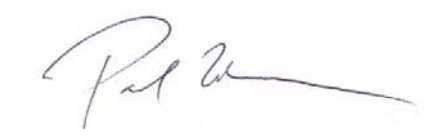
Environment, Safety and Health Plan

3 June 2005



3 June 2005

Paul Zschack , UNICAT Director

UNICAT Environmental, Safety, and Health Plan
May 2005

Introduction

The University of Illinois at Urbana-Champaign, the Oak Ridge National Lab, the National Institute for Standards & Technology, UOP LLC and the University-National Lab-Industry Collaborative Access Team (UNICAT) have created and will maintain a safe and ecologically sound research environment at the Advanced Photon Source (APS). This document describes UNICAT's plans for achieving these objectives by controlling hazards and reducing risks to acceptable levels. Specifically, UNICAT will:

- Comply with required standards and adhere to practices and procedures mandated by the Advanced Photon Source;
- Identify and evaluate the hazards at each stage of beamline development, from beamline construction to operations and (if necessary) decommissioning;
- When practical, incorporate engineered hazard controls into the design of the equipment and facilities UNICAT uses at the APS;
- Develop procedures that take full advantage of these engineered controls;
- Develop training programs that enable UNICAT members and visitors to use the engineered and procedural hazard controls effectively in creating a safe work environment; and
- Provide UNICAT personnel with the support needed to promptly identify and resolve safety issues.

UNICAT reserves the right to suspend the activities or revoke the research privileges of any person within its purview who disregards or attempts to circumvent these requirements.

The APS requires that all activities at Argonne National Laboratory - East (ANL-E) will conform to the requirements of the documents listed below, except as provided for by variances or APS procedures. All of the following are available through the CAT Safety Coordinator.

1. ANL-E Environment, Safety and Health Manual

2. APS User Policies and Procedures

3. ANL-E Hoisting and Rigging Manual

4. ANL-E Transportation Safety Manual

5. ANL-E Waste Handling Procedures Manual

In addition, the APS requires that:

1) Failing to conform with this plan may result in sanctions and/or the loss of access to the APS and CAT facilities.

2) Any person has the authority to stop activities that are unsafe or environmentally unsound.. In addition, the CAT acknowledges that the APS has the authority to order a halt to CAT activities that the APS, or other entities with oversight responsibilities, deem unsafe or not in compliance with requirements.

3) The CAT will comply with current version of the APS Policy and Procedure for configuration control of shielding systems. No safety system under configuration control is to be modified without CAT and APS approval. (Refer to the APS User Policies and Procedures for the complete policy and procedure).

4) The CAT will cooperate with the APS to facilitate the oversight responsibilities of the APS, ANL and the DOE.

5)The -CAT will implement an experiment safety review program. The program will be kept current with the relevant APS policies and procedures, including those set forth in Technical Updates, User Policies and Procedures, and AOD Division Director memoranda covering the subject.

6) Experimenters shall identify to the CAT the potential hazards associated with their activities and hazardous materials to be used in experiments at the APS (via the APS Experiment Safety Assessment Form (ESAF), and no experiment shall proceed without a CAT and APS approved ESAF and posted APS Experiment Authorizationl Form (ESA) and Experiment Hazard Control Plan (EHCP).

7) New or modified equipment and unreviewed activities must be approved by the CAT Director, or designee, prior to energizing the equipment or the start of work. Before any change in the CAT's operations that might reasonably be thought to increase the risk of significant adverse impact on the APS facilities, the environment or any person, is begun, the CAT will obtain the written approval of the APS Operations Division Director, or designee.

8) The CAT will maintain a list of current safety assignments (Appendix A) and will update this plan to keep it consistent with scope of CAT activities. The assignment list will be reviewed at least annually and the plan biannually with updates provided to the APS User Safety Officer.

General Policies for Safety

UNICAT shall give highest priority to protecting the health and safety of its members, other users of the APS, visitors, ANL personnel, and the general public—and shall take all reasonable measures to prevent accidental damage to property and the environment.

UNICAT will take a graded approach in evaluating the hazards associated with all of the activities to be performed in the spaces it occupies. That is, evaluations will become more comprehensive as the likely severity of a mishap increases or the complexity of the process increases.

UNICAT will comply with all applicable regulations of the Occupational Safety and Health Administration (OSHA), the U.S. Environmental Protection Agency (EPA), and the U.S. Department of Transportation (DOT).

UNICAT will adhere to all APS safety-related requirements for the design of UNICAT's facilities and equipment. In accordance with APS design review procedures, UNICAT will:

- Make appropriate documents available to the APS,
- Consider all comments offered by the APS, and
- Implement required design changes.

UNICAT understands that the APS will continually issue and revise procedures relevant to UNICAT's management of environmental, safety, and health concerns. UNICAT may incorporate such procedures into its safety program as they become available.

Organizational Structure and Responsibilities

Assignments

UNICAT has identified and evaluated the hazards its personnel are likely to encounter during operations in its spaces at the APS. This analysis and the practices mandated by the APS have led to the following assignments of UNICAT responsibilities. The alternate is the individual who must assume the designated safety function in the absence of the primary individual.

Safety Function	Primary	Alternate
UNICAT Director	Paul Zschack	Hawoong Hong
UNICAT Safety Officer	Paul Zschack	Hawoong Hong
Electrical Safety Officer	Pete Jemian	Jenia Karapetrova
Chemical Safety Officer	Hawoong Hong	Paul Zschack
Cryogenic Safety Officer	Jenia Karapetrova	Hawoong Hong
Laboratory Supervisor D020	Jenia Karapetrova	Pete Jemian
Laboratory Supervisor D030	Hawoong Hong	Paul Zschack
Laboratory Supervisor E020	Jon Tischler	Paul Zschack
Laboratory Supervisor E030	Ning Yang	Hawoong Hong

LOM Shop Safety Supervisor	Jon Tischler	Paul Zschack
Sector 33 Supervisor	Paul Zschack	Hawoong Hong
Sector 34 Supervisor	Wenjun Liu	Paul Zschack
Crane Supervisor	Paul Zschack	Jon Tischler
Laser Officer	Paul Zschack	Jon Tischler
ESA Officer	Hawoong Hong	Paul Zschack

Director

The UNICAT Director has the ultimate responsibility within UNICAT for ensuring that the safety, health, and environmental protection components of this program embrace all of UNICAT's activities at the APS, including the experimental work performed by General Users and UNICAT members.

