Chapter 43

Industrial Wastewater

Chapter Outline

1 Overview

This chapter outlines SLAC programs and responsibilities required to comply with the rules and regulations regarding industrial wastewater and sanitary sewers administered by the South Bayside System Authority (SBSA) and the West Bay Sanitary District (WBSD). The relationship between SLAC and the SBSA and the WBSD is formalized in discharge regulations and wastewater discharge limits set forth in a permit. These limits are necessary to protect the sanitary sewer system and treatment plant as well as its operators, and are based on the ability of the sewage treatment plant to treat wastewater to safe levels before discharge to the San Francisco Bay.

1.1 Hazards/Impacts

Pouring hazardous material down sinks or floor drains could cause permit limits to be exceeded. Hazards associated with discharging industrial wastewater into the sewer system in excess of permit limits include damaging the water treatment plant and polluting water resources.

Factors that may impact SLAC include increased restrictions and conditions on quality and quantity of discharges to the sanitary sewer. The SLAC industrial wastewater program addresses these through current compliance and the establishment of a management system that can adapt to a more restrictive regulatory environment in the future.

2 Scope

The requirements of this chapter apply to all personnel, including SLAC employees, subcontractors, users, and visitors.

This chapter describes the SLAC industrial wastewater program requirements and conditions as specified in the Mandatory Wastewater Discharge Permit issued by the SBSA.

This chapter also includes applicable *best management practices* (BMPs) that help keep SLAC wastewater within permit limits.

This chapter pertains only to wastewater discharged to the *sanitary sewer*. For regulations and requirements regarding water that enters the *storm drain* system, see Chapter 26, “Stormwater”.[1]

The wastewater discharge permit accidental release plan requirement is met by the *Consolidated Chemical Contingency Plan (CCCP)*. The CCCP fulfills numerous emergency planning requirements, including those for a hazardous materials business plan (HMBP), which can be used in lieu of a separate accidental release plan.[2]

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1 *SLAC Environment, Safety, and Health Manual* (SLAC-I-720-0A29Z-001), Chapter 26, “Stormwater”, http://www-group.slac.stanford.edu/esh/environment/stormwater/policies.htm

2 *Consolidated Chemical Contingency Plan* (SLAC-I-730-3A86H-008), http://www-group.slac.stanford.edu/esh/documents/CCCP.pdf

3 Standards

SLAC adheres to the following standards for its industrial wastewater program.

- Title 33, *United States Code*, "Navigation and Navigable Waters", Chapter 26, "Water Pollution Prevention and Control"[3]
  - Section 1251, "Congressional Declaration of Goals and Policy" (33 USC 1251)
  - Section 1311, "Effluent Limitations" (33 USC 1311)
  - Section 1314(g), "Guidelines for Pretreatment of Pollutants" (33 USC 1314g)
  - Section 1317, "Toxic and Pretreatment Effluent Standards" (33 USC 1317)
  - Section 1318, "Records and Reports; Inspections" (33 USC 1318)
  - Section 1319, "Enforcement" (33 USC 1251)
  - Section 1341(a), "Compliance with Applicable Requirements; Application; Procedures; License Suspension" (33 USC 1341a)
- Title 42, *United States Code*, "The Public Health and Welfare"[4]
  - Chapter 82, "Solid Waste Disposal" (42 USC 6901 and following)
- Title 10, *Code of Federal Regulations*, "Energy", Chapter 1, "Nuclear Regulatory Commission"[5]
  - Section 20.2003(d), "Disposal by Release into Sanitary Sewerage Systems"
- Title 40, *Code of Federal Regulations*, "Protection of the Environment", Chapter 1, "Environmental Protection Agency"[6]
  - Part 403, "General Pretreatment Regulations for Existing and New Sources of Pollution"
  - Part 413, "Electroplating Point Source Category"
  - Part 433, "Metal Finishing Point Source Category"
- DOE Order 5400.5, "Radiation Protection of the Public and the Environment" [7]
- Title 17, *California Code of Regulations*, "Public Health", Division 1, "State Department of Health Services", Chapter 5, "Sanitation (Environmental)", Subchapter 4, "Radiation", Group 3, "Standards for Protection against Radiation", Article 3, "Surveys and Tests" [8]
  - Section 30287, "Disposal by Release into Sanitary Sewerage Systems" (17 CCR 30287)

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3 "United States Code: Main Page", http://www.gpoaccess.gov/uscode/index.html

4 "United States Code: Main Page", http://www.gpoaccess.gov/uscode/index.html

5 "Code of Federal Regulations (CFR): Main Page", http://www.gpoaccess.gov/cfr/index.html

6 "Code of Federal Regulations (CFR): Main Page", http://www.gpoaccess.gov/cfr/index.html

7 http://www.directives.doe.gov/pdfs/doe/doetext/oldord/5400/o54005c2.html

8 "California Code of Regulations", http://ccr.oal.ca.gov/

- Title 22, *California Code of Regulations*, "Social Security", Division 4.5, "Environmental Health Standards for the Management of Hazardous Waste", Chapter 45, "Requirements for Units and Facilities Deemed to Have a Permit by Rule", Article 1, "Permit by Rule"[9]
  - Sections 67450.1 through 67450.3 (22 CCR 67450.1–3)
- *California Health and Safety Code*, Division 20, "Miscellaneous Health and Safety Provisions", Chapter 6.5, "Hazardous Waste Control"
  - Article 9, "Permitting of Facilities" (HSC 25200.12–25205)[10]
- *California Water Code*, Division 7, "Water Quality"
  - Sections 13000 and following (WC 13000 and following)[11]
- Mandatory Wastewater Discharge Permit under South Bayside System Authority Uniform Regulations
- *Code of General Regulations of the West Bay Sanitary District*[12]

4 Definitions

Best management practice (BMP). Engineering or administrative actions to manage properly activities that have the potential to impact the sanitary sewer system

Sanitary sewer. A pipe or conduit that carries wastewater and to which storm and surface water are not intentionally admitted. The sanitary sewer at SLAC handles domestic and industrial wastewater discharges from SLAC operations.

Solvent management plan (SMP). A site-specific plan that identifies toxic organic compounds used at a facility and describes their proper use, storage, and management

South Bayside System Authority (SBSA). Wastewater treatment facility that serves southern San Mateo county, including SLAC

Total toxic organics (TTO). Summation of all quantifiable values of designated toxic organics in the wastewater discharge

Volatile organic compounds (VOCs). Organic compounds that have high enough vapor pressures under normal conditions to vaporize significantly and enter the atmosphere

Wastewater constituents. The individual chemical, physical, bacteriological, and radiological parameters, including volume and flow rate and such other parameters that serve to define, classify, or measure the contents, quality, quantity, or strength of wastewater

Wastewater discharge.

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9 "California Code of Regulations", http://ccr.oal.ca.gov/

10 "California Law", http://www.leginfo.ca.gov/calaw.html

11 "California Law", http://www.leginfo.ca.gov/calaw.html

12 http://www.westbaysanitary.org/pdf/code_genregulations.pdf

- *Non-routine.* Any water not included in the any current permit. Disposal of any non-routine discharge requires a non-routine permit
- *Prohibited.* A discharge explicitly prohibited under the terms of a permit, including spills
- *Routine.* Includes any non-hazardous wastewater that is routinely discharged during normal operations. There are 20 wastewater discharge types described in the main SLAC permit. Examples include cooling tower blow down, low conductivity water (LCW) from cooling systems, groundwater treatment facility discharges, and cafeteria wastewater.

Wastewater, industrial. The liquid wastes from industrial processes

West Bay Sanitary District (WBSD). The West Bay Sanitary District owns and maintains the sewer mains and pump stations. WBSD along with the cities of Belmont, San Carlos, and Redwood City are constituent members of the joint powers authority that owns and operates the SBSA (see *SBSA* above)

5 Requirements

5.1 General

The main requirement for SLAC is to comply with applicable rules and regulations regarding industrial wastewater, generally expressed in the permit. Staying in compliance involves correctly characterizing discharges, observing permitting requirements, and using BMPs where appropriate to stay within permit limits.

5.1.1 Types of Discharges

All wastewater discharges are categorized as *routine* (listed in a current SLAC permit), *non-routine* (eligible to be discharged under a non-routine permit), or *prohibited*, as described below.

5.1.1.1 Routine Discharges

The SLAC wastewater discharge permit with the SBSA and WBSD characterizes acceptable routine discharges to the sanitary sewer in terms of type and flow. These discharges are itemized in Industrial Wastewater: Permitted and Prohibited Discharge Reference.[13]

Any process change that significantly affects the constituents, strength, volume, temperature, or discharge period of the wastewater must be reported to the IW program manager to determine

- The type of permit required (update the existing permit or apply for a non-routine permit)
- Notification requirements (SBSA and WBSD)

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13 Industrial Wastewater: Permitted and Prohibited Discharge Reference (SLAC-I-750-0A16T-006), http://www-group.slac.stanford.edu/esh/eshmanual/references/iwRefPermits.pdf

5.1.1.2 Non-routine Discharges

Certain discharges not covered under the existing permit may require evaluation to determine the required type of permit or the appropriate disposal method if discharge to the sanitary sewer is prohibited. Process owners must contact the IW program manager for assistance.

