	Typical activities completed in FY 2010 and FY 2011.
	Procure services for regularly scheduled maintenance and grease removal for LBNL cafeteria grease interceptor.	Utilities Manager / LBNL Cafeteria Staff	February 2010	Completed - The LBNL cafeteria is managed by LBNL staff who have established regular 6 month grease interceptor cleaning by a local grease hauling company.
	Review existing cafeteria operating procedures and determine if improvements are necessary for FOG control BMP efforts.	Utilities Manager	February 2010	Completed - The LBNL cafeteria is managed by LBNL staff who have established regular 6 month grease interceptor cleaning by a local grease hauling company.
	Complete initial FOG disposal BMP training for cafeteria food preparation / dishwashing staff.	LBNL Cafeteria Management	April 2010	Completed - Training on FOG disposal BMPs is regularly provided to cafeteria staff by management, and documented during semi-annual inspections.
	Maintain documentation of grease interceptor maintenance and grease removal, including receipts / manifests from grease hauling contractors.	Utilities Manager	Semi-Annually	Records have been retained for the last six cafeteria grease interceptor cleanings, and will continue to be reviewed and collected during semi-annual facility inspections.
	Conduct inspection of cafeteria food preparation facility to determine success of grease interceptor maintenance and FOG disposal BMPs activities. Document inspections and deliver to the Facilities Division.	LBNL Cafeteria Management	Semi-Annually	Within the audit period, semi-annual inspections of the cafeteria by cafeteria management with respect to FOG disposal practices were not completed. However, during the August 24 th meeting described above, cafeteria management agreed to conduct the inspections going forward and deliver results to the Facilities Division.



Section	Task	Responsible Party	Scheduled Date	Action
SSMP Section viii	Compare calculated maximum hydraulic capacities of key sewer main line pipes to estimated PWWF to identify potential hydraulic capacity deficiencies.	Utilities Manager	August 2010	<p>Completed - 2009 daily sewer flow data from the sewer collection system's two outfall flow monitoring stations (Hearst and Strawberry Stations) was reviewed, and compared to rainfall data collected from the California Irrigation Management Information System (CIMIS), run by the Department of Water Resources. This comparison was made in order to analyze the sewer collection system's response to rainfall events, and to roughly quantify rainfall dependant infiltration and inflow (RDI/I) in the system during a 5-year 24-hour storm event in order to estimate peak wet weather flow (PWWF). Data from this analysis is attached to this SSMP Audit cover letter.</p> <p>Three major conclusions were drawn from a visual review of the data:</p> <ol style="list-style-type: none"> 1. The largest rainfall events do not correlate well with the largest flow events in the Strawberry portion of the collection system. 2. The large flow events in the Strawberry portion of the collection system are very isolated and are considered outliers in the data. 3. There is no appreciable increase in base flow in the system during winter / spring months, indicating groundwater dependant I/I is not significant. <p>Both of the sewer outfall flow monitoring stations are Parshall Flumes, which measure the flow depth through a specially designed contracted open flow channel. This type of flow measurement device is particularly susceptible to bad readings if a blockage in the contracted section of the flume occurs, thus increased the upstream flow depth. These flumes are regularly cleaned, however unexpected blockages do occur and do result in outlier readings, which are typically easy to see in the data, and can be removed from the analysis.</p> <p>After removal of outliers, the sewer collection system response was analyzed for 6 different 2009 rainfall events. One particularly large rainfall event, of 3.1 inches in one day on October 13th, 2009 was very close to the 5-year 24-hour rainfall of 3.33 inches. A best-fit equation for rainfall vs. RDI/I (flow above and beyond average dry weather flow) was developed for both the Hearst and Strawberry portions of the collection system, and the 5-year 24-hour RDI/I was estimated. The average peak wet weather daily flow was calculated as the 5-year 24-hour RDI/I plus average dry day flow. The instantaneous PWWF was estimated using a daily peaking factor of 3.0.</p> <p>The PWWF values calculated for each portion of the collection system were then compared to calculated open channel flow capacities of each sewer main pipe within the Asset Database to determine if any pipes do not have the capacity to convey the PWWF without surcharge, per the methodology described in SSMP Section viii-a. No pipes were found to have insufficient capacity.</p>
	Inspect flow conditions in the sanitary sewer collection system during periods of high rainfall to identify areas of surcharging.	Plant Maintenance Technician	Periodically (Typically Annually)	EH&S personnel observe flow conditions at the sewer flow monitoring stations on a regular basis, and have not reported any apparent surcharging events within the last two years. EH&S personnel will make an effort to make additional observations during the next audit period in areas that are identified as the lowest hydraulic capacity segments in the Strawberry and Hearst sewer main lines.



Section	Task	Responsible Party	Scheduled Date	Action
SSMP Section viii	Arrange for additional hydraulic analysis to be conducted when necessary due to comparison of flow monitoring data to Asset Database hydraulic capacity data, field observations, or impacts due to campus facility expansion that have not been analyzed previously.	Utilities Manager	As Deemed Necessary	No additional hydraulic analysis was deemed necessary beyond the typical I/I analysis described above, because none of the key sewer mains were found to have a hydraulic capacity less than the estimated peak wet weather flow. No major construction projects occurred within the sewer system service area during the audit period that would trigger additional hydraulic analysis. However, a new building is planned to be constructed within the Hearst portion of the sanitary sewer collection system in the near future. The Utilities Manager will ensure that the anticipated sewage flow from this new facility is estimated, and that the availability of hydraulic capacity in the sanitary sewer system is reviewed prior to construction of the facility.
	Conduct I/I analysis of Hearst and Strawberry monitoring station flow data and quantify total I/I versus 24-hour rainfall.	Utilities Manager	Ongoing	I/I analysis was completed for 2009 data as described above. I/I analysis will continue to be completed in future years.
	Prepare project descriptions and estimates for capacity-related capital improvement projects, and integrate into the overall sanitary sewer collection system capital improvement plan prioritization within the Asset Database.	Utilities Manager	Within 3 Months of Discovering a Hydraulic Capacity Deficiency	No capacity-related capital improvement projects have been identified during this audit period.
SSMP Section ix	Hold kickoff meeting with all RPs and introduce and handout PI tracking sheets.	Utilities Manager / Environmental Manager	October 2009	Completed - The first 2-Year SSMP Audit and Performance Indicator review process has been conducted by Water Works Engineers (September 2011), and the results reviewed with all appropriate LBNL staff to set the direction for future sewer collection system management, operation, and maintenance activities over the next two year period.
	Complete PI tracking sheets and assessments.	RPs for each PI	Biennially	Performance Indicator evaluation was completed as part of the FY 2010 / 2011 audit process.
	Incorporate SSMP element PI tracking into the Wastewater Discharge Program ECAAP assessment.	Wastewater Discharge Program Manager	As Scheduled Under the ECAAP	The last assessment of the Wastewater Discharge Program within the ECAAP was completed in Q4 of 2009, and did not include SSMP element PI tracking because the SSMP had just been finished in Q3 of 2009. The Wastewater Discharge Program is scheduled to be evaluated under the ECAAP again in 2012, at which point SSMP element PI tracking will be discussed.
	Review and update PI objectives and evaluation metrics based on past performance and changing SSMP goals or requirements.	Utilities Manager / Environmental Manager	Biennially	Performance Indicators were updated as part of the FY 2010 / 2011 audit process.



Section	Task	Responsible Party	Scheduled Date	Action
SSMP Section x	Collect and review PI tracking sheets, and any CATS database entries applicable to the sanitary sewer collection system. Evaluate the results of PI tracking, recommendations provided, and any applicable corrective actions recently taken to generate changes to SSMP programs, procedures, and text as needed.	Wastewater Discharge Program Manager / Utilities Manager	Biennially	PI tracking sheets were generated and reviewed by Water Works Engineers in consultation with LBNL staff, and the SSMP was updated based on the results of the FY 2010 / 2011 SSMP Audit.
	Conduct SSMP audit and generate SSMP audit cover letter.	Wastewater Discharge Program Manager	Biennially	FY 2010 / 2011 SSMP Audit completed by Water Works Engineers in September 2011.
	Present significant SSMP modifications to the DOE and obtain approval / re-certification of the SSMP.	Wastewater Discharge Program Manager / Utilities Manager	As Needed / Every 5 Years Minimum	Updates to the SSMP based on the FY 2010 / 2011 SSMP Audit were deemed minor enough that approval / re-certification of the SSMP by DOE was not deemed necessary. Appropriate LBNL staff signed off on the changes as a routine update to the SSMP.
SSMP Section xi	Make SSMP documents available on the EH&S Division website.	Environmental Manager	As Deemed Necessary	The SSMP was added to the EH&S website shortly after certification, and the updated version along with the FY 2010 / 2011 SSMP Audit will be posted soon after being finalized.
	Maintain pertinent documentation of communications conducted with UC Berkeley, City of Berkeley, and EBMUD such as meeting notes, memorandums, and emails.	Utilities Manager / Environmental Manager / Wastewater Discharge Program Manager	Ongoing – As Needed	No significant communications were required or conducted with UC Berkeley, City of Berkeley, or EBMUD during this audit period.



Review of Performance

Attached to this memorandum are performance indicator assessment sheets, which summarize the collection and analysis of specific data intended to provide a basis by which performance in various areas related to the management, operation, and maintenance of the sanitary sewer collection system may be measured. During each SSMP audit period, data is collected related to each performance indicator assessment sheet and a grade is provided for the LBNL's performance using the metrics established. In addition, recommendations for performance improvement are made with respect to measured performance for each performance indicator. This process is described in section ix of the LBNL SSMP. Below is a summary of the performance indicators tracked by the LBNL and performance in each area.

Section	PI	Description	Grade
Sewer System Mapping	1	Establish entries for each pipeline asset in the new Asset Database based on information available from AutoCAD map and the original utility survey.	A+
	2	Establish entries for each manhole asset in the new Asset Database based on information available from AutoCAD map and the original utility survey.	A+
	3	Entry of critical asset data items in Asset Database.	B
	4	Completion of AutoCAD map quality assurance.	C
O&M Program	1	Entry of asset-specific maintenance frequencies for major maintenance activities.	A+
	2	Determination of the average annual cost to operate and maintain the sanitary sewer collection system.	A
	3	Percentage of sewer pipe assets with overdue regular maintenance.	A+
Capital Improvement Program	1	Percentage of the system that will be CCTV surveyed by the end of the 10 year cycle at the current rate.	C-
	2	Average overall NASSCO quick rating for the sanitary sewer collection system.	A+
	3	Prioritization and planning for future capital improvement projects.	A+
SSO Prevention	1	Number of sewer system blockages or un-planned maintenance activities (non-SSO).	A+
	2	Number of Category 2 SSOs.	A+
	3	Number of Category 1 SSOs.	C
	4	Average response time for SSOs during normal business hours.	A+
	5	Average response time for SSOs after normal business hours.	A+
FOG Control Program	1	Initial FOG control practices implementation meeting held.	A+
	2	Review existing cafeteria operating procedures and determine if improvements are necessary for FOG control BMP efforts.	A
	3	Success of implementation of FOG disposal BMPs in LBNL cafeteria by cafeteria staff.	A+



Section	PI	Description	Grade
System Evaluation and Capacity Assurance	1	Determination of maximum hydraulic capacity in key sewer main lines.	B
	2	Determination of existing peak flow in key sewer trunk lines.	A-
	3	Identification of necessary hydraulic capacity improvements.	A
	4	Determination of existing groundwater infiltration and rain dependent infiltration levels in the system.	B

Future Performance Improvements

The following Performance Indicators received a grade below B- or had scoring criteria adjusted from the original grading criteria established prior to the first SSMP Audit:

- **Mapping PI#3 – Entry of critical asset data items in Asset Database: (Grading Criteria Adjusted)**

- **Goal Adjustment:** The original grading criteria measured completion of critical data for all sewer main pipes. However, it has been determined that collection of missing data, which consists mostly of sewer pipe invert data, slope data, and hydraulic capacity data is most efficient through the CCTV inspection process. Therefore, the criteria was adjusted to reflect collection of this data over time concurrent with CCTV inspections.

The collection of pipe installation date data will no longer be a priority that requires performance measurement. The performance indicator grading scale was adjusted as follows for this SSMP Audit:

- % of pipes that have been CCTV inspected for which length, diameter, material, upstream invert, downstream invert, slope, and hydraulic capacity have been entered into the Asset Database:
 - A+ : 95-100%, A : 90-95%, A- : 85-90%, B+ : 80-85%, B : 75-80%, B- : 70-75%, C+ : 65-70%, C : 60-70%, C- : 55-60%, D: 50-55%, F: <50%

- **Mapping PI#4 – Completion of AutoCAD map quality assurance: (Grade of C, Grading Criteria Adjusted)**

- **Reason for Grade Received:** The AutoCAD map review and verification that was completed was done with respect to CCTV work that was completed in 2009 and 2010. Based on the CCTV work, some manholes appear to be mislabeled and manhole 14S36E is missing. The Sewer Asset Database was updated, however updates to the AutoCAD mapping must still be completed.
- **Consequences:** None.



- **Recommendations:** The quality of the AutoCAD map was evaluated by comparing the AutoCAD data to data obtained from the 2009 and 2010 CCTV surveys. There were a few inconsistencies between the map and the CCTV data which are summarized below. It is recommended that the LBNL AutoCAD file manager update the map to reflect the updated information. The Asset Database has been updated by Water Works Engineers.
 - There are 2 manholes with the label “SSMH10S52E” near the eastern-most point of Centennial Drive.
 - SSMH11S62E near the eastern-most point of Centennial drive seems to be mislabeled since it is no further east than manholes labeled “XXS52E”. Furthermore, the 11S portion is questionable due to its relative location between 6S51E AND 12S49E.
 - SSMH 14S36E is missing from the AutoCAD map. This manhole is located at Centennial Drive between SSMH 13S33E and 15S39E. SSMH 14S36E was identified by Joe Fuata from Roto-Rooter during the 2009 CCTV survey and was used as an access point for the CCTV inspection of pipe segment SS-U217-01 (refer to the surveys 10 and 11 from Roto-Rooter’s “Centennial Dr. Aug 2009” inspection disc). This pipe segment is actually divided by SSM H14S36E and should therefore be designated as two separate pipe segments. The AutoCAD map should be updated to reflect the inclusion of SSMH 14S36E and the division of pipe segment SS-U217-01. This pipe segment was divided into SS-U217-01A (western segment) and SS-U217-01B (eastern segment) within the updated Asset Database. The location of the manhole can be estimated from the 2009 CCTV inspection data which states that SSMH 14S36E is 323.1’ from SSMH 13S33E and 280.2’ from SSMH 15S39E.

Any future mapping discrepancies discovered are expected to be relatively minor, similar to those identified above, and therefore map verifications will be completed in conjunction with ongoing CCTV surveys. LBNL will require that CCTV inspection contractors provide comments on discrepancies with mapping identified during field work, and identify any assets encountered in the field that do not show up on mapping.

Goal Adjustment: The performance indicator grading scale was adjusted as follows for this SSMP Audit:

- A: Contractor provided map accuracy comments for all CCTV work completed during the current audit period, and all recommended map updates provided to date have been completed in the AutoCAD Map.
- C: Contractor provided map accuracy comments for all CCTV work completed during the current audit period, however map updates have not yet been incorporated in the AutoCAD Map.
- F: Contractor did not provide map accuracy comments for CCTV work completed during the current audit period.



- **Capital Improvement Program – Percentage of the sanitary sewer collection system that has been CCTV inspected within the last 10 years: (Grade of C-, Grading Criteria Adjusted)**
 - **Reason:** At the current rate of CCTV inspection (based on work completed in 2009 and 2010), only 59.5 % of the sewer pipes $\geq 6''$ would be CCTV inspected within the established baseline 10 year cycle. However, if the current CCTV survey schedule is followed, the remainder of the system will be inspected by FY 2015. No condition assessments for manholes have been completed, however manhole condition assessments will be completed in conjunction with all future CCTV work.
 - **Consequences:** A complete CCTV analysis of the system is expected to be completed within the allotted 10 years. A CCTV survey schedule has been recommended to ensure the remainder of the system will be inspected by FY 2015. There are no sections of the sewer collection system that are known to be in deteriorating condition or that have suffered a notable amount of maintenance events, and therefore immediate CCTV inspection of the whole system was not deemed necessary.
 - **Recommendations:** Follow the CCTV inspection schedule outlined in the Sewer System CCTV Data (2009-2010) Analysis Technical Memorandum (Water Works Engineers, August 2011). The rate of CCTV inspection completion will be accelerated over the next four years compared to the last two years.
 - **Goal Adjustment:** The performance indicator grading scale was adjusted as described below for this SSMP Audit. The measurement of performance will be calculated by comparing the percentage of pipe segments that have been surveyed to the percentage of time that has elapsed in the current 10-year cycle. Example:
 - In this case, after 2 years of the 10-year cycle had elapsed, 11.9% of the system had been analyzed (by number of sewer main pipe segments).
 - $\left(\frac{2 \text{ yrs}}{10 \text{ yrs}}\right) * 100\% = 20\% \text{ of the } 10 \text{ yr cycle elapsed}$
 - $\left(\frac{11.9\% \text{ CCTV Surveys Complete}}{20\% \text{ of } 10 \text{ yr cycle elapsed}}\right) * 100\% = 59.5\%$
 - This figure estimates the percentage of the system that will be CCTV surveyed by the end of the 10 year cycle at the current rate. When this number is below 100%, the surveys are behind schedule and when it is above 100%, the surveys are ahead of schedule. The 59.5% indicates that the CCTV inspections are behind schedule and that the rate that the pipe segments are being surveyed needs to increase to complete the entire survey within the 10 year cycle. At the current rate, only 59.5% of the system will be CCTV surveyed by the end of the 10 year cycle.



Areas of Excellent Performance

The LBNL sanitary sewer collection system received very high performance reviews in many areas. The excellent performance was due to no SSOs or unplanned maintenance events occurring during the current audit period, a low average NASSCO quick rating for the surveyed portion of the sanitary sewer collection system (i.e. system is in relatively good condition with no major defects), a generally well documented sewer collection system Asset Database, and an analysis showing that the sewer collection system experiences a low level of infiltration and inflow and has adequate capacity to convey peak wet weather sewer flows.

Future performance reviews will continue to improve as additional data is collected during on-going CCTV surveys of the system according to the current survey schedule. Furthermore, the recommended maintenance schedule, as documented in the Asset Database, will reduce the likelihood of future SSOs which will maintain the very high performance ratings for SSO prevention.

SSMP Modifications

1. Section iv-a: Removed the entry of original asset installation date as a priority for Asset Database development.
2. Section iv-b: Added additional text clarifying that only pipes with diameter 6" and above are regularly hydroflushed and CCTV inspected. Pipes 6" and larger are considered "sewer mains". Pipes that are smaller than 4" are considered "laterals". Laterals cannot be easily CCTV inspected. Additionally, laterals do not have manholes upstream of them, and any blockages occurring in laterals will cause a backup inside of a building, which will not cause an SSO that affects the outdoor environment.
3. Section iv-c: Added additional text stating that when the identified schedule of system repairs for the current fiscal year results in costs that can be accommodated by the current utility operating budget, a detailed presentation to the COO of Project Funding Requests and review of the CIP may not be necessary, as the identified repairs can be completed as needed with the available funding.
4. Section vii-b: Updated the text to state that LBNL cafeteria staff are responsible for establishing a schedule for regular maintenance and grease removal for the cafeteria grease interceptor, and removed text that states this work is completed under a blanket contract for sewer maintenance services, as the contracts for that work are separate.
5. Section vii-c: Updated the text to reflect that the LBNL cafeteria is managed by LBNL staff, not separately contracted staff.
6. Section vii-d: Updated the text to state that LBNL cafeteria staff and the grease hauling contractor have determined that a 6 month schedule for grease interceptor cleaning and maintenance is adequate.



7. Section viii-a: Removed text stating that “the average dry weather flow of the Hearst system is approximately one third the flow measured in the Strawberry System”, as this was not accurate based on the most recent I/I analysis. Also added text clarifying that sewer pipes downstream of the Strawberry monitoring station are maintained by UC Berkeley, not by the LBNL, and therefore the improvements identified in the *Strawberry Canyon Sewer Study* would be under the control of UC Berkeley, not LBNL.
8. Section viii-c: Removed text referring to a pipe lining project on Centennial Drive which was mentioned in the *Strawberry Canyon Sewer Study*. The recent CCTV inspections of the Centennial Drive sewer mains were reviewed by Water Works Engineers, and it was recommended that these sections of pipe be re-inspected in FY 2014 to monitor deterioration, however no immediate repairs were deemed necessary.
9. Section ix-b: Changed the Performance Indicator evaluation frequency from annually to every 2-years to coincide with the 2-year SSMP Audits. There did not appear to be any benefit to evaluating the performance indicators annually, and a 2-year frequency was deemed adequate.
10. Section ix-c: Updated performance indicator grade scales as indicated above. Also, added new performance indicators to the FOG Control Program PI that measure submittal of a semi-annual FOG control inspection report submitted by cafeteria management to the Utilities manager, and completion of grease interceptor pumping and maintenance.
11. Modify CCTV inspection contract language to include the following requirements:
 - Require MACP (Level 1) inspection of all manholes upstream and downstream of pipelines that are scheduled for CCTV inspection, and require that all pipeline inverts are measured entering and exiting each manhole inspected.
 - Require that the contractor verify in the field the accuracy of the mapping provided by LBNL for use in conducting hydroflushing and CCTV work. Require the contractor to provide clear comments and map change notes directly on the maps provided to identify any discrepancies between the map and field conditions. Require the contractor to identify any pipelines observed in the field during manhole inspections that appear to be 6” diameter or greater that should be CCTV inspected which may be marked as sewer laterals (4” or less) on the map.



Impacts of Proposed SSMP Modifications

Many of the proposed SSMP modifications are simply clarifications and updates, and will not have any significant operational or fiscal impacts.

The impacts of the performance indicator updates will be to improve the accuracy with which performance assessments reflect the stated goal of the preventative maintenance programs.

The primary impact of the proposed modification to CCTV inspection contracting procedures will be a modest increase in the annual cost due to an increased number of CCTV surveys that will be conducted each year (through FY 2015) in accordance with the recently developed CCTV schedule. Planned CCTV inspection footages in the next 4 years are more than have been completed over the past 2 years. Furthermore, the price of CCTV inspections will increase with the addition of manhole inspections to the annual maintenance requirements, and a requirement that the contractor verify mapping accuracy. The anticipated increase in annual maintenance costs is not a major concern, however, because the budget for CCTV and hydroflushing work is flexible and can therefore adapt to these anticipated cost increases.

Conclusion

It is the opinion of Water Works Engineers that the Lawrence Berkeley National Laboratory is currently in compliance with all of the SSMP requirements as described in subsection D.13 of SWRCB Order No. 2006-0003.