UNICAT Safety Officer

The UNICAT Safety Officer is permanently resident at the APS. The UNICAT Safety Officer reports to the UNICAT Director and has the primary day-to-day responsibility for maintaining safe conditions in all spaces occupied by UNICAT at the APS. This responsibility includes ensuring that the work performed by UNICAT members, guests, and on-site contractors providing services under UNICAT auspices remains in accordance with the provisions of this program. The UNICAT Safety Officer sees to it that UNICAT personnel complete their required training and that UNICAT personnel properly execute the safety-related responsibilities assigned to them. The UNICAT Safety Officer is UNICAT's primary contact with the APS on environmental, safety, and health issues. The UNICAT Safety Officer is responsible for maintaining records related to safety and environmental protection at UNICAT facilities. The UNICAT Safety Officer has the authority to stop any UNICAT activity judged to be unsafe or environmentally unsound. The UNICAT Safety Officer is also responsible for the adequacy of accident and incident investigations.

Investigators & Visitors

UNICAT expects that its members and guests will:

- Complete required safety training before performing any work;
- Provide full disclosure and accurate assessment of hazards involved or anticipated in their work at the APS;
- Plan their work in advance, giving sufficient consideration to hazards and the controls needed to reduce risks to acceptable levels;
- Comply with job-specific safety requirements;
- Comply with protective equipment requirements;

- Remain outside demarcated areas unless both properly protected and authorized to enter; and
- Refuse to perform hazardous work when that work requires individuals to remain out of visual or audio range of other persons for more than a few moments.

Investigators are responsible for working in a safe, orderly, and ecologically sound manner at UNICAT facilities. Investigators must report hazards associated with their experiments to UNICAT management in accordance with APS mandated Experiment Safety Review procedures. They must also comply with UNICAT-issued safety requirements and take the steps needed to ensure that all individuals who could be exposed to hazards as a result of the Investigator's activities have the knowledge, opportunity, and equipment required to control the hazards. Investigators are accountable to the UNICAT Safety Officer regarding their safety responsibilities.

All visitors who will spend more than five (5) working days at the APS during a calendar year or who will do 'hands-on' work during a shorter should consult with the UNICAT Safety Officer to determine whether they need safety training beyond the standard APS User Orientation. Visitors are required to follow instruction given to them by UNICAT personnel or other appointed escort.

Electrical Safety Officer

The Electrical Safety Officer is responsible for ensuring that all UNICAT personnel adhere to safe electrical design criteria and work practices. To carry out these responsibilities, the Electrical Safety Officer:

- Inspects electrical equipment and wiring to be used during installation, commissioning, and operations to assure that electrical installations adhere to electrical safety design criteria;
- Verifies compliance with ANL requirements and procedures as regards to electrical safety;
- (when necessary) Reviews proposed experiments to verify that adequate safeguards will be in place to control electrical hazards;
- Reviews and approves electrical safety procedures UNICAT personnel are to follow (for example when working on or near electrically energized components that have a potential of 50 volts or greater to ground); and
- Maintains clear and comprehensive records regarding electrical utilities, grounding diagrams, signal cables, etc., for all of UNICAT's facilities at the APS.

Chemical Safety Officer

The UNICAT Chemical Safety Officer is UNICAT's Chemical Hygiene Officer, and as such is responsible for assisting in identifying and implementing proper controls for the hazards associated with chemicals, gases, and nonbiological samples or materials. In particular, the Chemical Safety Officer participates in all inspections of chemical storage areas to help ensure that all safety-related equipment stocked by the UNICAT is

appropriate for its intended uses. The Chemical Safety Officer is responsible for UNICAT's compliance with all mandatory APS requirements regarding the labeling, tracking, and transportation of all chemicals, gases, and nonbiological samples in UNICAT spaces at the APS. The Chemical Safety Officer also takes steps to ensure that all wastes—particularly chemical wastes—are disposed of in accordance with APS requirements. Procedures for handling chemicals in the UNICAT laboratory spaces or on the Experiment Hall floor must be developed in consultation with the UNICAT Chemical Safety Officer.

UNICAT Cryogenic Safety Officer

The UNICAT Cryogenic Safety Officer shall assure compliance with all required practices. He/she shall have the responsibility for advising the UNICAT in all areas of cryogenic safety, and is responsible for maintaining all UNICAT cryogenic facilities.

UNICAT Laboratory Supervisor(s)

UNICAT Laboratory Supervisors report to the UNICAT Safety Officer and are responsible for maintaining safe, neat, and orderly operations in the laboratories at UNICAT's sectors. A Supervisor is assigned to each Laboratory at the UNICAT facilities. Their responsibilities are listed below:

1. Ensure that all reasonable precautions are taken to minimize the safety, health, and environmental risks associated with activities being performed in the laboratory spaces.
2. Assign appropriate space to users and other UNICAT investigators who may require laboratory space.
3. Establish controls (engineered or procedural) that are required to adequately control hazards found in the UNICAT Laboratory spaces.
4. Maintain an adequate inventory of personal protective equipment for both visitors and UNICAT personnel.
5. Order an immediate halt to any activity that creates an imminent danger to life, health, or the environment, and report any such occurrence to the UNICAT Safety Officer.
6. Ensure that personnel using the laboratory are properly instructed or trained in the use of the laboratory's equipment and facilities.
7. Maintain equipment or facility inspections and logs as required.

