Chapter 43, "Industrial Wastewater", is being updated. The exhibit, Industrial Wastewater: Permitted and Prohibited Discharge Reference, has been replaced by this excerpt from the current wastewater permit.

Attachment B

Wastewater Generating Activities

No.	Description	Discharge Location(s)	Discharge Point	Average Discharge in Gallons per Day [gpd][1]
1	Cooling Tower (CT) Blowdown	CTs 015, 101, 404, 905, 1201, 1202, 1701	Sand Hill Road, Alpine Road	10,000[2]
2	Metal Finishing Pretreatment Facility (MFPF)	B038	Sand Hill Road	5,000
3	Groundwater from Underground Tunnels, Sumps and Vaults	sitewide	Sand Hill Road, Alpine Road	4,500
4	Groundwater Extraction Systems	B038 and B035	Sand Hill Road	1,000
5	Water from Containment Structures, and Storm Drain and Pavement Cleaning Activities	E of CT1701	Alpine Road or Reused	1,000
6	Steam Cleaning Pad Oil-Water Separator at Motor Pool	SE corner of B081 (outside)	Sand Hill Road	500
7	Low-Conductivity Water (LCW) from Cooling Systems	sitewide	Sand Hill Road, Alpine Road	500
8	SLAC Cafeteria	B053	Sand Hill Road	400
9	Construction Water	sitewide	Sand Hill Road, Alpine Road or Reuse	300
10	Pipe and Chiller Flushing	Various Locations	Sand Hill Road, Alpine Road	100[2]
11	Fire Water Testing	sitewide	Sand Hill Road, Alpine Road	70
12	Boiler Flushing	B023, B950, B015, B081, B750, Sector 10, Sector 20	Sand Hill Road, Alpine Road	50[2,3]
13	Laboratory Solutions	sitewide	Sand Hill Road, Alpine Road	50
14	Building 006 Clean Room	B006	Sand Hill Road	25
15	Emergency Eyewash and Shower Testing/ Inspection	sitewide	Sand Hill Road, Alpine Road	24
16	Building 015 All-in-One Washer, Dishwasher and Ultrasonic Cleaner	B015	Alpine Road	1.5
17	LCW from Klystron Tubes	B044	Sand Hill Road	0.6
18	Test Stand Cooling Water	B044	Sand Hill Road	0.4
19	Water from Wet-Blasting Operations	B123	Sand Hill Road	0.2
20	Monitoring Well Purge Water	100+ locations	Alpine Road	0.1
21	Detector Microfabrication Facility and Ultrapure Water System	B057	Sand Hill Road	11,000

Notes:

[1] Estimated average daily volume, calculated over a one year period. Actual daily discharges may vary. Refer to wastewater generating activity descriptions for additional details.

[2] Annual preventative maintenance that requires full draining of coolings towers, boilers, and chillers are included as routine discharges under this permit, but will be coordinated as a courtesy with Silicon Valley Clean Water (SVCW) and West Bay Sanitary District (WBSD). The average daily discharge shown may be exceeded for large draining events.

[3] Routine boiler water discharges will be less than 50 gpd. Annual preventative maintenance activities will require discharge of the entire volume of the boiler (largest boiler is 2,446 gallons), plus additional domestic water to bring the water temperature to below 120 degrees Fahrenheit. As a courtesy to WBSD, boiler preventative maintenance activities that require boiler draining will be coordinated with WBSD.

1 Cooling Tower Blowdown

Description

Water 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 cooling water 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.

Water treatment chemicals are added to the cooling water 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 domestic water used at SLAC. Scaling affects the heat 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.

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. CT-1200 (currently offline) is located at Sector 1 (far west end of the Linac), CT-1201 is at Sector 9 (west end of the Linac), CT-1202 is at Sector 22 (just west of I-280) and CT-905 is located at Sector 4 at the Cryoplant (west end of Linac). CT-015 is a small unit for local use and is located behind Building 15. 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, but is typically about 5 percent of makeup water volume. SLAC also performs maintenance of the cooling towers, which involves draining the towers on an annual basis. Emergency repairs may also require draining of a tower.

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

CT101, CT1200, CT1201, CT1202, CT905 – Sand Hill Road

CT1701, CT-015, CT-404 – Alpine Road

2 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.
- 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 Silicon Valley Clean Water (SVCW) and West Bay Sanitary District (WBSD) every six months in the required semiannual self-monitoring report.

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.

