

SCIPP Lab Safety and Chemical Hygiene Plan

This version applies to the Lab rooms 361, 365, 369, 377, 383, and 389 in
Natural Sciences II used by the Santa Cruz Institute for Particle Physics

Last Revision Date: 4/30/2013


Steve Ritz, PI and Director

5/3/2013
date


Robert Johnson, PI and Assoc. Dir.

May 3, 2013
date


Alex Grillo, PI

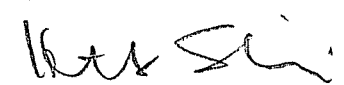
1-May-13
date

Alan Litke, PI

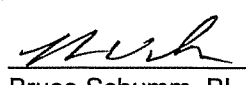
date


Jason Nielsen, PI

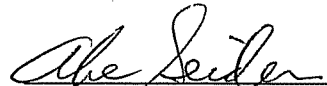
2-May-2013
date


Hartmut Sadrozinski, PI

5-3-13
date


Bruce Schumm, PI

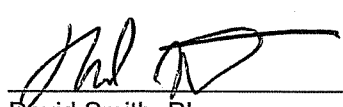
May 2, 2013
date


Abe Seiden, PI

May 2, 2013
date


Alexander (Sasha) Sher, PI

2-May-2013
date

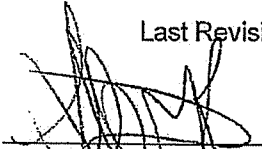

David Smith, PI

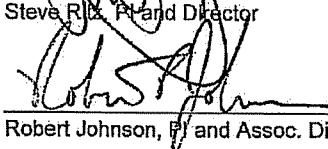
6-May-2013
date

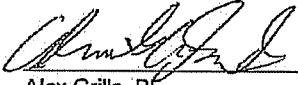
SCIPP Lab Safety and Chemical Hygiene Plan

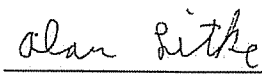
This version applies to the Lab rooms 361, 365, 369, 377, 383, and 389 in
Natural Sciences II used by the Santa Cruz Institute for Particle Physics

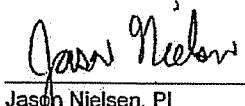
Last Revision Date: 4/30/2013

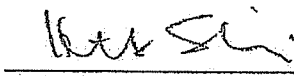

Steve Ritz, PI and Director
5/3/2013
date

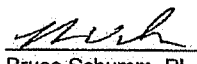

Robert Johnson, PI and Assoc. Dir.
May 3, 2013
date

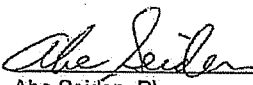

Alex Grillo, PI
1-May-13
date

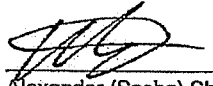

Alan Litke, PI
May 7, 2013
date

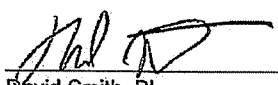

Jason Nielsen, PI
2-May-2013
date


Hartmut Sadrozinski, PI
5-3-13
date


Bruce Schumm, PI
May 2 2013
date


Abe Seiden, PI
May 2, 2013
date


Alexander (Sasha) Sher, PI
2-May-2013
date


David Smith, PI
6-May-2013
date

UC Santa Cruz, EH&S Concurrence

Name, title

date

SCIPP Lab Safety and Chemical Hygiene Plan

(Injury and Illness Prevention Plan Appendix J)

SECTION 1 -- ADMINISTRATIVE ELEMENTS

I.	Purpose.....	2
II.	Methods of Compliance	2
	A. Training	2
	B. Inspections.....	2
	C. Personal Protection and Engineering Controls	2
	D. Record Keeping	3
III.	CHP Responsibilities	3
	A. Executive Responsibility	3
	B. Chemical Hygiene Committee	3
	C. Chemical Hygiene Officer	4
	D. Chemical Hygiene Coordinator	4
	E. Principal Investigator	4
	F. Employees/Students	5
	G. Laboratory Specific	5

