



San Francisco
Water Power Sewer
Services of the San Francisco Public Utilities Commission

San Francisco Sewer System Management Plan

**Statewide General Waste Discharge Requirements for
Sanitary Sewer Systems
Order. No. 2006-0003-DWQ**

September 2021

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SEWER SYSTEM MANAGEMENT PLAN

ELEMENT 1: SSMP GOAL

The first of the mandatory elements of a Sewer System Management Plan is a goal.

A. GOALS

The goal of San Francisco's SSMP is to Manage, operate, and maintain the wastewater collection system Minimize SSOs and mitigate the impacts of SSOs when they occur.

B. SANITARY SEWER SYSTEM SERVICE AREA

The San Francisco collection system serves all of San Francisco and small portions of Brisbane and Daly City. The service area population is approximately 887,000 people¹.

A majority of the area is served by a combined sewer system with a few exceptions, namely Mission Bay. Areas currently under redevelopment - such as Hunters Point and Candlestick Park - will also be served by a separate sanitary system following completion of construction. Table 1.1 summarizes the collection system conveyance assets within both the combined and separate sewer systems as reported to the California Integrated Water Quality Information System (CIWQS)².

In general, the SFPUC manages gravity sewer assets as a system regardless of whether the sewers are combined or separate. This SSMP, therefore, describes the activities applicable to the system as a whole, and identifies the activities – such as hydraulic capacity assessment – where the distinction between combined and separate sewers necessitates different approaches.

¹ San Francisco Public Utilities Commission. (2020). Comprehensive Annual Financial Report for the Fiscal Years Ended June 30, 2019 and 2018, 229. <https://sfwater.org/Modules/ShowDocument.aspx?documentid=14902>

² See Appendix A for SFPUC's CIWQS Collection System Questionnaire content and methodology for determining data for the combined sewer system versus the separate sewer system.

Table 1.1 San Francisco Sewer System Mileage

	Combined Sewer	Separate Sewer
Miles of force mains and other pressure systems?	12	1.6
Miles of gravity sewers?	947	3.9
Estimated size distribution of GMs	Percent (%) of total Miles	
6 inches or less	1	8
8 inches	17	39
9-18 inches	53	34
19-36 inches	11	15
>36 inches	17	2
unknown	1	2
TOTAL (must equal 100)	100	100
Estimated size distribution of FMs	Percent (%) of total Miles	
6 inches or less	4	50
8 inches	9	0
9-18 inches	27	50
19-36 inches	19	0
>36 inches	40	0
unknown	1	0
TOTAL (must equal 100)	100	100

ELEMENT 2: ORGANIZATION

The Organization element of an SSMP must identify:

- a) The name of the responsible or authorized representative.
- 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.
- 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)).

A. AUTHORIZED REPRESENTATIVE

The authorized representative for the San Francisco Public Utilities Commission (SFPUC) is the Collection System Division Manager, Chris McDaniels. CIWQS Reporting is delegated to Sewer Operations Manager Daniel Whitlock.

B. ORGANIZATION CHART

SFPUC's Wastewater Enterprise (WWE) organization chart is available in Appendix B.

The Wastewater Enterprise (WWE) within SFPUC is responsible for implementing the measures in the SSMP program. WWE consists of the following divisions:

- Business Strategy and Performance: provides workforce planning and financial planning services to each Division.
- Collection System: responsible for inspecting and cleaning the sewer system and minimizing harmful pollutants entering the sewer system through management of the Pretreatment, Resource Recovery and Pollution Prevention Programs.
- Engineering: performs research, planning, design, construction, and start-up and troubleshooting of the City's wastewater facilities. WWE Engineering also provides review, comments, and feedback on all capital project planning, design, construction, and start-up activities.
- Maintenance: responsible for maintaining, repairing, and improving process equipment and facilities.
- Operations: responsible for the safe operation of all wastewater facilities within the National Pollutant Discharge Elimination System (NPDES) permit requirements.
- Regulatory Compliance: lead in coordinating WWE NPDES permit compliance.
- Urban Watershed Planning: develops green infrastructure plans, policies, regulations, watershed assessment and monitoring, and project design and delivery processes to protect water quality and improve the performance of San Francisco's collection system.

C. CHAIN OF COMMUNICATION: REPORTING SEWER SYSTEM OVERFLOWS

The procedures for reporting sewer overflows can be found in the Overflow Response, Mitigation, Documentation, and Sampling Standard Operating Procedures (SOP) in Appendix C.

SFPUC uses an Incident Command System (ICS) framework, a standardized hierarchical structure that allows for a cooperative response across departments to organize and coordinate response activities. The ICS is used for both planned and unplanned activities, including sewer overflows. During an overflow, the on-scene Sewer Operations

Service Worker is the designated Incident Commander and coordinates with their direct supervisor or the On-Call Supervisor to provide notifications to the State and local health department.

All Sewer Operations staff received ICS training in the Summer of 2020.

ELEMENT 3: LEGAL AUTHORITY

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.
- e) Enforce any violation of its sewer ordinances.

A. PREVENT ILLICIT DISCHARGES

Article 4.1, Section 123³ of the San Francisco Public Works Code describes the limitations and prohibitions associated with any discharge into the separate sanitary sewer system.

B. PROPER DESIGN AND CONSTRUCTION

The San Francisco Plumbing Code⁴ is composed of the 2019 California Plumbing Code⁵, which incorporates the 2018 Uniform Plumbing Code⁶, and the 2019 San Francisco Plumbing Code Amendments. The 2019 California Plumbing Code describes the standards for proper design and construction of sewers and connections. Chapter 7 of the California Plumbing Code also specifies the minimum design and construction standards related to the sanitary drainage system.

The San Francisco Public Works Code Article 4, Section 117⁷ requires that all public sewers and sewer laterals be constructed in accordance with current Standard Specifications and Plans.

C. ACCESSIBILITY

Article 4.1, Section 122⁸ of the San Francisco Public Works Code ensures access for maintenance, inspection, or repairs for portions of the lateral owned or maintained by San Francisco.

D. FATS, OILS AND GREASE (FOG)

Article 4.1, Section 140⁹ of the San Francisco Public Works Code describes the necessary control associated with Fats, oils, and grease (FOG).

E. ENFORCEMENT

³ https://codelibrary.amlegal.com/codes/san_francisco/latest/sf_publicworks/0-0-0-515

⁴ https://codelibrary.amlegal.com/codes/san_francisco/latest/sf_building/0-0-0-85773

⁵ <https://www.iapmo.org/hidden/state-adopted-codes/cpc-2019/>

⁶ <https://www.iapmo.org/publications/read-uniform-codes-online/>

⁷ https://codelibrary.amlegal.com/codes/san_francisco/latest/sf_publicworks/0-0-0-366

⁸ https://codelibrary.amlegal.com/codes/san_francisco/latest/sf_publicworks/0-0-0-441

⁹ https://codelibrary.amlegal.com/codes/san_francisco/latest/sf_publicworks/0-0-0-689

Article 4.1, Section 120¹⁰ and 132¹¹ of the San Francisco Public Works Code gives authority to the General Manager of SFPUC to administer and enforce any provisions in Article 4.1.

Chapter 1 of the San Francisco Plumbing Code authorizes enforcement of any provisions found in the San Francisco Public Works Code.

Article 4, Section 104¹² of the San Francisco Public Works Code gives the Director of Public Works of the City and County of San Francisco the authority to cause the abatement of any nuisance or hazard related to laterals or side sewers.

¹⁰ https://codelibrary.amlegal.com/codes/san_francisco/latest/sf_publicworks/0-0-0-502

¹¹ https://codelibrary.amlegal.com/codes/san_francisco/latest/sf_publicworks/0-0-0-616

¹² https://codelibrary.amlegal.com/codes/san_francisco/latest/sf_publicworks/0-0-0-389

ELEMENT 4: OPERATION AND MAINTENANCE PROGRAM

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.
- e) Provide equipment and replacement part inventories, including identification of critical replacement parts.

A. SEWER SYSTEM MAP & ASSET INVENTORY

The San Francisco Department of Public Works maintains an Oracle Geographic Information System database of every collection system asset in the sewer system. The database includes information such as unique asset identifier, pipe length, pipe size, pipe material, and pipe year of construction. In addition to these physical attributes, the GIS also provides information on the location of the assets.

The information in this database is continually updated as assets are added, modified, or as new information becomes available. This GIS system is currently maintained by DPW but is being transferred to the SFPUC. SFPUC procedures for updating the system are being developed in anticipation of this transfer.

B. PREVENTATIVE MAINTENANCE

Gravity Sewer Preventative Maintenance

SFPUC performs preventative maintenance on gravity sewers primarily through cleaning. Cleaning of sewers equal to and less than 36" in diameter is performed by hydro jetting. Larger diameter sewers typically require physical entry and specialized equipment for cleaning and debris removal. Sewers are prioritized for cleaning based on overall risk score in anticipation of CCTV/condition assessment. For planning and budgeting purposes, the SFPUC has a target of cleaning 100 miles of sewers annually. The SFPUC is currently re-visiting this target and the methodology for prioritizing sewers for cleaning. Modifications to the existing program will be described in future SSMP updates.

Pump Station Maintenance

A field crew from the Operations Division visits each pump station weekly to check the sumps, write up work orders for the Maximo system and determine if corrective action is necessary. In addition to the weekly inspection of the pump stations, there are scheduled quarterly, semi-annual and annual planned maintenance activities which include checking pump belts and oil levels, running the pumps, checking the electrical panels and connections and checking the output run time. These activities may reveal the need for corrective maintenance, which would be reported in the Maximo system.

C. REPAIR, REHABILITATION AND REPLACEMENT

Prioritization for condition assessment, cleaning, renewal, and replacement are currently based on total system risk. Total system risk is defined as the product of Likelihood of Failure and Consequence of Failure. Condition assessment on sewers equal to or less than 36" is performed by the SFPUC using closed circuit television (CCTV). Condition assessment on larger sewers typically requires several specialized tiers of inspection techniques such as desktop studies, visual inspection, and destructive testing. CCTV footage is systematically reviewed and coded according to the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment Certification Program (PACP). The PACP coding refines total risk score used to prioritize condition assessment and renewal and replacement. The CCTV inspection data and PACP coding are stored in an online database, currently utilizing WinCan. Information from condition assessment and other factors are used to identify and prioritize improvements.

Condition needs are addressed through either repair, rehabilitation, or replacement. The SFPUC currently has an annual planning and budgeting target of 700 locations for spot repair and 15 miles of renewal and replacement. The SFPUC is currently re-visiting this target and the methodology for prioritizing sewers for cleaning. Modifications to the existing program will be described in future SSMP updates.

D. TRAINING

WWE is in the process of implementing a competency-based training (CBT) model for critical field activities. The CBT model involves the creation of standard operating procedures (SOPs), training, assessment, gap analysis, re-training if necessary, and certification.

Table 4.1 Sewer Operations Competency-Based Modules Training

Sewer Operations Competency-Based Modules	Implementation
Overflow Response and Reporting	Completed annually
Vacon/Combo Truck	In Development
Service Truck	In Development
CCTV	Scheduled for 2022
Maximo Work Orders	Scheduled for 2022

E. EQUIPMENT INVENTORY

The equipment listed in table below is used by Collection System Division staff for day-to-day operations and maintenance of the collection system and may be available for emergency response. Equipment is located at 1603 Griffith Street or 1550 Evans Street, San Francisco.

Table 4.2 Sewer Operations Equipment Inventory

Equipment #	Description
425-3000	Pickup 3/4 ton utility body
425-3001	Pickup 3/4 ton utility body
425-502	Pickup 3/4 ton utility body
425-503	Pickup 3/4 ton
425-504	Mini van windstar 4 doors
425-506	Pickup 3/4 ton
425-00003	Hybrid escape
425-00002	Hybrid escape
425-00023	Pickup 3/4 ton utility body
425-00040	Pickup 3/4 ton utility body
425- 614	TV Van
425-615	TV Van
425-00004	TV Van IBAK
425-00038	TV Van IBAK
425-0032	TV Van IBAK
425-0037	TV Van IBAK
425-00005	TV Van
425-00011	TV Van IBAK
425-630	Harben 2003
425-631	Crew cab
425-00039	Walking Crew Truck
425-00025	Harben 2013
425-00027	Harben 2013
425-632	Harben 2005
425-5000	Harben 2008

Equipment #	Description
425-5001	Harben 2008
425-5002	Harben 2008
425-00024	Harben 2013
425-990	generator for building
425-902	HarbenTrailer 2001
425-00042	Barricade truck
425-692	Barricade truck
425-742	Swap loader
429-L008	Vaccon
429-L007	Vaccon
429-L006	Vaccon
429-L004	Vaccon
429-L001	Vaccon
429-L002	Vaccon
429-L003	Vaccon
429-L005	Vaccon
426-00161	Arrow Board
426-704	10 Wheel Grit dump
426-00121	10 Wheel Grit
426-01242	Cargo trailer
426-01243	Cargo trailer
426-01244	Cargo trailer
705-00057	F150
705-00073	F250 Super Duty
705-00037	Colorado

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¹³ From the WWE Emergency Operations Plan (2020).

ELEMENT 5: DESIGN AND PERFORMANCE PROVISIONS

The following are required of the design and performance provisions element:

- 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.
- b) Procedures and standards for inspecting and testing the installation of new sewers, pumps, and other appurtenances and for rehabilitation and repair projects

A. DESIGN AND CONSTRUCTION STANDARDS AND SPECIFICATIONS

The Standard Engineering Plans and Specifications for the City and County of San Francisco¹⁴ describes the design standards and specifications for installation, rehabilitation and repair of sanitary sewer systems.

Section 13 of the Subdivision Regulations¹⁵ for San Francisco is meant to supplement the Subdivision Code¹⁶. Together, the Subdivision Regulations and the Subdivision Code describe the standards of design for new sewer systems.

Chapter 7 of the complete California Plumbing Code specifies the minimum design and construction standards related to the sanitary drainage system.

B. INSPECTION

Section 3 of the Engineering Standard Specifications of the City and County of San Francisco describe procedures and standards for inspection and testing. The relevant sections related to inspection and testing are listed below:

- Section 304.13 Precast Reinforced Concrete Pipe Sewer, Material Testing
- Section 305.04 Vitrified Clay Pipe (VCP) Sewer, Testing
- Section 316.06 VCP Side Sewer Connections to Main Sewers, Side Sewer Investigation
- Section 319.02 Low Pressure Testing, Inspection and Testing
- Section 322.04 Polyethylene Pipe Sewer, Certificate of Compliance

Testing procedures are listed below:

- ASTM C 828-06 Standard Test Method for Low-Pressure Air Test of Vitrified Clay Pipelines
- ASTM C 924-02 Standard Practice for Testing Concrete Pipe Sewer Lines by Low-Pressure Air Test Method
- ASTM F 1417-92 Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air
- ASTM C 1244-05a Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill

¹⁴ San Francisco Public Works Standard Specifications and Plans:

<https://www.sfpublishworks.org/services/standards-specifications-and-plans>

¹⁵ San Francisco Subdivision Regulations (2015): https://sfpublishworks.org/sites/default/files/4740-2015%20Subdivision%20Regulations_final.pdf

¹⁶ San Francisco Subdivision Code: https://codelibrary.amlegal.com/codes/san_francisco/latest/sf_subdivision/0-0-0-2

ELEMENT 6: OVERFLOW EMERGENCY RESPONSE PLAN

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 and crowd control and other necessary response activities.
- 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.

A. SUMMARY

WWE's Overflow Response, Mitigation, Documentation, and Sampling SOP (Appendix B) and in-field Response Packets (Appendix D and E) detail Sewer Operations' internal notification procedures, overflow response, external agency notification procedures, public response activities, and the containment, prevention and minimization of overflows.

WWE Sewer Operations completes CBT training for responding and reporting of sanitary sewer overflows on an annual basis.

ELEMENT 7: FATS, OILS AND GREASE (FOG) CONTROL PROGRAM

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.
- 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.

A. PUBLIC EDUCATION AND OUTREACH

WWE's Pollution Prevention team provides FOG outreach and education to San Francisco residents through ads in the Nextdoor application and other social media posts, an annual calendar, and mail flyers.

The SFPUC website¹⁷ also contains commercial and residential information regarding the safe disposal of FOG.

B. FOG DISPOSAL

San Francisco residents can dispose of used cooking oil at the Recology Transfer Station, located at 501 Tunnel Avenue. Small amounts of used cooking oil may be disposed of in residential compost bins.

C. LEGAL AUTHORITY

SFPUC's legal authority to prohibit discharges to the system and identify measures to prevent SSOs and blockages caused by FOG are described in Article 4.1, Section 140 of the San Francisco Public Works Code. Legal authority is also provided by the General Wastewater Discharge Permit for Food Service Establishments (FSEs). This Permit authorizes FSEs to discharge wastewater into San Francisco's sewer system, provided that such discharges are conveyed through the facilities' laterals and are in accordance with both Article 4.1 of the San Francisco Public Works Code as well as the conditions set forth in the Permit.

¹⁷ SFPUC Website, Used Cooking Oil Disposal: <https://sfwater.org/index.aspx?page=465>

D. GREASE REMOVAL DEVICES

Under the FOG Control Ordinance, the grease capturing equipment required is determined by the FOG Discharger category. Category 1-3 FSEs, ranging from significant to less-significant producers of FOG, are required to install a grease removal device, or gravity grease interceptor. Category 4 FSEs are limited food preparation establishments and are not required to install grease capturing equipment.

An FSE may also file a request for a variance from the Grease Removal Device installation requirements of the FOG Control Ordinance if it is not feasible to install a Grease Removal Device due to lack of physical space. The determination as to whether an FSE qualifies for the variance will be at the sole discretion of the General Manager of the SFPUC.

FSEs are required to keep equipment maintenance and service logs or receipts on site and provide them upon request. All grease capturing equipment must be maintained such that the combined FOG accumulation does not exceed 25 percent of the total hydraulic depth of the equipment.

E. INSPECTION AND ENFORCEMENT

SFPUC's Source Control inspection and enforcement of FSEs is driven by the identification of FOG hotspots. Inspections include the following:

- Comprehensive walk-through of the facility to determine BMP compliance.
- Full assessment of kitchen equipment and potential FOG generation.
- Inspection of GCE maintenance records.
- Enforcement actions, as necessary, and ensure follow-up within two weeks.
- Scheduled visitation from P2 to review BMPs with FSE management and staff or provide P2-generated BMP resources for FSEs if appropriate.

If the likeliest source of the FOG appears to be residential, Source Control sends a referral to the Pollution Prevention program who is responsible for distributing educational outreach material.

F. IDENTIFICATION OF FOG "HOTSPOTS"

A hotspot is defined as a lateral(s) and or sewer main(s) with reported and/or documented FOG issues; this can be one asset, or when the source of FOG is unclear, a group of assets in close proximity to one another (i.e. within the same block). Hotspots are identified by the following criteria:

- Any assets in connection with an FSE that has experienced a FOG-related overflow within the last year.
- Any asset that has experienced two or more FOG-related overflows within the past two years.
- Other FOG-impacted assets that are referred to the FOG Program.

G. SOURCE CONTROL

Inspection, enforcement, and education and outreach are the means for FOG source control.

ELEMENT 8: SYSTEM EVALUATION AND CAPACITY ASSURANCE

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.
- 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 of the Order.

A. EVALUATION

SFPUC's Hydrologic and Hydraulic ("H&H") Model simulates the performance of the sewer system and is used regularly for planning, system capacity design, and operational evaluation. The H&H model consists of two linked components: the urban rainfall-runoff hydrologic model and the hydraulic network conveyance model. The hydrologic model represents the surface rainfall to runoff transformation through hydrologic parameters assigned to sub-catchments. The hydraulic model includes conveyance facilities such as sewers, manholes, pumps, weirs, gates, orifices, transport/storage ("T/S") boxes, and CSD structures.

B. DESIGN CRITERIA

Combined sewer system

Pipes in the combined sewer system must be sized to convey both dry weather sanitary and wet weather combined sanitary and stormwater flows. The SPUC uses the H&H Model to identify areas of the collection system where flooding may occur in a design storm that generates 1.3 inches of rainfall over a 3-hour period, which correlates to a storm event having a 20% probability of occurring in any year based on the City's Intensity-Duration-Frequency curve. Capacity improvements are prioritized using a flood risk model based on Federal Emergency Management Agency methodologies and are designed to eliminate all surface water in the design storm where feasible.

Separate sewer system

Separate sanitary sewer systems within San Francisco are predominantly located within redevelopment sites, which are subject to the San Francisco Subdivision Code and Regulations or their subdivision-specific code and

regulations. All of the subdivision regulations require that sanitary sewer pipes meet the following flow parameters:

- Average dry weather flow depth ratio (d/D) of no greater than 0.5 and peak wet weather flow depth ratio (d/D) of no greater than 0.75

C. CAPACITY ENHANCEMENT MEASURES

Capacity enhancement needs are considered citywide and addressed in the ten-year CIP.

D. CAPITAL IMPROVEMENT SCHEDULE

Information is available in the quarterly CIP fiscal reports¹⁸.

¹⁸ <https://www.sfwater.org/index.aspx?page=757>

ELEMENT 9: MONITORING, MEASUREMENT AND PROGRAM MODIFICATIONS

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.
- e) Identify and illustrate SSO trends, including frequency, location, and volume.

A. PRIORITIZATION

The SSMP covers a broad spectrum of activities used to properly manage, operate, and maintain all parts of the sanitary sewer system, including but not limited to preventative maintenance; repair, rehabilitation and replacement; inspection and enforcement; and education and outreach.

The prioritization of these activities is determined by monitoring and measurement of issues within the collection system, such as overflows and asset failures, and the cause of these issues. Data on overflows and asset failure is captured and analyzed internally in SFPUC databases. As of July 2020 sewer overflow data is also publicly available in CIWQS.

B. MEASURE OF EFFECTIVENESS OF SSMP PROGRAMS, PREVENTATIVE MAINTENANCE & OVERFLOW TRENDS

Performance indicator information is generated on an annual basis. Primary criteria tracked are shown in the tables below. SFPUC began reporting combined sewer system overflows into the CIWQS database at the beginning of Fiscal Year 2020-2021 (July 2020); as such, this is the only reporting year with performance indicator and overflow trend data. SFPUC will continue to record and analyze this data and make SSMP program changes when applicable.