3 Groundwater from Underground Tunnels, 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. Some of the groundwater, depending on the location and characteristics, may discharge into the sanitary sewer, or be pumped out and processed through the non-hazardous water treatment unit prior to re-use in Cooling Tower 1701, or discharged to the sanitary sewer.

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 that discharge to the sanitary sewer include the Linear Accelerator (LINAC), Beam Switch Yard (BSY), the Positron-Electron Project (PEP) and the Stanford Positron-Electron Asymmetric Ring (SPEAR) at the Stanford Synchrotron Research Laboratory (SSRL). In addition, numerous electrical utility vaults exist throughout the site.

Characterization

Groundwater contains elevated concentrations of sulfates, total dissolved solids, and calcium hardness. Samples are collected regularly at some locations for radioanalysis to monitor this flow. The radioanalysis monitoring data are summarized in a quarterly self-monitoring report submitted to Silicon Valley Clean Water.

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.

4 Groundwater Extraction Systems

Description

Former Hazardous Waste Storage Area Dual Phase Extraction System

The Former Hazardous Waste Storage Area (FHWSA) groundwater/soil vapor dual phase extraction (DPE) system was designed to reduce the concentrations of volatile organic compounds (VOCs) and 1,4-dioxane in soil, groundwater, and soil vapor at the FHWSA site and mitigate lateral migration of impacted groundwater. The system utilized 21 DPE wells (including temporary wells MW-25 and MW-92) and four vacuum-enhanced groundwater extraction (GWE) wells. The full-scale FHWSA DPE system began operations from 2006 until 2016 at which time it was determined that the FHWSA DPE system was found to have effectively remediated the groundwater and deeper soil at the FHWSA but was less effective in remediating VOCs in the shallow clayey soil. The San Francisco Bay Regional Water Quality Control Board (RWQCB) approved a curtailment request in April 2018 of the FHWSA remediation system and excavation of the VOC impacted shallow soil layer. The excavation of the shallow clayey soil at the FHWSA was completed in October of 2018 and included removal of much of the DPE well and piping infrastructure (see the attached system diagram for details).

A three-year rebound testing phase began at the FHWSA in 2018 and was completed in February 2021. A draft three-Year Rebound Test Report, completed in 2021, recommended to the RWQCB (pending review and concurrence), that the FHWSA remediation system remain shut down. No further FHWSA DPE discharges is anticipated at this time.

Former Solvent Underground Storage Tank Groundwater Extraction and Treatment System

The Former Solvent Underground Storage Tank (FSUST) DPE and treatment system is designed to reduce the concentrations of VOCs and semi-volatile organic compounds (SVOCs) in soil, groundwater and soil vapor at the FSUST site and mitigate lateral migration of impacted groundwater. The FSUST system utilizes nine DPE wells and one GWE well and has been in full-scale DPE operation since 2007. The FSUST DPE system is currently being refurbished, with the system operating using a subset of DPE wells, typically 4 DPE wells, to focus chemical mass removal from the subsurface residual source area. When refurbishment is completed, full scale operation of the system is expected, which includes two temporary DPE wells added in October 2020 (see the attached system diagram for details). Extracted groundwater is treated by granular activated carbon and discharged after treatment under permit to the sanitary sewer. Extracted soil vapor is discharged unabated to the atmosphere under a permit issued by the Bay Area Air Quality Management District (BAAQMD).

Plating Shop Area Groundwater Extraction System

The Plating Shop Area (PSA) DPE and treatment system is designed to reduce the concentrations of VOCs and 1,4-dioxane in soil, groundwater and soil vapor at the PSA site and mitigate lateral migration of impacted groundwater. The PSA system, which began operation in 2011, included 18 active DPE wells and eight vacuum-enhanced GWE wells. The eight GWE wells have been off since December 2014, as part of a long-term rebound test. In February 2019, SLAC developed a plan to optimize DPE operations by extracting groundwater from focused areas with only four of the 18 DPE wells in operation. Extracted groundwater from the active DPE wells had been treated using an air stripper but was bypassed on April 24, 2019, after it was determined that the levels of VOCs in the extracted groundwater were and are expected to remain well below the applicable sanitary sewer permitted limits. Extracted soil vapor is discharged unabated to the atmosphere under permits issued by the BAAQMD.

Test Lab/Central Lab (TL/CL) Groundwater Extraction System

There are seven DPE wells at the TL/CL area where DPE began in 2011. Initially, extracted groundwater was treated using an air stripper. Shortly after the start of DPE operations, due to low VOC concentrations, extracted groundwater was discharged directly to the sanitary sewer under permit. The DPE system at the TL was shut down in December 2012 for rebound testing and remains off, consistent with the recommendation in the *Five-Year Review Report* that no further remediation for soil or groundwater in the TL area is required.

