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**Advanced
Light Source**

Safety Handboo

May 1994

ALS DIRECTORY

Operations Coordinator

Dial 1272...Dial Page (601)...Message
State Message Including Phone Number

Control Room

4969

User Operations Leader (R. Thatcher)	7412	Pager: 602**
Building 6 Manager (B. Miller)	4738	Pager: 838**
EH&S Program Mgr. (R. Montgomery)	6297	
Industrial Hygienist (G. Perdue)	7407	Pager: 9-466-0248***
Radiation Safety Rep. (H. Collins)	4517	Pager: 9-840-6208***

Information Numbers:*

ALS Reception	4257
ALS Administrator (E. Saucier)	6166
ALS User Liaison (F. Schlachter)	4892
LBL Medical Services	6266
LBL Reception Center	6155

FAX Numbers:

FAX-ALS Reception	(510) 486-4960
FAX-ALS Experimental Floor	(510) 486-2930
FAX-Building 2 Room 400	(510) 486-7696
FAX-LBL Reception	(510) 486-6169

*From outside LBL, dial (510) 486-(4 digit extension).

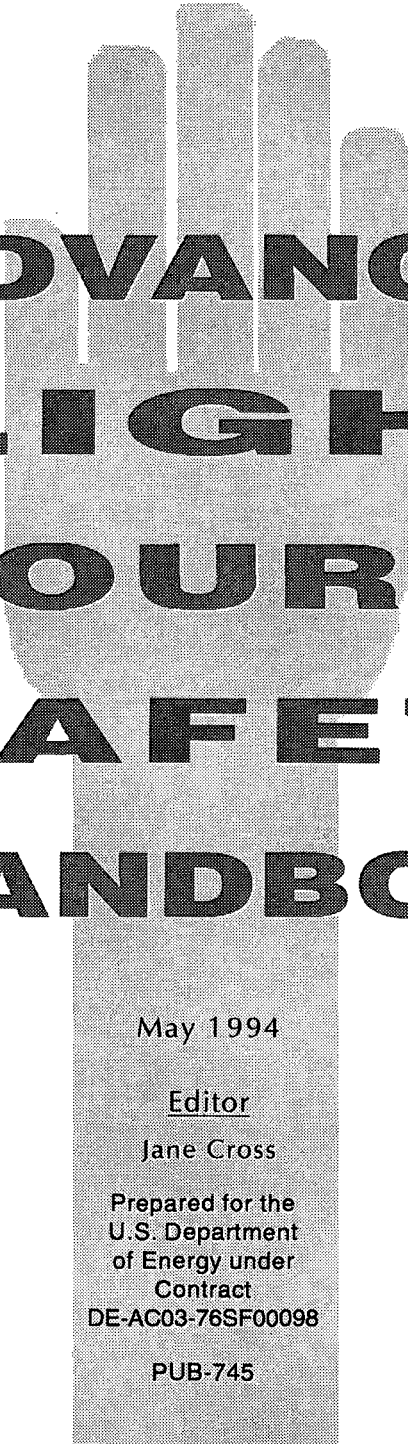
**Dial 1272...Wait for the long beep to stop
Dial 3 digit number...Leave message and phone number.

***Dial pager number...Dial your extension followed by
the # sign...Hang up and wait for return call.

Emergency Number: 7911

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ADVANCED LIGHT SOURCE SAFETY HANDBOOK

May 1994

Editor

Jane Cross

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OVERVIEW

About this handbook

Purpose | This handbook is designed to give you an overview of the health and safety issues at the Advanced Light Source (ALS)—use it as a guide and a resource. Important telephone numbers and addresses are on the inside cover of the book and included throughout the text.

Safety Policy | Lawrence Berkeley Laboratory (LBL) and the ALS require that every person performing work at the ALS be familiar with and follow the applicable Laboratory safety standards.

