Hazardous Waste Management Progress Report

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I. Introduction

The Department of Energy (DOE) is the owner and part operator of multiple facilities in Northern California. The facilities include those located at Lawrence Livermore National Laboratory (LLNL), Lawrence Berkeley National Laboratory (LBNL), Sandia National Laboratories/California (SNL/CA) and SLAC National Accelerator Laboratory (SLAC) among other sites. Through their operations, the facilities generate hazardous waste and, thereby, are subject to the requirements of Chapter 31 of the Title 22 California Code of Regulations, Waste Minimization. The Northern California sites are primarily research and development facilities in the areas relating to national security, high-energy physics, engineering, bioscience and environmental health and safety disciplines.

As mentioned above these DOE facilities are primarily research and development facilities. The hazardous wastes generated may be associated with operations that range in size from small, bench scale R&D to major maintenance and operations waste streams. Therefore, even though this document breaks down the waste streams based on California Waste Codes (CWC), the quantities of waste within one waste code category could be from many different locations and dissimilar processes. Because of the nature of the work at the sites, it is not economically feasible to try to implement source reduction measures for every process that generates a portion of the waste stream. This document identifies the processes that generate the major portion of the waste within an identified major waste stream and reports on progress made toward source reduction. In accomplishing the mission, it is DOE's goal to eliminate waste generation and emissions giving priority to those that may present the greatest risk to human health and the environment.

The following is brief description of sites subject to this document.

Lawrence Livermore National Laboratory: LLNL is managed and operated by the Lawrence Livermore National Security (LLNS) for the DOE. LLNL includes two sites, Livermore Site (Site 200) and Site 300. The Livermore Site is located in Livermore and covers approximately one square mile in Alameda County. Site 300 is approximately ten square miles and is near the City of Tracy in San Joaquin County and Alameda County. LLNL was established in 1952 and employs approximately 7,400 employees and contractors. LLNL is a large quantity hazardous waste generator and operates hazardous waste treatment, storage and disposal facilities under hazardous waste treatment and storage permits at the Livermore site and site 300. LLNL also operates hazardous waste treatment units at Livermore site under the California Tiered Permit Program.

Contact Person: Steve Nakasaki, LLNL Sustainability Performance Program Manager
Phone Number: (925) 422-8416

EPA ID #	Livermore Site:	CA2890012584
	Site 300:	CA2890090002

The address is:

Lawrence Livermore National Laboratory (Main Site)
7000 East Avenue L-626
Livermore, CA 94550-9234
SIC Code: 8733, 9611
NAICS: 54171, 928110, 541380

Lawrence Livermore National Laboratory Site 300
Corral Hollow Road
Tracy, CA 95376
SIC: 8733, 9611
NAICS: 92811, 54171, 541380, 928110

Lawrence Berkeley National Laboratory (Berkeley Lab) is located on a 202-acre site in the hills above the UC Berkeley campus. Berkeley Lab is a U.S. Department of Energy (DOE) research facility operated by the University of California (UC). Established in 1931 by Ernest Orlando Lawrence, Berkeley Lab has been awarded 13 Nobel Prizes for achievements in multiple fields of scientific research. Currently, the Lab employs approximately 3,816 permanent employees, 457 students, 441 post-doctorates and many visiting scholars.

The multidisciplinary research in energy sciences, general sciences, biosciences, and computing sciences conducted at the facility, as well as facility operation, maintenance, construction, and demolition activities, results in the production of various wastes. The Berkeley Lab main site is classified as a large-quantity generator and operates a hazardous waste storage facility under one hazardous waste treatment and storage permit. Berkeley Lab also operates hazardous waste treatment units under the California Tiered Permit Program.

