Sandia National Laboratories, California Sewer System Management Plan

WDID No. 2SSO11605

Trevor Manger
Environmental Management Department
Sandia National Laboratories, California Site

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Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.

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Acronyms and Abbreviations

ADWF	Average Dry Weather Flow
AP	Administrative Procedure
EPA	Environmental Protection Agency
ES&H	Environmental Safety and Health
CAS	Central Alarm System
CCTV	Closed Circuit Television
CIP	Capital Improvement Projects
COC	Chain of Custody
COD	Chemical Oxygen Demand
DOE	U.S. Department of Energy
gpm	gallon per minute
LECS	Liquid Effluent Control System
LLNL	Lawrence Livermore National Laboratory
LRO	Legally Responsible Official
MDL	Method Detection Limit
mg/L	milligrams per liter
N/A	not applicable
NNSA	National Nuclear Security Administration
NTESS	National Technology & Engineering Solutions of Sandia, LLC
OP	Operating Procedure
PDWF	Peak Dry Weather Flow
PM	Preventative Maintenance
POTW	Publicly Owned Treatment Works
PWWF	Peak Wet Weather Flow
RL	Reportable Limit
SFO	Sandia Field Office
SSMP	Sewer System Management Plan
SNL/CA	Sandia National Laboratories, California
SSO	Sanitary Sewer Overflow
SWRCB	State Water Resource Control Board
TDS	total dissolved solids
TSS	total suspended solids
TTO	total toxic organics
µg/L	microgram per liter
WDR	Waste Discharge Requirements

1.0 Introduction

The Sandia National Laboratories is a multi-mission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC (NTESS), a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration (DOE/NNSA) under contract DE-NA0003525. In 2008, a Notice of Intent (NOI) was filed for the Sandia National Laboratories, California (SNL/CA) facility to be covered under the State Water Resources Control Board (SWRCB) Order No. 2006-0003-DWQ Statewide General Waste Discharge Requirements (WDR) for Sanitary Sewer Systems (General Permit) and was issued the WDID No. 2SSO11605. The General Permit requires a proactive approach to reduce the number and frequency of sanitary sewer overflows (SSOs) within the State. Provision D.11 of the General Permit requires the development and implementation of a written Sewer System Management Plan (SSMP). This SSMP is prepared according to the mandatory elements required by Provision D.13 and D.14, as well as the schedule for a population less than 2,500 as outlined in Provision D.15.

2.0 Goals

This SSMP delineates the following SNL/CA goals:

- To properly manage, operate, and maintain all parts of the sanitary sewer system.
- Maintain compliance with all regulations governing sewage discharge from the SNL/CA site.
- To provide a safe working environment for DOE and SNL/CA employees.
- To provide adequate capacity to convey peak flows to the City of Livermore's sanitary sewer collection system via the Lawrence Livermore National Laboratory's sanitary sewer system.
- To minimize the frequency and duration of SSOs.
- To mitigate the impact of SSOs on public health and the environment.
- To respond quickly to notifications of SSOs or other collection system problems.
- To collect complete and accurate information regarding SSOs for reporting to the appropriate regulatory agencies.
- To provide SNL/CA maintenance employees with the tools and training needed to perform their work effectively.
- To document system Operation and Maintenance activities using tools that support efficient utilization of staff and resources, and which provide a means for long-term assessment of trends and effectiveness.

3.0 Organization

Sandia National Laboratories is a multi-mission laboratory with primary facilities in New Mexico and California. The site, the buildings, and the equipment are owned by the government; while NTESS manages and operates the laboratory for the DOE NNSA. The DOE NNSA/Sandia Field Office

hereinafter referred to as the Sandia Field Office (SFO) within this Section, oversees the operations at the site, using NTESS as a management and operating contractor.

The SFO Manager is designated by DOE as the authorized representative. The SFO Manager, as the Legally Responsible Official (LRO), has designated the SFO Water Quality Program Manager as an additional LRO and the SNL/CA Environmental Monitoring Program Lead as the Data Submitter. The Environmental Monitoring Program Lead ensures regulatory compliance for the wastewater, stormwater and groundwater programs on site. The SFO Water Quality Program Manager has oversight responsibility for the SNL/CA Environmental Management Department's Environmental Monitoring Program.

SNL/CA is a controlled site with a 24-hour security force. Any collection system problems can be reported through the Environmental, Safety and Health (ES&H) helpline (during normal business hours), the Maintenance Trouble Line (during normal business hours) or the security Central Alarm Station (manned 24 hours a day). The Environmental Monitoring Program Lead is informed of any problems or releases from the sanitary sewer system. The Environmental Monitoring Program Lead is responsible for informing the SFO Water Quality Program Manager of any SSOs that need to be reported to the State Water Resources Control Board (SWRCB) and the San Francisco Regional Water Quality Control Board (Region 2 Board).

An organization chart is presented in Figure 3-1. Roles and responsibilities of key personnel involved in the wastewater collection system are as follows:

SNL/CA Environmental Monitoring Program Lead: Responsible for developing, updating and coordinating implementation of the SSMP. Responsible for relating SSO reporting information to the SFO Water Quality Program Manager. Acts as Staff liaison with the SWRCB, City of Livermore Water Reclamation Plant and other appropriate regulatory agencies. Responsible for reporting SSOs in the State's SSO database. Designated as a Data Submitter.

SFO Water Quality Program Manager: Reviews all SSO reporting information from the Environmental Monitoring Program Lead. As a designated additional LRO by the SFO Manager, has responsibility for certifying all data reported to the SWRCB and other regulatory bodies.

