

Chapter 40: [Chemical Lifecycle Management](#)

Chemical Screening Requirements

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URL: <https://www-group.slac.stanford.edu/esh/eshmanual/references/chemmanageReqChemScreen.pdf>

1 Purpose

The purpose of these requirements is to reduce risk by identifying hazards and implementing appropriate controls before a toxic or hazardous chemical is delivered to the site or by substituting an acceptable, less hazardous, alternative product or process. They cover the screening of chemical purchase requests. They apply to ESH coordinators and ESH program managers as *chemical reviewers*. Management and staff may refer to the criteria to make informed chemical and product selections, thereby shortening the review process.

2 Requirements

All chemical orders must be reviewed by Environment, Safety, and Health (ESH) coordinators before purchase (see [Chemical Lifecycle Management: Purchasing Procedure](#)). Additional review by ESH program managers may also be appropriate. Review must be done in a timely manner, and based on clear and transparent criteria.

2.1 Chemical Reviewers

Chemical reviewers must have

- Comprehensive knowledge of applicable regulatory lists and requirements
- Ability to interpret *safety data sheets (SDSs)*
- [Chemical Management System](#) ESH reviewer status

Backup within each group is highly recommended to ensure continuity. Directorate and local ESH coordinators are vital in this review because of their process knowledge and understanding of the organizational needs of the users and existing controls.. The chemical lifecycle management program manager is the point of contact regarding chemical reviewer assignments.

Table 1 Review Groups and Areas of Responsibility

Discipline / Group	Subject or Area of Review Responsibility
Industrial Hygiene (IH)	Exposure, nanomaterial safety
SLAC fire marshal and Emergency Management	Fire safety, emergency management

Discipline / Group	Subject or Area of Review Responsibility
Hazardous Waste (HW)	Disposal restrictions
Waste Minimization / Pollution Prevention (WM/P2)	Preferred purchases (Greener Choice)
Water	Industrial wastewater discharge, stormwater discharge, groundwater discharge
Air Quality (AQ)	Permitted air emissions, greenhouse gases (GHGs), ozone depleting substances (ODSs), hazardous air pollutants (HAPs)
Radiation Protection (RP)	Radioactive and nuclear materials
Chemical Management Services (CMS) / Chemical Lifecycle Management	Chemical storage and inventory

2.2 Chemical Categorization

2.2.1 Categorization Considerations

For chemical screening purposes, chemicals are divided into the following four categories:

1. Banned
2. Of concern
3. Material-restricted
4. Use-restricted

A description of each category follows. In arriving at a categorization the SME may review various information sources and consider many factors, including the following:

- Analysis of the product SDS
- Identification of human toxicity and analysis of potential for exposure
- Identification of environmental toxicity and potential exposure, including impacts to air and water quality, soils/land, and climate, including an analysis of environmental persistence and bioaccumulation
- Availability of substitutes that deliver required performance
- Availability of controls to manage identifiable risks (for example, process design, engineering, administrative, or personal protective equipment)
- Consideration of the quantity in use and/or storage
- Impacts on mission capability and business costs, including decontamination and disposal costs
- Comparison of chemicals or constituents against applicable regulatory and environmental hazard lists such as priority chemicals identified by the United States Environmental Protection Agency (EPA), any agency-specific toxic or hazardous chemical lists, and emerging contaminants identified by the United States Geological Survey (USGS)

2.2.2 Categories

Categories provide a framework for the review process and assist in identifying risk types, such as exposure or environmental release. Understanding the category helps in determining controls so that the chemical can be used safely.

Note If a chemical belongs to more than one category, use the more restrictive.

Table 2 Toxic and Hazardous Chemical Categories

Category	Description
Banned	<p>The following are banned for use at SLAC due to SLAC policy and Department of Energy (DOE) or regulatory directives:</p> <ul style="list-style-type: none"> ▪ Polychlorinated biphenyls (PCBs) (see Chapter 32, “Polychlorinated Biphenyls”) ▪ Department of Transportation (DOT) Class 1.1: Explosives (49 CFR 173.50) Explosive substances release pressure, gas, and heat suddenly when they are subjected to shock, heat, or high pressure. Division 1.1: Explosives with a mass explosion hazard. A mass explosion is one which affects almost the entire load instantaneously. Examples: dynamite, TNT, black powder. ▪ Class I ozone-depleting substances (ODSs). ODSs were banned completely in 2010; however there is an exemption for laboratory and analytical uses as defined by EPA. This exemption has been extended through December 31, 2021. (See Chapter 30, “Air Quality”) ▪ Banned asbestos products (see Chapter 27, “Asbestos”) ▪ Controlled substances listed in the Stanford University Controlled Substances Program ▪ Lead paint, lead shot, or lead wool (see Chapter 20, “Lead Safety”)
Of concern	<p>Materials that are judged to pose a higher exposure or environmental risk fall into one of several types as listed below. This category of materials may require justification for use. Safer alternatives should be evaluated.</p> <p>Highly hazardous materials</p> <p>These materials present an exposure risk to workers, emergency responders, and the surrounding community due to physical and chemical hazards. Chemicals with the following properties are of particular concern:</p> <ul style="list-style-type: none"> ▪ Time sensitive ▪ Highly reactive, water reactive, or pyrophoric (butyllithium solutions in solvents) ▪ Explosive (such as heavy metal azides, perchlorates with heavy metals, picric acid [[f dry], and peroxide-forming substances) ▪ Highly corrosive (concentrated, glacial, fuming acids, concentrated bases) ▪ Highly toxic (cyanide compounds, due to potential generation of HCN gas), isocyanates (especially MDI), chromium (especially Cr+6), cadmium, lead, nickel, beryllium, including Cu-Be alloys ▪ Chemicals with permissible exposure levels (PELs) that are below levels that can be monitored ▪ Cal / OSHA-listed hazardous and toxic substances (8 CCR 5160–5199)