Table 9.1 Performance Indicators

	FY 20-21
Combined Sewer Overflows	21
Separate Sewer Overflows	0
Miles of Sewer CCTV	
Miles of Sewer Cleaned	
Miles of Sewer Awarded R&R	

Table 9.2 Number of Overflows by Total Volume Spilled

Size of Overflow (Gallons)	FY 20-21
Greater than or equal to 1,000	9
From 100-999	3
From 10 to 99	4
Less than 10	5

Table 9.3 Volume of Overflows

	FY 20-21
Total volume contained and returned to sewer system for treatment	40,878 gal
Total volume reaching waters of the United States	0
Total volume not contained but not reaching waters of the United States (everything else)	5,332
Total	46,210

Table 9.4 Causes of Overflows

Cause of Overflow	FY 20-21
Blockage:	
Roots	10
Grease	1
Debris - Construction	1
Debris - Rags	1
Pipe Structure Problem/Failure	6
Construction Diversion Failure	2

ELEMENT. 10: SSMP PROGRAM AUDITS

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.

B. SUMMARY

SFPUC audits and updates its SSMP on a biennial basis. A formal audit of the City's SSMP was completed in 2017 and is included in Appendix F. The next audit is scheduled to take place in 2023.

ELEMENT 11: COMMUNICATION PROGRAM

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.

COMMUNICATION PLAN

The SFPUC website provides Wastewater Enterprise information to City residents, including information on sewer inspection and cleaning¹⁹, sewer laterals²⁰, FOG control²¹, the capital improvement program²², and other key information related to SSMP programs.

Other methods of communicating any necessary sewer related information to the public include the Currents Newsletter (which is included in water/sewer bills or online), as well as communicating significant news issues to the local print media through the SFPUC Communications Division.

¹⁹ <https://sfpuc.org/construction-contracts/construction-projects/sewer-cleaning-and-repair>

²⁰ <https://sfpuc.org/learning/emergency-preparedness/sewer-laterals>

²¹ <https://sfpuc.org/construction-contracts/pretreatment-program/fats-oils-grease-fog-control>

²² <https://sfpuc.org/construction-contracts/sewer-system-improvement-program>

Appendix A - CIWQS Collection System Questionnaire and Methodology

		CSS	SSS	Notes	Source
1	SSS Category	Municipal (Public)	Municipal (Public)	CSS vs. SSS ratio: 0.6% Calculated using sewer system mileage	
2	Population	829080	5292	Total figure: 882,000	US Census data
3	Annual operation and maintenance budget	\$ 26,134,075.52	\$ 166,813.25		WWE Budget Report
4	Annual capital expenditure	\$ 112,672,800.00	\$ -	Includes figures for small and large diameter assessments and improvements and spot repair; no capital expenditures for SSS at this time	CIP Budget
5	Entry Level employees (less than 2 years)		6	0.04	Sewer Operations (Dan Whitlock) and organization chart
6	Journey Level (more than 2 years)		30	0.18	
7	Supervisory Level		4	0.02	
8	Managerial Level		3	0.02	
9	Grade I CWEA		0	0.00	
10	Grade II CWEA		2	0.01	
11	Grade III CWEA		1	0.01	
12	Grade IV CWEA		2	0.01	
13	Office of Water programs at Cal State University Certificate of Completion				
	Number of certified agency employees (Vol I)		1	0.00	Sewer Operations (Dan Whitlock)
	Number of certified agency employees (Vol II)		0	0	
14	Miles of force mains and other pressure systems?		12	1.6	SSS mileage does not include the PoFA FM COGNOS - Asset Registry Tool Report
15	Miles of gravity sewers?		947	3.9	Miles of SSS do not include OSP, not true SSS COGNOS - Asset Registry Tool Report
16	Estimated size distribution of GMs				COGNOS - Asset Registry Tool Report
	6 inches or less		1	8	
	8 inches		17	39	
	9-18 inches		53	34	
	19-36 inches		11	15	
	>36 inches		17	2	
	unknown		1	2	
	TOTAL (must equal 100)		100	100	
16	Estimated size distribution of FMs				COGNOS - Asset Registry Tool Report
	6 inches or less		4	50	
	8 inches		9	0	
	9-18 inches		27	50	
	19-36 inches		19	0	
	>36 inches		40	0	
	unknown		1	0	
	TOTAL (must equal 100)		100	100	
17	Total miles of laterals (upper and lower)		1046	2.82	
18	Which portion of laterals agency is responsible for?	Lower Laterals	Lower laterals		

19	Estimated total miles of laterals your agency is responsible for		1046	2.82		
20	Number of service lateral connections		162190	466		
21	Percentage of sewer system piping and number of pump stations that were constructed between the years of:					
21	2000- present		20	84	Gravity Mains + Force Mains	COGNOS - Asset Registry Tool Report
	1980-1999		9	8		
	1960-1979		11	1		
	1940-1959		12	2		
	1920-1939		16	1		
	1900-1919		20	0		
	Before 1900		8	0		
	unknown age		4	4		
	TOTAL		100	100		
21	2000- present		3	1		
	1980-1999		8	0		
	1960-1979		3	0		
	1940-1959		3	0		
	1920-1939		0	0		
	1900-1919		0	0		
	Before 1900		0	0		
	unknown age		5	0		
	TOTAL		22	1		
21	2000- present		0	0	Pump Stations <75K gal/d	Operations and Engineering SharePoint Manual documentation
	1980-1999		2	0		
	1960-1979		0	0		
	1940-1959		0	0		
	1920-1939		1	0		
	1900-1919		0	0		
	Before 1900		0	0		
	unknown age		0	0		
	TOTAL		3	0		
22	Estimated total miles of your sewer system not accessible for maintenance		0	0		
23	Miles of sewer system that were cleaned last year		69.16	0.1	Subtracted SSS from CSS mileage for total CSS figure	COGNOS and Sewer Operations Production Reports
24	Miles of sewer system that were inspected (e.g. CCTV) last year		58.94	0.1	Subtracted SSS from CSS mileage for total CSS figure	COGNOS and Sewer Operations Production Reports
25	Estimated Sewer System Flow characteristics					
	Average Daily Dry Weather Flow (MGD)		53.50	0.32	Ratio applied	2020 OSP and SEP Annual Reports
	Peak Daily Wet Weather Flow (MGD)		465	2.79	Ratio applied. Excludes decant	Plant maximum flow capacities (excludes North Point)
26	Where does SSS discharge to?		WDID #386013001, WDID #386009001	WDID #386013001	Since there are no true SSS in Westside, exclude OSP WDID	
27	Are there any tributary sanitary sewer systems?		no	no		

28	How many gravity mainline aerial or underground crossing of water bodies are loaded throughout the sewer systems?		0	0		
29	How many force main aerial or underground crossings of water bodies are located throughout the sewer system?		1	0		
30	How many siphons used to convey sewage are located throughout the sewer system?		0	0		

**Appendix B - SFPUC's Wastewater Enterprise
Organization Chart**

WASTEWATER ENTERPRISE ORGANIZATIONAL CHART

Division Manager

Manager / Superintendent

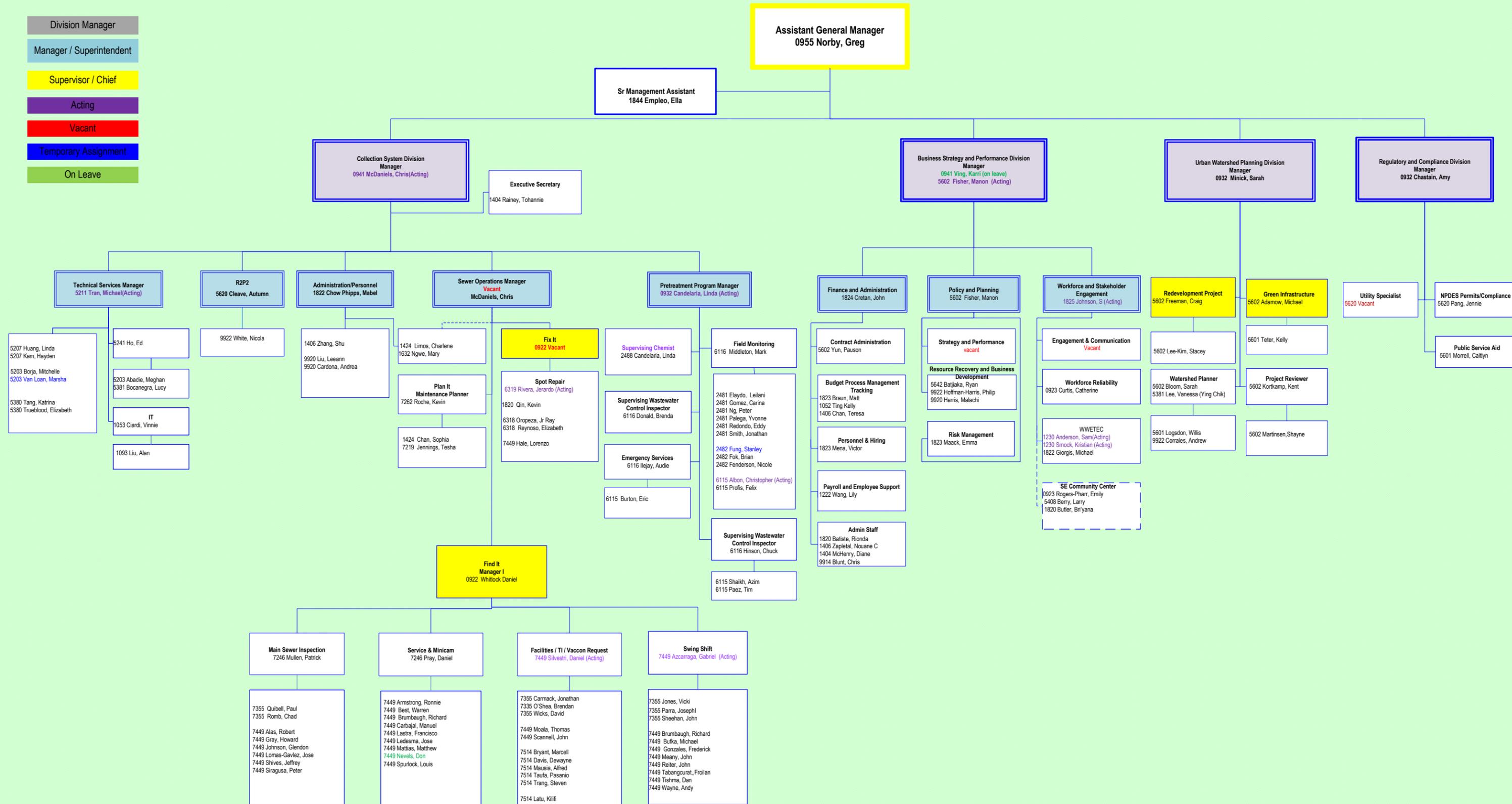
Supervisor / Chief

Acting

Vacant

Temporary Assignment

On Leave



**Appendix C - Overflow Response, Mitigation,
Documentation, and Sampling Standard Operating
Procedures**

Overflow Response, Mitigation, Documentation, and Sampling Standard Operating Procedures



Services of the San Francisco Public Utilities Commission

SOP-CSD100 / MAY 2019

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ADMINISTRATIVE

A. Introduction

1. This SOP contains the instructions and steps that SFPUC WWE employees will follow to respond to an Overflow in the Combined and Separated Systems. All work shall be performed safely in compliance with applicable standards and in a manner that minimizes adverse impacts.

B. References

1. State Water Resources Control Board Order No. 2006-003-DWQ, Statewide General Waste Discharge Requirements for Sanitary Sewer Systems.
2. State of California Water Resources Control Board Order NO. WQ 2013-0058-EXEC, Amending Monitoring and Reporting Program for Statewide General Waste Discharge Requirements for Sanitary Sewer Systems.
3. San Francisco Bay Regional Water Quality Control Board, Order No. R2-2013-0029, NPDES S No. CA0037664.
4. United States Environmental Protection Agency, Region 9, Order No. R2-2009-0062, NPDES NO. CA0037681, Waste Discharge Requirements for the City and County of San Francisco, Oceanside Water Pollution Control Plant (Southwest Outfall) and Collection System to Include the Westside Wet Weather Facility.
5. Federal Register, Part VII, Combined Sewer Overflow Control Policy Notice, April 1994.

C. Objectives

1. Upon completion of training, the employee will be aware of the steps to:
 - a. Receive an Overflow Report
 - b. Respond to an Overflow
 - c. Determine the Cause of the Overflow
 - d. Break a Blockage
 - e. Overflow Removal and Clean Up
 - f. Start Time Estimation
 - g. Eyeball Method Estimation
 - h. Measured Volume Method Estimation

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- i. Duration and Flow Method Estimation
- j. Overflow Sampling Notification
- k. CIWQS Data Entry and Certification (Designated Data Submitters and LRO only) (Includes SOCS Annual Reporting Data Generation)

D. Equipment/Personnel Required

- 1. Personnel – Response (1 Sewer Service Worker minimum)
- 2. PPE – Hard hat, gloves, safety shoes, respiratory protection, eye protection, face shield, hearing protection, safety clothing, sampling safety clothing
- 3. Equipment – Response Vehicle, Combination Truck, Harben Truck, Overflow Response Tools/Systems (e.g., berms, bags, field test kits, public warning signage)

E. Terminology

- 1. NOTE is used when information is available that can assist the Operator in accomplishing his or her task. Information is advisory in nature.
- 2. CAUTION is used when special cautions must be taken by the Operator. Failure to following prescribed steps may cause serious bodily injury, damage equipment, or violate federal/state/local/PUC regulation.
- 3. WARNING is used when special cautions must be taken by the Operator. Failure to follow prescribed steps will cause loss of life or limb and severely damage equipment.
- 4. Combined System Discharge (CSD). A CSD is an authorized discharge during a wet weather day from an approved combined sewer discharge point list in Table 2 of Order No. R2-2009-0062 and R2-2013-0029.
- 5. Sewer Overflow in the Combined System (SOCS). Any overflow, spill, release, discharge or diversion of untreated or partially treated wastewater from a **Combined Sewer System (CSS)** that is not a CSD. SOCS include:
 - a. Overflows or releases of untreated or partially treated wastewater that reach waters of the United States.
 - b. Overflows or releases of untreated or partially treated wastewater that do not reach waters of the United States.
 - c. Wastewater backups into buildings and on private property that are caused by blockages or flow conditions within the publicly owned portion of a combined storm sewer system.

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6. Sanitary Sewer Overflow (SSO). Any overflow, spill, release, discharge or diversion of untreated or partially treated wastewater from a Sanitary Sewer System. SSOs include:

- a. Overflows or releases of untreated or partially treated wastewater that reach waters of the United States.
- b. Overflows or releases of untreated or partially treated wastewater that do not reach waters of the United States.
- c. Wastewater backups into buildings and on private property that are caused by blockages or flow conditions within the publicly owned portion of a sanitary sewer system.

7. State Water Resources Control Board WDR Overflow Categories:

CATEGORIES	DEFINITIONS
1	Discharges of untreated or partially treated wastewater of any volume resulting from an enrollee’s Sanitary Sewer System failure or flow condition that: Reach surface water and/or reach a drainage channel tributary to a surface water; or Reach a municipal separate storm sewer system and are not fully captured and returned to the Sanitary Sewer System not otherwise captured and disposed of properly. Any volume of wastewater not recovered from the municipal separate Storm Sewer System is considered to have reached surface water unless the storm drain system discharges to a dedicated storm water or ground water infiltration basin (e.g., infiltration pit, percolation pond).
2	Discharge of untreated or partially treated wastewater of 1,000 gallons or greater resulting from an enrollee’s Sanitary Sewer System failure or flow condition that do not reach surface water, a drainage channel, or a municipal separate Storm Sewer System unless the entire SSO discharged to the storm drain system is fully recovered and disposed of properly.
3	All other discharges of untreated or partially treated wastewater resulting from an enrollee’s Sanitary Sewer System failure or flow condition.
Private Lateral Sewage Discharge (PLSD)	Discharges of untreated or partially treated wastewater resulting from blockages or other problems within a privately owned sewer lateral connected to the enrollee’s Sanitary Sewer System or from private sewer assets. PLSDs that the enrollee becomes aware of may be voluntarily reported to the CIWQS SSO Database.

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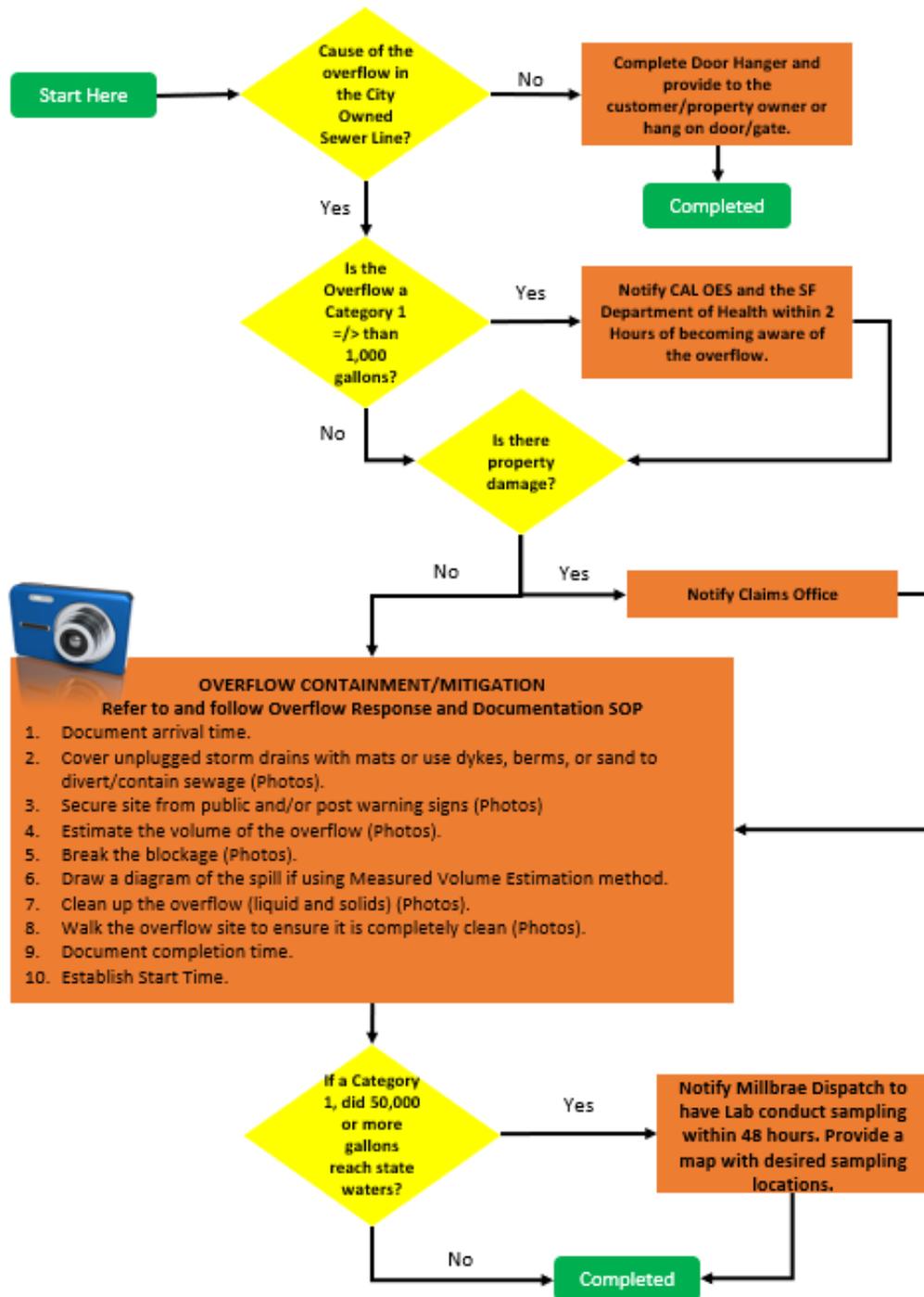
8. Sewer Overflow in the Combined System (SOCS) Overflow Categories:

CATEGORIES	DEFINITIONS
1	Discharges of untreated or partially treated wastewater of <i>any volume</i> resulting from a Combined Sewer System failure or flow condition that: Reach surface water and/or reach a drainage channel tributary to a surface water; and Does not meet the criteria for a Combined Sewer Discharge (CSD).
2	Discharges of untreated or partially treated wastewater of <i>1,000 gallons or greater</i> resulting from a Combined Sewer System failure or flow condition that <i>did not</i> reach surface water or a drainage channel.
3	<i>All other discharges</i> of untreated or partially treated resulting from a Combined Sewer System failure or flow condition.
Private Lateral Sewage Discharge (PLSD)	Discharges of untreated or partially treated wastewater resulting from blockages or other problems within a <i>privately owned sewer lateral</i> connected to the Combined Sewer System or from other private sewer assets.

