

**Advanced Photon Source**

**CHEMICAL HYGIENE PLAN**

**Effective: 30 Sept 2004**

**A copy of the signature page is on file in the office of the APS  
Chemical Hygiene Officer**

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**Introduction**

This plan clarifies how the Advanced Photon Source (APS) addresses requirements in Chapter 4-2 of the Argonne National Laboratory (ANL) *Environment, Safety and Health Manual (ES&H Manual)*. It also incorporates, by means of this reference, the current requirements of the *ES&H Manual*.

This plan applies only to those APS facilities engaged in the laboratory use of hazardous chemicals, as defined in Occupational Safety and Health Administration (OSHA) Regulation 29 CFR 1910.1450, "Occupational Exposure to Hazardous Chemicals in Laboratories."<sup>1</sup> Such APS facilities exist as part of the Experimental Facilities Division (XFD), APS Operations Division (AOD), and the Accelerator Systems Division (ASD). APS personnel seeking clarification of the applicability of the plan should address questions to the Division Chemical Hygiene Officer (DCHO). This plan does not cover the laboratory use of radioactive materials. Any activities involving radioactive materials are subject to review by the Division ES&H Coordinator and, in some cases, the APS Radiation Safety Committee.

As indicated on the preceding signature page, the APS Directors have accepted and endorsed the policies and practices set forth in this Division Chemical Hygiene Plan. Additionally, the DCHO and the ANL Site Chemical Hygiene Officer (SCHO) concur with the policies and practices described below.

**Responsibilities**

The APS Directors have assigned the DCHO to coordinate activities specified in this plan.

The DCHO is responsible for an annual review of this plan and a report of his/her findings to the APS Division Directors and the SCHO. At his or her discretion, the Division Directors may ask the APS Chemical Safety Committee to review the plan and annual

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<sup>1</sup> "Laboratory use" of hazardous chemicals means handling or use of such chemicals in which **all** of the following conditions are met:

- (i) Chemical manipulations are carried out on a "laboratory scale,"
- (ii) Multiple chemical procedures or chemicals are used,
- (iii) The procedures involved are not part of a production process, nor in any way simulate a production process, and
- (iv) "Protective laboratory practices and equipment" are available and in common use to minimize the potential for employee exposure to hazardous chemicals.

"Laboratory" means a facility where the "laboratory use of hazardous chemicals" occurs. It is a workplace where relatively small quantities of hazardous chemicals are used on a nonproduction basis.

"Laboratory scale" means work with substances in which the containers used for reactions, transfers, and other handling of substances are designed to be easily and safely manipulated by one person. Laboratory scale excludes those workplaces whose function is to produce commercial quantities of materials.

report and propose revisions needed to correct identified deficiencies.

APS management has assigned a laboratory custodian to each division laboratory. Appendix 1 of this document defines the general responsibilities of laboratory custodians, as well as, the additional responsibilities assigned to laboratory custodians of chemical laboratories.

Principal Investigators shall review material safety data sheets (MSDSs) of chemicals they use to identify their hazardous characteristics and, as required, consult with the DCHO to determine whether they are:

- confirmed or suspected carcinogens, or
- confirmed or suspected reproductive hazards, or
- recognized to have high acute toxicity.

A summary of Principal Investigator responsibilities pertaining to the use of carcinogens can be found in Attachment 2 of this document.

The APS shall rely on the SCHO to provide for site-wide coordination and support for the DCHO and to review the APS Chemical Hygiene Plan.

## **Definitions**

**Action level** — the level at which increased hazard control and evaluation measures become mandatory. Some OSHA regulations define action levels for specific chemicals; they are normally one-half of the permissible exposure level (PEL) for the chemical.

**Designated area** — a work area (for example, a laboratory, an area within a laboratory or a hood) identified and posted for work with high toxicity<sup>2</sup> materials, select carcinogens, and reproductive toxins.

**Hazardous chemical** — a chemical having the potential to cause acute or chronic health effects; the term applies to many laboratory chemicals.

**High acute toxicity** — having the potential to cause significant acute ill health effects at low dosages. The term applies to substances that qualify as highly toxic<sup>3</sup> or toxic<sup>4</sup> that may be fatal

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<sup>2</sup> See “Highly toxic” below.