Attachments:

1. FY 2010 / 2011 Performance Indicator Assessment Sheets (6)
 - 1 - Mapping
 - 2 - O&M Program
 - 3 - Capital Improvement Program
 - 4 - SSO Prevention
 - 5 - FOG Control Program
 - 6 - SECAP
2. Sewer Collection System Peak Wet Weather Flow Analysis Data
3. Proposed SSMP Text Updates
 - Updated Performance Indicator Assessment Sheets for FY 2012 / 2013
 - Updated SSMP Sections (MS Word format with Track Changes)

Goal:	Sewer System Mapping (FY 2010 / 2011)
Responsible Person (RP):	Utilities Manager
<u>Description of Performance Indicator(s) (PIs):</u>	
<p>The LBNL Facilities Division maintains an AutoCAD map of LBNL utility infrastructure, which includes the sanitary sewer collection system. The AutoCAD map was generated based on a survey that was conducted in order to create an inventory of utility infrastructure assets for the purposes of tracking and asset management of DOE real property. The asset inventory generated from the survey was delivered in a spreadsheet format which identified sewer pipelines by length and diameter on each LBNL grid map block. The GWDRs require that work orders are documented for the sanitary sewer collection system, that areas with maintenance problems are identified, and that more frequent maintenance is scheduled in problem areas. In order to meet these requirements, LBNL will be implementing a spreadsheet database to track work completed for each sanitary sewer system asset (pipeline or manhole). This database will be easily referenced to the existing AutoCAD mapping. The PIs listed below track the completion of tasks related to establishing this new Asset Database, and making sure that the AutoCAD mapping and Asset Database are up to date.</p>	
<u>PIs and Data Analysis Methods:</u>	
<ol style="list-style-type: none"> <p><i>Establish entries for each pipeline asset in the new Asset Database based on information available from AutoCAD map and the original utility survey.</i></p> <p>Discussion & Scoring Criteria: The original utility survey identified sewer pipelines on each map grid using a unique identifier, and identified the length, material, and diameter. However, pipelines that crossed grid lines were split into two different assets. The new Asset Database will list only whole pipe segments. To assess the % completion of line item entry of pipeline assets, the total footage of pipeline entries in the new Asset Database will be compared to the total sewer system pipeline footage determined from the original utility survey (28,897 feet).</p> <p><i>Establish entries for each manhole asset in the new Asset Database based on information available from AutoCAD map and the original utility survey.</i></p> <p>Discussion & Scoring Criteria: The original utility survey only quantified the number of manholes. The new Asset Database will include a line item entry for each manhole by the unique identifier assigned on the AutoCAD mapping. To assess the % completion of line item entry of manhole assets, the total number of manhole entries in the new Asset Database will be compared to the number of manholes established in the original utility survey (105).</p> <p><i>Entry of critical asset data items in Asset Database.</i></p> <p>Discussion & Scoring Criteria: Data columns are established for pipelines and manholes for information such as: ID, length, diameter, material, upstream / downstream manhole, upstream / downstream invert, slope, and hydraulic capacity. The percentage of non-null entries in the database for all of these pertinent data columns will be determined for all assets that have been CCTV inspected.</p> <p><i>Completion of AutoCAD map quality assurance.</i></p> <p>Discussion & Scoring Criteria: Completion of mapping accuracy review by CCTV contractor, and updates to the AutoCAD maps and Asset Database based on comments provided by the contractor.</p> 	

PI	A+	A	A-	B+	B	B-	C+	C	C-	D	F
1	95-100%	90-95%	85-90%	80-90%	75-80%	70-75%	65-70%	60-70%	55-60%	50-55%	<50%
2	95-100%	90-95%	85-90%	80-90%	75-80%	70-75%	65-70%	60-70%	55-60%	50-55%	<50%
3	95-100%	90-95%	85-90%	80-90%	75-80%	70-75%	65-70%	60-70%	55-60%	50-55%	<50%
4	Contractor provided map accuracy comments for all CCTV work completed during the current audit period, and all recommended map updates provided to date have been completed in the AutoCAD Map.			N/A			Contractor provided map accuracy comments for all CCTV work completed during the current audit period, however map updates have not yet been incorporated in the AutoCAD Map.			Contractor did not provide map accuracy comments for CCTV work completed during the current audit period.	

Performance Tracking		
PI	Measured Value	Performance Assessment Comments
1	A+	All whole pipes have been included in the Asset Database. Water Works Engineers reviewed the original LBNL Utility Survey along with the sewer system AutoCAD maps in 2010, assigned unique identifiers to each sewer pipe asset with labels in the AutoCAD map, and generated the Asset Database, including all available asset data that was shown on the AutoCAD maps. The Asset Database is now being used to document completed condition assessment and O&M work, and being used to strategically schedule future work.
2	A+	All manholes have been listed in the Asset Database, as part of the work done by Water Works Engineers in 2010, as discussed in PI #1 above.
3	B	For the sewer pipes that were CCTV inspected as part of the 2009 and 2010 CCTV inspection projects, 80% of the data in the fields listed for this PI was complete. A majority of the data that was missing was invert data, as the CCTV contractor was not required to collect invert data as part of their contract.
4	C+	The CCTV contractor that completed the 2009 and 2010 CCTV inspection projects used LBNL mapping to confirm the location of the assets inspected. The contractor verified the accuracy of the mapping, and provided observations. The Asset Database and geographical information systems (GIS) mapping for the sewer collection system have been updated to reflect the observations made by the contractor. However, updates to the AutoCAD mapping have yet to be completed but will be completed in the near future.

Recommendations for Programmatic or SSMP Updates

PI 1 – Establishment of sewer system pipeline asset entries in the new Asset Database.

Recommendation: No action needed. This performance indicator will be removed from future performance assessments, as it is fully complete at this time.

PI 2 – Establishment of sewer system manhole asset entries in the new Asset Database.

Recommendation: No action needed. This performance indicator will be removed from future performance assessments, as it is fully complete at this time.

PI 3 – Entry of critical asset data in the new Asset Database.

Recommendation: Obtain missing invert information during future CCTV surveys by measuring the distance from the rim of each manhole to the invert of each pipe. After obtaining invert data, the slopes and hydraulic capacities can also be calculated. Obtaining missing information during CCTV surveys has been deemed the most efficient way to collect any missing data. The scoring system for this PI has been updated as part of the SSMP Audit to reflect that all missing data will be collected over the next 4 years as CCTV inspection of the entire LBNL system is completed.

The original installation dates of sewer collection system assets have not been readily available in the past, and the benefit of collecting this data does not appear to be worth the effort at this time. The estimated remaining asset life, which can be determined based on condition assessments, is more valuable than knowing an asset's current service life based on the installation date. Installation data will be updated in the future as pipes are replaced and rehabilitated over time.

PI 4 – Completion of AutoCAD map quality assurance.

Recommendation: The quality of the AutoCAD map was evaluated by comparing the AutoCAD data to data obtained from the 2009 and 2010 CCTV surveys. There were a few inconsistencies between the map and the CCTV data which are summarized below.

- There are 2 manholes with the label “SSMH10S52E” near the eastern-most point of Centennial Drive.
- SSMH11S62E near the eastern-most point of Centennial drive seems to be mislabeled since it is no further east than manholes labeled “XXS52E”. Furthermore, the 11S portion is questionable due to its relative location between 6S51E AND 12S49E.
- SSMH 14S36E is missing from the AutoCAD map. This manhole is located at Centennial Drive between SSMH 13S33E and 15S39E. SSMH 14S36E was identified by Joe Fuata from Roto-Rooter during the 2009 CCTV survey and was used as an access point for the CCTV inspection of pipe segment SS-U217-01 (refer to the surveys 10 and 11 from Roto-Rooter's “Centennial Dr. Aug 2009” inspection disc). This pipe segment is actually divided by SSMH 14S36E and should therefore be designated as two separate pipe segments. The AutoCAD map should be updated to reflect the inclusion of SSMH 14S36E and the division of pipe segment SS-U217-01. This pipe segment was divided into SS-U217-01A (western segment) and SS-U217-01B (eastern segment) within the updated Asset Database. The location of the manhole can be estimated from the 2009 CCTV inspection data which states that SSMH 14S36E is 323.1' from SSMH 13S33E and 280.2' from SSMH 15S39E.

It is recommended that the LBNL AutoCAD file manager update the map to reflect the updated information. The scoring system for this PI has been updated as part of the SSMP Audit to reflect that the entire LBNL sewer system AutoCAD mapping will be compared to field conditions over the next 4 years as CCTV inspection of the entire LBNL system is completed.

Signature of Responsible Person: (sign when complete)	Date:
Joe Ziemann 	9/23/2011

Goal:	Operation and Maintenance Program (FY 2010 / 2011)
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Responsible Person (RP):	Utilities Manager
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Description of Performance Indicator(s) (PIs):

The basis of the operation and maintenance program for the sanitary sewer collection system is the completion of hydroflushing (i.e. pipeline cleaning), CCTV inspection, and chemical root treatment (or mechanical root cutting if necessary) as proactive measures to assess the condition of the system and prevent the occurrence of sanitary sewer overflows. The Facilities Division uses the sewer system Asset Database to record required maintenance frequencies for each asset for the three main activities described above. A standard maintenance frequency is established for each activity for most assets, but higher frequency maintenance should be scheduled for assets that have historically had problems such as debris accumulation or more rapid root growth. The PIs listed below track the usage of the Asset Database to schedule regular maintenance for each sanitary sewer collection system asset, and the determination of an average annual cost to maintain the system that can be accommodated by existing budgetary constraints.

PIs and Data Analysis Methods:

1. *Entry of asset-specific maintenance frequencies for major maintenance activities.*
Discussion & Scoring Criteria: A maintenance frequency in months should be established for each asset for hydroflushing, CCTV inspection, and root treatment. Not every sewer pipe will require root treatment, only those identified as having root problems through CCTV inspection. If there are no identified root problems for a pipe, a frequency of 0 should be entered. The % of non-null values for all sewer pipe assets in the hydroflushing frequency, CCTV inspection frequency, and root control frequency columns will be determined.

2. *Determination of the average annual cost to operate and maintain the sanitary sewer collection system.*
Discussion & Scoring Criteria: An average cost for hydroflushing, CCTV inspection, and root control work per foot of sewer pipe should be entered into the Asset Database that corresponds to the costs incurred by LBNL for past work of a similar type. The Asset Database should be used to calculate the average annual cost for completing these regularly scheduled maintenance activities based on the length and maintenance frequency of each asset. Grading for this PI is dependent upon the general “success” in calculating a cost that generally assesses the entire system (i.e. appropriate maintenance frequencies are available for all assets for all three major activities) and is within current budgetary limitations. If the estimated cost is not within budgetary constraints, action should be taken to adjust planned maintenance within acceptable risk tolerances and / or adjust the available operation and maintenance budget.

3. *Percentage of sewer pipe assets with overdue regular maintenance.*
Discussion & Scoring Criteria: The sewer system Asset Database can be used to identify assets with planned maintenance activities that are overdue using conditional formatting. The percentage of sewer pipe assets with any overdue maintenance at the time this PI is analyzed is determined using the Asset Database.

PI	A+	A	A-	B+	B	B-	C+	C	C-	D	F
1	95-100%	90-95%	85-90%	80-90%	75-80%	70-75%	65-70%	60-70%	55-60%	50-55%	<50%
2	Average Annual Cost Well Within Budget			Average Annual Cost Within Budget			Average Annual Cost Near Limit of Budgetary Constraints			Avg, Annual Cost Over Budget	Avg. Annual Cost Not Known
3	95-100%	90-95%	85-90%	80-90%	75-80%	70-75%	65-70%	60-70%	55-60%	50-55%	<50%

Performance Tracking		
PI	Measured Value	Performance Assessment Comments
1	A+	Maintenance frequencies for all assets in the Sewer Asset Database were entered. A review of CCTV data from the 2009 and 2010 CCTV inspection projects was completed. Pipelines with roots were scheduled for root treatment activities, and pipelines with small offset joints were scheduled for more frequent hydroflushing. Some pipelines showed signs of corrosion, and those pipelines were scheduled for more frequent CCTV inspection. Refer to the Sewer System CCTV Data Analysis Technical Memo (Water Works Engineers, August 2011) for more detailed information.
2	A	The Asset Database was used to calculate the average annual preventative maintenance cost for the entire collection system. Costs to complete the 2009 and 2010 CCTV projects were approximately \$20,000 for 4,650 linear feet of pipe. It was assumed that 75% of this cost is attributed to CCTV work, and 25% of the cost is attributed to hydroflushing work, resulting in unit costs of approximately \$3.25 per foot for CCTV and \$1.10 per foot for hydroflushing. It should be noted that for pipes less than 6" in diameter (considered to be sewer laterals, not sewer mains), hydroflushing and CCTV inspection is not regularly scheduled or completed. Additionally, the cost of completed manhole MACP inspections was estimated at \$100 per manhole. The estimated annual cost of preventative maintenance is \$13,500, which is anticipated to fall within budgetary constraints.
3	A+	A schedule for the completion of hydroflushing and CCTV inspection of the entire sewer collection system by FY 2015 has been developed (refer to the Sewer System CCTV Data Analysis Technical Memo, Waterworks Engineers, August 2011), and provided that the schedule is followed, no sewer collection system assets will be overdue for scheduled preventative maintenance.

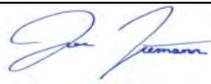
Recommendations for Programmatic or SSMP Updates
<p>PI 1 – Establishment of asset-specific maintenance frequencies. Recommendation: Continue to update asset specific maintenance frequencies based on the results of CCTV inspections, and analyze causes for any un-planned maintenance activities.</p> <p>PI 2 – Success of establishing an average annual sewer system maintenance cost within budget. Recommendation: Communicate with LBNL Chief Operating Officer (utility budget manager) regarding planned upcoming increases to sewer collection system preventative maintenance costs over the next 4 years to complete work as scheduled.</p> <p>PI 2 – Percentage of sewer pipe assets with overdue regular maintenance. Recommendation: Continue to follow maintenance frequencies outlined in the Asset Database, and the CCTV / hydroflushing schedule developed in the Sewer System CCTV Data Analysis Technical Memo.</p>

Signature of Responsible Person: (sign when complete)	Date:
Joe Ziemann 	9/23/2011

Goal:	Capital Improvement Program (FY 2010 / 2011)										
Responsible Person (RP):	Utilities Manager										
<u>Description of Performance Indicator(s) (PIs):</u>											
<p>The Facilities Division analyzes sanitary sewer collection system condition assessment data collected by CCTV inspection contractors using the Asset Database and the methodology described in the SSMP. The purpose of the analysis is to identify assets that are in poor condition (above defined thresholds) and establish capital improvement projects that are funded by DOE and completed in a timely fashion to mitigate the risk of an SSO due to asset failure, and to control un-planned or emergency maintenance costs. The PIs listed below track the timely completion of condition assessments and analysis of condition assessment data.</p>											
<u>PIs and Data Analysis Methods:</u>											
<p>1. <i>Percentage of the system that will be CCTV surveyed by the end of the 10 year cycle at the current rate.</i> Discussion & Scoring Criteria: The established frequency at which the entire sanitary sewer collection system should be CCTV inspected is approximately every 10 years to maintain an up-to-date assessment of asset condition. The current percentage of sewer system pipes and manholes that have been expected within the current 10 year inspection cycle to keep pace with an average 10% system inspection completion per year will be calculated using the Asset Database with the formula below:</p> $\% \text{ CCTV Completion} = (\% \text{ of system inspected in last 10 years}) / (\text{years into cycle} / 10)$											
<p>2. <i>Average overall NASSCO quick rating for the sanitary sewer collection system.</i> Discussion & Scoring Criteria: The overall NASSCO quick rating summarizes the results of the condition assessment of an asset. Asset defects are ranked on a 1-5 scale for severity, and the quick rating identifies the number of defects in the two highest severity categories. The average overall NASSCO quick rating for the sanitary sewer collection system provides a snapshot of the condition. The average overall quick rating should be determined for both manholes and pipes, and should not include assets for which no quick rating has been established (i.e. has not been inspected yet). The average pipeline quick rating should constitute 80% of the overall system score, and the average manhole quick rating should constitute 20% of the overall system score.</p>											
<p>3. <i>Prioritization and planning for future capital improvement projects.</i> Discussion & Scoring Criteria: After NASSCO quick ratings have been entered into the Asset Database, assets in poor condition should be prioritized for repair according to the methodology established in the SSMP, and appropriate methods of repair should be identified. The total number of assets (pipelines and manholes) which have an overall NASSCO quick rating in excess of 4000 is quantified. Then, the percentage of those assets for which all of the following have been completed is determined: CCTV inspection results have been reviewed, appropriate repair methodology has been determined, and approximate cost to complete the repairs has been quantified.</p>											
PI	A+	A	A-	B+	B	B-	C+	C	C-	D	F
1	95-100%	90-95%	85-90%	80-90%	75-80%	70-75%	65-70%	60-70%	55-60%	50-55%	<50%
2	<1000	1000-1500	1500-2000	2000-2500	2500-3000	3250-3500	3500-3750	3750-4000	4000-4500	4500-5000	> 5000
3	95-100%	90-95%	85-90%	80-90%	75-80%	70-75%	65-70%	60-70%	55-60%	50-55%	<50%

Performance Tracking		
PI	Measured Value	Performance Assessment Comments
1	C-	23 of the 193 pipes \geq 6" have been CCTV inspected (11.9%) within the first 2 years of the 10 year inspection cycle. Based on the grading formula established, the % CCTV Completion is 59.5%. If the established CCTV survey schedule is followed, the remainder of the system will be inspected by FY 2015. No condition assessments for manholes have been completed yet, however manhole condition assessments will be completed in conjunction with all future CCTV work.
2	A+	The average overall PACP Quick Rating is 780 for the 10.3% of the system that has been CCTV surveyed in the last 10 years. This is not an accurate representation of the system as a whole, and the remaining segments must be analyzed to get a full and accurate assessment of the system. However, the portions of the system that have been inspected were in relatively good shape, as reflected by the low average system NASSCO quick rating.
3	A+	There are no pipes with a NASSCO quick rating in excess of 4000 from the 2009 and 2010 surveys. However, as a result of the CCTV inspections completed in 2009 and 2010, some minor repairs were identified and executed, including a root cutting / foaming operation and an offset joint repair, as identified in the Sewer System CCTV Data (2009-2010) Analysis Technical Memorandum (Water Works Engineers, August 2011).

Recommendations for Programmatic or SSMP Updates
<p>PI 1 – Percentage of sewer collection system that has been CCTV inspected within the last 10 years. Recommendation: Follow the CCTV inspection schedule outlined in the Sewer System CCTV Data (2009-2010) Analysis Technical Memorandum (Water Works Engineers, August 2011).</p> <p>The scoring system for this PI has been updated as part of the SSMP Audit to reflect that the entire sewer collection system will be CCTV inspected by FY 2015.</p> <p>PI 2 – Average overall NASSCO quick rating for the sewer collection system. Recommendation: For the 2009 and 2010 condition assessment projects, manholes were not inspected in detail, only pipelines were inspected. For future CCTV projects, requirements for manhole inspections will be added to the scope of work for CCTV contractors.</p> <p>PI 3 – Prioritization and planning for future capital improvement projects. Recommendation: Continue to update and analyze NASSCO quick rating information in the Asset Database as future CCTV surveys are completed.</p>

Signature of Responsible Person: (sign when complete)	Date:
Joe Ziemann 	9/23/2011

Goal:**Sanitary Sewer Overflow Prevention
(FY 2010 / 2011)****Responsible Person (RP):**

Environmental Manager

Description of Performance Indicator(s) (PIs):

LBNL's success in preventing the occurrence of sanitary sewer overflows is a key metric in gauging the overall success of several SSMP programs. The PIs listed below track un-planned maintenance events (indicative of the possibility for the occurrence of SSOs) and SSOs that have occurred over the past 5 years.

PIs and Data Analysis Methods:

1. *Number of sewer system blockages or un-planned maintenance activities (non-SSO).*

Discussion & Scoring Criteria: Use the sewer Asset Database to determine the number of un-planned maintenance activities occurring within the past five years.

2. *Number of Category 2 SSOs.*

Discussion & Scoring Criteria: Use the sewer Asset Database or CIWQS website to determine the number of Category 2 SSOs occurring within the past five years.

3. *Number of Category 1 SSOs.*

Discussion & Scoring Criteria: Use the sewer Asset Database or CIWQS website to determine the number of Category 1 SSOs occurring within the past five years.

4. *Average response time for SSOs during normal business hours.*

Discussion & Scoring Criteria: Search the SSO Incident Map on the CIWQS website for the SSOs reported from the agency "Lawrence Berkeley National Laboratory" for the fiscal year in question. Examine the "Full Incident Report" for each SSO (Category 1 and Category 2) that started during normal business hours. Find the "Estimated Spill Start Date/Time" and the "Estimated Operator arrival date/time" on the "Full Incident Report" and calculate the difference between these two times to determine the spill response time. Average the spill response times for all of the SSOs during the year to obtain the desired value and compare to the grading criteria.

5. *Average response time for SSOs after normal business hours.*

Discussion & Scoring Criteria: Search the SSO Incident Map on the CIWQS website for SSOs reported from the agency "Lawrence Berkeley National Laboratory" for the fiscal year in question. Examine the "Full Incident Report" for each SSO (Category 1 and Category 2) that started outside of normal business hours. Find the "Estimated Spill Start Date/Time" and the "Estimated Operator arrival date/time" on the "Full Incident Report" and calculate the difference between these two times to determine the spill response time. Average the spill response times for all of the SSOs during the year to obtain the desired value and compare to the grading criteria.

PI	A+	A	A-	B+	B	B-	C+	C	C-	D	F
1	0-3			4-6			6-8			8-10	>10
2	1			2			3			4	>4
3	0			1			2			3	>3
4	<5 min	5-10 min	10-15 min	15-20 min	20-25 min	25-30 min	30-35 min	35-40min	40-45 min	45-60 min	>60 min
5	15-20 min	20-25 min	25-30 min	30-35 min	35-40 min	40-45 min	45-50 min	50-55 min	55-60 min	60-75 min	>75 min

Performance Tracking		
PI	Measured Value	Performance Assessment Comments
1	A+	No system blockages or un-planned maintenance activities have occurred in the sanitary sewer system during this audit period.
2	A+	No Category 2 SSOs have occurred within the last 5 years.
3	C	Two (2) Category 1 SSOs occurred within the last 5 years, both occurring in 2007.
4	A+	Due to proper preventative maintenance, no SSOs have occurred during this audit period, therefore, no response has been necessary.
5	A+	Due to proper preventative maintenance, no SSOs have occurred during this audit period, therefore, no response has been necessary.

Recommendations for Programmatic or SSMP Updates
<p>PI 1 – Number of sewer system blockages or un-planned maintenance activities (non-SSO). Recommendation: Continue to follow hydroflushing and CCTV survey schedule to continue to prevent future blockages and unplanned maintenance events.</p> <p>PI 2 – Number of Category 2 SSOs. Recommendation: No action required.</p> <p>PI 3 – Number of Category 1 SSOs. Recommendation: No action required. No Category 1 SSOs have occurred since 2007, and next year, the past SSOs will fall out of the 5 year evaluation period.</p> <p>PI 4 – Average response time for SSOs during normal business hours. Recommendation: Ensure staff members are thoroughly aware of spill response procedures in the event of a future SSO, per the requirements of the SSMP Section VI – Overflow Emergency Response Plan.</p> <p>PI 5 – Average response time for SSOs after normal business hours. Recommendation: Ensure staff members are thoroughly aware of spill response procedures in the event of a future SSO, per the requirements of the SSMP Section VI – Overflow Emergency Response Plan.</p>

Signature of Responsible Person: (sign when complete)	Date:
Joe Ziemann 	9/23/2011

Goal:**FOG Control Program (FY 2010 / 2011)****Responsible Person (RP):**

Utilities Manager

Description of Performance Indicator(s) (PIs):

The Facilities Division is implementing a program to control the discharge of FOG from the LBNL cafeteria as a preventative measure to reduce the potential for FOG accumulation in the sanitary sewer collection system and to ensure compliance with the local limit for FOG as required by the EBMUD site-wide sewer discharge permit. The PIs listed below track the initial implementation of the FOG control program as described in the SSMP.

