Chapter 22

Waste Minimization and Pollution Prevention

Chapter Outline

1   Overview

SLAC is required by the US Environmental Protection Agency (US EPA),[1] the California Environmental Protection Agency (Cal/EPA),[2] the US Department of Energy (DOE), and local agencies, where technically and economically practicable, to

- Reduce the generation of hazardous, non-hazardous, and radioactive wastes
- Prevent pollution to environmental media, air, water and land, and conserve natural resources

SLAC implements a waste minimization and pollution prevention (WM/P2) program to achieve these requirements. The program strives to reduce the environmental impact of SLAC research and operational activities, as well as reduce the burden of compliance with environmental regulations. SLAC is committed to integrating environmental stewardship into all facets of its mission. This stewardship includes integrating pollution prevention, waste minimization, resource conservation, and environmental compliance into all of planning and decision-making. Cost-effective practices are used to eliminate, minimize, or mitigate environmental impacts.

Promoting the WM/P2 program is a part of the overall SLAC Environment, Safety, and Health Policy[3] and pollution prevention is integrated into the SLAC Integrated Safety and Environmental Management System (ISEMS),[4] which is designed to achieve continual improvement.

SLAC strives to reduce the environmental impact of its activities in a balanced way so as to not compromise its mission. Requirements for the WM/P2 program are designed so that an organization can show good faith efforts by setting goals, planning strategies and measures, tracking progress, and communicating accomplishments reducing the generation waste and preventing pollution.

This chapter outlines the program and describes how SLAC – from single operations run by a few or daily activities performed by many – can achieve the goals of the program.

1.1   Hazards/Impacts

Failure to minimize waste and prevent pollution can

- Increase exposures to hazards in the workplace
- Increase liabilities under federal, state, and local environmental laws and regulations

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1   "US Environmental Protection Agency", http://www.epa.gov/

2   "California Environmental Protection Agency", http://www.calepa.ca.gov/

3   Stanford Linear Accelerator Center Environment, Safety and Health Policy (SLAC-I-720-0A00B-003), http://www-group.slac.stanford.edu/esh/about_esh/eshpolicy.htm

4   *SLAC Integrated Safety and Environmental Management System Description* (SLAC-I-720-0A00B-001), http://www-group.slac.stanford.edu/esh/general/isems/sms.pdf

- Increase environmental impact from use of toxic materials

- Increase costs associated with air pollution control, sewage treatment, water cleanup, waste generation, and waste disposal

- Decrease resources from inefficient use of materials, water and energy

- Reduce available funding from costs of environmental cleanups and remediation

The hazards associated with hazardous wastes include the pollution of soil, water, and air, environmental concerns that can seriously impact our health and safety. Concerns about these hazards also impact the SLAC mission. SLAC and DOE have spent millions of dollars to clean up soil and groundwater that have been impacted by chemicals such as lead, polychlorinated biphenyls, and volatile organic compounds.

Even when dealing with wastes that would appear to have little impact on our health, for example, common office paper, which is considered non-hazardous, there are still hazards/health impacts throughout the paper life cycle – its production, use, and disposal. Recycled paper exemplifies the benefit of pollution prevention. Producing paper from one ton of recycled paper instead of paper made from virgin wood pulp saves 17 trees, uses 60 percent less energy and generation of greenhouse gases, uses 50 percent less water, and saves more than three cubic yards of landfill space.

2   Scope

The requirements of this program apply to all personnel at SLAC, engaged in any activity that may generate waste or pollution, from research and administration to design, fabrication, operations, and maintenance.

This chapter describes overall WM/P2 measures. Additional detailed measures and restrictions for specific materials, media, and activities are described in chapters describing those programs, for example, Chapter 17, "Hazardous Waste". [5] (See Section 7, "References", for a list of related chapters.)

Low-level radioactive wastes and mixed wastes generated at SLAC are managed by the Radiation Protection Department, which has requirements in place to minimize the generation of such waste. (See the SLAC *Radioactive Waste Manual*.[6])

2.1   Exemptions

There are no exemptions to the requirements of this program.

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5   *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

6   *Radioactive Waste Manual* (SLAC-I-760-2A08Z-001), http://www-group.slac.stanford.edu/esh/documents/RWM.pdf

3 Standards

- Title 42, *United States Code*, "The Public Health and Welfare"[7]

  – Chapter 133, "Pollution Prevention" (42 USC 13001 and following)

- Title 40, *Code of Federal Regulations*, "Protection of the Environment", Chapter 1, "Environmental Protection Agency"[8]

  – Part 247, "Comprehensive Procurement Guideline for Products Containing Recovered Materials" (40 CFR 247)

  – Part 370, "Hazardous Chemical Reporting: Community Right-to-Know" (40 CFR 370)

  – Part 372, "Toxic Chemical Release Reporting: Community Right-to-Know" (40 CFR 372)

- Title 22, *California Code of Regulations,* "Social Security", Division 4.5, "Environmental Health Standards for the Management of Hazardous Waste" [9]

  – Chapter 12, "Standards Applicable to Generators of Hazardous Waste", (22 CCR 66262 and following)

- *California Health and Safety Code,* Division 20, "Miscellaneous Health and Safety Provisions", Chapter 6.5, "Hazardous Waste Control"

  – Article 11.9, "Hazardous Waste Source Reduction and Management Review Act of 1989" (HSC 25244.12–25244.24)[10]

  – Article 10.3, "Electronic Waste Recycling Act of 2003" (HSC 25214.10)

- Executive Order 13101, "Greening the Government through Waste Prevention, Recycling, and Federal Acquisition" (EO 13101)[11]

- Executive Order 13148, "Greening the Government through Leadership in Environmental Management" (EO 13148)

- DOE Order 450.1, "Environmental Protection Program"[12]

Additional detail on these standards can be found in WM/P2: Regulatory Requirements.[13]

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

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

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

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

11   "NARA – Federal Register – Executive Orders Disposition Table", http://www.archives.gov/federal-register/executive-orders/

12   http://www.directives.doe.gov/pdfs/doe/doetext/neword/450/o4501c2.html

13   WM/P2: Regulatory Requirements (SLAC-I-750-0A16S-006), http://www-group.slac.stanford.edu/esh/eshmanual/references/wmp2ReqRegulatory.pdf

4   Definitions

Environmentally-preferable facilities, products, and services. Those that help reduce environmental impact

Life-cycle cost analysis. Evaluation of the total installed cost of a project, the annual operating costs, and closure costs

Mixed waste. Waste that has both hazardous and radioactive components

Pollution prevention. A broader term that includes waste minimization. It is defined by the EPA as measures that reduce the generation of non-hazardous and hazardous waste and that prevents deterioration of the earth's atmosphere, water, land, and biota caused by pollution. Pollution prevention also includes spill prevention measures and resource conservation through sustainable design and environmentally-preferred purchasing measures.

Pollution prevention hierarchy. Measures to prevent pollution, ranked by desirability:

1. *Reduce* the generation of waste through improvements in the design, manufacture, processing, purchasing, or use of material (such as equipment, products and packaging) to prevent the generation of a waste or to reduce the amount and/or toxicity of the waste generated.

2. *Reuse* potential waste that cannot be eliminated, in a manner that is similar to its original use or for an alternative use without creating additional pollution.

3. *Recycle* waste that cannot be reused, using discarded material as raw material for producing new products. Complete recycling consists of three major components: segregating and collecting materials, using the material as raw material to make new products, and purchasing the recycled products.

4. *Treat* waste that cannot be recycled through any operation that changes or is designed to change the physical, chemical, or biological character to remove or reduce its hazardous characteristics.

Pollution prevention opportunity assessment. A systematic, structured appraisal of a process, activity, or operation to identify and evaluate potential activities that will eliminate or reduce waste, conserve natural resources, reduce toxic chemical or hazardous material use, and recycle materials

Source reduction. See *reduce*

Sustainable design. Improving environmental performance of facilities, products, and services through measures such as optimizing site potential, minimizing energy consumption, protecting and conserving water, using environmentally preferable facilities, products, and services, enhancing indoor environmental quality, and optimizing operational and maintenance practices.

Waste minimization. Defined by the US EPA as measures that reduce the volume and toxicity of hazardous waste disposed to landfills. California defines waste minimization as those measures to reduce or recycle hazardous waste at the point in a process where it may be generated.

5   Requirements

5.1   General

Under the SLAC ES&H policy and ISEMS, we are expected to demonstrate to the DOE and our community that we all take responsibility for maintaining the environment and improving it by minimizing waste and preventing pollution.

5.1.1   Plans

SLAC is required under federal and state regulations to produce plans for WM/P2, set goals, and track progress towards the goals.