As an ALS user, it is your responsibility to read this handbook and follow the ALS safety policies and procedures it describes. This responsibility includes taking the initiative to consult with ALS personnel when assistance or advice is needed to carry out safe operations.

Content | This handbook contains five sections.

Section	Topic
1	Describes things to do before arriving at the ALS.
2	Explains the check-in procedure when arriving at LBL and the ALS.
3	Gives an overview of ALS and LBL safety policies.
4	Contains safety information concerning hazardous materials and experimental and radiation safety.
5	Describes emergency procedures.



ADVANCED PLANNING

What to do before you arrive

Overview

The ALS wants to ensure that users can begin experiments as quickly and efficiently as possible.

To expedite this process, you should:

- Have your experiment approved before coming to the ALS.
- Send your completed registration forms to ALS Administration at least three weeks before arriving.
- Schedule an appointment through ALS Administration for the day you arrive (if possible) to complete necessary paperwork and take the safety training required by the ALS.

Registration Forms

To comply with regulations, LBL requires specific information about all visitors. Thus, it is important for you to contact ALS Administration at least five weeks in advance of your scheduled arrival to allow enough time to receive and complete the required registration forms.

Filling-out and returning the forms to ALS Administration ahead of your visit greatly minimizes the time spent completing the check-in procedure when you arrive.

What to do before you arrive, continued

Appointment with Reception Center

When your arrival date is known, you are encouraged to schedule an appointment for the day you arrive to complete the registration process and take the safety training required to work at the ALS. Contact ALS Administration to arrange an appointment.

Non U.S. citizens must schedule an appointment in advance of their arrival as the registration process takes longer and requires additional information. To arrange an appointment, non-citizens should contact the ALS Administrator at least six weeks before coming to the ALS.

Note: All users must complete the safety training to have access to the ALS experimental area.

Contact Information

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ALS Administrator
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Berkeley, CA 94720
Tel: (510) 486-6166
Fax: (510) 486-4960
Email: ECSaucier@lbl.gov

Lawrence Berkeley Laboratory
Reception Center
MS 65
Berkeley, CA 94720
Tel: (510) 486-6155
Fax: (510) 486-6169

Experiment Form

To conduct research at the ALS, the spokesperson for a proposed experiment must first submit an ALS Experiment Form describing the experiment to the ALS Administrator (Elizabeth Saucier). It is important to begin the experimental proposal process well before the scheduled start of an experiment (5 weeks is recommended) to allow sufficient time to implement any special safety requirements.

The Experiment Form requests information about all potentially hazardous materials and equipment the experimenters plan to bring. The ALS reviews the form to identify any problems or safety issues that need to be resolved before experimental equipment is shipped to the ALS or the experiment begins.

It is essential to declare all potentially hazardous materials and equipment. Not doing so can lead to unnecessary delays while any new activity-hazard documents are prepared and approved.

For more information on proposing an experiment, contact the ALS User Liaison, Fred Schlachter, at (510) 486-4892.

Note: No experiments can be performed without an approved Experiment Summary Sheet (ESS), created by the ALS on the basis of the review of the user's Experiment Form. The approved ESS must be posted by the beamline before experimental work begins.

What to do before you arrive, continued

Experiment Review Procedure

The review and approval of a user experiment involves the following steps:

Step	Action
1 -----	Spokesperson for the experiment prepares an ALS Experiment Form, part of which is a complete list of all chemicals, and potentially hazardous materials to be used in the experiment.
2 -----	ALS personnel review the proposed experiment and provide instructions to the user detailing the packaging, transportation, and storage of such materials.
3 -----	User arranges for the transport of all hazardous materials to the ALS (see Transport on p. 14).
4 -----	ALS creates and approves an Experiment Summary Sheet for the experiment which is posted by the beamline. The appropriate safety checklists and procedures as well as verification that all users have met the necessary training requirements must be in place before the experiment can begin.
5 -----	Any modification to an experiment requires the experimenter in charge to submit an Experiment Modification Form. This form must be approved <u>before</u> the start of the modified experiment.