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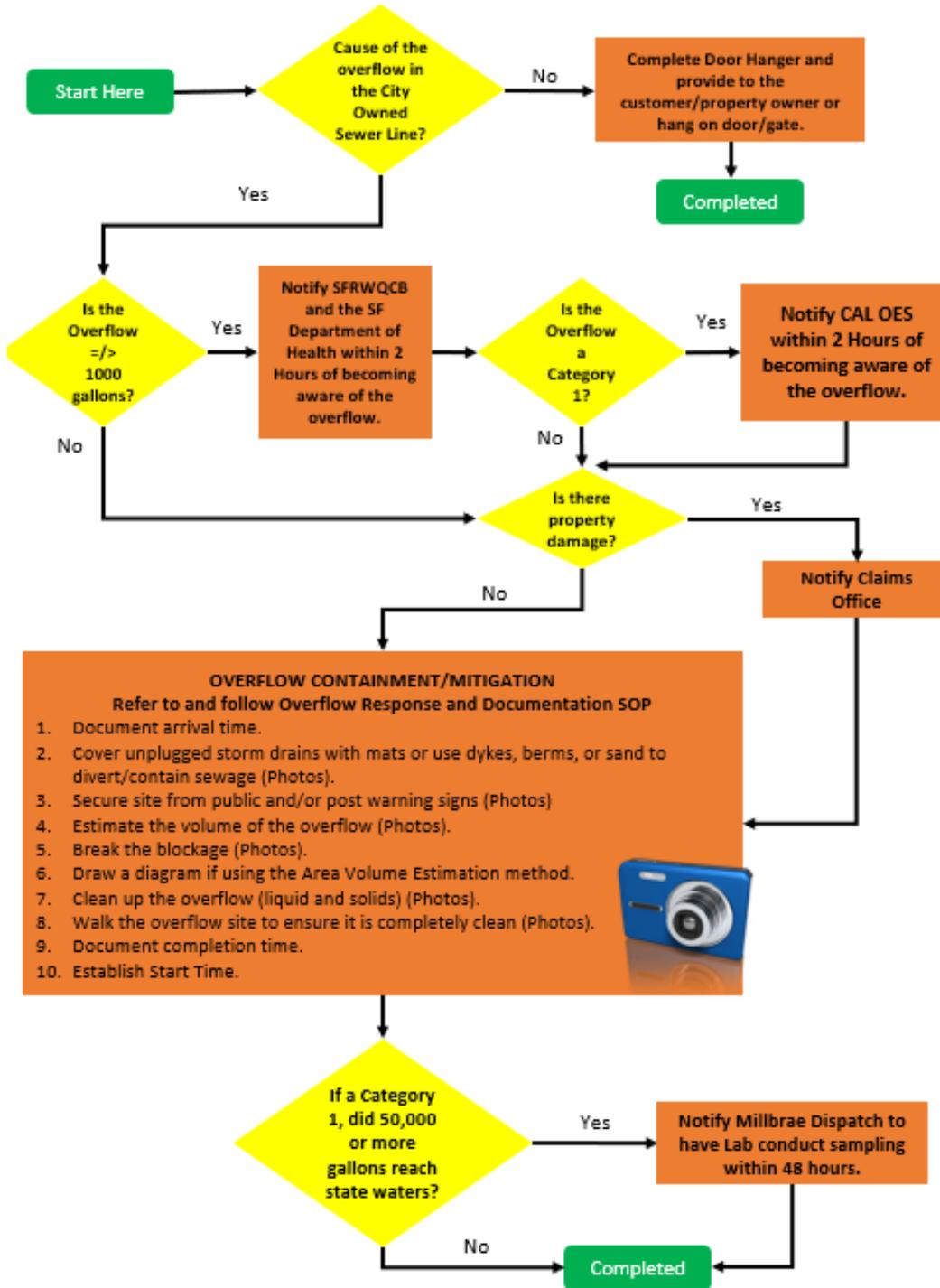
PROCEDURES

1. SSO Response and Documentation Flowchart



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2. SOCS Response and Documentation Flowchart



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3. Receiving a Report and Arriving on Scene of an Overflow

3.1 Receiving Overflow Report

Step 1: Document initial information

NOTE

Capture the following information:

- | | |
|--|--------------------------|
| - Address | - Caller Name |
| - Phone Number | - Time Call Was Received |
| - Time Worker is Dispatched | - Initial Responder Name |
| - Time caller first noticed the overflow | |

Step 2: Determine location of the overflow

- Combined or Separated System
- Overflow can affect or be located in an area where combined and separated systems overlap

Step 3: Conduct vehicle pre-trip

- Verify vehicle contains Overflow Response equipment

Step 4: Proceed to the location of the reported overflow

Step 5: Document arrival time

Step 6: Task Complete

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4. Overflow Response

NOTE

Upon arrival, immediately capture video/pictures of the event and determine the cause of the overflow. If the overflow is:

SSO/SOCS Category 1 and is/could possibly be => 1,000 gallons. Immediately notify the On-Call Supervisor and inform them that the overflow appears to be a Category 1, it is => 1,000 gallons, and to call CalOES within 2 hours and the SF DPH. The first responder will call CalOES (800-852-7550) ***if they cannot reach the On-Call Supervisor.*** Record the OES Control Number and Date/Time CalOES receives the initial report.

SOCS => 1,000 gallons and Not a Category 1, call the SF DPH and the SFRWQCB.

Refer to the SSO or SOCS overflow App or OERP packet for contact information and reporting process.

NOTE

As soon as possible, determine if assistance/additional resources are required.

4.1 Initial Response

Step 1: Start the SSO or SOCS App or OERP Packet

Step 2: Setup Traffic Control and signage

- Refer to and follow California Manual on Uniform Traffic Control Devices, Current Edition
- Traffic Control is required if vehicle or personnel are in or working near the street



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Step 3: Secure site from the public

- If public can or will come in contact with the overflow
- Post warning signs if the overflow will be a prolonged event
- Use cones, signage, and/or tape

Step 4: Take pictures including wide/panoramic shot of entire overflow

- Origin (all overflowing manholes, vents, or catch basins) of the overflow to recapture point and containment efforts
- Public access restrictions including any property damage such as flooded building(s), both affected and unaffected areas
- If there is property damage, contact the claims office

Step 5: Determine the problem causing the overflow

- If overflow is coming from a Manhole, Catch Basin, or multiple Air Inlets, refer to Section 4.3
- Regardless of where the overflow originates from, always check the main on every service call

Step 6: Determine if overflow needs to be contained

- The overflow must be contained if located in a separated system or reaches an MS4
- Call your Supervisor if containment is necessary to prevent entry into an MS4
- Determine if the downstream storm pump station should be shut down to prevent discharge to state waters
- The overflow does not need to be contained if originating from the combined system and is draining into a catch basin within the combined system
- Plug MS4 lines if necessary to contain the overflow in a separated system
- Use barricades, berms, sand bags, or PIG Spill Blockers



Step 7: Task Complete

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4.2 Overflow Debris Removal and Site Clean Up

NOTE

In the combined system, the overflow is returned or hosed down to the nearest catch basin.

In both the combined and separated systems, consider removing/replacing soil if the overflow was in a sensitive area (e.g., School, Park, etc.)

Step 1: Vacuum and/or clean to remove overflow wastewater

- Vacuum after breaking the blockage
- Including storm drains if in a combined sewer area and the overflow entered MS4



Step 2: Remove solid waste from overflow area

- Clean and remove all solid waste and material
- Clean soil last



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CAUTION

Do not use disinfectant on streets flowing to an MS4.

Step 3: Disinfect (combined system) and spray down the overflow area

- Return water to the catch basin if in a combined system area
- Keep water out of the storm drain and return to the sewer line if in a separated system area
- Do not overspray onto vehicles



Step 4: Walk the site of the overflow to ensure it is completely clean

Step 5: Take pictures of the cleaned overflow area

Step 6: Remove plugs in MS4 lines near separated systems

- If installed

Step 7: Remove public access barriers

- If necessary

Step 8: Remove traffic control devices

- If necessary

Step 9: Document completion time

Step 10: Task Complete

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4.3 Overflow at Manhole/Catch Basin/Multiple Air Inlet Overflow

NOTE

It is possible to have a stoppage on a hill and not see the high water in the Upstream Manhole or catch basin because the invert may be higher than the elevation of the spill. If the Upstream Manhole is on a hill above the Downstream Manhole, refer Section 3.4 to check for a blockage on a hill.

Step 1: Check maps and determine direction of flow

Step 2: Open and check the Upstream Manhole

- Note the flow or lack of flow
- Check whether it is holding water which would indicate a blockage downstream



Step 3: Close the Upstream Manhole

Step 4: Open and check the downstream manhole

- If the flow is the same or more than the upstream manhole, it is possibly not a SOCS/SSO, refer to and follow the Private Lateral Sewage Discharge (PLSD) SOP
- If the flow is less than the upstream manhole, it is likely a SOCS/SSO (especially on a hill), proceed to Step 5

Step 5: Call and request a Combination Truck to break the blockage and any other resources as needed

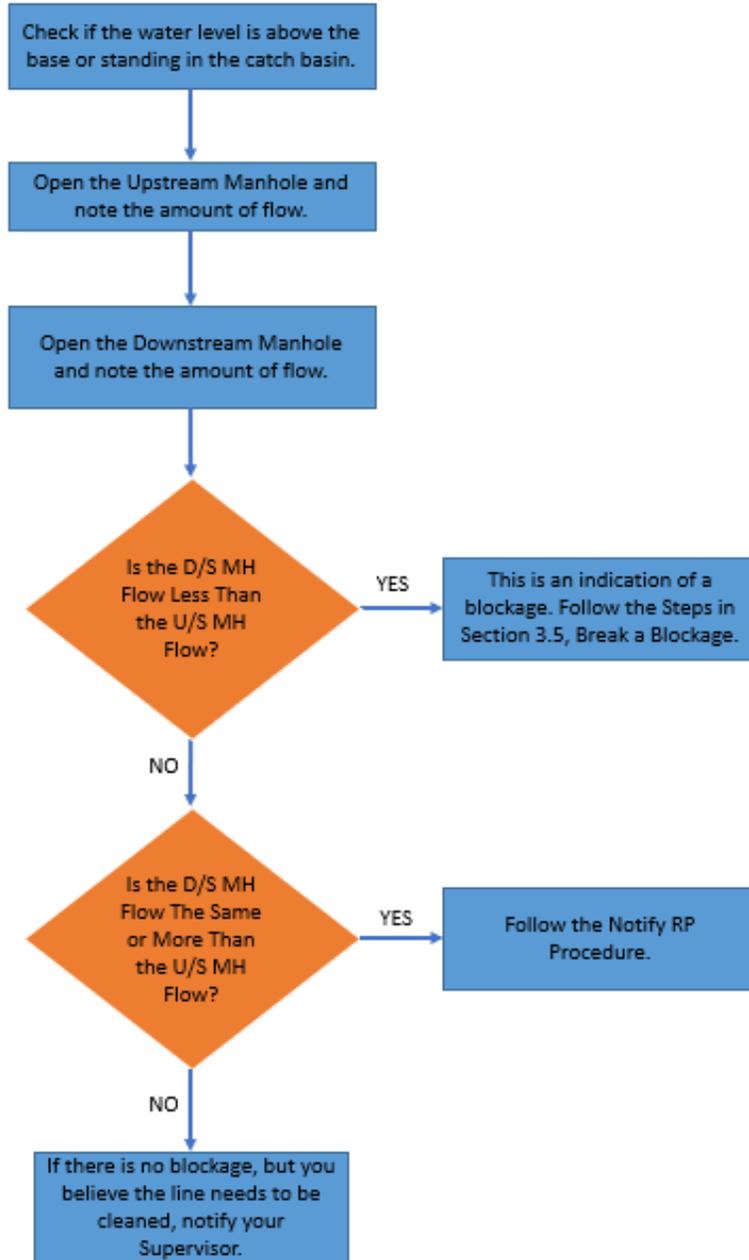
Step 6: Task Complete

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4.4 Checking for a Blockage on a Hill



San Francisco Public Utilities
Wastewater Enterprise (Collections)
Checking for a Blockage on a Hill



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4.5 Break a Blockage

Step 1: Determine the location of the blockage

- Follow the sewer line downstream and inspect consecutive manholes with sewage backed up in them until you locate the first manhole with normal or no flow. This will be the manhole the jetter will set up on.
- The stoppage will be at some point in the sewer line between the normal/no flow manhole and the next upstream manhole which has sewage backed up in it

Step 2: Setup traffic control at setup manhole

Step 3: Position the combination truck at setup manhole

Step 4: Select appropriate nozzle for breaking a stoppage

- This would be either a Pipe Wolf (6"-15"), Tadpole/Polywog with penetrator (18" – 24"), Warthog or Bulldog with penetrator



Step 5: Set footage counter to zero prior to jetting

Step 6: Begin sending the nozzle upstream until encountering the blockage

- At this point the jetter hose will usually stop and you will have some slack hose in the manhole the truck is setup on



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- Step 7: Note the footage counter reading where the stoppage is located
- Step 8: Increase the water pressure and repeatedly withdraw and pay out hose
- Until the nozzle penetrates the blockage



- Step 9: Document the time the blockage was broken/cleared
- Step 10: Stop jetting
- Wait until the backed-up sewage behind the obstruction has drained
 - This will greatly reduce the likelihood of forcing sewage up a lateral and into a building
- Step 11: Work the nozzle back and forth
- To further break up the cause of the blockage

NOTE

If using a Warthog or Bulldog, skip to Step 14.

- Step 12: Stop work and pull back to the manhole
- Step 13: Change to a cleaning nozzle
- Step 14: Clean the sewer line
- Work the cleaning nozzle back and forth in the area of the stoppage in case any material is adhering to the pipe
 - Remove solids/debris that can cause another blockage
- Step 15: Check the upstream manhole(s)
- Washdown any accumulated debris
- Step 16: Verify sewer main has a normal flow
- Step 17: Task Complete

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5. Overflow Volume Estimation

5.1 Overflow Start Time Estimation

Step 1: Determine the start time of the overflow

NOTE

The following items will help in determining start time:

- Interview caller and ask:
 - * Where did you see sewage overflow from?
 - * What time did you notice the sewage?
 - * Was there a time you did not notice sewage overflowing?
- Add additional comments made by the caller that will assist in determining start time.
- Observations from odors and sounds (e.g., water running in a normally dry creek) can be used to determine start time.
- SCADA Force Main data
- Cameras (Traffic, Residential, etc.)

Overflows that occur in right-of-way are usually observed and reported promptly. Overflows that occur out of the public view can go on longer before detection.

Conditions at the Overflow site change over time.

- Initially there will be limited deposits of toilet paper and other sewage solids.
- After a few hours, paper and solids start to build up.
- After a day or two the sewage solids form a light-colored residue.
- After a week or more, the sewage can become septic and stain the concrete black.
- The quantity of toilet paper and other materials of sewage origin increase over time.

Step 2: Complete the start time determination worksheet or field app

Step 3: Document start time in the App or OERP packet

- Include information on how this time was determined

Step 4: Task Complete

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5.2 Determine Estimation Method

NOTE

Determine the method to conduct volume estimation.

- If the entire overflow can be seen, use the Eyeball or Measured Volume methods.
- If the entire overflow is completely contained, use Measured Volume method.
- If some of the overflow was not captured, use one of the three Flow Rate Duration methods.
- If the overflow is from a Force Main or Pump Station, use SCADA data.
- During rain events (does not include NPDES wet weather events), use flow modeling data and rain gauge data.

5.3 Eyeball Estimate Method

NOTE

This method is useful for contained Overflows up to approximately 100 gallons. Do not use this method if the Overflow appears to be more than four (4) drums.

Step 1: Imagine the amount of water that would spill from a bucket or a barrel.

- A bucket contains 5 gallons and a drum contains 55 gallons.

Step 2: If the Overflow is larger than 55 gallons, try to break the standing water into drums

- Multiply this drum estimation by 55 gallons

Size of bucket(s) or barrel(s)	How many of this Size?	Multiplier	Total Volume Estimated
1 gal. water jug		X 1	
5 gal. bucket		X 5	
32 gal. trash can		X 32	
55 gal drum		X 55	
Total Volume Estimated Using Eyeball Method			

Step 3: Task Complete

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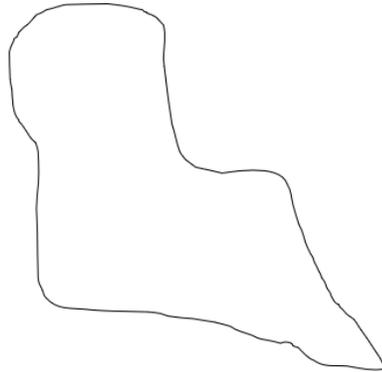
5.4 Measured Volume Method

NOTE

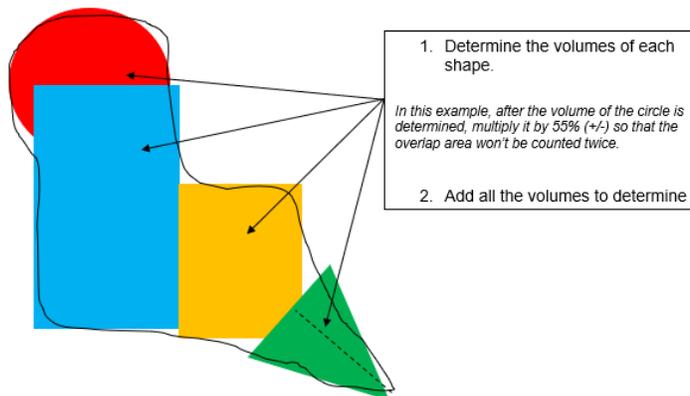
The volume of most small Overflows that have been contained can be estimated using this method. The shape, dimensions, and the depth of the contained wastewater are needed. The shape and dimensions are used to calculate the area of the Overflows and the depths is used to calculate volume.

- Step 1: Determine the overflow surface area(s)
- Asphalt, Concrete, Dirt, Landscape, etc.

Step 2: Sketch the shape of the contained sewage



Step 3: Develop the geometric shapes within the overflow shape

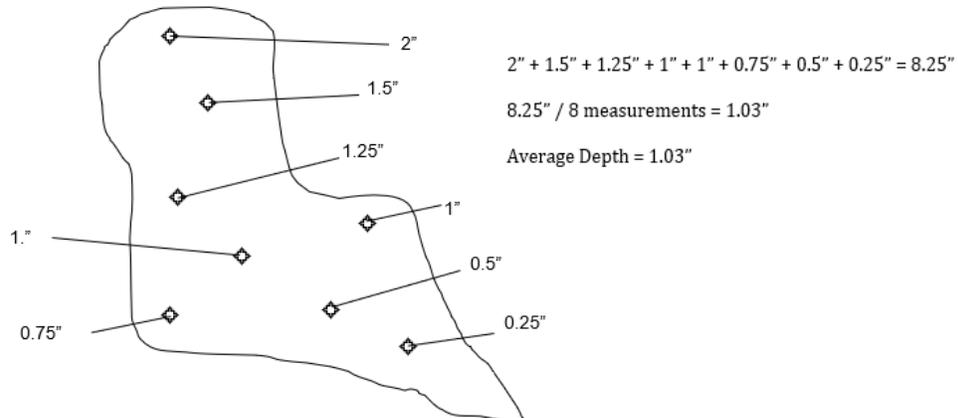


- Step 4: Take a picture of the overflow area
- Step 5: Measure or pace off the dimensions
- Step 6: Measure the depth at several locations and select an average

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Step 7: Convert the dimensions, including depth, to feet

- The following graphic is for hard surfaces
- Refer to Overflow training for estimated unimproved areas such as a field or dirt parking lot



NOTE

Wet Stain on a Concrete Surface - For a stain on concrete, use 0.0026'. This number is 1/32" converted to feet. For a stain on asphalt use 0.0013' (1/64").
 Sewage "Ponding" or Contained – Measure actual depth of standing sewage whenever possible. When depth varies, measure several (representative) points, determine the average and use that number in your formula to determine volume.

Step 8: Calculate the area in square feet using the following formulas

NOTE

Rectangle: Area = length (feet) x width (feet)
 Circle: Area = radius (feet) x radius (feet) x 3.14
 Triangle: Area = base (feet) x height (feet) x 0.5

Step 9: Multiply the area (square feet) times the average depth (in feet) to obtain the volume in cubic feet

Step 10: Multiply the volume in cubic feet by 7.48 to convert it to gallons

Step 11: Document the volume estimate

Step 12: Retain the drawing(s) and photo(s) with any calculations

- To include in any report

Step 13: Task Complete

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5.5 Duration and Flow Rate Method

NOTE

Calculating the volume of larger Overflows, where it is difficult or impossible to measure the area and depth, requires a different approach. In this method, the separate estimates are made of the duration of the Overflow and the flow rate.

The duration is the elapsed time from the time the Overflow started to the time the flow was restored.

NOTE

The flow rate is the average flow that has left the sewer system during the time of the Overflow.

There are three ways to estimate the flow rate:

1. Use of the WWE Flow Rate Estimating Tool. *See Appendix A for examples of different flow rates.* These pictures show water flowing from a manhole cover. The first responder shall select the appropriate flow rate from the tool. Photographs/videos must be taken of the actual overflowing manhole(s), air inlet(s), and drain inlet(s) for inclusion in any reports.
2. Counting Connections. Once the location of the Overflow is known, the number of upstream connections can be determined from the sewer maps. Multiply the number of connections from the engineering specifications. This works only in the upper end of the system in residential areas. Use the duration pattern worksheet.

Effective date: May 2019	OVERFLOW RESPONSE, MITIGATION, DOCUMENTATION, SAMPLING, AND REPORTING	SOP-CS100
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NOTE

The following example is given to estimate Overflow volume:

Once the duration and flow rate have been estimated, the volume of the Overflow is the product of the duration in hours or days, and the flow rate in gallons per hour or gallons per day.

Overflow Start Time = 1123

Overflow End Time = 1435

Overflow Duration = 3 hours and 12 minutes

Overflow Duration in Minutes (3 X 60 = 180) 180 minutes plus 12 minutes

3.3GPM X 192Min = 633.6 Gallons (Round up to the nearest whole gallon, in this case 634 Gallons)

Step 1: Establish flow rate

Step 2: Take photographs to document the observations

- They can be helpful if questions arise later in the process

NOTE

It is important to remember that Overflows may not be continuous. Blockages are not usually complete (some flow continues). In this case the Overflow would occur during the peak flow periods (typically 0800 to 2000 each day).

Step 3: Establish end time

- Field crews on-site observe the “blow down” that occurs when the blockage has been removed.
- The “blow down” can also be observed in downstream flow meters, if installed

Start Date and Time	1.
End Date and time	2.
Total time elapsed of SSO event (subtract line 1 from line 2. Show time in minutes)	3.
Average flow rate GPM (account for diurnal pattern)	4.
Total volume estimate using duration and flow rate method (Line 3 x Line 4)	5.

Step 4: Task complete

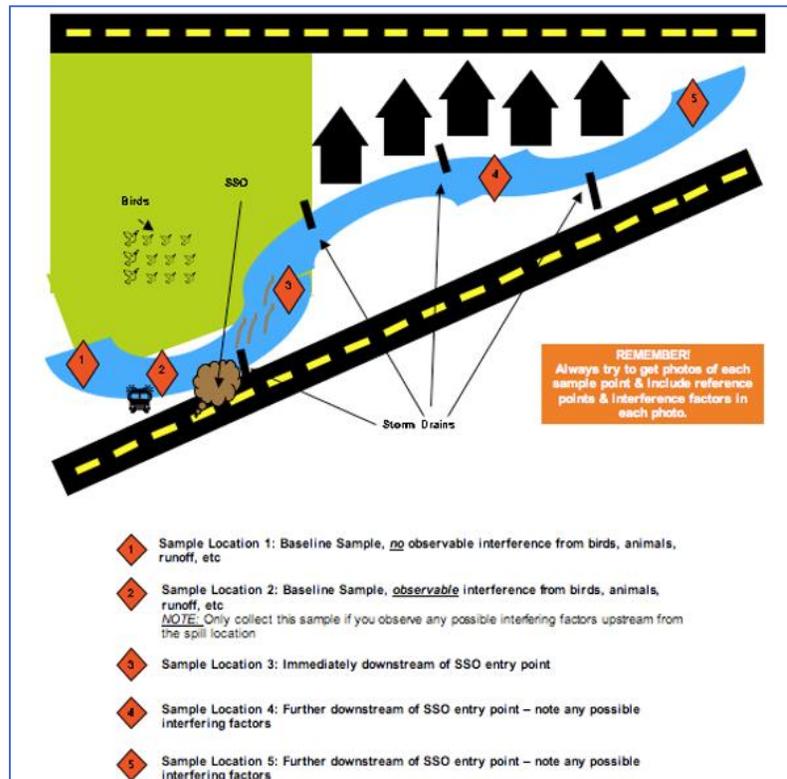
Effective date: May 2019	OVERFLOW RESPONSE, MITIGATION, DOCUMENTATION, SAMPLING, AND REPORTING	SOP-CS100
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5.6 Sampling Notification

NOTE

Sampling is *required* if the SOCS or SSO is a Category 1 and is equal to or greater than 50,000 gallons. Water Quality Monitoring

- Step 1: Contact the 24 Hour Millbrae Dispatch (650) 872-5900 for sample collection
- Step 2: Document the call in the Overflow App or OERP Packet
- Step 3: Photograph, map and mark the sampling location
 - To assist the lab in determining sampling locations



Step 4: Task Complete

Effective date: May 2019	OVERFLOW RESPONSE, MITIGATION, DOCUMENTATION, SAMPLING, AND REPORTING	SOP-CS100
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6. Documenting an Overflow

NOTE

The App or Overflow Emergency Response Plan (OERP) packet (for either a SSO or SOCS) is filled out as the incident progresses. Data/information should be captured throughout the incident and filled in when/as time permits.

