

National Institute of General Medical Sciences and
National Cancer Institute
Collaborative Access Team
(GM/CA-CAT)

Environmental, Safety & Health Plan

Presented To the Advanced Photon Source,
Argonne National Laboratory
9700 S. Cass Avenue
Argonne, Illinois 60439

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1. GM/CA-CAT ES&H Policy

1.1 Purpose

The National Institute of General Medical Sciences / National Cancer Institute Collaborative Access Team (GM/CA-CAT) and the Biosciences Division of Argonne National Laboratory (ANL) are committed to ensuring that all CAT activities are conducted in a safe and environmentally sound manner. This plan describes the CAT's safety program which is implemented to fulfill this commitment.

1.2 Scope

To ensure that all CAT activities are conducted in a safe and environmentally sound manner, this plan defines: 1) the standards to be followed by GM/CA-CAT, and 2) the responsibilities within the CAT organization. All GM/CA-CAT personnel shall be given an orientation to the contents of this manual and shall be expected to comply with the environmental, safety, and health (ES&H) policies and practices set forth herein.

This document covers the ES&H Policy for Operations of the GM/CA-CAT at the assigned sector on the experimental floor, and in the LOM at the APS. Special considerations specific to beamline and LOM laboratory activities can be found in the Appendices. Policies and procedures specific to commissioning-phase activities will be described in the GM/CA-CAT Beamline Commissioning Readiness Document.

1.3 References

All activities at Argonne National Laboratory - East (ANL-E) shall 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 Environmental, 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

This document shall be considered as a supplement to the standard policies and practices described in the above ANL documents. Any discrepancies between this document and the ANL documents listed above shall be reported to the GM/CA-CAT Safety Coordinator.

Hazards not covered by this document or by the ANL documents listed above shall be brought to the attention of the GM/CA-CAT Safety Coordinator.

1.4 General Policies

The GM/CA-CAT shall abide by the following general policies.

- 1) Failure to conform with this plan may result in sanctions and/or the loss of access to the APS and CAT facilities. GM/CA-CAT recognizes that noncompliance may lead to shutdown of GM/CA-CAT facilities or exclusion of individuals from experimental areas at the discretion of the APS or of the GM/CA-CAT Director or his/her designee.
- 2) GM/CA-CAT expects all personnel to adhere to the Argonne National Laboratory policy that authorizes and, indeed, requires them to order cessation of work that is being conducted in a manner that appears to pose a serious and imminent safety or health risk. Furthermore, GM/CA-CAT personnel shall report such incidents through the GM/CA-CAT line management structure, and to the GM/CA-CAT Safety Coordinator. GM/CA CAT personnel shall practice Integrated Safety Management (ISM) principles.
- 3) GM/CA-CAT shall comply with current version of the APS User Policies and Procedures for configuration control of shielding systems. In particular, no personnel shall tamper with or hinder the operation of any APS engineered or administrative safety control.
- 4) GM/CA-CAT shall cooperate with the APS to facilitate the oversight responsibilities of the APS, ANL and the DOE.
- 5) Experimenters shall identify to GM/CA-CAT the potential hazards associated with their activities and hazardous materials to be used in experiments at the APS, and no experiment shall proceed without a GM/CA-CAT approved and posted APS Experiment Safety Assessment Form (ESAF).
- 6) New or modified equipment and unreviewed activities must be approved by the GM/CA-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 shall obtain the written approval of the APS Operations Division Director, or designee.
- 7) The CAT shall maintain a list of current safety assignments (Appendix A of this document), and shall update this plan to keep it consistent with the scope of CAT activities. The assignment list shall be reviewed at least annually and the plan biennially with updates provided to the APS User Safety Officer.
- 8) The CAT will accept APS-designed safety interlocks and will allow the APS staff to install these on the CAT's beamlines and other experimental facilities.
- 9) The GM/CA-CAT will require the use of the ANL Chemical Management System and the Hazardous Waste Management System and will comply with ANL and OSHA chemical safety standards in all of the CAT's facilities.
- 10) GM/CA-CAT will carry out an experiment safety review and approval program conforming to requirements set forth in Technical Updates, User Policy and Procedures, and AOD Division

Director Memoranda covering the subject. The GM/CA-CAT will permit no APS-based experimental activity to proceed without the posting of an Experiment Hazard Control Plan (EHCP) and an Experiment Authorization Form (EA) generated from a properly approved APS Experiment Safety Assessment Form (ESAF).