SFO Manager: Acts as the legally authorized representative of the Department of Energy and designated LRO. Provides oversight of the SFO Water Quality Program Manager. The designated LRO has further delegated some responsibilities to an additional LRO and Data Submitter.

SNL/CA Project and Construction Management: Responsible for implementing capital improvement projects, including preparation of design documents, construction execution and construction oversight. Develops SNL/CA's specifications for sewer construction. Responsible for maintaining sanitary sewer system maps.

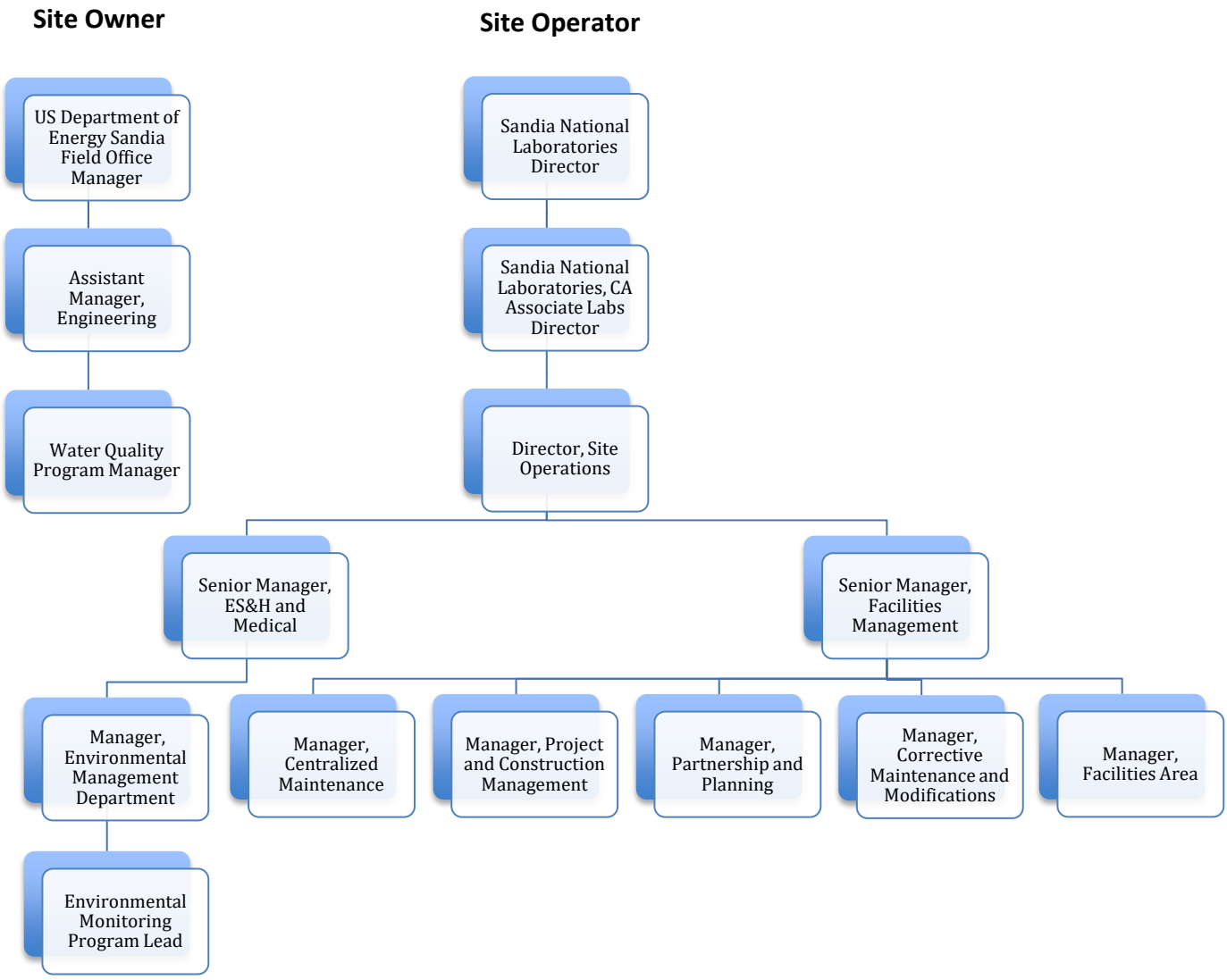
Customer Operations: Manages collection system operations and maintenance activities and collection system data management. Provides data to Environmental Monitoring Program Lead, prepares and implements contingency plans, coordinates site response to collection system

emergencies or problems, coordinates investigations and follow-up of blockages and SSOs. Brings all SSOs and all significant blockages (those that could lead to a SSO) to the attention of the Environmental Monitoring Program Lead so that proper reporting and corrective actions can be initiated.

Conducts collection system corrective and preventive maintenance activities, including emergency response for blockages and SSOs. When directed, coordinates with vendors and outside contractors for equipment and services. Note: Waste Management staff trained in spill response are also available to respond to SSOs.

Partnership and Planning: Conducts collection system capacity analysis and develops recommendations and budgets for capital improvements projects.

Figure 3-1. Organization Chart (Sewer System Management)



4.0 Legal Authority

The DOE/NNSA and SNL/CA understands that it is an Enrollee in the SWRCB's Statewide General Order 2006-0003-DWQ and accordingly, must demonstrate that it possesses the legal authority to:

(a) Prevent illicit discharges into its sanitary sewer system (examples may include I/I [Inflow and Infiltration], 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.