<sup>3</sup> "Highly toxic" - A chemical falling within any of the following categories:

(a) A chemical that has a median lethal dose (LD<sub>50</sub>) of 50 milligrams or less per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.

or cause damage to target organs as a result of a single exposure or exposures of short duration. Chemicals satisfying one or more of the following criteria should be considered to pose a high acute toxicity hazard.

- Highly volatile toxic materials (such as hydrogen cyanide, hydrogen sulfide and nitrogen dioxide)
- Highly toxic noncarcinogenic materials (such as hydrofluoric acid)
- Chemicals with a Threshold Limit Value-Short Term Exposure Limit (TLV-STEL) or Threshold Limit Value-Ceiling (TLV-C) of less than 1 ppm or 0.5 mg/m<sup>3</sup>.

**Permissible Exposure Level (PEL)** – the OSHA 8 hour time-weighted average (TWA) occupational exposure limit.

**Reproductive toxins** — chemicals that can affect reproductive capabilities including those capable of producing chromosomal damage (mutations) and those capable of producing effects on fetuses (teratogenesis).

**Select carcinogen** — Class 1 and Class 2 substances from Chapter 4-5, Carcinogenic Chemicals, in the ANL *ES&H Manual*. The term also includes, on a case-by-case basis, other substances meeting one of the following criteria.

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- (b) A chemical that has a median lethal dose (LD<sub>50</sub>) of 200 milligrams or less per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between two and three kilograms each.
  - (c) A chemical that has a median lethal concentration (LC<sub>50</sub>) in air of 200 parts per million by volume or less of gas or vapor, or 2 milligrams per liter or less of mist, fume, or dust, when administered by continuous inhalation for one hour (or less if death occurs within one hour) to albino rats weighing between 200 and 300 grams each.

<sup>4</sup> "Toxic" - A chemical falling within any of the following categories:

- (a) A chemical that has a median lethal dose (LD<sub>50</sub>) of more than 50 milligrams per kilogram but not more than 500 milligrams per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.
- (b) A chemical that has a median lethal dose (LD<sub>50</sub>) of more than 200 milligrams per kilogram but not more than 1,000 milligrams per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between two and three kilograms each.
- (c) A chemical that has a median lethal concentration (LC<sub>50</sub>) in air of more than 200 parts per million but not more than 2,000 parts per million by volume of gas or vapor, or more than two milligrams per liter but not more than 20 milligrams per liter of mist, fume, or dust, when administered by continuous inhalation for one hour (or less if death occurs within one hour) to albino rats weighing between 200 and 300 grams each.

- Substances regulated by OSHA as a carcinogen.
- Substances listed under the category ***Known to be Carcinogens*** in the Annual Report on Carcinogens published by the National Toxicology Program (NTP) (latest edition).
- Substances listed under Group 1, Carcinogenic to Humans, by the "International Agency for Research on Cancer (IARC) Monographs" (latest edition).
- Substances listed in either Group 2A or 2B by IARC or under the category, "reasonably anticipated to be carcinogens" by NTP, *and* causes statistically significant tumor incidence in experimental animals in accordance with any of the following criteria:
  - *after inhalation exposure* of 6-7 hours per day, 5 days per week, for a significant portion of a lifetime, to dosages of less than 10 mg/m<sup>3</sup>;
  - *after repeated skin application* of less than 300 mg/kg of body weight per week; or
  - *after oral dosages* of less than 50 mg/kg of body weight per day.

**Threshold Limit Values (TLVs)** — workplace exposure limits established by the American Conference of Governmental Industrial Hygienists (ACGIH). (The DOE requires that operations conducted in its facilities comply with these standards. The Division Chemical Hygiene Officer has a copy available for viewing.)

**Chemical Exposure  
Evaluation and  
Monitoring Plan**

Where the DCHO or APS Chemical Safety Committee believes that exposures may be of concern, the DCHO shall consult with EQO-Industrial Hygiene regarding the need for exposure monitoring. Principal Investigators and affected employees may also request reviews by EQO-IH concerning recommendations for personal exposure monitoring. In making this determination, the DCHO will consider applicable OSHA Permissible Exposure Levels, action levels, and/or ACGIH TLVs. When personnel are exposed to substances that do not have established exposure limits and the DCHO believes exposures create a potential for significant health effects, he/she shall consult with the SCHO and competent medical professionals regarding the need for exposure monitoring or biological testing.