The planning process involves

- Collaborative effort among line managers and Environment, Safety, and Health (ES&H) Division, Conventional and Experimental Facilities (CEF) Department, and Purchasing Department program managers to analyze activities that generate waste and pollution and to develop and implement strategies and measures to reduce wastes and prevent pollution

- Review of new projects and ongoing activities in accordance with Chapter 2, "Work Authorization",[14] which requires Environmental Safety Citizen Committee (EnvSC)[15] review of major new projects and operations for potential environmental impacts by the of potential environmental impacts

- Review of work for environmental and safety compliance and the implementation of WM/P2 measures through the SLAC Quality Assurance and Compliance Design Assurance and Construction Inspection Procedure[16]

- Assessing the WM/P2 program to determine if waste reduction and pollution prevention strategies and measures are achieving goals and to develop future strategies and measures that will help achieve goals

5.1.2   Reports

The following reports are used to track SLAC's performance in the WM/P2 program:

1. Facility newsletters

2. SLAC Annual Site Environmental Report (ASER)[17]

3. DOE Annual Pollution Prevention Progress Report

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14 *SLAC Environment, Safety, and Health Manual* (SLAC-I-720-0A29Z-001), Chapter 2, "Work Authorization", http://www-group.slac.stanford.edu/esh/general/work_authorization/policies.htm

15 "Environmental Safety Citizen Committee", https://www-internal.slac.stanford.edu/esh/committees/envsc/charter.htm

16 SLAC Quality Assurance and Compliance Design Assurance and Construction Inspection Procedure (SLAC-I-770-0A22C-001), https://www-internal.slac.stanford.edu/OA/documents/QAdesign.pdf

17 "Annual Site Environmental Reports (ASER)", http://www-group.slac.stanford.edu/esh/divisional/aser.htm

4.   US EPA Biennial Hazardous Waste Report

5.   US EPA Toxic Chemical Release Inventory (TRI) Report

6.   California Hazardous Waste Source Reduction and Management Review Plan and Report

7.   DOE report on the procurement of EPA-designated products or environmentally preferred products

8.   Report on energy and water conservation measures

Details on requirements for these reports are in WM/P2: Regulatory Requirements.[18]

5.1.3   Pollution Prevention Opportunity Assessments

Under DOE order, *pollution prevention opportunity assessments (PPOA)* of site operations must be performed. The WM/PP program manager will assist project/program managers or line management in determining what processes are candidates, evaluating potential impacts, and conducting the assessments. (See WM/P2: Pollution Prevention Opportunity Assessment Procedures.[19])

5.1.4   Purchasing Practices

SLAC is required by the US EPA to purchase products that are recyclable or made from recycled material when technically and economically practicable.

Note   Recycling is not just sending materials off to recyclers. In order to recycle, one must also buy products that are manufactured from recycled. The government provides a large market and opportunity for effective use of recycled materials.

Personnel must follow SLAC Purchasing procedures to ensure the procurement and use of environmentally-friendly products and services in new projects and existing operations and activities.

Note   The Chemical Management Services (CMS) system[20] must be used to purchase chemicals; see Chapter 40, "Hazardous Materials".[21]

5.1.5   Reduction Measures

5.1.5.1   Non-hazardous Waste

All personnel must implement measures to reduce, reuse, and recycle non-hazardous waste (see Non-hazardous Waste Reduction Guidelines,[22] Non-hazardous Waste Recycling Guidelines[23] and Non-hazardous Waste Reduction, Reuse, and Recycling Procedures[24]).

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18   WM/P2: Regulatory Requirements (SLAC-I-750-0A16S-006), http://www-group.slac.stanford.edu/esh/eshmanual/references/wmp2ReqRegulatory.pdf

19   WM/P2: Pollution Prevention Opportunity Assessment Procedure (SLAC-I-750-0A16C-008), http://www-group.slac.stanford.edu/esh/eshmanual/references/wmp2ProcedPPOA.pdf

20   "Chemical Management Services (CMS)", http://www-group.slac.stanford.edu/esh/groups/cgs/cms/

21   *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

5.1.5.2   Hazardous Waste

Hazardous waste poses a threat to human health and the environment. The types and quantities of hazardous materials or chemicals used and the processes or operations that use them determine the level of hazardous waste generated at SLAC.

Unlike non-hazardous waste, hazardous waste is highly regulated. Hazardous waste can only be stored for a limited time on site and must be properly managed, using required containers, labels, and secondary containment. As a result, it is in the best interest of any organization not to generate hazardous waste in the first place. Since hazardous wastes typically arise from the use of hazardous materials, any measures that are taken to reduce, reuse, or recycle hazardous materials can relieve SLAC of the burden associated with managing hazardous waste.

SLAC has well developed programs for the management of hazardous material (see Chapter 40, "Hazardous Materials"[25]) and hazardous wastes (see Chapter 17, "Hazardous Wastes"[26]). The preferred method of waste minimization and pollution prevention is for personnel to modify their operations or activities to reduce the use of hazardous materials so that hazardous waste is never generated or is effectively minimized. Reuse is the next preferred method, followed by recycling and treatment, both of which are subject to strict regulatory controls for hazardous wastes.

All personnel must implement measures to reduce, reuse, and recycle hazardous waste (see WM/P2: Hazardous Waste Reduction Guidelines[27]). For determining if a waste is hazardous, see Chapter 17, "Hazardous Waste".[28]

5.1.6   Individual Recognition

The efforts of individuals in identifying and implementing waste minimization and pollution prevention measures will be recognized through an award program. Certificates are awarded based on the merit of the WM/P2 activity and on the recommendations of managers and supervisors.

Managers and supervisors will contact the WM/P2 program manager to recommend personnel as recipients of WM/P2 awards. The ES&H Division will evaluate the recommendations. Awards are presented by the

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22   WM/P2: Non-hazardous Waste Reduction Guidelines (SLAC-I-750-0A16T-003), http://www-group.slac.stanford.edu/esh/eshmanual/references/wmp2GuideReduce.pdf

23   WM/P2: Non-hazardous Waste Recycling Guidelines (SLAC-I-750-0A16T-004), http://www-group.slac.stanford.edu/esh/eshmanual/references/wmp2GuideRecycle.pdf

24   WM/P2: Non-hazardous Waste Reduction, Reuse, and Recycling Procedure (SLAC-I-750-0A16C-009), http://www-group.slac.stanford.edu/esh/eshmanual/references/wmp2ProcedReduce.pdf

25   *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

26   *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

27   WM/P2: Hazardous Waste Reduction Guidelines (SLAC-I-750-0A16T-005), http://www-group.slac.stanford.edu/esh/eshmanual/references/wmp2GuideReduceHazwaste.pdf

28   *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

ES&H Division and the associate director of the award recipient's directorate. Details on how to prepare nominations and how awards are determined are provided in WM/P2: Individual Recognition Requirements.[29]

5.1.7   Information Resources

The WM/P2 program manager will ensure information on WM/P2 efforts is readily available to the SLAC public.

5.1.8   Personnel

5.1.8.1   Program Managers

The CEF and Purchasing departments must designate WM/P2 program managers to fulfill their respective responsibilities.

5.1.9   Roles and Responsibilities

5.1.9.1   WM/P2 Program Manager

The WM/P2 program manager will

- Assist department and program managers and university technical representatives (UTRs) in identifying and evaluating technically and economically practicable WM/P2 alternatives

- Evaluate toxic chemical usage and hazardous waste generation for pollution prevention opportunities

- Propose goals for and coordinates the WM/P2 program based on regulations, good operating practices, technology transfer, and available funding

- Provide overall tracking and reporting of WM/P2 performance using existing systems and periodic requests for data

- Work with the air quality program manager to prepare the toxic chemical release inventory (TRI) report and use it and CMS data to report on and identify waste reduction and pollution prevention opportunities annually

- Act as point of contact for DOE hazardous material exchange and work to identify on-site and off-site reuse options of hazardous materials

- Assist in nominating individuals for recognition of efforts to implement WM/P2 measures

- Provide periodic updates on the program to increase employee awareness of pollution prevention measures, activities, accomplishments, and performance

5.1.9.2   Environmental Safety Committee

The Environmental Safety Committee (EnvSC) will review new projects and ongoing operations that may significantly impact the environment and make recommendations to conduct pollution prevention opportunity assessments and to implement cost-effective WM/P2 strategies and measures

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29 WM/P2: Individual Recognition Requirements (SLAC-I-750-0A16S-007), http://www-group.slac.stanford.edu/esh/eshmanual/references/wmp2ReqRecognition.pdf

5.1.9.3   Conventional and Experimental Facilities Department

The Conventional and Experimental Facilities (CEF) Department will

▪ Administer the subcontracts for recycling (for example, corrugated cardboard, various office paper, beverage cans/bottles), the disposal of common non-hazardous wastes, and the recycling and disposal associated with non-hazardous construction or subcontractor activities (composting or *green* waste, non-treated scrap wood and tree cuttings, uncontaminated asphalt, concrete and soils, and other construction materials identified as practicable to recyclable)

▪ Ensure that the non-hazardous recycling and disposal subcontractors provide data to the WM/P2 program manager on the quantities of recyclable material collected and waste generated from SLAC projects and operations

Note   This data is used to help evaluate WM/P2 measures for SLAC and to meet DOE reporting requirements.