Contact Person: David Kestell, Department Head, Environmental, Waste and Radiation Protection

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EPA ID # CA4890008986

The address is:
Lawrence Berkeley National Laboratory
One Cyclotron Road
Berkeley, California 94720
SIC Code: 9611, 8733
NAICS: 54171

SLAC National Accelerator Laboratory: SLAC is managed and operated by Stanford University under contract with DOE. The site occupies 426 acres and is located in the

City of Menlo Park in San Mateo County. Today, SLAC is a multipurpose national laboratory with strong programs in cosmology, chemistry, biology, materials science and energy research, leveraging the lab's historical strength in particle physics and accelerator research to power discoveries across an even greater range of scientific disciplines. SLAC operates the world's first hard X-ray free-electron laser, which generates light of unprecedented brilliance that enables the capture of atomic-scale snapshots. SLAC also helps companies use synchrotron radiation to design better pharmaceuticals, stronger materials and more efficient sources of energy, and continues to build on a solid foundation in particle physics to peer into the farthest reaches of the universe, using ever more sophisticated tools and techniques.

SLAC was established in 1962 and employs 1,500 full-time employees. It is recognized internationally with 4,000 visiting scientists from US universities, national laboratories, industrial concerns and foreign countries. SLAC is a large quantity hazardous waste generator (a 90-day waste accumulation facility) and operates hazardous waste treatment units under the California Tiered Permit Program. SLAC is not an operator of a treatment, storage, and disposal facility.

Contact Person: Yolanda Pilastro, Chemical and Waste Management Department Head

Phone Number: (650) 926-3586

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The address is:
SLAC National Accelerator Laboratory
2575 Sand Hill Road
Menlo Park, CA 94025
SIC Code: 9611, 8733
NAICS: 541712

Sandia National Laboratories/California: Sandia National Laboratories is a multi-mission laboratory managed and operated by National Technology and Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525. The SNL/CA site occupies approximately 410 acres in the City of Livermore in Alameda County. It was established in 1956 and employs approximately 1,600 employees, contractors and interns. SNL/CA is a large quantity hazardous waste generator and operates a hazardous waste storage facility under a hazardous waste treatment and storage permit. SNL/CA also operates hazardous waste treatment units under the California Tiered Permit Program.

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Phone Number: (925) 294-3803

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Sandia National Laboratories/California
7011 East Avenue
Livermore, CA 94551-0969
SIC Code: 9611, 8733
NAICS: 92811

As mentioned above, the DOE Northern California sites are also subject to the requirements of the State of California; specifically, SB 14 requirements. The DOE California Site Office has prepared this multi-site Plan, Progress Report and Summary Progress Report in accordance with the requirements of Chapter 31 of the Title 22 CCR and Guidance Manual for complying with the Hazardous Waste Source Reduction & Management Review Act of 1989, dated December 2010. The reporting year for this document is calendar year 2018 and the baseline year is 2014.

II. Category A

1. CWC 132: Aqueous solution with metals

Site	2014 Quantity (lb)	2018 quantity (lb)
SLAC	588,000	500,781
LBNL	152,299	27,355
LLNL	87,700	258,464

Primary waste generators:

For SLAC

1.1 Rinse Water from Copper Cyanide Plating – Metal Finishing Operations

The hazardous waste is rinse water containing drag-out of the copper cyanide plating bath. The process is the plating of parts dipped in the copper cyanide plating bath. The Metal Finishing Operations Group (MFO) in the SLAC Mechanical Fabrication Department (MFD) performs plating of carbon steel, stainless steel, copper, and aluminum parts and uses several processes for cleaning and plating of metal parts. Typical process steps include bead or sand blasting to remove scale, vapor degreasing to remove machining oils and other organics, alkaline cleaning to remove organics and for surface preparation, acid cleaning to remove oxidation and for surface preparation for plating, electroplating or electroless plating, and drying. The process steps employed depend on the surface finishing specifications required of the research being performed and the application of the equipment being fabricated. MFO has traditionally used copper cyanide to plate parts in the high-voltage klystrons.
After the parts are immersed in the cyanide bath, they are handled carefully to reduce drag-out before the parts are immersed in a single-stage rinse water bath. The rinse water is treated on-site in batch mode in treatment tanks, using a conventional, two-step alkaline and sodium hypochlorite oxidation process to destroy the cyanide.