SECTION 2 -- PRACTICES AND PROCEDURES

IV.	Laboratory Operating Procedures.....	6
	A. Standard Operating Procedures	6
	B. Operations Requiring Prior Approval	7
	C. Warning Signs and Labels	7
	D. Housekeeping	7
	E. Food.....	8
V.	Personnel Protective Equipment and Engineering Controls	8
	A. Laboratory Clothing	8
	B. Respirator Use	9
	C. Fume Hoods and Local Exhaust Ventilation	9
VI.	Hazardous Materials Management	10
	A. Handling Carcinogens and Other High Hazard Materials	10
	B. Procurement/Storage.....	10
	C. Chemical Disposal	10
	D. Inventory Maintenance	10
VII.	Monitoring and Medical Evaluations	11
	A. Exposure Monitoring	11
	B. Medical Evaluations	11
VIII.	Emergency Response.....	12
	A. Laboratory Policy on Emergency Response.....	12
	B. Emergency Response Guidelines	12
IX.	Training	13

SECTION 1 - ADMINISTRATIVE ELEMENTS

SCIPP Lab Safety and Chemical Hygiene Plan

I. Purpose

This SCIPP Lab Safety and Chemical Hygiene Plan (CHP) is part of the Campus Injury and Illness Prevention Program. It constitutes written operating policies and procedures designed to ensure laboratory operations are carried out in a manner consistent with requirements of the California Occupational Safety and Health (Cal-OSHA) regulation entitled "Occupational Exposure to Hazardous Chemicals in Laboratories" (*California Code of Regulations, Title 8, Section §5191*); often referred to as the "Lab Standard". Cal-OSHA developed the standard to protect employees from hazards associated with chemicals in laboratories.

II. Methods of Compliance

Elements listed below shall be implemented as mandatory components of the CHP.

A. **Training**

Appendix H shall be used as a guide in determining specific training needs for operations conducted in this laboratory. Health and safety training activities shall be conducted on an on-going basis and documented.

B. **Inspections**

Formal in-house safety inspections shall be conducted at least annually in accordance with the "Periodic Inspections Audit Schedule" identified in the IIPP Appendix B. (see http://ehs.ucsc.edu/lab_research_safety/compliance_chp_iipp.php) Inspections shall be documented and noted deficiencies shall be corrected or programmed for correction in a timely manner (IIPP Appendix E, see http://ehs.ucsc.edu/injury_illness_prevention/forms.php). Records of inspections and Corrections are kept in Room 383 of Natural Sciences II.

C. **Personal Protection and Engineering Controls**

Hazards associated with this laboratory operation shall be eliminated through use of engineering and administrative controls where feasible. Personal protective equipment shall be used only where

engineering controls are not feasible. The need for special personal protective equipment such as respirators shall be evaluated by the Campus Industrial Hygienist.

D. Record Keeping

Records required by this CHP shall be maintained in accordance with appendix C (see http://ehs.ucsc.edu/injury_illness_prevention/forms.php). They shall be readily available for inspection by regulatory agencies such as Cal-OSHA, County of Santa Cruz Department of Environmental Health Services, as well as the Campus Chemical Hygiene Officer, the Chemical Hygiene Committee, and EH&S.

III. CHP Responsibilities

Responsibility for the Chemical Hygiene Program resides at all levels. A brief description of these responsibilities is as follows:

A. Executive Responsibility

Ultimate responsibility for chemical hygiene and laboratory safety resides with the Chancellor. The Chancellor may delegate authority for implementing the program to Vice Chancellors and Deans who in turn may assign responsibilities to Board Chairs and Directors.

Board Chairs and Directors shall provide more direct support to Principal Investigators, Managers, Administrators, and Supervisors who have direct responsibility for implementing chemical hygiene and laboratory safety programs within their areas of responsibility.

B. Chemical Hygiene Officer

The designated Chemical Hygiene Officer (CHO) shall be the Campus Industrial Hygienist or an appointed representative. The CHO is responsible for providing guidance to the Chemical Hygiene Committee when it convenes. CHO guidance to the committee may include recommendations on developing and implementing chemical hygiene plans and for providing technical assistance in developing standard operating procedures related to chemical hygiene, laboratory safety, and emergency response. The CHO also assists with program audits and file maintenance.