**Note: Employees who develop signs or symptoms indicating possible overexposure to chemicals must report the situation to**

**their supervisor and the HR-Medical Department in Building 201.**

If initial monitoring indicates exposure exceeding the OSHA action level or the established ACGIH TLV, the DCHO will request EQO-IH to conduct periodic monitoring until exposure potential is reduced to less than these criteria.

The DCHO will request that monitoring results be issued to the responsible Principal Investigator.

Within 15 days of receipt of any exposure monitoring results, Principal Investigators shall inform employees covered by the monitored operation of the results in writing, individually or by posting. Principal Investigators will refer individuals with questions on interpretation of monitoring results to the DCHO.

Where unacceptable exposure potential exists, the responsible Principal Investigator, in consultation with the DCHO, will develop a corrective action plan. The primary responsibility for formulating an acceptable plan for reducing exposures to acceptable levels rests with the cognizant Principal Investigator. The APS requires Principal Investigators to involve the DCHO to help ensure early identification of relevant laboratory requirements. The Principal Investigator will regularly notify affected employees, the DCHO and EQO-IH about progress in formulating and implementing the plan.

**Medical  
Consultation and  
Examinations**

The APS will rely upon the ANL-E Medical Department to provide pre-employment and periodic physical examinations to carcinogen users, as well as, additional tests appropriate to a user's exposure to a particular chemical. Note: the Medical Department obtains the information it needs to make reliable determinations from the Job Hazard Questionnaire and maintains records identifying carcinogen users.

**Standard Operating  
Procedures**

Principal Investigators (PIs) shall develop standard operating procedures for all laboratory procedures involving chemicals:

- having an National Fire Protection Association Standard 704 (NPFA 704) rating of 4 for flammability, and/or
- having an NPFA 704 rating of 3 or 4 for reactivity, and/or
- having an NPFA 704 rating of 3 or 4 for health effects, and/or
- considered suspect or known carcinogens, and/or

- considered suspect or known reproductive hazards, and/or
- having high acute toxicity, and/or
- subjected to heating (or other energy sources), mechanical actions (e.g., agitation), or other factors that could increase the amount of a chemical in the air or otherwise significantly increase the risk posed by use of the chemical.

Note: The DCHO, in consultation with the SCHO, can waive the requirement for a procedure for suspect carcinogens unless the substance is an ANL Select Carcinogen.

The APS standard operating procedures (SOPs) will incorporate warnings about significant hazards and precautionary statements and procedural steps (requirements) indicating how hazards are to be controlled. Procedures for handling carcinogens must satisfy the requirements set forth in Chapter 4-5 of the ANL *ES&H Manual*. When completed, procedures may be submitted to and approved by the APS Chemical Safety Committee before they are implemented. Once approved, the PI responsible for the procedure should provide a copy to the office of the DCHO. Interested parties can obtain copies of the procedures from either the responsible group leader or the office of the DCHO.

### **Restricted Procedures**

No person may conduct chemical work in an APS laboratory without the knowledge and approval of the responsible laboratory custodian. The laboratory custodian may give blanket or qualified ongoing authorizations to APS personnel who regularly work in their laboratories.

### **APS Requirements for Laboratory Use of Particularly Hazardous Substances<sup>5</sup>**

In addition to using protective measures specified in the associated written procedure, workers must confine their work with carcinogens to *Designated Areas*. The laboratory custodians and PIs must restrict entry into Designated Areas to trained personnel directly involved in the procedure.

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<sup>5</sup> The term “particularly hazardous substances” includes select carcinogens, substances known to cause cell mutations, reproductive toxins, and substances with high acute toxicity.

When the Designated Area is only a part of a laboratory, a double red line on the floor will be used to demarcate the Designated Area. Where entire laboratories (rooms) are considered to be a Designated Area, the doors will have signs that restrict entry. When a fume hood is considered to be the Designated Area, the hood will be posted with respect to the ANL class carcinogen that is in use.