After the cyanide destruction processing, the treated rinse water is forwarded to the Metal Finishing Pretreatment Facility (MFPF), a conventional pH adjustment-flocculation-sedimentation pretreatment system of tanks, to precipitate and remove the copper and other heavy metal before discharging the treated water to the sanitary sewer. This cyanide rinse water is considered Category A because it is treated on-site and treated water is discharged to the POTW. The water is treated to meet discharge requirements of the POTW under the Clean Water Act. The copper is precipitated and collected in a settling tank in the form of a metal hydroxide sludge in the MFPF. The sludge is concentrated in a filter press to form a filter cake. The copper cyanide treatment process, the MFPF, and the sludge drying processes are authorized to operate under the California Tiered Permitting program.

The LCLS II construction, which began in 2015, contributed to the decrease in rinse water from cyanide operations.
For LBNL

1.2 Ultra high vacuum facility, metal surface finishing process

This waste stream is generated as a result of metal surface cleaning operations. Metal parts are cleaned through a multi-step process including the following:

- Ultrasonic aqueous degreasing,
- Washing with commercial industrial cleaners (such as 909, B.N., Blue Gold, and Mirachem 500 cleaners),
- Surface cleaning with acidic solutions, and
- DI-water and tap water rinsing.

The decrease in the waste quantities for this waste stream is primarily due to changes in the type and volume of surface cleaning required by operations. Controlling the types and volumes of the parts surface contamination, reduces the need for cleaning, therefore reducing the volumes of generated waste streams.

For LLNL

1.3 Tank Farm Aqueous Solution Treatment

LLNL generated aqueous solution from its wastewater treatment operation at Building 695 located at the Decontamination and Waste Treatment Facility (DWTF). Aqueous waste generated by programmatic activities is sent to the DWTF for processing.

The treatment process involved chemical preparation and rotary drum vacuum filtration without evaporation, which is a part of the wastewater treatment within the DWTF. The wastewater is treated to meet discharge limits and was sent to sewer. Wastewater treatment can vary from time to time based on mission-driven activities by programs that generate water requiring treatment. The increase seen in 2018 is due to an increase in programmatic work.

2. CWC 791: Aqueous solution without metals

Site	2014 Quantity (lb)	2018 quantity (lb)
LBNL	977,760	3,849,424
SNL/CA	117,022	43,959

For LBNL

2.1 Building 70A Acid Neutralization.

This waste stream consists of acidic or caustic wastewaters, and is generated as a result of metal and electronic parts cleaning operations. The waste stream is generated primarily in three research buildings, Buildings 2, 67 and 70A, where wastewater from multiple sinks in different laboratories is collected in a retention tank.

The wastewater is subsequently treated and discharged to a POTW. The treatment consists of a neutralization process, which is authorized by the DTSC under the California Tiered Permit program (Permit-by-Rule for Buildings 2 and 70A. Conditional Authorization for Building 67).

In January 2011, an operational change was made to route treated water into the cooling towers for use as the makeup water which resulted in reduction of discharge to POTW. However, in Fall 2018, Building 70A had maintenance issues and LBNL decided to discontinue diverting water to the cooling tower in Fall 2018. This resulted in a decrease of the quantity of water diverted to the cooling tower and therefore, an increase discharge to the POTW.

For SNL/CA

2.2 Microstructures Laboratory

This waste stream includes rinsates from wet etching and from photolithographic developing; washing/rinsing of laboratory glassware and utensils; and finally, drainage from the wafer dicing saw and spin rinse/dryers.

The reduction in waste water generation in the Microstructures Laboratory is due to a significant reduction in work that requires process water. In addition, the lab owner is emphasizing the need to reduce creating excess rinse water to all new lab users. It is anticipated this waste stream will continue to reduce.