Note *For discharges that must be disposed of as a* California-regulated *waste, see Chapter 17, "Hazardous Waste".* [14]

5.1.1.3 Prohibited Discharges

SLAC's permit characterizes prohibited discharges, which include any discharge that endangers human life or safety, causes a fire or explosion, contains hazardous materials, causes a detrimental environmental impact, or obstructs flow. For a complete list of prohibited discharges, see Industrial Wastewater: Permitted and Prohibited Discharge Reference.[15]

All spills or discharges to the sanitary sewer system that violate permit conditions must be reported to the IW program manager, who will ensure the spill or discharge is reported to the SBSA, as required. Any spills containing radioactive water or constituents must also be reported to the Radiation Protection Department (RP). For more information on handling spills, see Chapter 16, "Spills".[16]

5.1.2 Permit Requirements

SLAC's wastewater discharge permit with the SBSA and WBSD characterizes acceptable routine discharges to the sanitary sewer in terms of type and flow.

5.1.2.1 Application and Renewal

New Routine Discharges

The IW program manager must characterize all new routine discharges and add them to the permit.

Routine Discharges

The mandatory permit is issued for one year and may be renewed automatically for successive one-year terms for up to five years if all sampling, metering, and reporting stipulations are met (see below). In addition, a solvent management plan (SMP) is required pursuant to a permit modification issued by SBSA in April of 2001, which directed dischargers to generate such a plan in lieu of continued monitoring for *total toxic organics* (TTOs). For SLAC's SMP, see Industrial Wastewater: Solvent Management Plan.[17]

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14 *SLAC Environment, Safety, and Health Manual* (SLAC-I-720-0A29Z-001), Chapter 17, "Hazardous Waste", http://www-group.slac.stanford.edu/esh/environment/hazardous_waste/policies.htm

15 Industrial Wastewater: Permitted and Prohibited Discharge Reference (SLAC-I-750-0A16T-006), http://www-group.slac.stanford.edu/esh/eshmanual/references/iwRefPermits.pdf

16 *SLAC Environment, Safety, and Health Manual* (SLAC-I-720-0A29Z-001), Chapter 16, "Spills", http://www-group.slac.stanford.edu/esh/environment/spills/policies.htm

17 [forthcoming]

The permit can be revised at any time for the purposes of protecting workers and sanitary sewer facilities and to accommodate new regulations that encompass the sewage treatment plant or the sanitary district.

Non-routine Discharges

Non-routine discharges require a non-routine permit. Approval for a wastewater discharge permit must occur prior to discharge and may include fees and constraints on quantity and timing of discharge. The IW program manager will assist process owners and personnel in

- Characterizing non-routine wastewater
- Applying for a non-routine discharge permit
- Coordinating the discharge with the SBSA and WBSD

5.1.2.2 Metering

Wastewater volume is measured by meters located as required in order to

- Monitor the total flow from the SLAC site (SLAC's contract with WBSD specifies a total industrial and sanitary flow; if this flow is exceeded, additional charges apply)
- Monitor the volume discharged from the Metal Finishing Pretreatment Facility (MFPF)
- Calculate total wastewater and constituents of concern entering the sanitary sewer (flow measurements together with sample analysis are the basis for total flow and total constituent calculations)

Meters are inspected, calibrated, and maintained by the Conventional and Experimental Facilities (CEF) Department.

Note *The volume of any radioactive water discharged to the sanitary sewer is reported to RP. Such discharges are tracked by RP to ensure that permit limits are not exceeded.*

5.1.2.3 Sampling

Sample collection frequency, constituent analysis, and reporting are specified in the permit. Samples are collected by the SBSA and SLAC, as indicated below.

SBSA Sampling Events

The SBSA monitors compliance by collecting quarterly composite and grab samples of SLAC's discharge into the sanitary sewer. Samples are analyzed for a variety of constituents, including metals and selected VOCs.

SLAC Sampling Requirements

SLAC's permit includes one location (MFPF) where potentially hazardous wastewater is treated prior to discharging to the sanitary sewer. Samples from this location must be analyzed for constituents of concern two times per year.

Radioanalysis of wastewater with known or suspected radiological analytes must be performed prior to discharge to the sanitary sewer in order to ensure that SLAC is within the permit's annual discharge limits.

5.1.2.4 Reporting

Routine and accidental reporting requirements for SLAC's discharge permits and radioactive releases are itemized below. All reports are submitted to the SBSA and WBSD.

Mandatory Discharge Permit Reporting Requirements

SLAC is required to submit a semi-annual self-monitoring report to SBSA by January 31 and July 31 of each year that encompasses the conditions of the permit. This report also includes results from SLAC's semi-annual sampling event.

In addition, the SBSA requires a certification statement included in the self-monitoring report that states that

- SLAC fully implements the SMP
- No concentrated toxic organics were released to the sewer system during the six month reporting period.

Radioactive Releases Reporting Requirements

RP submits a quarterly report to the SBSA that provides radioanalysis results, volume of radioactive water released to the system, and total amount of radioactivity.

Accidental Release Reporting Requirements

- **All spills.** All spills or discharges to the sanitary sewer system that violate permit conditions must be reported to the IW program manager, who will report the spill or discharge to the SBSA, as required.
- **Radioactive spills.** Any releases containing radioactive water or constituents must be reported to RP in addition to reporting to the IW program manager.

5.1.3 Industrial Wastewater Best Management Practices

Best management practices (BMPs) are industry standards that are accepted by regulatory agencies as a way to protect the environment. Industrial wastewater BMPs are not mandatory, but their implementation is a key to SLAC staying within wastewater permit discharge limits.

5.1.4 Sanitary Sewer System

5.1.4.1 Maintenance

The sanitary sewer system must be maintained in compliance with the discharge permit. The Conventional and Experimental Facilities (CEF) Department will meet this responsibility.

5.1.4.2 Connections

All new connections to the system must be approved by CEF.

Note *Connection of any process stream to the storm drain system is prohibited. (See Chapter 26, "Stormwater". [18])*

5.1.4.3 Construction

The Chemical and General Safety (CGS) Department must review construction projects for potential to affect the system.

5.1.5 Roles and Responsibilities

5.1.5.1 Industrial Wastewater Program Manager

The IW program manager will

- Act as the primary point of contact (POC) for the SBSA and WBSD
- Address any compliance issues concerning the SLAC mandatory wastewater discharge permit, including ensuring that spills that violate permit requirements are reported
- Prepare, submit, and track non-routine discharge applications
- Prepare the semi-annual self-monitoring report of wastewater discharge and SMP certification statement for submittal to the SBSA and WBSD
- Review new equipment and modified processes for compliance with the wastewater discharge permit conditions
- Coordinate with RP on all matters concerning wastewater that potentially contains radioactivity. This includes meeting permit conditions, system design and implementation, and reporting.

5.1.5.2 Conventional and Experimental Facilities Department

CEF must approve connections to the sanitary sewer. No portion of the sanitary sewer system may be blocked, either temporarily or permanently, without CEF approval. CEF will

- Review for approval any new connections to the potable water system, sanitary sewer, or storm drain system
- Clean the cafeteria grease traps and coordinate with the WBSD for grease trap inspections
- Coordinate with the IW program manager and RP to ensure wastewater discharges, including modified or new connections, are in compliance with permit requirements
- Inspect, clean, service, calibrate, and maintain flow meters required under the mandatory wastewater discharge permit. This must be done at least annually and as required for proper operation
- Maintain the SLAC sanitary sewer system. This includes replacement, repair, cleaning and flushing, removing blockages, and implementing preventive maintenance programs
- Assess capacity issues with the addition of new discharges and plan for system upgrades and expansion

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18 *SLAC Environment, Safety, and Health Manual* (SLAC-I-720-0A29Z-001), Chapter 26, "Stormwater", http://www-group.slac.stanford.edu/esh/environment/stormwater/policies.htm

5.1.5.3 Mechanical Fabrication Department

The Mechanical Fabrication Department (MFD) operates a wastewater treatment plant that removes pollutants from industrial process effluents prior to discharge to the sanitary sewer system. MFD will

- Ensure that discharges of treated wastewater for the MFPF in Building 38 comply with permit limits
- Comply with monitoring and record-keeping requirements for operations under their control. This includes documenting procedures, process upsets and changes, and sampling results. Any process upsets and changes must be reported to the IW program manager as soon as possible.

5.1.5.4 Radiation Protection Department

RP will ensure that any wastewater that may be radiologically active meets regulatory requirements. This includes, but is not limited to the RP

- Performing radioanalysis of wastewater with known or suspected radiological analytes prior to discharge to the sanitary sewer
- Summarizing radioanalysis results in a quarterly report to the SBSA
- Reviewing permit updates and renewals with the IW program manager
- Reviewing and approving any new or modified systems or discharges for known or suspected radiological analytes

Note *Sample collection and delivery to RP are the responsibility of the group generating the wastewater.*

5.1.5.5 Waste Management Group

The Waste Management Group (WM) is responsible for the handling and disposal of industrial wastewater that is a regulated, non-radiological waste that can not be discharged to the sanitary sewer system under the mandatory wastewater discharge permit or a non-routine wastewater discharge permit. For information on characterizing and labeling hazardous waste, see Chapter 17, "Hazardous Waste". [19]

5.1.5.6 Chemical and General Safety Department

The Chemical and General Safety (CGS) Department is responsible for reviewing construction projects that may impact the sanitary sewer system.