6.1 Complete the App or Overflow Emergency Response Plan Packet

Step 1: Verify all required information is captured

- App is Primary and Hardcopy OERP is the backup
- Completed as more information is obtained as the event unfolds

Step 2: Save the Report in the App or deliver the hardcopy packet to the designated Supervisor

Step 3: Task Complete

6.2 Wet Weather Overflow Estimation Support

NOTE

In the event of a wet weather overflow and estimating the total volume is not possible by field crews, support can be obtained from the Hydraulics group. If possible, provide your supervisor with the following information:

Start/Stop Time of Overflow

Manhole(s) / Catch Basin Asset Numbers

Height of the overflow from the manhole and/or catch basin

Pictures of the Overflow

Pictures of Damage

Drawing of Overflow Area

High Water Marks



Step 1: Collect information

Step 2: Provide to Supervisor

Step 3: Task Complete

Effective date: May 2019	OVERFLOW RESPONSE, MITIGATION, DOCUMENTATION, SAMPLING, AND REPORTING	SOP-CS100
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7. CIWQS Reporting and Certification

NOTE

Data Submitter and Legally Responsible Official will verify the data from the App or OERP Hardcopy, and CIWQS match **before** submitting Drafts, Ready To Certify, and Certified overflow reports.

Data Submitter and Supervisor will verify the data from the App or OERP Hardcopy match before submitting a SOCS report in accordance with the current NPDES permit.

CIWQS Clock starts upon log in. Data Submitter or LRO has 59:59 to complete each session.

Save Work-In-Progress option resets the clock.

7.1 Write/Submit SSO or SOCS Report from App or OERP Hardcopy

Step 1: Complete the applicable report

- CIWQS for SSO
- SOCS for the combined system
- Refer to San Francisco Bay Regional Water Quality Control Board Order No. R2-2013-0029, Pages 17 and 18 for SOCS report

Step 2: Save Report in CIWQS and Click Send or Save SOCS report in App

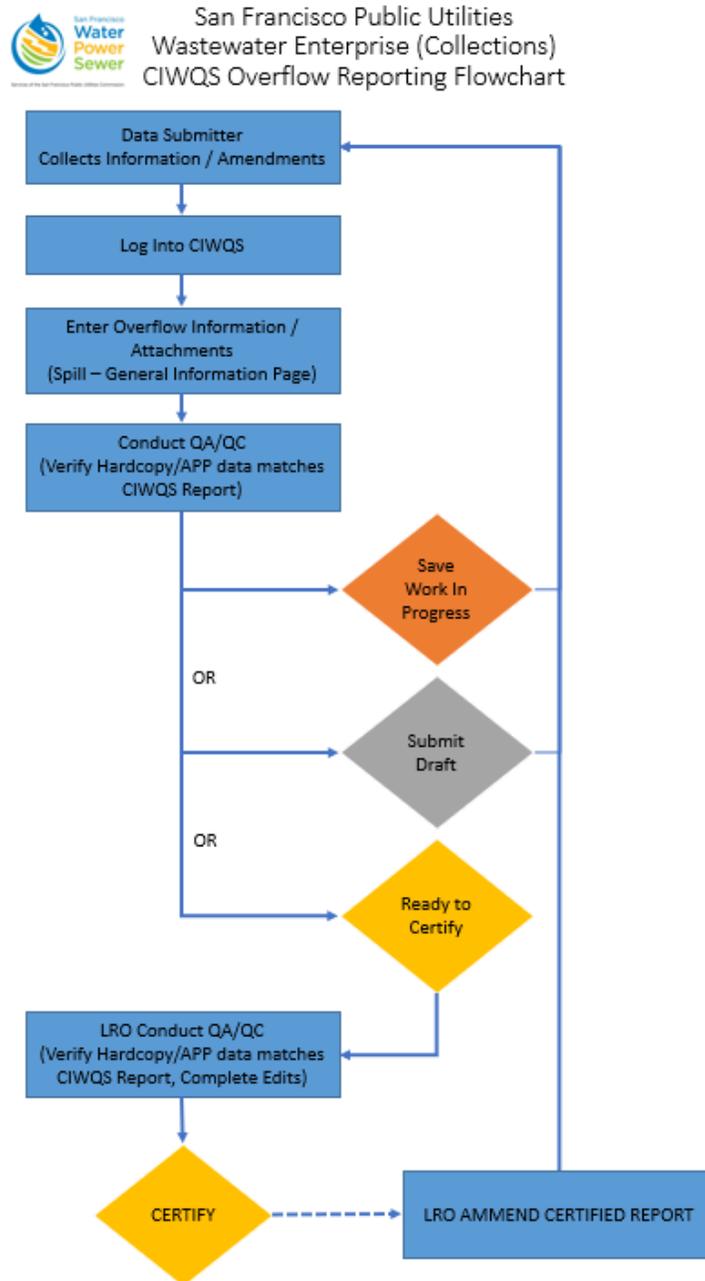
Step 3: Task Complete

Effective date: May 2019	OVERFLOW RESPONSE, MITIGATION, DOCUMENTATION, SAMPLING, AND REPORTING	SOP-CS100
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7.2 Enter CIWQS Data and Certify Report

Step 1: Complete Flow Chart steps

- Refer to and follow Enrollee's Guide to the CIWQS Data Base, State Water Resources Control Board, Section 2.3 as applicable



Step 2: Task Complete

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APPENDIX A FLOW RATE ESTIMATING TOOL (27 3/4" Lid)



1 GPM



3 GPM



5 GPM



7 GPM



10 GPM



**Bubbling From
Air Vents is Visible**

15 GPM

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20 GPM



25 GPM



30 GPM



35 GPM



40 GPM



45 GPM

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50 GPM



75 GPM



1/4" Air Vent
Bubble Height



1" Air Vent
Bubble Height



100 GPM



125 GPM



1.5 " Air Vent
Bubble Height



2" Air Vent
Bubble Height

Effective date: May 2019	OVERFLOW RESPONSE, MITIGATION, DOCUMENTATION, SAMPLING, AND REPORTING	SOP-CS100
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150 GPM



175 GPM



3" Air Vent
Bubble Height



3.5" Air Vent
Bubble Height



200 GPM



4" Air Vent
Bubble Height

Effective date: May 2019	OVERFLOW RESPONSE, MITIGATION, DOCUMENTATION, SAMPLING, AND REPORTING	SOP-CS100
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APPENDIX B SPILL CAUSE

Air Relief Valve (ARV)/Blow Off Valve (BOV) Failure
 Construction Diversion Failure
 CS Maintenance Caused Spill/Damage
 Damage by Others Not Related to CS Construction/Maintenance
 Debris from Construction
 Debris from Lateral
 Debris-General
 Debris Wipes/Non-Dispersible
 Flow Exceeded Capacity (Separate CS Only)
 Grease Deposition (FOG)
 Inappropriate Discharge to CS
 Natural Disaster
 Operator Error
 Other (Specify Below)
 Pipe Structural Problem/Failure
 Pipe Structural Problem/Failure – Installation
 Pump Station Failure – Controls
 Pump Station Failure – Mechanical
 Pump Station Failure – Power
 Rainfall Exceeded Design, I and I (Separate CS Only)
 Root Intrusion
 Siphon Failure
 Surcharged Pipe (Combined CS Only)
 Vandalism

**Appendix D - Sewer Operations SOCS Overflow
Response Packets**

Sewer Overflow in the Combined System (SOCS) Response Packet (Version 14)

- A SOCS Category 1 \geq 1000 gallons, immediately contact the following within 2 hours:
 - CALOES (800) 852-7550
 - SFDPH ((415) 215-0805

- If this SOCS is equal to or greater than 1,000 gallons, immediately contact the SF Regional Water Quality Control Board: (510) 622-2369 and the SF Department of Public Health: (415) 215-0805

- For Water Sampling:** Millbrae Dispatch (650) 872-5900

- For any media inquiries/requests:** Contact your Supervisor or Manager

SEWER SERVICE WORKER:

- Open this envelope.

- Follow the instructions on the Overflow Response Flowchart.

- Complete the chain of custody record (to the right) and deliver this package to the SOCS inbox located outside of the designated Supervisors office.

CHAIN OF CUSTODY:

Print Name:

Initial: _____

Date: _____

Time: _____

SEWER REPAIR SUPERVISOR:

- Open this envelope and review forms. Contact the Sewer Service Worker if needed to obtain additional information.

- Complete NPDES SOCS report.

- File this package.

CHAIN OF CUSTODY:

Print Name:

Phone #:

Initial: _____

Date: _____

Time: _____

Sewer Overflow in the Combined System (SOCS)
Regulatory Reporting Guide

Reporting Instructions

Deadline	<u>See reverse side for contact information and definitions of the overflow categories.</u>		
	Category 1	Category 2	Category 3
2 Hours after awareness of an Overflow	<p>If SOCS is equal to or greater than 1,000 gallons, call the San Francisco Regional Water Quality Control Board (SFRWQCB) and SF Department of Public Health.</p> <p>A SOCS Category 1 of any volume, call CAL-OES and SFDPH.</p>	<p>If SOCS is equal to or greater than 1,000 gallons, call the San Francisco Regional Water Quality Control Board (SFRWQCB) and SF Department of Public Health.</p>	-
As soon as possible	<p>If SOCS impacts private property that may be a failure of the sewer main and/or if a claim for damages may be submitted against the city, notify the Claims Office.</p>		
48 after awareness of an Overflow	<p>If 50,000 gallons or more were not recovered, begin water quality sampling.</p>	-	-
3 Business Days after awareness of an Overflow	<p>Submit draft SOCS report.</p>	<p>Submit draft SOCS report.</p>	-
15 Days after response conclusion	<p>Certify SOCS report in accordance with NPDES. Update as needed.</p>	<p>Certify SOCS report in accordance with NPDES. Update as needed.</p>	-
30 Days after end of calendar month in with Overflow occurred.			<p>Certify spill report. Update as needed.</p>

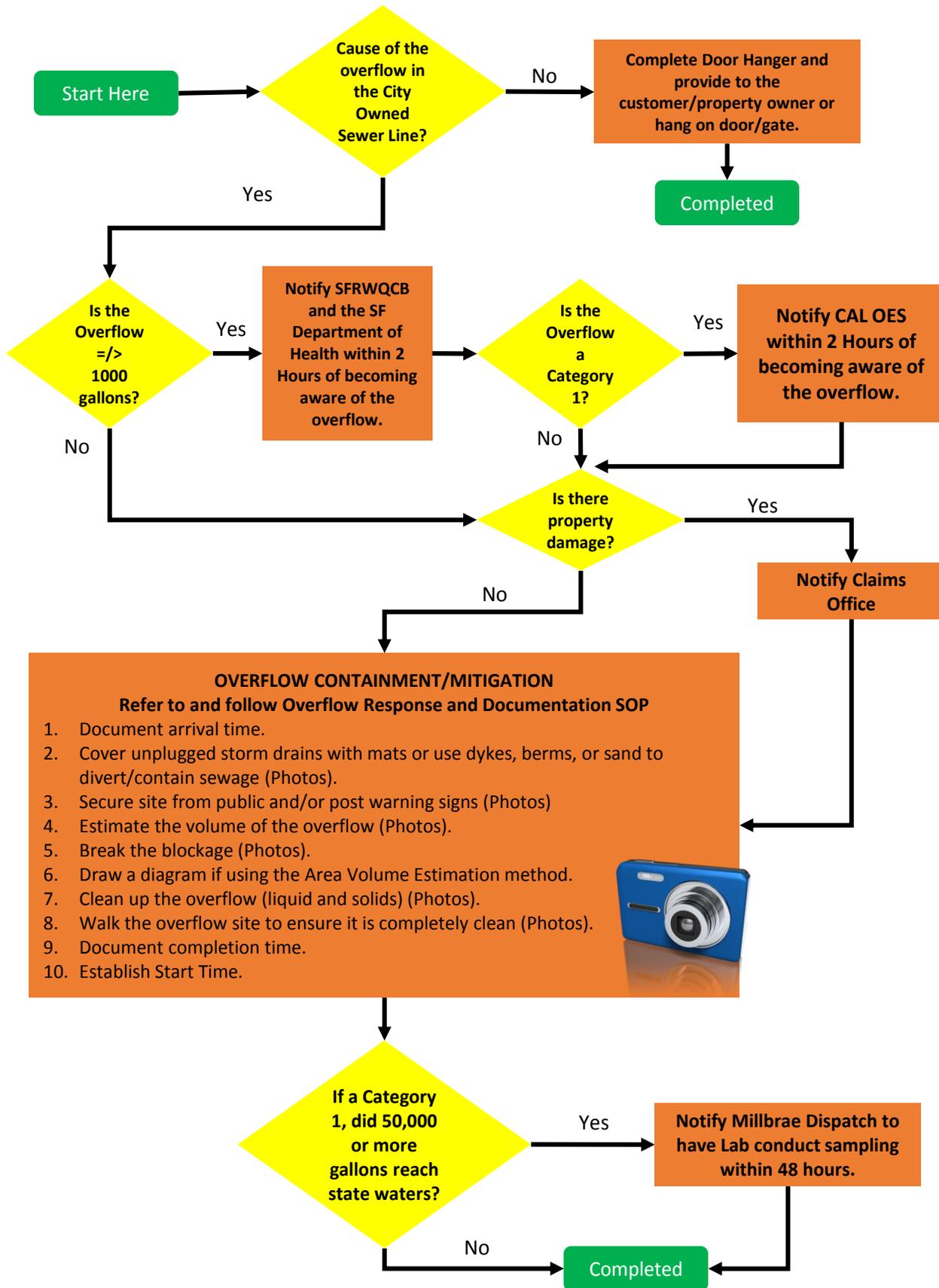
SOCS Regulatory Reporting Guide

CONTACT INFORMATION

CAL OES	(800) 852-7550
SF Department of Public Health	(415) 215-0805
Claims Office (Refer to current City Attorney Investigator On-Call List after work hours)	Theresa Lacson-Kuan M-F 8AM-5PM (925) 285-6416
Millbrae Dispatch (Water Quality Sampling)	Natural Resources Land Management Division (NRLMD) (650) 872-5900
San Francisco Regional Water Quality Control Board (SFRWQCB)	Phone: (510) 622-2369 Fax: (510) 622-2460
State Water Resources Control Board	(916) 341-5586

CATEGORIES	DEFINITIONS
1	Discharges of untreated or partially treated wastewater of <u>any volume</u> resulting from a Combined Sewer System failure or flow condition that: Reach surface water and/or reach a drainage channel tributary to a surface water; and Does not meet the criteria for a Combined Sewer Discharge (CSD).
2	Discharges of untreated or partially treated wastewater of <u>1,000 gallons or greater</u> resulting from a Combined Sewer System failure or flow condition that <u>did not</u> reach surface water or a drainage channel.
3	<u>All other discharges</u> of untreated or partially treated resulting from a Combined Sewer System failure or flow condition.
Private Lateral Sewage Discharge (PLSD)	Discharges of untreated or partially treated wastewater resulting from blockages or other problems within a <u>privately owned sewer lateral</u> connected to the Combined Sewer System or from other private sewer assets.

Sewer Overflow in the Combined System (SOCS) Flowchart



SFPUC: Overflow Emergency Response Plan**Sewer Overflow in the Combined System (SOCS)
Notifications****C-1****NOTIFICATIONS****CAL OES (800) 852-7550**

Notification Date/Time:

Name of Who You Spoke To:

OES Control Number:

SF Regional Water Quality Control Board (510) 622-2369

Notification Date/Time:

Name of Whom You Spoke To: Left Message: **SF Department of Health (415) 215-0805**

Notification Date/Time:

Name of Whom You Spoke To: Left Message: **Millbrae Lab (650) 872-5900**

Notification Date/Time:

Name of Whom You Spoke To: Left Message: **Claims Office (During Work Hours:(925) 285-6416) On Call List After Work Hours**

Notification Date/Time:

Name of Whom You Spoke To: Left Message:

SFPUC: Overflow Emergency Response Plan

D-1

**Sewer Overflow in the Combined System (SOCS)
Location and Volume by Destination**

MAXIMO WORK ORDER #: _____

SOCS FIELD REPORT

PHYSICAL LOCATION DETAILS

Spill Location Name

Latitude of spill location

Longitude of spill location

County

San Francisco

Regional Water Quality Control Board

Region 2 – San Francisco Bay

VOLUMES BY DESTINATION

Volume Spilled
(Gallons)

Volume Recovered
(Gallons)

2.a/2.b Estimated spill volume that reached a separate storm drain that flows to a surface body of water? (If not all recovered, this is a Category 1)

2.c/2d Estimated spill volume that directly reached a drainage channel that flows to a surface water body? (Any volume spilled is a Category 1)

2.e/2.f Estimated spill volume discharged directly to a surface water body? (Any volume spilled is a Category 1)

2.g/2.h 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).
(Includes discharges to Combined System).

Volume Spilled

Volume Recovered

Total Volume Spilled (Verify this matches the volume reported in the SOCS annual report)

SFPUC: Overflow Emergency Response Plan

D-2

**Sewer Overflow in the Combine System (SOCS)
Location, Appearance Points, and Destination**

SOCS FIELD REPORT

Spill location description.

Number of appearance points.

Spill appearance points. (Circle all that apply) Catch Basin Backflow Prevention Device
Force Main Gravity Mainline Inside Building/Structure Lateral Clean Out (Private / Public)
Lower Lateral (Private / Public) Manhole Pump Station Upper Lateral (Private / Public)
Other Sewer System Structure

Spill appearance point explanation. (Enter information here if "Other" or multiple appearance points were selected):

Final spill destination. (Circle all that apply). Beach Building/Structure
Combined Storm Drain Drainage Channel Other (Specify Below) Paved Surface
Separate Storm Drain Street/Curb and Gutter Surface Water Unpaved Surface

Explanation of final spill destination. (Enter information if "Other" was selected.

SFPUC: Overflow Emergency Response Plan

**Sewer Overflow in the Combined System (SOCS)
Time Milestones**

D-3

DATE/TIME DETERMINATIONS

	DATE	TIME
Estimated Spill Start Date/Time		
SFPUC Notified Date/Time		
Estimated Operator Arrival Date/Time		
Estimated Spill End Date/Time		
Spill Response Completion Date/Time		

USE START/END TIME WORKSHEET (WS-1)

Sewer Overflow in the Combine System Cause

SOCS FIELD REPORT

Spill cause: (Circle One)

Air Relief Valve (ARV)/Blow Off Valve (BOV) Failure

Construction Diversion Failure

CS Maintenance Caused Spill/Damage

Damage by Others Not Related to CS Construction/Maintenance (Specify Below)

Debris from Construction

Debris from Lateral

Debris-General

Debris-Rags

Debris Wipes/Non-Dispersible

Flow Exceeded Capacity (Separate CS Only)

Grease Deposition (FOG)

Inappropriate Discharge to CS

Natural Disaster

Operator Error

Other (Specify Below)

Pipe Structural Problem/Failure

Pipe Structural Problem/Failure – Installation

Pump Station Failure – Controls

Pump Station Failure – Mechanical

Pump Station Failure – Power

Rainfall Exceeded Design, I and I (Separate CS Only)

Root Intrusion

Siphon Failure

Surcharged Pipe (Combined CS Only)

Vandalism

Spill cause explanation: (Required if Spill Cause is "Other")

SFPUC: Overflow Emergency Response Plan

D-5

**Sewer Overflow in the Combined System (SOCS)
Failures, Association, Asset, and Response Activities**

SOCS FIELD REPORT

Where did failure occur?

Air Relief Valve (ARV)/Blow Off Valve (BOV) Failure Force Main Gravity Mainline
Lower Lateral (Public) Manhole Other (Specify Below) Pump Station Failure – Controls
Pump Station Failure – Mechanical Pump Station Failure – Power
Siphon Upper Lateral (Public)

Explanation of where failure occurred: (Required if Where Failure Occurred is “Other”)

Was Spill associated with a storm event?

YES

NO

Diameter of sewer pipe at the point of blockage or failure.

Inches

Material of sewer pipe at the point of blockage or failure.

Estimated age of sewer asset at the point of blockage or failure (if applicable):

YEARS

Spill Response Activities. (Circle all that apply) Cleaned-Up Mitigated Effects of Spill
Contained All or Portion of Spill Other (Specify Below) Restored Flow
Returned All Spoil to Sanitary Sewer System Property Owner Notified
Other Enforcement Agency Notified

Explanation of spill response activities: (Required if spill response activities is “Other”)

SFPUC: Overflow Emergency Response Plan**D-6****Sewer Overflow in the Combined System (SOCS)
Failures, Association, Asset, and Response Activities****SOCS FIELD REPORT**

Spill corrective action taken: (Circle all that apply)

- Added Sewer To Preventive Maintenance Program
- Adjusted Schedule/Method of Preventive Maintenance
- Enforcement Action Against FOG Source
- Inspected Sewer Using CCTV to Determine Cause
- Other (Specify Below)
- Plan Rehabilitation or Replacement of Sewer
- Repaired Facilities or Replaced Defect

Explanation of corrective action taken: (Required if spill corrective action is "Other")

Is there an ongoing investigation?