III. Category B

1. CWC 132: Aqueous solution with metals

Site	2014 quantity (lb)	2018 quantity (lb)
LLNL	33,880	24,571

2.1 Floor Care Effluent

In an effort to improve both pollution prevention and worker health and safety, the team that carries out floor maintenance and floor stripping operations routinely tries alternative stripping and finish products, such as products that do not contain zinc and/or are Green Seal-certified. As a result, the floor stripping process generated approximately 3,063 lbs of CWC 132 waste in 2018 compared to 20,426 lbs in 2014.

2. CWC 134: Aqueous Solution with Total Organic Residues Less Than 10 Percent

Site	2014 quantity (lb)	2018 quantity (lb)
LLNL	666,682	852,409

2.1 B322 Plating Shop Rinse Water Recycling

Water generated from the rinsing of parts in the Building 322 plating shop is typically contaminated with organic chemicals and hazardous metals used in plating operations. While the shops employ pollution prevention measures to minimize wastewater generation during rinsing operations by using spray rinsing of parts rather than drag out rinsing, this is still one of the largest hazardous waste streams at LLNL. The wastewater generated from this process is reclaimed using an evaporator unit, hard-plumbed into the B322 shop's rinse water collection system. Water processed in the evaporator is then reused as rinse water in the shop.

The increase in the amount of Plating Shop rinse water recycling from 2014 to 2018 is attributed to an increase in plating shop work.

As noted in previous SB 14 Plans/Reports, this CWC 134 waste represented the largest hazardous waste stream generated at LLNL. However, the bulk of this waste stream was reconditioned and recycled through Building 322 evaporator unit. Because this single waste stream is so large, it was excluded when calculating LLNL Category B wastes so as not to dwarf other waste streams of significance.

3. CWC 135: Unspecified Aqueous Solution

Site	2014quantity (lb)	2018 quantity (lb)
SNL/CA	5,768	11,021
LLNL	17,743	11,408

For SNL/CA

3.1 Building 963 Wash Down Pad Landscapers / Maintenance

The Maintenance Engineering Department power-washes various types of equipment at the Building 963 wash down pad as part of routine maintenance. The types of equipment that are power-washed include landscaping equipment, heavy equipment and the trash truck. This activity generates wastewater that is contaminated with oil, dirt and grease. This waste is collected in the oil and water separator located at the Building 963 wash down pad and disposed of as a non-RCRA hazardous waste.

In an effort to conserve water, conservation efforts have been implemented that affect the routine washing of vehicles and equipment - this has resulted in an overall decrease in waste water generated through routine maintenance operations.

3.2 Building 943 Surface Cleaning Operations

This waste stream is generated from the Building 943 surface cleaning operation. The surface cleaning operation saw a significant increase in their workload (approximately 30%) in CY18 due to an increase in DOE programmatic work. The increase in the workload resulted in the surface cleaning baths needing to be changed out more frequently.

For LLNL

3.3 B391 HF etching solution

This waste stream is generated from NIF optics processing operations. These processes have been optimized to generate the minimal amount of waste while producing the high quality optics required. For example, optics are batched to minimize solution change out between types, and baths are reused before spent etchant must be discarded and replaced.

In 2009, NIF started implementation of an optics repair process to extend the life of the optics. This operation has continued to expand and reduces both the need to acquire new replacement optics and the chemicals used to process them.

4. CWC 181: Other Inorganic Solid Waste

Site	2014 Quantity (lb)	2018 quantity (lb)
LLNL	18,272	22,026
LBNL	4,344	3,895
SLAC	8,562	7,431

For LLNL

4.1 B291 ion exchange resin, activated alumina or carbon

The low conductivity water coolers at Building 291 use ion exchange resin to strip copper from the water. The water is monitored for copper and when concentrations of copper are detected the ion exchange resin is exchanged; this occurs approximately every seven years. The process generated 18,272 lbs of waste in 2014 but no waste in 2018 because change out of ion exchange resin did not occur.