UNICAT Sector Supervisor(s)

UNICAT Sector Supervisors report to the UNICAT Safety Officer and are responsible for maintaining safe, neat, and orderly operations on the Experiment Hall Floor. A Supervisor is assigned to each UNICAT Sector. Their responsibilities are listed below:

1. Ensure that all reasonable precautions are taken to minimize the safety, health, and environmental risks associated with activities being performed on the Experiment Hall Floor.

2. Establish controls (engineered or procedural) required to adequately control hazards found in common UNICAT experiment protocols.
3. Maintain an adequate inventory of personal protective equipment for both visitors and UNICAT personnel.
4. Order an immediate halt to any activity that creates an imminent danger to life, health, or the environment, and report any such occurrence to the UNICAT Safety Officer.
5. Assure that Experiment Safety Approval procedures are followed.

UNICAT Shop Safety Supervisor

The UNICAT Shop Safety Supervisor is responsible for the safe operation and maintenance of the LOM User shop by UNICAT personnel. The UNICAT LOM Shop Safety Supervisor will:

- Assure compliance with all required practices;
- Notify the APS, in advance of installation, about machine tools (and other equipment and furnishings) the CAT proposes to add to the LOM shop or to use elsewhere at the APS;
- Conduct monthly machine shop inspections;
- Grant authorization for UNICAT personnel to use the LOM shop facility; and
- Provide candidates for machine tool authorization with an orientation to available machine tools.

Laser Safety Officer

The UNICAT Laser Safety Officer is responsible for all laser usage at UNICAT facilities and will assure that the installation and use of lasers at UNICAT meets ANL requirements.

Crane Supervisor

The UNICAT Crane supervisor is responsible for all hutch cranes and other hoisting and rigging activities at the UNICAT.

Experiment Safety Approval Officer

The ESA Officer is the individual responsible for approval of a proposed experiment at UNICAT beam lines. He may prescribe additional controls or procedures that will enable an experiment to be safely performed at the UNICAT facility. Experiment Safety Approval is granted by the ESA Officer, and no experiment may be performed on the experiment hall floor without this approval. The ESA Officer is appointed by the UNICAT Director and is accountable to the UNICAT Safety Officer.

UNICAT Guidelines

ESA
LAA (lab activity approval)
Training
Construction/Maintenance/Commissioning
PPE
Hoisting & Rigging
Electrical Hazards
Chemical Hazards
Radiological Hazards
LOM User Shop
Lasers
Assessments & inspections & Investigations
Cryogenic Hazards

UNICAT Guideline – Experimental Safety Approval

Experimental Activities

The UNICAT has designed its facilities at the APS to safely accommodate a variety of research activities and common experimental protocols. For any given experiment, hazards must be identified and appropriate controls prescribed.

The policy and procedures for Experimental Safety Approval are determined by the APS and all UNICAT users are required to comply.

> Experimenters shall identify to the CAT the potential hazards associated with their activities and hazardous materials to be used in experiments at the APS (via the APS Experiment Safety Assessment Form (ESAF), and no experiment shall proceed without a CAT and APS approved ESAF and posted APS Experiment Authorizationl Form (ESA) and Experiment Hazard Control Plan (EHCP).

UNICAT Guideline – Laboratory Activity Approval

The UNICAT has determined that laboratory spaces at the APS require direct and careful oversight. Each lab under UNICAT authority has a Laboratory Supervisor assigned to assure safe operations and compliance with all UNICAT, APS, or ANL requirements. All activities within the lab are the responsibility of the Lab Supervisor.

Often, other resident or visiting investigators require laboratory space to safely prepare samples or set up equipment ancillary to their experimental program. Assignment of space and use of the laboratory facilities is authorized only by the Laboratory Supervisor.

To assist the Lab Supervisor in determining the requirements of other investigators, the UNICAT requires submission of a Lab Activity Approval form. The information necessary to determine the hazards, risks, controls, or procedures that are required shall be provided by the investigator.

Space will be assigned based on an analysis of risks, and compatibility with other activity in the lab. Controls or specific procedures that are required to safely control hazards associated with the proposed activity will be determined by the Laboratory Supervisor.

UNICAT Guideline – Training

UNICAT will require its personnel to complete the APS User Orientation provided by the APS and the complementary UNICAT-administered Sector Orientation.

UNICAT intends to fully comply with the training mandates set forth by the APS. UNICAT line management may also specify training requirements for UNICAT personnel based on other criteria.

UNICAT personnel who hold specific roles in the UNICAT safety plan are expected to be adequately knowledgeable in their area of responsibility. In fact, certain roles may require training by ANL. When appropriate, training courses offered at ANL or elsewhere will be used by UNICAT to prepare its personnel for their safety responsibilities.

Exemptions from some required training normally provided by the APS or UNICAT may be granted based on an individual's prior education and experience combined, in some cases, with the results of an examination.

UNICAT will depend upon the APS to use its User Training Management System to keep track of the training given to each individual, whether that training was provided by the APS, UNICAT, or another entity.

UNICAT Guideline – Construction/Maintenance/Commissioning

The UNICAT hazard evaluation and control effort with respect to installation and maintenance activities is based on the following concepts:

- UNICAT line management is responsible for planning and implementing the hazard controls required to ensure safe construction, modification, and maintenance of the UNICAT beamlines and support facilities;
- Adequate planning for construction/maintenance/commissioning activities is recognized as critical for assuring safe task implementation;
- When necessary, line management will involve in the planning effort those UNICAT members and nonmember support personnel who are best qualified to anticipate the hazards that will be present during the installation and maintenance activities.
- To address unanticipated hazards encountered during the installation, maintenance or commissioning activities, additional hazard controls will be implemented, and hazard evaluation and control documentation will be promptly revised as required.