UPON ARRIVAL

Arriving at LBL and the ALS

Registration

All users are asked to contact ALS Administration before their scheduled arrival to make an appointment with the LBL Reception Center.

At the Reception Center, you will:

- Complete any forms that may not have been prepared ahead of time.
- Take the necessary safety training to obtain a film badge and conduct experiments.
- Receive an identification badge and parking permit.

Users must take the safety training to have access to the ALS experimental floor, so it is advisable to schedule the appointment for the day you arrive if possible. The check-in process and safety training take approximately two hours.

The Reception Center is located in Building 65 near the LBL shuttle-bus terminal and is open Monday through Friday from 8 a.m. to 5 p.m.

Safety Training

All first-time ALS users are required to complete the following safety training at the LBL Reception Center before getting a film badge (required for access to the ALS experimental floor) or performing experiments:

- Personal Radiation Monitoring (15 minute video)
- Radiation Training for Accelerators (40 minute video)
- Safety At the ALS (20 minute video)

SAFETY OVERVIEW

Health and safety guidelines

Overview

The health and safety policies of the ALS are designed to provide a safe work environment, to protect the general public and the environment from harm, and to protect property from damage and loss.

To achieve its safety goals, the ALS requires every person performing work at the facility to:

- Immediately stop work in the event of danger to persons or property and notify the operations coordinator (Pager: 1272..601).
- Plan and perform experiments with full consideration given to the prevention of accidents.
- Be trained to perform all work safely and to be particularly aware of potentially hazardous operations. On-site training and consultation are available for hazardous operations.
- Ensure that personal exposure to toxic chemicals, ionizing radiation, and contaminants be maintained within prescribed standards and as low as reasonably achievable.
- Minimize the volume and toxicity of all wastes that are generated and maintain chemical inventories as low as is reasonable.



Health and safety guidelines, continued

Beamline Operations Safety

The ALS operations coordinators should be the user's first contact for questions or problems about experimental and beamline safety (pager 1272..601). Available 24 hours a day, they can provide assistance with the forms and procedures required for experiment approval and beamline operations, and help users with electrical and mechanical maintenance requests.

Vehicle Safety

The maximum speed limit in most areas of LBL is 25 mph. Lower speeds are often necessary because of the hilly terrain, wildlife, and frequent hazardous conditions such as road repair, wet weather, poor visibility, and pedestrian traffic.

Park only in designated areas and do not block areas needed by emergency vehicles.

All individuals operating motor vehicles on LBL property must comply with the California Vehicle Code and with LBL traffic and parking regulations. Violation of regulations may result in issuance of a traffic ticket by the University Police.

Smoking

All indoor work spaces at the Laboratory and the ALS are designated as nonsmoking areas.

Controlled Substances

The use or possession of any controlled substance (except as prescribed by a physician) and alcoholic beverages is prohibited.



Health and safety guidelines, continued

ALS Safety Personnel

Ask for more information about safety procedures or practices you may not understand—ensuring a safe working environment is everyone's responsibility. The table below lists the personnel who are primarily involved with health and safety concerns at the ALS.

Title	Name	Ext.
Operations Coordinator		Pager: 1272..601
User Operations Leader	Ray Thatcher	7412 Pager: 1272..602
EH&S Program Manager	Ron Montgomery	6297
Industrial Hygienist	Georgeanna Perdue	7407
Radiation Safety	Hank Collins	4517
Building 6 Manager	Bob Miller	4738

Publications

The following publications give more detailed information on the Health and Safety Policies of LBL and the ALS. Copies are available at ALS Reception.

- *Health and Safety Manual*, LBL PUB 3000
- *Chemical Hygiene and Safety Plan*, LBL PUB 5341
- *Emergency Plan Building 6 Complex*, LBL PUB 529

EXPERIMENTAL AND RADIATION SAFETY

Hazard awareness

What is a Hazard?