PIs and Data Analysis Methods:1. *Initial FOG control practices implementation meeting held.*

Discussion & Scoring Criteria: The Facilities Division will hold a meeting with cafeteria management to discuss the need to implement regular grease interceptor maintenance and FOG disposal BMPs in the food preparation / dishwashing area to help prevent the occurrence of SSOs. The grading criteria will be subjective based on the perceived success of this meeting regarding the ability to move forward with implementation of the recommended practices following the meeting. A written justification for the subjective grade will be provided during evaluation.

2. *Review and modification of cafeteria operation services contract for FOG control BMP implementation.*

Discussion & Scoring Criteria: The Facilities Division will determine if amendments to the cafeteria operations scope of work are necessary to ensure that typical EBMUD FOG control BMPs are implemented and that BMP implementation is documented through regular inspections by cafeteria management.

3. *Success of implementation of FOG disposal BMPs in LBNL cafeteria by cafeteria staff.*

Discussion & Scoring Criteria: LBNL cafeteria management will conduct semi-annual inspections of the cafeteria food preparation / dishwashing area to determine the level of success of implementation of the typical BMPs recommended by EBMUD and available through the EBMUD FOG Control Program website. The success of implementation will be graded based on the total number of key BMPs considered to be fully implemented out of the list below, based on the Facilities Division's review of semi-annual inspection reports submitted by cafeteria management, or Facilities Division site visits:

1. All staff are knowledgeable about the need to properly dispose of FOG wastes.
2. Signs are posted above sinks that prohibit the discharge of FOG.
3. A cooking oil / fryer grease recycling bin is in use for storage and later removal of undiluted FOG wastes.
4. Dishwashing staff know that it is important to dry-wipe grease cooking ware and dishes prior to washing to remove FOG and food solids.
5. Grease spill cleanup materials (i.e. absorbent materials) are available, and staff know to use those to clean up spills rather than mop it into a floor drain.

PI	A+	A	A-	B+	B	B-	C+	C	C-	D	F
1	subjective	subjective	subjective	subjective	subjective	subjective	subjective	subjective	subjective	subjective	subjective
2	Contract Has Been Reviewed and Amended As Needed to Require BMP Implementation			Contract Reviewed, Any Required Modifications Have Been Identified			Contract In Process of Being Reviewed, No Specific Modifications Identified Yet			No Action	No Action
3	All BMPs Fully Implemented			4/5 BMPs Fully Implemented			3/5 BMPs Fully Implemented			2/5	1 or 0

Performance Tracking		
PI	Measured Value	Performance Assessment Comments
1	A+	A meeting was held with Dan Fleege from Water Works Engineers, Bill Llewellyn from LBNL, and two other members of the cafeteria management staff at the LBNL cafeteria on 8/24/11. During the meeting, the importance of FOG prevention was discussed, the current use of the cafeteria grease interceptor device was reviewed, EBMUD FOG control program materials were provided, and the FOG disposal BMPs were reviewed. The meeting was considered a success because cafeteria management were already generally aware of grease management BMPs and had already implemented the basic BMPs recommended by the EBMUD program.
2	A	LBNL does not hire an outside company to run the cafeteria, as was initially thought, so there is no contract that requires review or modification to ensure that FOG control BMPs are implemented and that regular inspections are conducted to ensure ongoing adherence to the guidance provided in the SSMP.
3	A+	All key grease control BMP measures are being utilized by LBNL cafeteria staff: <ol style="list-style-type: none"> 1. All staff members have been informed of proper FOG disposal methods. 2. Signs and posters have been posted (including some bi-lingual signs for Spanish-speaking staff members). 3. A cooking oil grease recycling bin is currently in use. 4. Staff has been informed to dry wipe dishes prior to washing. 5. Grease spill material is available and staff has been trained to use them.

Recommendations for Programmatic or SSMP Updates

PI 1 – Initial FOG control practices implementation meeting held.

Recommendation: No further action required. This performance indicator will be removed from future performance assessments as it is fully complete at this time. It should also be noted that the grease interceptor device is cleaned every 6 months, and not quarterly by an EBMUD approved grease hauler. The cafeteria staff claimed that minimal use of cooking oil, grease recycling, and proper FOG disposal methods make more frequent cleanings unnecessary. The SSMP will be updated to reflect the reduced maintenance frequency.

PI 2 – Review and modification of cafeteria operation services contract for FOG control BMP implementation.

Recommendation: Currently, there is no third party contractor operating the LBNL cafeteria. LBNL staff ensures grease control BMP implementation and documentation. This performance indicator will be removed from future performance assessments.

PI 3 – Success of implementation of FOG disposal BMPs by cafeteria staff.

Recommendation: Continue to monitor the implementation of BMP's to control the discharge of FOG from the LBNL cafeteria. It should be noted that since SSMP implementation, official documentation of semi-annual inspections to confirm adherence to BMP implementation was not recorded, and that the Utilities Manager should pay a semi-annual visit to the cafeteria to ensure inspections are completed as described in the SSMP, and inspection documentation is delivered in a timely fashion.

Signature of Responsible Person: (sign when complete)	Date:
Joe Ziemann 	9/23/2011

Goal: **System Evaluation and Capacity Assurance
(FY 2010 / 2011)**

Responsible Person (RP): Utilities Manager

Description of Performance Indicator(s) (PIs):

The Utilities Division uses the sewer Asset Database to evaluate the hydraulic capacity of key portions of the sanitary sewer collection system. The hydraulic capacity of these key portions of the system are compared to existing flow monitoring data to determine the potential for SSOs due to the capacity being exceeded during peak wet weather sewer flows. Additionally, LBNL analyzes flow monitoring data captured at the Strawberry and Hearst monitoring stations to quantify actual I/I rates experienced by the sanitary sewer collection system. The PIs listed below track the completion of tasks necessary to conduct analysis of the hydraulic capacity of the sanitary sewer collection system and plan for any identified improvements necessary to provide adequate capacity.

PIs and Data Analysis Methods:

1. *Determination of maximum hydraulic capacity in key sewer main lines.*
Discussion & Scoring Criteria: The sewer Asset Database will be used to calculate the maximum hydraulic capacity of key sanitary sewer main lines identified below. A section of pipeline is considered evaluated when the maximum capacity of all pipe segments between the manholes identified below has been determined using Manning’s Equation:
 - Strawberry mains: (1) Strawberry East Main: SSMH 6S51E to SSMH 13S30E (2) Strawberry North Main: SSMH 1N33E to SSMH 12S30E (3) Strawberry Main Trunk: SSMH 13S30E to SSMH 14S18E
 - Hearst mains: (1) Hearst North Main: SSMH 10N18E to SSMH 5N12E (2) Hearst East Main: SSMH 2N25E to SSMH 5N12E (3) Hearst Main Trunk: SSMH 5N12E to SSMH 5N9E

2. *Determination of existing peak flow in key sewer trunk lines.*
Discussion & Scoring Criteria: The existing peak flow for each of the main line sections listed above must be identified using the analysis procedures described in SSMP section viii-a.

3. *Identification of necessary hydraulic capacity improvements.*
Discussion & Scoring Criteria: An engineering analysis must be conducted to determine the improvements necessary to provide adequate hydraulic capacity of deficiencies identified.

4. *Determination of existing groundwater infiltration and rain dependent infiltration levels in the system.*
Discussion & Scoring Criteria: An estimate of the existing GWI/I and RDI/I must be made by analyzing flow monitoring data as described in SSMP section viii-b.

PI	A+	A	A-	B+	B	B-	C+	C	C-	D	F
1	5/5 Key Trunks Evaluated			4/5 Key Trunks Evaluated			3/5 Key Trunks Evaluated			2/5	< 2/5
2	5/5 Key Trunks Evaluated			4/5 Key Trunks Evaluated			3/5 Key Trunks Evaluated			2/5	< 2/5
3	Full Analysis Complete			Analysis Nearly Complete			Analysis Underway			Analysis Scheduled	No Action
4	Full Analysis Complete			Analysis Nearly Complete			Analysis Underway			Analysis Scheduled	No Action

Performance Tracking		
PI	Measured Value	Performance Assessment Comments
1	B	The majority of the sanitary sewer collection system Asset Database is missing accurate pipeline invert elevation data at this time (it is being collected over time along with CCTV inspections), so the maximum capacity was estimated by approximating missing invert elevations based on known rim elevations and slopes. Sanitary sewer pipelines within the LBNL system tend to follow the contour of the ground surface fairly consistently due to the sloping contours of the campus, and therefore estimated data based on other known data is likely to be accurate enough for the purposes of a general analysis of gravity pipeline capacity assessment. An estimated gravity pipeline maximum capacity was determined for all the pipe segments listed for this performance indicator. A grade of B was given instead of an A because the evaluation includes estimates instead of all verified field data.
2	A-	The peak flows for each of the sewer main segments listed above were determined from 2009-2010 flow data at both the Hearst and Strawberry monitoring stations. The average day flow during dry weather conditions was determined at each monitoring station. An analysis was conducted to determine an estimate for the RDI/I occurring during the 5-year 24-hour rainfall event (see PI #4), which was then added to the average dry day flow to determine the maximum day flow. A daily peaking factor of 3.0 was then applied to determine the peak instantaneous wet weather flow rate. An estimated peak instantaneous wet weather flow rate was determined for all the pipe segments listed for this performance indicator, based on the assumptions of % flow carried by each main segment listed in SSMP section viii-a.
3	A	No hydraulic capacity improvements were deemed necessary based on the hydraulic analysis. The lowest maximum capacity approximated for the Strawberry collection system was 590 gpm while the lowest maximum capacity for the Hearst station was 376 gpm. These values are greater than their respective peak flows of 237 gpm for the Strawberry Station and 291 gpm for the Hearst Station. Therefore, Water Works Engineers has determined that the system is capable of handling peak flows with a very low risk of capacity related SSO events. Additional flow data and invert elevation data will increase the accuracy of these calculations but the conservative estimates indicate that the hydraulic capacity is not a concern at this time.
4	B	<p>2009 daily sewer flow data from the sewer collection system's two outfall flow monitoring stations (Hearst and Strawberry Stations) was reviewed, and compared to rainfall data collected from the California Irrigation Management Information System (CIMIS), run by the Department of Water Resources. This comparison was made in order to analyze the sewer collection system's response to rainfall events, and to roughly quantify rainfall dependant infiltration and inflow (RDI/I) in the system during a 5-year 24-hour storm event in order to estimate peak wet weather flow (PWWF). RDI/I was considered to be additional flow above average dry day flow experienced in the system coincident with a rainfall event.</p> <p>Three major conclusions were drawn from a visual review of the data:</p> <ol style="list-style-type: none"> 1. The largest rainfall events do not correlate well with the largest flow events in the Strawberry portion of the collection system. 2. The large flow events in the Strawberry portion of the collection system are very isolated and are considered outliers in the data. 3. There is no appreciable increase in base flow in the system during winter / spring months, indicating groundwater dependant I/I is not significant.

Both of the sewer outfall flow monitoring stations are Parshall Flumes, which measure the flow depth through a specially designed contracted open flow channel. This type of flow measurement device is particularly susceptible to bad readings if a blockage in the contracted section of the flume occurs, thus increased the upstream flow depth. These flumes are regularly cleaned, however unexpected blockages do occur and do result in outlier readings, which are typically easy to see in the data, and can be removed from the analysis.

It should also be noted that the Strawberry system showed an increase in average daily flow rates during the summer months, which may have been due to a specific research program that produced more wastewater than is normally experienced by the system. This increased period of flow was not considered average, and also did not coincide with any rainfall events.

After removal of outliers, the sewer collection system response was analyzed for 6 different 2009 rainfall events. One particularly large rainfall event, of 3.1 inches in one day on October 13th, 2009 was very close to the 5-year 24-hour rainfall of 3.33 inches. A best-fit equation for rainfall vs. RDI/I (flow above and beyond average dry weather flow) was developed for both the Hearst and Strawberry portions of the collection system, and the 5-year 24-hour RDI/I was estimated.

It was determined that the Hearst system had a 3.1 wet weather peaking factor, and the Strawberry system had a 2.3 wet weather peaking factor at the 5-year 24-hour event. These peaking factors are very reasonable for such a large rainfall event. It was also noted during the analysis that the system does not generally experience any significant response to smaller rainfall events, below approximately 0.5-0.75 inches in 24 hours, with sewer flows during many of these small events falling below average day dry weather flows. The system only seems to respond to larger events. Coupled with the observation that sewer flows are not significantly higher during the winter and spring when groundwater should be higher, it can be concluded that both the Strawberry and Hearst sewer systems are relatively tight in terms of underground infiltration through pipes and manholes, and that most infiltration that is experienced likely occurs through inflow into sewer manholes only during larger rain events when significant street ponding of stormwater is experienced.

A grade of B was assigned for this performance indicator because quality data for 2010 was not available for review.

Recommendations for Programmatic or SSMP Updates

PI 1 – Determination of maximum hydraulic capacity in key sewer main lines.

Recommendation: Obtain missing invert elevations during future CCTV surveys. This information will allow for calculation of the maximum hydraulic capacity with increased accuracy.

PI 2 – Determination of existing peak flow in key sewer trunk lines.

Recommendation: Continue to collect daily flow data from the Hearst and Strawberry monitoring stations for future analysis.

PI 3 – Identification of necessary improvements existing and future.

Recommendation: Continue to refine analysis of peak wet weather flow versus hydraulic capacity through ongoing data collection. Ensure that proposed campus expansion or building improvement projects are reviewed to determine if an increase in sewer flows will result, and compare the increased sewer flows to estimated available hydraulic capacity in the sewer collection system and identify if improvements are necessary.

PI 4 – Determination of existing GWI/I and RDI/I levels in the system.

Recommendation: Continue to collect daily flow data from the Hearst and Strawberry monitoring stations and conduct analysis in concert with rainfall data to provide a picture of sewer collection system response to rainfall over time. At a minimum, data from the outfall flow monitoring stations should be reviewed annually to determine if flows are approaching the hydraulic capacity of the system during peak wet weather events. Ensure that the Strawberry monitoring station is cleaned frequently enough to avoid outlier data resulting from clogging of the Parshall Flume.

Signature of Responsible Person: (sign when complete)

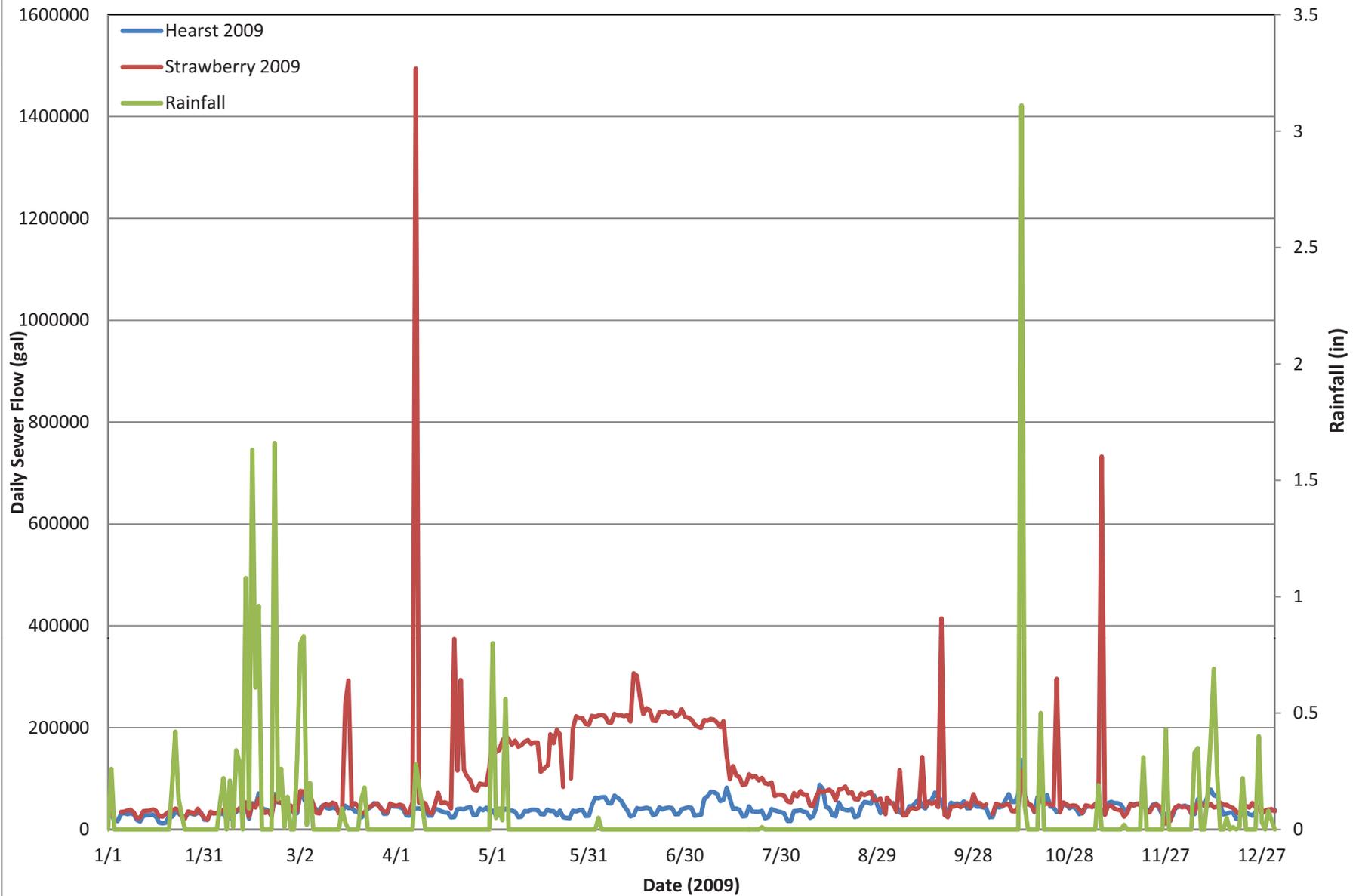
Date:

Joe Ziemann



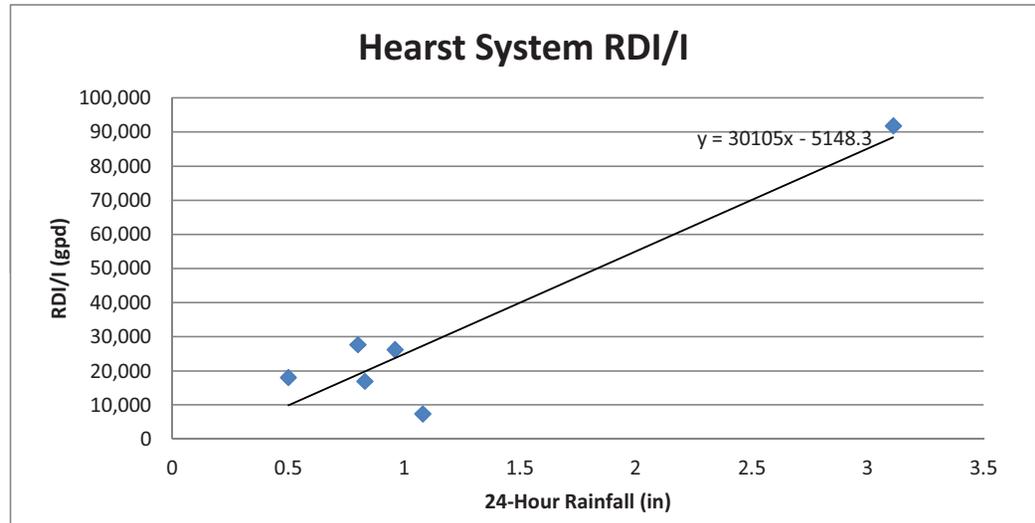
9/23/2011

2009 Daily Sewer Flows (@ Monitoring Stations) Vs. Rainfall



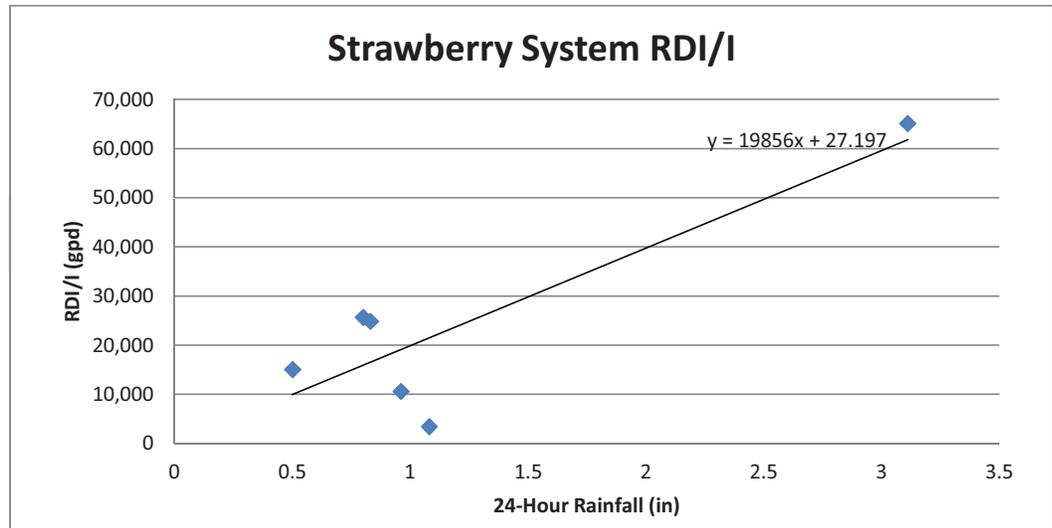
LBNL Sanitary Sewer Collection System I/I Analysis			
Hearst Monitoring Station - 2009			
Average Base Flow (gpd)		44,371	
2009 Rainfall Events			
Date	24-Hour Flow (gal)	24 Hour Rainfall (in)	RDI/I Flow (gpd)
Friday, February 13, 2009	51,802	1.08	7,431
Tuesday, February 17, 2009	70,617	0.96	26,246
Monday, March 02, 2009	72,065	0.8	27,694
Tuesday, March 03, 2009	61,352	0.83	16,981
Tuesday, October 13, 2009	136,196	3.11	91,825
Monday, October 19, 2009	62,473	0.5	18,102

I/I Data Analysis	
5-Year 24-Hour Rainfall (in)	
3.33	
RDI/I @ 5-Year 24-Hour Storm (gpd)	
95,101	
Total PWWF @ 5-Year 24-Hour Storm (gpd)	
139,472	
Peak Instantaneous Flow Assumed Peaking Factor	
3.0	
Estimated Instantaneous PWWF @ 5-Year 24-Hour Storm (gpd)	
418,417	
Estimated Instantaneous PWWF @ 5-Year 24-Hour Storm (gpm)	
291	
System Peaking Factor @ 5-Year 24-Hour Storm	
3.1	



LBNL Sanitary Sewer Collection System I/I Analysis			
Strawberry Monitoring Station - 2009			
Average Base Flow (gpd)		49,865	
2009 Rainfall Events			
Date	24-Hour Flow (gal)	24 Hour Rainfall (in)	RDI/I Flow (gpd)
Friday, February 13, 2009	53,303	1.08	3,438
Tuesday, February 17, 2009	60,466	0.96	10,602
Monday, March 02, 2009	75,536	0.8	25,671
Tuesday, March 03, 2009	74,714	0.83	24,849
Tuesday, October 13, 2009	114,971	3.11	65,106
Monday, October 19, 2009	64,913	0.5	15,048

I/I Data Analysis	
5-Year 24-Hour Rainfall (in)	
3.33	
RDI/I @ 5-Year 24-Hour Storm (gpd)	
66,093	
Total PWWF @ 5-Year 24-Hour Storm (gpd)	
115,958	
Peak Instantaneous Flow Assumed Peaking Factor	
3.0	
Estimated Instantaneous PWWF @ 5-Year 24-Hour Storm (gpd)	
347,874	
Estimated Instantaneous PWWF @ 5-Year 24-Hour Storm (gpm)	
242	
System Peaking Factor @ 5-Year 24-Hour Storm	
2.3	



Goal: Sewer System Mapping
(FY 2012 / 2013)

Responsible Person (RP): Utilities Manager

Description of Performance Indicator(s) (PIs):

The LBNL Facilities Division maintains an AutoCAD map of LBNL utility infrastructure, which includes the sanitary sewer collection system. The AutoCAD map was generated based on a survey that was conducted in order to create an inventory of utility infrastructure assets for the purposes of tracking and asset management of DOE real property. The asset inventory generated from the survey was delivered in a spreadsheet format which identified sewer pipelines by length and diameter on each LBNL grid map block. The GWDRs require that work orders are documented for the sanitary sewer collection system, that areas with maintenance problems are identified, and that more frequent maintenance is scheduled in problem areas. In order to meet these requirements, LBNL implemented a spreadsheet database to track work completed for each sanitary sewer system asset (pipeline or manhole). This database is easily referenced to the AutoCAD mapping. The PIs listed below track efforts to ensure that the AutoCAD mapping and Asset Database are up to date.