C. Chemical Hygiene Coordinator

Each campus department or laboratory shall appoint an in-house Chemical Hygiene Coordinator (CHC) or designated Lab Safety

Representative (LSR). The CHC / LSR acts as liaison to EH&S and coordinates chemical hygiene activities at the laboratory level. For the SCIPP labs relevant to this document, Max Wilder is the CHC/LSR.

D. Principal Investigator

The Principal Investigators of this laboratory have direct responsibility for developing and implementing the CHP. These individuals are responsible for the health and safety of all personnel under their direction. Specific responsibilities include:

1. Implementing policies and procedures described in the Campus Injury and Illness Prevention Program and the Lab Standard.
2. Developing specific policies and procedures for chemical hygiene and laboratory safety for all lab activities.
3. Monitoring the procurement, use, and disposal of chemicals used in laboratory operations.
4. Ensuring training requirements are fulfilled, records are maintained, and audits are performed.
5. Seeking ways to improve chemical hygiene and laboratory safety within the operation.
6. Ensuring workers know and follow the rules of chemical hygiene and laboratory safety established through this CHP.
7. Ensuring regular formal chemical hygiene and housekeeping inspections are performed.
8. Ensuring engineering controls are operable and personal protective equipment is properly selected, used and available.

E. Employees/Students

Each employee or student working in this laboratory is responsible for knowing and following the policies and procedures established by the CHP. No person shall handle hazardous materials or attempt laboratory procedures until adequately trained to perform the operation safely and in a manner consistent with good chemical hygiene practices.

G. Laboratory Specific

The names of individuals with specific chemical hygiene responsibilities for this laboratory are identified in appendix A.

SECTION 2 - CHEMICAL HYGIENE PRACTICES AND PROCEDURES

IV. Laboratory Operating Procedures

Operating guidelines and procedures described in this section are generally recognized by the research community as an effective means for minimizing exposures in laboratories. Manuals and policies identified in the Addendum are companion documents to this Chemical Hygiene Plan and describe operating parameters for all UCSC laboratory operations.

Specific standard operating policies and procedures for this laboratory are as follows.

A. **Basic Standard Operating Procedures**

Every laboratory worker is to observe the following guidelines:

1. Know the safety rules and procedures that apply to the work being done. Review potential hazards (e.g., physical, chemical, biological, electrical) and take appropriate safety precautions before beginning any new operations.
2. Know where emergency equipment is located (e.g., fire extinguishers, spill kits, safety shower/eyewash stations) and know how to use it properly. Familiarize yourself with emergency response procedures, facility alarm systems, and building evacuation routes.
3. Become familiar with the types of protective equipment available and understand its use and limitations.
4. Do not consume food or beverages, smoke, or apply cosmetics in areas where chemicals are being used or stored.
5. Confine long hair and loose clothing when working in the laboratory.
6. Do not use mouth suction to pipette chemicals or to start a siphon. A pipette bulb or an aspirator should be used to provide vacuum.
7. Wash well before leaving the laboratory area but avoid the use of organic solvents for washing your skin. Solvents may remove the natural protective oils from skin causing irritation and inflammation. In some cases, washing with a solvent may facilitate absorption of a toxic chemical.
8. Follow accepted waste disposal procedures.
9. Clearly label all chemicals in the laboratory. Post warning signs when unusual hazards such as radiation, laser operations, biological hazards, or other special problems exist.

10. Use laboratory equipment in a safe manner and only for its designated purpose.

B. Operations Requiring Prior Approval

Prior approval will be obtained from the Principal Investigator, the appropriate governing Committee, (i.e. Chemical Hygiene, Radiation Safety, Biosafety Safety etc.), or their representative for laboratory activities which present specific, foreseeable hazards to employees. Such activities include off-hours laboratory work, use of any hazardous chemicals, use of radioactive sources, particularly hazardous operations and unattended operations. Certain operations or use of certain equipment, including those listed below, will require appropriate training. Note that personnel trained in a certain potentially hazardous procedure generally are *not* authorized to train other personnel in the same procedure!