Hazards fall into three categories: chemical, biological, and physical. Remember that hazards are only a potential problem: their presence does not mean you will experience adverse effects.

Types of Hazards

There are three categories of hazards.

Biological

A biological hazard means any viable infectious agent that presents a risk, or potential risk, to the well being of humans. Everyone working with infectious agents and human blood or blood products must receive special training.

Chemical

A chemical is considered hazardous if it has flammable, corrosive, reactive, explosive, or toxic properties. Examples are solvents, acids, and carcinogens.

Physical

Examples of physical hazards are ionizing radiation, high-voltage electricity, noise, and lasers.

Hazard awareness, continued

Guidelines

It is your responsibility to work safely and to prevent harm to other people and the environment. You must:

- Recognize the type and degree of hazard present in any work you do.
- Protect yourself and others.
- Report safety problems to the operations coordinator (pager: 1272..601) and control room (ext. 4969).
- Report any injuries to the LBL Health Services Department (ext. 6266).

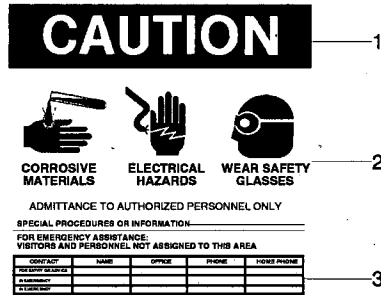
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Hazard signs

Purpose Hazard signs alert you to the presence, nature, and level of a potential hazard in an area, the protection required, and who to contact in case of emergency. The signs are posted by laboratories and experimental areas.

Example All ALS Hazard Signs follow the same general format.



Part	Function
1	<p>Indicates the level of hazard in the area.</p> <p>DANGER warns of the presence of an immediate danger, requiring special precautions to ensure safety.</p> <p>CAUTION indicates a possible hazard for which proper precautions must be taken.</p> <p>NOTICE provides general instructions for information related to safety.</p>
2	Text or symbols indicating the type of hazard in the area.
3	Name of the person to contact in case of emergency.

Working with hazards

Guidelines

Users of the ALS must adhere to the following guidelines for the use of hazardous materials.

- Ship the smallest quantity of material necessary for your experiment. Use of hazardous materials on the experimental floor is limited to small quantities.
- Sample preparation, wet chemistry procedures, and other procedures that may require exhaust hoods or other controls should be carried out in the user support laboratories in Building 10. Use of these laboratories must be scheduled with the operations coordinator (pager: 1272..601).
- Call the control room (4969) and operations coordinator (pager: 1272..601) immediately in the event of a chemical spill or any other accident concerning hazardous materials.
- Know what to do in an emergency and where first aid kits and fire extinguishers are located. The Building Emergency Plan located by every beamline and available from ALS Reception contains this information.
- Never eat or drink in areas where chemicals are being used or stored—including the experimental area by the beamlines.
- Do not personally transport any hazardous materials on or off LBL property. Call the operations coordinator for assistance (pager: 1272..601).

Working with hazards, continued

Hazardous Gases

Arrangements for the use of hazardous gases must be made in advance by contacting the operations coordinator (pager: 1272..601).

Labels

All containers (including lab glassware and plastic squeeze bottles) must have hazard warning labels that identify their chemical content and their chemical and physical hazards. Precautionary labels for many of the common chemicals are available from LBL Stores.

The label must:

- Show the name of the material.
- Contain information on the hazards associated with use of the chemical.
- Be legible and prominently displayed.

Hazardous Waste

Never pour hazardous liquids down the drain or put hazardous materials in the trash.

All hazardous waste must be properly identified, labeled, and stored for transfer to a Hazardous Waste Handling Facility. Call the operations coordinator (pager: 1272..601) to arrange for the pickup and disposal of hazardous waste.