PIs and Data Analysis Methods:

1. *Entry of critical asset data items in Asset Database.*
Discussion & Scoring Criteria: Data columns are established for pipelines and manholes for the following critical information: ID, length, diameter, material, upstream / downstream manhole, upstream / downstream invert, slope, and hydraulic capacity. The percentage of pipes that have been CCTV inspected for which all of the above data is entered into the Asset Database will be determined for all asset entries.

2. *Completion of AutoCAD map quality assurance.*
Discussion & Scoring Criteria: Completion of mapping accuracy review by CCTV contractor, and updates to the AutoCAD maps and Asset Database based on comments provided by the contractor.

PI	A+	A	A-	B+	B	B-	C+	C	C-	D	F
1	95-100%	90-95%	85-90%	80-85%	75-80%	70-75%	65-70%	60-65%	55-60%	50-55%	<50%
2	Contractor provided map accuracy comments for all CCTV work completed during the current evaluation period, and all recommended map updates provided to date have been completed in the AutoCAD Map.			N/A			Contractor provided map accuracy comments for all CCTV work completed during the current evaluation period, however map updates have not yet been incorporated in the AutoCAD Map.			Contractor did not provide map accuracy comments for CCTV work completed during the current evaluation period.	

Performance Tracking		
PI	Measured Value	Performance Assessment Comments
1		
2		

Recommendations for Programmatic or SSMP Updates
<p>PI 1 – Collection of missing asset data as part of CCTV inspection work. Recommendation:</p> <p>PI 2 – Completion of mapping accuracy reviews as part of CCTV inspection work. Recommendation:</p>

Signature of Responsible Person: (sign when complete)	Date:

Goal:

**Operation and Maintenance Program
(FY 2012 / 2013)**

Responsible Person (RP):

Utilities Manager

Description of Performance Indicator(s) (PIs):

The basis of the operation and maintenance program for the sanitary sewer collection system is the completion of hydroflushing (i.e. pipeline cleaning), CCTV inspection, and chemical root treatment (or mechanical root cutting if necessary) as proactive measures to assess the condition of the system and prevent the occurrence of sanitary sewer overflows. The Facilities Division uses the sewer system Asset Database to record required maintenance frequencies for each asset for the three main activities described above. A standard maintenance frequency is established for each activity for most assets, but higher frequency maintenance should be scheduled for assets that have historically had problems such as debris accumulation or more rapid root growth. The PIs listed below track the usage of the Asset Database to schedule regular maintenance for each sanitary sewer collection system asset, and the determination of an average annual cost to maintain the system that can be accommodated by existing budgetary constraints.

PIs and Data Analysis Methods:

1. *Entry of asset-specific maintenance frequencies for major maintenance activities.*

Discussion & Scoring Criteria: A maintenance frequency in months should be established for each asset for hydroflushing, CCTV inspection, and root treatment. Not every sewer pipe will require root treatment, only those identified as having root problems through CCTV inspection. If there are no identified root problems for a pipe, a frequency of 0 should be entered. The % of non-null values for all sewer pipe assets in the hydroflushing frequency, CCTV inspection frequency, and root control frequency columns will be determined. It should be determined if maintenance frequencies have been reviewed and updated within the current evaluation period based on the review of CCTV data and any unplanned maintenance events.

2. *Determination of the average annual cost to operate and maintain the sanitary sewer collection system.*

Discussion & Scoring Criteria: An average cost for hydroflushing, CCTV inspection, and root control work per foot of sewer pipe should be entered into the Asset Database that corresponds to the costs incurred by LBNL for past work of a similar type. The Asset Database should be used to calculate the average annual cost for completing these regularly scheduled maintenance activities based on the length and maintenance frequency of each asset. Grading for this PI is dependent upon the general "success" in calculating a cost that generally assesses the entire system (i.e. appropriate maintenance frequencies are available for all assets for all three major activities) and is within current budgetary limitations. If the estimated cost is not within budgetary constraints, action should be taken to adjust planned maintenance within acceptable risk tolerances and / or adjust the available operation and maintenance budget.

3. *Percentage of sewer pipe assets with overdue regular maintenance.*

Discussion & Scoring Criteria: The sewer system Asset Database can be used to identify assets with planned maintenance activities that are overdue using conditional formatting. The percentage of sewer pipe assets with any overdue maintenance at the time this PI is analyzed is determined using the Asset Database.

PI	A+	A	A-	B+	B	B-	C+	C	C-	D	F
1	All assets have maintenance frequencies assigned and were updated this evaluation period.			All assets have maintenance frequencies assigned but were not updated this evaluation period.			Greater than 90%, but less than 100% of all assets have maintenance frequencies assigned but were not updated this evaluation period.			Less than 90% of all assets have maintenance frequencies assigned.	
2	Average Annual Cost Well Within Budget			Average Annual Cost Within Budget			Average Annual Cost Near Limit of Budgetary Constraints			Avg, Annual Cost Over Budget	Avg. Annual Cost Not Known
3	95-100%	90-95%	85-90%	80-85%	75-80%	70-75%	65-70%	60-65%	55-60%	50-55%	<50%

Performance Tracking		
PI	Measured Value	Performance Assessment Comments
1		
2		
3		

Recommendations for Programmatic or SSMP Updates
<p>PI 1 – Entry of asset-specific maintenance frequencies for major maintenance activities. Recommendation:</p>
<p>PI 2 – Success of establishing an average annual sewer system maintenance cost within budget. Recommendation:</p>
<p>PI 2 – Percentage of sewer pipe assets with overdue regular maintenance. Recommendation:</p>

Signature of Responsible Person: (sign when complete)	Date:

Goal: **Capital Improvement Program
(FY 2012 / 2013)**

Responsible Person (RP): Utilities Manager

Description of Performance Indicator(s) (PIs):

The Facilities Division analyzes sanitary sewer collection system condition assessment data collected by CCTV inspection contractors using the Asset Database and the methodology described in the SSMP. The purpose of the analysis is to identify assets that are in poor condition (above defined thresholds) and establish capital improvement projects that are funded by DOE and completed in a timely fashion to mitigate the risk of an SSO due to asset failure, and to control un-planned or emergency maintenance costs. The PIs listed below track the timely completion of condition assessments and analysis of condition assessment data.

PIs and Data Analysis Methods:

1. *Percentage of the system that will be CCTV surveyed by the end of the 10 year cycle at the current rate.*
Discussion & Scoring Criteria: The established frequency at which the entire sanitary sewer collection system should be CCTV inspected is approximately every 10 years to maintain an up-to-date assessment of asset condition. The current percentage of sewer system pipes and manholes that have been expected within the current 10 year inspection cycle to keep pace with an average 10% system inspection completion per year will be calculated using the Asset Database with the formula below:

$$\% \text{ CCTV Completion} = (\% \text{ of system inspected in last 10 years}) / (\text{years into cycle} / 10)$$

2. *Average overall NASSCO quick rating for the sanitary sewer collection system.*
Discussion & Scoring Criteria: The overall NASSCO quick rating summarizes the results of the condition assessment of an asset. Asset defects are ranked on a 1-5 scale for severity, and the quick rating identifies the number of defects in the two highest severity categories. The average overall NASSCO quick rating for the sanitary sewer collection system provides a snapshot of the condition. The average overall quick rating should be determined for both manholes and pipes, and should not include assets for which no quick rating has been established (i.e. has not been inspected yet). The average pipeline quick rating should constitute 80% of the overall system score, and the average manhole quick rating should constitute 20% of the overall system score.

3. *Prioritization and planning for future capital improvement projects.*
Discussion & Scoring Criteria: After NASSCO quick ratings have been entered into the Asset Database, assets in poor condition should be prioritized for repair according to the methodology established in the SSMP, and appropriate methods of repair should be identified. The total number of assets (pipelines and manholes) which have an overall NASSCO quick rating in excess of 4000 is quantified. Then, the percentage of those assets for which all of the following have been completed is determined: CCTV inspection results have been reviewed, appropriate repair methodology has been determined, and approximate cost to complete the repairs has been quantified.

PI	A+	A	A-	B+	B	B-	C+	C	C-	D	F
1	95-100%	90-95%	85-90%	80-85%	75-80%	70-75%	65-70%	60-65%	55-60%	50-55%	<50%
2	<1000	1000-1500	1500-2000	2000-2500	2500-3000	3250-3500	3500-3750	3750-4000	4000-4500	4500-5000	> 5000
3	95-100%	90-95%	85-90%	80-85%	75-80%	70-75%	65-70%	60-65%	55-60%	50-55%	<50%

Performance Tracking		
PI	Measured Value	Performance Assessment Comments
1		
2		
3		

Recommendations for Programmatic or SSMP Updates
<p>PI 1 – Percentage of the system that will be CCTV surveyed by the end of the 10 year cycle at the current rate. Recommendation:</p> <p>PI 2 – Average overall NASSCO quick rating for the sewer collection system. Recommendation:</p> <p>PI 3 – Prioritization and planning for future capital improvement projects. Recommendation:</p>

Signature of Responsible Person: (sign when complete)	Date:

Goal:

**Sanitary Sewer Overflow Prevention
(FY 2012 / 2013)**

Responsible Person (RP):

Environmental Manager

Description of Performance Indicator(s) (PIs):

LBNL’s success in preventing the occurrence of sanitary sewer overflows is a key metric in gauging the overall success of several SSMP programs. The PIs listed below track un-planned maintenance events (indicative of the possibility for the occurrence of SSOs) and SSOs that have occurred over the past 5 years.

PIs and Data Analysis Methods:

1. *Number of sewer system blockages or un-planned maintenance activities (non-SSO).*
Discussion & Scoring Criteria: Use the sewer Asset Database to determine the number of un-planned maintenance activities occurring within the past five years.

2. *Number of Category 2 SSOs.*
Discussion & Scoring Criteria: Use the sewer Asset Database or CIWQS website to determine the number of Category 2 SSOs occurring within the past five years.

3. *Number of Category 1 SSOs.*
Discussion & Scoring Criteria: Use the sewer Asset Database or CIWQS website to determine the number of Category 1 SSOs occurring within the past five years.

4. *Average response time for SSOs during normal business hours.*
Discussion & Scoring Criteria: Search the SSO Incident Map on the CIWQS website for the SSOs reported from the agency “Lawrence Berkeley National Laboratory” for the fiscal year in question. Examine the “Full Incident Report” for each SSO (Category 1 and Category 2) that started during normal business hours. Find the “Estimated Spill Start Date/Time” and the “Estimated Operator arrival date/time” on the “Full Incident Report” and calculate the difference between these two times to determine the spill response time. Average the spill response times for all of the SSOs during the year to obtain the desired value and compare to the grading criteria.

5. *Average response time for SSOs after normal business hours.*
Discussion & Scoring Criteria: Search the SSO Incident Map on the CIWQS website for SSOs reported from the agency “Lawrence Berkeley National Laboratory” for the fiscal year in question. Examine the “Full Incident Report” for each SSO (Category 1 and Category 2) that started outside of normal business hours. Find the “Estimated Spill Start Date/Time” and the “Estimated Operator arrival date/time” on the “Full Incident Report” and calculate the difference between these two times to determine the spill response time. Average the spill response times for all of the SSOs during the year to obtain the desired value and compare to the grading criteria.

PI	A+	A	A-	B+	B	B-	C+	C	C-	D	F
1	0-3			4-6			6-8			8-10	>10
2	1			2			3			4	>4
3	0			1			2			3	>3
4	<5 min	5-10 min	10-15 min	15-20 min	20-25 min	25-30 min	30-35 min	35-40min	40-45 min	45-60 min	>60 min
5	15-20 min	20-25 min	25-30 min	30-35 min	35-40 min	40-45 min	45-50 min	50-55 min	55-60 min	60-75 min	>75 min

Performance Tracking		
PI	Measured Value	Performance Assessment Comments
1		
2		
3		
4		
5		

Recommendations for Programmatic or SSMP Updates
<p>PI 1 – Number of sewer system blockages or un-planned maintenance activities (non-SSO). Recommendation:</p>
<p>PI 2 – Number of Category 2 SSOs. Recommendation:</p>
<p>PI 3 – Number of Category 1 SSOs. Recommendation:</p>
<p>PI 4 – Average response time for SSOs during normal business hours. Recommendation:</p>
<p>PI 5 – Average response time for SSOs after normal business hours. Recommendation:</p>

Signature of Responsible Person: (sign when complete)	Date:

Goal:**FOG Control Program
(FY 2012 / 2013)****Responsible Person (RP):**

Utilities Manager

Description of Performance Indicator(s) (PIs):

The Facilities Division is implementing a program to control the discharge of FOG from the LBNL cafeteria as a preventative measure to reduce the potential for FOG accumulation in the sanitary sewer collection system and to ensure compliance with the local limit for FOG as required by the EBMUD site-wide sewer discharge permit. The PIs listed below track the completion of FOG control activities at the cafeteria.

PIs and Data Analysis Methods:

1. *Completion of semi-annual FOG control inspection of cafeteria and submittal of inspection report.*
Discussion & Scoring Criteria: The Utilities Manager shall ensure that an inspection of the cafeteria with respect to FOG control practices is completed semi-annually, and that a standard inspection form is submitted. Both the percent completion of inspections, and general quality of inspections are evaluated.
2. *Completion of grease interceptor maintenance.*
Discussion & Scoring Criteria: The Utilities Manager will review semi-annual cafeteria inspection reports to confirm that the grease interceptor is cleaned every 6 months, and receipts are submitted for the work completed.
3. *Success of implementation of FOG disposal BMPs in LBNL cafeteria by cafeteria staff.*
Discussion & Scoring Criteria: LBNL cafeteria management will conduct semi-annual inspections of the cafeteria food preparation / dishwashing area to determine the level of success of implementation of the typical BMPs recommended by EBMUD and available through the EBMUD FOG Control Program website. The success of implementation will be graded based on the total number of key BMPs considered to be fully implemented out of the list below, based on the Facilities Division's review of semi-annual inspection reports submitted by cafeteria management, or Facilities Division site visits:
 1. All staff are knowledgeable about the need to properly dispose of FOG wastes.
 2. Signs are posted above sinks that prohibit the discharge of FOG.
 3. A cooking oil / fryer grease recycling bin is in use for storage and later removal of undiluted FOG wastes.
 4. Dishwashing staff know that it is important to dry-wipe grease cooking ware and dishes prior to washing to remove FOG and food solids.
 5. Grease spill cleanup materials (i.e. absorbent materials) are available, and staff know to use those to clean up spills rather than mop it into a floor drain.

PI	A+	A	A-	B+	B	B-	C+	C	C-	D	F
1	2/2 semi-annual inspections completed, detailed documentation.			2/2 semi-annual inspections completed, incomplete documentation.			1/2 semi-annual inspections completed, detailed documentation.			1/2 semi-annual inspections completed, incomplete documentation.	No semi-annual inspections completed.
2	2/2 grease interceptor cleanings completed, receipts available.			2/2 grease interceptor cleanings completed, no receipts available.			1/2 grease interceptor cleanings completed, receipts available.			1/2 grease interceptor cleanings completed, no receipts available.	No grease interceptor cleanings completed.
3	All BMPs Fully Implemented			4/5 BMPs Fully Implemented			3/5 BMPs Fully Implemented			2/5	1 or 0

Performance Tracking		
PI	Measured Value	Performance Assessment Comments
1		
2		
3		

Recommendations for Programmatic or SSMP Updates
<p>PI 1 – Completion of semi-annual FOG control inspection of cafeteria and submittal of inspection report. Recommendation:</p> <p>PI 2 –Completion of grease interceptor maintenance. Recommendation:</p> <p>PI 3 – Success of implementation of FOG disposal BMPs by cafeteria staff. Recommendation:</p>

Signature of Responsible Person: (sign when complete)	Date:

Goal:**System Evaluation and Capacity Assurance
(FY 2012 / 2013)****Responsible Person (RP):**

Utilities Manager

Description of Performance Indicator(s) (PIs):

The Utilities Division uses the sewer Asset Database to evaluate the hydraulic capacity of key portions of the sanitary sewer collection system. The hydraulic capacity of these key portions of the system are compared to existing flow monitoring data to determine the potential for SSOs due to the capacity being exceeded during peak wet weather sewer flows. LBNL analyzes flow monitoring data captured at the Strawberry and Hearst monitoring stations to estimate actual I/I rates experienced by the sewer collection system. The PIs listed below track the completion of tasks necessary to conduct analysis of the hydraulic capacity of the sanitary sewer collection system and plan for any identified improvements necessary to provide adequate capacity.

PIs and Data Analysis Methods:

1. *Pipeline invert / slope data and hydraulic capacity calculations in Asset Database updated.*

Discussion & Scoring Criteria: Additional sewer pipeline invert and slope data is collected in conjunction with CCTV inspections. The data collected by the CCTV contractor must be entered into the Asset Database to ensure the completion and accuracy of hydraulic capacity calculations.

2. *Determination of existing peak flow in key sewer trunk lines.*

Discussion & Scoring Criteria: The existing peak flow for each of the main line sections listed below must be identified using the analysis procedures described in SSMP section viii-a. The peak flow estimate must be updated based on flow monitoring and rainfall data from the current evaluation period.

- Strawberry mains: (1) Strawberry East Main: SSMH 6S51E to SSMH 13S30E (2) Strawberry North Main: SSMH 1N33E to SSMH 12S30E (3) Strawberry Main Trunk: SSMH 13S30E to SSMH 14S18E
- Hearst mains: (1) Hearst North Main: SSMH 10N18E to SSMH 5N12E (2) Hearst East Main: SSMH 2N25E to SSMH 5N12E (3) Hearst Main Trunk: SSMH 5N12E to SSMH 5N9E

3. *Identification of necessary hydraulic capacity improvements.*

Discussion & Scoring Criteria: An engineering analysis must be conducted to determine the improvements necessary to provide adequate hydraulic capacity of deficiencies identified. Additionally, the potential impact to the sewer collection system of any confirmed campus expansion projects must be analyzed with respect to available sewer collection system capacity.

4. *Determination of existing groundwater infiltration and rain dependent infiltration levels in the system.*

Discussion & Scoring Criteria: An estimate of the existing GWI/I and RDI/I must be made by analyzing flow monitoring data as described in SSMP section viii-b from the current evaluation period.

PI	A+	A	A-	B+	B	B-	C+	C	C-	D	F
1	Pipe invert data collected by CCTV contractor and entered into Asset Database.			N/A			Pipe invert data collected by CCTV contractor but not yet entered into Asset Database.			Pipe invert data not collected by CCTV contractor.	
2	Sewer main line peak flow data updated in Asset Database based on recent flow monitoring data.			N/A			N/A			Sewer main line peak flow data not updated this evaluation period.	
3	Full Analysis Complete			Analysis Nearly Complete			Analysis Underway			Analysis Scheduled	No Action
4	Full Analysis Complete			Analysis Nearly Complete			Analysis Underway			Analysis Scheduled	No Action

Performance Tracking		
PI	Measured Value	Performance Assessment Comments

Recommendations for Programmatic or SSMP Updates
<p>PI 1 – Pipeline invert / slope data and hydraulic capacity calculations in Asset Database updated. Recommendation:</p>
<p>PI 2 – Determination of existing peak flow in key sewer trunk lines. Recommendation:</p>
<p>PI 3 – Identification of necessary improvements existing and future. Recommendation:</p>
<p>PI 4 – Determination of existing GWI/I and RDI/I levels in the system. Recommendation:</p>

Signature of Responsible Person: (sign when complete)	Date:

Attachment x-2:
FY2012/2013 SSMP Audit,
Water Works Engineers
(September 2013)



Memorandum

To: Mike Dong, LBNL Utilities Manager

From: Joe Ziemann, P.E.
Mike Fisher, P.E.
Rebecca Tabor, E.I.T.
Anthony Baltazar, E.I.T.

Date: September 20, 2013

Subject: 2-Year SSMP Audit Cover Letter for FY 2012- FY 2013

Objectives

This memorandum summarizes the results of the required Sewer System Management Plan (SSMP) internal audit process for the FY 2012/2013 audit period. The purpose of the SSMP is to provide a written framework for sanitary sewer collection system management, operation, and maintenance programs executed by the LBNL, with the ultimate goal of minimizing sanitary sewer overflows (SSOs) and achieving compliance with California State Water Resources Control Board (SWRCB) Orders No. 2006-0003. The SSMP audit is based on a review of performance indicators established to evaluate the LBNL's success in achieving compliance with various requirements of SWRCB Orders No. 2006-0003 and implementing programs as stated in the SSMP. The SSMP audit process allows the SSMP document to evolve over time through the identification of deficiencies in the management, operation and maintenance of the sanitary sewer collection system and the implementation of changes to the SSMP to address any deficiencies. This memorandum summarizes the following information:

1. SSO history, describing the number and nature of SSOs over the past five years.
2. Summary of progress made implementing SSMP elements.
3. Summary of the effectiveness of the implemented SSMP elements based on performance indicator (PI) evaluation.
4. Specific identification of performance areas in need of improvement, including a summary of proposed modifications to SSMP elements and programs over the next audit period to address all identified areas of past poor performance.
5. Summary of proposed SSMP modifications (i.e. new programs, new performance indicators, etc.) not tied to poor performance, but tied to a desire to change or increase the scope of management, operations, and maintenance activities.
6. Summary of proposed SSMP modifications due to increased, adjusted, or new regulations required by the general waste discharge requirement (GWDR).



SSO History

LBNL has experienced two SSO events during the current audit period. The two SSOs that have occurred at LBNL in the past 5 years occurred in 2012 due to sewer line blockages caused by debris and roots.

The generally steep slopes of the collection system pipelines help reduce the buildup of solids in the system and reduce the occurrence of SSOs, but adequate operation and maintenance are required to ensure future overflow events are avoided.