**Criteria Governing Selection of Hazard Controls**

Control measures intended to reduce exposures of laboratory workers to hazardous chemicals will conform to the requirements of the ANL *ES&H Manual*. For those cases in which the manual does not specify control measures, the selection of hazard controls will follow good industrial hygiene practices as recommended by the DCHO and EQO-IH.

The preferred means of reducing hazards will, whenever feasible, be through the substitution of less hazardous chemicals. Principal Investigators should investigate such alternatives before proposing the use of a hazardous chemical. The APS Chemical Safety Committee may inquire about attempts to find suitable substitutes and may withhold approval of a procedure until satisfied that the use of such hazardous materials is justified.

When less hazardous substances are not available, feasible *engineered controls* will be the preferred means of controlling hazards. The governing written procedure will describe applicable engineered controls. Examples of engineered controls include:

- enclosure of processes
- use of chemical fume hoods
- placement of shields between workers and processes
- use of tools and equipment

In selecting engineered exposure controls, the APS will take into account known routes of entry into the body. For example, if a material is a gaseous inhalation hazard, it should probably be handled in a chemical fume hood or other ventilated enclosure. Similarly, liquids with higher vapor pressures and liquids subjected to agitation or heating to any extent likely to produce vapors, aerosols or mists should be handled in an enclosure or chemical fume hood if inhalation would pose a hazard. The same controls would be appropriate for solids that might be vaporized or reduced to dust. A chemical fume hood, however, would not be sufficient for an operation where dermal exposure to a gas posed a hazard.

Shields might be used as a primary barrier against splashes of

liquids. They might also be used to increase the capture efficiency of ventilation systems used to control the generation of gases, vapors, aerosols and mists.

The use of both common and specialized (procedure-specified, user-developed or user-adapted) tools and equipment can also be used to reduce the potential for user exposure. For example, instead of pouring a corrosive liquid, it might be possible to transfer it to another container using a pump. Even tools as simple as tongs can be used to eliminate the need to reach into a hazardous liquid with one's hands.

The APS uses the term *procedural controls* to refer to recognized methods of performing a task in a manner that minimizes risk. Its use of the term applies not only to the written reviewed procedures that govern a whole activity but also to those ways of performing the discrete tasks that make up a job. Principal Investigators should understand the importance of teaching (demonstrating) the use of the proper technique (procedural controls) when showing personnel how to perform a procedure.

Clearly, the APS places a high priority on procedures. As can be read elsewhere in this plan, the APS expects well-documented procedures that incorporate warnings and safeguards that follow a standard format. Moreover, the APS expects that PIs (or other designated competent individuals) will train persons who perform activities governed by these procedures. Such training should involve a review of the procedure and applicable MSDS, demonstrations by experienced personnel and possibly dry-run demonstrations of proficiency by trainees before the trainees are permitted to work on their own.

In addition, PIs and/or laboratory custodians are then encouraged to develop and maintain an authorized user list for each chemical process under his/her control. The PI or laboratory custodian should then post this list in a conspicuous area near the location of the chemical process.

Although exceptions may exist, as a rule, *administrative controls* (ie, division policy) would have limited application. Although such controls might be considered if engineered and procedural controls prove infeasible or ineffective, they are unlikely to be a preferred means of controlling exposures. For instance, use of such controls would be inappropriate if it would expose a greater number of people than necessary to carcinogens or reproductive hazards. Moreover, where technique plays an important role in controlling an exposure, it might be inappropriate to use such controls because less time on task might lead to decreased

proficiency in performing a task.

Although the use of *personal protective equipment* might be specified in most chemical procedures, it will rarely be relied upon to provide primary protection. For example, gloves that are worn when dipping a part into a solvent or removing a submerged part from a corrosive liquid should only provide secondary protection from unlikely splashes. The use of a sample basket or tongs would provide a primary means of protection.

In addition, it should never be assumed that a particular type of glove that is available within a laboratory is compatible with every chemical that is used or stored therein. APS personnel are encouraged to always consult the MSDS and verify the proper glove selection for a particular chemical. The DCHO may also be consulted on glove selection issues.

### **Respirator Use**

The substitution of lower toxicity materials and engineered controls shall be the first level of personnel respiratory protection. Where engineered controls are not feasible or where an additional level of protection is desired, respiratory equipment may be required.