SNL/CA is a government owned facility under the DOE/NNSA. The site, the buildings, and the equipment are owned by the government; while NTESS, manages and operates the facility under contract to the DOE/NNSA. The DOE/NNSA/SFO oversees the operations at the site, using NTESS as a management and operating contractor.

SNL/CA is managed and operated in compliance with the applicable federal, state, and local environmental laws and regulations. Additionally, as a DOE facility, the site is subject to DOE directives (DOE Orders), and to presidential executive orders. Current DOE Orders establish environmental protection program requirements, authorities, and responsibilities. These Orders along with the Management and Operating Contract with NTESS stipulate compliance with Federal, State, and local environmental protection laws and regulations, and best management practices. Sandia is also certified to be compliant with ISO 14001, which also requires compliance with all environmental laws and regulations.

SNL/CA personnel have the authority to perform all of the prevention, maintenance and enforcement activities required in the State General Permit through oversight by the DOE NNSA/SFO (the owner of the sanitary sewer system, buildings and equipment).

5.0 Operation and Maintenance Program

Detailed sanitary sewer system and storm drain system maps are maintained in electronic form (AutoCad) by the SNL/CA Project and Construction Management Department. A map of the sewer system is included in Appendix A. The map shows the sanitary sewer system onsite including all gravity line segments and manholes, pumping facilities, pressure pipes and valves, and stormwater conveyance system.

5.1 Routine Preventative Maintenance

SNL/CA personnel operate a prioritized preventative maintenance (PM) program designed to maintain the integrity of the system, reduce the frequency of SSOs, and reduce inflow and infiltration (I/I). The program uses the MAXIMO (commercially available software) database as the primary data management tool, in conjunction with inspections and other management tools. PM activities are prioritized based on results from historic PM and corrective maintenance activities. Prioritization is an ongoing process, with PM schedules updated based on recommendations contained in inspection reports.

PM activities include flushing sewer lines and pump maintenance. MAXIMO issues a monthly schedule that specifies PM activities for that month. The location of the PM is specified in terms of structure identification or sewer line segment identified by upstream and downstream manholes.

Annually, the two main trunk lines of the sewer system are cleaned, using a pressurized water cleaning method.

5.2 Scheduled Inspections and Condition Assessment

SNL/CA's system for inspections and condition assessment is closely integrated into the preventative maintenance program described in the previous section. The system is designed to proactively identify problem areas and structural deficiencies, and to take appropriate actions before these problems result in blockages, SSOs, or structural failures. Problem areas are identified using a variety of tools, including visual inspection, video inspections and flow monitoring.

A physical survey/visual inspection of all sewer system components including manholes, exposed sewer pipes, pump stations (B914 Equipment Room, B912 Basement, B955, B964 basement, and B910 Basement), cooling tower basins, Liquid Effluent Containment Systems (LECS), (906, 916, 968 and 941 LECS) and sumps, is conducted annually. The physical survey/visual inspection identifies defects related to safety, defects related to structural and mechanical stability and operation, accumulated sediment and debris deposits, visible flow bottlenecks, and any evidence of present or prior surcharging or overflows. A log of physical survey/visual inspection shall record the inspection date, name of inspector, and observation notes. These records will be retained for 5 years.

Problem areas are documented and forwarded to SNL/CA Partnership and Planning, or Customer Operations as appropriate for corrective action.

Closed Circuit Television (CCTV) inspection for all sewer lines that are 6 inches in diameter or greater, and sewer lines that are associated with chronic basement flooding or chronic maintenance areas, will be conducted every three years. The CCTV inspection will be coordinated with a scheduled sewer line cleaning. Inspection will usually be performed by a specialty sewer maintenance contractor. The sewer lines shall be cleaned using high pressure jetting prior to an internal pipe inspection by CCTV. For severely clogged sewer lines that could not be unclogged by high pressure jetting, a machine-driven root cutter or other mechanical device may be used to clear the blockage. The CCTV inspection shall include audio/visual documentation, with a written summary to include the location of roots intrusions, defective joints, defective pipes, sewer line depressions, breaks in lateral connections, and grease and sediment accumulations. The CCTV Inspection report will be documented in both written and digital formats. The inspection records will be retained for five years. A copy of the report will be sent to SNL/CA Partnership and Planning.

SNL/CA Partnership and Planning will use the PM and inspection logs to plan, budget and prioritize corrective actions. In prioritizing the correction of structural deficiencies, a number of factors in addition to the specific structural condition must also be considered, including: budgeting and timing considerations vis-à-vis other SNL/CA projects; grouping of corrective actions into coherent projects that are large enough to attract highly qualified contractors and maximize the benefit attained for the funds expended; ability to maintain service during construction, including consideration of reasonable “worst-case” flow scenarios; and environmental and customer impact issues.

5.3 Contingency Equipment and Replacement Inventories

Emergency equipment includes a variety of trailer mounted portable generators (up to 460 kw), portable pumps (up to 12 inch), spare electric submersible pumps that are direct replacements for the pumps used in many of the smaller collection system pump stations, piping and hoses, samplers, and other equipment. In addition, SNL/CA has several pieces of equipment that are available to be utilized in the event of an emergency, such as back-hoes and a Vactron™.

For the collection system, repair parts consist primarily of repair clamps in those sizes needed to match SNL/CA lines. Sandia also has a contract with a supply company that is able to provide any needed parts that SNL/CA may not have available. These parts are available 7 days a week, 24-hours a day.

Table 5-1 is a general list of the equipment available on-site for emergency sewer repairs.