▪ Designate a program manager to coordinate and report on SLAC energy and water conservation measures

▪ Manage project designs and operations with consideration to recycling non-hazardous construction wastes, reusing water, efficiently using existing or alternative energy sources, and implementing sustainable designs in the construction of buildings and experimental facilities

5.1.9.4   Property Control Department

The Property Control Department will

▪ Provide site-wide collection of the various types of equipment and articles classified as government property and managed as non-hazardous (includes office trailers, office furniture, electronic/electrical equipment, appliances, scrap metals and wire, and other articles)

▪ Promote reuse or recycling of these items with potential SLAC, DOE or external organizations

5.1.9.5   Purchasing Department

The Purchasing Department will

▪ Designate a program manager to help implement environmentally preferred purchasing of products and services

▪ Encourage site-wide purchasing WM/P2 strategies and measures

▪ Purchase environmentally-preferable products and services that promote WM/P2

▪ Ensure that subcontracts include WM/P2 practices where practical

▪ Track and record purchases of US EPA-designated products as required by DOE

▪ Consider the cost of waste disposal in evaluation and selection of products

5.1.9.6   Radiation Physics Group

The Radiation Physics Group will

▪ Provide training and guidance to departments on the minimization of low-level radioactive and mixed wastes

- Assist in developing measures for reduction of radioactive and mixed wastes

5.1.9.7   Program Managers, Project Managers, and University Technical Representatives

Program managers, project managers, and university technical representatives (UTRs) – and any personnel who oversee aspects of hazardous waste generation and accumulation – will

- Work with ES&H, CEF, and Purchasing program managers to conduct pollution prevention opportunity assessments for new projects if required by the EnvSC

- Ensure that hazardous materials and wastes are stored, handled, used, and transferred in a manner that reduces waste generation and prevents pollution

- Implement WM/P2 strategies and measures that are deemed technically and economically practical

- Ensure that personnel who store, handle, use, or transfer hazardous or radioactive material or waste have completed required training

- Ensure that waste minimization, pollution prevention, and sustainable design measures are incorporated into new projects, when technically and economically practical

- Inform ES&H program managers of plans for new projects that will generate waste and develop procedures that ensure WM/P2 in the project and ongoing operations

- Communicate with the WM/P2 program manager to identify proposed and implemented measures that reduce waste and prevent pollution to assist in reporting of SLAC accomplishments to DOE and the public

- Project managers and UTRs will ensure that subcontractors comply with the WM/P2 program

5.1.9.8   Managers and Supervisors

Managers and supervisors will

- Recommend personnel who have made significant contributions to WM/P2 at SLAC as nominees of WM/P2 awards

- Work with the WM/P2 program manager an to assess pollution prevention opportunities for operations that are deemed to have a significant environmental impact

5.1.9.9   Supervisors, Building Managers, and Administrative Assistants

Supervisors, building managers, and administrative assistants will encourage non-hazardous recycling in their work areas and buildings.

5.1.9.10 Subcontractors

Subcontractors involved in a project that generates non-hazardous or hazardous waste must perform their work in a manner that minimizes waste and prevents pollution.

5.1.9.11 Personnel

All personnel will

- Reduce, reuse, and recycle

- Communicate WM/P2 ideas and suggestions to managers and supervisors

- Purchase products that are recycled or recyclable, less hazardous, or have reduced or recyclable packaging
- Become familiar with the WM/P2 measures through available information sources

5.2   Procedures and Specific Requirements

The following procedures are required. For a full list of implementing documents, see Section 6, "Exhibits".

5.2.1   Pollution Prevention Opportunity Assessments

Assessing routine and non-routine projects and operations to identify opportunities to prevent pollution (see WM/P2: Pollution Prevention Opportunity Assessment Procedure[30])

5.2.2   Purchasing Practices

Purchasing products that are energy-efficient and environmentally friendly (see SLAC Purchasing Department[31] and US EPA guidelines[32])

Note   The Chemical Management Services system[33] must be used to purchase chemicals; see Chapter 40, "Hazardous Materials".[34]

5.2.3   Non-hazardous Waste Reduction, Reuse, and Recycling

How to reduce non-hazardous waste in a work area (see WM/P2: Non-hazardous Waste Recycling Guidelines[35] and WM/P2: Non-Hazardous Waste Reduction, Reuse, and Recycling Procedures[36])

5.2.4   Hazardous Waste Reduction, Reuse, and Recycling

How to reduce the generation of hazardous waste (see WM/P2: Hazardous Waste Reduction Guidelines[37])

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30 WM/P2: Pollution Prevention Opportunity Assessment Procedure (SLAC-I-750-0A16C-008), http://www-group.slac.stanford.edu/esh/eshmanual/references/wmp2ProcedPPOA.pdf

31 "Purchasing Department", http://www-group.slac.stanford.edu/bsd/pur/

32 "Comprehensive Procurement Guidelines (CPG)", http://www.epa.gov/cpg/index.htm

33 "Chemical Management Services (CMS)", http://www-group.slac.stanford.edu/esh/groups/cgs/cms/

34 *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

35 WM/P2: Non-hazardous Waste Recycling Guidelines (SLAC-I-750-0A16T-004), http://www-group.slac.stanford.edu/esh/eshmanual/references/wmp2GuideRecycle.pdf

36 WM/P2: Non-hazardous Waste Reduction, Reuse, and Recycling Procedure (SLAC-I-750-0A16C-009), http://www-group.slac.stanford.edu/esh/eshmanual/references/wmp2ProcedReduce.pdf

37 WM/P2: Hazardous Waste Reduction Guidelines (SLAC-I-750-0A16T-005), http://www-group.slac.stanford.edu/esh/eshmanual/references/wmp2GuideReduceHazwaste.pdf

5.3   Training

There are no specific training requirements for the WM/P2 program; general training is, however, provided in courses required through other programs (see related chapters in Section 7, "References"), and an overview is provided to all personnel at SLAC as part of their orientation training (see Chapter 24, "Training"[38]).

6   Exhibits

- WM/P2: Implementation Plan (SLAC-I-750-0A16M-005)[39]

- WM/P2: Regulatory Requirements (SLAC-I-750-0A16S-006)[40]

- WM/P2: Pollution Prevention Opportunity Assessment Procedure (SLAC-I-750-0A16C-008)[41]

- WM/P2: Non-hazardous Waste Reduction, Reuse, and Recycling Procedure (SLAC-I-750-0A16C-009)[42]

- WM/P2: Non-hazardous Waste Reduction Guidelines (SLAC-I-750-0A16T-003)[43]

- WM/P2: Non-hazardous Waste Recycling Guidelines (SLAC-I-750-0A16T-004)[44]

- WM/P2: Hazardous Waste Reduction Guidelines (SLAC-I-750-0A16T-005)[45]

- WM/P2: Individual Recognition Requirements (SLAC-I-750-0A16S-007)[46]

- SLAC Quality Assurance and Compliance Design Assurance and Construction Inspection Procedure (SLAC-I-770-0A22C-001)[47]

- "Chemical Management Services (CMS)"[48]

- "Purchasing Department"[49]

- "SLAC Recycling Program"[50]

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38 *SLAC Environment, Safety, and Health Manual* (SLAC-I-720-0A29Z-001), Chapter 24, "Training", http://www-group.slac.stanford.edu/esh/training/chapter/policies.htm

39 http://www-group.slac.stanford.edu/esh/eshmanual/references/wmp2PlanImplement.pdf

40 http://www-group.slac.stanford.edu/esh/eshmanual/references/wmp2ReqRegulatory.pdf

41 http://www-group.slac.stanford.edu/esh/eshmanual/references/wmp2ProcedPPOA.pdf

42 http://www-group.slac.stanford.edu/esh/eshmanual/references/wmp2ProcedReduce.pdf

43 http://www-group.slac.stanford.edu/esh/eshmanual/references/wmp2GuideReduce.pdf

44 http://www-group.slac.stanford.edu/esh/eshmanual/references/wmp2GuideRecycle.pdf

45 http://www-group.slac.stanford.edu/esh/eshmanual/references/wmp2GuideReduceHazwaste.pdf

46 http://www-group.slac.stanford.edu/esh/eshmanual/references/wmp2ReqRecognition.pdf