2. GM/CA-CAT SAFETY AND ENVIRONMENTAL PROTECTION ORGANIZATION

2.1 Safety Organization Structure and Responsibilities

The structure of the GM/CA-CAT Safety Organization and the personnel assignments are illustrated in Appendix A. The specific responsibilities of each member of the GM/CA-CAT Safety organization are outlined in the following text. The GM/CA-CAT Director has line responsibility for all safety aspects of GM/CA-CAT activities. At the same time, the success of the GM/CA-CAT safety and environmental protection effort depends on the commitment of all GM/CA-CAT personnel.

2.2 GM/CA-CAT Director

The GM/CA-CAT Director has full responsibility for all safety and environmental protection aspects of all CAT construction and operations activities at the APS. The Director shall be responsible for ensuring that this plan is implemented and for evaluating and responding in a graded manner to nonconformances with this plan. The Director has the authority to delegate safety matters to the other members of the CAT as deemed appropriate. The Director shall make the APS Management aware of any safety or environmental protection issues that require its attention. The Director shall assign the individual safety coordinators, captains and custodians; however, in exercising their particular safety duties, they shall report to the Safety Coordinator.

2.3 GM/CA-CAT Project Manager

The GM/CA-CAT Project Manager shall have the primary day-to-day responsibility for maintaining safe conditions in all spaces occupied by GM/CA-CAT at the APS. This responsibility includes ensuring that the work performed by GM/CA-CAT members, guests, and on-site contractors providing services under GM/CA-CAT auspices remains in accordance with the provisions of this program. The Project Manager shall work closely with the GM/CA-CAT Safety Coordinator in identifying and resolving safety and environmental issues involving GM/CA-CAT personnel at the APS. The Project Manager shall have the authority to stop any GM/CA-CAT activity judged to be unsafe or environmentally unsound. Additionally, the Project Manager shall be responsible for calling for and overseeing ES&H related beamline reviews at various stages of development, starting from conceptual design, engineering design, and construction to the operational stages as requested by the APS Safety Organization

As described in the GM/CA-CAT Management Plan, in the absence of the permanent GM/CA-CAT Director, the GM/CA-CAT Project Manager shall assume the authority and responsibilities of the Director outlined above.

2.4 GM/CA-CAT Safety Coordinator

The GM/CA-CAT Safety Coordinator shall be responsible for implementing and overseeing conformance with this safety plan. The CAT Safety Coordinator shall ensure that the CAT has access to the ANL-E ES&H Manual, the other documents referenced in section 1.3 and the APS User Policies and Procedures in order to assist CAT members and users in meeting the requirements of these standards.

The GM/CA-CAT Safety Coordinator shall be responsible for the safety, neatness, and orderliness of all GM/CA-CAT construction and operation activities conducted at the APS. The Safety Coordinator shall work with the APS and APS Operations Division Safety Committees, and the APS Operations Division ES&H Coordinator, and the GM/CA-CAT developers and contractors to create safe procedures pertaining to the beamline operation and other day-to-day safety requirements. The GM/CA-CAT Safety Coordinator shall be responsible for filing an ES&H Incident Report to the GM/CA-CAT Director and to the APS Operations Division ES&H Coordinator should violations of safe procedures and/or abnormal events occur. The GM/CA-CAT Safety Coordinator also shall be responsible for reviewing proposal forms for safety-related issues.

The GM/CA-CAT Safety Coordinator shall be Chairman of the GM/CA-CAT Safety Committee which shall be composed of at least the Chemical Safety Coordinator, Biological Safety Coordinator and Transportation Safety Coordinator.