Air is compressed and containerized at Building 291 for various laboratory uses. Activated alumina and carbon are used to remove moisture from the air during this process. Over time the activated alumina and carbon desiccants become ineffective and must be exchanged; this occurs about every 3 to 5 years. The spent desiccants are collected and disposed of as hazardous waste.

No ion exchange resin waste was generated from Building 291 during CY2018.

For LBNL

4.2 Lab Clean Out Debris

This waste stream decreased by 10% and consists of clean-out debris from laboratories that were shut down and/or relocated. The debris included predominantly glassware and dismantled experimental equipment. Equipment evaluated during clean outs as outdated and/or no longer of use is routinely disposed of and frequently characterized as having contaminates present, which render it as hazardous. Laboratory clean outs are done more frequently reducing large quantity accumulation resulting in an overall reduction of this waste stream.

For SLAC

4.3 Overall Hazardous Waste and Process Description

This waste stream decreased by 26% due to continued improvements in housekeeping and more efficient segregation of hazardous and non-hazardous wastes. The processes

generating these wastes are from removal of experimental equipment and lead shielding generating lead and lead debris, metal finishing operations generating filter cake, Sector 0-10 Equipment Removal project in preparation for LCLS-II construction, closed-loop, low-conductivity cooling water system generating spent deionization resins and metal finishing operations that generate empty chemical containers, acid and alkaline debris.

5. CWC 221: Used Oil and Mixed Oil

Site	2014 Quantity (lb)	2018 quantity (lb)
SLAC	9,612	12,555
LBNL	7,283	6,732

For SLAC

5.1 Machining Operations and Equipment Maintenance

This waste stream is generated from oils used to operate electrical, mechanical (pumps, compressors), T20s (modulators), chokes (subboosters) and machining equipment. Oil is an important component in the successful operation of electrical and mechanical equipment, and in machining operations performed at SLAC. The LCLS II construction, which began in 2015, contributed to the increase in waste oil generated from equipment removal operations.

For LBNL

5.2 Service and repair of heavy machinery, pumps and other equipment

This waste stream is generated throughout LBNL as a result of maintenance of equipment such as heavy machinery, pumps, etc.

LBNL has shown a reduction of 7.5% of this waste stream since the last reporting period. Source reduction measures already implemented include closing of the onsite motor pool, purchase of oil-less pumps, installation of cyclone dewatering devices on some tanks, and optimization of oil consolidation strategies at waste accumulation areas. Additional oil less pumps have been implemented and routine oil generation have reduced. All the above are best management practices that have resulted in continued reduction of this waste stream.

6. CWC 223: Unspecified Oil-Containing Waste

Site	2014 Quantity (lb)	2018 quantity (lb)
SNL/CA	10,247	20,795
LLNL	16,278	16,827
SLAC	22,686	16,295

For SNL/CA

6.1 Building 914- Machine Shop coolant/oil/water

The Building 914 Machine shop uses lathes, milling machines, drill presses, band saws, grinders, and other equipment to produce classified and prototype parts in support of all on-going projects at SNL/CA. Certain machining tools require metal working fluid (coolant).

Building 914 Machine Shop doubled their workload in CY18 due to an increase in DOE programmatic work. The increase in the workload resulted in the coolant needing to be changed out from the machines more frequently.

For LLNL

6.2 Routine Oily Waste

No CWC 223 waste was generated from Building 622 during CY2018, however several non-PCB capacitors (3,668 pounds) from various Lab locations were disposed during CY2018, including 1,438 lbs. from Building 176 and 2,230 lbs. from Building 517.

For SLAC

6.3 Routine Oil Containing Waste

This waste stream is composed of oily/solvent solid debris/rags, oil-filled equipment, oil/water mixture, cutting fluid/oil/water mixture. Ongoing pollution prevention training contributed to the 28% decrease in oily waste generated at SLAC.