- 2/2/2012 SSO Event:
 - Affected Asset: Spill out of MH 14N15E
 - Category: 1 (Spill reached a combined storm drain which discharges into the North Fork of Strawberry Creek.)
 - Spill Volume: 30 gallons
 - Cause: Root intrusion caused blockage in manhole.
 - Corrective Action: Blockage was removed from the manhole, asset placed on 2 year cleaning schedule.
- 11/29/2012 SSO Event:
 - Affected Asset: Spill out of MH 3N18E due to root ball and grease buildup in MH 4N17E
 - Category: 1 (Spill reached a separate storm drain which discharges into the North Fork of Strawberry Creek.)
 - Spill Volume: 3000-5000 gallons
 - Cause: The overflow was caused by the discharge of a large volume of water from the disinfection of domestic water pipes at a project site into the sanitary sewer system.
 - Corrective Action: Line cleared with hydrojet, asset placed on 2 year cleaning schedule.



SSMP Element Implementation Progress

This section of the SSMP Audit lists the tasks identified in the “Plan and Schedule” section of each SSMP element that were required to complete initial implementation of SSMP programs that had discrete completion dates assigned. The progress made with respect to completion of each task is summarized below. Additionally, actions with respect to non-discreet tasks that are periodic or ongoing are also described.

Section	Task	Responsible Party	Scheduled Date	Action
SSMP Section iv	Print and make available to maintenance staff all sewer system / storm drain system overall facility maps and utility grid maps.	Utilities Manager	October 2009	Completed - Facility maps have been produced and made available to all maintenance staff.
	Include sewer pipeline unique identifiers from Asset Database on Master Utility Map.	Utilities Manager	May 2010	Completed - All pipe segments have unique identifiers in both the Asset Database and the Master Utility Map. A separate AutoCAD layer containing all unique identifiers for pipelines was created for coordination with the Sewer System Asset Database.
	Include upstream / downstream manhole identification, invert, slope, and installation date in Asset Database.	Utilities Manager	May 2010	Completed - The upstream / downstream manholes have been identified in the Asset Database, and all available pipeline invert and slope data has been entered.
	Create an Asset Database table for sewer manholes.	Utilities Manager	May 2010	Completed - An Asset Database table has been created for all sewer manholes.
	Identify data missing from Asset Database, and determine the most cost-effective way to obtain that data.	Utilities Manager	As-Needed	Completed - It has been determined that the most efficient way to collect any missing invert data is during CCTV inspections. Because no invert data has been collected during the CCTV inspections thus far, the invert data from the portions of the system that have already been CCTV inspected will be collected during the next CCTV inspection cycle. It has also been determined that installation dates for sewer collection system assets are not readily available, and will not be collected and entered into the Asset Database given that condition assessment data is far more valuable in the assessment of an asset’s remaining service life than its current time in service.
	Make updates to the Master Utility Map and Asset Database based on necessary corrections noted in the field, and due to improvements made in the system as documented in as-built plans. Document updates using CAD revision blocks.	Utilities Manager	As Needed	Complete- Updates to the Master Utility Map and Sewer Asset Database are made as part of the engineering process for campus utility projects. Several updates due to work performed on the system and comments provided by the CCTV contractors have been incorporated into Master Utility Map. The Sewer Asset Database has been updated to incorporate these changes.
	Assign maintenance frequencies for hydroflushing, CCTV inspection, and root treatment (only for assets with known root growth) to each sewer pipeline asset.	Utilities Manager	November 2009	Completed - All maintenance frequencies have been assigned in the Asset Database for each individual sewer asset with a diameter ≥ 6 inches. Maintenance frequencies have been updated as needed for pipelines CCTV inspected during this audit period. Pipelines with a diameter < 6 inches are considered sewer laterals and maintenance frequencies are not assigned.
	Assign higher hydroflushing frequencies to assets in areas where blockages have occurred previously or other areas of concern.	Utilities Manager	November 2009	Completed – Hydroflushing and root control frequencies have been adjusted for specific assets where blockages have occurred in the past, and based on the results of CCTV inspections that give reason for concern, such as evidence of root infiltration, and offset joints.
	Review Asset Database and schedule contracted maintenance for assets for which regular maintenance is due.	Utilities Manager	Periodically (Minimum Annually)	CCTV inspection and hydroflushing projects were completed in 2012. Additional preventative maintenance projects will continue to be executed through FY 2021 based on available budget and all plans are subject to annual review and revision.
Record data from maintenance work order invoices provided by contractors in the Asset Database.	Utilities Manager	Periodically (Minimum Annually)	All data from the 2012 CCTV inspection, hydroflushing, and root control projects was entered into the Asset Database. Due to staffing availability and to more appropriately align tasks with a utility of LBNL size, the completion date will be modified to “Per Audit Period (Biennially)” within the next SSMP.	



Section	Task	Responsible Party	Scheduled Date	Action
SSMP Section iv	Document unscheduled maintenance or event response activities in the Asset Database.	Utilities Manager	As Needed	All unscheduled maintenance and event response activities have been entered into the Asset Database.
	Collect CCTV inspection condition assessment data from contractors following completion of scheduled work, enter pertinent data from inspection reports into Sewer Asset Database, and file inspection reports, pictures, and video for later reference.	Utilities Manager	As Needed (Per Established CCTV Inspection Frequencies and Schedules)	Completed for the 2012 CCTV inspection projects.
	Prioritize the repair of identified deficiencies using the NASSCO quick rating methodology for all severity 3, 4, and 5 defects.	Utilities Manager	No Later Than 3 Months Following Reception of New CCTV Data	Repair and preventative maintenance actions for the sewer collection system based on the 2012 CCTV inspection projects were developed by Water Works Engineers within the Sewer System CCTV Data (2012-2013) Analysis Technical Memorandum (Water Works Engineers, September 2013). Due to staffing availability and to more appropriately align tasks with a utility of LBNL size, the completion date will be modified to "Per Audit Period (Biennially)" within the next SSMP.
	Review CCTV inspection video, pictures, and reports for severity 3, 4, and 5 defects and determine appropriate rehabilitation / repair methods, or appropriate preventative maintenance activities to address deficiencies.	Licensed LBNL Staff Or Contracted Engineer	No Later Than 6 Months Following Reception of New CCTV Data	Repair and preventative maintenance actions for the sewer collection system based on the 2012 CCTV inspection projects were developed by Water Works Engineers within the Sewer System CCTV Data (2012-2013) Analysis Technical Memorandum (Water Works Engineers, September 2013). Due to staffing availability and to more appropriately align tasks with a utility of LBNL size, the completion date will be modified to "Per Audit Period (Biennially)" within the next SSMP.
	Assemble sanitary sewer collection system improvement project bid packages, estimate cost, and assign preliminary construction date. Update sanitary sewer collection system CIP.	Licensed LBNL Staff Or Contracted Engineer	No Later Than 9 Months Following Reception of New CCTV Data or Hydraulic Analysis	Because the available budget is allotted per fiscal year, it is not always feasible to procure contracts for the recommended repairs and preventative maintenance actions with 9 months of receiving new CCTV or hydraulic analysis data. This completion date will be modified to "Per Audit Period (Biennially)" within the next SSMP.
	Present changes to sanitary sewer collection system CIP to LBNL Chief Operating Officer in the form of Project Funding Requests. Maintain documentation of Project Funding Request submittals.	Utilities Manager	No Later Than 1 Year Following Reception of New CCTV Data or Hydraulic Analysis	The repair and preventative maintenance actions recommended by Water Works Engineers within the Sewer System CCTV Data (2012-2013) Analysis Technical Memorandum (Water Works Engineers, August 2013) will require approval by the Chief Operating Officer, and Project Funding Requests will be submitted to the Chief Operating Officer prior to project bidding. Due to staffing availability and to more appropriately align tasks with a utility of LBNL size, the completion date will be modified to "Per Audit Period (Biennially)" within the next SSMP.
	Initiate design / construction of approved sewer system capital improvement projects.	Utilities Manager	In Compliance With Project Completion Dates in Approved CIP	Design / construction of approved sewer system capital improvement projects will continue to be executed based on available budget and all plans are subject to annual review and revision.
SSMP Section v	Lead post-construction reviews of specifications and details used for sanitary sewer collection system infrastructure projects for the purpose of updating the standards if appropriate.	Utilities Manager	Within 3 Months of Completing Sanitary Sewer Collection System Infrastructure Projects	Several sanitary sewer collection system infrastructure projects were completed during the evaluation period. Specifications and details were reviewed and updated as deemed necessary. Due to staffing availability and to more appropriately align tasks with a utility of LBNL size, the completion date will be modified to "Per Audit Period (Biennially)" within the next SSMP.



Section	Task	Responsible Party	Scheduled Date	Action
SSMP Section v	Conduct general review of standard design requirements, specifications, and details by comparison with nationally recognized "industry standards".	Utilities Manager	Typically Every 5 Years	No general review was completed. General review of standard design requirements, specifications, and details is anticipated in 2014.
SSMP Section vi	Hold a SSO response evaluation meeting with all staff involved in response to an SSO (including UC Berkeley Staff if applicable). Implement any necessary additional or ongoing operation and maintenance activities to prevent future SSOs in the same location.	Environmental Services Group Leader	If Deemed Necessary -Within 1 Week After an SSO Event	Two SSOs occurred during the audit period. Sewer system assets which have experienced SSOs have been placed on increased frequency maintenance schedules as identified in the Asset Database. On-site interviews and response evaluation meetings with appropriate staff were held.
	Update the Emergency Response Protocol or SSO response SOPs as needed based on results of SSO response procedure evaluations, and notify external agencies and key LBNL Staff involved with SSO response of the update.	Environmental Services Group Leader / Utilities Manager	As Needed	Based on the results of the SSO response procedure evaluations, no significant updates to the Emergency Response Protocol or SSO response SOPs were deemed necessary.
SSMP Section vii	Discuss FOG control practices and provide EBMUD FOG control guidance documents to cafeteria managerial staff.	Utilities Manager	January 2010	Completed - A meeting was held with LBNL cafeteria management on August 24 th , 2011 to review the implementation of FOG control BMPs recommended by EBMUD. However, this task should be completed every time the cafeteria managerial staff changes. Therefore, the completion date will be modified to "As Needed" within the next SSMP.
	Complete waste discharge awareness flyer / sink labeling distribution and inspections, and disseminate waste discharge awareness communications.	Waste Discharge Program Manager	Annually	No waste discharge communications or inspections were completed during this audit period.
	Procure services for regularly scheduled maintenance and grease removal for LBNL cafeteria grease interceptor.	Utilities Manager / LBNL Cafeteria Staff	February 2010	The LBNL cafeteria uses enzymes as a means to control cafeteria grease rather than the previous method of employing a grease hauler.
	Review existing cafeteria operating procedures and determine if improvements are necessary for FOG control BMP efforts.	Utilities Manager	February 2010	This task was initially completed in 2010, but should be completed at least Biennially to ensure proper FOG control practices are in place. Therefore, the completion date will be modified to "Per Audit Period (Biennially)" within the next SSMP.
	Complete initial FOG disposal BMP training for cafeteria food preparation / dishwashing staff.	LBNL Cafeteria Management	April 2010	Initial training on FOG disposal BMPs was completed by cafeteria staff; however, this training should be completed by each new hire. Therefore, the completion date will be modified to "As Needed for Cafeteria New Hires" within the next SSMP.
	Maintain documentation of grease interceptor maintenance and grease removal, including receipts / manifests from grease hauling contractors.	Utilities Manager	Semi-Annually	The grease interceptor was not pumped and no maintenance was performed during this audit cycle. LBNL uses enzymes to control cafeteria grease.



Section	Task	Responsible Party	Scheduled Date	Action
SSMP Section vii	Conduct inspection of cafeteria food preparation facility to determine success of grease interceptor maintenance and FOG disposal BMPs activities. Document inspections and deliver to the Facilities Division.	LBNL Cafeteria Management	Semi-Annually	No inspections of the cafeteria food preparation facility were performed during this audit cycle.
SSMP Section viii	Compare calculated maximum hydraulic capacities of key sewer main line pipes to estimated PWWF to identify potential hydraulic capacity deficiencies.	Utilities Manager	August 2010	<p>Completed - 2011/2012 daily sewer flow data from the sewer collection system's two outfall flow monitoring stations (Hearst and Strawberry Stations) was reviewed. Water Work Engineers utilized EPA's Sanitary Sewer Overflow Analysis and Planning Toolbox software to analyze the sewer collection system's response to rainfall events, and to roughly quantify rainfall dependent infiltration and inflow (RDI/I) in the system. RDI/I was considered to be additional flow above average dry day flow experienced in the system coincident with a rainfall event. Data from this analysis is attached to this SSMP Audit cover letter.</p> <p>Both of the sewer outfall flow monitoring stations are Parshall Flumes, which measure the flow depth through a specially designed contracted open flow channel. This type of flow measurement device is particularly susceptible to bad readings if a blockage in the contracted section of the flume occurs, thus increased the upstream flow depth. These flumes are regularly cleaned, however unexpected blockages do occur and do result in outlier readings, which are typically easy to see in the data, and can be removed from the analysis.</p> <p>After removal of outliers, the sewer collection system response was analyzed for 3 different rainfall events in 2011 and 2012. Data resulting from this analysis can be found in Table 5 of the document titled "LBNL May 2010 – May 2013 Sanitary Sewer Flow Data Review Technical Memorandum".</p> <p>By looking at Table 4 of the aforementioned document, it can be seen that dry day flows in the winter months for both monitoring stations are very close to summer flows. This indicates that the LBNL system as a whole is not significantly affected by GWI/I that occurs outside of rainfall events. Most infiltration that is experienced likely occurs through inflow into sewer manholes only during larger rain events when significant street ponding of stormwater is experienced.</p> <p>The PWWF values calculated for each portion of the collection system were then compared to calculated open channel flow capacities of each sewer main pipe within the Asset Database to determine if any pipes do not have the capacity to convey the PWWF without surcharge, per the methodology described in SSMP Section viii-a. No pipes were found to have insufficient capacity.</p>
	Inspect flow conditions in the sanitary sewer collection system during periods of high rainfall to identify areas of surcharging.	Plant Maintenance Technician	Periodically (Typically Annually)	EH&S personnel observe flow conditions at the sewer flow monitoring stations on a regular basis, and have not reported any apparent surcharging events within the last two years. EH&S personnel will make an effort to make additional observations during the next audit period in areas that are identified as the lowest hydraulic capacity segments in the Strawberry and Hearst sewer main lines.
	Arrange for additional hydraulic analysis to be conducted when necessary due to comparison of flow monitoring data to Asset Database hydraulic capacity data, field observations, or impacts due to campus facility expansion that have not been analyzed previously.	Utilities Manager	As Deemed Necessary	No additional hydraulic analysis was deemed necessary beyond the typical I/I analysis described above, because none of the key sewer mains were found to have a hydraulic capacity less than the estimated peak wet weather flow. No major construction projects were completed within the sewer system service area during the audit period that would trigger additional hydraulic analysis. However, a new building is planned to be constructed within the Hearst portion of the sanitary sewer collection system in the near future. The Utilities Manager will ensure that the anticipated sewage flow from this new facility is estimated, and that the availability of hydraulic capacity in the sanitary sewer system is reviewed prior to construction of the facility.



Section	Task	Responsible Party	Scheduled Date	Action
SSMP Section viii	Conduct I/I analysis of Hearst and Strawberry monitoring station flow data and quantify total I/I versus 24-hour rainfall.	Utilities Manager	Ongoing	I/I analysis was completed for 2011-2012 data as described above. I/I analysis will continue to be completed in future years.
	Prepare project descriptions and estimates for capacity-related capital improvement projects, and integrate into the overall sanitary sewer collection system capital improvement plan prioritization within the Asset Database.	Utilities Manager	Within 3 Months of Discovering a Hydraulic Capacity Deficiency	No capacity-related capital improvement projects have been identified during this audit period.
SSMP Section ix	Hold kickoff meeting with all RPs and introduce and handout PI tracking sheets.	Utilities Manager / Environmental Manager	October 2009	Completed - The 2-Year SSMP Audit and Performance Indicator review process has been conducted by Water Works Engineers (September 2013), and the results reviewed with all appropriate LBNL staff to set the direction for future sewer collection system management, operation, and maintenance activities over the next two year period.
	Complete PI tracking sheets and assessments.	RPs for each PI	Biennially	Performance Indicator evaluation was completed as part of the FY 2012 / 2013 audit process.
	Review and update PI objectives and evaluation metrics based on past performance and changing SSMP goals or requirements.	Utilities Manager / Environmental Manager	Biennially	Performance Indicators were updated as part of the FY 2012 / 2013 audit process.
SSMP Section x	Collect and review PI tracking sheets, and any CATS database entries applicable to the sanitary sewer collection system. Evaluate the results of PI tracking, recommendations provided, and any applicable corrective actions recently taken to generate changes to SSMP programs, procedures, and text as needed.	Wastewater Discharge Program Manager / Utilities Manager	Biennially	PI tracking sheets were generated and reviewed by Water Works Engineers in consultation with LBNL staff, and the SSMP was updated based on the results of the FY 2012 / 2013 SSMP Audit.
	Conduct SSMP audit and generate SSMP audit cover letter.	Wastewater Discharge Program Manager	Biennially	FY 2012 / 2013 SSMP Audit completed by Water Works Engineers in September 2013.
	Present significant SSMP modifications to the DOE and obtain approval / re-certification of the SSMP.	Wastewater Discharge Program Manager / Utilities Manager	As Needed / Every 5 Years Minimum	Updates to the SSMP based on the FY 2012 / 2013 SSMP Audit were deemed minor enough that approval / re-certification of the SSMP by DOE was not deemed necessary. Appropriate LBNL staff signed off on the changes as a routine update to the SSMP.



Section	Task	Responsible Party	Scheduled Date	Action
SSMP Section xi	Make SSMP documents available on the EH&S Division website.	Environmental Manager	As Deemed Necessary	The updated SSMP along with the FY 2012 / 2013 SSMP Audit will be posted soon after being finalized.
	Maintain pertinent documentation of communications conducted with UC Berkeley, City of Berkeley, and EBMUD such as meeting notes, memorandums, and emails.	Utilities Manager / Environmental Manager / Wastewater Discharge Program Manager	Ongoing – As Needed	No significant communications were required or conducted with UC Berkeley, City of Berkeley, or EBMUD during this audit period.



Review of Performance

Attached to this memorandum are performance indicator assessment sheets, which summarize the collection and analysis of specific data intended to provide a basis by which performance in various areas related to the management, operation, and maintenance of the sanitary sewer collection system may be measured. During each SSMP audit period, data is collected related to each performance indicator assessment sheet and a grade is provided for the LBNL's performance using the metrics established. In addition, recommendations for performance improvement are made with respect to measured performance for each performance indicator. This process is described in section ix of the LBNL SSMP. Below is a summary of the performance indicators tracked by the LBNL and performance in each area.

Section	PI	Description	Grade
Sewer System Mapping	1	Entry of critical asset data items in Asset Database.	A-
	2	Completion of AutoCAD map quality assurance.	C
O&M Program	1	Entry of asset-specific maintenance frequencies for major maintenance activities.	A+
	2	Determination of the average annual cost to operate and maintain the sanitary sewer collection system.	D
	3	Percentage of sewer pipe assets without overdue regular maintenance.	C
Capital Improvement Program	1	Percentage of the system that will be CCTV surveyed by the end of the 10 year cycle at the current rate.	F
	2	Average overall NASSCO quick rating for the sanitary sewer collection system.	A
	3	Prioritization and planning for future capital improvement projects.	A+
SSO Prevention	1	Number of sewer system blockages or un-planned maintenance activities (non-SSO).	A
	2	Number of Category 2 SSOs.	A+
	3	Number of Category 1 SSOs.	C
	4	Average response time for SSOs during normal business hours.	A
	5	Average response time for SSOs after normal business hours.	A+
FOG Control Program	1	Completion of semi-annual FOG control inspection of cafeteria and submittal of inspection report.	F
	2	Completion of grease interceptor maintenance.	F
	3	Success of implementation of FOG disposal BMPs in LBNL cafeteria by cafeteria staff.	F



Section	PI	Description	Grade
System Evaluation and Capacity Assurance	1	Pipeline invert / slope data and hydraulic capacity calculations in Asset Database updated.	D
	2	Determination of existing peak flow in key sewer trunk lines.	A
	3	Identification of necessary hydraulic capacity improvements.	A
	4	Determination of existing groundwater infiltration and rain dependent infiltration levels in the system.	A

Future Performance Improvements

The following Performance Indicators received a grade below B- or had scoring criteria adjusted from the grading criteria established in the prior SSMP Audit:

- **Mapping PI#2 – Completion of AutoCAD map quality assurance: (Grade of C)**
 - **Reason for Grade Received:** The AutoCAD map review and verification that was completed was done with respect to CCTV work that was completed in 2012. The contractors provided some comments with regard to mapping accuracy. Also, there were several discrepancies in pipe material, diameter, and asset labeling between the inspection data and the AutoCAD map. The Sewer Asset Database was updated to reflect the CCTV findings; however updates to the AutoCAD mapping must still be completed.
 - **Consequences:** None.
 - **Recommendations:** It is recommended that LBNL require CCTV inspection contractors to provide a map highlighting the areas where work was completed, comments on discrepancies with mapping identified during field work, and identify any assets encountered in the field that do not show up on mapping. The quality of the AutoCAD map was evaluated by comparing the AutoCAD data to data obtained from the 2012 CCTV surveys. There were inconsistencies between the map and the CCTV data which are summarized below. It is recommended that the LBNL AutoCAD file manager update the map to reflect the updated information. The Asset Database has been updated by Water Works Engineers.

Diameter Discrepancies

- **SS-U059-01:** The pipe material was originally labeled as a 6 inch diameter pipe but was found to be an 8 inch diameter pipe by H&R Plumbing in the July 28, 2012 inspection. The Sewer Asset Database has been updated to reflect this finding. The AutoCAD map should be updated to reflect this finding as well.



- **SS-U059-09:** The pipe material was originally labeled as a 6 inch diameter pipe but was found to be an 8 inch diameter pipe by H&R Plumbing in the July 28, 2012 inspection. The Sewer Asset Database has been updated to reflect this finding. The AutoCAD map should be updated to reflect this finding as well.

Material Discrepancies

- **SS-U060-08:** The pipe material was originally labeled as cast iron (CI) but was found to be PVC by Presidio Systems, Inc. in the August 7, 2012 inspection. The Sewer Asset Database has been updated to reflect this finding. The AutoCAD map should be updated to reflect this finding as well.
- **SS-U061-01:** The pipe material was originally labeled as cast iron (CI) but was found to be PVC by Presidio Systems, Inc. in the August 8, 2012 inspection. The Sewer Asset Database has been updated to reflect this finding. The AutoCAD map should be updated to reflect this finding as well.
- **SS-U082-05:** The pipe material was originally labeled as ductile iron (DI) but was found to be cast iron (CI) by Presidio Systems, Inc. in the August 8, 2012 inspection. The Sewer Asset Database has been updated to reflect this finding. The AutoCAD map should be updated to reflect this finding as well.
- **SS-U082-08:** The pipe material was originally labeled as ductile iron (DI) but was found to be PVC by Presidio Systems, Inc. in the August 8, 2012 inspection. The Sewer Asset Database has been updated to reflect this finding. The AutoCAD map should be updated to reflect this finding as well.

General Mapping Updates

- **SS-U060-09:** Originally, there were two separate pipe sections between SSMH 14N18E and the cleanout (CO) to the southeast. The CCTV inspection performed by Presidio Systems, Inc. on August 8, 2012 found that one continuous pipe section separates the manhole and the cleanout. To account for this finding in the Sewer Asset Database SS-U060-10 was deleted, and the length of pipe section SS-U060-09 was adjusted accordingly. The AutoCAD map should be updated to reflect this change.