47 https://www-internal.slac.stanford.edu/OA/documents/QAdesign.pdf

48 http://www-group.slac.stanford.edu/esh/groups/cgs/cms/

49 http://www-group.slac.stanford.edu/bsd/pur/

▪   "Salvage: Use and Disposal"[51]

7   References

SLAC Environment, Safety, and Health Manual (SLAC-I-720-0A29Z-001)[52]

▪   Chapter 16, "Spills"[53]

▪   Chapter 17, "Hazardous Waste"[54]

▪   Chapter 26, "Stormwater"[55]

▪   Chapter 30, "Air Quality"[56]

▪   Chapter 32, "Polychlorinated Biphenyls"[57]

▪   Chapter 40, "Hazardous Materials"[58]

▪   Chapter 43, "Industrial Wastewater"[59]

Other SLAC Documents

▪   Environmental Safety Citizen Committee (EnvSC)[60]

▪   SLAC Annual Site Environmental Report (ASER)[61]

▪   *Radioactive Waste Manual* (SLAC-I-760-2A08Z-001)[62]

Other

▪   "Stanford Recycling Center"[63]

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50   https://www-internal.slac.stanford.edu/cef/recycling/recycle.html

51   https://www-internal.slac.stanford.edu/bsd/pc/use_disposal.htm

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

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

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

55   http://www-group.slac.stanford.edu/esh/environment/stormwater/policies.htm

56   http://www-group.slac.stanford.edu/esh/environment/air_quality/policies.htm

57   http://www-group.slac.stanford.edu/esh/hazardous_substances/pcb/policies.htm

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

59   http://www-group.slac.stanford.edu/esh/environment/industrial_wastewater/

60   "Environmental Safety Citizen Committee", https://www-internal.slac.stanford.edu/esh/committees/envsc/charter.htm

61   "Annual Site Environmental Reports (ASER)", http://www-group.slac.stanford.edu/esh/divisional/aser.htm

62   http://www-group.slac.stanford.edu/esh/documents/RWM.pdf

- ▪ "Comprehensive Procurement Guidelines"[64]

- ▪ Executive Order 12845, "Requiring Agencies to Purchase Energy Efficient Computer Equipment" (EO 12845)[65]

- ▪ Executive Order 12902, "Energy Efficiency and Water Conservation at Federal Facilities" (EO 12902)

- ▪ Executive Order 13123, "Greening the Government through Efficient Energy Management" (EO 13123)

- ▪ Executive Order 13134, "Developing and Promoting Biobased Products and Bioenergy" (EO 13134)

- ▪ Executive Order 13149, "Greening the Government through Federal Fleet and Transportation Efficiency" (EO 13149)

8   Implementation

The requirements of this chapter will be implemented according to WM/P2: Implementation Plan.[66]

9   Ownership

Department: Environmental Protection

Program: Waste Minimization and Pollution Prevention

Owner: Program Manager, Rich Cellamare

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63   http://recycling.stanford.edu/5r/

64   http://www.epa.gov/cpg/index.htm

65   http://www.archives.gov/federal-register/executive-orders/

66   WM/P2: Implementation Plan (SLAC-I-750-0A16M-005), http://www-group.slac.stanford.edu/esh/eshmanual/references/wmp2PlanImplement.pdf

WM/P2: Implementation Plan

Department: Environmental Protection
Program: Waste Minimization and Pollution Prevention
Owner: Rich Cellamare
Authority: ES&H Manual, Chapter 22, Waste Minimization and Pollution Prevention

The requirements of Chapter 22, "Waste Minimization and Pollution Prevention", will be phased in according to the following schedule.

Section Number	Section Title	Requirement Note	Effective Date	Schedule Note
	Use note. To be deleted.	Optional. Anything you want to call out about requirement	Use "Immediate" or a date, mm/dd/yyyy	Optional. Add note about schedule: why something is to happen by date given
5	Requirements			
5.1	General			
5.1.1	Plans		Immediate	
5.1.2	Reports		Immediate	
5.1.3	Pollution Prevention Opportunity Assessments	Develop methodology for having the line conduct and report on pollution prevention opportunities evaluations in their projects.	9/28/2007	
5.1.3	Pollution Prevention Opportunity Assessments	Set up targeted training to key departments on performing PPOAs	9/28/2007–12/14/2007	
5.1.4	Purchasing Practices		Immediate	
5.1.5	Reduction Measures		Immediate	
5.1.6	Individual Recognition	Further develop a dedicated SLAC Environmental Stewardship Recognition Program	2/6/2007	Presentation to the ESHCC of recommended SLAC Environmental Stewardship Recognition Program tier that can be used to endorse nominations that do not make it to the DOE Pollution Prevention and Environmental Stewardship Awards Program.

WM/P2: Implementation Plan

Section Number	Section Title	Requirement Note	Effective Date	Schedule Note
5.1.7	Information Resources	Prepare more informational tools to place on the web	9/28/2007	Trying to use existing tools and/or available websites; not trying to customize.
5.1.8	Personnel		Immediate	
5.1.9	Roles and Responsibilities		Immediate	
5.2	Procedures and Specific Requirements			
5.2.1	Pollution Prevention Opportunity Assessments		Immediate	
5.2.2	Purchasing Practices		Immediate	
5.2.3	Non-hazardous Waste Reduction, Reuse, and Recycling		Immediate	
5.2.4	Hazardous Waste Reduction, Reuse, and Recycling		Immediate	
5.3	Training		Immediate	

WM/P2: Regulatory Requirements

Department: Environmental Protection
Program: Waste Minimization and Pollution Prevention
Owner: Program Manager, Rich Cellamare
Authority: ES&H Manual, Chapter 22, Waste Minimization and Pollution Prevention

Regulatory Driver	General Requirements	Implementation Requirements	Reporting Requirements	Lead
Title 42, *United States Code*, "The Public Health and Welfare"[1] ▪ Chapter 133, "Pollution Prevention" (42 USC 13001 and following)	Congress declares it to be the national policy of the US that pollution should be prevented or reduced and requires that the US EPA establish a program to collect and disseminate information on source reduction activities.	This law requires that facilities use the pollution prevention hierarchy – first, source reduction, second, reuse, third, recycling and finally, disposal.	Annual Pollution Prevention Report for the DOE reports on municipal, industrial, hazardous and radioactive waste generation and reduction progress and measures planned or implemented to reduce wastes in these categories WasteGeneration The following waste types must be reported as *routine* or *non-routine*, in liquid or solid forms by each program office on site. ▪ High level ▪ Transuranic ▪ Mixed transuranic ▪ Low-level radioactive ▪ Low-level mixed (radioactive and hazardous) ▪ RCRA regulated ▪ State regulated (industrial waste) ▪ TSCA regulated ▪ Mixed TSCA Site-wide Recycling or Reuse Activities and Sanitary Waste Generation Reporting Report amounts of waste recycling and/or reuse from the following categories: Paper Products	WM/P2 program manager

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

Regulatory Driver	General Requirements	Implementation Requirements	Reporting Requirements	Lead
			▪ Office and mixed paper	
			▪ Corrugated cardboard	
			▪ Phone books	
			▪ Newspapers/magazines	
			Scrap Metals	
			▪ Stainless steel	
			▪ Copper	
			▪ Iron/steel	
			▪ Aluminum	
			▪ Aluminum cans	
			▪ Lead	
			▪ Zinc	
			▪ Other scrap metals (such as mercury)	
			Precious Metals	
			▪ Silver	
			▪ Gold	
			▪ Platinum	
			▪ Other precious metals	
			Other Items	
			▪ Antifreeze	
			▪ Engine oils	
			▪ Toner cartridges	
			▪ Batteries	
			▪ Tires	
			▪ Food waste	
			▪ Concrete/asphalt	
			▪ Glass	
			▪ Fluorescent bulbs	
			▪ Ballasts	
			▪ Plastic	
			▪ Styrofoam	
			▪ Transformers	