7. CWC 343: Unspecified organic liquid mixtures

Site	2014 quantity (lb)	2018 quantity (lb)
LBNL	1,912	2,866

7.1 Scintillation Vial

The majority of this waste stream consists of scintillation fluid used in the detection of radioactivity. The waste represented here are those wastes where no radioactivity detected. LBNL will continue segregation of this waste stream to minimize radioactive contamination.

8.0 CWC 352: Other Organic Solids

Site	2014 Quantity (lb)	2018 quantity (lb)
LBNL	9,925	8,459
SNL/CA	2,778	4,756

For LBNL

8.1 Organic Solids

This waste stream consists of Kim wipes, paper towels, gloves, pipette tips, and plastics contaminated with organic materials. This waste stream may vary from year to year depending the type of research performed.

For SNL/CA

8.2 Maintenance & various researchers - general lab waste

This waste stream is generated from multiple operations throughout the site. An increase in DOE programmatic work has resulted in an increase in waste generation.

9. CWC 551: Laboratory Waste Chemicals

Site	2014 Quantity (lb)	2018 quantity (lb)
SNL/CA	8,955	13,221
LBNL	11,034	9,582

For SNL/CA

9.1 Maintenance & various researchers - general lab waste

This waste stream is generated from multiple operations throughout the site. An increase in DOE programmatic work has resulted in an increase in waste generation.

For LBNL

9.2 Chemical Wastes Generated by Research Laboratories

The chemicals and chemical solutions are used throughout LBNL research Divisions (i.e. Life Sciences, Material Sciences, Chemical Sciences, Physical Biosciences and other research related Divisions) to prepare research samples and conduct experiments. Chemicals purchased in small amounts are stored in the individual laboratories. Waste stream quantities fluctuate with the volume of research activities in progress. Reduction in research projects and building of new labs have resulted in a decrease in this waste stream for this reporting period. Recently, LBNL has implemented waste management reduction measures through procurement to monitor and limit purchases of large volumes of chemicals.

10. CWC 741: Liquids with Halogenated Organic Compounds (≥ 1000 mg/l)

Site	2014 quantity (lb)	2018 quantity (lb)
LBNL	10,529	9,285

10.1 Halogenated Solvent Waste from Research Activities

CWC 741 waste streams are from laboratory research activities. The predominant generator is the nano-technology research facility. The waste streams are comprised of chemical mixtures from research activities, including; chlorobenzene, methylene chloride, chloroform, polyfluorene, toluene, methanol, acetonitrile and many others. A decrease in experiments utilizing organic synthesis techniques resulted in an overall reduction of this waste stream for this reporting period.

11. CWC 791: Liquids with pH < 2

Site	2014 Quantity (lb)	2018 quantity (lb)
LBNL	3,619,890	2,127
SNL/CA	3,100	3,815

For LBNL

11.1 Acid Neutralization

Site	2014 quantity (lb)	2018 quantity (lb)
LBNL	3,619,890	

This waste stream consists of acidic waste waters. It is generated a result of metal and electronic parts cleaning operations. LBNL decided to discontinue diverting water to the cooling tower in Fall 2018 because of maintenance issues. This resulted in a decrease of the quantity of water diverted to the cooling tower and therefore an increase to the POTW.

For SNL/CA

11.2 Surface Cleaning Operations

This waste stream is generated from the Building 943 surface cleaning operations. The surface cleaning operation saw a significant increase in their workload (approximately 30%) in CY18 due to an increase in DOE programmatic work. The increase in the workload resulted in changing out the surface cleaning baths more frequently.

12. CWC 792: Liquids With pH≤2 With Metals

Site	2014 quantity (lb)	2018 quantity (lb)
LBNL	6,239	3,112

For LBNL

12.1 Ultra High Vacuum Cleaning Facility

This waste stream is generated as a result of metal surface cleaning operations. Metal parts are cleaned through a multi-step process including the following:

- Ultrasonic aqueous degreasing,
- Washing with commercial industrial cleaners (such as 909, B.N., Blue Gold, and Mirachem 500 cleaners),
- Surface cleaning with acidic solutions, and
- DI-water and tap water rinsing.