YES

NO

Health warnings posted?

YES

NO

Did spill result in beach closure

YES

NO

Name of Impacted Beach(es): (Enter N/A if none)

Name of impacted surface waters:

Sewer Overflow in the Combined System (SOCS)
Failures, Association, Asset, and Response Activities

SSO FIELD REPORT

Water quality samples analyzed for: (Circle all that apply)

- Dissolved Oxygen
- Other Chemical Indicators(s) – Specify Below
- Biological Indicator(s) – Specify Below
- No Water Quality Samples Taken
- Not Applicable to the Spill
- Other (Specify Below)

Explanation of water quality samples analyzed for: (Required if water quality samples analyzed for is "Other chemical indicator(s)", "Biological indicator(s)", or "Other")

Water quality sample results reported to: (Circle all that apply) County Health Agency
Regional Water Quality Control Board Other (Specify Below) No Water Quality Samples Taken
Not Applicable to this Spill

Explanation of water quality sample results reported to: (Required if water quality sample results reported to is "Other")

Method and explanation of volume estimation methods used: (Circle all that apply)
Eyeball Estimate Measured Volume Duration and Flow Rate
PUC Overflow Flow Rate Estimating Tool
Other (Explain): _____

Sewer Overflow in the Combined System (SOCS) Estimation Method Calculations

Start Time Determination/Notes

Caller Interview: Where did you see sewage spill from? Manhole [] Inside Building []
Vent/Clean Out [] Catch Basin [] Wet Well/Lift Station [] Other _____

Comments: _____

Last Time Caller Observed NO Spill occurring: _____ AM / PM Date ____ / ____ / ____

Comments: _____

If the volume of the SOCS and rate of flow are known, divide volume by rate of flow to get duration of SOCS event.
_____ Gallons ÷ _____ GPM = _____ Minutes (SOCS Duration). Subtract the Duration from the SOCS End Date/Time to establish the SOCS Start Date/Time.

Other Efforts to Determine Start Time: _____

Other Comments Regarding Spill Start Time: _____

Estimated SOCS Start Time: _____ AM / PM Date: ____ / ____ / ____

SOCS End Time: _____ AM / PM Date: ____ / ____ / ____



SFPUC: Overflow Emergency Response Plan

WS-2

**Sewer Overflow in the Combined System (SOCS)
Estimation Method Calculations**

Eyeball Estimate Method: Imagine a bucket(s) or barrel(s) of water tipped over.

Size of bucket(s) or barrel(s)	How many of this size?	Multiplier	Total Volume Estimated
1 Gallon Water Jug		X 1	
5 Gallon Bucket		X 5	
32 Gallon Trash Can		X 32	
55 Gallon Drum		X 55	
Total Volume Estimated Using Eyeball Method			

Measured Volume Method: This may take several calculations as you may have to break down the Odd shaped spill to rectangles, circles, and polygons. It is important that, if possible, measure depth in several locations and use an average depth. Use the SOCS Volume Estimate by Area Work Sheet to Sketch the shapes and show your work.

Duration and Flow Rate Method:

Start Date and Time	1.
End Date and Time	2.
SOCS Event Total Time Elapsed (Subtract Line 1 from Line 2. Show in minutes)	3.
Average Flow Rate GPM (Account for diurnal flow pattern)	4.
Total Volume Estimated Using Duration and Flow Method (Line 3 x Line 4)	5.

See SFPUC WWE Overflow Response, Mitigation, Documentation, and Reporting SOP, Appendix A for examples of manhole flow rates from a 27 ¾" lid.

SOCS Measured Volume Estimation Method Calculations
(27 ¾" Manhole Cover Flow Rates)



1 GPM



3 GPM



5 GPM



7 GPM



10 GPM



15 GPM

SOCS Measured Volume Estimation Method Calculations
(27 ¾" Manhole Cover Flow Rates)



20 GPM



25 GPM



30 GPM



35 GPM



40 GPM



45 GPM

SOCS Measured Volume Estimation Method Calculations
(27 ¾" Manhole Cover Flow Rates)



50 GPM



1/4" Air Vent
Bubble Height



75 GPM



1" Air Vent
Bubble Height



100 GPM



1.5" Air Vent
Bubble Height



125 GPM



2" Air Vent
Bubble Height

SOCS Measured Volume Estimation Method Calculations
(27 ¾" Manhole Cover Flow Rates)



150 GPM



175 GPM



3" Air Vent
Bubble Height



3.5" Air Vent
Bubble Height



200 GPM



4" Air Vent
Bubble Height

Sewer Overflow in the Combined System (SOCS)
Containment

SPILL CONTAINMENT

Containment Implemented: _____ AM PM

Date: _____ / _____ / _____

Containment Measures: Plugged Storm Drain(s) Washed Down
Vacuum Up Sewage Other Measures: _____

Comments: _____

TAKE PHOTOS OF CONTAINMENTS EFFORTS/OUTCOMES



Sewer Overflow in the Combined System (SOCS)
Clean Up, Milestones, and Reporting

CLEAN UP

Clean Up Begin: _____ AM PM Date: _____ / _____ / _____

Clean Up Complete: _____ AM PM Date: _____ / _____ / _____

Describe Clean Up Operations: _____



OTHER IMPORTANT MILESTONES

Contacted Supervisor: _____ AM PM Date: _____ / _____ / _____

Requested Additional EE's/Equip: _____ AM PM Date: _____ / _____ / _____

Requested Additional EE's/Equip: _____ AM PM Date: _____ / _____ / _____

Requested Additional EE's/Equip: _____ AM PM Date: _____ / _____ / _____

_____: _____ AM PM Date: _____ / _____ / _____



CAUSE OF SPILL

Spill Cause: Roots Grease Debris Vandalism Pump/Lift Sta Failure Other: _____

Spill Caused to be determined by CCTV inspection. (Attach TV Report to this form)

Final Cause Determination: _____



Proper Operation and Maintenance Determination:

Date Last Cleaned: _____ Date Last TV'd: _____ Date Last Replaced/Rehabilitated: _____

Follow-up or Corrective Action Taken: _____



CONVERSIONS

** To convert inches into feet: Divide the inches by 12.

Example: $27'' / 12 = 2.25'$

Or Use Chart A

Example: $1 \frac{3}{4}'' = ?$

$$1'' (0.08') + \frac{3}{4}'' (0.06') = \underline{0.14'}$$

** One Cubic Foot = 7.48 gallons of liquid.

Chart A

Conversion:

Inches to Feet

Wet Asphalt	=	.0013
Wet Concrete	=	.0026
1/8"	=	0.01'
1/4"	=	0.02'
3/8"	=	0.03'
1/2"	=	0.04'
5/8"	=	0.05'
3/4"	=	0.06'
7/8"	=	0.07'
1"	=	0.08'
2"	=	0.17'
3"	=	0.25'
4"	=	0.33'
5"	=	0.42'
6"	=	0.50'
7"	=	0.58'
8"	=	0.67'
9"	=	0.75'

GEOMETRY

For the purposes of this work sheet, the unit of measurement will be in feet for formula examples.

Area is two-dimensional - represented in square feet. (Length x Width)

Volume is three-dimensional - represented in cubic feet. (Length x Width x depth) or (Diameter Squared) $D^2 \times 0.785 \times \text{depth}$.

A Note about Depth

Wet Stain on a Concrete Surface - For a stain on concrete, use 0.0026'. This number is 1/32" converted to feet. For a stain on asphalt use 0.0013' (1/64"). These were determined to be a reasonable depth to use on the respective surfaces through a process of trial and error by SPUC staff. A known amount of water (one gallon) was poured onto both asphalt and concrete surfaces. Once the Area was determined as accurately as possible, different depths were used to determine the volume of the wetted footprint until the formula produced a result that (closely) matched the one gallon spilled. 1/32" was the most consistently accurate depth on concrete and 1/64" for asphalt. This process was repeated several times.

Sewage "Ponding" or Contained – Measure actual depth of standing sewage whenever possible. When depth varies, measure several (representative) points, determine the average and use that number in your formula to determine volume.

Area/Volume Formulas

Area is two dimensional and is represented as Square Feet (SQ/FT)

Volume is three dimensional and is represented as Cubic Feet (CU/FT)

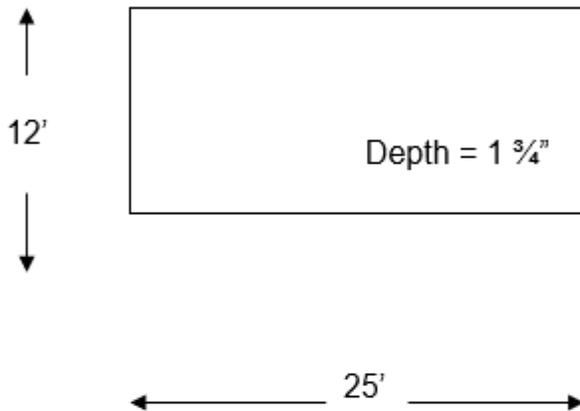
One Cubic Foot = 7.48 gallons

Sewer Overflow in the Combined System (SOCS)
Volume by Area Estimation Worksheet

WS-8

AREA/VOLUME OF A RECTANGLE OR SQUARE

Formula: **Length x Width x Depth** = Volume in Cubic Feet



Length (25') x Width (12') x Depth (0.14')

$25' \times 12' \times 0.14' = 42$ Cubic Feet.

Now the Volume in Cubic Feet is known.

There are 7.48 Gallons in one Cubic Foot

Chart A

Conversion:

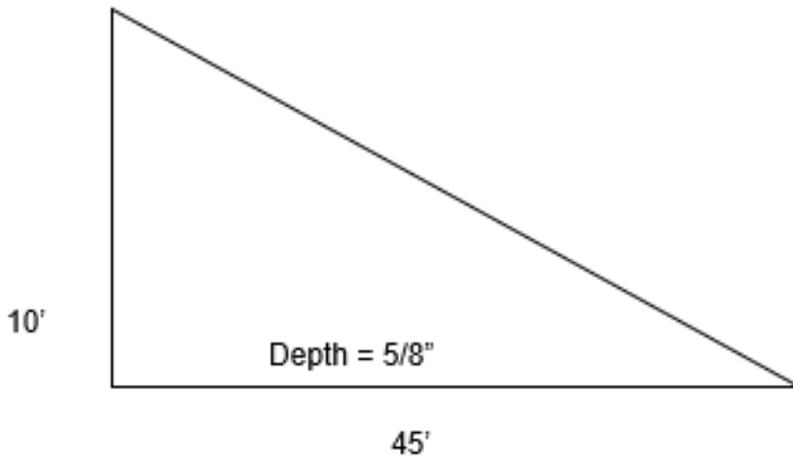
Inches to Feet

Wet Asphalt	=	.0013
Wet Concrete	=	.0026
1/8"	=	0.01'
1/4"	=	0.02'
3/8"	=	0.03'
1/2"	=	0.04'
5/8"	=	0.05'
3/4"	=	0.06'
7/8"	=	0.07'
1"	=	0.08'
2"	=	0.17'
3"	=	0.25'
4"	=	0.33'
5"	=	0.42'
6"	=	0.50'
7"	=	0.58'
8"	=	0.67'
9"	=	0.75'

Sewer Overflow in the Combined System (SOCS)
Volume by Area Estimation Worksheet

AREA/VOLUME OF A RIGHT TRIANGLE

Base x Height x 0.5 x Depth = Volume in Cubic Feet



Base (45') x Height (10') x 0.5 x Depth (.05') x 7.48 gallons/cubic foot = **84 gallons**

For Isosceles Triangles (two sides are equal lengths), Break it down into two Right Triangles and compute area as you would for the Right Triangle above.

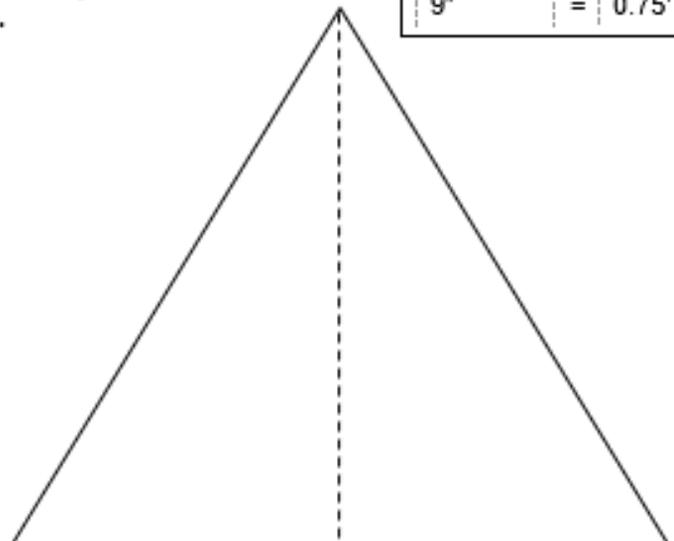


Chart A

Conversion:

Inches to Feet

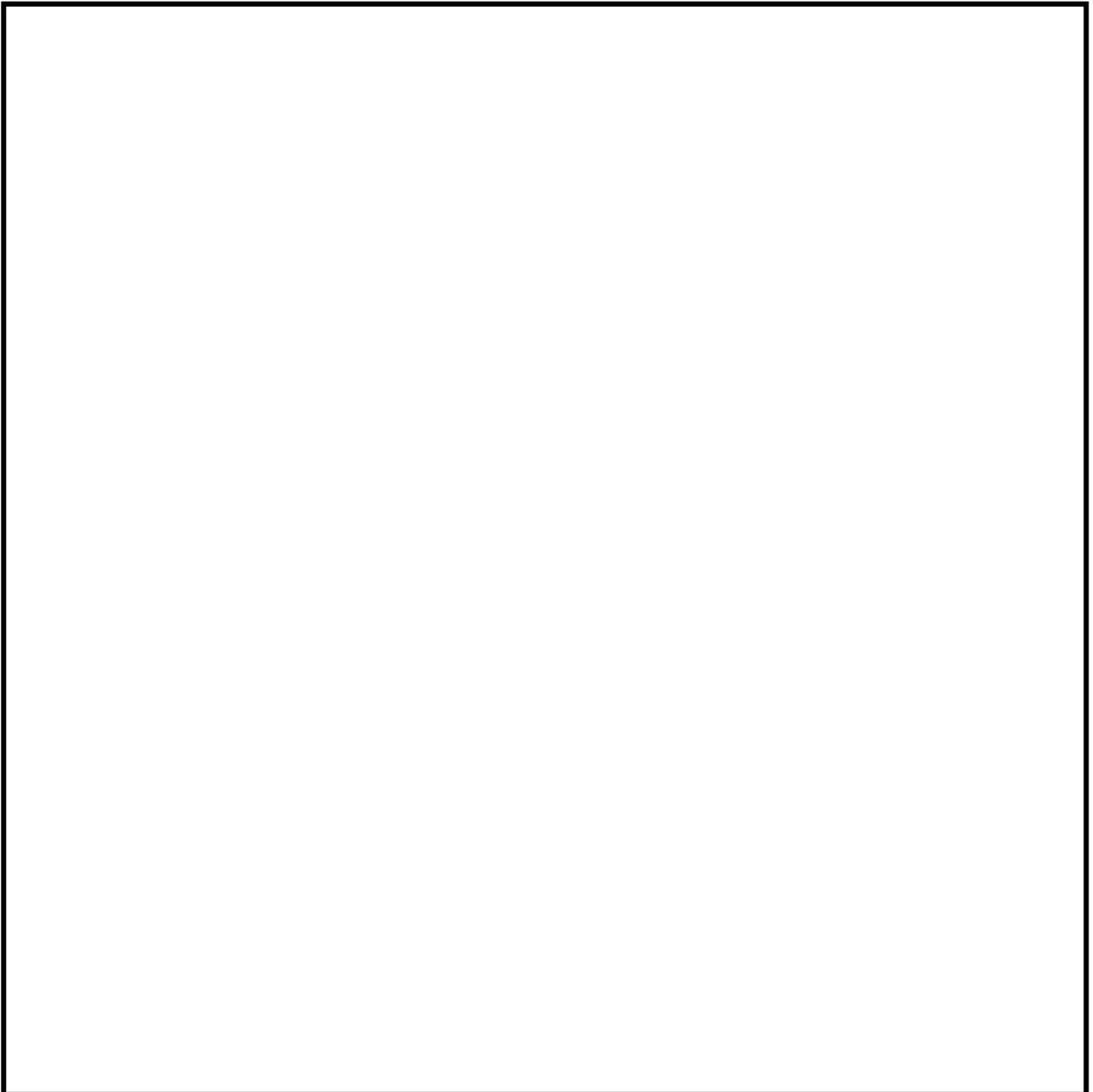
Wet Asphalt	=	.0013
Wet Concrete	=	.0026
1/8"	=	0.01'
1/4"	=	0.02'
3/8"	=	0.03'
1/2"	=	0.04'
5/8"	=	0.05'
3/4"	=	0.06'
7/8"	=	0.07'
1"	=	0.08'
2"	=	0.17'
3"	=	0.25'
4"	=	0.33'
5"	=	0.42'
6"	=	0.50'
7"	=	0.58'
8"	=	0.67'
9"	=	0.75'

Sewer Overflow in the Combined System (SOCS)
Volume by Area Estimation Worksheet

Surface: Asphalt Concrete Dirt Landscape Inside Building

Other _____

1. Draw a sketch on this page using the **SOCS Volume Estimate by Area Work Sheet** immediately after this page, or use a copy of the PUC Block Book to draw on and attach it to this package.
2. Draw shapes and dimensions used on your sketch.
3. Use correct formula for various shapes.



Sewer Overflow in the Combine System (SOCS)
Volume by Area Estimation Worksheet

WS-11
Side A

Area #1 (Rectangle) $L \times W = \underline{\text{SQ FT}} \times \text{Depth} = \text{Volume} \times 7.48 \times \% \text{Wet} = \underline{\text{Gallons}}$

Length _____ x Width _____ x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

(Triangle) $L \times W \times .5 = \underline{\text{SQ FT}} \times \text{Depth} = \text{Volume} \times 7.48 \times \% \text{Wet} = \underline{\text{Gallons}}$

Length _____ x Width _____ x .5 x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

(Circle) $\text{Dia} \times \text{Dia} \times 0.785 \times \text{Depth} = \underline{\text{SQFT}} \times \text{Depth} = \underline{\text{Volume}} \times 7.48 \times \% \text{Wet} = \underline{\text{Gallons}}$

Dia _____ x Dia _____ x 0.785 x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

Area #2 (Rectangle) $L \times W = \underline{\text{SQ FT}} \times \text{Depth} = \text{Volume} \times 7.48 \times \% \text{Wet} = \underline{\text{Gallons}}$

Length _____ x Width _____ x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

(Triangle) $L \times W \times .5 = \underline{\text{SQ FT}} \times \text{Depth} = \text{Volume} \times 7.48 \times \% \text{Wet} = \underline{\text{Gallons}}$

Length _____ x Width _____ x .5 x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

(Circle) $\text{Dia} \times \text{Dia} \times 0.785 \times \text{Depth} = \underline{\text{SQFT}} \times \text{Depth} = \underline{\text{Volume}} \times 7.48 \times \% \text{Wet} = \underline{\text{Gallons}}$

Dia _____ x Dia _____ x 0.785 x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

Area #3 (Rectangle) $L \times W = \underline{\text{SQ FT}} \times \text{Depth} = \text{Volume} \times 7.48 \times \% \text{Wet} = \underline{\text{Gallons}}$

Length _____ x Width _____ x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

(Triangle) $L \times W \times .5 = \underline{\text{SQ FT}} \times \text{Depth} = \text{Volume} \times 7.48 \times \% \text{Wet} = \underline{\text{Gallons}}$

Length _____ x Width _____ x .5 x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

(Circle) $\text{Dia} \times \text{Dia} \times 0.785 \times \text{Depth} = \underline{\text{SQFT}} \times \text{Depth} = \underline{\text{Volume}} \times 7.48 \times \% \text{Wet} = \underline{\text{Gallons}}$

Dia _____ x Dia _____ x 0.785 x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

Sewer Overflow in the Combined System (SOCS)
Volume by Area Estimation Worksheet

WS-11
Side B

Area #4 (Rectangle) $L \times W = \text{SQ FT} \times \text{Depth} = \text{Volume} \times 7.48 \times \% \text{Wet} = \text{Gallons}$

Length _____ x Width _____ x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

(Triangle) $L \times W \times .5 = \text{SQ FT} \times \text{Depth} = \text{Volume} \times 7.48 \times \% \text{Wet} = \text{Gallons}$

Length _____ x Width _____ x .5 x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

(Circle) $\text{Dia} \times \text{Dia} \times 0.785 \times \text{Depth} = \text{SQFT} \times \text{Depth} = \text{Volume} \times 7.48 \times \% \text{Wet} = \text{Gallons}$

Dia _____ x Dia _____ x 0.785 x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

Area #5 (Rectangle) $L \times W = \text{SQ FT} \times \text{Depth} = \text{Volume} \times 7.48 \times \% \text{Wet} = \text{Gallons}$

Length _____ x Width _____ x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

(Triangle) $L \times W \times .5 = \text{SQ FT} \times \text{Depth} = \text{Volume} \times 7.48 \times \% \text{Wet} = \text{Gallons}$

Length _____ x Width _____ x .5 x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

(Circle) $\text{Dia} \times \text{Dia} \times 0.785 \times \text{Depth} = \text{SQFT} \times \text{Depth} = \text{Volume} \times 7.48 \times \% \text{Wet} = \text{Gallons}$

Dia _____ x Dia _____ x 0.785 x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

Area #6 (Rectangle) $L \times W = \text{SQ FT} \times \text{Depth} = \text{Volume} \times 7.48 \times \% \text{Wet} = \text{Gallons}$

Length _____ x Width _____ x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

(Triangle) $L \times W \times .5 = \text{SQ FT} \times \text{Depth} = \text{Volume} \times 7.48 \times \% \text{Wet} = \text{Gallons}$

Length _____ x Width _____ x .5 x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

(Circle) $\text{Dia} \times \text{Dia} \times 0.785 \times \text{Depth} = \text{SQFT} \times \text{Depth} = \text{Volume} \times 7.48 \times \% \text{Wet} = \text{Gallons}$

Dia _____ x Dia _____ x 0.785 x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

Total Volume: #1 _____ + #2 _____ + #3 _____ + #4 _____ + #5 _____ + #6 _____
= _____ Gallons Spilled

Area Volume of Circle/Cylinder

Dia _____ x Dia _____ x 0.785 x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

(Circle) Dia x Dia x 0.785 x Depth = SQFT x Depth = Volume x 7.48 x %Wet = Gallons

Diameter = Any straight line segment that passes through the center of a circle

For our purposes: It is the measurement across the widest part of the circle.