- **SS-U082-05:** Originally, there were three separate pipe sections between SSMH 10N22NE and SSMH 11N21E. The CCTV inspection performed by Presidio Systems, Inc. on August 8, 2012 found that one continuous pipe section separates the manholes. To account for this finding in the Sewer Asset Database SS-U082-06 and SS-U082-07 were deleted, and the length of pipe section SS-U082-05 was adjusted accordingly. The AutoCAD map should be updated to reflect this change.

Any future mapping discrepancies discovered are expected to be relatively minor, similar to those identified above, and therefore map verifications will be completed in conjunction with ongoing CCTV surveys.

- **Operations and Maintenance Program PI#2 – Determination of the average annual cost to operate and maintain the sanitary sewer collection system: (Grade of D, Grading Criteria Adjusted)**
 - **Reason:** It was assumed that scheduled annual CCTV inspections and hydroflushing would fall within LBNL budgetary limits. However, due to unforeseen funding constraints, the Sequester, and increased costs of CCTV inspection and hydroflushing, LBNL was not able to meet the annual operation and maintenance schedules during this audit period.
 - **Consequence:** None
 - **Recommendation:** The scheduled preventative maintenance projects should continue to be executed through FY 2021 based on available budget with the understanding that all plans are subject to annual review and revision. The scoring for this PI will be adjusted within the future SSMP.
 - **Goal Adjustment:** The original performance indicator grading scale has been adjusted to read as follows for the 2014-2015 SSMP.
 - Determination of the average annual cost to operate and maintain the sanitary sewer collection system: An average cost for hydroflushing, CCTV inspection, and root control work per foot of sewer pipe should be recorded that corresponds to the costs incurred by LBNL for past work of a similar type. Grading for this PI is dependent upon the general “success” in keeping a record of how much money is spent on each O&M activity.
 - A+ to A-: A complete record of all O&M activities and their costs was kept.
 - B to C: N/A
 - D to F: No record of O&M activities exists, or it is incomplete.



- **Operations and Maintenance Program PI#3 – Percentage of sewer pipe assets with overdue regular maintenance: (Grade of C, Grading Criteria Adjusted)**
 - **Note:** *It was assumed that the original grading criteria contained an error, so the grading for this PI was calculated as:*
 - **100%-(% of sewer pipe assets with overdue regular maintenance)**
 - **Reason:** Seventy-one out of 191 (37%) pipelines had regular CCTV inspections scheduled during 2011 and 2012 that was not completed. Seventy-six out of 191 pipelines (39.7%) had hydroflushing scheduled during 2011 and 2012 that was not completed. This equates to about 37% percent of the total pipelines. Due to unforeseen funding constraints, the Sequester, and increased costs of CCTV inspection and hydroflushing, LBNL was not able to meet the annual operation and maintenance schedules during this audit period.
 - **Consequences:** A complete CCTV analysis of the system was expected to be completed within 10 years, and the entire system hydroflushed every 5 years. The suggested rate of CCTV inspection and hydroflushing will be accelerated over the next years to ensure that operation and maintenance tasks remain on track with the understanding that all plans are subject to annual review and revision based on available budget.
 - **Recommendations:** As available annual budget allows, continue to follow the suggested future CCTV inspection and hydroflushing schedule recommended in the Sewer Asset Database.
 - **Goal Adjustment:** The original performance indicator grading scale has been adjusted to read as follows for the 2014-2015 SSMP.
 - Percentage of sewer pipe assets with overdue regular maintenance:
 - A+: 0-5%, A: 5-10%, A-: 10-15%, B+: 15-20%, B: 20-25%, B-: 25-30%, C+: 30-35%, C: 35-40%, C-:40-45%, D: 45-50%, F: >50%

- **Capital Improvement Program PI#1 – Percentage of the sanitary sewer collection system that will be CCTV surveyed by the end of the 10 year cycle at the current rate: (Grade of F)**
 - **Reason:** At the current rate of CCTV inspection (based on work completed since 2009) only 24.1% (46 of 191) of the sewer pipes $\geq 6''$ have been CCTV inspected. None of the 107 manholes have been inspected. Based on the grading formula established and considering pipes $\geq 6''$ only, the percent CCTV completion is 48.2%. If both pipes $\geq 6''$ and manholes are considered, the percent CCTV completion of the system is 30.8%. Although no condition assessments for manholes have been completed thus far, manhole condition assessments should be completed in conjunction with all future CCTV work. Due to unforeseen funding constraints, the Sequester, and increased costs of CCTV inspection and hydroflushing, LBNL was not able to meet the annual operation and maintenance schedules during this audit period.



- **Consequences:** A complete CCTV analysis of the system was expected to be completed by 2014. Currently, if the recommended CCTV survey schedule is followed, the remainder of the system will be inspected by FY 2016. There are no sections of the sewer collection system that are known to be in deteriorating condition or that have suffered a notable amount of maintenance events, and therefore immediate CCTV inspection of the whole system was not deemed necessary.
 - **Recommendations:** As available annual budget allows, continue to follow the suggested future CCTV inspection and hydroflushing schedule recommended in the Sewer Asset Database.
- **Sanitary Sewer Overflow Prevention PI#3 – Number of Category 1 SSOs. (Grade of C)**
 - **Reason:** Two (2) Category 1 SSOs have occurred within the last 5 years, both occurring in 2012.
 - **Consequences:** Two separate SSO incident reports had to be filed with the State Water Resources Control Board. These reports along with an incident map are available to the public through the Water Board's website.
 - **Recommendations:** As available annual budget allows, continue to follow suggested hydroflushing, CCTV survey, and root maintenance schedule to continue to prevent future SSOs.
 - **FOG Control Program PI#1 – Completion of semi-annual FOG control inspection of cafeteria and submittal of inspection report: Grade of F**
 - **Reason:** No semi-annual inspections were completed by the LBNL.
 - **Consequences:** Without performing semi-annual inspections, it is impossible to know if FOG control policies being employed by cafeteria staff. If FOG policies are not being employed then there is a potential for grease problems within the sewer system to develop which increases the risk of SSOs.
 - **Recommendations:** Ensure the FOG cafeteria inspection forms are being completed twice a year. The forms should be submitted to the Utilities Manager for review. In the future, if a change in cafeteria management occurs, ensure that they are aware of LBNL's FOG control program and all related activities that must be performed.
 - **FOG Control Program PI#2 – Completion of grease interceptor maintenance: Grade of F**
 - **Reason:** No grease interceptor cleanings have occurred during this audit period. An enzyme was used to emulsify the grease, but the interceptor itself was never cleaned.



- **Consequences:** LBNL is at an increased risk of grease problems within the sewer system which increases the risk of SSOs.
- **Recommendations:** The grease interceptor should be cleaned as soon as possible by an EBMUD approved grease hauler. It should then be cleaned every 6 months, or on a more frequent basis if the new cafeteria staff is found to not be effectively implementing the grease management BMP's as found in PI#3. Work receipts should be submitted to the Utilities Manager every time the grease interceptor is cleaned.

- **FOG Control Program PI#3 – Success of implementation of FOG disposal BMPs by cafeteria staff: Grade of F**
 - **Reason:** While some of the BMP's might be currently implemented, there are no completed semi-annual inspection forms to verify this claim. No Facilities Division site visits have been documented to date. Therefore, it is not possible to know for sure whether or not these FOG BMP's are being implemented.
 - **Consequences:** LBNL is at an increased risk of grease problems within the sewer system which increases the risk of SSOs.
 - **Recommendations:** Complete the semi-annual FOG control inspection forms so that it can be determined whether or not these 5 FOG disposal BMP's are being successfully implemented. While it may be true that some or all of the BMP's are being implemented, without completed inspection forms or documented Facilities Division site visits, it is not possible to verify this claim.

- **SECAP – Pipeline invert / slope data and hydraulic capacity calculations in Asset Database updated: (Grade of D)**
 - **Reason:** Neither Presidio Systems, Inc. nor H&R Plumbing collected invert / slope data for the 2012 CCTV inspections.
 - **Consequences:** Sewer pipeline invert / slope data is needed to accurately complete hydraulic capacity calculations, or in some cases update them.
 - **Recommendations:** Obtain missing invert elevations during future CCTV surveys. This information will allow for calculation of the maximum hydraulic capacity with increased accuracy.

Areas of Excellent Performance

The LBNL sanitary sewer collection system received very high performance reviews in many areas. The excellent performance was due to a well-executed Overflow Emergency Response Plan, low average NASSCO quick rating for the surveyed portion of the sanitary sewer collection system (i.e. system is in relatively good condition with no major defects), a generally well documented sewer collection system Asset Database, and an analysis showing that the sewer collection system experiences a low level of infiltration and inflow and has adequate capacity to convey peak wet weather sewer flows.



Future performance reviews will continue to improve as additional data is collected during on-going CCTV surveys of the system according to the current survey schedule. Furthermore, the recommended maintenance schedule, as documented in the Asset Database, will reduce the likelihood of future SSOs.

SSMP Modifications

1. Section 0: Aligned the definitions and pertinent reporting requirements associated with the SSO categories with the amended MRP (WQO 2013-0058-EXEC). Eliminated wording stating that certifications of SSOs must be submitted to the RWQCB.
2. Section ii-c: Eliminated wording that states the RWQCB and City of Berkeley Environmental Health Division must be notified within the first 2 hours of discovering an SSO that impacts a drainage channel or surface water. Also eliminated wording that states a certification must be submitted to Regional Water Quality Control Boards within 24 hours of making notification calls. Also changed wording regarding when a report must be submitted by for the three different SSO categories.
3. Section iv-b: Changed the fourth task's Scheduled Date to "Per Audit Period (Biennially)".
4. Section iv-c: Changed the second through fifth tasks' Scheduled Date to "Per Audit Period (Biennially)".
5. Section iv-d: Removed the document titled "LBNL Emergency Response Protocol for Sewage and Potable Water Releases" because it has been integrated into another document.
6. Section iv-e: Removed wording involving the document titled "LBNL Emergency Response Protocol for Sewage and Potable Water Releases".
7. Section v-a: Changed the first task's Scheduled Date to "Per Audit Period (Biennially)".
8. Section vi-d: Added a requirement/task that all LBNL Staff members involved in SSO volume estimation must go through CWEA training on spill volume estimation.
9. Section vii-a: Changed the first task's Scheduled Date to "As Needed".
10. Section vii-c: Changed the first task's Scheduled Date to "Per Audit Period (Biennially)".
11. Section vii-d: Changed the first task's Scheduled Date to "As Needed for Cafeteria New Hires".
12. Section ix-b: Removed the third task because the DOE does not require implementation of ECAAP anymore. Also removed wording involving ECAAP.
13. Section ix-c: Changed the description of the second Performance Indicator for the O&M Program SSMP Element. The description now matches the new grading scale for that particular Performance Indicator.
14. Section xi-a: Removed wording involving ECAAP as the DOE does not require implementation of that program anymore.
15. Modify CCTV inspection contract language to include the following requirements:



- Require MACP (Level 1) inspection of all manholes upstream and downstream of pipelines that are scheduled for CCTV inspection, and require that all pipeline inverts are measured entering and exiting each manhole inspected.
- Require that the contractor verify in the field the accuracy of the mapping provided by LBNL for use in conducting hydroflushing and CCTV work. Require the contractor to provide clear comments and map change notes directly on the maps provided to identify any discrepancies between the map and field conditions. Require the contractor to identify any pipelines observed in the field during manhole inspections that appear to be 6" diameter or greater that should be CCTV inspected which may be marked as sewer laterals (4" or less) on the map.

16. The grading scale for the FY 2014/2015 Performance Indicators has been changed away from the A through F scale. The new scale can be seen in the attached PI Assessment Sheets for FY 2014/2015.

Impacts of Proposed SSMP Modifications

Many of the proposed SSMP modifications are simply clarifications and updates, and will not have any significant operational or fiscal impacts.

The impacts of the performance indicator updates will be to improve the accuracy with which performance assessments reflect the stated goal of the preventative maintenance programs.

The primary impact of the proposed modification to CCTV inspection contracting procedures will be a modest increase in the annual cost due to an increased number of CCTV surveys that will be conducted each year (through FY 2015) in accordance with the recently developed CCTV schedule. Planned CCTV inspection footages in the next 4 years are more than have been completed over the past 2 years. Furthermore, the price of CCTV inspections will increase with the addition of manhole inspections to the annual maintenance requirements, and a requirement that the contractor verify mapping accuracy. The anticipated increase in annual maintenance costs is not a major concern, however, because the budget for CCTV and hydroflushing work is flexible and can therefore adapt to these anticipated cost increases.

A new Performance Indicator titled "MRP" will be added to the Audit for the Fiscal Year 2014/2015. This document concerns the amendments made to the Monitoring and Reporting Program through WQO 2013-0058-EXEC.



Conclusion

It is the opinion of Water Works Engineers that the Lawrence Berkeley National Laboratory is currently in compliance with all of the SSMP requirements as described in subsection D.13 of SWRCB Order No. 2006-0003.

Attachments:

1. FY 2012 / 2013 Performance Indicator Assessment Sheets (6)
 - 1 - Mapping
 - 2 - O&M Program
 - 3 - Capital Improvement Program
 - 4 - SSO Prevention
 - 5 - FOG Control Program
 - 6 - SECAP
2. Proposed SSMP Text Updates
 - Updated Performance Indicator Assessment Sheets for FY 2014 / 2015
 - Includes new MRP Performance Indicator
 - Updated SSMP Sections (MS Word format with Track Changes)

Goal: Sewer System Mapping
(FY 2012 / 2013)

Responsible Person (RP): Utilities Manager

Description of Performance Indicator(s) (PIs):

The LBNL Facilities Division maintains an AutoCAD map of LBNL utility infrastructure, which includes the sanitary sewer collection system. The AutoCAD map was generated based on a survey that was conducted in order to create an inventory of utility infrastructure assets for the purposes of tracking and asset management of DOE real property. The asset inventory generated from the survey was delivered in a spreadsheet format which identified sewer pipelines by length and diameter on each LBNL grid map block. The GWDRs require that work orders are documented for the sanitary sewer collection system, that areas with maintenance problems are identified, and that more frequent maintenance is scheduled in problem areas. In order to meet these requirements, LBNL implemented a spreadsheet database to track work completed for each sanitary sewer system asset (pipeline or manhole). This database is easily referenced to the AutoCAD mapping. The PIs listed below track efforts to ensure that the AutoCAD mapping and Asset Database are up to date.

PIs and Data Analysis Methods:

1. *Entry of critical asset data items in Asset Database.*
Discussion & Scoring Criteria: Data columns are established for pipelines and manholes for the following critical information: ID, length, diameter, material, upstream / downstream manhole, upstream / downstream invert, slope, and hydraulic capacity. The percentage of pipes that have been CCTV inspected for which all of the above data is entered into the Asset Database will be determined for all asset entries.

2. *Completion of AutoCAD map quality assurance.*
Discussion & Scoring Criteria: Completion of mapping accuracy review by CCTV contractor, and updates to the AutoCAD maps and Asset Database based on comments provided by the contractor.

PI	A+	A	A-	B+	B	B-	C+	C	C-	D	F
1	95-100%	90-95%	85-90%	80-85%	75-80%	70-75%	65-70%	60-65%	55-60%	50-55%	<50%
2	Contractor provided map accuracy comments for all CCTV work completed during the current evaluation period, and all recommended map updates provided to date have been completed in the AutoCAD Map.			N/A			Contractor provided map accuracy comments for all CCTV work completed during the current evaluation period, however map updates have not yet been incorporated in the AutoCAD Map.			Contractor did not provide map accuracy comments for CCTV work completed during the current evaluation period.	

Performance Tracking		
PI	Measured Value	Performance Assessment Comments
1	A-	For the sewer pipes that were CCTV inspected as part of the 2012 CCTV inspection projects, 87% of the data in the fields listed for this PI was complete. A majority of the data that was missing was invert data, as the CCTV contractor was not required to collect invert data as part of their contract.
2	C	The CCTV contractors provided comments during the current evaluation period, but not all of them have been incorporated in the AutoCAD Map.

Recommendations for Programmatic or SSMP Updates

PI 1 – Collection of missing asset data as part of CCTV inspection work.

Recommendation: Obtain missing invert information during future CCTV surveys by requiring the contractor to measure the distance from the rim of each manhole to the invert of each pipe. After obtaining invert data, the slopes and hydraulic capacities can also be calculated. Obtaining missing information during CCTV surveys has been deemed the most efficient way to collect any missing data. Because no invert data has been collected during the CCTV inspections thus far, the invert data from the portions of the system that have already been CCTV inspected will be collected during the next CCTV inspection cycle.

PI 2 – Completion of mapping accuracy reviews as part of CCTV inspection work.

Recommendation: It is recommended that LBNL require CCTV inspection contractors to provide a map highlighting the areas where work was completed, comments on discrepancies with mapping identified during field work, and identify any assets encountered in the field that do not show up on mapping. The quality of the AutoCAD map was evaluated by comparing the AutoCAD data to data obtained from the 2012 CCTV surveys. There were several inconsistencies between the map and the CCTV data which are summarized below. It is recommended that the LBNL AutoCAD file manager update the map to reflect the updated information. The Asset Database has been updated by Water Works Engineers.

Diameter Discrepancies

- **SS-U059-01:** The pipe material was originally labeled as a 6 inch diameter pipe but was found to be an 8 inch diameter pipe by H&R Plumbing in the July 28, 2012 inspection. The Sewer Asset Database has been updated to reflect this finding. The AutoCAD map should be updated to reflect this finding as well.
- **SS-U059-09:** The pipe material was originally labeled as a 6 inch diameter pipe but was found to be an 8 inch diameter pipe by H&R Plumbing in the July 28, 2012 inspection. The Sewer Asset Database has been updated to reflect this finding. The AutoCAD map should be updated to reflect this finding as well.

Material Discrepancies

- **SS-U060-08:** The pipe material was originally labeled as cast iron (CI) but was found to be PVC by Presidio Systems, Inc. in the August 7, 2012 inspection. The Sewer Asset Database has been updated to reflect this finding. The AutoCAD map should be updated to reflect this finding as well.
- **SS-U061-01:** The pipe material was originally labeled as cast iron (CI) but was found to be PVC by Presidio Systems, Inc. in the August 8, 2012 inspection. The Sewer Asset Database has been updated to reflect this finding. The AutoCAD map should be updated to reflect this finding as well.
- **SS-U082-05:** The pipe material was originally labeled as ductile iron (DI) but was found to be cast iron (CI) by Presidio Systems, Inc. in the August 8, 2012 inspection. The Sewer Asset Database has been updated to reflect this finding. The AutoCAD map should be updated to reflect this finding as well.
- **SS-U082-08:** The pipe material was originally labeled as ductile iron (DI) but was found to be PVC by Presidio Systems, Inc. in the August 8, 2012 inspection. The Sewer Asset Database has been updated to reflect this finding. The AutoCAD map should be updated to reflect this finding as well.

General Mapping Updates

- **SS-U060-09:** Originally, there were two separate pipe sections between SSMH 14N18E and the cleanout (CO) to the southeast. The CCTV inspection performed by Presidio Systems, Inc. on August 8, 2012 found that one continuous pipe section separates the manhole and the cleanout. To account for this finding in the Sewer Asset Database SS-U060-10 was deleted, and the length of pipe

section SS-U060-09 was adjusted accordingly. The AutoCAD map should be updated to reflect this change.

- **SS-U082-05:** Originally, there were three separate pipe sections between SSMH 10N22NE and SSMH 11N21E. The CCTV inspection performed by Presidio Systems, Inc. on August 8, 2012 found that one continuous pipe section separates the manholes. To account for this finding in the Sewer Asset Database SS-U082-06 and SS-U082-07 were deleted, and the length of pipe section SS-U082-05 was adjusted accordingly. The AutoCAD map should be updated to reflect this change.

Signature of Responsible Person: (sign when complete)	Date:

Goal:	Operation and Maintenance Program (FY 2012 / 2013)
Responsible Person (RP):	Utilities Manager
<u>Description of Performance Indicator(s) (PIs):</u>	
<p>The basis of the operation and maintenance program for the sanitary sewer collection system is the completion of hydroflushing (i.e. pipeline cleaning), CCTV inspection, and chemical root treatment (or mechanical root cutting if necessary) as proactive measures to assess the condition of the system and prevent the occurrence of sanitary sewer overflows. The Facilities Division uses the sewer system Asset Database to record required maintenance frequencies for each asset for the three main activities described above. A standard maintenance frequency is established for each activity for most assets, but higher frequency maintenance should be scheduled for assets that have historically had problems such as debris accumulation or more rapid root growth. The PIs listed below track the usage of the Asset Database to schedule regular maintenance for each sanitary sewer collection system asset, and the determination of an average annual cost to maintain the system that can be accommodated by existing budgetary constraints.</p>	
<u>PIs and Data Analysis Methods:</u>	
<ol style="list-style-type: none"> <li> <p>1. <i>Entry of asset-specific maintenance frequencies for major maintenance activities.</i> Discussion & Scoring Criteria: A maintenance frequency in months should be established for each asset for hydroflushing, CCTV inspection, and root treatment. Not every sewer pipe will require root treatment, only those identified as having root problems through CCTV inspection. If there are no identified root problems for a pipe, a frequency of 0 should be entered. The % of non-null values for all sewer pipe assets in the hydroflushing frequency, CCTV inspection frequency, and root control frequency columns will be determined. It should be determined if maintenance frequencies have been reviewed and updated within the current evaluation period based on the review of CCTV data and any unplanned maintenance events.</p> <li> <p>2. <i>Determination of the average annual cost to operate and maintain the sanitary sewer collection system.</i> Discussion & Scoring Criteria: An average cost for hydroflushing, CCTV inspection, and root control work per foot of sewer pipe should be entered into the Asset Database that corresponds to the costs incurred by LBNL for past work of a similar type. The Asset Database should be used to calculate the average annual cost for completing these regularly scheduled maintenance activities based on the length and maintenance frequency of each asset. Grading for this PI is dependent upon the general “success” in calculating a cost that generally assesses the entire system (i.e. appropriate maintenance frequencies are available for all assets for all three major activities) and is within current budgetary limitations. If the estimated cost is not within budgetary constraints, action should be taken to adjust planned maintenance within acceptable risk tolerances and / or adjust the available operation and maintenance budget.</p> <li> <p>3. <i>Percentage of sewer pipe assets with overdue regular maintenance.</i> Discussion & Scoring Criteria: The sewer system Asset Database can be used to identify assets with planned maintenance activities that are overdue using conditional formatting. The percentage of sewer pipe assets with any overdue maintenance at the time this PI is analyzed is determined using the Asset Database.</p> 	

PI	A+	A	A-	B+	B	B-	C+	C	C-	D	F
1	All assets have maintenance frequencies assigned and were updated this evaluation period.			All assets have maintenance frequencies assigned but were not updated this evaluation period.			Greater than 90%, but less than 100% of all assets have maintenance frequencies assigned but were not updated this evaluation period.			Less than 90% of all assets have maintenance frequencies assigned.	
2	Average Annual Cost Well Within Budget			Average Annual Cost Within Budget			Average Annual Cost Near Limit of Budgetary Constraints			Avg, Annual Cost Over Budget	Avg. Annual Cost Not Known
3	95-100%	90-95%	85-90%	80-85%	75-80%	70-75%	65-70%	60-65%	55-60%	50-55%	<50%

Performance Tracking		
PI	Measured Value	Performance Assessment Comments
1	A+	Maintenance frequencies for all assets in the Sewer Asset Database were entered. A review of CCTV data from the 2012 CCTV inspection projects was completed. It should be noted that for pipes less than 6" in diameter (considered to be sewer laterals, not sewer mains), hydroflushing and CCTV inspection are not regularly scheduled or completed. Pipelines with roots were scheduled for root treatment activities, and pipelines with small offset joints were scheduled for more frequent hydroflushing. Some pipelines showed signs of corrosion, and those pipelines were scheduled for more frequent CCTV inspection. Refer to the Sewer System CCTV Data Analysis Technical Memo (Water Works Engineers, August 2013) for more detailed information.
2	D	It was assumed that scheduled annual CCTV inspections and hydroflushing would fall within LBNL budgetary limits. However, due to unforeseen funding constraints, the Sequester, and increased costs of CCTV inspection and hydroflushing, LBNL was not able to meet the annual operation and maintenance schedules during this audit period.
3	C	<i>Note: It was assumed that the original grading criteria contained a typographical error, and should have read, "Percentage of sewer pipe assets without overdue regular maintenance."</i> Seventy-one out of 191 (37%) pipelines had regular CCTV inspections scheduled during 2011 and 2012 that was not completed. Seventy-six out of 191 pipelines (39.7%) had hydroflushing scheduled during 2011 and 2012 that was not completed. This equates to about 37% percent of the total pipelines. Due to unforeseen funding constraints, the Sequester, and increased costs of CCTV inspection and hydroflushing, LBNL was not able to meet the annual operation and maintenance schedules during this audit period.