Regulatory Driver	General Requirements	Implementation Requirements	Reporting Requirements	Lead
			▪ Wood (chips, compost)	
			▪ Computers/electronic equipment	
			▪ Other recycled materials (such as paint, furniture, appliances, pallets, equipment)	
Title 40, *Code of Federal Regulations*, "Protection of the Environment", Chapter 1, "Environmental Protection Agency"[2] ▪ Part 247, "Comprehensive Procurement Guideline for Products Containing Recovered Materials" (40 CFR 247)	Government agencies are mandated to increase their purchases of products containing recovered materials (that is, waste materials and by-products that have been recovered or diverted from solid waste).	US EPA issued procurement guidelines that designate specific items that are or can be made with recovered materials, and recommends practices with respect to the procurement of recovered materials and items containing such materials. Federal agencies and their contractors are required to buy designated items with the highest recovered material content practicable.	Annual Environmental Preferable Purchasing (EPP) Report for DOE reports on progress in increasing the procurement of environmental preferable products (including bio-based products) and services	Purchasing Department EPP program manager
Executive Order 13101, "Greening the Government through Waste Prevention, Recycling, and Federal Acquisition" (EO 13101)[3]		Requires federal agencies to incorporate waste prevention and recycling into their operations, and to increase and expand markets for recovered materials by establishing the federal government's preference for recycled products.	Annual Environmental Preferable Purchasing (EPP) Report for DOE reports on progress in increasing the procurement of environmental preferable products (including bio-based products) and services	Purchasing Department EPP program manager
Title 40, *Code of Federal Regulations*, "Protection of the Environment", Chapter 1, "Environmental Protection Agency"[4] ▪ Part 370, "Hazardous Chemical Reporting: Community Right-to-Know" (40 CFR 370) ▪ Part 372, "Toxic Chemical Release Reporting: Community Right-to-Know" (40 CFR 372)	Facilities using toxic chemicals that exceed threshold quantities in a given year must complete a toxic chemical release inventory (TRI) report, which requires the facilities to provide source reduction and recycling efforts for the reported toxic chemicals.	Implement source reduction and recycling into operations that use or generate toxic chemicals	TRI Report prepared annually for the US EPA and DOE reports on toxic materials used by SLAC that are released to air, surface waters, and land	Air quality program manager
Title 22, *California Code of Regulations,* "Social Security", Division 4.5, "Environmental Health	The US EPA published guidelines to identify the basic elements that constitute a waste minimization	Hazardous waste manifests require that the generators certify that they have a program in place to reduce the volume and toxicity of	Hazardous Waste Biennial Report for the US EPA and the California Department of Toxic Substances Control and reports on the types	Hazardous waste program manager

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

3   "NARA – Federal Register – Executive Orders Disposition Table", http://www.archives.gov/federal-register/executive-orders/

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

Regulatory Driver	General Requirements	Implementation Requirements	Reporting Requirements	Lead
Standards for the Management of Hazardous Waste" [5] ▪ Chapter 12, "Standards Applicable to Generators of Hazardous Waste", (22 CCR 66262 and following)	program. In addition, hazardous waste generators must submit a biennial report describing efforts to reduce the volume and toxicity of hazardous waste generated.	waste to a degree determined to be economically practicable.	and quantities of hazardous and mixed wastes generated by a facility during a two-year period.	
California Health and Safety Code, Division 20, "Miscellaneous Health and Safety Provisions", Chapter 6.5, "Hazardous Waste Control" ▪ Article 11.9, "Hazardous Waste Source Reduction and Management Review Act of 1989" (HSC 25244.12–25244.24) [6]	Applicable hazardous waste generators must conduct a source reduction evaluation review and plan every four years outlining potentially viable source reduction approaches, rationales for approaches that will be taken, and numerical goals and reporting of waste reduction achieved during the four year period. Each plan must have both a technical certification and a financial certification completed by an individual responsible for site operations or by a professional engineer or environmental assessor with expertise in hazardous waste management. The performance report is used to track hazardous waste reduction relative to a baseline year (1990).	California Hazardous Waste Source Reduction and Management Review Plan and Report for the California Department of Toxic Substances Control requires that a facility prepare plans to use source reduction and recycling measures to reduce state-regulated hazardous wastes that are greater than five percent of the total hazardous waste generated over four year reporting period cycle which starts in 1991. The plan is revised every four years to account for new waste streams that become greater than five percent of the total hazardous waste generated.	Reports to the California Department of Toxic Substances Control on the types and quantities of hazardous waste generated in a four year reporting period and the plans to further reduce hazardous wastes (greater than five percent of the total hazardous waste generated) for the next four year reporting period. The types of waste reported are based on the California hazardous waste code categories; those typically generated at SLAC include ▪ Waste description, state code ▪ Alkaline solutions, 122 ▪ Aqueous solutions with metals, 132 ▪ Off-spec, surplus inorganics, 141 ▪ Asbestos, 151 ▪ Other inorganic solids, 181 ▪ Halogenated solvents, 211 ▪ Oxygenated solvents, 212 ▪ Waste oil, 221 ▪ Oily solids, 223 ▪ Polymeric resins, 272 ▪ Latex waste, 291 ▪ Off-spec, surplus organics, 331	WM/P2 program manager

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5   "California Code of Regulations", http://ccr.oal.ca.gov/
6   "California Law", http://www.leginfo.ca.gov/calaw.html

WM/P2: Regulatory Requirements

- Organic liquids with halogens, 341
- Organic liquids with metals, 342
- Unspecified organic liquid mixture, 343
- Organic solids with halogens, 351
- Other organic solids, 352
- Paint sludge, 461
- Drilling mud, 521
- Photochemical/photoprocessing waste, 541
- Laboratory waste chemicals, 551
- Gas scrubber waste, 581
- Remediation, 611
- Cyanide liquids, 711
- Arsenic liquids, 721
- Mercury, 725
- Halogenated organic liquids, 741
- Solids or sludges w/organic compounds, 751
- Other inorganic & organic solids, 181, 352
- Oxygenated & chlorinated solvents, 212, 741
- Pcb remediation, 261, 611
- Pcb equip. Removal, 261, 731
- Empty containers <30 gal or >30 gal, 512, 513
- Empty containers <30 gal, other inorganic solids, 513, 181
- Empty containers <30 gal, other organic solids, 513, 352
- Spent acids with and without metals, 791, 792

WM/P2: Regulatory Requirements

Regulatory Driver	General Requirements	Implementation Requirements	Reporting Requirements	Lead
California Health and Safety Code, Division 20, "Miscellaneous Health and Safety Provisions", Chapter 6.5, "Hazardous Waste Control" ▪ Article 10.3, "Electronic Wastes" (HSC 25214.10)[7]	Under federal initiatives retailers are encouraged to share in the responsibility of safe electronics recycling; under state-implemented law (Electronic Waste Recycling Act of 2003) costs have been imposed on purchases of electronic equipment to fund the collection and recycling of equipment. The State of California has also imposed the Cell Phone Recycling Act of 2004 to require retailers of cell phones sold in California to collect cell phone for reuse, recycling or proper disposal.	Assure that electronic waste are managed in accordance with hazardous waste control laws	Report to the California Department of Toxic Substances Control on quantities of electronic waste generated.	Hazardous waste program manager
Executive Order 13148, "Greening the Government through Leadership in Environmental Management" (EO 13148)[8]	Requires federal agencies to Establish and implement environmental compliance audit programs and policies emphasizing pollution prevention, and implementation of an environmental management system	Requires SLAC departments (CGS, CEF, WM) to ▪ Reduce their toxic chemical releases and offsite transfers of toxic chemicals annually by 10 percent beginning with the 2002 reporting year, with a goal of a 40 percent reduction (based on 2001 reporting year amounts) by December 31, 2006 ▪ Achieve a 50 percent reduction in their use of persistent, bio-accumulative, and toxic (PBT) chemicals and/or hazardous substances and pollutants, or the generation of hazardous and radioactive waste at federal facilities by December 31, 2006 ▪ Develop a plan to phase-out the procurement of Class I ozone-depleting substances for all non-excepted uses by December 31, 2010 ▪ Promote sustainable management of federal facility lands by implementing cost-	Reported annually to DOE as part of the Annual Pollution Prevention Report	WM/P2 program manager

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7   "California Law", http://www.leginfo.ca.gov/calaw.html
8   "NARA – Federal Register – Executive Orders Disposition Table", http://www.archives.gov/federal-register/executive-orders/

Regulatory Driver	General Requirements	Implementation Requirements	Reporting Requirements	Lead
		effective and environmentally sound landscaping practices and programs		
Executive Order 13123, "Greening of the Government through Efficient Energy Management" (EO 13123)[9]	Develop cost-effective plans to reduce energy and water usage and promote the usage of renewable energy products	Includes goals for ■ *Greenhouse Gases Reduction Goal.* Through life-cycle cost-effective energy measures, each agency shall reduce its greenhouse gas emissions attributed to facility energy use by 30 percent by 2010 compared to such emissions levels in 1990. In order to encourage optimal investment in energy improvements, agencies can count greenhouse gas reductions from improvements in nonfacility energy use toward this goal to the extent that these reductions are approved by the Office of Management and Budget (OMB). ■ *Energy Efficiency Improvement Goals.* Through life-cycle costeffective measures, each agency shall reduce energy consumption per gross square foot of its facilities, excluding facilities covered in section 203 of this order, by 30 percent by 2005 and 35 percent by 2010 relative to 1985. No facilities will be exempt from these goals unless they meet new criteria for exemptions, to be issued by the Department of Energy (DOE). ■ *Industrial and Laboratory Facilities.* Through life-cycle cost-effective measures, each agency shall reduce energy consumption per square foot, per unit of production, or per other unit as applicable by 20 percent by 2005 and 25 percent by 2010 relative to 1990. No facilities will be	Federal Energy Management and Conservation Program Reporting for DOE prepared annually by the SLAC Energy and Water Conservation program manager in the Conventional and Experimental Facility Department (CEF) reports on projects and measures to conserve energy and water usage	CEF energy and water conservation Program manager

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9   "NARA – Federal Register – Executive Orders Disposition Table", http://www.archives.gov/federal-register/executive-orders/

Regulatory Driver	General Requirements	Implementation Requirements	Reporting Requirements	Lead
		exempt from these goals unless they meet new criteria for exemptions, as issued by DOE.		
		▪ *Renewable Energy.* Each agency shall strive to expand the use of renewable energy within its facilities and in its activities by implementing renewable energy projects and by purchasing electricity from renewable energy sources. In support of the Million Solar Roofs initiative, the Federal Government shall strive to install 2,000 solar energy systems at Federal facilities by the end of 2000, and 20,000 solar energy systems at Federal facilities by 2010.		