The approval, selection and user training of respiratory equipment will be provided by EQO-Industrial Hygiene (ext. 2-4149). In addition, annual respirator training and an HR-Medical Department examination are required.

Please contact the DCHO with any questions regarding operations which may require the use of respiratory protection.

### **Laboratory Fume Hoods**

The installation of any new chemical fume hood must be reviewed and approved by EQO-Industrial Hygiene. The APS will rely on routine annual testing conducted by PFS-Building Maintenance to assure adequate airflow into general purpose (non-carcinogen use) chemical fume hoods. The laboratory custodian is responsible for communicating the need for increased flow rates to PFS-BM for general purpose chemical fume hoods.

In the event that a general purpose chemical fume hood will be used for carcinogen work, the DCHO must be notified so that the need for an increased flow rate that is consistent with carcinogen work is communicated to PFS-BM. Once PFS-BM adjusts the flow rate to the hood, the DCHO will then request EQO-IH to recertify the hood for carcinogen work.

Use of laboratory fume hoods will conform to the requirements listed in Chapter 7-11 (Ventilation and Air Cleaning) of the ANL

*ES&H Manual.*

### **Acquiring Chemicals**

Typically, first-time purchase and use of a particular chemical must be reviewed for hazards it may pose during its planned use and foreseeable emergencies (note: this does not include chemicals that are available from the APS stockroom). Prior to any use of the chemical, necessary procedures must be formulated and approved and specified hazard control measures must be implemented. To help ensure that needed controls are identified, people planning to purchase a chemical must (before purchasing the chemical):

- Obtain and review a copy of the current MSDS for the chemical,
- Keep a copy for themselves and forward the original MSDS to the office of the DCHO for review,
- Discuss the planned application for the chemical with the DCHO, and
- Reach agreement with the DCHO about specific hazard controls that will be implemented during the storage, use, and disposal of the particular chemical.

Although the APS does not wish to discourage “borrowing,” it expects that all intradivision transfers of chemicals will be managed with the same rigor required for the purchase of chemicals. No person may take or allow to be taken any chemical unless the person taking the chemical has informed the custodian of the chemical and has a current MSDS. The person taking the chemical must review the MSDS and discuss the proposed use with the DCHO prior to obtaining the chemical. Hazard controls must be implemented before using the chemical.

The DCHO may give verbal approval for the purchase of low-risk<sup>6</sup> chemicals and may verbally specify needed controls. Personnel wishing to purchase chemicals posing greater risk should request an e-mail or another confirming communication regarding specified controls measures and approval to purchase a chemical.

Chemicals and chemical products ordered or brought on site for employee use must be tracked in the ANL Chemical Management System (CMS) and a Material Safety Data Sheet (MSDS) must be readily available to users. The APS expects each group that uses

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<sup>6</sup> Low risk chemicals are those chemicals whose Hazardous Materials Identification System (HMIS) or NFPA 704 health, reactivity and flammability hazard ratings are all either 0 or 1.

hazardous chemicals to appoint an individual to serve as the chemical custodian. These personnel should be assigned responsibility for creating and maintaining Chemical Tracking System (CTS) records for each chemical container.

Since MSDSs are a basic source of information on chemical reagents, hard copies of MSDSs are generally kept in binders located immediately outside APS chemical laboratories. Official copies of MSDSs for ANL-owned products are maintained in the ANL-E Chemical Management System (CMS). The APS requires that its employees take the time to familiarize themselves with the information found in MSDSs for the chemicals they use. Employees are encouraged to contact the DCHO if they have trouble accessing a particular MSDS.

In both the PARIS and AMOS procurement systems, provision is made to link with the CMS to generate an inventory record and assure that an MSDS is obtained. Users are responsible to flag chemical items in these systems when placing orders, complete the storage location information in the Chemical Order Form in the procurement systems, and select the matching MSDS from the existing inventory. In AMOS, many of the chemicals from vendor catalogs have been pre-linked to the ANL MSDS collection. In PARIS, the orderer can select the matching MSDS from the ANL file. Items with missing MSDS are flagged for follow-up by EQO Industrial Hygiene.