5.1.5.7 Project Managers and University Technical Representatives

Project managers and university technical representatives (UTRs) are required to know and adhere to all SLAC ES&H policies for systems or operations, and they are responsible for subcontractors under their control. Each person will

- Implement construction management practices and perform construction activities in compliance with regulatory requirements and BMPs

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19 *SLAC Environment, Safety, and Health Manual* (SLAC-I-720-0A29Z-001), Chapter 17, "Hazardous Waste", http://www-group.slac.stanford.edu/esh/environment/hazardous_waste/policies.htm

- Notify the IW program manager of any unplanned discharges to the sanitary sewer system arising from work conducted under project manager or UTR direction
- Obtain approval from CEF to make new connections to the potable water system, sanitary sewer, or storm drain systems. It is desirable to obtain approval early in the design process

5.1.5.8 Managers and Supervisors

SLAC managers and supervisors are responsible for implementing ES&H policy with regard to complying with the conditions of SLAC's discharge permit. Managers and supervisors will

- Add BMPs into standard operating procedures and work practices for any processes or storage areas that require them
- Ensure that operations in buildings and areas under their control, including wastewater discharges, comply with SLAC ES&H requirements
- Identify processes that may be sources of non-permitted discharges to the sanitary sewer system and report them to the IW program manager for evaluation and possible inclusion in the permit
- Instruct employees on proper disposal and storage of material to prevent accidental releases to the sanitary sewer
- Instruct employees on proper disposal of accumulated water and on the process for getting approval for a non-routine discharge to the sanitary sewer

5.1.5.9 Personnel

SLAC personnel will

- Learn and comply with ES&H policies, practices, procedures and requirements regarding allowable (permitted) discharges to the sanitary sewer
- Coordinate with the IW program manager when evaluating the installation of new effluent-producing processes. The IW program manager must review and approve all new or non-routine discharges to the sanitary sewer system prior to discharge
- Coordinate with WM to dispose of chemicals and hazardous waste
- Report accidental discharges to the sanitary sewer immediately. For more information see Chapter 16, "Spills".[20]
- Contact CEF before making any changes to the sanitary sewer
- Coordinate with CEF for proper connection of processes to the sanitary sewer system

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20 *SLAC Environment, Safety, and Health Manual* (SLAC-I-720-0A29Z-001), Chapter 16, "Spills", http://www-group.slac.stanford.edu/esh/environment/spills/policies.htm

5.2 Procedures and Specific Requirements

5.2.1 Permitting

5.2.1.1 Routine Discharges

SLAC's permit with the SBSA and WBSD specify wastewater discharge conditions for routine discharges. These are listed in Industrial Wastewater: Permitted and Prohibited Discharge Reference.[21]

5.2.1.2 Non-routine Discharges

For any non-routine discharges, the existing permit must be updated or a non-routine permit must be applied for and issued. For additional information, see Industrial Wastewater: Discharge Characterization Guidelines.[22]

5.2.2 Best Management Practices

Implementing BMPs for operations that produce industrial wastewater is essential to staying within SLAC's industrial wastewater discharge permit limits.

- BMPs for machine, maintenance, and craft shops are listed in Industrial Wastewater: Machine, Maintenance, and Craft Shop Best Management Practices.[23]
- BMPs for laboratories are listed in Industrial Wastewater: Wet or Chemical Lab Best Management Practices.[24]
- BMPs for pipe flushing are listed in Industrial Wastewater: Treatment of Pipe Flushing Water Best Management Practices.[25]
- BMPs for the cafeteria are listed in Industrial Wastewater: Cafeteria Best Management Practices.[26]

Note *For work that is performed outside, such as power washing of buildings, shielding material, equipment, and vehicles, see the BMPs in Chapter 26,"Stormwater", to ensure that no waste water enters the storm drains.*[27]

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21 Industrial Wastewater: Permitted and Prohibited Discharge Reference (SLAC-I-750-0A16T-006), http://www-group.slac.stanford.edu/esh/eshmanual/references/iwRefPermits.pdf

22 Industrial Wastewater: Discharge Characterization Guidelines (SLAC-I-750-0A16T-007), http://www-group.slac.stanford.edu/esh/eshmanual/references/iwGuideDischarge.pdf

23 Industrial Wastewater: Machine, Maintenance, and Craft Shop Best Management Practices (SLAC-I-750-0A16E-015), http://www-group.slac.stanford.edu/esh/eshmanual/references/iwBMPMachine.pdf

24 Industrial Wastewater: Wet or Chemical Labs Best Management Practices (SLAC-I-750-0A16E-016), http://www-group.slac.stanford.edu/esh/eshmanual/references/iwBMPLab.pdf

25 Industrial Wastewater: Treatment of Pipe Flushing Water Best Management Practices (SLAC-I-750-0A16E-018), http://www-group.slac.stanford.edu/esh/eshmanual/references/iwBMPPipeFlushing.pdf

26 Industrial Wastewater: Cafeteria Best Management Practices (SLAC-I-750-0A16E-017), http://www-group.slac.stanford.edu/esh/eshmanual/references/iwBMPCafeteria.pdf

5.2.3 Sampling

Sampling is carried out by specified entities at regular intervals. For details see Industrial Wastewater: Wastewater Sampling Requirements.[28]

5.3 Training

There are no specific training requirements for the industrial wastewater program.

6 Exhibits

- Industrial Wastewater: Implementation Plan (SLAC-I-750-0A16M-006)[29]
- Industrial Wastewater: Permitted and Prohibited Discharge Reference (SLAC-I-750-0A16T-006)[30]
- Industrial Wastewater: Discharge Characterization Guidelines (SLAC-I-750-0A16T-007)[31]
- Industrial Wastewater: Wastewater Sampling Requirements (SLAC-I-750-0A16S-008)[32]
- Industrial Wastewater: Solvent Management Plan [plan being revised][33]
- Industrial Wastewater: Wet or Chemical Labs Best Management Practices (SLAC-I-750-0A16E-016)[34]
- Industrial Wastewater: Machine, Maintenance, and Craft Shop Best Management Practices (SLAC-I-750-0A16E-015)[35]
- Industrial Wastewater: Cafeteria Best Management Practices (SLAC-I-750-0A16E-017)[36]
- Industrial Wastewater: Treatment of Pipe Flushing Water Best Management Practices (SLAC-I-750-0A16E-018)[37]
- *Consolidated Chemical Contingency Plan* (SLAC-I-730-3A86H-008)[38]

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27 *SLAC Environment, Safety, and Health Manual* (SLAC-I-720-0A29Z-001), Chapter 26, “Stormwater”, http://www-group.slac.stanford.edu/esh/environment/stormwater/policies.htm

28 Industrial Wastewater: Wastewater Sampling Requirements (SLAC-I-750-0A16S-008), http://www-group.slac.stanford.edu/esh/eshmanual/references/iwReqSampling.pdf

29 http://www-group.slac.stanford.edu/esh/eshmanual/references/iwPlanImplement.pdf

30 http://www-group.slac.stanford.edu/esh/eshmanual/references/iwRefPermits.pdf

31 http://www-group.slac.stanford.edu/esh/eshmanual/references/iwGuideDischarge.pdf

32 http://www-group.slac.stanford.edu/esh/eshmanual/references/iwReqSampling.pdf

33 [forthcoming]

34 http://www-group.slac.stanford.edu/esh/eshmanual/references/iwBMPLab.pdf

35 http://www-group.slac.stanford.edu/esh/eshmanual/references/iwBMPMachine.pdf

36 http://www-group.slac.stanford.edu/esh/eshmanual/references/iwBMPCafeteria.pdf

37 http://www-group.slac.stanford.edu/esh/eshmanual/references/iwBMPPipeFlushing.pdf

7 References

SLAC Environment, Safety, and Health Manual (SLAC-I-720-0A29Z-001)[39]

- Chapter 9, "Radiological Safety"[40]
- Chapter 16, "Spills"[41]
- Chapter 17, "Hazardous Waste" [42]
- Chapter 26, "Stormwater"[43]
- Chapter 40, "Hazardous Materials"[44]

8 Implementation

The requirements of this chapter will be implemented according to the schedule in Industrial Wastewater: Implementation Plan.[45]

9 Ownership

Department: Environmental Protection

Program: Industrial Wastewater

Owner: Program Manager, Darrin Gambelin

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38 http://www-group.slac.stanford.edu/esh/documents/CCCP.pdf

39 http://www-group.slac.stanford.edu/esh/eshmanual/

40 http://www-group.slac.stanford.edu/esh/general/radiological_safety/policies.htm

41 http://www-group.slac.stanford.edu/esh/environment/spills/policies.htm

42 http://www-group.slac.stanford.edu/esh/environment/hazardous_waste/policies.htm

43 http://www-group.slac.stanford.edu/esh/environment/hazardous_waste/policies.htm

44 http://www-group.slac.stanford.edu/esh/hazardous_substances/haz_materials/policies.htm

45 http://www-group.slac.stanford.edu/esh/eshmanual/references/iwPlanImplement.pdf

Industrial Wastewater: Implementation Plan

Department: Environmental Protection
Program: Industrial Wastewater
Owner: Darrin Gambelin
Authority: ES&H Manual, Chapter 43, Industrial Wastewater

The requirements of Chapter 43, "Industrial Wastewater", will be phased in according to the following schedule.