Category	Description
	<ul style="list-style-type: none"> ▪ Cal / OSHA-listed carcinogens, mutagens, teratogens, reproductive toxins (8 CCR 5209) ▪ Proposition 65 (see chemical lifecycle management program manager for current list) <p>Persistent, bio-accumulative, and toxic pollutants (PBTs)</p> <p>The EPA's Persistent Bio-accumulative and Toxic (PBT) Chemical Program addresses chemicals that are a risk due to their persistence, bioaccumulation within the food web, and toxicity to living organisms. PBTs transfer relatively easily among air, water, and land, and span boundaries of regulatory programs, geographic entities, and generations, and so require stringent controls to prevent release into the environment.</p> <p>Priority chemicals</p> <p>The National Waste Minimization Program focuses efforts on reducing 31 priority chemicals (PCs) found in our nation's products and wastes by finding ways to eliminate or substantially reduce their use by recovering or recycling them.</p>
Material-restricted	<p>Release of these materials are subject to regulatory thresholds that must not be exceeded and apply to the SLAC site as a whole. Every instance of product use must be tracked by work groups and areas.</p> <ul style="list-style-type: none"> ▪ Total toxic organics (TTO) must never exceed levels specified in the <i>Solvent Management Plan (SMP)</i>. For information, see Chapter 43, "Industrial Wastewater". ▪ Hazardous air pollutants listed in Chapter 30, "Air Quality" ▪ Greenhouse gases such as carbon dioxide, methane, nitrous oxide, and fluorinated gases, many of which have high global warming potential and include sulfur hexafluoride (SF6), hydrofluorocarbons (HFCs) and perfluorinated compounds (PFCs) ▪ Ozone-depleting substances, Class II ODS; no production or importing of 90% of hydrochlorofluorocarbons (HCFCs) will be implemented by 2015 with a complete ban of ODSs to be implemented by 2030. ▪ Non-exempt uses of high volatile organic content (VOC) material, which generally includes products that contain more than 300 grams/liter (g/l) VOCs. Note: Bay Area Air Quality Management District (BAAQMD) regulations include specific limits in the 50-800 g/l range (for example, the limit for lacquer thinner is 50 g/l).
Use-restricted	<p>The following materials may only be used in a specified area or process and/or are kept under specified quantity thresholds. This category includes justified mission-critical materials of concern. Use-restricted products must be highly controlled and may require additional work planning and control procedures.</p> <ul style="list-style-type: none"> ▪ Radioactive materials and standards require prior approval by the Radiation Protection Department and specified training. See ESH Manual, Chapter 9, "Radiological Safety". ▪ Nuclear materials listed in Department of Energy Order 474.2, Change 4, "Nuclear Material Control and Accountability" (DOE O 474.2, Chg 4 [PgChg]), including nonradioactive deuterium (in any form), tritium, and lithium-6, must be approved by the Radiation Protection Department prior to ordering.

Category	Description
	<ul style="list-style-type: none">▪ Cyanide salts can be used only within the constraints of the SLAC <i>Risk Management Plan</i>.▪ Mercury-containing apparatus and equipment cannot be purchased unless the exceptions specified by the California Department of Toxic Substances Control (DTSC) are met (see DTSC Fact Sheet). (See also DTSC's "Mercury in Thermostats" and <i>California Health and Safety Code</i>, Division 20, Chapter 6.5, Article 10.2.1 [HSC 25214.8.1-25214.8.6].)▪ Asbestos-containing products can be purchased and used only if approved by the asbestos program manager and the air quality program manager.▪ Materials with a National Fire Protection Association (NFPA) health rating of 3 or 4 must remain at or below quantities that can be "easily and safely manipulated by one person" (8 CCR 5191) unless approved by the fire marshal. Additional assessment may be required if these materials are stored or used in an area above 5 gallons and all must be tracked (inventoried) in one-gallon quantities.▪ New lead purchases must be justified in part by determining that on-site stock will not meet user/requesters requirements (see Chapter 20, "Lead Safety").▪ DEA listed precursors (Stanford University Controlled Substances Program) must have a rigorous inventory control process and must be stored in a secured area.▪ Small volumes of material with high VOC content can be approved for specified uses with the approval of the air quality program manager.▪ Toxic gases can be purchased only if they can be managed safely.