DPE operations were shut down at the CL in October 2018 for a system repair and remain off due to the significant progress in the remediation at the CL site. The soil vapor extraction (SVE) portion of the DPE system at the CL was restarted in 2020 and continues to be operated to further remediate a small, localized area for shallow soil vapor, as concurred by the RWQCB in 2019. The GWE portion of the DPE system at the CL is no longer used, consistent with the recommendation in the *Five-Year Review Report* that no further remediation of groundwater in the CL area is required.

5 Water from Containment Structures, and Storm Drain and Pavement Cleaning Activities

Description

Rainwater collects in many types of secondary containments installed around electrical equipment, storage tanks, chemical storage areas, and other structures. These containments are monitored for rainwater accumulation and evacuated by a vacuum truck with a 2,000-gallon tank. Rainwater also collects in the 12-foot diameter Hydrodynamic Sedimentation Unit (HSU) at the IR-6 Channel Outfall. The purpose of the HSU is to remove suspended sediments from storm water flows from the Research Yard area into the IR-6 drainage channel. Up to 8,000 gallons of clarified water is removed from the HSU at least biennially. The accumulated HSU sediment is vacuum-removed and contained separately for off-site disposal. 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 pre-filter. The water is then discharged into the reservoir of Cooling Tower 1701 for re-use in cooling operations or discharged to the sanitary sewer.

On an annual basis, the pavement in the Research Yard and/or select storm drain lines and catch basins are power-washed, and the rinse waters are clarified, and any sediment is collected. The sediment is sent off-site for disposal, and the wash water is processed through the non-hazardous water treatment unit, and reused in cooling operations, or discharged to the sanitary sewer.

Other non-hazardous water batches, such as water collected from domestic water line leaks, pipe flushing and construction activities, may be processed through the treatment unit as appropriate for re-use in the cooling tower.

Location

Secondary containments throughout SLAC, the HSU at the IR-6 Channel, Research Yard pavement, and select storm drain lines and catch basins.

Characterization

The water could potentially contain low levels of PCBs, metals, petroleum hydrocarbons, and other contaminants, so it will be processed through activated carbon canisters to remove organics and solids. Power-wash water from pavement and catch basin cleaning is also analyzed prior to treatment by activated carbon to ensure that metals do not exceed loading limits at Alpine Road. Yearly average daily discharge volume is estimated to be 1,000 gallons per day.

Point of Discharge

East side of Cooling Tower 1701, south of Research Yard. Discharge is to Alpine Road.

6 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 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 is equipped with 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 steam cleaning pad and sumps are cleaned twice per year. The accumulated sludge is disposed of as hazardous waste.

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.

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.

7 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 2,000 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 11 500-gallon plastic tanks installed along the north side of the Gallery. Each tank is sampled for radioanalysis prior to discharge.

LCW with low levels of radioactivity is collected in temporary holding tanks and subsequently transferred to the IR-8 PEP Tunnel Sump Holding Tank for delayed discharge to the sanitary sewer from 12 am to 2 am.

Location

LCW systems are located throughout SLAC.

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. The radioanalysis data are summarized in a quarterly self-monitoring report submitted to Silicon Valley Clean Water.

8 SLAC Cafeteria

Description

The on-site cafeteria produces wastewater associated with food preparation and dishwashing. This water passes through a grease interceptor before entering the sanitary sewer. The grease interceptor is serviced on a quarterly basis.

Location

Science User Support Building (SUSB) Cafeteria (Building 053).

Flow

Characterization

Domestic water mixed with food waste.

Point of Discharge

Sink and dishwasher drain in the SUSB Cafeteria (Building 053).

9 Construction Water

Description

During construction projects, wastewater is generated and discharged to the sanitary sewer. Some of the construction activities that generate wastewater include the following:

- Draining of domestic and fire line pipes prior to replacing or connecting into existing lines.
- Commissioning activities of heating hot water (HHW) and chilled water (CHW) system loops treated with alkaline phosphate cleaner.
- Flushing of new fire sprinkler lines and fire suppression lines following Fire Life Safety inspection.
- Flow testing of new fire lines.
- Pressure testing of new aboveground and underground piping systems.
- Cutting of Transite pipes and asbestos removal activities.