Section Number	Section Title	Requirement Note	Effective Date	Schedule Note
5	Requirements			
5.1.1	Types of Discharges			
5.1.1.1	Routine Discharges		Immediate	
5.1.1.2	Non-routine Discharges		Immediate	
5.1.1.3	Prohibited Discharges		Immediate	
5.1.1.4	Accidental Discharges		Immediate	
5.1.2	Permit Requirements	New permit requires implementation of a "slug discharge plan." This plan will be developed from existing site plans and implemented.	6/1/2007	New Permit Issued 12/16/06
5.1.2.1	Application and Renewal		Immediate	
5.1.2.2	Metering		Immediate	
5.1.2.3	Sampling		12/16/2006	New sampling requirements have been implemented
5.1.2.4	Reporting		12/16/2006	New reporting requirements have been implemented

Section Number	Section Title	Requirement Note	Effective Date	Schedule Note
5.1.3	Industrial Wastewater Best Management Practices		Immediate	
5.1.4	Sanitary Sewer System			
5.1.4.1	Maintenance		Immediate	
5.1.4.2	Connections		Immediate	
5.1.4.3	Construction		Immediate	
5.1.5	Roles and Responsibilities			
5.1.5.1	Industrial Wastewater Program Manager		Immediate	
5.1.5.2	Conventional and Experimental Facilities Department		Immediate	
5.1.5.3	Mechanical Fabrication Department		Immediate	
5.1.5.4	Radiation Protection Department		Immediate	
5.1.5.5	Waste Management Group		Immediate	
5.1.5.6	Chemical and General Safety Department		Immediate	
5.1.5.7	Project Managers and University Technical Representatives		Immediate	
5.1.5.8	Managers and Supervisors		Immediate	
5.1.5.9	Personnel		Immediate	
5.2	Procedures and Specific Requirements			
5.2.1	Permitting		Immediate	
5.2.1.1	Routine Discharges		Immediate	
5.2.1.2	Non-routine Discharges		Immediate	

Section Number	Section Title	Requirement Note	Effective Date	Schedule Note
5.2.2	Best Management Practices		Immediate	
5.2.3	Sampling		12/16/06	New sampling requirements have been implemented
5.3	Training		Immediate	

Industrial Wastewater: Permitted and Prohibited Discharge Reference

Department: Environmental Protection
Program: Industrial Wastewater
Owner: Program Manager, Darrin Gambelin
Authority: ES&H Manual, Chapter 43, Industrial Wastewater

SLAC's industrial wastewater permits are explicit about the type and amount of wastewater that can enter the sanitary sewer, and all 20 permitted discharges are described in this exhibit. The permits are also explicit about which types of discharges are prohibited, and these are itemized as well. Any industrial wastewater discharges not listed below must first be cleared with the industrial wastewater (IW) program manager before discharge to the sanitary sewer. Any prohibited discharge must be managed by the Waste Management (WM) Group. (See Industrial Wastewater: Discharge Characterization Guidelines.[1])

Permitted Industrial Discharges

Each of the twenty industrial wastewater discharges currently named in SLAC's permits is listed below by their permit discharge number (left column) and each is described in terms of process description, location, flow, characterization, and point of discharge on the page number listed on the right.

1 Industrial Wastewater: Discharge Characterization Guidelines (SLAC-I-750-0A16T-007), http://www-group.slac.stanford.edu/esh/eshmanual/references/iwGuideDischarge.pdf

Prohibited Discharges

SLAC's permit stipulates that no discharge may enter the sanitary sewer that may cause

- Danger to human life or safety
- Fire or explosion
- Introduction of hazardous waste to be discharged to the sanitary sewer
- Odors, air pollution, or any noxious, toxic, or malodorous gas or substance, or gas producing substances
- Flow obstruction or injury to the sewerage facilities
- Interference or overloading of the wastewater treatment or reclamation process, or sewerage facilities, or excessive costs, or use of a disproportionate share of the capacity of the sewerage facilities
- A detrimental environmental impact or nuisance, e.g., any discharge containing detectable levels of polychlorinated biphenyls
- Dilution of a discharge of waste or wastewater as a substitute for adequate treatment
- Inhibition of maintenance or operation of the sewerage facilities
- Any adverse action that impacts the ability of the sewage treatment plant to protect the San Francisco Bay

For help in characterizing any potential hazard and how best to discharge, treat, or remove it, contact the IW program manager.

Itemized SLAC Permitted Discharges

Details for permitted discharges follow on the following pages.

1 Metal Finishing Pretreatment Facility

Description

The Metal Finishing Pretreatment Facility (MFPF) pretreats

- All wastewaters associated with the Plating Shop operations. Operations and equipment include: process tanks (including cyanide room tanks), air scrubbers, laboratory sinks, effluent from the regeneration of de-ionized water, and steam-cleaning runoff.
- Non-hazardous wastewaters generated by flushing heat-exchanger and cooling system piping. The metal content determines if pretreatment is required.
- Solutions from the regeneration of de-ionized water
- Miscellaneous non-hazardous wastewaters that require pH adjustment or reduction of metals concentrations in order to meet permit limits.

Location

Building 38, west of the Heavy Fabrication Building (Building 26) and east of the Plating Shop (Building 25) and the Chemical Storage Area (Building 36)

Flow

The MFPF operates continuously during normal business hours, typically for an 8-hour shift, and may be operated off-hours as needed. Along with analytical results, monthly averages and maximum flow per month are reported to the South Bayside System Authority (SBSA) every six months in the required semiannual self-monitoring report.

Flow Period	Estimated Gallons
Daily (avg. daily flow July ‘02-June ‘03)	4,000
Weekly (5day)	20,000
Monthly	100,000
Annual	1,200,000

Characterization

Industrial wastewater containing low concentrations of metals, pre-treated to meet all mandatory wastewater discharge permit requirements.

Point of Discharge

Treated wastewater overflows a weir at the top of the clarifier. This flow is hard-plumbed to the sanitary sewer at the north end of the MFPF.

2 Former Hazardous Waste Storage Area Dual Phase Extraction

Description

The Former Hazardous Waste Storage Area (FHWSA) Dual Phase Extraction System (DPE) is designed to reduce the concentrations of VOCs and SVOCs in soil, groundwater and soil vapor at the FHWSA site and reduce lateral migration of impacted groundwater. The DPE system utilizes 19 groundwater/soil vapor extraction wells and four vacuum-enhanced groundwater extraction wells. Extracted groundwater is treated by an air stripper and discharged after treatment into the sanitary sewer. Extracted soil vapors are discharged unabated to the atmosphere under a permit issued by the BAAQMD.

Location

Near Building 15

Flow

The system operates 24 hrs a day, sevens days a week

Maximum Process Flow / Period	Gallons
Daily	15,120
Quarterly	232,050
Annually	928,200

Characterization:

Treated groundwater from a former hazardous waste storage area

Point of Discharge:

The FHWSA is located in an enclosure near Building 15. It discharges to the Alpine Road sanitary sewer line.

3 Low-conductivity Water from Cooling Systems

Description

Operation of SLAC's electron accelerator generates considerable heat, which is absorbed by low conductivity water (LCW) circulating through flanges, jackets, and pipes around the accelerator tube in closed-loop configurations. The heat is later transferred from the LCW in closed-loop systems to domestic water open-air cooling systems, and is ultimately dissipated to the atmosphere by evaporation in induced-draft cooling towers. The accelerator and its support equipment are served by numerous independent cooling systems throughout SLAC.

LCW is generated at the deionized water plant in Building 461. Domestic water is processed by an ion-exchange system that maintains the conductivity at or below 8 meg-ohms, resulting in relatively high-purity water.

SLAC has approximately 130 circulating systems, ranging in capacity from several hundred gallons to 50,000 gallons. Systems are frequently drained for maintenance and installation of new equipment. A system of average size holds approximately 2000 gallons. Typically, a section requiring maintenance or repair can be valved off, allowing only a small part of the system to be drained.

A storage tank network is in place to contain spilled or leaking water from cooling systems in the Klystron Gallery. The network comprises ten 350-gallon plastic tanks installed along the north side of the Gallery. Each tank is sampled for radioanalysis prior to discharge.

Location

LCW systems are located throughout SLAC.

Flow

Flow	Gallons
Daily	350
Weekly (5day)	1750
Monthly	7000
Annual	84,000

Characterization

LCW contains very low concentrations of heavy metals; primarily copper from the piping. This discharge may contain extremely low levels of radioactivity which are within state and federal regulations for discharge into the sanitary sewer. Each batch of potentially radioactive LCW is sampled for radioanalysis prior to discharge to ensure compliance with all applicable discharge requirements.

Point of Discharge

Because this is a facility-wide activity, discharge locations are to the sanitary sewer connection closest to the system or section being drained.