1. **Unattended SCIPP Lab Operations** – Potentially hazardous procedures carried out continuously or overnight must be planned carefully to avoid hazards from mishaps such as utility failure or failure of cooling water supplies. Arrangements for routine inspections should be made, and in all cases, laboratory lights should be left on and appropriate signs posted warning of the operation. (Unattended operation of low-voltage, low-powered electronics and computers is not at issue here.)
2. **Working Alone in SCIPP Labs** – It is prudent to avoid working in the laboratory alone. Under normal conditions, arrangements should be made between individuals working in separate laboratories outside of working hours to cross check periodically. Experiments known to be particularly hazardous should *never* be undertaken by a worker alone in the laboratory. The Principal Investigator has primary responsibility for determining which procedures require special safety precautions. Minors are not permitted to work in SCIPP lab unattended.
3. **SCIPP Machine Shop** – Only authorized SCIPP personnel with specific machine shop training are allowed to enter the machine shop without escort and use the machine tools therein. Students in particular are not allowed to use the machine-shop tools without supervision.
4. **Drill Press** – the drill press located outside of the machine shop presents potential safety hazards if used improperly. Therefore, the drill press may only be used with approval by the Principal Investigator and after completion of special training.
5. **SCIPP Radioactive Sources** – All use of radioactive sources in the SCIPP lab must strictly follow all rules and procedures of the

UCSC Radiation Safety Program in addition to SCIPP-specific procedures. Therefore, they may be used only with approval of the Principal Investigator and after completion of special safety training, issuance of a dosimeter, and training in SCIPP-specific procedures.

6. **SCIPP Infrared Cutting Laser** – the laser presents a special hazard when used in conjunction with a microscope. The beam is not visible, yet severe eye damage could result from looking through the microscope at an object reflecting the beam. The laser may be used only with approval by the Principal Investigator and after completion of special training.
7. **SCIPP Nitrogen Dewar** – the nitrogen dewars present specific potential hazards of extreme frostbite and suffocation and therefore may be used only with approval by the Principal Investigator and after completion of special training. Most applications in SCIPP rely upon the dry gaseous nitrogen from the dewar. Extraction of liquid nitrogen is more hazardous and should not be attempted without appropriate approval, training, and protective clothing, including special gloves.
8. **SCIPP Hazardous Chemicals** – the use of hazardous chemicals is rarely needed in the SCIPP labs. Therefore, any plans to use hazardous chemicals must be approved by the SCIPP lab manager, who will ensure that adequate planning and training is carried out. In normal circumstances such hazardous chemicals may only be used in the SCIPP fume hood in Room 389. Specific exceptions may be made in case that chemicals must be used within the clean-room environment. Epoxy adhesives and small quantities of ethanol (in properly labeled bottles or dispensers!) may be used throughout the lab; use of other organic solvents requires special approval.
9. **SCIPP Special Electrical Hazards** – the use of high voltage equipment or the use of equipment with exposed AC (120 V or 240 V) requires special approval by the Principal Investigator, who will ensure that adequate planning, protection, and training is in place. Untrained personnel should never open the chassis of a piece of electrical equipment in the lab and expose the AC leads.
10. **Soldering** – soldering of electrical circuits in the SCIPP lab may be attempted only after completion of special training in operation of the equipment. Specific safety hazards include burns and ignition of fires.

C. Warning Signs and Labels

Laboratory areas that have special or unusual hazards should be posted with warning signs. Standard signs and symbols have been established for a number of special situations such as radioactivity hazards, biological hazards, fire hazards, and laser operations. Other signs should be posted to show the locations of safety shower/eyewash stations, exits, and fire extinguishers.

D. Housekeeping

There is a definite relationship between safety and orderliness in the laboratory. When housekeeping standards fall, safety performance deteriorates. Laboratory work areas should be kept clean and orderly at all times. Exit access should be maintained clear. All wastes should be promptly deposited in the appropriate receptacle.