During operations phase, the GM/CA-CAT Safety Coordinator shall coordinate Experimental Safety Reviews, and shall have the responsibility of reviewing all Experimental Safety Review Forms associated with all activities to be done in connection with experiments on the GM/CA-CAT beamlines, including activities in the LOM laboratories assigned to GM/CA-CAT.

2.5 Chemical Safety Coordinator

The GM/CA-CAT Chemical Safety Coordinator shall be responsible for assisting in all areas of chemical safety, including the identification of the proper procedures for the handling of chemicals, gases, and nonbiological samples. The Chemical Safety Coordinator shall ensure the use of the ANL Chemical Management System and the Hazardous Waste Management System, and shall ensure compliance with ANL and OSHA chemical safety standards in all of the CAT's facilities.

The Chemical Safety Coordinator shall help ensure that safety items and protective equipment stocked by the GM/CA-CAT are appropriate for the work being performed and the materials being handled.

The Chemical Safety Coordinator shall review the chemical safety aspects of proposed experiments upon the request of the Safety Coordinator.

If an inspection or review activity lies outside the Chemical Safety Coordinator's area of

expertise, the Coordinator shall seek assistance from GM/CA-CAT personnel having the proper expertise. If no such person is available, assistance shall be sought from the APS.

2.6 Electrical Safety Coordinator

The GM/CA-CAT Electrical Safety Coordinator shall be responsible for assisting in all areas of electric safety and for ensuring compliance with ANL electrical safety standards in all of the CAT's facilities. The Electrical Safety Coordinator shall be aware of ANL ESH Manual defined electrical safety requirements as typically attained through completing ANL electrical safety and LOTO training.

The Electrical Safety Coordinator shall have the responsibility for ensuring that electrical utilities records are maintained for the sector and the LOM areas assigned to GM/CA-CAT. Upon request, the coordinator shall also review temporary electrical installations for safety and ensure that ANL lockout/tagout requirements for electrical work are met.

The Electrical Safety Coordinator shall review the electrical safety aspects of proposed experiments upon the request of the Safety Coordinator.

If an inspection or review activity lies outside the Electrical Safety Coordinator's area of expertise, the Coordinator shall seek assistance from GM/CA-CAT personnel having the proper expertise. If no such person is available, assistance shall be sought from the APS.

2.7 Transportation Safety Coordinator

The GM/CA-CAT Transportation Safety Coordinator shall be responsible for assisting in all areas regarding the safe transportation of materials to and from the CAT's facilities at ANL and ensuring compliance with ANL transportation safety standards. The Transportation Safety Coordinator shall be aware of ANL transportation requirements, APS specific shipping and receiving requirements, and shall remain current in the APS transportation safety course.

The Transportation Safety Coordinator shall review the transportation safety issues related to proposed experiments upon the request of the Safety Coordinator.

If an inspection or review activity lies outside the Transportation Safety Coordinator's area of expertise, the Transportation Safety Coordinator shall seek assistance from GM/CA-CAT personnel having the proper expertise. If no such person is available, assistance shall be sought from the APS.

2.8 Hoisting and Rigging Coordinator

The Hoisting and Rigging Coordinator shall be responsible for ensuring that records of rigging equipment are maintained for the GM/CA-CAT facilities. The Coordinator shall satisfy the training and qualification requirements specified by ANL for incidental crane operators, and shall review training records of personnel, approve individuals to perform rigging operations and maintain a list of all trained individuals at GM/CA-CAT facilities.

The Hoisting and Rigging Coordinator shall review equipment brought to GM/CA-CAT facilities and shall approve it for use at GM/CA-CAT facilities. The Coordinator shall be responsible for arranging for storage of rigging equipment, and the completion of crane and sling inspections according to the ANL East ES&H Manual, Chapter 16-2. The Coordinator also shall review rigging procedures for non-standard operations and, when appropriate, shall recommend the use of ANL professional riggers.

If an inspection or review activity lies outside the Rigging Coordinator's area of expertise, the Coordinator shall seek assistance from GM/CA-CAT personnel having the proper expertise. If no such person is available, assistance shall be sought from the APS.