Table 5-1 List of Emergency Equipment

Equipment	Inventory
Sewer sump pump, ¾ HP	1
By-pass Hose	400 ft.
Balloons 2 inch to 8 inch	6
Repair clamps 2 inch to 8 inch	4
Sewer Cables	2
No Hub bands 4 inch to 8 inch	6
10 mil tape	6 rolls
Emergency lights and generators	4

5.4 Training

SNL/CA's training activities fall into two categories, safety and job skills. The two are closely related insofar as safety is of prime consideration in performance of any job activity. Annual safety training is conducted by SNL/CA staff, outside consultants or through corporate web based training. Safety Training is recorded in the on-line training database. Records are available for all individuals responsible for sanitary sewer operations. Job skills training, and the certifications held by plumbing staff is retained in their personnel files.

Job skills training includes reviewing technical work documents (e.g. Operating Procedures) and job specific training conducted by SNL/CA staff (e.g. spill response).

Subcontractors may either maintain their own ES&H programs and associated programs, or they may choose to comply with SNL/CA's ES&H programs, in which case they are required to complete SNL/CA training.

5.5 Rehabilitation and Replacement Plan

Based upon the Sanitary Sewer Evaluation Report (URS May 5, 2009), SNL/CA has developed a schedule for capital improvement or repair of sections of the sanitary sewer. Table 5-2 shows the priority for completing these items. Additions to this table will be made after annual sewer system inspections or triennial CCTV inspections (see section 5.2) as necessary.

Table 5-2 Sewer Repair and Rehabilitation Schedule

Sanitary Sewer Capital Improvement Plan			
Task	Scope of Work of High Priority Tasks	Status	Schedule
1	Sanitary Sewer Line Replacement, East Campus	Completed	FY16
2	Sanitary Sewer Line Replacement, North Main	Completed	FY18
3	Sanitary Sewer Terminal facility Rehabilitation	Competed	FY17
4	Sewer Line Replacement, Central Campus	Completed	FY18
5	Sewer Line Replacement, 8th St.	Completed	FY18
6	Sewer Line Replacement, South Campus	Completed	FY18
7	Liquid Effluent Control System Upgrades, C941	In Progress	FY23
8	New Sanitary Sewer Lift Station and Monitoring	Pending	FY25
9	Liquid Effluent Control System (LECS) Revitalization	Pending	FY25

6.0 Overflow Emergency Response Program

The site's overflow emergency response program is detailed in the operating procedures for emergency spill response by Hazardous Waste Management (OP472343 Waste Management Spill Response Procedures at SNL/CA) and notification by the wastewater program (OP471608 Operating Procedure for Incident Reporting). The following describes key elements of the Response Plan.

SNL/CA has internal incident reporting and tracking procedures. A sanitary sewer system issue may fall under: Nonconforming Item Identification and Tracking Administrative Procedure 800070 , Nonconformance Reporting, Form Logging and Tracking Operating Procedure 471411, depending upon the circumstances.

However, all SSOs will be reported in accordance with OP 471608 Operating Procedure for Incident Reporting.

Incidences may be reported by telephone to the ES&H Helpline 925-294-3724 or the 24-hour security manned Central Alarm System (CAS) 925-294-2300. The ES&H Helpline and security personnel have a call list for response to spills. Waste Management program personnel are contacted to respond to the spill. Waste Management personnel may contact maintenance and staff from other ES&H programs to assist with the spill.

Waste Management personnel respond to spill calls according to an Operating Procedure for the Hazardous Waste Operations Program within the Environmental Management Department. The spill response team and backup team all receive the appropriate training courses and annual refresher training. Training is documented in the corporate TEDS system. The spill response team may also contact appropriate maintenance and ES&H personnel as needed. The response team completes an Environmental Protection Emergency Response Records Form (Spill Response Records).

For an emergency sanitary sewer overflow incident the Environmental Monitoring Program lead is notified. The Program lead is responsible for notification to the appropriate regulatory agencies and DOE/SFO according to the Operating Procedure for Incident Reporting OP471608.

The cleanup procedure is to contain spilled material (plus any washdown water). Visual monitoring is part of the initial response to determine what immediate actions should be taken. After the initial response and documentation of spill volume, an assessment of possible impacts on surface water should be conducted as part of the spill evaluation process. Material may be removed and/or disinfected if the spill location is in an area frequented by members of the workforce.

The incident reporting procedure and spill response triggers an Occurrence Report. The Occurrence Report is documented by the Quality Assurance Department. The Occurrence Reporting program gathers information, analyzes events for causal factors and determines and tracks actions to prevent recurrence.

The Environmental Monitoring Program lead is responsible for reporting of SSOs to the SWQCB via the CIWQS SSO electronic reporting database. Reporting requirements are summarized in Operating Procedure for Incident Reporting OP471608. SSOs must be reported within the following time frames for the following defined spill categories:

- Category 1 Spills (≥1,000 gallons and reach surface waters): Submit uncertified report no later than 3 business days after being made aware of the SSO. Submit final certified report within 15 calendar days of the conclusion of SSO response activities. Certified reports must be submitted by the LRO or Authorized Signatory (AS).
- Category 2 Spills (≥1,000 gallons, and do not reach surface waters) : Submit final certified report within 15 calendar days after the end of the calendar month in which the SSO occurred (no initial, uncertified report is required). Certified reports must be submitted by the LRO or AS.
- Category 3 Spills (≤1,000 gallons and do not reach surface waters): Submit final certified report within 30 calendar days after the end of the calendar month in which the SSO occurred (no initial, uncertified report is required). Certified reports must be submitted by the LRO or AS.

For months during which there are no SSOs, a "no spill certification" must be submitted. In addition, the CIWQS collection system questionnaire must be updated annually.