Recommendations for Programmatic or SSMP Updates

PI 1 – Entry of asset-specific maintenance frequencies for major maintenance activities.

Recommendation: Continue to update asset specific maintenance frequencies based on the results of CCTV inspections, and analyze causes for any un-planned maintenance activities.

PI 2 – Success of establishing an average annual sewer system maintenance cost within budget.

Recommendation: Because of the uncertainty in forecasting the annual budgets due to unforeseen funding constraints, and the Sequester, the scheduled preventative maintenance projects should continue to be executed through FY 2021 based on available budget with the understanding that all plans are subject to annual review and revision. The scoring for this PI will be adjusted within the future SSMP.

PI 3 – Percentage of sewer pipe assets with overdue regular maintenance.

Recommendation: Follow the future CCTV inspection and hydroflushing dates recommended in the Sewer Asset Database. The rate of CCTV inspection and hydroflushing will be accelerated over the next years to ensure that operation and maintenance tasks remain on track with the understanding that all plans are subject to annual review and revision based on available budget.

Signature of Responsible Person: (sign when complete)

Date:

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Goal: **Capital Improvement Program
(FY 2012 / 2013)**

Responsible Person (RP): Utilities Manager

Description of Performance Indicator(s) (PIs):

The Facilities Division analyzes sanitary sewer collection system condition assessment data collected by CCTV inspection contractors using the Asset Database and the methodology described in the SSMP. The purpose of the analysis is to identify assets that are in poor condition (above defined thresholds) and establish capital improvement projects that are funded by DOE and completed in a timely fashion to mitigate the risk of an SSO due to asset failure, and to control un-planned or emergency maintenance costs. The PIs listed below track the timely completion of condition assessments and analysis of condition assessment data.

PIs and Data Analysis Methods:

1. *Percentage of the system that will be CCTV surveyed by the end of the 10 year cycle at the current rate.*
Discussion & Scoring Criteria: The established frequency at which the entire sanitary sewer collection system should be CCTV inspected is approximately every 10 years to maintain an up-to-date assessment of asset condition. The current percentage of sewer system pipes and manholes that have been expected within the current 10 year inspection cycle to keep pace with an average 10% system inspection completion per year will be calculated using the Asset Database with the formula below:

$$\% \text{ CCTV Completion} = (\% \text{ of system inspected in last 10 years}) / (\text{years into cycle} / 10)$$

2. *Average overall NASSCO quick rating for the sanitary sewer collection system.*
Discussion & Scoring Criteria: The overall NASSCO quick rating summarizes the results of the condition assessment of an asset. Asset defects are ranked on a 1-5 scale for severity, and the quick rating identifies the number of defects in the two highest severity categories. The average overall NASSCO quick rating for the sanitary sewer collection system provides a snapshot of the condition. The average overall quick rating should be determined for both manholes and pipes, and should not include assets for which no quick rating has been established (i.e. has not been inspected yet). The average pipeline quick rating should constitute 80% of the overall system score, and the average manhole quick rating should constitute 20% of the overall system score.

3. *Prioritization and planning for future capital improvement projects.*
Discussion & Scoring Criteria: After NASSCO quick ratings have been entered into the Asset Database, assets in poor condition should be prioritized for repair according to the methodology established in the SSMP, and appropriate methods of repair should be identified. The total number of assets (pipelines and manholes) which have an overall NASSCO quick rating in excess of 4000 is quantified. Then, the percentage of those assets for which all of the following have been completed is determined: CCTV inspection results have been reviewed, appropriate repair methodology has been determined, and approximate cost to complete the repairs has been quantified.

PI	A+	A	A-	B+	B	B-	C+	C	C-	D	F
1	95-100%	90-95%	85-90%	80-85%	75-80%	70-75%	65-70%	60-65%	55-60%	50-55%	<50%
2	<1000	1000-1500	1500-2000	2000-2500	2500-3000	3250-3500	3500-3750	3750-4000	4000-4500	4500-5000	> 5000
3	95-100%	90-95%	85-90%	80-85%	75-80%	70-75%	65-70%	60-65%	55-60%	50-55%	<50%

Performance Tracking		
PI	Measured Value	Performance Assessment Comments
1	F	46 of the 191 pipes $\geq 6''$ have been CCTV inspected (24.1%) within the first 5 years of the 10 year inspection cycle. None of the 107 manholes have been inspected. Based on the grading formula established and considering pipes $\geq 6''$ only, the percent CCTV completion is 48.2%. If pipes $\geq 6''$ and manholes are considered, the percent CCTV completion is 30.8%. If the established CCTV survey schedule is followed, the remainder of the system will be inspected by FY 2021. Due to unforeseen funding constraints, the Sequester, and increased costs of CCTV inspection and hydroflushing, LBNL was not able to meet the annual operation and maintenance schedules during this audit period.
2	A	The average overall PACP Quick Rating is 1370 for the 24.1% of the system that has been CCTV surveyed in the last 10 years. This is not an accurate representation of the system as a whole, and the remaining segments must be analyzed to get a full and accurate assessment of the system. However, the portions of the system that have been inspected were in relatively good shape, as reflected by the low average system NASSCO quick rating
3	A+	There are 10 pipes with a NASSCO quick rating in excess of 4000 from the 2012 surveys. All inspection results have been reviewed, appropriate repair methodology has been determined, and the approximate costs to complete the repairs have been quantified.

Recommendations for Programmatic or SSMP Updates

PI 1 – Percentage of the system that will be CCTV surveyed by the end of the 10 year cycle at the current rate.

Recommendation: Follow the future CCTV inspection dates recommended in the Sewer Asset Database. The 10 year cycle for CCTV inspection and will be adjusted over the next years to ensure that operation and maintenance tasks remain on track with the understanding that all plans are subject to annual review and revision based on available budget.

PI 2 – Average overall NASSCO quick rating for the sewer collection system.

Recommendation: For the 2012 condition assessment projects, manholes were not inspected in detail, only pipelines were inspected. For future CCTV projects, requirements for manhole inspections should be added to the scope of work for CCTV contractors.

PI 3 – Prioritization and planning for future capital improvement projects.

Recommendation: There are 10 pipes with a NASSCO quick rating in excess of 4000 from the 2012 surveys. Follow the repair methodology outlined in the Sewer System CCTV Data (2012-2013) Analysis Technical Memorandum (Water Works Engineers, September 2013).

Signature of Responsible Person: (sign when complete)

Date:

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Goal: **Sanitary Sewer Overflow Prevention
(FY 2012 / 2013)**

Responsible Person (RP): Environmental Manager

Description of Performance Indicator(s) (PIs):

LBNL’s success in preventing the occurrence of sanitary sewer overflows is a key metric in gauging the overall success of several SSMP programs. The PIs listed below track un-planned maintenance events (indicative of the possibility for the occurrence of SSOs) and SSOs that have occurred over the past 5 years.

PIs and Data Analysis Methods:

1. *Number of sewer system blockages or un-planned maintenance activities (non-SSO).*
Discussion & Scoring Criteria: Use the Sewer Asset Database to determine the number of un-planned maintenance activities occurring within the past five years.

2. *Number of Category 2 SSOs.*
Discussion & Scoring Criteria: Use the Sewer Asset Database or CIWQS website to determine the number of Category 2 SSOs occurring within the past five years.

3. *Number of Category 1 SSOs.*
Discussion & Scoring Criteria: Use the sewer Asset Database or CIWQS website to determine the number of Category 1 SSOs occurring within the past five years.

4. *Average response time for SSOs during normal business hours.*
Discussion & Scoring Criteria: Search the SSO Incident Map on the CIWQS website for the SSOs reported from the agency “Lawrence Berkeley National Laboratory” for the fiscal year in question. Examine the “Full Incident Report” for each SSO (Category 1 and Category 2) that started during normal business hours. Find the “Estimated Spill Start Date/Time” and the “Estimated Operator arrival date/time” on the “Full Incident Report” and calculate the difference between these two times to determine the spill response time. Average the spill response times for all of the SSOs during the year to obtain the desired value and compare to the grading criteria.

5. *Average response time for SSOs after normal business hours.*
Discussion & Scoring Criteria: Search the SSO Incident Map on the CIWQS website for SSOs reported from the agency “Lawrence Berkeley National Laboratory” for the fiscal year in question. Examine the “Full Incident Report” for each SSO (Category 1 and Category 2) that started outside of normal business hours. Find the “Estimated Spill Start Date/Time” and the “Estimated Operator arrival date/time” on the “Full Incident Report” and calculate the difference between these two times to determine the spill response time. Average the spill response times for all of the SSOs during the year to obtain the desired value and compare to the grading criteria.

PI	A+	A	A-	B+	B	B-	C+	C	C-	D	F
1	0-3			4-6			6-8			8-10	>10
2	1			2			3			4	>4
3	0			1			2			3	>3
4	<5 min	5-10 min	10-15 min	15-20 min	20-25 min	25-30 min	30-35 min	35-40min	40-45 min	45-60 min	>60 min
5	15-20 min	20-25 min	25-30 min	30-35 min	35-40 min	40-45 min	45-50 min	50-55 min	55-60 min	60-75 min	>75 min

Performance Tracking		
PI	Measured Value	Performance Assessment Comments
1	A	<p>Two unplanned maintenance events occurred within the last 5 years.</p> <ul style="list-style-type: none"> • SS-U061-01: A root ball was found 3.0' from MH 12N23E. The affected section of pipe was replaced. • MH 2N38E: A hole was found in the bottom of the manhole and soil was visible. The hole was patched and the bottom of the manhole was reformed.
2	A+	No Category 2 SSOs have occurred within the last 5 years.
3	C	Two (2) Category 1 SSOs have occurred within the last 5 years, both occurring in 2012.
4	A	Two (2) Category 1 SSOs have occurred during normal business hours during this audit period. The average response time was 8 minutes.
5	A+	No SSOs have occurred after normal business hours during this audit period

Recommendations for Programmatic or SSMP Updates

PI 1 – Number of sewer system blockages or un-planned maintenance activities (non-SSO).

Recommendation: As available annual budget allows, continue to follow suggested hydroflushing, CCTV survey, and root maintenance schedule to continue to prevent future blockages and unplanned maintenance events.

PI 2 – Number of Category 2 SSOs.

Recommendation: As available annual budget allows, continue to follow suggested hydroflushing, CCTV survey, and root maintenance schedule to continue to prevent future SSOs.

PI 3 – Number of Category 1 SSOs.

Recommendation: As available annual budget allows, continue to follow suggested hydroflushing, CCTV survey, and root maintenance schedule to continue to prevent future SSOs.

PI 4 – Average response time for SSOs during normal business hours.

Recommendation: Ensure staff members are thoroughly aware of spill response procedures in the event of a future SSO, per the requirements of the SSMP Section VI – Overflow Emergency Response Plan.

PI 5 – Average response time for SSOs after normal business hours.

Recommendation: Ensure staff members are thoroughly aware of spill response procedures in the event of a future SSO, per the requirements of the SSMP Section VI – Overflow Emergency Response Plan.

Signature of Responsible Person: (sign when complete)

Date:

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Goal:**FOG Control Program
(FY 2012 / 2013)****Responsible Person (RP):**

Utilities Manager

Description of Performance Indicator(s) (PIs):

The Facilities Division is implementing a program to control the discharge of FOG from the LBNL cafeteria as a preventative measure to reduce the potential for FOG accumulation in the sanitary sewer collection system and to ensure compliance with the local limit for FOG as required by the EBMUD site-wide sewer discharge permit. The PIs listed below track the completion of FOG control activities at the cafeteria.

PIs and Data Analysis Methods:

1. *Completion of semi-annual FOG control inspection of cafeteria and submittal of inspection report.*

Discussion & Scoring Criteria: The Utilities Manager shall ensure that an inspection of the cafeteria with respect to FOG control practices is completed semi-annually, and that a standard inspection form is submitted. Both the percent completion of inspections, and general quality of inspections are evaluated.

2. *Completion of grease interceptor maintenance.*

Discussion & Scoring Criteria: The Utilities Manager will review semi-annual cafeteria inspection reports to confirm that the grease interceptor is cleaned every 6 months, and receipts are submitted for the work completed.

3. *Success of implementation of FOG disposal BMPs in LBNL cafeteria by cafeteria staff.*

Discussion & Scoring Criteria: LBNL cafeteria management will conduct semi-annual inspections of the cafeteria food preparation / dishwashing area to determine the level of success of implementation of the typical BMPs recommended by EBMUD and available through the EBMUD FOG Control Program website. The success of implementation will be graded based on the total number of key BMPs considered to be fully implemented out of the list below, based on the Facilities Division's review of semi-annual inspection reports submitted by cafeteria management, or Facilities Division site visits:

1. All staff are knowledgeable about the need to properly dispose of FOG wastes.
2. Signs are posted above sinks that prohibit the discharge of FOG.
3. A cooking oil / fryer grease recycling bin is in use for storage and later removal of undiluted FOG wastes.
4. Dishwashing staff know that it is important to dry-wipe grease cooking ware and dishes prior to washing to remove FOG and food solids.
5. Grease spill cleanup materials (i.e. absorbent materials) are available, and staff know to use those to clean up spills rather than mop it into a floor drain.

PI	A+	A	A-	B+	B	B-	C+	C	C-	D	F
1	2/2 semi-annual inspections completed, detailed documentation.			2/2 semi-annual inspections completed, incomplete documentation.			1/2 semi-annual inspections completed, detailed documentation.			1/2 semi-annual inspections completed, incomplete documentation.	No semi-annual inspections completed.
2	2/2 grease interceptor cleanings completed, receipts available.			2/2 grease interceptor cleanings completed, no receipts available.			1/2 grease interceptor cleanings completed, receipts available.			1/2 grease interceptor cleanings completed, no receipts available.	No grease interceptor cleanings completed.
3	All BMPs Fully Implemented			4/5 BMPs Fully Implemented			3/5 BMPs Fully Implemented			2/5	1 or 0

Performance Tracking		
PI	Measured Value	Performance Assessment Comments
1	F	No semi-annual inspections were completed by the LBNL staff. New management is in charge of the cafeteria, and was not notified of the required FOG inspection forms.
2	F	No grease interceptor cleanings have occurred during this audit period. An enzyme was used to emulsify the grease, but the interceptor itself was never cleaned.
3	F	While some of the BMP's might be currently implemented, there are no completed semi-annual inspection forms to verify this claim. No Facilities Division site visits have been documented to date. Therefore, it is not possible to know for sure whether or not these FOG BMP's are being implemented.

Recommendations for Programmatic or SSMP Updates

PI 1 – Completion of semi-annual FOG control inspection of cafeteria and submittal of inspection report.

Recommendation: Ensure the FOG cafeteria inspection forms are being completed twice a year. The forms should be submitted to the Utilities Manager for review. In the future, if a change in cafeteria management occurs, ensure that they are aware of LBNL’s FOG control program and all related activities that must be performed.

PI 2 –Completion of grease interceptor maintenance.

Recommendation: The grease interceptor should be cleaned as soon as possible by an EBMUD approved grease hauler. It should then be cleaned every 6 months, or on a more frequent basis if the new cafeteria staff is found to not be effectively implementing the grease management BMP’s as found in PI 3. Work receipts shall be submitted to the Utilities Manager every time the grease interceptor is cleaned.

PI 3 – Success of implementation of FOG disposal BMPs by cafeteria staff.

Recommendation: Complete the semi-annual FOG control inspection forms so that it can be determined whether or not these 5 FOG disposal BMP’s are being successfully implemented. While it may be true that some or all of the BMP’s are being implemented, without completed inspection forms or documented Facilities Division site visits, it is not possible to verify this claim.

Signature of Responsible Person: (sign when complete)	Date:

Goal:	System Evaluation and Capacity Assurance (FY 2012 / 2013)
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Responsible Person (RP):	Utilities Manager
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Description of Performance Indicator(s) (PIs):

The Utilities Division uses the sewer Asset Database to evaluate the hydraulic capacity of key portions of the sanitary sewer collection system. The hydraulic capacity of these key portions of the system are compared to existing flow monitoring data to determine the potential for SSOs due to the capacity being exceeded during peak wet weather sewer flows. LBNL analyzes flow monitoring data captured at the Strawberry and Hearst monitoring stations to estimate actual I/I rates experienced by the sewer collection system. The PIs listed below track the completion of tasks necessary to conduct analysis of the hydraulic capacity of the sanitary sewer collection system and plan for any identified improvements necessary to provide adequate capacity.

PIs and Data Analysis Methods:

- Pipeline invert / slope data and hydraulic capacity calculations in Asset Database updated.*
Discussion & Scoring Criteria: Additional sewer pipeline invert and slope data is collected in conjunction with CCTV inspections. The data collected by the CCTV contractor must be entered into the Asset Database to ensure the completion and accuracy of hydraulic capacity calculations.
- Determination of existing peak flow in key sewer trunk lines.*
Discussion & Scoring Criteria: The existing peak flow for each of the main line sections listed below must be identified using the analysis procedures described in SSMP section viii-a. The peak flow estimate must be updated based on flow monitoring and rainfall data from the current evaluation period.

 - Strawberry mains: (1) Strawberry East Main: SSMH 6S51E to SSMH 13S30E (2) Strawberry North Main: SSMH 1N33E to SSMH 12S30E (3) Strawberry Main Trunk: SSMH 12S30E to SSMH 14S18E
 - Hearst mains: (1) Hearst North Main: SSMH 10N18E to SSMH 5N12E (2) Hearst East Main: SSMH 2N25E to SSMH 5N12E (3) Hearst Main Trunk: SSMH 5N12E to SSMH 5N9E
- Identification of necessary hydraulic capacity improvements.*
Discussion & Scoring Criteria: An engineering analysis must be conducted to determine the improvements necessary to provide adequate hydraulic capacity of deficiencies identified. Additionally, the potential impact to the sewer collection system of any confirmed campus expansion projects must be analyzed with respect to available sewer collection system capacity.
- Determination of existing groundwater infiltration and rain dependent infiltration levels in the system.*
Discussion & Scoring Criteria: An estimate of the existing GWI/I and RDI/I must be made by analyzing flow monitoring data as described in SSMP section viii-b from the current evaluation period.

PI	A+	A	A-	B+	B	B-	C+	C	C-	D	F
1	Pipe invert data collected by CCTV contractor and entered into Asset Database.			N/A			Pipe invert data collected by CCTV contractor but not yet entered into Asset Database.			Pipe invert data not collected by CCTV contractor.	
2	Sewer main line peak flow data updated in Asset Database based on recent flow monitoring data.			N/A			N/A			Sewer main line peak flow data not updated this evaluation period.	
3	Full Analysis Complete			Analysis Nearly Complete			Analysis Underway			Analysis Scheduled	No Action
4	Full Analysis Complete			Analysis Nearly Complete			Analysis Underway			Analysis Scheduled	No Action

Performance Tracking		
PI	Measured Value	Performance Assessment Comments
1	D	No additional sewer pipeline invert and slope data was collected during the 2012 CCTV inspections performed by both Presidio Systems, Inc. and H&R Plumbing. Of the lines inspected in 2012, 36% are missing invert and/or slope data that is necessary to calculate maximum hydraulic capacities. A grade of D was given instead of an F because most of the lines already had field verified / estimated invert and slope data.
2	A	The peak flows for each of the sewer main segments listed above were determined from 2011-2012 flow data at both the Hearst and Strawberry monitoring stations. The average day flow during dry weather conditions was determined at each monitoring station. An analysis was conducted to determine the RDI/I for 3 different rainfall events in 2011 and 2012. The peaking factors associated with each event can be found in the document titled "LBNL May 2010 – May 2013 Sanitary Sewer Flow Data Review Technical Memorandum". An estimated peak instantaneous wet weather flow rate was determined for all the pipe segments listed for this performance indicator, based on the assumptions of % flow carried by each main segment listed in SSMP section viii-a. The peak flow estimates have been updated in the Sewer Asset Database based on the flow monitoring and rainfall data from the current evaluation period.
3	A	No hydraulic capacity improvements were deemed necessary based on the hydraulic analysis. The lowest maximum capacity approximated for the Strawberry collection system was 590 gpm while the lowest maximum capacity for the Hearst station was 376 gpm. These values are greater than their respective peak flows of 210 gpm for the Strawberry Station and 286 gpm for the Hearst Station. Therefore, Water Works Engineers has determined that the system is capable of handling peak flows with a very low risk of capacity related SSO events. Additional flow data and invert elevation data will increase the accuracy of these calculations but the conservative estimates indicate that the hydraulic capacity is not a concern at this time. Water Works Engineers has not been notified of any confirmed campus expansion projects that may potentially impact the sewer collection system.
4	A	<p>2011/2012 daily sewer flow data from the sewer collection system's two outfall flow monitoring stations (Hearst and Strawberry Stations) was reviewed. Water Work Engineers utilized EPA's Sanitary Sewer Overflow Analysis and Planning Toolbox software to analyze the sewer collection system's response to rainfall events, and to roughly quantify rainfall dependent infiltration and inflow (RDI/I) in the system. RDI/I was considered to be additional flow above average dry day flow experienced in the system coincident with a rainfall event.</p> <p>Both of the sewer outfall flow monitoring stations are Parshall Flumes, which measure the flow depth through a specially designed contracted open flow channel. This type of flow measurement device is particularly susceptible to bad readings if a blockage in the contracted section of the flume occurs, thus increasing the upstream flow depth. These flumes are regularly cleaned, however unexpected blockages do occur and do result in outlier readings, which are typically easy to see in the data, and can be removed from the analysis.</p> <p>It should also be noted that the Strawberry system showed an increase in average daily flow rates during the summer months of 2011, which may have been due to a specific research program that produced more wastewater than is normally experienced by the</p>

system. This increased period of flow was not considered average, and also did not coincide with any rainfall events.

After removal of outliers, the sewer collection system response was analyzed for 3 different rainfall events in 2011 and 2012. Data resulting from this analysis can be found in Table 5 of the document titled “LBNL May 2010 – May 2013 Sanitary Sewer Flow Data Review Technical Memorandum”.

By looking at Table 4 of the aforementioned document, it can be seen that dry day flows in the winter months for both monitoring stations are very close to summer flows. This indicates that the LBNL system as a whole is not significantly affected by GWI/I that occurs outside of rainfall events. Most infiltration that is experienced likely occurs through inflow into sewer manholes only during larger rain events when significant street ponding of stormwater is experienced.