2.9 LOM Shop Coordinator

The LOM Shop Coordinator shall be responsible for overseeing the machine shop located in the LOM in order to maintain a safe, neat, and orderly operation. The Shop Coordinator shall ensure that ANL lockout/tagout requirements for shop equipment are met and that monthly inspections of all machines to ensure that they are operating properly are completed. All monthly inspection reports are to be posted in the shop.

Users of the shop must demonstrate that they can safely operate a particular machine before the Shop Coordinator grants approval to use that machine. The Shop Coordinator shall provide or recommend training as needed to qualify machine operators. A list of qualified operators shall be posted in the shop.

2.10 BioSafety Coordinator

The BioSafety Coordinator shall be responsible for ensuring that the designs of any special areas where biohazardous materials will be handled satisfies the specifications set forth in the CDC-NIH publication *Biosafety in Microbiological and Biomedical Laboratories* (U.S. Department of Health and Human Services, 4th edition, April 1999). The BioSafety Coordinator also shall assist in formulating, implementing, and administering all sample handling procedures. The Coordinator shall track all biohazardous materials that are being stored or used at GM/CA-CAT facilities using a check-in/check-out mechanism. The BioSafety Coordinator shall ensure safe disposal of all samples that are no longer required.

Biomaterials requiring BSL 1(a.k.a. P1) procedures (normal microbiological laboratory precautions) are not normally considered "hazardous". All of the currently planned and anticipated experiments fall into this category. If in the future, the need arises for developing BSL-2 procedures, the issue shall be appropriately addressed at that time. However, GM/CA-CAT does not anticipate ever allowing experiments that require handling at BSL 3 or 4.

2.11 Sealed Source Custodian

The GM/CA-CAT Sealed Source Custodian shall be responsible for ensuring that ANL and APS requirements for inventorying, storing and using sealed sources are met. The Custodian shall

maintain current training such as ANL “Sealed Radioactive Source Custodian Training”.

Detailed procedures will be developed as needed for the operational phase of the GM/CA-CAT ES&H Plan.

2.12 Beamline Coordinators

The Beamline Coordinators shall be responsible for maintaining a safe work environment in the station for which they are responsible. The Coordinators shall oversee the development of a safety plan and safety training specific to their station, and they shall be responsible for the safe operation of the station for both their own research and when other researchers are using the station.

The Beamline Coordinators shall advise the Safety Coordinator of safety related matters in connection with experiments performed on the GM/CA-CAT beamlines.

2.13 LOM Laboratory Safety Captain

The Laboratory Safety Captain shall be responsible for overseeing the laboratory space located in the LOM in order to maintain a safe, neat, and orderly operation. The Captain shall have the responsibility for ensuring that all aspects of the GM/CA-CAT safety program are properly administered and documented in the assigned laboratory. Safe operating procedures for facilities and apparatus within the laboratory space shall be maintained and the Laboratory Safety Captain shall be responsible for training in these and related procedures. The Captain shall have the authority to stop activities in the laboratory which the Captain feels are unsafe or environmentally unsound. If such action is necessary, the Captain shall report the activity to the GM/CA-CAT Safety Coordinator.

2.14 Principle Investigators

Principal Investigators (PIs) shall ensure that the safety and environmental protection aspects of each experimental activity that they direct or their group performs in any GM/CA-CAT-controlled area. This responsibility includes the following:

1. Recognition of hazards and incorporation of safeguards at the planning stage of experimental programs.
2. Cooperation during the conduct of any safety analysis process for proposed or on-going experimental programs.
3. Preparation of required written procedures for activities performed under or in support of experimental programs.
4. Exertion of authority as shall be necessary to ensure the safe operation of experimental programs and the safe conduct of personnel working under the PIs direction.
5. Protection of all persons exposed to hazards created by the experimental work.