Outside contractors must assess the hazards associated with their work and submit a document to the contract manager that identifies the hazards and planned controls. UNICAT will generally accept as sufficient any plans developed by contractors that have been reviewed and approved by the ANL ESH or APS Divisions.

UNICAT has identified the following installation, modification, and maintenance activities as major sources of hazards:

- Hand and portable-power tool usage;
- Hoisting and rigging and other material handling;
- Work from elevated surfaces;
- Work posing pressure-related hazards;
- Work with hazardous materials, including cryogenic liquids and compressed gases;
- Hot work (fire hazards);
- Work on or near electrically energized components; and
- Exposure to ionizing radiation

Work that involves tasks that include these hazards will be carefully monitored by UNICAT. When appropriate, training and other procedural controls will be used to minimize the risks associated with these activities.

UNICAT Guideline – PPE

UNICAT recognizes that improper selection or misuse of personal protective equipment (PPE) can have severe consequences, and has taken steps to maximize the effectiveness of PPE usage.

Supervisors and Investigators shall enforce the proper use of PPE.

Members shall be instructed to restrict their use of PPE to what has been approved for the member's intended application.

Supervisors, Investigators, and Laboratory Supervisors shall ensure that appropriate PPE is available when needed, verifying that reusable PPE remains in good condition and that defective PPE is immediately removed from service.

UNICAT Guideline – Hoisting & Rigging

The UNICAT recognizes that hoisting and rigging activities can pose potential risks. Whenever practical, the UNICAT will employ the services of rigging professionals provided through ANL.

All hoisting and rigging activities shall have the approval of the UNICAT Crane Supervisor.

Rigging equipment at UNICAT (for example hutch cranes and synthetic slings) are not utilized on a regular schedule. This hoisting and rigging equipment will remain unavailable for use until inspected by the Crane Supervisor.

UNICAT personnel who wish to bring hoisting and rigging equipment to the UNICAT sector at the APS shall first contact the UNICAT Crane Supervisor, who will determine if the equipment is suitable for the intended use and will complete any required inspections. If required, the UNICAT Crane Supervisor will arrange an inspection schedule.

If the possibility exists that a proposed lifting operation could affect the APS storage ring or another CAT's sector, the UNICAT will arrange for the operation to be done by ANL Plant Facilities and Services personnel.

In all other cases, the UNICAT Safety officer determines whether a user's training and experience is suitable for the rigging equipment to be used, and informs the user of additional training that may be required.

The UNICAT Crane Supervisor provides qualified candidates with an orientation to the hoisting and rigging equipment they need to use and describes the applicable requirements and limitations.

The UNICAT Safety officer records the name of each qualified candidate and keeps a record of their authorization.

UNICAT Guideline – Electrical Hazards

UNICAT recognizes the need to emphasize electrical safety awareness. High voltage and currents can present dangerous and potentially fatal conditions. Therefore, UNICAT requires that safe electrical practices be observed at all times.

The UNICAT will restrict work on equipment that remains connected to energy sources if workers could contact energized components with a potential of 50 volts or greater to ground. If such work is necessary, ANL "working hot" procedures shall be followed. The UNICAT Electrical Safety Officer and the APS Electrical Safety Committee must approve any 'working hot' activity at UNICAT facilities.

UNICAT will only permit use of extension cords in temporary applications.

Electrical equipment brought to the UNICAT facilities having Underwriters Laboratory approval shall be assumed to meet all requirements for electrical safety.

Modified equipment, custom electronics, or experimental apparatus will be inspected for electrical safety by the UNICAT Electrical Safety Officer prior to use at UNICAT.

UNICAT Guideline – Chemical Hazards

UNICAT will adhere to the ANL ES&H Chemical Hygiene Plan to help manage the hazards presented by use of chemicals in UNICAT spaces. Specifically, UNICAT will assure that the users of hazardous chemicals have appropriate instruction and understand relevant safe practices. Use of hazardous chemicals either in the laboratories or in other UNICAT facilities must be authorized by the UNICAT Chemical Safety Officer. To control the hazards associated with hazard chemical usage at UNICAT, the Chemical Safety Officer may require specific training, or prescribe administrative and engineered controls. UNICAT requires that appropriate warning labels be placed on all containers of chemicals, and that warning signs be posted as necessary.

Materials designated by the US Department of Transportation (DOT) as hazardous materials shall be transported, in accordance with DOT or ANL transportation requirements.

Hazardous chemicals shall be stored only in limited quantities and only in designated storage cabinets in the UNICAT chemical laboratories 438-D030 or 438-E030 at the APS. Only short-term storage is permitted for particularly hazardous materials. The UNICAT Chemical Safety Officer will approve any long-term storage and assign storage space.

Chemical wastes shall be stored at designated Satellite Accumulation Areas in suitably labeled waste containers and are to be disposed of in accordance with ANL ES&H procedures. The UNICAT Chemical Safety Officer will assure that disposal of all waste is in compliance with ANL practices.

APS requires that the UNICAT Chemical Safety Officer properly use the ANL Chemical Management System.

UNICAT Guideline – Radiological Hazards

UNICAT activities may expose persons and the environment to the certain hazards associated with ionizing radiation. These include ozone production, prompt synchrotron radiation, prompt radiation from sealed radioactive sources or non-dispersible samples, contamination (leakage from sealed sources).

UNICAT will abate the production of ozone, so far as is practical, by discouraging the use of experimental setups that require an x-ray beam to pass through air. Where the beam must pass through air, UNICAT will assess and control ozone exposures to acceptable levels.

UNICAT personnel will comply with the training requirements set forth by the APS.

UNICAT will comply with the shielding requirements issued by the APS.