Location

Site-wide

Characterization

The characterization data show discharge of construction wastewater to be well within permit limits for oil and grease, metals and pH. For heating, ventilation, and air conditioning (HVAC) commissioning activities that involve treatment of domestic water with an alkaline phosphate cleaner, samples will be collected for oil and grease, metals, and pH analysis as appropriate, to ensure compliance with SVCW discharge specifications.

Construction wastewater may also be processed through the non-hazardous water treatment unit adjacent to CT1701, as appropriate, for re-use in the cooling tower.

Wastewater generated from Transite pipe cutting and asbestos removal activities is filtered using four in-line filter cartridges connected in series. The first cartridge in the series contains 100 micron (μm) prefilters, the second and third cartridges contain 25 μm filters, and the final cartridge contains 0.5 μm absolute filters. This filtration method has been found to remove asbestos in wastewater to non-detect, or less than the laboratory reporting limit of 2 million fibers/L (MFL).

Point of Discharge

Various

10 Pipe and Chiller Flushing

Description

Chilled water is used at SLAC for various purposes, but primarily to cool research and operational equipment. SLAC has three main chillers in the Central Utility Building (B023), and a number of smaller chillers throughout the site. The chillers' copper piping system is cleaned once or twice each year, and the spent solution is discharged to the sanitary sewer. The evaporator barrel tubes are rarely cleaned, as the water treatment typically prevents any buildup of debris. The condenser barrel tubes are cleaned as necessary, typically every one to three years. Following cleaning, the process cooling water is discharged to the sanitary sewer; however, rarely is an entire system completely drained. Other piping systems at SLAC, including domestic and fire pipes, are occasionally flushed with water.

Location

Various

Characterization

Domestic water that may contain the anti-corrosives Aqua Treat, OptiShield, OptiShield II, OptiShield Plus and OptiShield II Plus. Sodium nitrite may be used to treat the closed loop systems. The characterization data show this discharge to be well within permit limits for metals and pH.

Point of Discharge

Various

11 Fire Water Testing

Description

The SLAC Fire Protection Systems Group performs semiannual sprinkler inspection and testing of approximately 160 sprinkler systems on-site. Testing involves flow through a ½-inch orifice for a period that averages about one minute. Assuming a pressure drop across the outlet of about 70 psi, the flow averages about 40 gallons per minute (gpm).

In addition, main drain tests are done following sprinkler valve closures. These tests occur much less frequently (perhaps 20 times per year) and use about 400 gpm per test for a period of about 20 seconds. A few times per year, typically for inspection purposes, fire system drain-downs are performed.

Location

Buildings throughout SLAC.

Characterization

Domestic fire water.

Point of Discharge

Hard-plumbed connections to the sanitary sewer or flow into a container, the contents of which are then released manually to sanitary sewer.

12 Boiler Flushing

Description

Hot water is used at SLAC for various purposes, but primarily to heat office spaces. Preventative maintenance is performed annually on the boilers, and the entire volume of the boiler is typically discharged to the sanitary sewer during annual maintenance. The boiler vessel is rarely cleaned, as the water treatment typically prevents any buildup of debris. During preventative maintenance, hot water is discharged to the sanitary sewer after it has cooled to below 120 degrees Fahrenheit. If it is not possible to cool the boiler water prior to discharge, it will be mixed with additional domestic water to lower the temperature during discharge. SLAC has three large boilers and one small boiler that need to be drained during preventative maintenance. SLAC has six small (less than 20 gallons) electric and gas boilers that do not need to be drained during preventative maintenance activities.

Location

Building 023 (B023):

Superior Boiler (Boiler-200): 2,446 gallons

Cleaver/Brooks Boiler (Boiler-201): 2,410 gallons

B950A:

Large Boiler (Boiler-2): 920 gallons

Small Boiler (Boiler-1): 108 gallons

There are three small (less than 20 gallons) electric boilers located at Sector 10, Sector 20, and B750. There are three small (less than 20 gallons) gas boilers located in B015 and B081.

Characterization

The hot water loop at Building 023 that feeds the main campus is treated with the anti-corrosive Corrshield MD4100. The hot water loop at Building 950, and the small electric and gas boilers are treated with Aqua Treat B239, similar to the chilled water loops at SLAC. The characterization data show this discharge to be well within permit limits for metals and pH. Yearly average daily discharge volume is estimated to be 50 gallons per day. Discharges will will exceed 50 gpd for maintenance activities that require full discharge of the boiler as described above.