E. Food

Laboratory workers must make special provisions for comestibles in proximity to laboratory operations. The following applies to the SCIPP laboratory:

1. No food or beverages are allowed in the SCIPP lab areas, as posted at the entrances, or in the machine shop and clean rooms. In Room 389 food and beverages are allowed only in the front office-desk section, not in the vicinity of the soldering station or fume hood at the rear of the room.
3. Glassware or utensils that have been used for laboratory operations should never be used to prepare or serve food. Laboratory refrigerators/freezers etc. should never be used for food storage. Storage of perishable food is restricted to the refrigerator in the SCIPP printer/copier room.

V. Personnel Protective Equipment and Engineering Controls

A. Laboratory Clothing

Appropriate clothing should always be worn by laboratory personnel. Appropriate clothing means any combination of garments that will minimize potential exposure from splashes or contaminated surfaces in the laboratory. Appropriate clothing includes garments such as long sleeve shirts, long pants, lab coats, aprons, and coveralls.

1. Shoes, pants and skirts -- Open toe shoes and sandals may not be worn in the SCIPP laboratories. Short pants or skirts may not be worn in the SCIPP laboratories.
2. Eye and Face Protection and lab coats -- Approved safety glasses and lab coats should be worn at all times in the SCIPP labs when handling chemicals, as well as inside the SCIPP machine shop or when working with the drill press. Chemical

goggles or face shields should be worn when working with corrosive or highly irritating concentrated solutions; or where component failure may release hazardous chemicals with velocity.

Note: the only SCIPP safety-shower/eyewash station is inaccessible except when in the machine shop, so the only assessable nearby option is the restroom, including the shower in the 3rd-floor men's restroom of NS-II.

3. Gloves -- Protective gloves should be worn when handling hazardous materials or while performing any task where the work surfaces of equipment may be contaminated with hazardous chemicals. The type of gloves used must be carefully considered and selected according to the type of hazard. For example, special thermal gloves must be worn when working with or transferring liquid nitrogen.

B. Respirator Use

The use of respirators may be required under certain circumstances such as:

1. Where hazardous chemicals must be handled outside of a chemical fume hood.
2. While cleaning up hazardous chemical spills.
3. Work during an interim period when fume hoods are unavailable or are not performing properly.
4. While working with high hazard chemicals for protection in the event of containment failure.

Such circumstances should rarely or never arise in the SCIPP labs. Any work that may require use of a respirator must be approved by the Principal Investigator.

All University employees required to use respirators as part of their job must do so in accordance with the University's respiratory protection program. Contact EH&S for training, fit testing and medical certification to use respirators.

C. Fume Hoods and Local Exhaust Ventilation

Chemical fume hoods are one of the most important pieces of safety equipment in the laboratory. They are intended for use during all procedures which pose a significant inhalation hazard or where apparatus component failure may cause a hazardous release with velocity. *Use of hazardous chemicals in the SCIPP lab requires special approval by the Principal Investigator and normally must be carried out in the fume hood.*

A properly functioning hood has a minimum face velocity of 100 linear feet per minute. Each hood should have a visual indicator

which ensures the hood is operating properly. This indicator should be checked by the user prior to using the hood.

Any observed decline or failure of proper operation warrants immediate shut-down of hazardous operations in that hood. Contact Campus Facilities (x4444) to initiate hood repair and post warning signs to indicate the hood is out of service.

For optimal hood performance the following guidelines should be observed.

1. Keep all equipment at least 6 inches inside the face of the hood to prevent disruptive air flow patterns.
2. Do not clutter hoods with chemicals or equipment storage.
3. Keep sash closed as much as possible.
4. Maintain an air space under large equipment by placing on blocks to allow air currents to freely pass under the equipment. This minimizes "dead space" at the hood face and thereby improves overall hood performance.

VI. Hazardous Materials Management

A. Handling Carcinogens and Other High Hazard Materials

Use of carcinogens, biohazardous agents, radioactive materials and other high hazard materials shall require prior approval and shall be used in accordance with UCSC Programs and policies established for these materials. Where applicable, governing committees (e.g. Chemical Hygiene, Radiation Safety, Biosafety Safety, etc.), or their representative shall review and grant approvals for such materials prior to procurement and use. Specific requirements are referenced in the Addendum.