2.3 Preferred Materials

Identifying chemicals and products with fewer health and environmental risks that meet performance specifications is an integral part of the ESH chemical screening process, and supports the federal government's goals to reduce the quantity of toxic and hazardous chemicals and materials acquired, used, or disposed.

2.3.1 Greener Choices

The [Chemical Management System](#) identifies preferable "Greener Choice" products for a number of applications. A "Greener Choice" product is typically one that has been certified as "green" by an outside organization, such as products certified by Green Seal, EcoLogo, or the EPA's Design for the Environment program, or certified as BioPreferred by the USDA. "Greener Choices" exhibit some or all of the following attributes:

- Minimize exposure to concentrated chemicals
- Reduced or non-ozone depleting substances
- Reduced bio-concentration and toxicity
- Reduced flammability (Hazardous Materials Information System [HMIS] / NFPA ratings of 1 or 2 preferably)
- Reduced or no added dyes, except when added for safety purposes

- Reduced or no added fragrances
- Reduced or no skin irritants
- Reduced or no VOCs
- Reduced packaging
- Recyclable packaging
- Recycled content in packaging
- Reduced use of disinfectants

2.3.2 Resources

Chemical requesters and ESH reviewers can use the resources in the following table to identify environment-friendly products.

Table 3 Environment-friendly Product Resources

Product Category	Resources	Legal and Other Requirements
Recycled content	<ul style="list-style-type: none"> ▪ US EPA Comprehensive Procurement Guidelines 	<ul style="list-style-type: none"> ▪ EO 13514, "Federal Leadership in Environmental, Energy, and Economic Performance" ▪ EO 13423, "Strengthening Federal Environmental, Energy, and Transportation Management" ▪ Resource Conservation and Recovery Act (RCRA), Section 6002 (42 USC 6962) ▪ "Comprehensive Procurement Guideline for Products Containing Recovered Materials" (40 CFR 247)
Environmentally preferable	<ul style="list-style-type: none"> ▪ US EPA Environmentally Preferable Purchasing ▪ Green Seal ▪ EcoLogo ▪ EPA Safer Choice 	<ul style="list-style-type: none"> ▪ EO 13514 ▪ EO 13423
Bio-based	<ul style="list-style-type: none"> ▪ USDA Bio-Preferred 	<ul style="list-style-type: none"> ▪ EO 13514 ▪ EO 13423 ▪ Farm Security and Rural Investment Act of 2002, Section 9002 (7 USC 8102)
Alternative fuels, fuel efficiency	<ul style="list-style-type: none"> ▪ US DOE Federal Energy Management Program: Federal Fleet Management Requirements ▪ US DOE Energy Efficiency and Renewable Energy: Vehicle Technologies Office 	<ul style="list-style-type: none"> ▪ EO 13514 ▪ EO 13423 ▪ Energy Policy Act of 1992 (EPAct), Section 303 (42 USC 13212)

Product Category	Resources	Legal and Other Requirements
Non-ozone depleting substances	<ul style="list-style-type: none">US EPA Ozone Layer Depletion – Alternatives / SNAP	<ul style="list-style-type: none">Clean Air Act, Section 613 (42 USC 7671)

** Other requirements include applicable Federal Acquisition Regulation (FAR) and Department of Energy Acquisition Regulations (DEAR), as specified in the [DOE/SU Contract](#)*

3 Forms

The following forms and systems are required by these requirements:

- [Chemical Management System](#). System used for ordering and tracking chemicals and storing safety data sheets

4 Recordkeeping

The following recordkeeping requirements apply for these requirements:

- None

5 References

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

- [Chapter 40, “Chemical Lifecycle Management”](#)
 - [Chemical Lifecycle Management: Purchasing Procedure](#) (SLAC-I-730-0A09C-001)
 - [Chemical Management Services \(CMS\)](#)
 - [Chemical Management Services Program Site](#) (SharePoint)
 - [CMS Requester List](#)
- [Chapter 9, “Radiological Safety”](#)
- [Chapter 20, “Lead Safety”](#)
- [Chapter 27, “Asbestos”](#)
- [Chapter 30, “Air Quality”](#)
- [Chapter 32, “Polychlorinated Biphenyls”](#)
- [Chapter 43, “Industrial Wastewater”](#)