4 Cooling Tower Blowdown

Description

LCW circulates through the cooling water system, drawing heat from various sources such as air conditioners and experimental equipment, and expelling the heat at cooling towers. The LCW remains contained in pipes and is cooled with circulated domestic water via counter-current heat exchangers. The circulated domestic water within the tower's bulk water system becomes heated and evaporates, which concentrates the amount of dissolved solids and increases the problems of corrosion, scaling and fouling.

The Conventional and Experimental Facilities (CEF) Department apply water treatment chemicals to control the problems of corrosion, scaling and bio-fouling. Corrosion affects the metal pipes and components of the system. Sulfuric acid is used to adjust the pH of the alkaline domestic water used at SLAC. Scaling affects the transfer pipes and pumps, hindering the efficiency of the system. Variables such as hardness, pH, temperature and alkalinity determine the amount of scaling and each must be controlled. The chemicals are dispensed using an automated system to minimize both handling and quantities of additives required. Both CEF and ESH maintain material safety data sheets (MSDSs) for these chemicals, which are specifically formulated to break down soon after application.

Flow	Gallons
Daily	13,000
Weekly (7 days)	90,000
Monthly	420,000
Annual	5,000,000

Location

CT-101 is located along the Loop Road south of Building 44 (Test Laboratory). CT-1701 is located south of End Station B, adjacent to the Research Yard along the Klystron Gallery, CT-1200 is at Sector 1 (west end of the linac), CT-1201 is at Sector 9, and CT-1202 is at Sector 22 (just west of I-280). CT-015 is a small unit for local use and is located behind Building 15. The newest cooling tower, CT-404, is located in the northeast corner of the Research Yard, adjacent to Beam Dump East.

Flow

SLAC discharges blowdown water from the cooling towers to the sanitary sewer. Blowdown volume and frequency are dependent on research activities, climatic conditions, and the characteristics of the makeup water.

Characterization

Blowdown water with elevated concentrations of suspended and dissolved solids, and low concentrations of chemicals added to inhibit corrosion, scaling, and fouling of cooling-system piping.

Point of Discharge

Each of the seven cooling towers is connected to the sanitary sewer.

5 Monitoring Well Purge Water

Description

Prior to collecting a groundwater sample from a monitoring well, any standing water in the well must be removed. This process is called "purging", and is performed to ensure that the sample taken is truly representative of the body of water surrounding the screened interval of the well.

Purge water from each well has been thoroughly characterized by repeated sampling and analysis by a state-certified laboratory. In most cases, the results have shown the water to be in compliance with the conditions of this discharge permit. Purge water from these wells is pumped into drums or tanks and discharged directly to the sanitary sewer.

Note *Purge water from any well having more than 2 parts per million of total volatile organic compounds (VOCs), based on prior characterization and monitoring, is collected in drums and managed as hazardous waste by WM.*

Location

Purge water is generated from a network of operational groundwater monitoring wells located throughout the SLAC facility.

Flow	Gallons (est)
Daily	<5
Weekly (5 days)	23
Monthly	100
Annual	1,200

Flow

Typical discharge (per event): batch, approximately 600 gallons every six months

Note *Not every well is sampled for every sampling event.*

Characterization

Groundwater with naturally elevated concentrations of sulfates and total dissolved solids and with less than 2 parts per million (ppm) of total VOCs, per previous characterization. Purge water is evaluated for potential radioactivity, and sampled as appropriate prior to discharge.

Point of Discharge

Designated discharge point east of the Batch Treatment Plant (Building 460)

6 Rainwater from Secondary Containments

Description

Rainwater collects in many types of secondary containment installed around onsite electrical equipment, storage tanks, chemical storage areas, and others structures. These containments are monitored for rainwater accumulation and evacuated by a vacuum truck with a 2,000-gallon tank. The water is processed through a non-hazardous water treatment unit, which uses activated carbon canisters to remove organics and solids and is equipped with a 100-micron prefilter. The water is then discharged into the reservoir of Cooling Tower 1701 for re-use in cooling operations.

Location

Secondary containment through SLAC

Flow

Flow is highly seasonal, depending primarily on rainfall. The regulatory wet season is October 1 through May 31. Individual containment capacities range from several gallons to several thousand gallons. A typical “significant” rain event – defined as delivering more than 0.1 inch of rainfall – produces an estimated 10,000 to 20,000 gallons of containment water. As noted above, the following values are for discharge of treated effluent into the cooling-tower system, not directly into the sanitary sewer.

Flow	Gallons
Daily	415
Weekly (7 days)	2,083
Monthly	8,333
Annual	100,000

Characterization

Non-hazardous treated rainwater accumulated in secondary containments and potentially exposed to PCBs, metals, petroleum hydrocarbons, and other contaminants. Other non-hazardous water batches (for example, water used to decontaminate sampling equipment) may be processed through the treatment unit as appropriate for re-use in the cooling tower.

Point of Discharge

East side of Cooling Tower 1701, south of Research Yard

7 Groundwater from Underground Sumps and Vaults

Description

SLAC has many underground buildings, vaults, and other structures that extend below the elevation of the groundwater table, at least during the wet season. Groundwater entering these structures either flows directly into the sanitary sewer, or is pumped out and processed through the non-hazardous water treatment unit prior to re-use in Cooling Tower 1701.

Tunnels

Groundwater collects in sumps in tunnels, and must be removed continually to protect sensitive electronic equipment.

Vaults

Accumulated groundwater is removed from electrical vaults and other structures as needed, usually to facilitate access for repair work or to allow, for example, cable pulling to occur.

Location

Primary underground structures include the linear accelerator (linac), the SLAC Linear Collider (SLC), the Positrion-Electron Project (PEP) and the Stanford Positron-Electron Asymmetric Ring (SPEAR) at the Stanford Synchrotron Research Laboratory (SSRL). In addition, numerous underground tunnels and electrical utility vaults exist throughout the site.

Flow

Flow	Gallons
Daily	18,000
Weekly (7 days)	126,000
Monthly	504,000
Annual	6,048,000

Characterization

Groundwater with elevated concentrations of sulfates, total dissolved solids, and calcium hardness. Samples are collected regularly for radioanalysis to monitor this flow.

Point of Discharge

Because this is a facility-wide activity, discharge locations are to the sanitary sewer connection closest to the sump or vault being drained.

8 Soapy Low-conductivity Water

Description

Operational testing of klystron pulse tanks uses ionized water as an electrical load. Soap is added to low-conductivity water (LCW) to form ionized water. Adjustment of the load impedance is a trial and error process accomplished by varying the relative proportions of soap and LCW. Periodically, the solution of soapy LCW is partially drained from the tank in order to balance the system.

Location

Building 44 (Test Lab), just outside Room 165

Flow

Flow	Gallons
Daily	15
Weekly (5 days)	75
Monthly	300
Annual	3600

Characterization

A solution of LCW containing between five and 20 percent Arm and Hammer baking soda laundry detergent

Point of Discharge

Hard-plumbed connection to the sanitary sewer in southeast region of Building 44

9 Low-conductivity Water from Wet-blasting Operation

Description

Radio-frequency (RF) windows in klystrons are made by brazing aluminum oxide (Al_2O_3) to copper ring in a stainless-steel housing. The RF windows are cleaned periodically in a wet-blaster, using a mixture of LCW and Al_2O_3. The wet-blaster contains approximately 50 gallons of LCW in a semi-closed, re-circulating system. The LCW reservoir must be drained and replaced every one to two months, depending on usage. The drained LCW is discharged to the sanitary sewer.

In addition, every three to six months both the LCW and the Al_2O_3 are drained, and the blaster itself is cleaned. The Al_2O_3 is allowed to settle out of the water and is disposed of as hazardous waste after the water is decanted from the bucket. Settling is performed after each use, as well. The LCW is discharged to the sanitary sewer.

Location

Building 23, Room 101-B; southeast of Building 44 (Test Lab)

Flow

Flow	Gallons
Daily	0.2
Weekly (5 days)	1
Monthly	5
Annual	60

Characterization

LCW with traces of Al_2O_3, copper and stainless steel

Point of Discharge

Sink in Building 123

10 Low-conductivity Water from Klyston Tubes

Description

Klystron tube assemblies are routinely modified and repaired. One gallon LCW circulates in the lower pulse tank of each klystron in a closed-loop re-circulating system. Upon disassembly of a pulse tank, the LCW is drained. As a precaution, any klystron removed from a Radioactive Materials Management Area (RMMA) is surveyed for radioactivity prior to disassembly. However, klystron water has never shown detectable radioactivity. Should radioactivity be detected, the Radiation Protection Department (RP) will coordinate disposal of the water in accordance with applicable state and federal regulations. Approximately one tank per day is disassembled and drained.

Location

Tanks are disassembled in Rooms 165 and 170 in Building 44 (Test Lab).

Flow

Flow	Gallons
Daily	0.6
Weekly (5 days)	3
Monthly	12
Annual	144

Characterization

Non-radioactive, uncontainment low-conductivity water (LCW)

Point of Discharge

Sink in Building 44, Room 170

11 Test Stand Cooling Water

Description

Fully dressed klystron and other research and development units are operationally tested after assembly before being returned to service. Low-conductivity water (LCW) is circulated through each unit under pressure in a closed-loop cooling system. When the cooling system is not in use, some LCW is drained in order to relieve pressure on the gauging system.