Dia X Dia (D² x 0.785 = Volume in cubic feet.

Example:

27 x 27 x 0.785 x 0.03 = 17.17 Cubic Feet

17.17 Cubic Feet x 7.48 Gallons/Cubic Feet = 128 Gallons

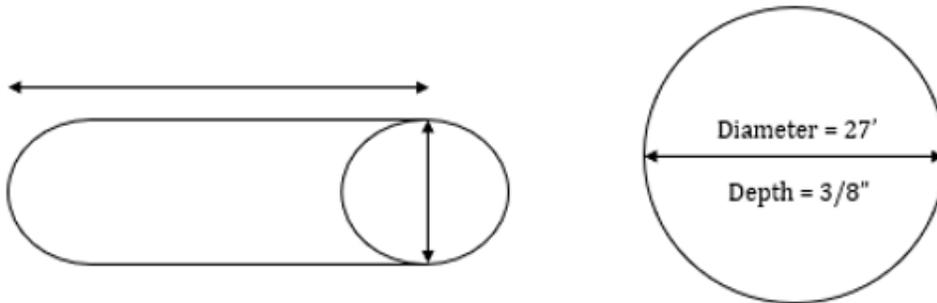
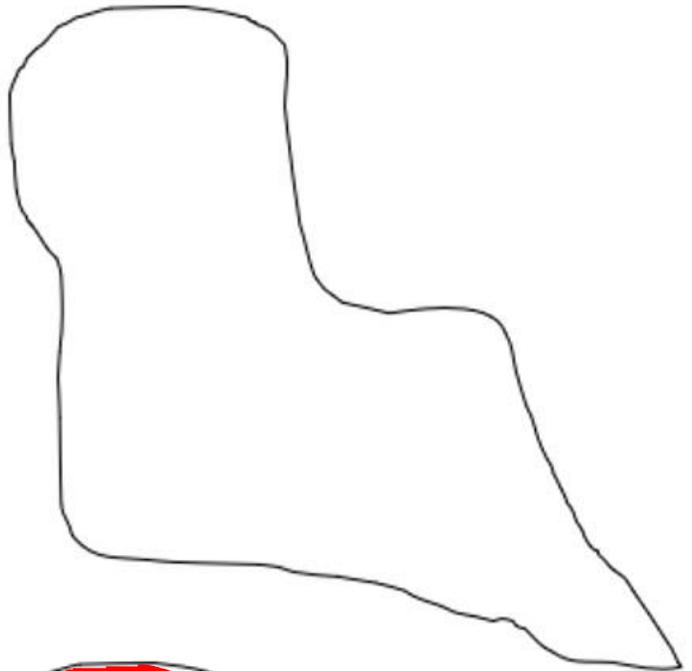


Chart A	
Conversion:	
Inches to Feet	
Wet Asphalt	= .0013
Wet Concrete	= .0026
1/8"	= 0.01'
1/4"	= 0.02'
3/8"	= 0.03'
1/2"	= 0.04'
5/8"	= 0.05'
3/4"	= 0.06'
7/8"	= 0.07'
1"	= 0.08'
2"	= 0.17'
3"	= 0.25'
4"	= 0.33'
5"	= 0.42'
6"	= 0.50'
7"	= 0.58'
8"	= 0.67'
9"	= 0.75'

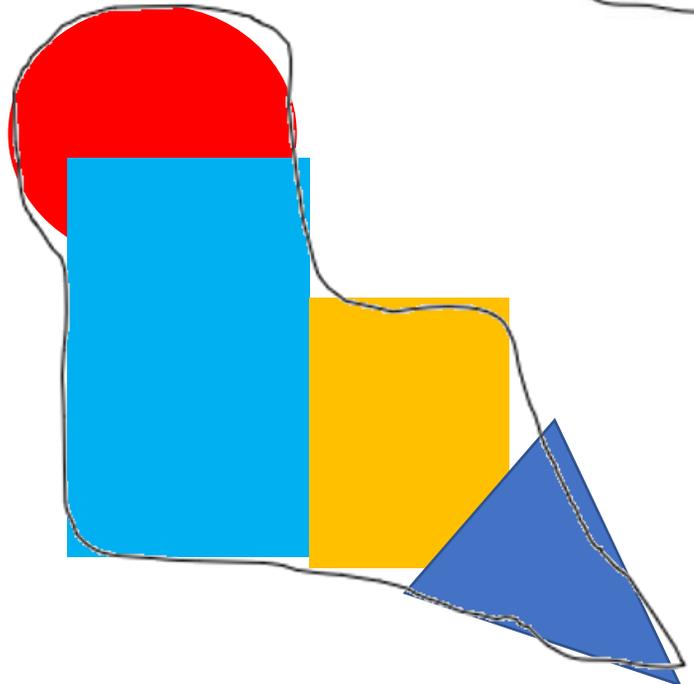
Step 1

Sketch the outline of the spill in a black line.



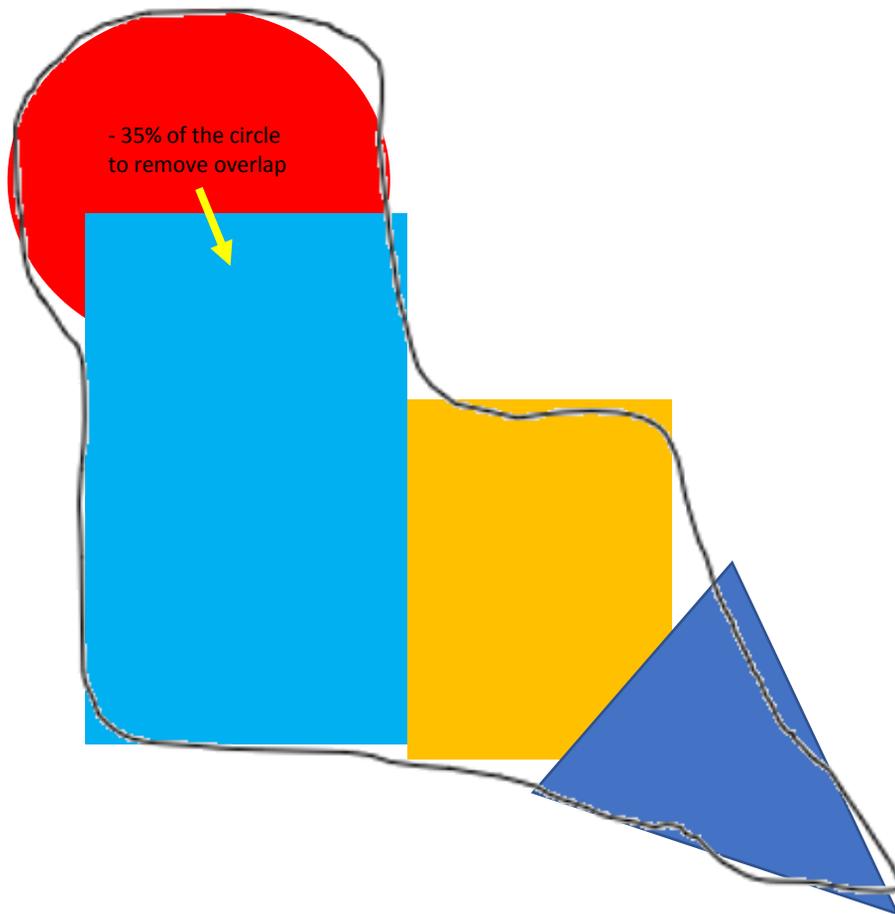
Step 2

Break the sketch down into recognizable shapes (circles, squares, etc.) as well as you can.



Step 3

Determine the volume of each shape. (Note: In this example, after the volume of the circle is determined, multiply it by approximately 65% so that the overlap with the rectangle area won't be counted twice.)



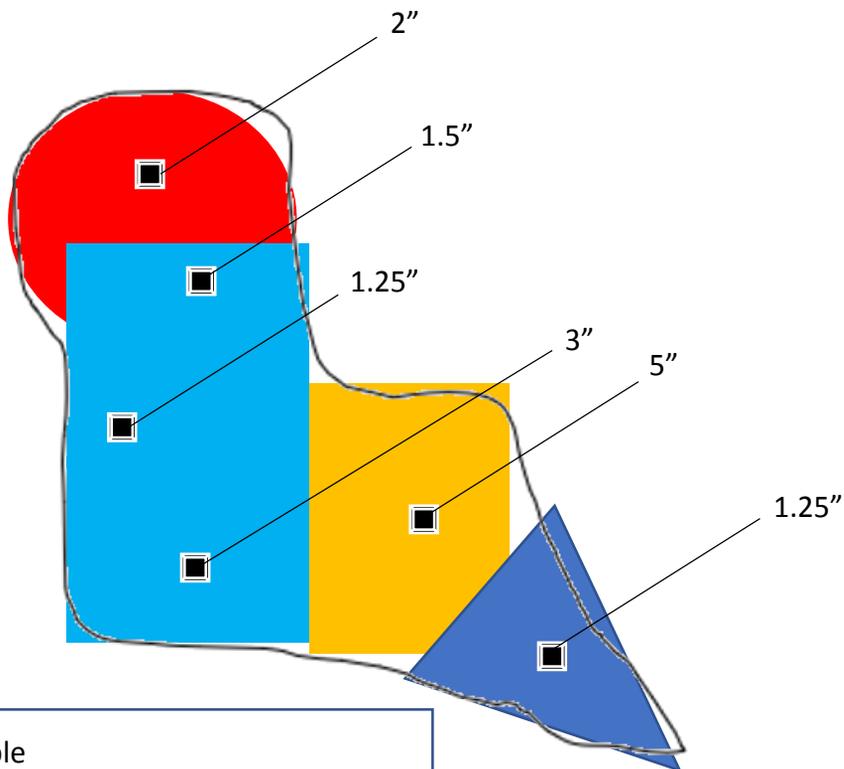
Sewer Overflow in the Combined System (SOCS) Volume by Area Estimation Worksheet

WS-13
Side C

Step 4

If the spill is of varying depths, take several measurements at different depths and find the average.

If the spill affects a dry unimproved area such as a field or dirt parking lot, determine the area of the wetted ground in the same manner as you would on a hard surface. Using a round-pointed shovel, dig down into the soil until you find dry soil. Do this in several locations within the wetted area and measure the depth of the wet soil. Average the measurement/thickness of the wet soil and determine the average depth of the wet soil.



Average Depth Example

$$2'' + 1.5'' + 1.25'' + 3'' + 5'' + 1.25'' = 14.0''$$

$$14.0'' \div 6 \text{ measurements} = 2.33''$$

$$\text{Average Depth} = 2.33'' (0.194')$$

**Appendix E - Sewer Operations SSO Overflow Response
Packets**

Sanitary Sewer Overflow (SSO) Response Packet (Version 15)

- If this is a Category 1 SSO greater than or equal to 1,000 gallons, immediately contact the following within 2 hours:
 - CALOES (800) 852-7550
 - SF Department of Public Health: (415) 215-0805

- For Water Sampling:** Millbrae Dispatch (650) 872-5900

- For any media inquiries/requests:** Contact your Supervisor or Manager

SEWER SERVICE WORKER: <ul style="list-style-type: none"><input type="checkbox"/> Open this envelope.<input type="checkbox"/> Follow the instructions on the Overflow Response Flowchart.<input type="checkbox"/> Complete the chain of custody record (to the right) and deliver this package to the SSO inbox located outside of the designated Supervisors office.	CHAIN OF CUSTODY: Print Name: _____ Initial: _____ Date: _____ Time: _____
---	--

SEWER REPAIR SUPERVISOR: <ul style="list-style-type: none"><input type="checkbox"/> Open this envelope and review forms. Contact the Sewer Service Worker if needed to obtain additional information.<input type="checkbox"/> Enter data into CIWQS.<input type="checkbox"/> File this package.	CHAIN OF CUSTODY: Print Name: _____ Phone #: _____ Initial: _____ Date: _____ Time: _____
--	--

SSO Regulatory Reporting Guide

Reporting Instructions

Deadline	<u>See reverse side for contact information and definitions of the overflow categories.</u>		
	Category 1	Category 2	Category 3
2 Hours after awareness of an Overflow	If SSO is equal to or greater than 1,000 gallons, call CAL OES and SF Department of Public Health	-	-
As soon as possible	If SSO impacts private property that may be a failure of the sewer main and/or if a claim for damages may be submitted against the city, notify the Claims Office.		
48 hours after awareness of an Overflow	If 50,000 gallons or more were not recovered, begin water quality sampling	-	-
3 Business Days after awareness of an Overflow	Submit draft report in the CIWQS database.	Submit draft report in the CIWQS database.	-
15 Days after response conclusion	Certify spill report in CIWQS. Update as needed until 120 days after overflow end date.	Certify spill report in CIWQS. Update as needed until 120 days after overflow end date	-
30 Days after end of calendar month in with Overflow occurred.			Certify spill report in CIWQS. Update as needed until 120 days after overflow end date
45 Days after Overflow end date.	If 50,000 gallons or more was not recovered, submit CIWQS SSO Technical Report in CIWQS.	-	-

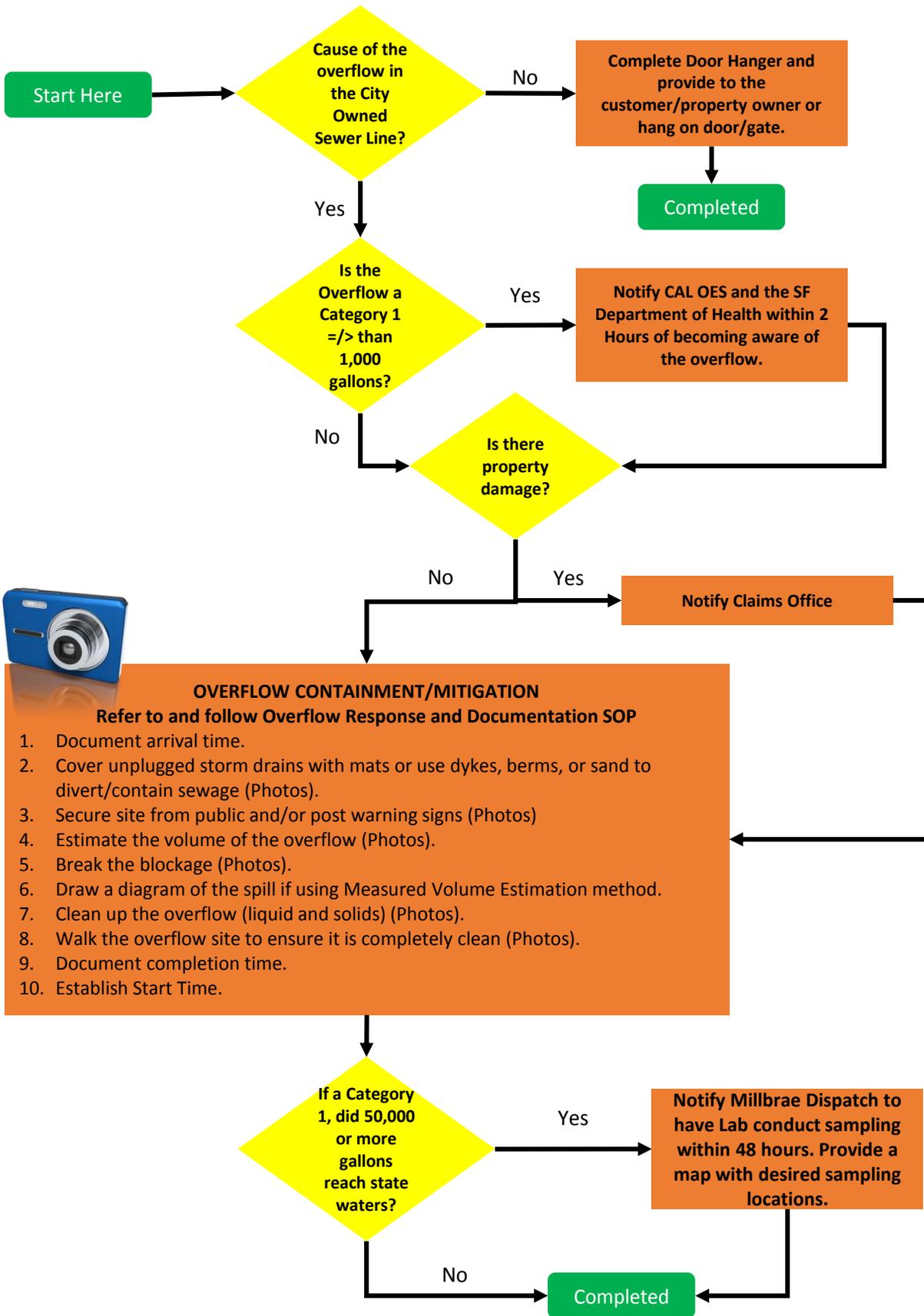
Regulatory Notifications Packet
Regulatory Reporting Guide

CONTACT INFORMATION

CAL OES	(800) 852-7550
SF Department of Health	(415) 215-0805
Claims Office (Refer to current City Attorney Investigator On-Call List after work hours)	Theresa Lacson-Kuan M-F 8AM-5PM (925) 285-6416
Millbrae Dispatch (Water Quality Sampling)	Natural Resources Land Management Division (NRLMD) (650) 872-5900
San Francisco Regional Water Quality Control Board (SFRWQCB)	Phone: (510) 622-2369 Fax: (510) 622-2460
State Water Resources Control Board	(916) 341-5586

Category	Definition
1	Discharges of untreated or partially treated wastewater of any volume resulting from an enrollee’s sanitary sewer system failure or flow condition that: <ul style="list-style-type: none"> - Reach surface water and/or reach a drainage channel tributary to a surface water; or - Reach a Municipal Separate Storm Sewer System (MS4) and are not fully captured and returned to the sanitary sewer system or not otherwise captured and disposed of properly. Any volume of wastewater not recovered from the MS4 is considered to have reached surface water unless the storm drain system discharges to a dedicated storm water or groundwater infiltration basin (e.g., infiltration pit, percolation pond).
2	Discharges of untreated or partially treated wastewater of 1,000 gallons or greater resulting from an enrollee’s sanitary sewer system failure or flow condition that do not reach surface water, a drainage channel, or a MS4 unless the entire SSO discharged to the storm drain system is fully recovered and disposed of properly.
3	All other discharges of untreated or partially treated wastewater resulting from an enrollee’s sanitary sewer system failure or flow condition.
Private Lateral Sewage Discharge (PLSD)	Discharges of untreated or partially treated wastewater resulting from blockages or other problems within a privately owned sewer lateral connected to the enrollee’s sanitary sewer system or from other private sewer assets. PLSDs that the enrollee becomes aware of may be voluntarily reported to the California Integrated Water Quality System (CIWQS) Online SSO Database.

Sanitary Sewer Overflow Flowchart



Sanitary Sewer Overflow Notifications

NOTIFICATIONS

CAL OES (800) 852-7550

Notification Date/Time:

Name of Whom You Spoke To:

OES Control Number:

SF Department of Health (415) 215-0805

Notification Date/Time:

Name of Whom You Spoke To: Left Message: **Millbrae Lab (650) 872-5900**

Notification Date/Time:

Name of Whom You Spoke To: Left Message: **Claims Office (During Work Hours:(925) 285-6416) On Call List After Work Hours**

Notification Date/Time:

Name of Whom You Spoke To: Left Message:

SFPUC: Overflow Emergency Response Plan

D-1

Sanitary Sewer Overflow Location and Volume by Destination

MAXIMO WORK ORDER #: _____

SSO FIELD REPORT

PHYSICAL LOCATION DETAILS

Spill Location Name

Latitude of spill location

Longitude of spill location

County

San Francisco

Regional Water Quality Control Board

Region 2 – San Francisco Bay

VOLUMES BY DESTINATION

Volume Spilled
(Gallons)

Volume Recovered
(Gallons)

2.a/2.b Estimated spill volume that reached a separate storm drain that flows to a surface body of water? (If not all recovered, this is a Category 1)

2.c/2d Estimated spill volume that directly reached a drainage channel that flows to a surface water body? (Any volume spilled is a Category 1)

2.e/2.f Estimated spill volume discharged directly to a surface water body? (Any volume spilled is a Category 1)

2.g/2.h 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).

Volume Spilled

Volume Recovered

Total Volume Spilled (Verify this matches the table in between 2.h and 3 in CIWQS)

SFPUC: Overflow Emergency Response Plan

D-2

Sanitary Sewer Overflow Location, Appearance Points, and Destination

SSO FIELD REPORT

Spill location description.

Number of appearance points.

Spill appearance points. (Circle all that apply) Backflow Prevention Device
Force Main Gravity Mainline Inside Building/Structure Lateral Clean Out (Private / Public)
Lower Lateral (Private / Public) Manhole Pump Station Upper Lateral (Private / Public)
Other Sewer System Structure

Spill appearance point explanation. (Enter information here if "Other" or multiple appearance points were selected):

Final spill destination. (Circle all that apply). Beach Building/Structure
Combined Storm Drain Drainage Channel Other (Specify Below) Paved Surface
Separate Storm Drain Street/Curb and Gutter Surface Water Unpaved Surface

Explanation of final spill destination. (Enter information if "Other" was selected.

DATE/TIME DETERMINATIONS

	DATE	TIME
Estimated Spill Start Date/Time		
SFPUC Notified Date/Time		
Estimated Operator Arrival Date/Time		
Estimated Spill End Date/Time		
Spill Response Completion Date/Time		

USE START/END TIME WORKSHEET (WS-1)

Sanitary Sewer Overflow Cause

SSO FIELD REPORT

Spill cause: (Circle One)

Air Relief Valve (ARV)/Blow Off Valve (BOV) Failure

Construction Diversion Failure

CS Maintenance Caused Spill/Damage

Damage by Others Not Related to CS Construction/Maintenance (Specify Below)

Debris from Construction

Debris from Lateral

Debris-General

Debris-Rags

Debris Wipes/Non-Dispersible

Flow Exceeded Capacity (Separate CS Only)

Grease Deposition (FOG)

Inappropriate Discharge to CS

Natural Disaster

Operator Error

Other (Specify Below)

Pipe Structural Problem/Failure

Pipe Structural Problem/Failure – Installation

Pump Station Failure – Controls

Pump Station Failure – Mechanical

Pump Station Failure – Power

Rainfall Exceeded Design, I and I (Separate CS Only)

Root Intrusion

Siphon Failure

Surcharged Pipe (Combined CS Only)

Vandalism

Spill cause explanation: (Required if Spill Cause is "Other")

SFPUC: Overflow Emergency Response Plan**D-5****Sanitary Sewer Overflow Failures, Association, Asset, and Response Activities****SSO FIELD REPORT**

Where did failure occur?