Working with hazards, continued

Storage

- The ALS has limited space available for the short-term storage of flammable and corrosive liquids. Contact the operations coordinator for information (pager: 1272..601).
- Do not use fume hoods as storage areas for chemicals.
- Do not store chemicals in refrigerators labeled for food storage.
- Do not store chemicals near sinks unless they are in a secondary container.
- Users are expected to arrange for the shipping of their materials back to their home institution upon completion of their experiment.

Transport

- Users must arrange for all hazardous materials to be shipped to the ALS prior to the start of an experiment. **Transportation of hazardous materials by private vehicle, LBL shuttle buses, or any other LBL vehicle is not permitted.**
- Hazardous materials to be shipped to the ALS or off-site must be packaged and handled in accordance with the U.S. Department of Transportation guidelines. All hazardous material shipments must include pertinent Material Safety Data Sheets (MSDSs). Contact the operations coordinator for further details (pager: 1272..601).

Beamline safety

Introduction

The ALS is committed to ensuring a safe working environment on the experimental floor. If you have any questions about safety that concerns beamline operations, contact the operations coordinator (pager: 1272..601).

Radiation

Regardless of the work being done, radiation exposure should be kept as low as reasonably achievable.

The ALS experimental floor is a Controlled Access Area (an area where there is a potential for radiation exposure). All ALS users are required to have safety training before using the ALS facility and must wear a film badge while working on the experimental floor. Badges are obtained at the LBL Reception Center after viewing the Personal Radiation Monitoring video.

Users are not allowed on top of the storage ring shielding, in the linac and booster area, or in areas marked *High Radiation* or *Very High Radiation*.

Radiation Hazards

Within the ALS building, there may be *Radiation Areas*, *High Radiation Areas*, and *Very High Radiation Areas*, which have increased levels of radiation hazard and increased safety features (including interlock systems) to protect personnel. Radiation signs are posted throughout these areas warning of any hazard that may exist.

For more information on ALS radiation safety, contact the EH&S Program Manager (ext. 6297) or the operations coordinator (pager: 1272..601).

Personnel Protection System

The safety of everyone at the ALS depends on the integrity of the personnel protection interlock systems. Modifications and maintenance on these systems are rigidly controlled by the ALS.

Any attempt to bypass the interlock system is prohibited. Such actions as bypassing door switches, defeating locks, or leaving someone inside an interlocked hutch may lead to loss of research privileges.

Safety Training

All users of the ALS are required to complete the following training.

Type of Training	Location
Personal Radiation Monitoring (video) Radiation Training for Accelerators (video) Safety at the ALS (video)	LBL Reception Center
Beamline Safety	Experimental Floor: given by operations coordinator before use of a beamline.

Additional training requirements may be noted by the ALS during the experiment review process. It is the responsibility of the spokesperson for an experiment to ensure that all users receive the proper training.

Beamline safety, continued

Beamline Readiness Review

A Beamline Readiness Review is carried out by the operations coordinator before the beamline is used for the first time. As part of the review, the operations coordinator checks to make sure that the appropriate safety checklists and procedures are in place and that all users have met the necessary training requirements.

The Experiment Summary Sheet (ESS), created by the ALS on the basis of the review of the user's ALS Experiment Form, must also be approved and posted at the beamline before experimental work begins. The ESS serves as a guide for the final inspection of all equipment and materials brought by the users.

Radiation Shielding

Users must not remove any shielding or exclusion zones from the beamline or experimental station without the approval of the operations coordinator. An exclusion zone is an area along a beamline where access is restricted due to the possibility of radiation exposure. Common materials used to form an exclusion zone are plexiglass, sheet metal, and wire mesh.

Changing an Experiment

Modifications to an approved experiment must be authorized by the ALS before the start of the modified experiment.

The experimenter in charge must complete an Experiment Modification Form (EMF) and return it to ALS Administration or an operations coordinator. If the EMF is approved, a new Experiment Summary Sheet reflecting the changes will be prepared by the ALS and posted at the experiment.