Location

Building 44 (Test Lab).

Flow

Flow	Gallons
Daily	0.4
Weekly (5 days)	2
Monthly	8
Annual	100

Characterization

LCW

Point of Discharge

Hard-plumbed connection to sanitary sewer in central western area inside Building 44

12 Chiller Flushing

Description

Chilled water is used at SLAC for various purposes, but primarily to cool research and operational equipment. Two large chillers are housed in Building 23 (the Central Utility Building) and supply the facility with chilled water. The chillers' copper piping system is cleaned once or twice each year, and the spent solution is discharged to the sanitary sewer.

Location

Building 23 (Central Utility Building)

Flow

Flow	Gallons
Daily	5
Weekly (5 days)	25
Monthly	100
Annual	1,200

Characterization

Domestic water. The characterization data show this discharge to be well within permit limits for metals and pH.

Point of Discharge

Floor drain in Building 23, underneath chiller

13 Former Solvent Underground Storage Tank Groundwater Treatment Facility

Description

A low-flow pump-and-treat facility operates near the site of a former solvent underground storage tank (FSUST) along the west side of Building 35. (Spent organic solvents were once pumped into the FSUST, which deteriorated over time and released contents to the surrounding soil.) The pump-and-treat facility removes volatile and semi-volatile organic compounds from groundwater. Extracted groundwater is filtered through canisters of granular activated carbon and then discharged to the sanitary sewer. Effluent from the system is sampled and analyzed on a quarterly basis.

Location

Building 35 (Plant Maintenance and Utility Shops Buildings)

Flow

Flow	Gallons
Daily	250
Weekly (7 days)	1,750
Monthly	7,000
Annual	91,250

Characterization

Treated groundwater with very low levels of volatile organic compounds (VOCs)

Point of Discharge

Hard-plumbed connection to sanitary sewer

14 Steam Cleaning Pad and Oil-Water Separator at Motor Pool

Description

Motor pool personnel wash vehicles and equipment and steam-clean parts on an unroofed concrete pad adjacent to Building 81 (General Services Building). This facility provides centralized cleaning services for the entire range of vehicles used on-site, which includes mobile cranes, forklifts and other heavy equipment, passenger cars, and trucks.

The steam-cleaning unit (VNG4-20021B) uses only domestic water and soap or detergent. Its flow capacity is 3.9 gallons per minute. Steam cleaning and stormwater run off from the steam cleaning pad flow into a below-grade sump via the central slot drain. The sump is connected to the oil-water separator (OWS).

The sewer-discharge OWS (Alpha-3100D) is equipped with an ozone generator, a polishing sheen filter pack, an oil surface skimmer, and a 600 gallon polyethylene clarifier/settling tank. Run-off from the pad is pumped from the sump into the settling tank to remove particulates, then processed through the OWS, and finally discharged to the sanitary sewer. The OWS unit is serviced periodically. The accumulated sludge is disposed of as hazardous waste.

Maximum Process Flow / Period	Gallons
Daily	500
Weekly (5 days)	2500
Monthly	10,400
Annual (50 weeks)	125,000

Location

The steam cleaning pad and oil-water separator unit is located outside, adjacent to south-east corner of Building 81, immediately south of the motor-pool vehicle service bays.

Flow

Maximum daily process flow from the steam cleaning pad was estimated to be approximately 500 gallons per day based on information provided by Fleet Services and the following assumptions:[2]

2 Storm run-off also enters this system but is not included as process water. SLAC meteorological data indicate that maximum rainfall intensity over a 5-day work week could produce up to approximately 1,000 gallons of runoff from the steam cleaning pad:
Maximum rainfall recorded at SLAC = 7.9 inches per with a 5-day period
(Feb. 3 -7, 1998) = 0.13 feet per day

- Steam-cleaning delivery rate = 3.9 gpm
- Maximum cleaning time per vehicle = 30 minutes
- Water used per vehicle = 117 gallons
- Maximum daily use of wash pad = 2 hours per day
- Maximum discharge per day = 468 gallons per day (gpd)

Characterization

Domestic water containing mild detergent and trace amounts of oil and metals.

Point of Discharge

Treatment unit is hard-plumbed sanitary sewer connection at Building 081.

Wash pad area (40' x 25') = 1000 square feet
Maximum storm run off (0.13 ft. x 1000 sq. ft.) = 130 cubic feet per day = 972.5 gpd

15 Photographic Processing

Description

X-ray films are developed at an on-site photographic processing laboratory for the Stanford Synchrotron Research Laboratory (SSRL). The process uses domestic water and involves a series of alternating baths and rinses.

Immediately after being exposed, photographic print paper is dipped in the following sequence: developer solution, first rinse, fixer solution, final rinse. Both rinse trays are fed by a constant stream of domestic water when in use, which discharges to the sanitary sewer via the lab sink. Spent fixer is collected and removed for off-site disposal, while spent developer is discharged to the sanitary sewer. Small quantities of the developer and fixer solutions are removed during rinsing, and so enter the sanitary sewer with the rinse effluent.

Approximately 90% of the fixer used is recovered, with only 10% being discharged to the sanitary sewer in the rinse water.

Flow Period	Estimated Gallons
Daily	5
Weekly (5 days)	25
Monthly	100
Annual	1,200

Location

SSRL Building 120, ground floor

Flow

Approximately 10 gallons per hour when lab is in use

Characterization

Domestic water with low concentrations of photographic fixer and higher concentrations of developer

Point of Discharge

Sink in Building 120

16 Cafeteria

Description

The on-site cafeteria produces wastewater associated with food preparation and dishwashing. This water passes through a grease trap before entering the sanitary sewer. The grease trap is inspected every 4 to 6 weeks by field personnel from the West Bay Sanitary District (WBSD).

Location

Cafeteria (Building 42)

Flow

Flow Period	Gallons
Daily	300
Weekly (5 days)	1,500
Monthly	6,000
Annual	72,000

Characterization

Domestic water mixed with food waste

Point of Discharge

Sink and dishwasher drain in the cafeteria (Building 42)

17 Metallography Neutralization Tanks

Description

Metallographic sample preparation normally requires a specific sequence of operations which includes sectioning, mounting, grinding, polishing, cleaning and etching. The metallography neutralization tanks are used in the etching process step. Samples are cleaned with two types of commercially available dishwashing soap and tap water. In most cases, chemical etching is required because a polished specimen will not exhibit its microstructure because incident light is uniformly reflected. Only features which exhibit differences greater than 10% reflectivity can be viewed without etching.

Chemical etching of metallic specimens involve oxidation and reduction reactions. Standard acids and bases are used to make the etching solution. Metals in contact with the solution have a tendency to become ionized by releasing or losing electrons into solution. Metallic elements react individually according to their electron affinity. Some elements, preceding hydrogen on the electromotive activity scale, are attacked by acids alone. All elements following hydrogen cannot be attacked without the addition of an oxidizing agent. Thus, microstructure elements are attacked at different rates and this produces differential etching which produces microstructure contrast.

The etching procedure, performed inside a fume hood, uses a small amount of acid mixture (primarily sulfuric acid, <1 ml/sample) on a cotton ball to wipe the metal sample (copper, stainless or aluminum). After a few seconds, etching is stopped with flowing tap water in the sink. The cotton ball goes to hazardous waste disposal. Ethanol (<1ml/sample) is sprayed onto the wet sample and blown dry with nitrogen gas in the fume hood. The rinse water effluent from the sink passes through a neutralization tank prior to entering the sanitary sewer. The effluent pH is monitored quarterly, immediately downstream of the tank using semi-quantitative litmus paper.

According to the written procedure provided by the metallography laboratory, each tank is inspected quarterly and limestone chips are added as necessary to ensure that the height of the chips is above the water level.

Location

The laboratory fume hood is located downstairs in Building 040, G140. The tanks are at two locations:

1. Primary location: south end of room G144, serving the fume-hood sink in G140
2. Secondary location: northwest corner of room G144 (rarely used, in conjunction with a second fume hood in G144)

Flow

Flow Period	Estimated Gallons
Daily	1
Weekly (5 days)	5
Monthly	20
Annual (50 weeks)	250

Characterization

Effluent from this process may contain metal particles and dissolved metal. Effluent from the neutralization tank is sampled on a monthly basis while under running water, simulating the process used in the laboratory. The effluent contained low levels of metals (in the parts per billion range) and had a pH between 6.5 and 8.5 after pre-treatment.

Oxygen-free electrolytic copper (OFE) is the primary metal analyzed in the metallographic laboratory, but occasionally stainless steel or aluminum is prepared. The effluent stream of a chemical etching process will contain ionized metals in solution similar in composition to the metal being etched. The waste stream should contain trace amounts Cu^{2+}, Fe^{3+}, Al^{3+}, Cr^{3+}, Ni^{2+}, and Mn^{2+}.

A log is maintained documenting the monthly neutralization bed inspections and maintenance. The log record contains the inspection date, pH value, and other pertinent comments.

Point of Discharge

Hooded sinks discharge to neutralization tanks (G140 and G144). Neutralization tanks are hard plumbed to the sanitary sewer.