WM/P2: Pollution Prevention Opportunity Assessment Procedure

Department: Environmental Protection
Program: Waste Minimization and Pollution Prevention
Owner: Program Manager, Rich Cellamare
Authority: ES&H Manual, Chapter 22, Waste Minimization and Pollution Prevention

To reduce hazardous waste or prevent pollution, conduct a process waste or *pollution prevention opportunity assessment (PPOA)*. This type of assessment evaluates all aspects of operations that can generate hazardous waste or impact air and water quality.

PPOAs can be used for routine processes, for example, manufacturing and fabrication operations, sampling, and analysis activities. PPOAs can also be used for non-routine projects, for example, new facility design and construction, decommissioning activities, and remediation activities.

Step	Person	Action
1.	Personnel	Selects the process or operation and characterizes it: 1. Identifies flow of resources and wastes – material purchases and usage, energy usage, waste generation data, tour area and process activity 2. Develops process understanding 3. Prepares a baseline flow diagram or map 4. Determines material balance and energy usage and material and energy costs
2.	Personnel	Selects opportunities for improvement: 1. Develops needs and assessment criteria 2. Evaluates process improvement opportunities 3. Considers using various assessment tools and techniques – team brainstorming, fishbone diagram with waste minimization and pollution prevention (WM/P2) measures, life-cycle cost analyses to develop WM/P2 options
3.	Personnel	Prepares an action and program plan: 1. Describes options and costs and prioritizes options
4.	Personnel	Implements an improvement plan: 1. Designs and tests selected options 2. Selects preferred option
5.	Personnel	Audits the improvement plan: 1. Considers additional improvements from feedback and process performance
6.	Personnel	Maintains the improvement plan: 1. Documents the improved process performance

WM/P2: Non-hazardous Waste Reduction, Reuse, and Recycling Procedure

Department: Environmental Protection
Program: Waste Minimization and Pollution Prevention
Owner: Program Manager, Rich Cellamare
Authority: ES&H Manual, Chapter 22, Waste Minimization and Pollution Prevention

Legend

CEF = Conventional and Experimental Facilities Department

RP = Radiation Protection Department

WM = Waste Management Group

WM/P2 = Waste Minimization and Pollution Prevention

Procedure

Step	Person	Action
1.	Personnel	Makes sure that the materials or items being considered for reduction, reuse, or recycling are not hazardous or radioactive. If necessary, consults with WM (Ext. 2399) or RP/Radiation Physics (Ext. 3544) (see Chapter 17, "Hazardous Waste").[1]
2.	Personnel	If the material is non-hazardous, determines if the material can be eliminated or reduced (see WM/P2: Non-hazardous Waste Reduction Guidelines)[2]
3.	Personnel	After considering reduction, determines if a material can be reused through the following channels: • Reuse within department. Consults with the department manager or supervisor or other departments in work area. • Reuse of various equipment or articles (office trailers, office furniture, electrical/electronics equipment, scrap metals, and various articles) for on-site or off-site reuse. Consults with the SLAC Property Control Group (Ext. 2329).[3] • Reuse of various construction materials (soils, asphalt, concrete, scrap wood, and other) for on-site or off-site reuse. Consults with CEF (Ext. 8901) *Note Construction materials contaminated with chemicals are likely not reusable. Consults with WM (Ext. 2399) on proper management of contaminated construction*

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1   *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

2   WM/P2: Non-hazardous Waste Reduction Guidelines (SLAC-I-750-0A16T-003), http://www-group.slac.stanford.edu/esh/eshmanual/references/wmp2GuideReduce.pdf

3   https://www-internal.slac.stanford.edu/bsd/pc/default.htm

		materials.
4.	Personnel	If the material cannot be reused, considers recycling measures (see WM/P2: Non-hazardous Waste Recycling Guidelines[4])
5.	Personnel	After considering all of the above and finding that none of the measures can be implemented, arranges for disposal using a trash dumpster. Contacts CEF (Ext. 8901) for a new dumpster.

Note   Project managers and UTRs must consult with CEF and the SLAC Purchasing Department on planning for the management of materials that have been identified as recyclable and disposable. The Purchasing Department will work with project managers and UTRs to incorporate recycling of materials into project work scope and contract. The work scope must include quantification of the recyclable materials collected from the project and the information must be forwarded to the WM/P2 program manager.

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4   WM/P2: Non-hazardous Waste Reduction Guidelines (SLAC-I-750-0A16T-003), http://www-group.slac.stanford.edu/esh/eshmanual/references/wmp2GuideReduce.pdf

WM/P2: Non-hazardous Waste Reduction Guidelines

Department: Environmental Protection
Program: Waste Minimization and Pollution Prevention
Owner: Program Manager, Rich Cellamare
Authority: ES&H Manual, Chapter 22, Waste Minimization and Pollution Prevention

Note   These waste reduction measures are presented as guidelines since it is expected that a combination of these measures may be implemented within a SLAC department or area but not all of these measures may be applicable to all departments or areas. Departments and areas are encouraged to use a combination of measures to achieve the best results and continuously improve when appropriate.

Reduce

Eliminate or reduce the source of non-hazardous waste generation through source reduction. Examples of ways to reduce sources of non-hazardous waste include

- Buy and use only what you need. Do not overstock
- Buy products with longer shelf lives when possible
- Buy products without excessive packaging
- Use material completely or give excess material to others
- Only make as many copies of a document as you need
- Make double-sided copies when possible
- Use the phone or e-mail instead of paper memos when feasible
- Preview documents before printing
- Use routing slips instead of making multiple copies of documents
- Repair broken products rather than discarding them
- Work with the Purchasing Department to buy products with recycled material content when such products are suitable replacements for those made from virgin materials
- Contact the waste minimization and pollution prevention (WM/P2) program manager for information on waste reduction measures before starting a new project that will generate a significant amount of non-hazardous waste

Reuse

Reusing material when possible minimizes non-hazardous waste generation. Examples of ways to reuse non-hazardous waste include

- Use the blank side of paper that was used on only one side for scratch paper before recycling it
- Reuse interoffice envelopes
- Reuse styrofoam packing beads ("peanuts")
- Reuse paper clips and rubber bands
- Use a reusable mug instead of disposable cups
- In the SLAC Cafeteria, use reusable trays instead of disposable ones when possible

- Check with other users or the Salvage Group for materials already available from SLAC or DOE before purchasing new products
- Contact the Salvage Group (Ext. 2329) for pickup of unneeded items and equipment. See the web site for a list of the types of items the Salvage Group will pick up.[1]

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1 "Salvage: Use and Disposal", https://www-internal.slac.stanford.edu/bsd/pc/use_disposal.htm

WM/P2: Non-hazardous Waste Recycling Guidelines

Department: Environmental Protection
Program: Waste Minimization and Pollution Prevention
Owner: Program Manager, Rich Cellamare
Authority: ES&H Manual, Chapter 22, Waste Minimization and Pollution Prevention

Introduction

SLAC has a recycling program in place to send commonly recyclable materials to qualified off-site subcontractors or users, who then collect these materials for reprocessing into new products.

Table 1 provides an items/categories list of materials recycled, specifications, and guidelines on the materials recycled, and information on how to recycle them. Examples of recyclable materials include

- Aluminum, glass, and plastic food/beverage cans and bottles and aluminum foil
- Cardboard and paperboard (for example, cereal boxes and manila folders)
- Corrugated cardboard
- Mixed paper or various paper types (white, glossy, and colored papers, including soft- and hard-covered books, magazines, newspaper, telephone books, junk mail, computer printouts)
- Styrofoam packing beads
- Computer floppy disks and compact disks
- Laser and inkjet printer toner cartridges
- Scrap metals
- Transparencies
- Wooden pallets, spools, and scrap wood

Note   All of the items listed above qualify as non-hazardous items when properly managed. Two items/categories are classified as hazardous waste if not properly managed: 1) laser or inkjet toner cartridges and 2) scrap metals or equipment containing chemicals or oils. Follow relevant procedures to avoid hazardous waste disposal issues. If there is a hazardous waste concern with an item, contact the Waste Management Group (Ext. 2399).