Lockout/Tagout (LOTO)

Definition

Lockout/Tagout (LOTO) is a policy controlling the servicing, maintenance, or modification of equipment in which the unexpected energizing or start-up of the equipment or release of stored energy could cause injury to people or damage to equipment.

The LOTO procedure applies to *all* energy sources including, but not limited to, electrical, mechanical, chemical, hydraulic and magnetic.

Rules

Any person who performs any servicing, maintenance, or modification on any piece of de-energized equipment may only do so in accordance with LBL LOTO policy and no one may apply LOTO who has not been properly trained and authorized to do so.

Each person performing the servicing, maintenance, or modification of equipment that requires being locked- or tagged-out is responsible for applying their own LOTO devices. Users can receive LOTO training from LBL's EH&S Division or from a qualified ALS Supervisor. Users must complete the necessary training plus receive authorization to perform LOTO on specific equipment before doing so.

Only LBL-approved LOTO devices (e.g., tags and padlocks) may be used for the lockout/tagout procedure and LOTO devices may not be used for any other purpose.

WARNING: A LOTO device may only be removed by the authorized person who applied the LOTO device. Penalties for violation are severe and may include dismissal from the ALS.

Electrical safety

Introduction

ALS users should be aware of potential electrical hazards in their work areas and follow the correct procedures regarding electrical safety. If you have any questions about electrical safety requirements or procedures, contact the operations coordinator (pager: 1272..601).

Guidelines

- All electrical equipment used in conjunction with beamlines must satisfy the electrical safety requirements established in *Health and Safety Manual*, LBL PUB 3000, Chapter 8.
- All non-commercially fabricated electrical components or devices must be inspected and approved by the ALS before use. Contact the operations coordinator for assistance.
- Always assume that any wiring or electrical fixture is energized (“hot”) since equipment can contain hazardous levels of stored energy even when it is unplugged.
- Never use any electrical device with a frayed or altered cord.
- Use only grounded, 3-pronged plug extension cords. Do not link extension cords together or run them through doorways or across walkways.
- Beamline components must be properly grounded, especially during bakeout. All heaters used for bakeout must be protected by a ground fault circuit interrupter (GFCI). Heater tape connectors must be permanently bonded together to form one assembly: split connectors are not allowed.

EMERGENCY PROCEDURES

Emergency preparedness

Preparation

It is important to prepare for proper and immediate response to emergency situations before they happen.

It is the responsibility of ALS users to know the following information for the experimental floor area and user laboratories and offices.

- Building Evacuation Routes
- Assembly Areas
- Locations of
 - Fire Extinguishers
 - First Aid Kits
 - Eye Wash Stations
 - Emergency Showers

Information

Copies of the Building Emergency Plan are posted by every beamline and available from ALS Administration. The plan shows:

- Evacuation routes and emergency exits
- Assembly areas
- Fire alarms and fire extinguishers

The evacuation routes, emergency exits, and assembly areas are also posted on the wall throughout the experimental floor and in all laboratory buildings.

Any questions? Call the operations coordinator (pager: 1272..601) or the Building 6 Manager (ext. 4738).



In case of emergency

To Report an Emergency

Dial 7911

Call immediately for help in case of fire, explosion, medical emergency, gas leak, or chemical or radioactive emergency.

What To Do

In case of an emergency requiring evacuation of the building, go to the nearest assembly area using the evacuation routes shown on the floor plans posted in each building.

Emergency responses are summarized below.

Emergency	Response
Fire Alarm: Loud Bells	<ul style="list-style-type: none">• Leave the building immediately.• Remain outside until re-entry is authorized.
Other Signal: Public Address System Announcement	<ul style="list-style-type: none">• Listen to the announcement and follow the instructions.• Evacuate if necessary.
Medical Injury Minor	<ul style="list-style-type: none">• Apply first aid and, if necessary, go to Medical Services in Building 26.• Report all injuries, no matter how minor, to Medical Services (Ext. 6266).
Medical Injury Major	<ul style="list-style-type: none">• Do not leave the scene to report the injury.• Call for help.• Instruct a bystander to dial 7911 to summon medical aid.• Have someone notify the Control Room at Ext. 4969.