7.0 FOG (Fats, Oil, and Grease) Control Program

SNL/CA evaluated the site's sanitary sewer system and service area and has determined a FOG Control Program is not necessary. There have been no identified sections of the sewer system subject to grease blockages or in need of cleaning due to grease obstruction. Though there are no current food preparation activities or grease producing facilities on site that would lead to fats or grease being discharged to the sewer, a smaller cafeteria is currently being constructed. The installment of the cafeteria had prior coordination with the City of Livermore Department of Water Resources, who issues SNL/CA's wastewater permit. Since the cafeteria will be handling food preparation activities, the City of Livermore required the installation and maintenance of a 750 gallon or larger grease interceptor. SNL/CA has elected to install a Jensen Precast 1,000 gallon grease interceptor and will be implementing regular cleaning and maintenance of the interceptor. Grease, oils and solid wastes will be disposed of properly.

The Maintenance yard near Building 963 has a wash pad for cleaning vehicles, carts, and equipment. The wash pad, in operation for over ten years, drains to the sanitary sewer through

an oil-water separator. The separator is a Jensen Precast 500 Gallon Sand-Oil Interceptor. Maintenance staff inspect the separator and schedule the clean out annually (typically in October). Prior to pumping the sump out, the Facilities Maintenance plumber will ensure all piping from the wash rack drain to the sump is clear. If necessary, the piping will be snaked out. Waste Management collects samples for analysis by a contract laboratory. Upon receiving the sample analysis results, Waste Management contacts the appropriate disposal company contractor and schedules the service.

Through routine and preventative sanitary sewer maintenance and cleaning staff will continue to monitor the sewer system for possible grease obstructions or blockages. Creation of a future FOG control program will be reevaluated if any grease obstructions or blockages occur, or if there is observed significant increases in the monthly analytics for oils and grease at the sewer outfall station.

8.0 Design and Performance Provisions

Comprehensive sewer design standards are contained in the Sandia National Laboratories Facilities Sanitary Sewer Design and Performance Manual. It is the responsibility of the Project and Construction Management Department to maintain this manual.

9.0 System Evaluation and Capacity Assurance Plan

9.1 Introduction

This section of the SSMP discusses SNL/CA programs and activities for capacity management including system evaluation and capacity assurance plan. This section fulfills the System Evaluation and Capacity Assurance Plan SSMP requirement of the SSMP.

9.2 Regulatory Requirements for System Evaluation and Capacity Assurance Plan

According to the SWRCB, 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, the agency should undertake the evaluation identified in (a) above to establish appropriate design criteria. Design criteria are covered in Chapter 8 of this SSMP.

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 agency shall develop a schedule of completion dates for all portions of the CIP developed in (a) through (c) above. This schedule shall be reviewed and updated at least every five years

9.3 System Evaluation

9.3.1 Review of Existing Sewer System Data

9.3.1.1 Sewer Collection System

The existing sewer system collects wastewater from SNL/CA and discharges into the adjacent sewer system at the Lawrence Livermore National Laboratory (LLNL) and then subsequently to the City of Livermore's public sewer system. This systemis approximately 3.1 miles in length with two primary trunk sewers: the North Trunk Sewer, which consists of 3,622 ft of 8-inch diameter pipe, and the South Trunk Sewer, which consists of 4,546 ft of 6- and 8-inch diameter pipe. Wastewater from sanitary facilities, cooling tower blow-down, laboratory discharges, liquid effluent control systems (LECS), and building floor and wall drain sump pumps are discharged into the trunk sanitary sewer system. Some buildings are connected to the collection system via holding tanks (LECS), that are pumped into the collection system in a batch mode at approximately 200 gpm.

Total flow in the system varies from as low as 3 gallons per minute (gpm) to above 100 gpm as measured by a magnetic flow meter. Sewage flows by gravity in a 10-inch diameter PVC pipe into a 5-foot diameter Manhole No. 1C, which serves as the inlet wet well for two 250 gpm self-priming sewage pumps that pump the flow to LLNL in one of two parallel 4-inch diameter pressurized force mains. A 3-inch magnetic flow meter on the discharge side of these pumps serves as the meter of record for the total volume of sewage discharged. In February 2022, a 10-inch diameter PVC pipe was installed from the top of the manhole to gravity flow to the LLNL sewer system. This overflow line will only be in use when an emergency circumstance arises such that the manhole fills to the top where the overflow lines exists, and its only function is to prevent an overflow event from occurring.

9.3.1.2 Collection System Master Planning

SNL/CA performed a master plan study for five utility systems in 2015. This included the sanitary sewer system. The master plan study examined both sustainment of the existing site utilities as well as anticipated future infrastructure needs to support Sandia missions for the next twenty-year planning horizon. The CIP (Table 5-2) represents the immediate five-year planning of rehabilitation projects based on the results of the master plan study.

9.3.1.3 Collection System Physical Inspection

Every three years, the SNL/CA sewer system is inspected via CCTV. Results of the inspection are used to identify areas that need corrective action. These corrective actions may then be added to the CIP (if they cannot be corrected immediately).

9.3.2 Sewer Model Construction

SNL/CA does not have a flow model of the existing system. For evaluation purposes, a spreadsheet model was developed using Microsoft Excel software based on existing system information to reflect a model of the sewer trunk lines. The spreadsheet model simulates the North and South Trunk sewers which account for 100 percent of the system flow. The spreadsheet model was prepared with the intent to characterize average dry weather flow (ADWF), peak dry weather flow (PDWF), and peak wet weather flow (PWWF) in the backbone of the collection system. The spreadsheet model skeleton generally corresponds to the elements in the sanitary sewer map shown in Appendix A. A simplified piping system was used in the model that includes approximately 1.51 miles of sewer pipes, comprised of 6- and 8-inch diameter pipes and 41 manholes. Individual building sewers were not modeled.