If uncertain about what to do, please consult your administrative assistant, the Conventional and Experimental Facilities (CEF) Department (Ext. 8901) or the waste minimization and pollution prevention (WM/P2) program manager (Ext. 3401).

Additional information on recycling is provided on the web.[1]

SLAC subcontracts with the Stanford University Recycling Program. Information on how the materials are recycled to make new products is provided on the web.[2]

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1   "SLAC Recycling Program", https://www-internal.slac.stanford.edu/cef/recycling/recycle.html
2   "Stanford Recycling Center", http://recycling.stanford.edu/5r/

WM/P2: Non-hazardous Waste Recycling Guidelines

*Note   Some of the recycling guidelines used at SLAC are different from those of the
        Stanford University Program because of differences in the types of facilities and
        nature of the operations at SLAC. Please use the guidelines in the table below for
        recycling at SLAC.*

Table 1 SLAC Recycling Guidelines

Items/Categories	Material Specification	Requirement	How to Recycle
Aluminum, tin, and other metal cans, and aluminum foil	▪ All types of metal cans used for food/beverages ▪ Aluminum foil used for food	▪ Empty cans completely and rinse ▪ Rinse aluminum foil ▪ No aerosol cans ▪ No scrap metal or aluminum oil used in work areas (see Scrap Metals)	Place in appropriate green recycling bin labeled "Bottles & Cans"
Aseptic containers	Aseptic containers (drink boxes) that hold primarily beverages such as milk, fruit juice and wine. Usually made with high quality paper, polyethylene and a small percentage of aluminum.	Empty as much as you can	Place in appropriate green recycling labeled "Bottles and Can"
Computer floppy disks and Compact disks	3.5" floppy disks Compact disks (standard and small	▪ No 5.25″ floppy disks	Drop off at Salvage (Building 28) or mail small quantities (12 or less per envelope) to Salvage (MS 85A)
Corrugated cardboard	Corrugated cardboard (large pieces greater than 6″x6″x6″ boxes)	▪ Recycle contents of cardboard boxes per this table and throw other non-hazardous contents in trash ▪ No paperboard or cardboard spools (See Paper Various Types) ▪ If the corrugated cardboard is in the form of a box containing Styrofoam packing beads (i.e., "peanuts"), close box with tape or by interlocking box flaps, and leave near trash dumpster or "Corrugated Cardboard Only" dumpster.	▪ Place corrugated cardboard in dumpsters labeled "Corrugated Cardboard Only" ▪ Flatten and leave stacked for pickup by CEF. Set up pickup point in coordination with the building or area manager.

WM/P2: Non-hazardous Waste Recycling Guidelines

Items/Categories	Material Specification	Requirement	How to Recycle
Glass bottles/jars	▪ All glass bottles and jars (any color) used for food/beverages ▪ Jar caps acceptable (metal or plastic 1 or 2)	▪ Empty completely and rinse ▪ No auto glass ▪ No ceramics ▪ No drinking glass ▪ No light bulbs ▪ No mirrors ▪ No plate or frosted glass	Place in appropriate green recycling bins labeled "Bottles & Cans"
Laser and inkjet printer toner cartridges	Toner cartridges supplied by the SLAC office product supplier	No liquid toner materials	Consult with office support staff to arrange for pickup by product supplier or designated recycler ▪ See website for recycling program description and guidance[3] ▪ If cartridges cannot be recycled, they must be managed by the Waste Management Group (Ext. 2399)
Mixed paper or various paper types	▪ Blue-and-white striped computer paper ▪ Paper bags ▪ Corrugated cardboard (6″x6″x6″ boxes or smaller) ▪ Glossy paper and bright neon-colored paper ▪ Hardbound and paperbound book ▪ Junk mail ▪ Magazines ▪ Mixed files ▪ Newspaper (including glossy inserts) ▪ Newsprint paper ▪ Notebook paper ▪ NRC (No-carbon-required) paper ▪ Paper bags ▪ Paperboard (e.g., cereal box, manila folders, cardboard spools) ▪ Telephone books	▪ No blueprint paper ▪ No food-contaminated paper (e.g., pizza boxes, doughnut boxes, cartons with foods in contact with the paper). Foods and oils can cause recycle paper loads to be rejected by recycling vendors. ▪ No napkins or tissues ▪ No paper shredded as confetti (Place in plastic bag and throw in trash.) ▪ No plastic- or wax-coated paper ▪ No plastic wrapping (e.g., plastic wrapped mail, plastic envelopes) ▪ No photographs or negatives ▪ No rubber bands ▪ Staples and small metal clips are acceptable	Place in appropriate green recycling bin labeled "Mixed Paper"

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3   "Corporate Express E-way", https://www.eway.com/ce/eway/ui [access available to personnel authorized to purchase office products]

Items/Categories	Material Specification	Requirement	How to Recycle
	▪ White or colored ledger paper ▪ White or colored envelopes, with or without plastic windows or labels ▪ Any color ink		
Plastic bottles containers	Plastic containers for food/beverages (numbers 1 and 2 only. The number is usually found on the bottom of the container)	▪ Empty completely and rinse ▪ No plastic bags ▪ No styrofoam blocks or beads ('peanuts") ▪ No 3, 4, 5, 6, and 7 plastics	Place in appropriate green recycling labeled "Bottles & Cans"
Scrap metal and metal equipment	Metal from wire, pipe, sheet metal, rod, etc. – aluminum, brass, copper, ferrous, non-ferrous, and other)	▪ Arrange to drain oil from the equipment ▪ No lead	Contact Property Group (Ext. 2329)
Styrofoam packing beads	Styrofoam packing beads or "peanuts"	▪ No bulk styrofoam or plastic ▪ No starch packing beads ▪ Leave in original container ▪ Close container flaps or tape shut	Leave peanuts in the original box. Keep box closed and store in an indoor location and contact CEF (Ext. 8901) for container pickup
Transparencies	Overhead projector transparencies	▪ Transparencies only ▪ No paper or plastic wrapping	Place 50 sheets or less per interoffice envelop and mail to "Waste Management MS 36"
Wood	▪ Scrap wood ▪ Wood pallets (that are broken or no longer usable) ▪ Wood spools (for wire or cable)	No wood that is treated with coal tar, or other chemicals (e.g., chromated copper arsenate, other chemicals). This wood is handled by the Waste Management Group (Ext. 2399)	Contact CEF (Ext. 8901) for pickup. Set up pickup point with building manager

Additional Guidance on Recycling and Disposal

- For the most commonly recyclable materials (paper, corrugated cardboard, beverage cans/bottles), "green" recycling bins marked "Mixed Paper" and "Beverage Cans/Bottles" and dumpsters marked "Corrugated Cardboard Only" are distributed throughout the site in offices and work areas. Check with your administrative assistant or building manager for those recycling bins and dumpsters near you.
- Place only the appropriate recyclable material in recycling bins. Segregate food and wet waste from recyclable material.

- To save trips to the recycling containers, use a desktop collection box for your recyclable material. Desktop collection boxes are available from the WM/P2 program manager (Ext. 3401).
- To facilitate safe working conditions, proper handling of recyclables, and timely pickup of recyclables, employees need to consult with their building or area managers when requesting a recycling bin in a new area or when trying to use a new area to collect recyclable materials. Requests to obtain additional recycling bins, to replace old bins, to obtain extra pickups of recyclables or trash, to change the frequency of recycle or trash pickup are placed with CEF (Ext. 8901).