Other SLAC Documents

- Risk Management Plan*
- Solvent Management Plan* (SLAC-I-750-3A03M-001)

Other Documents

- Title 7, *United States Code*, “Agriculture”, Chapter 107, “Renewable Energy Research and Development”, Section 8102, “Biobased Markets Program” ([7 USC 8102](#))
- Title 42, *United States Code*, “The Public Health and Welfare”, Chapter 82, “Solid Waste Disposal”, Subchapter 6, “Federal Responsibilities”, Section 6962, “Federal Procurement” ([42 USC 6962](#))
- Title 42, *United States Code*, “The Public Health and Welfare”, Chapter 85, “Air Pollution Prevention and Control”, Subchapter 6, “Stratospheric Ozone Protection”, Section 7671, “Definitions” ([42 USC 7671](#))
- Title 42, *United States Code*, “The Public Health and Welfare”, Chapter 134, “Energy Policy”, Subchapter 1, “Alternative Fuels-General”, Section 13212, “Minimum Federal Fleet Requirement” ([42 USC 13212](#))
- Title 40, *Code of Federal Regulations*, “Protection of the Environment”, Chapter 1, “Environmental Protection Agency”, Part 247, “Comprehensive Procurement Guideline for Products Containing Recovered Materials” ([40 CFR 247](#))
- Title 49, *Code of Federal Regulations*, “Transportation”, Subtitle B, “Other Regulations Relating to Transportation”, Chapter 1, “Pipeline and Hazardous Materials Safety Administration, Department of Transportation”, Part 173, “Shippers: General Requirements for Shipments and Packaging”, Subpart C, “Definitions, Classification, and Packaging for Class 1” ([49 CFR 173.50](#))
- Executive Order (EO) 13423, “Strengthening Federal Environmental, Energy, and Transportation Management” ([EO 13423](#))
- Executive Order (EO) 13514, “Federal Leadership in Environmental, Energy, and Economic Performance” ([EO 13514](#))
- Department of Energy Contract [DE-AC02-76SF00515](#)
- Department of Energy Order 474.2, Change 4, “Nuclear Material Control and Accountability” ([DOE O 474.2, Chg 4 \[PgChg\]](#))
- *California Health and Safety Code*, Division 20, “Miscellaneous Health and Safety Provisions”, Chapter 6.5, “Hazardous Waste Control”, Article 10.2.1, “Mercury-Added Thermostats, Relays, Switches, and Measuring Devices” ([HSC 25214.8.1-25214.8.6](#))
- Title 8, *California Code of Regulations*, “Industrial Relations”, Division 1, “Department of Industrial Relations”, Chapter 4, “Division of Industrial Safety”, Subchapter 7, “General Industry Safety Orders”, Group 16, “Control of Hazardous Substances” ([8 CCR 5139–5230](#))
- Department of Agriculture. [Bio-Preferred](#)
- Department of Energy. [Energy Efficiency and Renewable Energy: Vehicle Technologies Office](#)
- Department of Energy. [Federal Energy Management Program: Federal Fleet Management Requirements Resource Center](#)
- Environmental Protection Agency. [Greenhouse Gas Emissions](#)
- Environmental Protection Agency. [Safer Choice](#)
- Environmental Protection Agency. [Sustainable Marketplace: Greener Products and Services](#)
- Environmental Protection Agency. [Ozone Layer Protection](#)
- Environmental Protection Agency. [Significant New Alternatives Policy \(SNAP\) Program](#)
- Environmental Protection Agency. [Ozone-depleting Substances](#)

- Environmental Protection Agency. [Phaseout Exemptions for Laboratory and Analytical Uses](#)
- Environmental Protection Agency. [Persistent Bioaccumulative Toxic \(PBT\) Chemicals Covered by the TRI Program](#)
- Environmental Protection Agency. [Wastes: Hazardous Waste: Waste Minimization](#)
- Environmental Protection Agency. [Wastes: Hazardous Waste: Waste Minimization: Priority Chemicals](#)
- Environmental Protection Agency. [Comprehensive Procurement \(CPG\) Guideline Program](#)
- Occupational Safety and Health Administration (OSHA). [Safety and Health Topic: Chemical Hazards and Toxic Substances](#)
- Occupational Safety and Health Administration (OSHA). [Safety and Health Topic: Isoocyanates](#)
- California Department of Toxic Substances Control. [Products and Devices That Contain Mercury](#)
- California Department of Toxic Substances Control. [Mercury in Thermostats](#)
- California Office of Environmental Health Hazard Assessment. [Proposition 65](#)
- UL. [EcoLogo Certification Program](#)
- Green Seal. [Certified Products and Services](#)
- Stanford University, Office of Environmental Health and Safety. [Stanford University Controlled Substances Program](#)