The spreadsheet model uses Manning's equation to evaluate the theoretical capacity of the system. The flow calculations were based key parameters such as pipe sizes, pipe slopes, and pipe materials within the system. Assumptions were used to create a complete set of data for the modeled system. Where data were missing, assumptions included were: Flow Depth: 25 percent; unknown pipe slope: 1 percent; and, unknown pipe size is assumed based on known pipe sizes of connecting pipes.

As shown in Table 9-1, the theoretical capacity of the existing system at an assumed flow depth percentage of 25 percent is approximately 2,763 gallons per minute (gpm). The theoretical capacity of the current system when flowing full is approximately 21,650 gpm.

Table 9-1 Estimated Capacity of North and South Trunk Sewer System

Segment ID		Pipe Size (IN)	Pipe Material	Manning Roughness Coef. ("N")	Hydraulic Radius 25% Full (FT)	Slope (FT/FT)	Pipe Capacity (CFS)	Pipe Capacity (GPM)
Upstream Manhole	Downstream Manhole							
North Trunk Sewer System								
MH 35	MH 34	8.00		0.011	0.0978		0.00	0.0
MH 34	MH 34A	8.00	PVC	0.011	0.0978		0.00	0.0
MH 34A	MH 33	8.00	PVC	0.011	0.0978	0.018	0.26	118.4
MH 33	MH 32	8.00	PVC	0.011	0.0978	0.016	0.25	230.5
MH 32	MH 31	8.00	PVC	0.011	0.0978	0.010	0.20	318.5
MH 31	MH 30	8.00	PVC	0.011	0.0978	0.004	0.12	372.8
MH 30	MH 29	8.00	PVC	0.011	0.0978	0.008	0.17	451.0
MH 29	MH 28	8.00	PVC	0.011	0.0978	0.010	0.20	539.1
MH 28	MH 27	8.00	PVC	0.011	0.0978	0.010	0.20	627.1
MH 27	MH 26	8.00	PVC	0.011	0.0978	0.022	0.29	758.3
MH 26	MH 21	8.00	PVC	0.011	0.0978	0.003	0.11	808.1
MH 21	MH 20	8.00	PVC	0.011	0.0978	0.021	0.29	936.8
MH 20	MH 19	8.00	PVC	0.011	0.0978	0.010	0.19	1022.6
MH 19	MH 18	8.00	PVC	0.011	0.0978	0.009	0.18	1105.2
MH 18	MH 17	8.00	PVC	0.011	0.0978	0.009	0.19	1189.2
MH 17	MH 17B	8.00	PVC	0.011	0.0978	0.006	0.15	1255.1
MH 17B	MH 17C	8.00	PVC	0.011	0.0978	0.007	0.16	1328.7
MH 17C	MH 15	8.00	PVC	0.011	0.0978	0.007	0.17	1403.4
MH 15	MH 1	8.00	PVC	0.011	0.0978	0.010	0.20	1491.5
South Trunk Sewer System								
MH 42	MH 41	6.00	VCP	0.011	0.0733	0.020	0.13	57.4
MH 41	MH 40	6.00	VCP	0.011	0.0733	0.022	0.14	118.6
MH 40	MH 39	6.00	VCP	0.011	0.0733	0.023	0.14	180.8
MH 39	MH 38	6.00	VCP	0.011	0.0733	0.027	0.15	247.4
MH 38	MH 37	6.00	VCP	0.011	0.0733	0.016	0.11	298.9
MH 37	MH 36	6.00	SL	0.011	0.0733	0.012	0.10	342.7
MH 36	MH 35	6.00	VCP/SL	0.011	0.0733	0.013	0.10	389.9
MH 35	MH 10	6.00	VCP/PVC	0.011	0.0733	0.011	0.09	432.0
MH 10	MH 10A	6.00	PVC	0.011	0.0733	0.043	0.19	516.8
MH 10A	MH 10B	6.00	PVC	0.011	0.0733	0.014	0.11	565.7
MH 10B	MH 9	6.00	PVC	0.011	0.0733	0.024	0.14	629.4
MH 9	MH 8	6.00	PVC	0.011	0.0733	0.011	0.10	672.7
MH 8	MH 7	6.00	PVC	0.011	0.0733	0.008	0.08	709.0
MH 7	MH 6	8.00	PVC	0.011	0.0978	0.006	0.15	777.8
MH 6	MH 5	8.00	PVC	0.011	0.0978	0.006	0.15	846.5
MH 5	MH 4	8.00	PVC	0.011	0.0978	0.008	0.17	923.8
MH 4	MH 3	8.00	PVC	0.011	0.0978	0.013	0.23	1025.3
MH 3	MH 3A	8.00	PVC	0.011	0.0978	0.010	0.20	1113.3
MH 3A	MH 2	8.00	PVC	0.011	0.0978	0.010	0.20	1201.4
MH 2	MH 1	8.00	PVC	0.011	0.0978	0.006	0.16	1271.8

Total Theoretical Capacity at 25% Full Pipe Flow (North + South Trunk Sewers) = 2,763 gpm or 3.4 mgd

The spreadsheet model was used to compare theoretical capacities of the trunk lines to the estimated actual flows in order to identify any hydraulic deficiencies in the system. Table 9-2 shows the estimated flows in the existing collection system. Flows were developed from existing building occupancy data, type of lab operations, and individual building cooling tower data.