B. Procurement/Storage

The decision to procure a chemical shall be a commitment to handle and use the chemical properly from initial receipt to ultimate disposal. Requests for procurement of new chemicals shall be submitted to the Principle Investigator for approval. Chemicals used in this laboratory shall be purchased from the UCSC Central Purchasing system Cruzbuy.

All chemical reagents and wastes shall be segregated and stored by compatibility and in accordance with campus storage guidelines.

C. Chemical Disposal

Hazardous chemicals used in this laboratory will be disposed of properly through the Campus Waste Management Program. Under no circumstances will hazardous chemicals be disposed down the drain. All members of this laboratory operation have a legal

obligation to use the smallest quantity of hazardous materials possible and to generate the least amount of hazardous waste practicable. This includes an obligation to review experimental protocols with the goal of substituting non-hazardous or less hazardous reagents; using micro-scale procedures; and using materials that can be easily neutralized, detoxified, chemically or physically stabilized as part of the experimental process.

D. Inventory Maintenance

A current room by room inventory of all hazardous materials used in this laboratory shall be maintained by the SCIPP Laboratory Safety Representative. The UCSC Inventory tracking system (Chemtracker) is administered through EH&S. While there will be periodic inventory checks and updates performed by EH&S student employees, the accuracy of day to day inventory information is the responsibility of the Principal Investigators.

VII. Monitoring and Medical Evaluations

A. Exposure Monitoring

Exposure monitoring shall be performed in this laboratory as required by specific regulatory mandates (e.g. use of formaldehyde) or when there is reason to believe exposures are in excess of Cal-OSHA Permissible Exposure Levels (PELs). The Laboratory Manager maintains a list of materials used by this laboratory which have a specific mandate for exposure monitoring.

Due to the large number of chemicals used in many laboratories (but *not* the SCIPP laboratories), exposure guidelines may not be readily available for many compounds. Control of these chemicals will be based on toxicity and exposure potential as described in industry recognized references. Personnel in this laboratory should be aware of the hazards associated with the materials they use including symptoms of exposure such as irritation, dizziness, etc.

Exposure monitoring shall be coordinated through the Campus Industrial Hygienist. All documentation associated with exposure monitoring shall be maintained by the Principal Investigator and EH&S.

B. Medical Evaluations

Medical consultation and or examination shall be made available to employees and students of this laboratory under the following circumstances:

1. An individual develops signs or symptoms associated with exposures to the hazardous materials being used.

2. Monitoring reveals exposures above the "Action Level" or PEL established for the chemical.
3. An accident such as a spill or equipment failure results in possible overexposures to hazardous materials.

Medical consultations and exams shall be conducted by a licensed physician at no cost to the employee. Records of medical evaluations should include results of all tests and recommendations from the physician concerning the need for further medical testing.

VIII. Emergency Response

A. Laboratory Policy on Emergency Response

All laboratory personnel, regardless of whether that person is engaged in activities involving hazardous chemicals, shall be familiar with campus emergency response procedures and trained in specific chemical spill response procedures established for this laboratory. The emergency response plan is maintained by the Principal Investigators and is designed to:

1. Prevent or minimize injury to laboratory personnel.
2. Prevent or minimize damage to the environment and property.
3. Ensure all members of this laboratory are trained to at least the first responder awareness level as designated in the Title 8 California Code of Regulations Section 5194, 29 CFR. 1910.120. (q). See <https://www.dir.ca.gov/title8/index/T8index.asp>.
4. Ensure all laboratory personnel receive instructions on:
 - a. Emergency reporting protocols.
 - b. Specific actions to be taken in the event of a spill.
 - c. Escape procedures and routes.
 - d. Critical laboratory operations.
 - e. A plan for accounting for all employees following emergency evacuation.

B. Emergency Response Guidelines

1. *CATASTROPHIC INCIDENTS*
 - a. Attend to injured or contaminated persons and remove them from any further harm.
 - b. Alert people in the immediate area to evacuate.
 - c. Call for **EMERGENCY RESPONSE 911**.
 - d. Close doors to affected area.