For items brought on site outside of the Procurement process, the owner is responsible for assuring that the CMS inventory is created and the MSDS obtained for the central MSDS file.

To create and access records in the CMS, contact the APS DCHO to establish an access account. Open access (no password required) via the ANL Intranet is provided to search and print MSDS, search for surplus chemicals and complete a CMS web training course. These web services can be accessed at <https://www.cms.anl.gov/>.

**Employee Training**

Personnel performing work covered by written procedures must satisfy all training requirements specified in the procedure and on their training profiles before being exposed to any particular hazard.

The APS will rely on the ANL Job Hazard Questionnaire (JHQ) and the Training Management System (TMS) to identify ES&H training made mandatory by federal regulations. Moreover, the APS will rely on such training to provide its personnel with the necessary information to stay abreast of procedural requirements relating to the procurement, storage, handling, use and disposal of chemicals and chemical waste. Trained personnel will be expected to consult the following relevant ANL Tier 2 documents that define ANL policies and procedural requirements relating to chemicals, chemical waste, pollution prevention, and waste minimization techniques:

- The ANL-E *ES&H Manual*,
- The *Waste Handling Procedures Manual*,
- The *Hazardous Materials Transportation Safety Manual*

**Waste Disposal &  
Waste  
Minimization**

The APS will expect that waste disposal and waste minimization planning will be implemented as part of any purchase of a hazardous material or laboratory procedure.

The chemical user shall ensure that the waste products generated by any process are safely and effectively disposed of through PFS-Waste Management. The waste is to be collected and stored in properly labeled containers that are compatible with the waste constituents (note: chemical waste containers should be labeled with an NFPA 704 label. Information to be applied to this label is available from the MSDS for the particular chemical. The name(s) of the chemical constituent(s) should also be written out on the label. The use of chemical symbols should be avoided as a means of identifying waste constituents). Chemical users shall then place the waste in the designated Satellite Accumulation Area (SAA) located within the lab and update the SAA logbook. The waste will then be written up on a WMO-197 chemical waste requisition form by a qualified waste certifier and arrangements made with PFS-Waste Management to have the waste removed from the area.

The quantities of chemicals ordered should correspond with the short-term programmatic needs of the APS. In addition, every effort should be made to obtain chemicals through the Argonne Chemical Exchange System (ACES) before placing an order for

new chemicals. Whenever practical, the recovery and reuse of the chemical shall be considered as part of the process to ensure waste minimization.

The APS DCHO may be consulted for additional guidance on waste disposal or waste minimization procedures.

**Management of  
Accidental  
Releases of  
Chemicals**

APS personnel observing an accidental chemical release that has caused injury, significant property damage or was discharged into a lab drain must immediately report the incident by dialing 9-1-1.

APS personnel observing an accidental chemical release that could cause an explosion, fire, acute ill health effect, or significant property damage must report the incident by dialing 9-1-1.

APS personnel who dial 9-1-1 to report an accidental chemical release must, as soon as possible, notify line management and the DCHO.

Any APS personnel observing an accidental chemical release that they judge unlikely to pose lower levels of risk must report the incident to line management and take such actions as are necessary to keep other personnel out of harm's way.

Any APS personnel may clean up a minor chemical release only if they have the necessary knowledge, equipment, personal protective equipment, and supplies. In general, waste and contaminated debris will be disposed of through PFS-Waste Management Operations.

The APS does not expect personnel to clean up spills that might put them at any significant level of risk of injury or illness.

**Moving Chemicals**

No reagent may be moved to or used in any location without first obtaining the approval of the cognizant laboratory custodian.

Any chemical moved to a new location within a building must either have the original manufacturers label or be labeled in conformance with the requirements set forth in this chemical hygiene plan and Chapter 4-1 of the ANL *ES&H Manual*. In addition, the chemical container must be placed in an unbreakable secondary container and accompanied with an MSDS and appropriate protective gloves for that chemical.

APS personnel may not move chemicals across the ANL site in their personal vehicles. Note: The DCHO may be consulted on small quantity exception issues.

In general, all shipments of chemicals to off-site locations and all

movements of chemicals that will result in the container being taken outside of a building must conform to the requirements set forth in the ANL-E *Transportation Safety Manual* and Chapter 20-1 of the ANL-E *ES&H Manual*.