Table 9-2 Estimated Flows

Segment ID		LEC Tank (gallons)	Max Discharge Rate for LEC Tanks (GPM)	Blow Down Water Cooling Towers (GPM)	Estimated Bldg Flows (GPM)	Total Flow (GPM)	Friction Head Loss Calculation					Total flow (GPM)
Upstream Manhole ID	Downstream Manhole ID						Hazen Williams Roughness Constant C	Pipe Material	Volume Flow (GPM)	Inside Diameter (IN)	Friction Headloss (fth20/100 ft pipe)	
North Trunk Sewer System												
MH 35	MH 34					0.00						
MH 34	MH 34A					0.00						
MH 34A	MH 33				2.99	2.99	130.00	PVC	2.99	8.00	0.00	2.99
MH 33	MH 32					2.99	130.00	PVC	2.99	8.00	0.00	2.99
MH 32	MH 31					2.99	130.00	PVC	2.99	8.00	0.00	2.99
MH 31	MH 30	10000	200			202.99	130.00	PVC	202.99	8.00	0.10	202.89
MH 30	MH 29			1.58	0.21	204.78	130.00	PVC	204.78	8.00	0.10	204.68
MH 29	MH 28			4.74	0.06	209.57	130.00	PVC	209.57	8.00	0.10	209.47
MH 28	MH 27			3.16	1.26	213.99	130.00	PVC	213.99	8.00	0.11	213.89
MH 27	MH 26					213.99	130.00	PVC	213.99	8.00	0.11	213.89
MH 26	MH 21			4.74	3.02	221.75	130.00	PVC	221.75	8.00	0.11	221.63
MH 21	MH 20	12000	200	1.58	1.81	425.14	130.00	PVC	425.14	8.00	0.38	424.76
MH 20	MH 19					425.14	130.00	PVC	425.14	8.00	0.38	424.76
MH 19	MH 18					425.14	130.00	PVC	425.14	8.00	0.38	424.76
MH 18	MH 17					425.14	130.00	PVC	425.14	8.00	0.38	424.76
MH 17	MH 17B					425.14	130.00	PVC	425.14	8.00	0.38	424.76
MH 17B	MH 17C					425.14	130.00	PVC	425.14	8.00	0.38	424.76
MH 17C	MH 15					425.14	130.00	PVC	425.14	8.00	0.38	424.76
MH 15	MH 1					425.14	130.00	PVC	425.14	8.00	0.38	424.76
South Trunk Sewer System												
						0.00						
MH 42	MH 41			3.16	0.03	3.19	110.00	VCP	3.19	6.00	0.00	3.19
MH 41	MH 40				0.07	3.26	110.00	VCP	3.26	6.00	0.00	3.26
MH 40	MH 39					3.26	110.00	VCP	3.26	6.00	0.00	3.26
MH 39	MH 38			1.58	0.02	4.86	110.00	VCP	4.86	6.00	0.00	4.86
MH 38	MH 37				0.05	4.91	110.00	VCP	4.91	6.00	0.00	4.91
MH 37	MH 36				0.24	5.15	110.00	SL	5.15	6.00	0.00	5.15
MH 36	MH 35	8000	200	3.16	0.68	208.99	110.00	VCP/SL	208.99	6.00	0.57	208.42
MH 35	MH 10					208.99	110.00	VCP/PVC	208.99	6.00	0.57	208.42
MH 10	MH 10A				0.50	209.49	130.00		209.49	6.00	0.42	209.07
MH 10A	MH 10B					209.49	130.00	PVC	209.49	6.00	0.42	209.07
MH 10B	MH 9					209.49	130.00		209.49	6.00	0.42	209.07
MH 9	MH 8				1.15	210.63	130.00	PVC	210.63	6.00	0.42	210.21
MH 8	MH 7			3.16	0.03	213.82	130.00	PVC	213.82	6.00	0.43	213.39
MH 7	MH 6					213.82	130.00	PVC	213.82	8.00	0.11	213.71
MH 6	MH 5					213.82	130.00	PVC	213.82	8.00	0.11	213.71
MH 5	MH 4	10000	200			413.82	130.00	PVC	413.82	8.00	0.36	413.46
MH 4	MH 3					413.82	130.00	PVC	413.82	8.00	0.36	413.46
MH 3	MH 3A					413.82	130.00	PVC	413.82	8.00	0.36	413.46
MH 3A	MH 2					413.82	130.00	PVC	413.82	8.00	0.36	413.46
MH 2	MH 1					413.82	130.00	PVC	413.82	8.00	0.36	413.46

9.3.3 Model Results

The results of the trunk sewer modeling show that the current system capacity is adequate to convey current ADWF and PDWF, without surcharging of the pipes. According to metered sewer flow data for a three-year period, the ADWF for the existing systems is approximately

15,400 gallons per day (gpd), or 10.7 gallons per minute(gpm). The meter data included three wet weather seasons and did not reveal obvious peak flows or much difference in flows for the wet weather months versus dry weather months. Typically, the PWWF can be estimated by applying a peaking factor to the ADWF for the existing system, based on population served and nature of the land use contributing to the system, and then adding the infiltration and inflow (I/I) component. For this system, the land use is a mix of office and laboratory and there are currently no laundry or food production activities that would contribute to a typical domestic diurnal flow pattern. Therefore, for this system, the PWWF is assumed to be the peak flow that was recorded by the meter, and adjusted for seasonal variation. For purposes of this analysis, the ADWF is assumed to be the recorded dry month flow of approximately 15,400 gpd, or 10.7 gpm; the PDWF is assumed to be approximately 25,400 gpd, or 17.6 gpm; and the PWWF is assumed to be 64,000 gpd, or 44 gpm (to match the highest recorded wet weather flow data for the study dataset). In all cases, the flows are less than the theoretical capacity of the piping system which is also supported by SNL/CA's history of no sanitary sewer system overflows.