Point of Discharge

Various

13 Laboratory Solutions

Description

Research laboratories at SLAC managed by the SSRL, LCLS, and Energy Sciences Directorates generate various liquid wastes with low toxicity including buffer solutions and other dilute mixtures. SSRL and LCLS non-hazardous waste solutions consist of episodic, final stage preparations in which buffers and similar non-hazardous aqueous solutions are used to stabilize sample states. Energy Sciences non-hazardous waste solutions are produced by long term experiments where buffers and similar non-hazardous aqueous solutions are used in experimental protocols. Biology research laboratories work with biosafety levels (BSL) 1 and 2 materials and generate various liquid wastes with low toxicity, including buffer solutions and culture media.

Solutions that are within SVCW permitted discharge specifications are disposed of in the sanitary sewer through laboratory sinks. Any solutions which do not meet SVCW discharge specifications are shipped off-site for disposal. SVCW discharge specifications require that a solution discharged to the sanitary sewer be non-hazardous, non-toxic to rats, rabbits, and *Onchorhynchus mykiss* (Rainbow trout), and that it has a pH in the range of 6.0-11.

In SLAC's biology laboratories, non-hazardous waste solutions are produced by bleach-decontamination of biological agent-contaminated culture media and buffer solutions produced during culturing of cells (human cell lines, animal cell lines and primary cells) and pathogens (e.g. viruses) used in experimental protocols. Per the Stanford University Biosafety-approved protocol, the decontamination procedure involves adding a 10% bleach solution to the cell culture media containing BSL1 or BSL2 biological materials. The solution is required to sit for at least 30 minutes to completely deactivate all biohazardous agents in solution. Once contact time has passed, the material is discharged to the sanitary sewer. If the pH of the material is not within the permitted range, the material contains antibiotics, or is determined to be hazardous or toxic, it is collected and sent to SLAC's Waste Management Department for offsite disposal.

Point of Discharge

SSRL (B120, B130, B131, B006, B040A); LCLS (B057, B750, B950, B999, FEH); CryoEM Center (B006 and B057); Bioscience (B040 and B057); and Energy Sciences Directorate/AED + SUNCAT (B040A and B057).

Characterization

Solutions contain low levels of inorganic salts, buffer solutions, supplemental proteins and vitamins, and other dilute chemicals, as well as the decontamination solution for biological solutions (10% bleach/90% water). This is a Center for Disease Control (CDC)-approved protocol that destroys biological agents contaminating those solutions prior to discharge. Typical SSRL and LCLS discharge wastes are solutions that contain multiple non-hazardous components, where any one component does not exceed a concentration of 1000 millimolar. For typical solutions in any participating laboratory, total components are approximately 3% to 10%

of total solution by weight. Yearly average daily discharge volume is estimated to be 50 gallons per day.

Verification

Routine spot checks are performed by the Laboratory Manager and Environmental Safety and Health (ESH) Coordinator to ensure discharges are performed in accordance with agreed procedures and per orientation requirements provided to all personnel working in the space. Additionally, an online sink disposal log is used to track those materials approved for discharge through the sink, including the date range of the experiment, the lab room, and the responsible person.

14 Building 006 Clean Room

Description

The Building 006 clean room utilizes domestic water from an ultra-pure water filtration system mixed with a mild detergent to clean dust from metal parts. Wash water and backwash from the ultra-pure water filtration system are discharged to the sewer.

Location

The clean room is located in Building 006.

Characterization

The wastewater contains 1-part mild detergent to 15 parts water and any dust washed from the parts. Parts washed in this clean room do not have oil, grease or other contaminants. Backwash water from the ultra-pure water filtration system contains low concentrations of minerals found in domestic water.

Discharge Location

The water is plumbed to the sanitary sewer system in Building 006.

15 Emergency Eyewash and Shower Testing/Inspection

Description

SLAC has many plumbed eyewash stations and safety showers. Plumbed eyewashes are flushed weekly to minimize the accumulation of sediment and other obstructions. Safety showers are flushed monthly. Eyewashes and showers are flushed until the water runs clear, which is typically attained in about one minute. The eyewash stations are capable of delivering no less than 0.4 gallons of water per minute for fifteen minutes. The safety showers are cable of delivering 20 gallons of water per minute for 15 minutes.

Location

Site-wide

Characterization

Domestic water.

Point of Discharge

Hard-plumbed connections to the sanitary sewer.