The waste stream consists of acidic wastes that contain particles and dissolved metals.

LBNL evaluated the possibilities of extending the useful life of the acidic solutions. The evaluation concluded that extending the useful life of acidic solutions is not technically feasible. The reduction in generation in 2018 is due to decreased operations.

IV. Category C

1. CWC 141: Off-specification, aged, or surplus inorganics

Site	2014 quantity (lb)	2018 quantity (lb)
LLNL	114	124
LBNL	102	10

1.1 Surplus inorganic chemicals

Site	2014 quantity (lb)	2018 quantity (lb)
LLNL	114	124

Routine lab operations and clean-out activities. This waste stream can vary in volume from year to year. Whenever laboratories are cleaned out during laboratory or researcher relocations, or projects are completed and decommissioned, there tends to be an increase in the generation of this waste stream.

1.2 Routine Laboratory Cleanout Process

Site	2014 quantity (lb)	2018 quantity (lb)
LBNL	102	10

This waste stream represents the variety of chemicals used in the research and operations areas. A very small percentage of these discarded chemicals were acutely hazardous. During 2014, there were many laboratory moves to accommodate building renovation efforts and to consolidate programmatic personnel. The chemicals used represent those passed on from previous researchers, those no longer needed for current research directions, house cleaning activities preceding a laboratory move or the result of the closure of laboratory space. The number of lab closures and relocations decreased during this reporting period resulting in a reduction of this waste stream.

2. CWC 181: Other inorganic solid waste

Site	2014 quantity (lb)	2018 quantity (lb)
SLAC	240	108

2.1 Spent Cyanide Filters from Metal Finishing Operations

CWC 181 is generated through the Metal Finishing Operations (MFO) Group in the SLAC Mechanical Fabrication Department (MFD), See section 1.1 for explanation of the process.

The LCLS-II construction needs which began in 2015, contributed to the decrease in plating shop operations. Cyanide filters were not consistently changed on a monthly basis.

2. CWC 331: Other inorganic solid waste

Site	2014 quantity (lb)	2018 quantity (lb)
LBNL	218	7

2.1 Off-specification, Aged or Surplus Organic Chemicals

This waste stream represents the variety of chemicals used in the research and operations areas. A very small percentage of these discarded chemicals were acutely hazardous. The number of lab closures and relocations decreased during this reporting period resulting in a reduction of this waste stream.

3. CWC 551: Laboratory Waste Chemicals

Site	2014 quantity (lb)	2018 quantity (lb)
LBNL	14	1

3.1 Laboratory Waste Chemicals

This waste stream represents the variety of chemicals used in the research and operations areas. A very small percentage of these discarded chemicals were acutely hazardous. The number of lab closures and relocations decreased during this reporting period resulting in a reduction of this waste stream.

4. CWC 791: Liquids with pH≤2

Site	2014 Quantity (lb)	2018 quantity (lb)
LLNL	63	73

4.1 Chemical Reduction Inventory

This waste is generated from various chemical reduction inventory efforts including lab cleanouts and disposal of off-specification chemicals, typically from previous research activities. In 2014 a total of 63 pounds of CWC 791 waste was generated. In 2018, these activities generated less than 2 pounds.

Electrochemical experiments and other processes generated approximately 71 lb of this waste stream in 2018.

V. Certification Statements

Technical Certification

I certify this Hazardous Waste Management Performance Report identifies factors that affect the generation and on-site and offsite management of hazardous wastes and summarizes the effect of those factors on the generation and on-site and off-site management of hazardous wastes.

_____ _____

Name Signature

_____ September/ 1/ 2019

Title

Financial Certification

I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or the persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for making false statements or representations to the Department, including the possibility of fines for criminal violations.

Karin King _____

Name Signature

_____ _____/_____/_____

Title Mo / Day / Year