18 Backflushing of Sand Filters for Vacuum-Pump Cooling System

Description

Vacuum required for certain accelerator operations is provided by two vacuum pump stations located in the Beam Switch Yard (BSY) and Sector 30 of the klystron gallery. The pumps generate considerable heat and so require cooling for efficient operation. Cooling water is provided to the BSY pump station by Cooling Tower 1701, and to the Sector 30 pump station by Cooling Tower 1202.

Before passing through the vacuum pump cooling jackets, water from the cooling towers passes through rapid sand filters to remove debris that might damage the circulating pumps. Two rapid sand filters are connected in parallel at each pump station. The filters are manually backflushed approximately once a week in order to maintain a certain range of back-pressure in the system. Backflush water from the BSY is discharged directly to the sanitary sewer. However, backflush water from Sector 30 is returned to CT-1202 and ultimately discharge to the sanitary sewer with the blowdown.

Location

The BSY station is located on the concrete pad just west of Building 105. The Sector 30 station is inside the east end of the klystron gallery (Building 2), on the south side.

Flow

Flow	Gallons
Daily	10
Weekly (7 days)	70
Monthly	280
Annual	3,360

Characterization

Domestic water with slightly elevated concentrations of heavy metals and several minerals

Point of Discharge

Hard-plumped connections to the sanitary sewer

19 Klystron Tube Washer

Description

The following process describes the cleaning of the ceramic high-voltage seal at the bottom of a klystron tube:

1. Remove klystron bottom, which is essentially a 15-gallon tank filled with mineral oil.
2. Wipe excess oil from outside of high-voltage seal of gun assembly with citrus-based solvent on rag.
3. Spray outside of high-voltage seal with a turpine surfactant-mixture aerosol ("Cut-Through").
4. Using crane, place high-voltage gun assembly in washer: a 30-gallon tank equipped with spray nozzles.
5. Mix a small amount of mild detergent into 15 gallons of hot LCW and circulate through jets in washer for several minutes.

The cleaning tank effluent is tested for PCBs and, if none are detected, discharged to the sanitary sewer.

Location

Building 44 (Test Lab)

Flow

Flow	Gallons
Daily	30
Weekly (5 days)	150
Monthly	600
Annual	7,200

Characterization

Domestic water containing low concentrations of mineral oil and various water-based cleaning agents within mandatory wastewater discharge permit requirements.

Point of Discharge

Hard-plumped connections in Building 44

20 Precision Bench Grinding of Bulk Silicon

Description

The discharge water from the precision bench grinding of bulk silicon crystal (for use in the X-Ray Monochromators at SSRL) has only been used for cooling, and carries no added process chemicals. A 5-micron in-line filter removes any particulates before discharge. The filter is cleaned at approximately six-month intervals or when the filter begins to back up into the grinder.

Location

Building 137
Room 111 (SSRL X-Ray Laboratory)

Annual Usage ~500 gallons

Flow

The flow is approximately 10 gallons an hour (maximum). It is difficult to estimate daily or weekly usage, but a figure of 50 hours a year is a conservative estimate.

Characterization

Filtered tap water that meets the mandatory wastewater discharge permit requirements

Point of Discharge

Permanent connection in Building 137, Room 111

Industrial Wastewater: Discharge Characterization Guidelines

Department: Environmental Protection
Program: Industrial Wastewater
Owner: Program Manager, Darrin Gambelin
Authority: ES&H Manual, Chapter 43, Industrial Wastewater

SLAC operations result in a wide variety of wastewater discharges, most of which are already listed in existing permits and so are considered routine. Non-routine discharges – that is, wastewater that is not yet listed on an existing permit – require additional evaluation and permitting. *Routine*, *non-routine*, and *prohibited* discharges are described below.

Note The industrial wastewater (IW) program manager is the point of contact for all permit applications and for (non-radioactive) wastewater characterization. Any wastewater containing radioactive constituents must be reported to both the IW program manager and the Radiation Protection Department (RP).

Permitted Routine Discharges

There are approximately 20 types of routine discharges listed in SLAC's wastewater discharge permits. These include discharges from cooling systems, radiologically controlled areas, groundwater treatment systems, the cafeteria, the metal finishing pretreatment facility (MFPF), and grinding operations. For a complete list and permit details, see Industrial Wastewater: Permitted and Prohibited Discharge Reference.[1]

Note Permit compliance requires that wastewater contain no hazardous constituent and that constituents of concern listed in the permit be below a specified limit.

Non-routine Discharges

Wastewater that is not included in current permits must be characterized in coordination with the IW program manager to determine if it falls within permit conditions, and if so, which type of permit is required. Depending on the evaluation results, the wastewater could be

- Discharged after it is added to SLAC's mandatory wastewater discharge permit
- Discharged after a non-routine discharge permit is issued
- Disposed of by the Waste Management Group (WM) if the wastewater contains prohibited constituents

SLAC must receive specific authorization from the South Bayside System Authority (SBSA) and the West Bay Sanitary District (WBSD) prior to any non-routine discharge.

1 Industrial Wastewater: Permitted and Prohibited Discharge Reference (SLAC-I-750-0A16T-006), http://www-group.slac.stanford.edu/esh/eshmanual/references/iwRefPermits.pdf

Examples of Wastewater Not Included in Permits

Modified Processes Affecting Discharge

Any change in operation that affects the characterization of a listed discharge as routine must be reported to the IW program manager because process modification may change wastewater constituents, strength, volume, or the discharge period. The program manager can assist in characterizing the new wastewater and notifying the SBSA and WBSD.

New Processes

Discharges resulting from a new process or activities must be characterized and added to the mandatory permit if the process or activity will be ongoing. If a new discharge results in a single discharge, it is best handled by applying for a non-routine permit.

Prohibited Discharges

SLAC's permits stipulate that no discharge may enter the sanitary sewer that may cause

- Danger to human life or safety
- Fire or explosion
- Discharge of hazardous waste to the sanitary sewer
- Odors, air pollution, or any noxious, toxic, or malodorous gas or substance, or gas-producing substances
- Flow obstruction or injury to the sewerage facilities
- Interference or overloading of the wastewater treatment or reclamation process, or sewerage facilities, or excessive costs, or use of a disproportionate share of the capacity of the sewerage facilities
- A detrimental environmental impact or nuisance (for example, any discharge with detectable concentrations of polychlorinated biphenyls)
- Dilution of a discharge of waste or wastewater as a substitute for adequate treatment
- Inhibition of maintenance or operation of the sewerage facilities
- Any adverse action that impacts the ability of the sewage treatment plant to protect the San Francisco Bay

Any spills or accidental discharges to the sanitary sewer system that violate the permit conditions must be reported to the IW program manager immediately so that the appropriate regulatory agencies can be notified. The following are examples of spill types that must be reported.

Non-hazardous Wastes

- A non-routine discharge due to a pipe break or similar event
- Any release with a pH less than six or greater than 12.5
- Any spill that may contain radioactivity (also report this to RP)
- Any treatment process upset that may allow a discharge outside of the permit conditions (such as high or low pH, discharge prior to treatment, equipment failure or operator error)

Hazardous Material or Waste

- Any release of fuel or oil
- Any release of chemicals or hazardous waste

Note *For more information on how to handle accidental discharges and spills, see Chapter 16, "Spills".*[2]

2 *SLAC Environment, Safety, and Health Manual* (SLAC-I-720-0A29Z-001), Chapter 16, "Spills", http://www-group.slac.stanford.edu/esh/environment/spills/policies.htm

Industrial Wastewater: Wastewater Sampling Requirements

Department: Environmental Protection
Program: Industrial Wastewater
Owner: Program Manager, Darrin Gambelin
Authority: ES&H Manual, Chapter 43, Industrial Wastewater

SLAC's certification that it is within permit limits is contingent on periodic wastewater sampling and analysis by specified entities. Certification eligibility must be demonstrated quarterly for certain permits. Sampling is carried out by the South Bayside System Authority (SBSA), the Mechanical Fabrication Department (MFD), and the Environmental Protection (EP) Department.

Note *Samples with potential radiological analytes must be submitted to the Radiation Protection Department (RP) for analysis.*

Sampling by SBSA

As part of SLAC's mandatory wastewater discharge permit, the SBSA collects quarterly composite and grab samples of SLAC's discharge to the sanitary sewer. Samples are analyzed for a variety of constituents including metals and selected VOCs.

The SBSA also conducts routine annual monitoring of the metal finishing pretreatment facility (MFPF) effluent. A composite sample is collected over a continuous 24-hour period using an autosampler. The composite sample is collect at the barbed fitting downstream from the confluence of the two clarifiers. Additional grab samples are also taken. All samples collected by the SBSA are split with SLAC on request and analyzed for heavy metals, total cyanide, and pH.

Sampling by MFD

To assess compliance with discharge requirements, the MFD collects wastewater samples periodically while the MFPF is in operation to analyze (in-house) for pH, copper, and chromium. Sampling typically occurs twice a day, but the actual frequency depends on the quantity of waste being treated. Analytical results are retained by MFD for at least 3 years.