It is the policy of UNICAT that no shielding or personnel safety system installed by the APS or included in an APS-approved configuration shall be modified, removed, or disabled and that no equipment, system, or apparatus shall be operated outside of its designed safety parameters without written approval of the APS Division Director for Operations, or his designate.

In keeping with the ALARA principle, UNICAT will encourage those working in the APS experiment hall to keep their exposures to a minimum.

UNICAT personnel will participate in the radiological dosimetry program managed by the ANL ESH Division and will follow required procedures issued by the APS.

UNICAT will purchase radiological survey instruments only after APS review and approval. UNICAT will attempt to ensure the continued reliability of those instruments, in part, by participating in the calibration and maintenance program administered by ANL ESH-Health Physics personnel.

UNICAT will participate in the APS Sealed Source Inventory Program by following relevant mandates issued by the APS.

UNICAT Guideline – LOM User Shop

The UNICAT will ensure that the 438 LOM shop machine tools are in compliance with safety requirements and that their usage is restricted to authorized persons.

UNICAT personnel shall obtain required UNICAT authorization before using machine tools. They shall also report any unsafe condition to the Shop Coordinator as soon as it comes to their attention. Machine operators will inspect machine tools before each use of the tool to verify that the tool appears to have required guarding and is operating properly.

The UNICAT will attempt to ensure that all OSHA or ANSI standards are met when CAT-owned machine tools are installed. The UNICAT will rely on the APS to ensure that APS-owned equipment is provided and maintained with required safeguards.

As appropriate to individual machines, the Shop Coordinator will ensure that a description of the guarding is attached to or posted near each machine tool. Before each use of the machine, the user will ensure that the guarding is in place. The Shop Coordinator will lock out machine tools having deficiencies and will not return them to service until the problems have been corrected.

Only CAT-authorized individuals may use LOM shop machine tools at the APS. The UNICAT will maintain a list of the names of all such personnel and the machines they have been authorized to use.

UNICAT management believes it will be impossible to provide in-depth training to every person that might want to use the shop. Consequently, most persons wishing to use the shop must come to the APS facility with appropriate skills or will have to have the machining done for them by others. The UNICAT will, however, provide experienced equipment users with an orientation to the shop and a copy of the general shop rules.

The UNICAT will provide candidates judged to have appropriate machine usage skills with an orientation to the LOM Machine Shop and/or CAT-owned machine tools not located in the shop.

The UNICAT Director, UNICAT Safety Officer, or Shop Supervisor may suspend or revoke any person's authorization to use the machine shop or machine tools for cause. Defeating or circumventing installed guarding is, by itself, sufficient cause for revocation of a person's authorization. If a person's authorization is revoked, the person's name will be removed from the list of authorized personnel. Personnel who use the shop after losing their authorization may lose research privileges at the APS.

UNICAT Guideline – Lasers

The UNICAT will appoint a Laser Safety Officer to assure that ANL requirements regarding laser usage are followed. Only the UNICAT Laser Safety Officer may authorize laser users at UNICAT facilities.

Initial use of class 3 or class 4 lasers in any UNICAT facility must have approval from the ANL Laser Safety Officer (LSO) prior to operation. Significant changes to an approved laser installation must have ANL LSO approval. Class 1 and class 2 lasers do not require controls.

A written standard operating procedure (SOP) is required and must have the approval of the ANL laser safety officer. The SOP will be available at the laser control area (LCA) at all times.

Laser safety eyewear and interlocks (if present) shall be inspected as required in the SOP. The results of these inspections shall be documented.

Laser safety eyewear shall not be relied upon as the primary means of personnel protection unless feasible engineering controls are inadequate to prevent hazardous exposures.

Public demonstrations of class 3 or 4 lasers must have prior approval of the ANL laser safety officer.

UNICAT Guideline – Accident Investigations

The primary purpose of an incident or accident investigation is to identify the hazard control systems that either failed or were absent. By determining the direct, contributing, and root causes, UNICAT hopes to identify corrective actions that can help prevent similar occurrences.

The UNICAT Safety officer shall investigate incidents and accidents unless the UNICAT Director assigns another individual to this role. UNICAT recognizes that the APS requires prompt notification of some types of incidents. The UNICAT Safety Officer will be responsible for this notification. If required, the UNICAT Safety officer will seek guidance from the APS regarding reporting incidents and accidents.

UNICAT expects that all personnel shall immediately report serious injuries and illnesses through the 911 system either by calling 911 or by having a co-worker call. UNICAT also expects that all personnel shall report accidents and incidents to UNICAT line management and ensure that the UNICAT Safety officer is promptly notified. All personnel, including witnesses to an incident/accident, are expected to participate in investigations as required.

Upon arriving at the scene of a reportable accident, UNICAT personnel shall secure the area and all related equipment and machinery to prevent further incidents and preserve evidence that may be relevant to subsequent investigations. UNICAT will notify APS if additional assistance is needed in securing the incident/accident scene.

Reports shall be submitted to the UNICAT Director for review and concurrence, and to APS as required.

UNICAT Guideline – Assessments & Inspections

The UNICAT intends to participate in the routine safety inspections offered by the APS as part of its safety oversight. This includes but is not limited to making available all records, procedures, and facilities for which UNICAT is responsible.

In addition to this audit of UNICAT's safety program, periodic inspections of UNICAT facilities are planned. Each UNICAT laboratory space, the LOM User Shop, and each Sector UNICAT occupies are subject to monthly inspections. The Supervisor of each area (or his designate) will perform a monthly walk through of the area to assure conformance with all safety rules and policies. Any safety problems found will be addressed immediately.

UNICAT will depend upon APS to assure that facilities such as drench showers and fume hoods installed in UNICAT laboratory spaces are inspected on a regular, ANL prescribed timetable.