Chemical custodians must update CTS records to reflect changes in ownership and chemical storage locations.

**References**

"Occupational Exposure to Hazardous Chemicals in Laboratories," Occupational Safety and Health Administration, 29 CFR 1910.1450.

"Hazard Communication," Occupational Safety and Health Administration, 29 CFR 1910.1200.

OCIS, U.S. Department of Labor - Occupational safety and Health Administration.

*Environment, Safety and Health Manual*, Chapter 4-1.

*Environment, Safety and Health Manual*, Chapter 4-2.

*Environment, Safety and Health Manual*, Chapter 4-3.

*Environment, Safety and Health Manual*, Chapter 4-5.

## **Attachment 1**

### **Laboratory Custodian Responsibilities**

#### **Laboratory Custodians**

Laboratory Custodian assignments are made by Group Leaders. The laboratory custodian advises the Group Leader on safety issues in the laboratory to which the laboratory custodian has been assigned and ensures that all aspects of the APS safety program are properly administered and documented in the assigned laboratory, as detailed below.

#### **All laboratories**

The Laboratory Custodian shall:

- Maintain cognizance of the activities being carried out in the workspace.
- Ensure that appropriate advice and support are sought to address questions and problems that are beyond the scope of the laboratory custodian's knowledge or experience.
- Ensure that personnel using the laboratory are properly trained for the equipment and facilities they will use.
- With the assistance of the group secretary, maintain an adequate inventory of personal protective equipment for both visitors and APS personnel.
- Ensure prompt reporting of incidents involving willful disregard for safe work practices or noncompliance with safety requirements. Such incidents shall be brought to the attention of the Group Leader and the respective APS Division ES&H Coordinator. In cases where a laboratory custodian believes that conditions or a person's actions create an imminent danger to life or health, the laboratory custodian shall order immediate cessation of activities that contribute to the danger. Where appropriate, the laboratory custodian shall also order those actions necessary to abate the hazard and then notify other parties as described above.
- Ensure timely abatement of safety deficiencies found in the laboratory and report completion of conditions cited in APS safety inspection reports, Corrective Action Tracking System (COATS) records, and communications from safety committees or any APS ES&H Coordinator.
- Ensure good housekeeping at all times within all laboratories under his/her control.
- Maintain required safety postings.
- Ensure that required periodic inspections of safety equipment (such as eyewashes) and facilities (such as hazardous waste Satellite Accumulation Areas) are performed on schedule.
- As requested, participate in safety reviews and accident investigations.

#### **Laboratories with chemical hazards**

A laboratory custodian assigned to a chemical laboratory shall have the additional responsibility for assisting in the formulation of procedures for the handling of chemicals, gases and chemical waste used or produced in the laboratory.

## Attachment 1, continued

The laboratory custodian shall ensure, with the support of the respective APS Division ES&H Coordinator, that safety items and protective equipment used in the laboratory are functioning properly and are appropriate for the materials being handled.

The laboratory custodian assigned to a chemical laboratory shall ensure that all chemicals, gases and chemical waste used or produced in that laboratory are managed and tracked in a manner consistent with current ANL and division policy.

The laboratory custodian shall discuss proposed additions to the lab's chemical inventory with the Principal Investigator who wishes to purchase a new chemical. If the laboratory custodian is not satisfied that the chemical can be safely stored and used in the laboratory, the purchase shall be postponed until appropriate safeguards are in place.

The laboratory custodian shall review the chemical, gas, and chemical waste storage areas monthly and keep a log of areas inspected, dates, findings, and actions taken.

Each month, the laboratory custodian assigned to a chemical laboratory shall:

1. Replenish depleted supplies of commonly used chemicals and personal protective equipment.
2. Ensure that the ANL Chemical Management System records are maintained reasonably current. (Note: laboratory custodians who are not CMS users can request needed changes through the APS DCHO).

## Attachment 2

### Summary of Principal Investigator Responsibilities Pertaining to the Use of Carcinogens

Note: This is a summary intended to heighten APS personnel's awareness of responsibilities associated with the use of carcinogens. Principal Investigators should not rely exclusively on this document, but should familiarize themselves with Chapter 4-5 of the ANL *Environment, Safety and Health Manual*.