Samples are collected at the MFPF semi-annually and analyzed for pH, cyanide, and the metals cadmium, chromium, copper, lead, nickel, silver and zinc. The sampling event consists of collecting a composite of four grab samples over two working days during working hours.

Sampling by EP

Discharge permit requirements for the treatment systems installed at the former solvent underground storage tank (FSUST) and the former hazardous waste storage area (FHWSA) are described below.

FSUST Groundwater Treatment System Sampling Requirements

- Frequency: quarterly
- Sample location: influent, mid-stream and effluent process water
- Required analyses: Gasoline and VOCs
- Additional analyses: SLAC also analyzes for semi-VOCs and 1,4 dioxane

FHWSA Process Water Sampling Requirements

- Frequency: quarterly
- Sample location: air stripper effluent process water
- Required analyses: TPH-gasoline, VOCs, and specific metals (As, Cd, Cr, Cu, Pb, Ni, Ag, Zn and Hg).
- Additional analysis: SLAC also analyzes for 1,4 dioxane

For each of these areas, concentrations of detected constituents are multiplied by the average daily volume of water discharged in order to determine the total amount of constituent discharged by SLAC. This quantity is used to determine if SLAC is within the discharge limits defined in the discharge permit.

Radiological Sampling Requirements

Radioanalysis of wastewater with known or suspected radiological analytes is performed prior to discharge to the sanitary sewer. The concentration of each release is multiplied by the volume of the release to ensure that SLAC is within the permit’s annual discharge limits.

Note *Sample collection and delivery to RP are the responsibility of the group generating the wastewater.*

Industrial Wastewater: Wet or Chemical Labs Best Management Practices

Department: Environmental Protection
Program: Industrial Wastewater
Owner: Program Manager, Darrin Gambelin
Authority: ES&H Manual, Chapter 43, Industrial Wastewater

Industrial wastewater best management practices (BMPs) are guidelines that minimize the impact of activities that potentially contribute contaminants to the sanitary sewer. Most of these guidelines reflect practices already implemented at SLAC as prudent practices or as ES&H requirements.

The following BMPs apply to wet or chemical laboratories and are intended to protect water quality.

Drain Protection

- Seal floor drains where chemicals are used or stored. Provide a floor drain stopper if the drain cannot be sealed.
- Protect the lab's safety shower drain with a temporary plug or covered sump.

Chemical Storage

These BMPs apply to chemical storage. For additional detailed information on how to properly store hazardous materials, see Chapter 40, "Hazardous Materials".[1]

- Store chemicals on low shelves or under countertops, on textured rubber mats whenever possible.
- Store chemicals behind protective barriers at least 1/5 the height of the tallest container.
- Never store chemicals above a sink.
- Keep flammable chemicals in an approved fire-proof cabinet.
- Do not leave chemical cabinet doors unlatched.
- Never store incompatible chemicals together. Avoid accidental mixing.

Chemical Disposal

These BMPs apply to chemical disposal. For detailed information on how to properly dispose of hazardous materials, see Chapter 17, "Hazardous Waste".[2]

- Collect and segregate hazardous waste for proper disposal
- Use signage and training to inform employees that hazardous material or hazardous waste is never discharged directly to the sewer. Signs above sinks have been effective.

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1 *SLAC Environment, Safety, and Health Manual* (SLAC-I-720-0A29Z-001), Chapter 40, "Hazardous Materials", http://www-group.slac.stanford.edu/esh/hazardous_substances/haz_materials/policies.htm

2 *SLAC Environment, Safety, and Health Manual* (SLAC-I-720-0A29Z-001), Chapter 17, "Hazardous Waste", http://www-group.slac.stanford.edu/esh/environment/hazardous_waste/policies.htm

- If you are not certain if a material is permitted to be poured down a drain, ask your environmental and safety coordinator or contact the industrial wastewater program manager.
- Dispose of mop water appropriately. If you expect a hazardous component based on operational knowledge, contact the Environmental Protection Department for characterization. If the mop water contains hazardous components, contact the Waste Management Group (WM) for proper disposal.

Secondary Containment

- Provide secondary containment for all hazardous chemicals and hazardous waste, including countertop flasks and squirt bottles.
- Keep secondary containment clean and dry.
- Never use a sink as secondary containment.

Spill Control

These BMPs apply to spill control. For additional information on how to handle spills, see Chapter 16, “Spills”.[3]

- Clean up spills whenever they occur.
- Keep a well stocked, accessible spill kit in the area. Make sure you have spill-control supplies for the type of materials you use and store.
- Ensure that employees are trained in SLAC emergency response procedures in the event of an accidental discharge or spill.

3 *SLAC Environment, Safety, and Health Manual* (SLAC-I-720-0A29Z-001), Chapter 16, “Spills”, http://www-group.slac.stanford.edu/esh/environment/spills/policies.htm

Industrial Wastewater: Machine, Maintenance, and Craft Shop Best Management Practices

Department: Environmental Protection
Program: Industrial Wastewater
Owner: Program Manager, Darrin Gambelin
Authority: ES&H Manual, Chapter 43, Industrial Wastewater

Industrial wastewater best management practices (BMPs) are guidelines that minimize the impact of activities that potentially contribute contaminants to the sanitary sewer. Most of these guidelines reflect practices already implemented at SLAC as prudent practices or as ES&H requirements.

The following BMPs apply to machine, maintenance, and craft shops and are intended to protect water quality.

1. Ensure that employees are aware of emergency response procedures in the event of an accidental discharge or spill. For additional information on how to handle spills, see Chapter 16, "Spills".[1]
2. Use signage and training to inform employees that hazardous material is never discharged directly to the sewer. Signs above sinks have been effective.
3. Keep machines and equipment maintained to minimize leaks.
4. Locate machines, equipment, and hazardous materials away from floor drains when possible.
5. Seal floor drains located near machines, processes and hazardous materials storage areas. Provide a floor drain stopper if it cannot be sealed.
6. Use drip pans to collect oil and spills from machines and equipment.
7. Use absorbent *socks* or *pigs* around leaky equipment.
8. Have kitty litter or absorbent pads on hand to clean up leaks as they occur.
9. Provide secondary containment for hazardous material, hazardous waste, or machines with significant quantities of internal fluid (oil or coolant) if they pose a release threat. For additional information on secondary containment, see Chapter 40, "Hazardous Materials".[2]
10. If possible, drain oil-filled equipment before moving.
11. Conduct activities inside if possible. If conducted outside follow all applicable storm water pollution prevention BMPs. See Chapter 26, "Stormwater".
12. Remove debris and sweep the shop floor often.
13. Dispose of mop water appropriately. If you expect a hazardous component based on operational knowledge, contact the Environmental Protection Department for characterization. If the mop water contains hazardous components, contact the Waste Management Group (WM) for proper disposal.

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1 *SLAC Environment, Safety, and Health Manual* (SLAC-I-720-0A29Z-001), Chapter 16, "Spills", http://www-group.slac.stanford.edu/esh/environment/spills/policies.htm

2 *SLAC Environment, Safety, and Health Manual* (SLAC-I-720-0A29Z-001), Chapter 40, "Hazardous Materials", http://www-group.slac.stanford.edu/esh/hazardous_substances/haz_materials/policies.htm

Industrial Wastewater: Cafeteria Best Management Practices

Department: Environmental Protection
Program: Industrial Wastewater
Owner: Program Manager, Darrin Gambelin
Authority: ES&H Manual, Chapter 43, Industrial Wastewater

Industrial wastewater best management practices (BMPs) are guidelines to minimize the impact of activities that potentially contribute contaminants to the sanitary sewer. Most of these guidelines reflect practices already implemented at SLAC as prudent practices or as ES&H requirements.

The following BMPs apply to the cafeteria and are intended to ensure that cafeteria wastewater is in compliance with SLAC's wastewater discharge permits.

Discharges of food, oil, and grease are restricted.

- Garbage grinders must have the capacity to shred waste so that waste particles are carried freely into and through the sewerage facilities under normal flow conditions.
- Food-preparation sinks and dishwashers must be plumbed to grease traps that are inspected and pumped on a regular basis.

Industrial Wastewater: Treatment of Pipe Flushing Water Best Management Practices

Department: Environmental Protection
Program: Industrial Wastewater
Owner: Program Manager, Darrin Gambelin
Authority: ES&H Manual, Chapter 43, Industrial Wastewater

Industrial wastewater best management practices (BMPs) are guidelines that minimize the impact of activities that potentially contribute contaminants to the sanitary sewer. Most of these guidelines reflect practices already implemented at SLAC as prudent practices or as ES&H requirements.

The following BMP applies to pipe flushing of all metal pipes.

- Water generated from the flushing of metal pipes may contain elevated levels of metals such as copper. When possible, water from pipe flushing of metal pipes should be treated at the Metal Finishing Pretreatment Facility (MFPF) to reduce the metal concentrations before release to the sanitary sewer.

These are the steps for requesting MFPF treatment:

1. The department performing the flushing will contact the MFPF to determine if and when MFPF can accept and treat the water.
2. The department performing the flushing will make arrangements to containerize the pipe flushing water in drums or tanks and transport these containers to the MFPF. Drums or small tanks may be obtained from the Waste Management Group.
3. MFPF will treat the water to remove metals before discharge to the sanitary sewer.