UNICAT will comply with the requirements prescribed by APS and ANL for inspections of specific experimental or support equipment. For example, ANL LCA inspections and crane inspections are performed by ANL authorization and on a schedule prescribed by ANL.

UNICAT Guideline – Cryogenic Hazards

UNICAT recognizes the physical, chemical, and physiological hazards associated with the use of cryogenic liquids. To address these hazards, UNICAT will appoint a Cryogenic Safety Officer to assure compliance with ANL requirements.

New installations of cryogenic equipment require the inspection and approval of the UNICAT Cryogenic Safety Officer.

No changes to approved cryogenic installations are permitted without the approval of the UNICAT Cryogenic Safety Officer.

UNICAT personnel who operate the Liquid Nitrogen Automatic Fill Station are first provided with a demonstration and brief orientation. Proper PPE including safety eyewear, face shield, and cryo-gloves is expected of users of cryogenic liquids.

Equipment or processes that pose significant potential hazards may require a written standard operating procedure (SOP). Inspection schedules, maintenance procedures, or emergency response instructions may be included in the SOP. The SOP must be approved by the UNICAT Cryogenic Safety Officer prior to operation at the UNICAT.

Experiments that utilze liquid cryogens may require use of an oxygen deficiency monitor as determined by the experiment safety review.

UNICAT Guideline – Hazardous Gas Handling

UNICAT Investigators may have the need to incorporate hazardous toxic gases or flammable gases into their experimental protocol. UNICAT recognizes its responsibility to minimize the risk to humans and the environment, and assure safe operations. Regarding the usage of hazardous or flammable gases, the following policies will be enforced at the UNICAT facility:

No individual will be permitted to utilize highly toxic or flammable gases without review and authorization of the UNICAT Safety Officer.

UNICAT will require that the user of these materials develop and maintain a Standard Operating Procedure that will specify engineering controls and will incorporate administrative procedures to assure safe operations. This SOP will be available at the point of usage on the experimental floor, and must be approved as part of the experiment safety approval process.

The inspection schedules, maintenance requirements, and written procedures specified in the Hazardous Gas Handling & Usage SOP will be strictly enforced.

All engineered controls shall be reviewed by the required ANL ESH personnel prior to use, and periodically as required.

Forms & Signage

UNICAT Sector Orientation Form

Laboratory Activity Approval Form

Crane Operator Authorization Form

Shop Inspection Form

Laboratory Inspection Form

USER Shop Rules

UNICAT User Shop Orientation

UNICAT SECTOR ORIENTATION

Facility Safety Information

- Alarms & phone numbers
- Emergency egress routes & procedures
- APS Registration & TLD usage
- Location of safety equipment (fire extinguisher, shower, eye wash)
- Waste disposal & Chemical Storage
- Safety Documentation (UNICAT ES&H Plan, MSDS Access, Lab Binders etc)
- Resources (UNICAT Staff & APS Floor Coordinator)
- TLD Usage

Beamline Safety Information

- Beamline Personnel Safety System (PSS) usage
- Shielding Configuration Control Policy
- Utility Shutoffs
- LN2 usage & fill procedures
- Gas cylinder handling & usage
- Green Cards

Beamline Operations Information

- Experiment Safety Approval Procedures
- Procedure to use UNICAT Lab Facilities
- Procedure to use LOM User Shop
- Crane Operation Procedures
- Location of Beamline Documentation
- Equipment Protection System
- Computer Usage
- End of Run Survey

Authorizations

User permitted unescorted access to Sector 33 / Sector 34 / Both UNICAT Facilities

User permitted / not permitted to submit Configuration Control Work Request.

User permitted / not permitted to make beamline vacuum changes.

User permitted / not permitted to utilize the Dark Room

I understand the instructions given to me.

User's Signature:_____ Date:_____

Name (print):_____ ID Number:_____

Instructor (print):_____ Signature:_____

FACILITY SAFETY INFORMATION

1. Alarms and phone numbers. Remind that 911 is emergency phone number for all emergency response. In this area, important alarm is the fire bell. Either continuous or intermittent ringing indicates evacuation is required.

2. Emergency egress routes and procedures. Identify several nearby exits from experiment hall. Note that assembly area in case of evacuation is outside LOM central pentagon. Also point out location of fire alarm box at LOM exits.

3. APS registration. All users must participate in APS administered orientation and must receive GERT through the user office.

4. Location of safety equipment. Identify location of fire extinguishers, shower, and eyewash. Remind user that activity that may require shower or eyewash should be performed in the Chem Lab.

5. Waste disposal and chemical storage. Note that UNICAT is not a chemical stockroom and cannot store users chemical needs. So, users should plan to have chemicals shipped in and out of ANL for their experimental needs. Any waste that is generated must be disposed of properly through UNICAT Chemical Safety Officer.

6. Safety documentation. Identify location of UNICAT ESH Plan, explain MSDS access, written lab procedures (if required).

7. Resources. Identify UNICAT persons responsible for comprehensive safety, electrical safety, chemical safety, laboratory safety, and LOM shop. Note the APS floor coordinator office and their helpfulness.

8. Temporary film badges are given to Users on a request basis. If for any reason a user requests a film badge, one will be provided. If you are pregnant a film badge is required.

Beamline Safety Information

1. Beamline PSS usage. Emphasize the importance of search to assure no one is ever closed inside a hutch. Walk through the search pattern for experimental hutch. Note location of experimental stop button and use. Explain shutters and usage.

2. Shielding configuration control policy. Point out yellow and red tags that identify shielding that is under administrative control. Explain that users are not to move any controlled shielding. If movement is required, UNICAT staff must be contacted first.

3. Utility shutoffs. Locate main electrical power distribution shutoff for each beamline. Explain water distribution and shutoff locations. Identify compressed air supply shutoff location.

4. LN2 usage and fill procedures. Identify location of LN2 fill station and filling procedures. Emphasize use of proper PPE.