Recommendations for Programmatic or SSMP Updates

PI 1 – Pipeline invert / slope data and hydraulic capacity calculations in Asset Database updated.

Recommendation: Obtain missing invert elevations during future CCTV surveys. This information will allow for calculation of the maximum hydraulic capacity with increased accuracy.

PI 2 – Determination of existing peak flow in key sewer trunk lines.

Recommendation: Continue to collect daily flow data from the Hearst and Strawberry monitoring stations for future analysis.

PI 3 – Identification of necessary improvements existing and future.

Recommendation: Continue to refine analysis of peak wet weather flow versus hydraulic capacity through ongoing data collection. Ensure that proposed campus expansion or building improvement projects are reviewed to determine if an increase in sewer flows will result, and compare the increased sewer flows to estimated available hydraulic capacity in the sewer collection system and identify if improvements are necessary.

PI 4 – Determination of existing GWI/I and RDI/I levels in the system.

Recommendation: Continue to collect daily flow data from the Hearst and Strawberry monitoring stations and conduct analysis in concert with rainfall data to provide a picture of sewer collection system response to rainfall over time. At a minimum, data from the outfall flow monitoring stations should be reviewed annually to determine if flows are approaching the hydraulic capacity of the system during peak wet weather events. Ensure that the Strawberry monitoring station is cleaned frequently enough to avoid outlier data resulting from clogging of the Parshall Flume.

Signature of Responsible Person: (sign when complete)

Date:

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Goal: Sewer System Mapping
(FY 2014 / 2015)

Responsible Person (RP): Utilities Manager

Description of Performance Indicator(s) (PIs):

The LBNL Facilities Division maintains an AutoCAD map of LBNL utility infrastructure, which includes the sanitary sewer collection system. The AutoCAD map was generated based on a survey that was conducted in order to create an inventory of utility infrastructure assets for the purposes of tracking and asset management of DOE real property. The asset inventory generated from the survey was delivered in a spreadsheet format which identified sewer pipelines by length and diameter on each LBNL grid map block. The GWDRs require that work orders are documented for the sanitary sewer collection system, that areas with maintenance problems are identified, and that more frequent maintenance is scheduled in problem areas. In order to meet these requirements, LBNL implemented a spreadsheet database to track work completed for each sanitary sewer system asset (pipeline or manhole). This database is easily referenced to the AutoCAD mapping. The PIs listed below track efforts to ensure that the AutoCAD mapping and Asset Database are up to date.

PIs and Data Analysis Methods:

1. *Entry of critical asset data items in Asset Database.*
Discussion & Scoring Criteria: Data columns are established for pipelines and manholes for the following critical information: ID, length, diameter, material, upstream / downstream manhole, upstream / downstream invert, slope, and hydraulic capacity. The percentage of pipes that have been CCTV inspected for which all of the above data is entered into the Asset Database will be determined for all asset entries.

2. *Completion of AutoCAD map quality assurance.*
Discussion & Scoring Criteria: Completion of mapping accuracy review by CCTV contractor, and updates to the AutoCAD maps and Asset Database based on comments provided by the contractor.

PI	Excellent			Good			Acceptable			Below Goal	
	95-100%	90-95%	85-90%	80-85%	75-80%	70-75%	65-70%	60-65%	55-60%	50-55%	<50%
1											
2	Contractor provided map accuracy comments for all CCTV work completed during the current evaluation period, and all recommended map updates provided to date have been completed in the AutoCAD Map.			N/A			Contractor provided map accuracy comments for all CCTV work completed during the current evaluation period, however map updates have not yet been incorporated in the AutoCAD Map.			Contractor did not provide map accuracy comments for CCTV work completed during the current evaluation period.	

Performance Tracking		
PI	Measured Value	Performance Assessment Comments
1		
2		

Recommendations for Programmatic or SSMP Updates
<p>PI 1 – Collection of missing asset data as part of CCTV inspection work. Recommendation:</p> <p>PI 2 – Completion of mapping accuracy reviews as part of CCTV inspection work. Recommendation:</p>

Signature of Responsible Person: (sign when complete)	Date:

Goal:	Operation and Maintenance Program (FY 2014 / 2015)
Responsible Person (RP):	Utilities Manager
<u>Description of Performance Indicator(s) (PIs):</u>	
<p>The basis of the operation and maintenance program for the sanitary sewer collection system is the completion of hydroflushing (i.e. pipeline cleaning), CCTV inspection, and chemical root treatment (or mechanical root cutting if necessary) as proactive measures to assess the condition of the system and prevent the occurrence of sanitary sewer overflows. The Facilities Division uses the sewer system Asset Database to record required maintenance frequencies for each asset for the three main activities described above. A standard maintenance frequency is established for each activity for most assets, but higher frequency maintenance should be scheduled for assets that have historically had problems such as debris accumulation or more rapid root growth. The PIs listed below track the usage of the Asset Database to schedule regular maintenance for each sanitary sewer collection system asset, and the determination of an average annual cost to maintain the system that can be accommodated by existing budgetary constraints.</p>	
<u>PIs and Data Analysis Methods:</u>	
<ol style="list-style-type: none"> <li> <p>1. <i>Entry of asset-specific maintenance frequencies for major maintenance activities.</i> Discussion & Scoring Criteria: A maintenance frequency in months should be established for each asset for hydroflushing, CCTV inspection, and root treatment. Not every sewer pipe will require root treatment, only those identified as having root problems through CCTV inspection. If there are no identified root problems for a pipe, a frequency of 0 should be entered. The % of non-null values for all sewer pipe assets in the hydroflushing frequency, CCTV inspection frequency, and root control frequency columns will be determined. It should be determined if maintenance frequencies have been reviewed and updated within the current evaluation period based on the review of CCTV data and any unplanned maintenance events.</p> <li> <p>2. <i>Determination of the average annual cost to operate and maintain the sanitary sewer collection system.</i> Discussion & Scoring Criteria: An average cost for hydroflushing, CCTV inspection, and root control work per foot of sewer pipe should be recorded that corresponds to the costs incurred by LBNL for past work of a similar type. Grading for this PI is dependent upon the general “success” in keeping a record of how much money is spent on each O&M activity.</p> <li> <p>3. <i>Percentage of sewer pipe assets with overdue regular maintenance.</i> Discussion & Scoring Criteria: The sewer system Asset Database can be used to identify assets with planned maintenance activities that are overdue using conditional formatting. The percentage of sewer pipe assets with any overdue maintenance at the time this PI is analyzed is determined using the Asset Database.</p> 	

PI	Excellent			Good			Acceptable			Below Goal	
1	All assets have maintenance frequencies assigned and were updated this evaluation period.			All assets have maintenance frequencies assigned but were not updated this evaluation period.			Greater than 90%, but less than 100% of all assets have maintenance frequencies assigned but were not updated this evaluation period.			Less than 90% of all assets have maintenance frequencies assigned.	
2	A complete record of all O&M activities and their costs was kept.			N/A			N/A			No record of O&M activities exists, or it is incomplete.	
3	0-5%	5-10%	10-15%	15-20%	20-25%	25-30%	30-35%	35-40%	40-45%	45-50%	>50%

Performance Tracking		
PI	Measured Value	Performance Assessment Comments
1		
2		
3		

Recommendations for Programmatic or SSMP Updates
<p>PI 1 – Entry of asset-specific maintenance frequencies for major maintenance activities. Recommendation:</p>
<p>PI 2 – Success of establishing an average annual sewer system maintenance cost within budget. Recommendation:</p>
<p>PI 2 – Percentage of sewer pipe assets with overdue regular maintenance. Recommendation:</p>

Signature of Responsible Person: (sign when complete)	Date:

Goal: **Capital Improvement Program
(FY 2014 / 2015)**

Responsible Person (RP): Utilities Manager

Description of Performance Indicator(s) (PIs):

The Facilities Division analyzes sanitary sewer collection system condition assessment data collected by CCTV inspection contractors using the Asset Database and the methodology described in the SSMP. The purpose of the analysis is to identify assets that are in poor condition (above defined thresholds) and establish capital improvement projects that are funded by DOE and completed in a timely fashion to mitigate the risk of an SSO due to asset failure, and to control un-planned or emergency maintenance costs. The PIs listed below track the timely completion of condition assessments and analysis of condition assessment data.

PIs and Data Analysis Methods:

1. *Percentage of the system that will be CCTV surveyed by the end of the 10 year cycle at the current rate.*
Discussion & Scoring Criteria: The established frequency at which the entire sanitary sewer collection system should be CCTV inspected is approximately every 10 years to maintain an up-to-date assessment of asset condition. The current percentage of sewer system pipes and manholes that have been expected within the current 10 year inspection cycle to keep pace with an average 10% system inspection completion per year will be calculated using the Asset Database with the formula below:

$$\% \text{ CCTV Completion} = (\% \text{ of system inspected in last 10 years}) / (\text{years into cycle} / 10)$$

2. *Average overall NASSCO quick rating for the sanitary sewer collection system.*
Discussion & Scoring Criteria: The overall NASSCO quick rating summarizes the results of the condition assessment of an asset. Asset defects are ranked on a 1-5 scale for severity, and the quick rating identifies the number of defects in the two highest severity categories. The average overall NASSCO quick rating for the sanitary sewer collection system provides a snapshot of the condition. The average overall quick rating should be determined for both manholes and pipes, and should not include assets for which no quick rating has been established (i.e. has not been inspected yet). The average pipeline quick rating should constitute 80% of the overall system score, and the average manhole quick rating should constitute 20% of the overall system score.

3. *Prioritization and planning for future capital improvement projects.*
Discussion & Scoring Criteria: After NASSCO quick ratings have been entered into the Asset Database, assets in poor condition should be prioritized for repair according to the methodology established in the SSMP, and appropriate methods of repair should be identified. The total number of assets (pipelines and manholes) which have an overall NASSCO quick rating in excess of 4000 is quantified. Then, the percentage of those assets for which all of the following have been completed is determined: CCTV inspection results have been reviewed, appropriate repair methodology has been determined, and approximate cost to complete the repairs has been quantified.

PI	Excellent			Good			Acceptable			Below Goal	
	95-100%	90-95%	85-90%	80-85%	75-80%	70-75%	65-70%	60-65%	55-60%	50-55%	<50%
1	95-100%	90-95%	85-90%	80-85%	75-80%	70-75%	65-70%	60-65%	55-60%	50-55%	<50%
2	<1000	1000-1500	1500-2000	2000-2500	2500-3000	3250-3500	3500-3750	3750-4000	4000-4500	4500-5000	> 5000
3	95-100%	90-95%	85-90%	80-85%	75-80%	70-75%	65-70%	60-65%	55-60%	50-55%	<50%

Performance Tracking		
PI	Measured Value	Performance Assessment Comments
1		
2		
3		

Recommendations for Programmatic or SSMP Updates
<p>PI 1 – Percentage of the system that will be CCTV surveyed by the end of the 10 year cycle at the current rate. Recommendation:</p> <p>PI 2 – Average overall NASSCO quick rating for the sewer collection system. Recommendation:</p> <p>PI 3 – Prioritization and planning for future capital improvement projects. Recommendation:</p>

Signature of Responsible Person: (sign when complete)	Date:

Goal: **Sanitary Sewer Overflow Prevention (FY 2014/ 2015)**

Responsible Person (RP): Environmental Manager

Description of Performance Indicator(s) (PIs):

LBNL’s success in preventing the occurrence of sanitary sewer overflows is a key metric in gauging the overall success of several SSMP programs. The PIs listed below track un-planned maintenance events (indicative of the possibility for the occurrence of SSOs) and SSOs that have occurred over the past 5 years.

PIs and Data Analysis Methods:

1. *Number of sewer system blockages or un-planned maintenance activities (non-SSO).*
Discussion & Scoring Criteria: Use the Sewer Asset Database to determine the number of un-planned maintenance activities occurring within the past five years.

2. *Number of Category 2 SSOs.*
Discussion & Scoring Criteria: Use the Sewer Asset Database or CIWQS website to determine the number of Category 2 SSOs occurring within the past five years.

3. *Number of Category 1 SSOs.*
Discussion & Scoring Criteria: Use the sewer Asset Database or CIWQS website to determine the number of Category 1 SSOs occurring within the past five years.

4. *Average response time for SSOs during normal business hours.*
Discussion & Scoring Criteria: Search the SSO Incident Map on the CIWQS website for the SSOs reported from the agency “Lawrence Berkeley National Laboratory” for the fiscal year in question. Examine the “Full Incident Report” for each SSO (Category 1 and Category 2) that started during normal business hours. Find the “Estimated Spill Start Date/Time” and the “Estimated Operator arrival date/time” on the “Full Incident Report” and calculate the difference between these two times to determine the spill response time. Average the spill response times for all of the SSOs during the year to obtain the desired value and compare to the grading criteria.

5. *Average response time for SSOs after normal business hours.*
Discussion & Scoring Criteria: Search the SSO Incident Map on the CIWQS website for SSOs reported from the agency “Lawrence Berkeley National Laboratory” for the fiscal year in question. Examine the “Full Incident Report” for each SSO (Category 1 and Category 2) that started outside of normal business hours. Find the “Estimated Spill Start Date/Time” and the “Estimated Operator arrival date/time” on the “Full Incident Report” and calculate the difference between these two times to determine the spill response time. Average the spill response times for all of the SSOs during the year to obtain the desired value and compare to the grading criteria.

PI	Excellent			Good			Acceptable			Below Goal	
1	0-3			4-6			6-8			8-10	>10
2	1			2			3			4	>4
3	0			1			2			3	>3
4	<5 min	5-10 min	10-15 min	15-20 min	20-25 min	25-30 min	30-35 min	35-40min	40-45 min	45-60 min	>60 min
5	15-20 min	20-25 min	25-30 min	30-35 min	35-40 min	40-45 min	45-50 min	50-55 min	55-60 min	60-75 min	>75 min

Performance Tracking		
PI	Measured Value	Performance Assessment Comments
1		
2		
3		
4		
5		

Recommendations for Programmatic or SSMP Updates
<p>PI 1 – Number of sewer system blockages or un-planned maintenance activities (non-SSO). Recommendation:</p> <p>PI 2 – Number of Category 2 SSOs. Recommendation:</p> <p>PI 3 – Number of Category 1 SSOs. Recommendation:</p> <p>PI 4 – Average response time for SSOs during normal business hours. Recommendation:</p> <p>PI 5 – Average response time for SSOs after normal business hours. Recommendation:</p>

Signature of Responsible Person: (sign when complete)	Date:

Goal:**FOG Control Program
(FY 2014/ 2015)****Responsible Person (RP):**

Utilities Manager

Description of Performance Indicator(s) (PIs):

The Facilities Division is implementing a program to control the discharge of FOG from the LBNL cafeteria as a preventative measure to reduce the potential for FOG accumulation in the sanitary sewer collection system and to ensure compliance with the local limit for FOG as required by the EBMUD site-wide sewer discharge permit. The PIs listed below track the completion of FOG control activities at the cafeteria.

PIs and Data Analysis Methods:

1. *Completion of semi-annual FOG control inspection of cafeteria and submittal of inspection report.*
Discussion & Scoring Criteria: The Utilities Manager shall ensure that an inspection of the cafeteria with respect to FOG control practices is completed semi-annually, and that a standard inspection form is submitted. Both the percent completion of inspections, and general quality of inspections are evaluated.
2. *Completion of grease interceptor maintenance.*
Discussion & Scoring Criteria: The Utilities Manager will review semi-annual cafeteria inspection reports to confirm that the grease interceptor is cleaned every 6 months, and receipts are submitted for the work completed.
3. *Success of implementation of FOG disposal BMPs in LBNL cafeteria by cafeteria staff.*
Discussion & Scoring Criteria: LBNL cafeteria management will conduct semi-annual inspections of the cafeteria food preparation / dishwashing area to determine the level of success of implementation of the typical BMPs recommended by EBMUD and available through the EBMUD FOG Control Program website. The success of implementation will be graded based on the total number of key BMPs considered to be fully implemented out of the list below, based on the Facilities Division's review of semi-annual inspection reports submitted by cafeteria management, or Facilities Division site visits:
 1. All staff are knowledgeable about the need to properly dispose of FOG wastes.
 2. Signs are posted above sinks that prohibit the discharge of FOG.
 3. A cooking oil / fryer grease recycling bin is in use for storage and later removal of undiluted FOG wastes.
 4. Dishwashing staff know that it is important to dry-wipe grease cooking ware and dishes prior to washing to remove FOG and food solids.
 5. Grease spill cleanup materials (i.e. absorbent materials) are available, and staff know to use those to clean up spills rather than mop it into a floor drain.

PI	Excellent	Good	Acceptable	Below Goal	
1	2/2 semi-annual inspections completed, detailed documentation.	2/2 semi-annual inspections completed, incomplete documentation.	1/2 semi-annual inspections completed, detailed documentation.	1/2 semi-annual inspections completed, incomplete documentation.	No semi-annual inspections completed.
2	2/2 grease interceptor cleanings completed, receipts available.	2/2 grease interceptor cleanings completed, no receipts available.	1/2 grease interceptor cleanings completed, receipts available.	1/2 grease interceptor cleanings completed, no receipts available.	No grease interceptor cleanings completed.
3	All BMPs Fully Implemented	4/5 BMPs Fully Implemented	3/5 BMPs Fully Implemented	2/5	1 or 0

Performance Tracking		
PI	Measured Value	Performance Assessment Comments
1		
2		
3		

Recommendations for Programmatic or SSMP Updates
<p>PI 1 – Completion of semi-annual FOG control inspection of cafeteria and submittal of inspection report. Recommendation:</p> <p>PI 2 –Completion of grease interceptor maintenance. Recommendation:</p> <p>PI 3 – Success of implementation of FOG disposal BMPs by cafeteria staff. Recommendation:</p>

Signature of Responsible Person: (sign when complete)	Date:

Goal: **System Evaluation and Capacity Assurance (FY 2014/ 2015)**

Responsible Person (RP): Utilities Manager

Description of Performance Indicator(s) (PIs):

The Utilities Division uses the sewer Asset Database to evaluate the hydraulic capacity of key portions of the sanitary sewer collection system. The hydraulic capacity of these key portions of the system are compared to existing flow monitoring data to determine the potential for SSOs due to the capacity being exceeded during peak wet weather sewer flows. LBNL analyzes flow monitoring data captured at the Strawberry and Hearst monitoring stations to estimate actual I/I rates experienced by the sewer collection system. The PIs listed below track the completion of tasks necessary to conduct analysis of the hydraulic capacity of the sanitary sewer collection system and plan for any identified improvements necessary to provide adequate capacity.

PIs and Data Analysis Methods:

1. *Pipeline invert / slope data and hydraulic capacity calculations in Asset Database updated.*
Discussion & Scoring Criteria: Additional sewer pipeline invert and slope data is collected in conjunction with CCTV inspections. The data collected by the CCTV contractor must be entered into the Asset Database to ensure the completion and accuracy of hydraulic capacity calculations.

2. *Determination of existing peak flow in key sewer trunk lines.*
Discussion & Scoring Criteria: The existing peak flow for each of the main line sections listed below must be identified using the analysis procedures described in SSMP section viii-a. The peak flow estimate must be updated based on flow monitoring and rainfall data from the current evaluation period.
 - Strawberry mains: (1) Strawberry East Main: SSMH 6S51E to SSMH 13S30E (2) Strawberry North Main: SSMH 1N33E to SSMH 12S30E (3) Strawberry Main Trunk: SSMH 12S30E to SSMH 14S18E
 - Hearst mains: (1) Hearst North Main: SSMH 10N18E to SSMH 5N12E (2) Hearst East Main: SSMH 2N25E to SSMH 5N12E (3) Hearst Main Trunk: SSMH 5N12E to SSMH 5N9E

3. *Identification of necessary hydraulic capacity improvements.*
Discussion & Scoring Criteria: An engineering analysis must be conducted to determine the improvements necessary to provide adequate hydraulic capacity of deficiencies identified. Additionally, the potential impact to the sewer collection system of any confirmed campus expansion projects must be analyzed with respect to available sewer collection system capacity.

4. *Determination of existing groundwater infiltration and rain dependent infiltration levels in the system.*
Discussion & Scoring Criteria: An estimate of the existing GWI/I and RDI/I must be made by analyzing flow monitoring data as described in SSMP section viii-b from the current evaluation period.

PI	Excellent	Good	Acceptable	Below Goal	
1	Pipe invert data collected by CCTV contractor and entered into Asset Database.	N/A	Pipe invert data collected by CCTV contractor but not yet entered into Asset Database.	Pipe invert data not collected by CCTV contractor.	
2	Sewer main line peak flow data updated in Asset Database based on recent flow monitoring data.	N/A	N/A	Sewer main line peak flow data not updated this evaluation period.	
3	Full Analysis Complete	Analysis Nearly Complete	Analysis Underway	Analysis Scheduled	No Action
4	Full Analysis Complete	Analysis Nearly Complete	Analysis Underway	Analysis Scheduled	No Action

Performance Tracking		
PI	Measured Value	Performance Assessment Comments
1		
2		
3		
4		

Recommendations for Programmatic or SSMP Updates

PI 1 – Pipeline invert / slope data and hydraulic capacity calculations in Asset Database updated.

Recommendation:

PI 2 – Determination of existing peak flow in key sewer trunk lines.

Recommendation:

PI 3 – Identification of necessary improvements existing and future.

Recommendation:

PI 4 – Determination of existing GWI/I and RDI/I levels in the system.

Recommendation:

Signature of Responsible Person: (sign when complete)

Date:

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Goal: **MRP**
(FY 2014 / 2015)

Responsible Person (RP): Environmental Manager

Description of Performance Indicator(s) (PIs):

The State Water Board has recently concluded that the existing Monitoring and Reporting Program must be amended to remain adequate enough to advance the Sanitary Sewer Overflow Reduction Program objectives, assess compliance, and enforce the requirements of the Sanitary Sewer Systems Waste Discharge Requirements. The amended MRP will become effective on September 9, 2013 concurrent with the routine bimonthly CIWQS maintenance release. The EH&S Division is responsible for submitting, signing, and certifying all reports required by the SSS WDRs and the amended MRP order. The PIs listed below track the completion of tasks necessary for LBNL to remain compliant with the SSS WDRs.

PIs and Data Analysis Methods:

1. *Completion of unpopulated fields in revised "Collection System Questionnaire"*
Discussion & Scoring Criteria: LBNL has three (3) months after September 9, 2013 to complete all unpopulated fields in the revised "Collection System Questionnaire" before the CIWQS locks you out from all reporting. After the questionnaire is completed, the system will default back to the annual update requirement and lock you out from all reporting only if the questionnaire is not updated at least annually.

2. *Update of OERP section in SSMP*
Discussion & Scoring Criteria: The Overflow and Emergency Response Plan section of LBNL's SSMP must be updated in accordance with the amended MRP by August 2014, when a board review of the SSMP will take place.

PI	Excellent	Good	Acceptable	Below Goal
1	All unpopulated fields completed by December 9, 2013.	N/A	N/A	All or some of the unpopulated fields not completed by December 9, 2013.
2	OERP section fully updated in SSMP before review.	N/A	N/A	OERP section never, or only partially, updated before review.

Performance Tracking		
PI	Measured Value	Performance Assessment Comments
1		
2		

Recommendations for Programmatic or SSMP Updates

PI 1 – Completion of unpopulated fields in revised “Collection System Questionnaire”

Recommendation:

PI 2 – Update of OERP section in SSMP
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Recommendation:

Signature of Responsible Person: (sign when complete)
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Date:

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