Principal Investigators shall:

- Revise or request the revision of Job Hazard Questionnaires of personnel potentially exposed to carcinogens used in operations directed by the Principal Investigator;
- Recognize carcinogen hazards and understand the control methods necessary to minimize exposures of employees and the public;
- Work with laboratory custodians and the DCHO to ensure that required labeling and signage requirements have been met;
- Ensure that affected employees are made aware of the carcinogens in use and that they receive appropriate training and information, including material safety data sheets (MSDSs), for working safely with or around carcinogens;
- Ensure that carcinogens are disposed of properly in accordance with ANL-E procedures;
- Complete an annual inventory of carcinogens in use and provide copies to the ANL-E Medical Department and EQO-Industrial Hygiene<sup>1</sup>;
- Provide for division and EQO review of carcinogen use as specified;
- Report occupational exposure incidents involving carcinogens to the Medical Department; and
- Incorporate safe carcinogen handling practices in standard operating procedures (SOPs).

Principal Investigators must work with their respective APS Division Training Management System Representative to update the Job Hazard Questionnaires of persons who will be working with carcinogens. Doing so will help ensure that required training and medical monitoring requirements are met. Updating the questionnaire must be done before the affected person's first planned use of the carcinogen to ensure that the Medical Department has a chance to review for unusual risk factors. Principal Investigators wishing to arrange for substance or hazard-specific training should contact the DCHO.

Before purchasing a new chemical, Principal Investigators are responsible for obtaining and reviewing the substance's MSDSs for carcinogen hazards. Before such substances are ordered, appropriate storage for the substances must be available. Additional planning, reviews, facilities, equipment, and training must be completed before the substances are used. In general, the APS Chemical Safety Committee may review the required SOP.

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<sup>1</sup> Laboratories that make use of the ANL Chemical Management System to track their chemical inventory can rely on the ability of the ANL Chemical Tracking System to produce a real time carcinogen report.

## Attachment 2, continued

Topics to be addressed in SOPs include:

- Designated areas and authorized carcinogen users
- Brief description of operations involving carcinogens
- Engineering exposure controls
- Hazard information and training, including required MSDS
- Personal protective equipment
- Storage
- Labeling
- Packaging/transportation
- Waste disposal
- Staffing off-hours
- Emergency/spill response

Principal Investigators are responsible for ensuring that appropriate labeling and posting practices are in place. To do so, Principal Investigators must consult with laboratory custodians and the DCHO. The required practices include:

- Labeling carcinogen containers in conformance with the general requirements of OSHA's Hazard Communication standard and ANL *Environment, Safety and Health Manual* provisions.
- Retaining container labels applied by the substance's manufacturer.
- Discussing with the DCHO the advisability of supplementing the manufacturer's warning labels with a National Fire Protection Association (NFPA) Standard 704 hazard warning label.
- Labeling supplemental containers with the identity of the material and with a hazard warning statement or label, such as the NFPA 704 diamond.
- Posting work areas with appropriate signage.

The Principal Investigator shall obtain and complete a copy of form ESH-189 from the DCHO and submit the completed form to the DCHO at carcinogen acquisition or at the beginning of the project, annually, and at completion of the project. The form is used to inform the Medical Department of Class 1 and Class 2 carcinogen users and to provide an inventory record of all carcinogens to the user's division and EQO-Industrial Hygiene. When a project ends and waste is disposed of, a final inventory showing zero balance indicates to the ANL-E Medical Department and EQO-Industrial Hygiene that carcinogen use has ended.

## Attachment 3

### List of Suggested Chemical Laboratory Safety References

1. ANL-E *Environment, Safety and Health Manual*  
[<http://www.aim.anl.gov/manuals/>]
2. ANL *Protective Glove Selection Guide*  
[Coming soon to: <http://www.anl.gov/ESH/ih/>]  
Also, DCHO/ES&H Coordinator's office
3. *Prudent Practices in the Laboratory*  
DCHO/ES&H Coordinator's office
4. *CRC Handbook of Laboratory Safety*  
DCHO/ES&H Coordinator's office
5. *Chemical Safety in the Laboratory*  
DCHO/ES&H Coordinator's office