5. Gas cylinder handling and usage. Identify storage location for gas cylinders. Emphasize safe handling requirements and use of proper regulators. Identify requirement that cylinders in use must be properly secured.

Beamline Operations

1. Experimental Safety Approval Procedures. Remind that all experimental activities must be identified on the approved and posted safety form. This includes identification of all samples. Explain procedure to change/modify ESA form.

2. Procedure to use UNICAT Lab facilities. UNICAT Laboratory Safety Officer must assign space in the lab to assure that activities are appropriate and compatible with other activities in the lab.

3. Procedure to use LOM shop. UNICAT Shop Coordinator must give orientation and grant approval prior to shop usage.

4. Crane operation procedure. Cranes cannot be used without authorization by UNICAT Safety Officer.

5. Location of Beamline documentation. Location of equipment manuals, software manuals, etc.

6. Equipment Protection System. Description of EPS and potential impact on white-beam shutter operation.

7. Computers are to be used for official use only. Also, software is not to be loaded without being approved. Please see Pete Jemian.

8. APS requires all users to complete an end of run survey; this is located at www.uni.aps.anl.gov under *forms*.

9. UNICAT requires and relies on published manuscripts. Without copies of such materials, UNICAT cannot demonstrate the productivity of our facilities. More information concerning this can be found at www.uni.aps.anl.gov under *publications*. This will also provide you with the exact *acknowledgement* that needs to be provided when publishing any manuscript that is supported by the use of UNICAT facilities.

Authorization

1. This orientation will apply to either Sector 33 or to Sector 34. Although many items are the same, locations of shutoffs are different.

2. Users are not permitted to make requests to move or modify shielding. Only UNICAT staff are authorized by the UNICAT to submit these requests to the APS.

3. Users are generally not permitted to access the beamline vacuum sections. Only those individuals with a demonstrated need will be given this privilege. These individuals must have knowledge of the beamline vacuum design and APS vacuum policy.

6. If the UNICAT Dark Room has been permitted, all postings are to be followed. Working alone is permitted only if a floor coordinator is contacted.

UNICAT LAB ACTIVITY APPROVAL FORM

Completed by Requester – Submit to UNICAT Laboratory Supervisor

NOTE: This form may be a supplement to the UNICAT Safety Approval Form. No samples or other chemicals will be allowed as part of an experiment without UNICAT approval.

Start Date :_____ **End-Date :** _____

Activity Description: Provide a detailed description of the planned activities for the Lab space. Include sufficient details concerning any hazards and planned controls. Also include bench-space and/or fume hood requirements. If necessary, use additional sheets.

☐ **Planned use of chemical fume hood.**
☐ **Planned use of non-UNICAT supplied equipment.**

☐ **Additional sheets attached for further details, including hazard controls or special procedures.**

Materials: List samples & chemicals to be used for this specific activity in the UNICAT Lab spaces. Check appropriate boxes regarding known hazards. Only the UNICAT Safety Officer or his designate may grant approval for chemical or sample usage in the UNICAT Labs. Use additional sheets as necessary.

Name of material	Quantity	CAS # (if known)	Known Hazards					Dispose at ANL	UNICAT Approval
			toxic	biohazard level	flammable	Radioactive	other[1]		
1									
2									
3									
4									
5									

☐ **Materials or Chemicals listed on attached Sheet(s).**

Note: Describe other known hazards here or on additional sheets.

I understand that violation any laboratory policy or procedure may be sufficient reason for termination of UNICAT Lab access privileges. I also understand that I am responsible for housekeeping and cleaning the assigned space after use.

Completed by: _____ (name (print)) _____ (signature) _____ (date)

Completed by CAT

Safety Approval Form Number (if available): _____ **Approval Expiration Date:**_____

CAT comments:_____

CAT approval: _____ (name (print)) _____ (signature) _____ (date)

Hazard Class Definitions:

Hazard: Any existing or possible condition that, by itself or through interaction with other conditions, has the capacity to cause death, injury, illness, property damage, unacceptable environmental impact, or other losses.

Risk: A quantitative measure (or estimate) of the product of the probability that a hazard will result in ill-effect and the consequence of an ill-effect.

Toxic: Having the capacity to cause death, illness, or diminished function. A material that meets one or more of the following criteria should be considered toxic:

- Has a published LD_{50} (Lethal Dose 50%) equal to or less than 0.5 g/kg of body weight.
- Has a published LC_{50} (Lethal Concentration 50%) equal to or less than 1000 ppm.
- Has an OSHA permissible exposure limit (PEL) or ACGIH Threshold Limit Value (TLV) equal to or less than 5000 ppm.
- Has an OSHA PEL or ACGIH TLV equal to or less than 10 mg/m^3.

Biohazard: An agent of biological origin (e.g., all infectious organisms, their toxins, allergens of biological origin, and genetic fragments) that has the capacity to cause ill-effects in humans.

Flammable: Susceptible to ignition during storage, normal handling, or use. The term includes, but is not necessarily limited to:

- All materials that ignite spontaneously when exposed to air.
- All gases easily ignited in atmospheres containing approximately 21% oxygen.
- All liquids having a flashpoint below 100°F (38°C).
- All combustible solids and liquids having a physical form that makes them easily ignitable if dispersed into ambient atmospheres.

Radioactive: Any material having a measurable specific activity above background. While on the ANL site, materials with a specific activity ≥ 2 nCi/g must be transported by the ANL Special Materials Group. APS must be notified of any shipment of radioactive materials to/from the site.

Other: Can include oxidizers, corrosives, carcinogens, explosives, and any other hazard not listed.

UNICAT

CRANE OPERATOR AUTHORIZATION

Date _____

Name _____

Briefly describe the type(s) of lifting device(s) to be used and the expected weight loads.