In the event of an earthquake

During an Earthquake

Try to remain calm and don't panic or run. By staying calm, you will be better able to assess your situation.

<i>If you are...</i>	<i>Then...</i>
Indoors	<ul style="list-style-type: none">• Stay inside.• Get under a desk or table and hand on to it.• Brace yourself in an inner doorway or corner.• Stay clear of windows, tall bookcases, and experimental setups.• Do not rush outside, or use stairs or elevators.
Outdoors	<ul style="list-style-type: none">• Stay outside.• Get into an open area, away from power lines and buildings.
Driving	<ul style="list-style-type: none">• Stop in an open area away from buildings, trees, and overhead power lines.• Do not park close to the edge of a hill—the road may give away.

After the Earthquake

- Do not smoke, light matches, or operate electrical switches and appliances.
- Check for fires, ignition sources, and hazardous spills.
- Check for injuries and summon medical help if needed. Do not attempt to move injured persons unless they are in danger of further injury.
- Go to your specified assembly area.
- Do not try to leave the laboratory by car. Roads must be kept clear for emergency vehicles.

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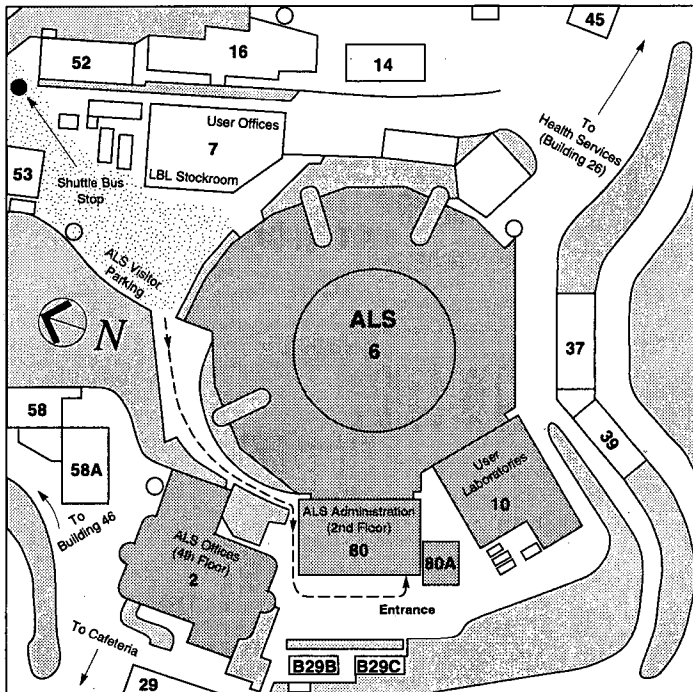
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Advanced Light Source Complex



The ALS Experimental Floor, Building 6, is a controlled-access area. All visitors must have a LBL film badge (personal dosimeter) or be escorted by an ALS staff member. Call the ALS Reception Center (510-486-4257 or ext. 4257) to arrange for access to Building 6.

ALS Administration

ALS Administrator: Elizabeth Saucier
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Berkeley, CA 94720
Tel: (510) 486-4257 or 486-6166
Fax: (510) 486-4960
Email: ECSaucier@lbl.gov

ALS User Liaison

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Lawrence Berkeley Laboratory
Advanced Light Source
MS 2-400
Berkeley, CA 94720
Tel: (510) 486-4892
Fax: (510) 486-7696
Email: Fred@lbl.bitnet or Fred@lbl.gov

LBL Reception Center

Lawrence Berkeley Laboratory
Reception Center
MS 65
Berkeley, CA 94720
Tel: (510) 486-6155
Fax: (510) 486-6169

ALS Safety Handbook

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The ALS values your suggestions. Please send any comments about this publication to Jane Cross at jccross@lbl.gov.

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