Air Relief Valve (ARV)/Blow Off Valve (BOV) Failure Force Main Gravity Mainline
 Lower Lateral (Public) Manhole Other (Specify Below) Pump Station Failure – Controls
 Pump Station Failure – Mechanical Pump Station Failure – Power
 Siphon Upper Lateral (Public)

Explanation of where failure occurred: (Required if Where Failure Occurred is “Other”)

Was Spill associated with a storm event?

YES

NO

Diameter of sewer pipe at the point of blockage or failure.

Inches

Material of sewer pipe at the point of blockage or failure.

Estimated age of sewer asset at the point of blockage or failure (if applicable):

YEARS

Spill Response Activities. (Circle all that apply) Cleaned-Up Mitigated Effects of Spill
 Contained All or Portion of Spill Other (Specify Below) Restored Flow
 Returned All Spoil to Sanitary Sewer System Property Owner Notified
 Other Enforcement Agency Notified

Explanation of spill response activities: (Required if spill response activities is “Other”)

SFPUC: Overflow Emergency Response Plan

D-6

Sanitary Sewer Overflow Corrective Actions, Investigation, Signage, and Closures

SSO FIELD REPORT

Spill corrective action taken: (Circle all that apply)

- Added Sewer To Preventive Maintenance Program
- Adjusted Schedule/Method of Preventive Maintenance
- Enforcement Action Against FOG Source
- Inspected Sewer Using CCTV to Determine Cause
- Other (Specify Below)
- Plan Rehabilitation or Replacement of Sewer
- Repaired Facilities or Replaced Defect

Explanation of corrective action taken: (Required if spill corrective action is "Other")

Is there an ongoing investigation?

YES

NO

Health warnings posted?

YES

NO

Did spill result in beach closure

YES

NO

Name of Impacted Beach(es): (Enter N/A if none)

Name of impacted surface waters:

Sanitary Sewer Overflow Water Quality Samples and Volume Estimation Method

SSO FIELD REPORT

Water quality samples analyzed for: (Circle all that apply)

- Dissolved Oxygen
- Other Chemical Indicators(s) – Specify Below
- Biological Indicator(s) – Specify Below
- No Water Quality Samples Taken
- Not Applicable to the Spill
- Other (Specify Below)

Explanation of water quality samples analyzed for: (Required if water quality samples analyzed for is "Other chemical indicator(s)", "Biological indicator(s)", or "Other")

Water quality sample results reported to: (Circle all that apply) County Health Agency
Regional Water Quality Control Board Other (Specify Below) No Water Quality Samples Taken
Not Applicable to this Spill

Explanation of water quality sample results reported to: (Required if water quality sample results reported to is "Other")

Method and explanation of volume estimation methods used: (Circle all that apply)
Eyeball Estimate Measured Volume Duration and Flow Rate
PUC Overflow Flow Rate Estimating Tool
Other (Explain): _____

Sanitary Sewer Overflow (SSO)
Estimation Method Calculations

Start Time Determination/Notes

Caller Interview: Where did you see sewage spill from? Manhole Inside Building
Vent/Clean Out Catch Basin Wet Well/Lift Station Other _____

Comments: _____

Last Time Caller Observed NO Spill occurring: _____ AM / PM Date ____ / ____ / ____

Comments: _____

If the volume of the SSO and rate of flow are known, divide volume by rate of flow to get duration of SSO event.

_____ Gallons ÷ _____ GPM = _____ Minutes (SSO Duration). Subtract the Duration from the SSO End Date/Time to establish the SSO Start Date/Time.

Other Efforts to Determine Start Time: _____

Other Comments Regarding Spill Start Time: _____

Estimated SSO Start Time: _____ AM / PM Date: ____ / ____ / ____

SSO End Time: _____ AM / PM Date: ____ / ____ / ____



Sanitary Sewer Overflow Estimation Method Calculations

Eyeball Estimate Method: Imagine a bucket(s) or barrel(s) of water tipped over.

Size of bucket(s) or barrel(s)	How many of this size?	Multiplier	Total Volume Estimated
1 Gallon Water Jug		X 1	
5 Gallon Bucket		X 5	
32 Gallon Trash Can		X 32	
55 Gallon Drum		X 55	
Total Volume Estimated Using Eyeball Method			

Measured Volume Method: This may take several calculations as you may have to break down the Odd shaped spill to rectangles, triangles, and circles. It is important that, if possible, measure depth in several locations and use an average depth. Use the SSO Volume Estimate by Area Work Sheet to Sketch the shapes and show your work.

Duration and Flow Rate Method:

Start Date and Time	1.
End Date and Time	2.
SSO Event Total Time Elapsed (Subtract Line 1 from Line 2. Show in minutes)	3.
Average Flow Rate GPM (Account for diurnal flow pattern)	4.
Total Volume Estimated Using Duration and Flow Method (Line 3 x Line 4)	5.

See SFPUC WWE Overflow Response, Mitigation, Documentation, and Reporting SOP, Appendix A for examples of manhole flow rates from a 27 ¾" lid.

Sanitary Sewer Overflow Measured Volume Estimation Method Calculations (27 ¾" Manhole Cover Flow Rates)



1 GPM



3 GPM



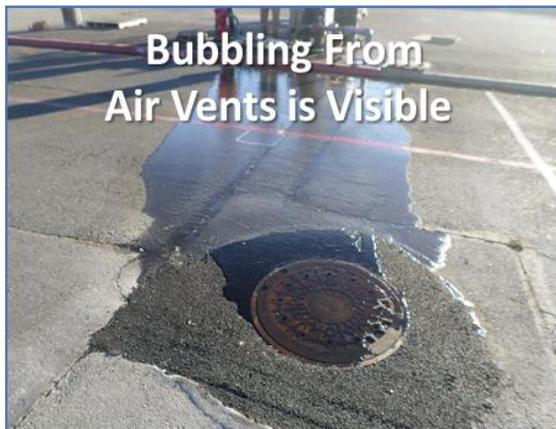
5 GPM



7 GPM



10 GPM



15 GPM

Sanitary Sewer Overflow Measured Volume Estimation
Method Calculations (27 ¾" Manhole Cover Flow Rates)



20 GPM



25 GPM



30 GPM



35 GPM



40 GPM



45 GPM

Sanitary Sewer Overflow Measured Volume Estimation Method Calculations (27 ¾" Manhole Cover Flow Rates)



50 GPM



1/4" Air Vent
Bubble Height



75 GPM



1" Air Vent
Bubble Height



100 GPM



1.5" Air Vent
Bubble Height



125 GPM



2" Air Vent
Bubble Height

Sanitary Sewer Overflow Measured Volume Estimation Method Calculations (27 ¾" Manhole Cover Flow Rates)



150 GPM



175 GPM



3" Air Vent
Bubble Height



3.5" Air Vent
Bubble Height



200 GPM



4" Air Vent
Bubble Height

Sanitary Sewer Overflow Containment

SPILL CONTAINMENT

Containment Implemented: _____ AM PM

Date: _____ / _____ / _____

Containment Measures: Plugged Storm Drain(s) Washed Down

Vacuum Up Sewage Turn Off Downstream Pump Station (Mission Bay & Treasure Is.)

Other Measures: _____

Comments: _____

TAKE PHOTOS OF CONTAINMENTS EFFORTS/OUTCOMES



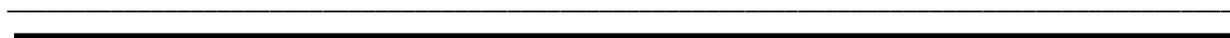
Sanitary Sewer Overflow Clean Up/Milestones/Reporting

CLEAN UP

Clean Up Begin: _____ AM PM Date: _____ / _____ / _____

Clean Up Complete: _____ AM PM Date: _____ / _____ / _____

Describe Clean Up Operations: _____



OTHER IMPORTANT MILESTONES

Contacted Supervisor: _____ AM PM Date: _____ / _____ / _____

Requested Additional EE's/Equip: _____ AM PM Date: _____ / _____ / _____

Requested Additional EE's/Equip: _____ AM PM Date: _____ / _____ / _____

Requested Additional EE's/Equip: _____ AM PM Date: _____ / _____ / _____

_____: _____ AM PM Date: _____ / _____ / _____



CAUSE OF SPILL

Spill Cause: Roots Grease Debris Vandalism Pump/Lift Sta Failure Other: _____

Spill Caused to be determined by CCTV inspection. (Attach TV Report to this form)

Final Cause Determination: _____



Proper Operation and Maintenance Determination:

Date Last Cleaned: _____ Date Last TV'd: _____ Date Last Replaced/Rehabilitated: _____

Follow-up or Corrective Action Taken: _____



Sanitary Sewer Overflow Volume by Area Estimation
Worksheet

WS-6

CONVERSIONS

** To convert inches into feet: Divide the inches by 12.

Example: $27'' / 12 = 2.25'$

Or Use Chart A

Example: $1 \frac{3}{4}'' = ?$

$$1'' (0.08') + \frac{3}{4}'' (0.06') = \underline{0.14'}$$

** One Cubic Foot = 7.48 gallons of liquid.

Chart A

Conversion:

Inches to Feet

Wet Asphalt	=	.0013
Wet Concrete	=	.0026
1/8"	=	0.01'
1/4"	=	0.02'
3/8"	=	0.03'
1/2"	=	0.04'
5/8"	=	0.05'
3/4"	=	0.06'
7/8"	=	0.07'
1"	=	0.08'
2"	=	0.17'
3"	=	0.25'
4"	=	0.33'
5"	=	0.42'
6"	=	0.50'
7"	=	0.58'
8"	=	0.67'
9"	=	0.75'

Sanitary Sewer Overflow Volume by Area Estimation
Worksheet**GEOMETRY**

For the purposes of this work sheet, the unit of measurement will be in feet for formula examples.

Area is two-dimensional - represented in square feet. (Length x Width)

Volume is three-dimensional - represented in cubic feet. (Length x Width x depth) or (Diameter Squared) $D^2 \times 0.785 \times \text{depth}$.

A Note about Depth

Wet Stain on a Concrete Surface - For a stain on concrete, use 0.0026'. This number is 1/32" converted to feet. For a stain on asphalt use 0.0013' (1/64"). These were determined to be a reasonable depth to use on the respective surfaces through a process of trial and error by SPUC staff. A known amount of water (one gallon) was poured onto both asphalt and concrete surfaces. Once the Area was determined as accurately as possible, different depths were used to determine the volume of the wetted footprint until the formula produced a result that (closely) matched the one gallon spilled. 1/32" was the most consistently accurate depth on concrete and 1/64" for asphalt. This process was repeated several times.

Sewage "Ponding" or Contained – Measure actual depth of standing sewage whenever possible. When depth varies, measure several (representative) points, determine the average and use that number in your formula to determine volume.

Area/Volume Formulas

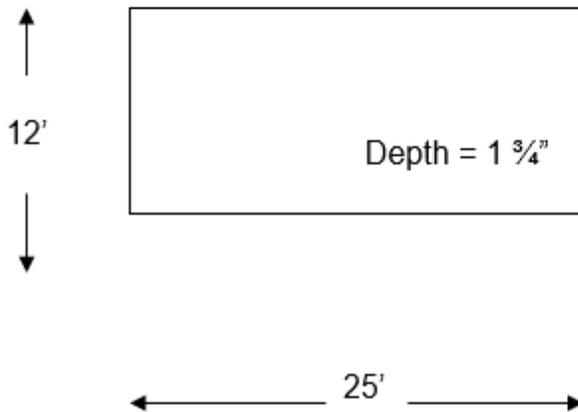
Area is two dimensional and is represented as Square Feet (SQ/FT)

Volume is three dimensional and is represented as Cubic Feet (CU/FT)

One Cubic Foot = 7.48 gallons

Sanitary Sewer Overflow Volume by Area Estimation
Worksheet

AREA/VOLUME OF A RECTANGLE OR SQUARE

Formula: **Length x Width x Depth** = Volume in Cubic Feet

Length (25') x Width (12') x Depth (0.14')

 $25' \times 12' \times 0.14' = 42$ Cubic Feet.

Now the Volume in Cubic Feet is known.

There are 7.48 Gallons in one Cubic Foot

Chart A

Conversion:

Inches to Feet

Wet Asphalt = .0013

Wet Concrete = .0026

1/8" = 0.01'

1/4" = 0.02'

3/8" = 0.03'

1/2" = 0.04'

5/8" = 0.05'

3/4" = 0.06'

7/8" = 0.07'

1" = 0.08'

2" = 0.17'

3" = 0.25'

4" = 0.33'

5" = 0.42'

6" = 0.50'

7" = 0.58'

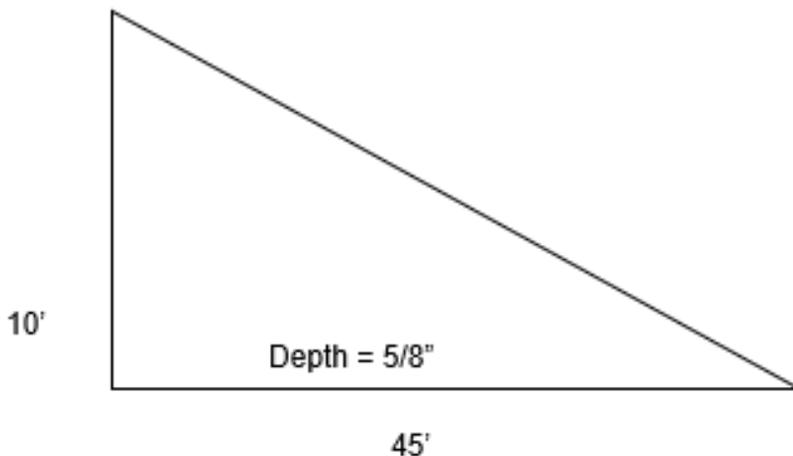
8" = 0.67'

9" = 0.75'

Sanitary Sewer Overflow Volume by Area Estimation
Worksheet

AREA/VOLUME OF A RIGHT TRIANGLE

Base x Height x 0.5 x Depth = Volume in Cubic Feet



Base (45') x Height (10') x 0.5 x Depth (.05') x 7.48 gallons/cubic foot = **84 gallons**

For Isosceles Triangles (two sides are equal lengths), Break it down into two Right Triangles and compute area as you would for the Right Triangle above.

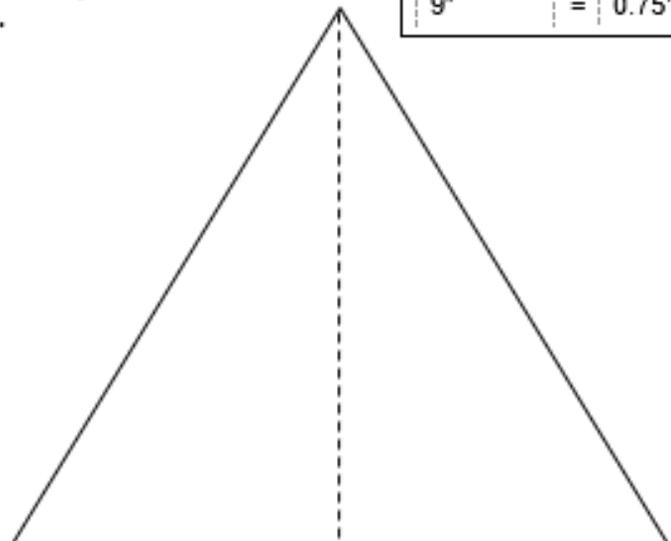


Chart A

Conversion:

Inches to Feet

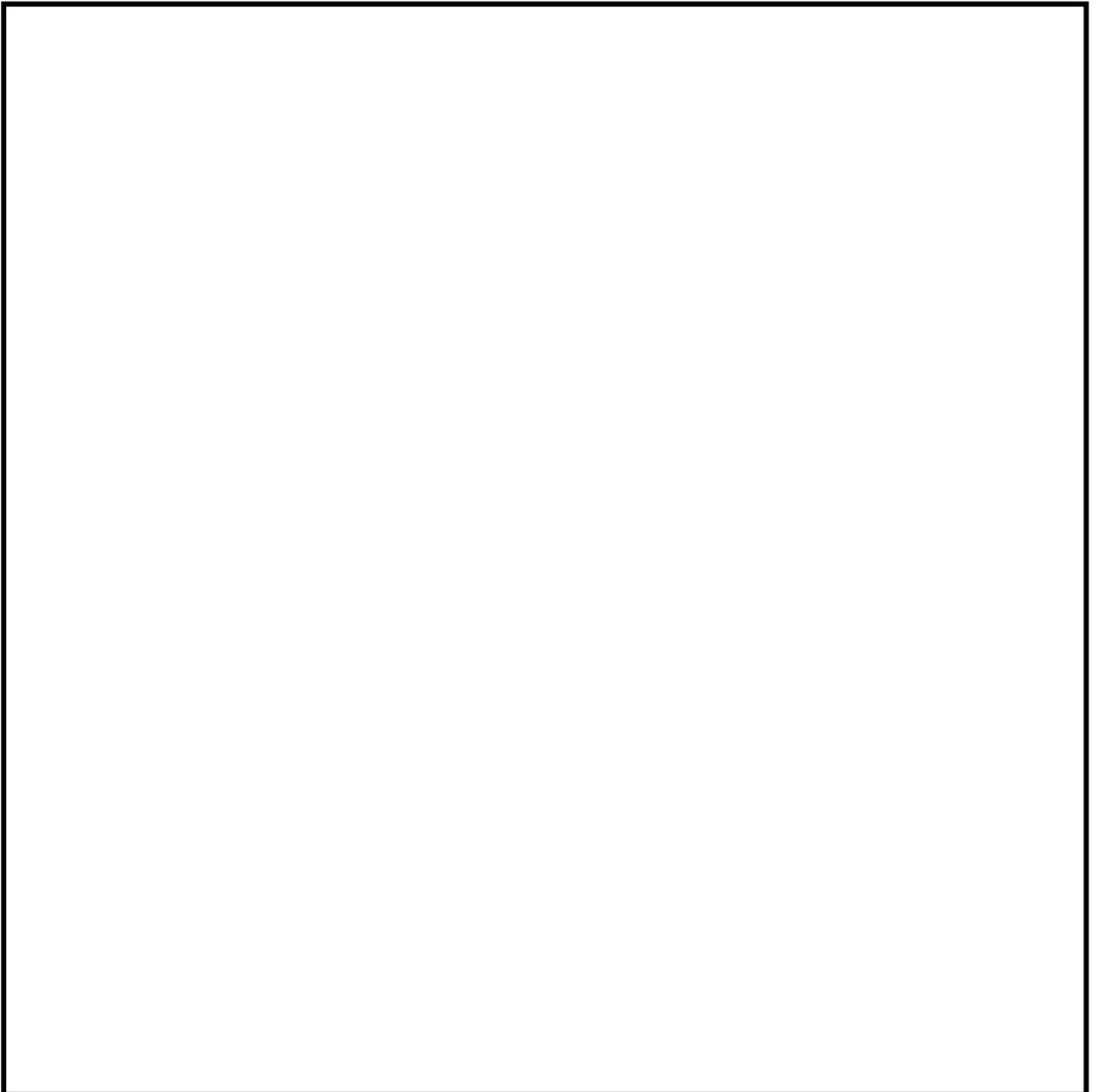
Wet Asphalt	=	.0013
Wet Concrete	=	.0026
1/8°	=	0.01'
1/4°	=	0.02'
3/8°	=	0.03'
1/2°	=	0.04'
5/8°	=	0.05'
3/4°	=	0.06'
7/8°	=	0.07'
1°	=	0.08'
2°	=	0.17'
3°	=	0.25'
4°	=	0.33'
5°	=	0.42'
6°	=	0.50'
7°	=	0.58'
8°	=	0.67'
9°	=	0.75'

Sanitary Sewer Overflow (SSO)
Volume by Area Estimation Worksheet

Surface: Asphalt Concrete Dirt Landscape Inside Building

Other _____

1. Draw a sketch on this page using the **SSO Volume Estimate by Area Work Sheet** immediately after this page, or use a copy of the PUC Block Book to draw on and attach it to this package.
2. Draw shapes and dimensions used on your sketch.
3. Use correct formula for various shapes.