Lifting Device	Weight Load
_Hutch Crane_____	_____2000 LBS._____
_Pallet Jack_____	_____- as rated -_____
_Bottle Jack_____	_____- as rated -_____
_____	_____

Operator training/experience operating a crane or other lifting device:

Date/Description of Training:

_____

_____

_____

_____

_____

I certify that, to the best of my knowledge, I have normal depth perception, field of vision, reaction time, manual dexterity, and coordination, and do not have a detectable or known disease or physical malfunction that would render me incapable of safe operation or rigging duties.

_____
Candidate's signature

_____
UNICAT Approval

UNICAT Laboratory Inspection Form – E030

X – Acceptable U – Urgent attention required R – Requires follow-up within 10 days NA – Not Applicable

Date of Inspection with inspector initials	General Housekeeping	Chemical Hygiene, labeling, etc..	Compliance with Lab Activity Forms	Gas Bottle usage appropriate	Eyewash / shower / fume hood Inspections up-to-date	SOP (if required) approved and Up-to-date	Electrical hazards – exposed wiring, extension cord usage, etc…	Adequate PPE inventory	Electrical inspections up to date	Chemical inventory logs complete	SAA inspection logs complete

GENERAL SHOP RULES

- Do not engage in horseplay.
- Immediately report all malfunctions and deficiencies to your CAT Shop Coordinator.
- Wear ANSI-approved safety eyewear with side shields whenever in the shop.
- Do not leave the work area without completing cleanup.
- Never leave machines running unattended.
- Use only brushes, vacuum tools, or other special tools to clean debris from pieces. Never use your hands to brush away chips and NEVER USE COMPRESSED AIR TO BLOW CHIPS AND DUST FROM WORK.
- Use tongs or other remote handling tools to keep hands away from pinch points and moving parts.
- As appropriate, use vises and clamps to hold work.
- Do not manually adjust and gauge (caliper) work while the machine is running.
- Never wear jewelry or loose fitting clothing while operating machines. Remove neckties, tuck in shirt tails, and securely roll up sleeves.
- Sturdy leather shoes (safety shoes preferred) are required. Athletic shoes, sandals, etc., do not satisfy this requirement.
- Cover long hair that could get caught in moving parts.
- Use the correct tool for the job. If the correct tool is not available, inform your CAT Shop Coordinator.
- Contact a Shop Coordinator or Floor Coordinator if you need to have a grinding wheel installed or replaced.
- Do not remove or circumvent any machine guarding.

LOM Machine Shop Orientation

This orientation is intended for experienced machine operators. By itself, it will not provide the knowledge and experience required to use machine tools properly.

1. **Authorization of Personnel**

Injuries on machine tools are most often caused by unsafe work practices or incorrect procedures. Poor training and inadequate supervision are often contributing causes. Proper safeguarding on machines, good housekeeping in the work area, and good work habits help to reduce injuries and accidents.

To earn authorization to use a machine tool, you must be able to demonstrate to the Shop Coordinator your ability to use the tool properly (including safely). The judgment regarding whether you possess the experience to safely operate shop machinery will be left up to the Shop Coordinator.

After you have demonstrated to the Shop Coordinator that you can use the machine and completed this orientation, your name will be added to the list of authorized personnel and you will be considered an authorized machine tool operator.

2. **APS General Shop Rules**

You must adhere to the following general shop rules to maintain your authorization. These rules are posted in the LOM Machine Shop.

- Do not engage in horseplay.
- Immediately report all malfunctions and deficiencies to your CAT Shop Coordinator.
- Wear ANSI-approved safety eyewear with side shields whenever in the shop.
- Do not leave the work area without completing cleanup.
- Never leave machines running unattended.
- Use only brushes, vacuum tools, or other special tools to clean debris from pieces. Never use your hands to brush away chips and NEVER USE COMPRESSED AIR TO BLOW CHIPS AND DUST FROM WORK.
- Use tongs or other remote handling tools to keep hands away from pinch points and moving parts.
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- Sturdy leather shoes (safety shoes preferred) are required. Athletic shoes, sandals, etc., do not satisfy this requirement.
- Cover long hair that could get caught in moving parts.
- Use the correct tool for the job. If the correct tool is not available, inform your CAT Shop Coordinator.
- Contact a Shop Coordinator or Floor Coordinator if you need to have a grinding wheel installed or replaced.
- Do not remove or circumvent any machine guarding.

3. **Housekeeping**

As an Authorized Operator, you are responsible for maintaining the area in a neat and orderly fashion while working in the Machine Shop. Plan and conduct your work in a manner that does not create tripping hazards and complete your cleanup before you leave the shop.

4. **Demarcated Areas**

Keep demarcated work areas and aisles free of equipment and materials. Maintain clear routes of egress at all times.

5. **Machine Guarding**

You may not remove machine guards. If a guard interferes with your work, report the problem to the Shop Coordinator or Floor Coordinator. One of them will attempt to resolve the problem.

6. **Lockout/Tagout**

Notify your Shop Coordinator if you feel you need to engage in shop activities that require lockout and tagout. Do not lock out equipment without immediately notifying the Shop Coordinator.

7. **Waste**

Dispose of wastes, such as metal chips, oily rags, and other dirty rags, in containers provided for this purpose to prevent accumulation. Use brushes to brush off chips and shavings from machines; do not use your hands or an air hose.

8. **Emergency Power Cutoff**

You must know the location of the emergency power cutoff prior to operating any power equipment and must have ready access to this switch during operation.

9. **Spill Control**

Shields or splash guards will be used on machines where cutting oils or coolants are used. Floors around machinery should be kept dry and clear of refuse to minimize the danger of slipping. Use the spill control absorbent immediately to controls spills and leakage and then clean it up.

10. **Machine Controls**

You must be aware of the various machine controls (start button, stop button, speed change control) for each machine you are authorized to operate. These controls must be unobstructed at all times.