Information to Facilitate Recycling Items from Home

If you need information about minimizing non-hazardous waste for items from home, see a recycling information display or contact your local recycling center. Recycling information displays are posted in the following locations:

- Stores (Building 81)
- Near the Medical Department (Building 41, first floor)
- Opposite the Petty Cash Window (Building 41, second floor)
- SSRL (Building 137, second floor)

WM/P2: Hazardous Waste Reduction Guidelines

Department: Environmental Protection
Program: Waste Minimization and Pollution Prevention
Owner: Program Manager, Rich Cellamare
Authority: ES&H Manual, Chapter 22, Waste Minimization and Pollution Prevention

Reduce

Eliminate or reduce the source of waste generation through source reduction. To reduce hazardous waste:

- Use SLAC Chemical Management Services[1] to select and purchase only the chemicals in the quantities required
- Limit chemical inventories to reduce the generation of out-of-date hazardous material (which can become hazardous waste)
- Substitute less hazardous and non-hazardous materials for more hazardous materials whenever possible
- Eliminate equipment that uses hazardous materials or replace it with equipment that uses non-hazardous or less hazardous material where technically and economically feasible. Examples include
  - Eliminate an extra solvent cleaning bath
  - Replace a polychlorinated biphenyl (PCB)-filled transformer with a non-PCB-filled transformer at the end of the transformer's useful life
  - Purchase equipment that contains chemicals that are not restricted at SLAC or phased out of commerce (for example, ozone-depleting substances)
- Modify a process to eliminate or reduce the hazardous waste produced. For example, use filters in plating baths (a potential hazardous waste) to eliminate the oil and particulate contaminants that reduce the life of the plating baths.
- Follow proper guidelines for storing, handling, and disposing of hazardous material and waste
- Segregate hazardous and non-hazardous waste. Keep hazardous waste from contaminating non-hazardous waste. Examples include
  - Prevent rain water from contacting areas that may be contaminated with hazardous material
  - Prevent concentrated cleaning chemicals from mixing with less hazardous or non-hazardous rinse water that may be tainted with cleaning chemicals
- Observe spill prevention practices (see Chapter 40, "Hazardous Materials",[2] for more information):
  - Use secondary containment
  - Regularly inspect hazardous material containers for leaks
  - Keep hazardous material containers sealed
  - Use pumps or spigots to dispense the contents of hazardous material containers

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1 "Chemical Management Services (CMS)", http://www-group.slac.stanford.edu/esh/groups/cgs/cms/
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

Reuse

Reusing hazardous material when possible minimizes waste generation:

- Contact the product manufacturer to determine if empty hazardous material containers can be returned for reuse
- Reuse solvent or acid that is used for high-quality cleaning for lower quality pre-cleaning
- Send unneeded hazardous material to another SLAC department or DOE facility that may have a use for it. (Contact the waste minimization and pollution prevention [WM/P2] program manager for assistance.)
- Reuse hazardous material in a process when possible instead of generating hazardous waste

Recycle

Recycling or reclaiming a hazardous material when possible minimizes waste generation. Examples of recycling include

- Recycling a used solvent. Solvent recycling can be performed at SLAC using proper process equipment
- Recovering, decontaminating, and reusing car-wash water

Treat

The toxicity and volume of waste can be reduced by treating it chemically, physically, biologically, or thermally. One example at SLAC is the Metal Finishing Pretreatment Facility, which removes heavy metals (copper, nickel, tin, and others) from water used in metal finishing operations before discharging it to the sanitary sewer.

See Chapter 17, "Hazardous Waste", for information on hazardous waste treatment.[3]

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3 *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

WM/P2: Individual Recognition Requirements

Department: Environmental Protection
Program: Waste Minimization and Pollution Prevention
Owner: Program Manager, Rich Cellamare
Authority: ES&H Manual, Chapter 22, Waste Minimization and Pollution Prevention

A suggested list of employee accomplishments and their descriptions are provided to recognize employees for accomplishments in waste minimization and pollution prevention (WM/P2). Under the Resource Conservation and Recovery Act and US Department of Energy (DOE) Order 5400.1, SLAC is required to prepare a P2 Awareness program plan. SLAC has prepared a plan based on DOE and US Environmental Protection Agency (EPA) guidance (Federal Register, May 28, 1993, pp. 31114-31120). One element of the plan is recognizing employees in individual and collective accomplishments that feasibly implement P2.

Award Process

1. Encourage employees to discuss their ideas with the waste minimization/P2 program manager and submit an application on their own (nominate themselves) or through their supervisor (supervisor nomination).

2. Evaluate the applications with a team consisting of three to five members of the Environmental Safety Citizen Committee. The evaluation will be based on the information in the award qualification. Potential award-winning accomplishments will be submitted to the chief operating officer (COO).

3. Awards will be presented by the Environment, Safety and Health Division associate director or COO in the form of a certificate of recognition and will be publicized in SLAC Today.

4. If they qualify, award applications will also be entered into the DOE Best in Class or P2 Star award program and the EPA Closing the Circle award program to gain recognition.

Award Categories

Table 1 lists the P2 award categories, descriptions, qualifying information/application criteria, and judgment criteria. This list is similar to one developed by DOE.

Qualifying Information/Application Criteria

To provide recognition to employees a P2 activity, a nomination must be completed and should include at least two of the following criteria:

- Complies with the EPA P2 hierarchy: source reduction, waste or pollution prevention, material reuse, or material reclamation (by reducing or preventing the generation or disposal of a non-hazardous [for example, paper, water, energy] waste, hazardous waste, or radiological waste before sending the waste or portions of the waste off-site for treatment or disposal) (see Table 2 for examples)

- Demonstrates cost-effectiveness, reduced environmental or safety hazards (or risks of hazards), or increased productivity
- Is implemented or demonstrates active use of P2 measures
- Demonstrates team work or coordination in developing P2 measures or publicizes/educates staff in implementation of P2 measures

Judgment Criteria

All nominations will be judged on their merit and ability to meet two or more of the above criteria. Award applications should include documentation and recordkeeping that supports the success of the P2 activity.

Table 1 Pollution Prevention (P2) Awards

Award	Description*	Application Information/Criteria	Judgment Criteria
Integrated Planning and Design/Environmental Management System	▪ Best example of integrated planning in an activity, project or technology ▪ Can include broad subject such as project planning or focused subjects such as technical design of a product, process, system, or technology	▪ Include summary of all related WMPP-related planning - e.g., National Environmental Policy Act, state/local permitting, design engineering, multi-media considerations ▪ Include inter-departmental/ divisional cooperation ▪ Quantify or project environmental and financial impacts	▪ Evidence of planning that significant avoidance or near zero generation of waste
Solid (Sanitary) Waste Reduction and Recycling	▪ Best solid waste reduction and recycling operation on site	▪ Include description and summary of accomplishments of reduction and recycling activities ▪ Include descriptions and supporting data	▪ Demonstrate effective changes that achieve quantifiable results ▪ Demonstrate publicity and education efforts
Hazardous/ Radioactive Waste Reduction and Recycling	▪ Best hazardous/radioactive waste reduction or recycling operation on site	▪ Include description and summary of reduction and recycling activities ▪ Include descriptions and supporting data ▪ Includes TSCA waste	▪ Demonstrate effective changes that achieve quantifiable results ▪ Demonstrate publicity and education efforts
Affirmative Procurement	▪ Best operation or activity to change purchasing practices and effectively use products or materials with recycled content	▪ Include description and summary of activities and accomplishments in the procurement of materials with recycled content ▪ Include special measures to improve control and tracking of materials	▪ Demonstrate effective changes that achieve quantifiable results ▪ Demonstrate publicity and educational efforts
Biggest Bang for the Buck	▪ Best programmatic improvement that achieved significant monetary saving or achieved a high benefit to the facility	▪ Include description and summary of activities and accomplishments that led to this programmatic improvement	▪ Demonstrate effective changes that achieve quantifiable results ▪ Demonstrate publicity and educational efforts

Award	Description*	Application Information/Criteria	Judgment Criteria
Commitment/ Participation	▪ Outstanding participation and commitment by management and employees	▪ Include description and supporting data	▪ Demonstrate active participation and management support
Zero Waste Generation	▪ Cessation of an activity that to eliminate generation sanitary, hazardous, or radioactive wastes	▪ Include description, supporting information and evaluation process to show benefits	▪ Demonstrate that zero generation was selected among alternatives rather than an inevitable event that happened to eliminate wastes ▪ Demonstrate that reduction is not by media transfer, off-site transfer, or change in facility status
Source Reduction	▪ Best example of waste reduction or avoidance of sanitary, hazardous or radioactive wastes	▪ Include description, supporting information and evaluation process to show benefits	▪ Demonstrate that zero generation was selected among alternatives rather than an inevitable event that happened to eliminate wastes ▪ Demonstrate that reduction is not by media transfer, off-site transfer, or change in facility status

Table 2 Example P2 Measures

Type of Measure	Examples
1. Reducing a source of waste or preventing pollution to achieve a net reduction in the generation of waste or pollution using measures such as operational improvements, input changes, process changes, less hazardous materials, storm water protection, secondary containment, or air pollution control	Elimination of extra cold cleaning solvent tanks, reduced water usage, use of secondary containment combined with stormwater protection, improvements in air pollution control equipment (not solely driven by compliance)
2. Reducing waste by reusing hazardous or non-hazardous materials (includes radiological materials) on-site or off-site	Sending empty containers back to the manufacturer for reuse, reusing solvents for other cleaning operations, sending chemicals to another DOE facility, reusing low-level radioactive or non-radioactive materials for construction of shielding
3. On-site reclamation or recycling of materials in closed-loop processing systems	Solvent recycling for component fabrication operations and wash water recycling for heavy-duty equipment