Sanitary Sewer Overflow Volume by Area Estimation
Worksheet

**WS-11
Side A**

Area #1 (Rectangle) $L \times W = \underline{\text{SQ FT}} \times \text{Depth} = \text{Volume} \times 7.48 \times \% \text{Wet} = \underline{\text{Gallons}}$

Length _____ x Width _____ x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

(Triangle) $L \times W \times .5 = \underline{\text{SQ FT}} \times \text{Depth} = \text{Volume} \times 7.48 \times \% \text{Wet} = \underline{\text{Gallons}}$

Length _____ x Width _____ x .5 x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

(Circle) $\text{Dia} \times \text{Dia} \times 0.785 \times \text{Depth} = \underline{\text{SQFT}} \times \text{Depth} = \underline{\text{Volume}} \times 7.48 \times \% \text{Wet} = \underline{\text{Gallons}}$

Dia _____ x Dia _____ x 0.785 x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

Area #2 (Rectangle) $L \times W = \underline{\text{SQ FT}} \times \text{Depth} = \text{Volume} \times 7.48 \times \% \text{Wet} = \underline{\text{Gallons}}$

Length _____ x Width _____ x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

(Triangle) $L \times W \times .5 = \underline{\text{SQ FT}} \times \text{Depth} = \text{Volume} \times 7.48 \times \% \text{Wet} = \underline{\text{Gallons}}$

Length _____ x Width _____ x .5 x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

(Circle) $\text{Dia} \times \text{Dia} \times 0.785 \times \text{Depth} = \underline{\text{SQFT}} \times \text{Depth} = \underline{\text{Volume}} \times 7.48 \times \% \text{Wet} = \underline{\text{Gallons}}$

Dia _____ x Dia _____ x 0.785 x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

Area #3 (Rectangle) $L \times W = \underline{\text{SQ FT}} \times \text{Depth} = \text{Volume} \times 7.48 \times \% \text{Wet} = \underline{\text{Gallons}}$

Length _____ x Width _____ x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

(Triangle) $L \times W \times .5 = \underline{\text{SQ FT}} \times \text{Depth} = \text{Volume} \times 7.48 \times \% \text{Wet} = \underline{\text{Gallons}}$

Length _____ x Width _____ x .5 x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

(Circle) $\text{Dia} \times \text{Dia} \times 0.785 \times \text{Depth} = \underline{\text{SQFT}} \times \text{Depth} = \underline{\text{Volume}} \times 7.48 \times \% \text{Wet} = \underline{\text{Gallons}}$

Dia _____ x Dia _____ x 0.785 x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

**Sanitary Sewer Overflow Volume by Area Estimation
Worksheet**

**WS-11
Side B**

Area #4 (Rectangle) $L \times W = \underline{\text{SQ FT}} \times \text{Depth} = \text{Volume} \times 7.48 \times \% \text{Wet} = \underline{\text{Gallons}}$

Length _____ x Width _____ x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

(Triangle) $L \times W \times .5 = \underline{\text{SQ FT}} \times \text{Depth} = \text{Volume} \times 7.48 \times \% \text{Wet} = \underline{\text{Gallons}}$
or

Length _____ x Width _____ x .5 x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

(Circle) $\text{Dia} \times \text{Dia} \times 0.785 \times \text{Depth} = \underline{\text{SQFT}} \times \text{Depth} = \text{Volume} \times 7.48 \times \% \text{Wet} = \underline{\text{Gallons}}$

Dia _____ x Dia _____ x 0.785 x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

=====

Area #5 (Rectangle) $L \times W = \underline{\text{SQ FT}} \times \text{Depth} = \text{Volume} \times 7.48 \times \% \text{Wet} = \underline{\text{Gallons}}$

Length _____ x Width _____ x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

(Triangle) $L \times W \times .5 = \underline{\text{SQ FT}} \times \text{Depth} = \text{Volume} \times 7.48 \times \% \text{Wet} = \underline{\text{Gallons}}$

Length _____ x Width _____ x .5 x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

(Circle) $\text{Dia} \times \text{Dia} \times 0.785 \times \text{Depth} = \underline{\text{SQFT}} \times \text{Depth} = \text{Volume} \times 7.48 \times \% \text{Wet} = \underline{\text{Gallons}}$

Dia _____ x Dia _____ x 0.785 x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

=====

Area #6 (Rectangle) $L \times W = \underline{\text{SQ FT}} \times \text{Depth} = \text{Volume} \times 7.48 \times \% \text{Wet} = \underline{\text{Gallons}}$

Length _____ x Width _____ x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

(Triangle) $L \times W \times .5 = \underline{\text{SQ FT}} \times \text{Depth} = \text{Volume} \times 7.48 \times \% \text{Wet} = \underline{\text{Gallons}}$

Length _____ x Width _____ x .5 x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

(Circle) $\text{Dia} \times \text{Dia} \times 0.785 \times \text{Depth} = \underline{\text{SQFT}} \times \text{Depth} = \text{Volume} \times 7.48 \times \% \text{Wet} = \underline{\text{Gallons}}$

Dia _____ x Dia _____ x 0.785 x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

Total Volume: #1 _____ + #2 _____ + #3 _____ + #4 _____ + #5 _____ + #6 _____
= _____ Gallons Spilled

Area Volume of Circle/Cylinder

Dia _____ x Dia _____ x 0.785 x Depth _____ x 7.48 x _____ %Wet = _____ Gallons

(Circle) Dia x Dia x 0.785 x Depth = SQFT x Depth = Volume x 7.48 x %Wet = Gallons

Diameter = Any straight line segment that passes through the center of a circle

For our purposes: It is the measurement across the widest part of the circle.

Dia X Dia (D2 x 0.785 = Volume in cubic feet.

Example:

27 x 27 x 0.785 x 0.03 = 17.17 Cubic Feet

17.17 Cubic Feet x 7.48 Gallons/Cubic Feet = 128 Gallons

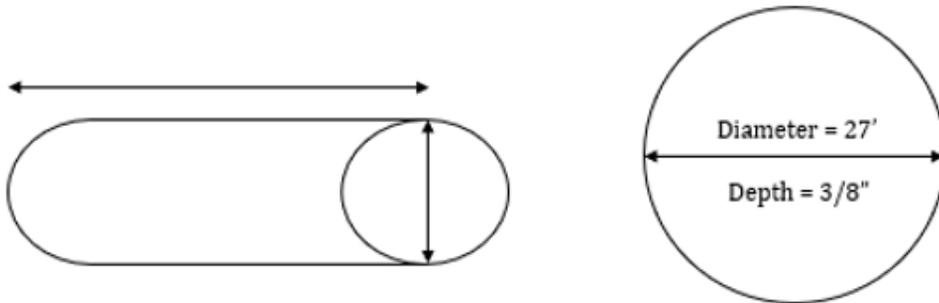


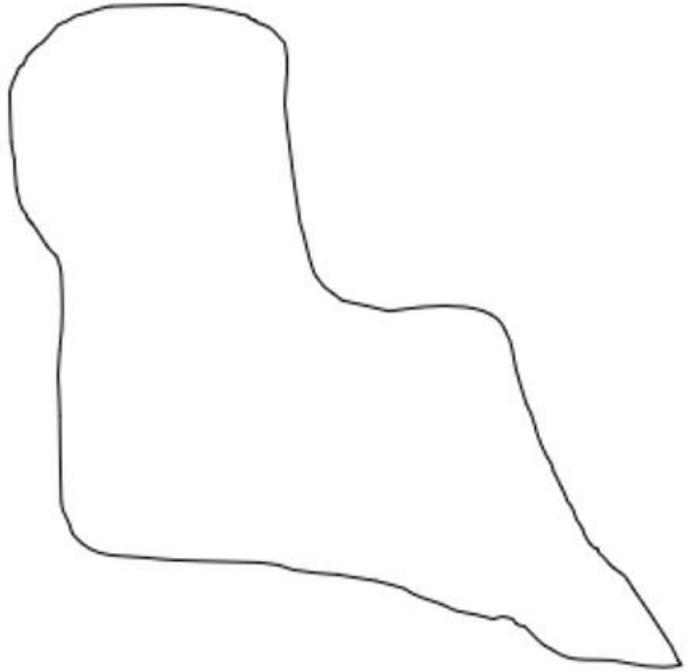
Chart A	
Conversion:	
Inches to Feet	
Wet Asphalt	= .0013
Wet Concrete	= .0026
1/8"	= 0.01'
1/4"	= 0.02'
3/8"	= 0.03'
1/2"	= 0.04'
5/8"	= 0.05'
3/4"	= 0.06'
7/8"	= 0.07'
1"	= 0.08'
2"	= 0.17'
3"	= 0.25'
4"	= 0.33'
5"	= 0.42'
6"	= 0.50'
7"	= 0.58'
8"	= 0.67'
9"	= 0.75'

Sanitary Sewer Overflow Volume by Area Estimation
Worksheet

WS-13
Side A

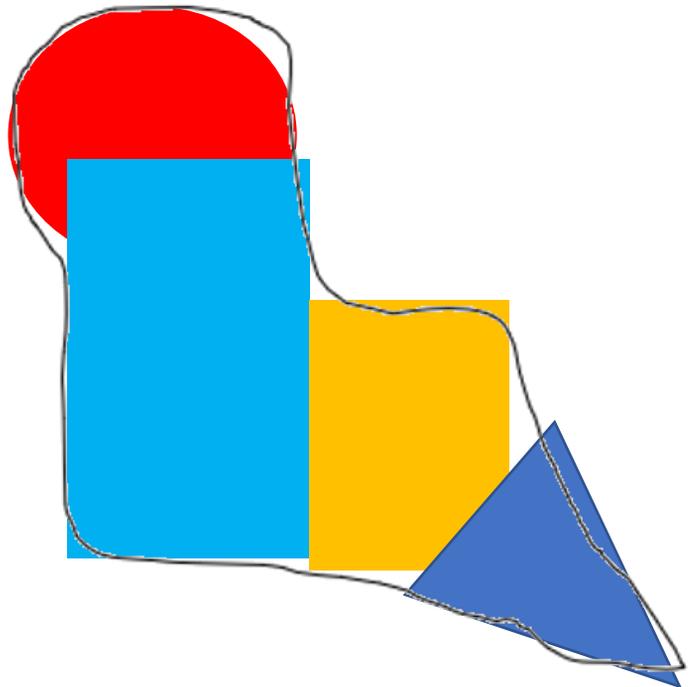
Step 1

Sketch the outline of the spill in a black line.



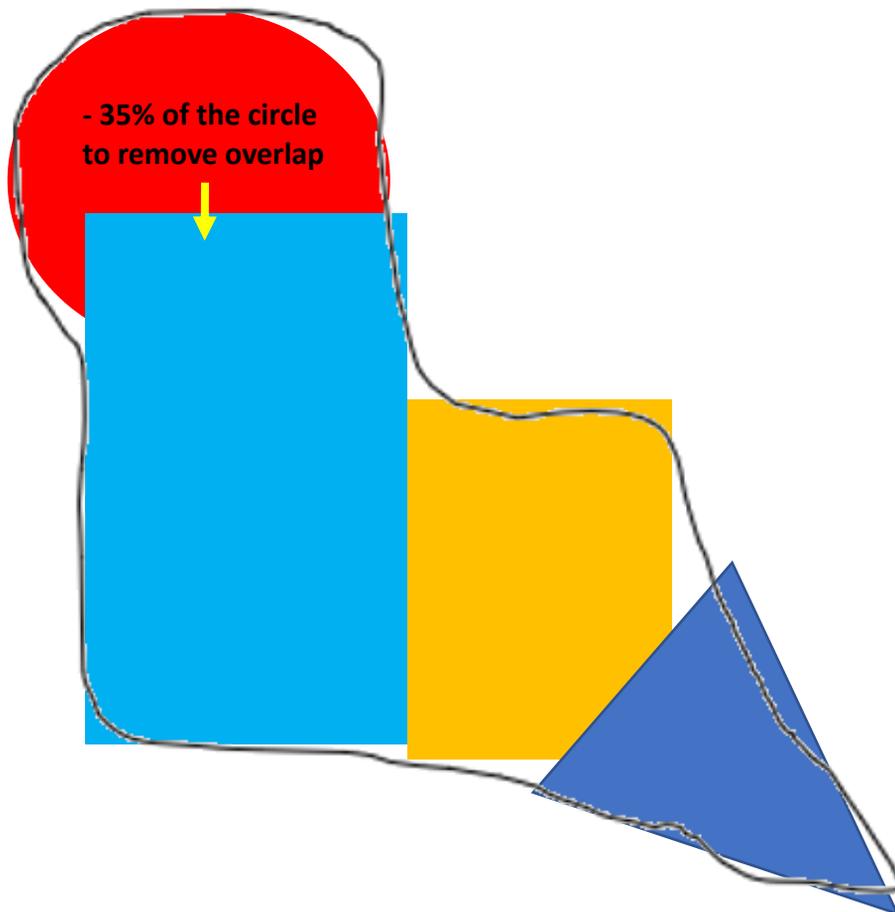
Step 2

Break the sketch down into recognizable shapes (circles, squares, etc.) as well as you can.



Step 3

Determine the volume of each shape. (Note: In this example, after the volume of the circle is determined, multiply it by approximately 65% so that the overlap with the rectangle area won't be counted twice.)

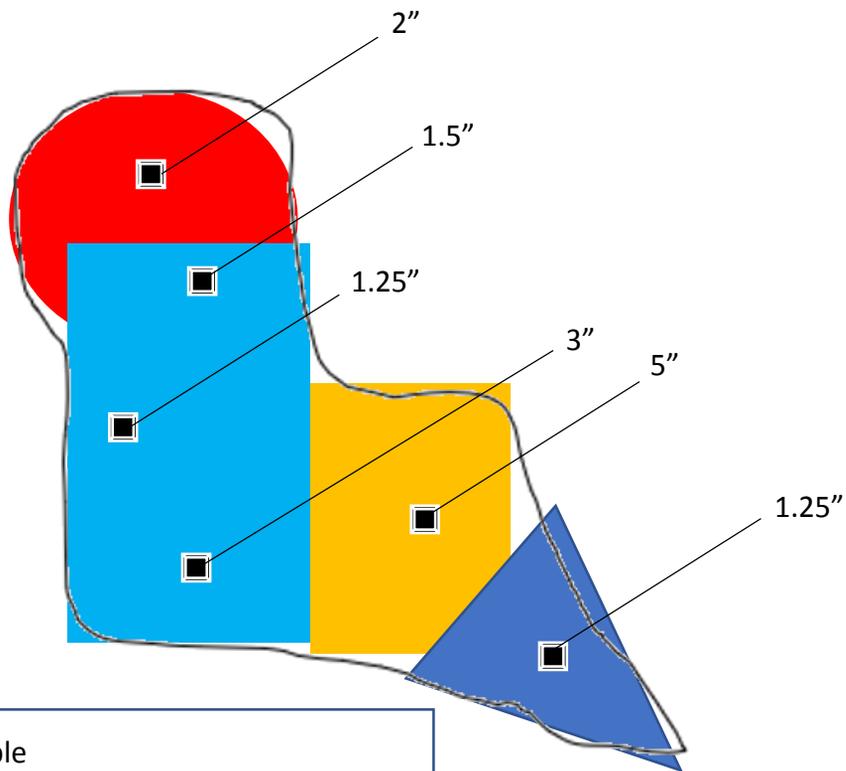


Sanitary Sewer Overflow Volume by Area Estimation
WorksheetWS-13
Side C

Step 4

If the spill is of varying depths, take several measurements at different depths and find the average.

If the spill affects a dry unimproved area such as a field or dirt parking lot, determine the area of the wetted ground in the same manner as you would on a hard surface. Using a round-pointed shovel, dig down into the soil until you find dry soil. Do this in several locations within the wetted area and measure the depth of the wet soil. Average the measurement/thickness of the wet soil and determine the average depth of the wet soil.



Average Depth Example

$$2'' + 1.5'' + 1.25'' + 3'' + 5'' + 1.25'' = 14.0''$$

$$14.0'' \div 6 \text{ measurements} = 2.33''$$

$$\text{Average Depth} = 2.33'' (0.194')$$

Appendix F - 2017 SSMP Audit

SEWER SYSTEM MANAGEMENT PLAN

INTERNAL AUDIT REPORT

SAN FRANCISCO PUBLIC UTILITIES COMMISSION - WASTEWATER ENTERPRISE

SAN FRANCISCO, CA

Audit conducted by:

SRT Consultants, Inc.

Adrian Santiago, Lead Auditor

References:

State Water Resources Control Board Order No. 2006-0003-DWQ, Statewide General Waste Discharge Requirement for Wastewater Collection Agencies

SFPUC Wastewater Enterprise Sewer System Management Plan – July 2015

Report – August 1, 2017

Introduction

The purpose of the Sewer System Management Plan (SSMP) internal audits are to evaluate the SSMP's effectiveness and the Enrollee's compliance with the SSMP requirements identified in the State Water Resources Control Board Order No. 2006-0003-DWQ (SSS WDR), and identify any deficiencies in the SSMP and the steps to correct them. The third party internal audits provide independent reviews and support credibility between certification audits.

The goal of the audit is to determine whether the SSMP for the San Francisco Public Utilities Commission's Wastewater Enterprise (WWE) is effective and in compliance with the SSS WDR.

Audit Scope

SRT Consultants, Inc. conducted a third party interim audit of the SSMP from Wednesday, June 28, 2017 to Friday, July 28, 2017. In general terms, the scope of the third party internal audit encompasses the entire SSMP, (organization; legal authority; design and performance provisions; the Overflow Emergency Response Plan; operation and maintenance program; FOG control program; system evaluation and capacity assurance plan; and monitoring, measurement, and program modifications).

The following individuals were interviewed or otherwise participated in meetings as part of the audit process:

- Laura Pagano, Regulatory Program Manager
- Karri Ving, Pollution Prevention and Resource Recovery Manager
- Joel Prather, Maintenance Division Manager
- Tomio Takeshita, Pretreatment Program Manager
- Michael Patolo, Sewer Operations Manager
- Kent Eickman, Associate Engineer
- Joseph Davis, Maintenance Planner

Internal Audit Findings

The internal audit included review of the latest version of the SSMP, dated July 2015, describing the plan and schedule to properly manage, operate, and maintain all parts of the sanitary sewer system. The internal audit found six nonconformances, four opportunities for improvement, and two positive observations.

The following is a review of the positive observations made during the audit process. Nonconformances and opportunities for improvement follow and are presented in the sequence of the SSS WDR elements. Each nonconformance description includes references to the minimum conformance requirements described in the SSS WDR.

POSITIVE OBSERVATIONS

Overall – WWE is in the process of implementing SSMP trainings into its Sharepoint training logger to effectively centralize training records for SSMP and OERP trainings. This project will involve use of Sharepoint to record trainings that is currently logged and recorded by hand. This system will automatically record the employee’s name, the training content, the date and time completed, and the date and time to be refreshed. The system eliminates illegible notes and records, transcription errors, hand-searching paper records, and allows quick analyses. It benefits several elements of the SSMP, including the OERP, the operations and maintenance program, and monitoring and measurement program.

FOG Control Program – WWE has a robust program to mitigate the control of FOG in the sanitary sewer area, with several drop-off/pick-up sites and restaurant pick-ups completed by SFGreasecycle.

NONCONFORMANCES AND OPPORTUNITIES FOR IMPROVEMENT

Organization

1. **Nonconformance: Names and contact information require updating.** As described in item D.13.ii.b of the SSS WDR, the SSMP should include names and telephone numbers for personnel responsible for implementing specific measures in the SSMP program. Appendix 1 of the Overflow Emergency Response Plan should be updated to include replacements for Herb Dang and George Engel. Further, references to California Emergency Management Agency (Cal EMA) should be replaced with California Office of Emergency Services (Cal OES); and references and procedures to RSAN should be replaced with i-INFO. Also, Chris McDaniels’ name is misspelled on page 13/325.

Legal Authority

2. **Opportunity for improvement: linked references to legal authority articles require updating.** Each of the footnoted links in the legal authority chapter were broken.

Operation and Maintenance Plan

3. **Nonconformance: missing map.** As described in item D.13.iv.a of the SSS WDR, the SSMP must include an up-to-date map of the sanitary sewer system showing all gravity line segments and manholes, pumping facilities, pressure pipes and vales, and applicable stormwater conveyance facilities. While Figure 1-1 of the SSMP depicted pump stations, neither Figure 1-1 nor Figure 5-1 includes gravity line segments, manholes, pressure pipes and valves, and all applicable stormwater conveyance facilities.

4. **Nonconformance: preventive maintenance program description to be updated.** As described in item D.13.iv.b of the SSS WDR, the SSMP must include a description of routine preventive operation and maintenance activities by staff and contractors, including a system for scheduling more frequent cleaning and maintenance targeted at known problem areas. While narrative on page 20/325 of the SSMP describes daily visits from O&M field crews to the pump stations and planned monthly, quarterly, and semi-annual preventative maintenance, the provided work orders do not support the assertion of monthly preventative maintenance. Further, neither the narrative nor the maintenance work orders describe more frequent cleaning and maintenance at known problem areas. Last, further discussion with staff revealed that SSMP should be updated to reflect current preventive maintenance efforts in the sanitary sewer area.
5. **Opportunity for improvement: update equipment and replacement part inventory.** As described by item D.13.iv.e of the SSS WDR, the SSMP must include an inventory for equipment and replacement parts. The inventory included as Appendix 2 to the SSMP is not dated. As a result, adding a date to the equipment and replacement part inventory will help ensure that the inventory is accurate and up to date.

Overflow Emergency Response Plan (OERP)

6. **Opportunity for improvement: finalize OERP.** The OERP as included in the SSMP is still marked as “draft”.
7. **Nonconformance: no training records.** As described by item D.13.vi.d of the SSS WDR, the OERP must include procedures to ensure that appropriate staff and contractor personnel are aware of, trained on, and follow the Emergency Response Plan. As described in Chapter 9 of the OERP (page 75/325 of the SSMP), the trainings are tracked in the Learning Management System. Further discussion with staff revealed that no such trainings have occurred, and there are no such records.

FOG Control Program

8. **Nonconformance: no identification of sections subject to blockages and cleaning maintenance schedules for those sections.** As described by item D.13.vii.e of the SSS WDR, the SSMP must include an identification of sanitary sewer system sections subject to FOG blockages. The existing SSMP only identified one area, and should be updated to reflect current sections subject to FOG blockages. Further, as described by item D13.vii.f, the SSMP should describe an established cleaning maintenance schedule for each section. The existing SSMP includes no such schedule.
9. **Opportunity for improvement: update SSMP to include grease pick-up/drop-off locations.** As described by D.13.vii.b of the SSS WDR, the SSMP may include a list of acceptable disposal facilities. While such a list is available on the sfwater.org website, the list is not included in the SSMP.

Monitoring and Measurement

10. **Nonconformance: SSMP does not illustrate SSO trends.** As described by D.13.ix.e, the SSMP must identify and illustrate SSO trends, including frequency, location, and volume. The existing SSMP makes no such identification or illustration.

Conclusions and Recommendations

The results of the internal audit show that WWE has a strong SSMP. While there are corrective actions to be applied, the SSMP and its maintenance should be a continuous improvement process. The results of this and future audits will provide value added to the system and should be viewed as an overall opportunity to improve. Every audit is a snapshot in time, and does not, or cannot, identify each and every area for improvement. While no single audit identifies all areas for improvement, the results of each audit provide an additional incremental step in the overall system's improvement.

Attachment 1

Documents and Other Objective Evidence Reviewed During the Internal Audit

1. Organization
 - a. Sewer System Management Plan – July 2015
2. Legal Authority
 - a. Sewer System Management Plan – July 2015
 - b. Articles 4.1 and 4.2 of the San Francisco Public Works Code
3. Operation and Maintenance Program
 - a. Sewer System Management Plan – July 2015
 - b. MAXIMO Work Orders from 7/1/15 to 6/30/17
4. Design and Performance Provisions
 - a. Sewer System Management Plan – July 2015
 - b. Standard Engineering Plans and Specifications for the City and County of San Francisco
 - c. Subdivision Regulations for San Francisco
 - d. California Plumbing Code
5. Overflow Emergency Response Plan
 - a. WWT Overflow Emergency Response Plan – June 2014
 - b. Collection System Division Sharepoint for Competence, Awareness, and Training
6. FOG Control Program
 - a. Sewer System Management Plan – July 2015
 - b. FOG Control public outreach website
7. System Evaluation and Capacity Assurance Plan
 - a. Sewer System Management Plan – July 2015
 - b. Sewer System Improvement Program Quarterly Reports
 - c. FY 2016-17 and FY 2017-18 Capital Project Budget
8. Monitoring and Measurement
 - a. Sewer System Management Plan – July 2015