9.4 Schedule

Future Program Improvements will be developed through the annual budget process. SNL/CA will develop short- and long-term CIP schedules. The organization and completion of these tasks will be considered in future budgets as part of a Sewer Collection System Master Plan or similar planning or technical evaluation effort.

10.0 Monitoring and Program Modifications

SNL/CA reports SSOs to the SWRCB monthly, and provides an annual summary to the San Francisco Bay Regional Water Quality Control Board. SSOs are a rare occurrence at SNL/CA, with only four occurring during the past five years, which a majority of them happened in close sequence due to equipment failures and COVID-19 related supply chain issues for parts. When there is an SSO, the cause is investigated (using industry standard root-cause analysis methods), and corrective actions implemented.

Implementation of this SSMP is a joint effort between the Environmental Management, Partnership and Planning, Project and Construction Management, and Customer Operations Departments. Frequent communication amongst the Departments regarding operational issues, rehabilitation/replacement, and planned new system load and capacity is necessary to ensure that the Sanitary Sewer System functions properly. At SNL/CA this is facilitated by a required process whereby all major projects on site are reviewed by an interdisciplinary team consisting of ES&H, facilities, and security personnel. During this review, it can be ascertained which disciplines have a need to participate in a project.

11.0 Program Audits

Audits of the SNL/CA SSMP are conducted on a biennial, calendar year, basis by personnel assigned to Division 8000 Assurance. Audits are performed to ascertain the validity and reliability of information and to provide an assessment of the management's system internal control.

Prior to the audit, the auditors review the SSMP and determine details of the audit. Audits, at a minimum, include:

- Review of the overall effectiveness of the SSMP
- Review of each chapter of the SSMP against current performance
- Identification of SSMP deficiencies and steps to correct them.

A description of accomplishments in improving the sewer system will be included in the audit. The description may include:

- Changes to SSMP elements
- A discussion of implementation changes with respect to SSMP elements in the past two years
- A discussion of the additions and improvements made to the sanitary sewer collection system in the past reporting year
- A discussion of the additions and improvements planned for the upcoming reporting year with an estimated schedule for implementation.

12.0 Communication Program

SNL/CA is a closed, secure facility, therefore the workforce is considered to be the public for the purposes of the communication plan.

Communications to the workforce concerning general wastewater issues are accomplished in several ways.

1. The Environmental Monitoring Program maintains a web-site on SNL/CA's internal network. This website includes information regarding wastewater regulations and limits.
2. Several messages per year are delivered to the workforce via a daily email newsletter concerning water use, wastewater, and storm water information.
3. Annually, the Environmental Monitoring Program Lead gives a presentation to the Maintenance Engineering Department personnel regarding wastewater, water usage, and/or storm water issues.

13.0 Final SSMP Implementation

This SSMP is considered to be complete and fully implemented as described in the SWRCB Order No. 2006-0003-DWQ General Permit.

14.0 Appendix A Sewer System Map

ABBREVIATIONS:

SS	–	SANITARY SEWER
FW	–	FIRE WATER
DCW	–	DOMESTIC CITY WATER
POC	–	POINT OF CONNECTION
COTG	–	CLEAN OUT TO GRADE
CI	–	CAST IRON
DI	–	DUCTILE IRON
GALV	–	GALVANIZED STEEL
CW	–	COLD WATER
SSMH	–	SANITARY SEWER MANHOLE

LEGEND:

- ○ MONUMENT, FLUSH
- ⊘ MONUMENT, RECESSED
- □ SPIKE (3/8"SQ. SHANK x 6"LONG)
- ◆ MARKER (1 1/2" DIA. BRONZE HEAD)
- ● PIPE (EXIST)
- MANHOLE
- SEWER LINE (UG)

GRAPHIC SCALE

200' 0 100' 200' 400'

SCALE 1"=200'

214515	U	11/5/21	DATA CENTER REPLACEMENT FACILITY	LDG	WFB	
209643	T	2/3/20	SANITARY SEWER REPLACEMENT (SNL SITE)	LDG	BAM	
	S	12/12/18	UPDATE XREF'S DWGS PER SNL CAD STANDARD	LDG	GDG	
	R	11/29/17	INCORPORATE UTILITY MASTER DWGS & INSERT XREF	LDG	GDG	
	Q	02/20/02	AS-BUILT	RYF	GDG	
PROJ.& W.O. NO.		DATE	REVISION	BY	CK.	DOE APP.

SANDIA NATIONAL LABORATORIES
FACILITIES MANAGEMENT
ALBUQUERQUE,NEW MEXICO; LIVERMORE, CALIFORNIA; TONOPAH,NEVADA

UNDERGROUND UTILITIES
SANITARY SEWER

CONTRACT NO.(DE-)	
DOE ACCT.NO.	
DRAWN	R FONG
CHECKED	G GUTIERREZ
SCALE	1"=200'-0"
DATE	SEPT 2000

SUBMITTED | RECOMMENDED | APPROVED

SCHEMATIC USE ONLY

DWG.NO. 01004

CADS DRAWING
FILE NAME: 01004.dwg

PROJ. NO. 214515
ORDER NO.