16 Building 015 All-in-One Washer/Dryer, Dishwasher, and Ultrasonic Cleaner

Description

The Building 015 all-in-one washer/dryer uses approximately 15 gallons of domestic water to clean power supply air filters, approximately once per month. The Building 015 dishwasher uses approximately four gallons of domestic water to clean electronic components, approximately once every two weeks. The Building 015 ultrasonic cleaner uses approximately two gallons of domestic water to clean power supply circuit boards, approximately once per week. This work is performed by the Electronics Engineering Department, Accelerator Power Systems (EED-APS) as preventative maintenance of the electronic components. Wastewater from the all-in-one washer/dryer, dishwasher, and ultrasonic cleaner is discharged to the sanitary sewer.

Location

All-in-One Washer/Dryer - Building 015 south high bay area
Dishwasher - Building 015 south high bay area
Ultrasonic Cleaner – Building 015 Cage 123

Characterization

The wastewater from the all-in-one washer/dryer, dishwasher, and ultrasonic cleaner may contain dirt and low levels of metals.

Discharge Location

The water is plumbed to the sanitary sewer system in Building 015.

17 Low-Conductivity Water from Klystron Tubes

Description

Klystron tube assemblies are routinely modified and repaired. Approximately three gallons of low-conductivity water (LCW) circulates in each klystron final assembly in a closed-loop re-circulating system. Upon disassembly of a klystron final assembly, the LCW is drained into the sanitary sewer. Approximately one klystron final assembly per day is disassembled and drained.

Location

Building 44 (Test Lab).

Characterization

Non-radioactive, uncontaminated LCW.

Point of Discharge

Sanitary sewer in Building 44.

18 Test Stand Cooling Water

Description

Fully dressed klystron and other research and development units are operationally tested after assembly before being put into or 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).

Characterization

Non-radioactive, uncontaminated LCW

Point of Discharge

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

19 Water from Wet-Blasting Operations

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 domestic water and Al_2O_3. The wet-blaster contains approximately 50 gallons of domestic water in a semi-closed, re-circulating system. The water reservoir must be drained and replaced every one to two months, depending on usage. The drained water is discharged to the sanitary sewer.

In addition, every three to six months both the domestic water 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 water is discharged to the sanitary sewer.

Location

Building 123

Characterization

Domestic water with traces of Al_2O_3, copper and stainless steel.

Point of Discharge

Sink in Building 123

20 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. 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 (ppm) of total volatile organic compounds (VOCs), based on prior characterization and monitoring, is collected in drums and managed as hazardous waste by SLAC Waste Management.*

Location

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

Characterization

Groundwater contains elevated concentrations of sulfates, total dissolved solids, and calcium hardness. Groundwater may also contain less than 2 ppm of total VOCs, based on prior characterization and monitoring. Purge water is evaluated for potential radioactivity and sampled as appropriate prior to discharge. The radioanalysis data are summarized in a quarterly self-monitoring report submitted to Silicon Valley Clean Water.

Point of Discharge

Building 015 casting pad sewer cleanout (manhole 85A) and the IR-8 PEP Tunnel Sump Holding Tank.

21 Detector Microfabrication Facility

Description

The Detector Microfabrication Facility (DMF) is a new Stanford University cleanroom and laboratory geared toward fabrication of state-of-the-art superconducting quantum devices and sensors. The DMF lab will be a 5,500-square-foot, class-100 cleanroom in the Arrillaga Science Center (B057) and will have six bays and eight chases. The lab will begin operations in October 2022; with full-scale operation anticipated by summer 2024. The lab will have the following tools:

- Lithography: stepper, coating track, developing track, laser direct write tool
- 3 acid wet benches: wafer cleaning with hydrofluoric acid, aluminum etchant, lithography developer bath
- 4 solvent wet benches: photoresist removal with acetone and isopropanol baths; liftoff with acetone and remover PG; detector releasing with isopropanol, acetone and Remover PG; and photoresists coating bench with SPR660, SPR220-3, SPR 220-7, LOR, HMDS and EBR-PG.
- 2 quick dump rinsers (QDR) from two acid benches
- 6 spin/rinse/dryers (SRD)
- 6 deposition tools
- 4 etching tools
- A suite of metrology tools
- 1 to 3 PECVD wet scrubbers

Up to 3,000 gallons per day of non-hazardous process wastewater will be treated by an acid waste neutralization system prior to discharge. An ultrapure water reverse osmosis system will discharge up to 8,000 gallons per day.

Point of Discharge

Arrillaga Science Center (B057).

Characterization

Non-hazardous solutions containing solvent and acid residues, residual acetone and isopropanol, metals, and other dilute chemicals treated through an acid waste neutralization system prior to discharge. Reverse osmosis reject water with total dissolved solids concentration of below 400 milligrams per liter.