All experimenters using beamlines and other experimental facilities shall comply with the requirements of safety orientation training as specified by the GM/CA-CAT Safety Coordinator

prior to their work on the experimental floor or LOM of the APS. Principal Investigators shall ensure that all experimenters work in a safe, neat, orderly, and ecologically sound fashion at the beamline and/or in the LOM. The Principle Investigator shall identify all potential hazards associated with the experiment and shall work with the GM/CA-CAT Safety Coordinator and the APS to provide all individuals who could be exposed to these hazards with the specific knowledge, means, and protective equipment needed to control the hazards. In designing, constructing, and implementing new experiments, the Principal Investigator shall submit an Experimental Safety Assessment Form to the Safety Coordinator in consultation with the Beamline Coordinators.

Principal Investigators and Experimenters shall report safety-related issues to the Beamline Coordinator or the GM/CA-CAT Safety Coordinator. Principal Investigators, in consultation with the GM/CA-CAT Transportation Safety Coordinator, shall ensure the safe transportation of materials to and from the CAT's facilities at ANL, ensuring compliance with ANL transportation safety standards and APS specific shipping and receiving requirements.

2.15 *Beamline Support Staff*

The Beamline Support Staff shall be responsible for maintaining a safe, neat, and orderly operation at the beamline and in the associated laboratories. The Beamline Support Staff shall be responsible for correcting all safety or environmental protection irregularities associated with the staff members assigned areas of responsibility. If an issue is outside the Beamline Support Staff's scope of expertise, it shall be brought to the attention of the GM/CA-CAT Safety Coordinator.

2.16 *GM/CA-CAT Safety Committee*

The GM/CA-CAT Safety Committee shall be appointed by, and reports to, the GM/CA-CAT Director. The Safety Committee shall have an advisory role to the GM/CA-CAT Safety Coordinator. The Safety Coordinator, Chemical Safety Coordinator, Electrical Safety Coordinator, Biosafety Coordinator and Transportation Safety Coordinator are permanent members. The GM/CA-CAT Safety Coordinator, as the Chair of the Committee, may designate other individuals with special expertise to serve as temporary members of the committee, on an as-needed basis.

Any member of the GM/CA-CAT Safety Committee shall have the power to suspend the operation of any activity being conducted at the GM/CA-CAT facilities in a manner that significantly deviates from compliance with ES&H regulations or acceptable laboratory practices. Notice of the suspension shall be immediately communicated to the GM/CA-CAT Safety Coordinator, who shall report it to the GM/CA-CAT Director. The suspension shall remain in effect until compliance is reestablished or a review of the issue by the GM/CA-CAT Safety Coordinator confirms the proper guidelines have been met.

2.17 Changes to the GM/CA-CAT Safety and Environmental Protection Organization

Changes to Appendices (checklists, forms, specific procedures, etc.) can be made with the approval of the GM/CA-CAT Safety Coordinator, who shall consult with the GM/CA-CAT Safety Committee. Policy changes (mainly contained in the body of this document) can be made only by approval of the GM/CA-CAT Director.

Appendix A - Safety Assignments & ESAF Approvers

Appendix A.1 - GM/CA-CAT Safety Assignments

Date: April 13, 2005

| Assignment | Person assigned |
|---------------------------------------|---------------------------------------|
| CAT Director | Dr. Janet L. Smith |
| CAT Project Manager | Dr. Robert F. Fischetti |
| CAT Safety Coordinator | Dr. Robert F. Fischetti |
| CAT Chemical Safety Coordinator | Dr. Derek Yoder |
| CAT Electrical Safety Coordinator | Steve Corcoran |
| CAT Transportation Safety Coordinator | Dr. Ward Smith; Dr. Ruslan Sanishvili |
| CAT Hoisting and Rigging Coordinator | Richard Benn |
| CAT LOM Shop Coordinator | Richard Benn |
| CAT BioSafety Coordinator | Dr. Ward Smith |
| CAT Sealed Source Custodian | Dr. Ruslan Sanishvili |
| CAT Beamline Coordinator(s) | Dr. Ward Smith; Dr. Ruslan Sanishvili |
| CAT LOM Laboratory Safety Captain | Dr. Ruslan Sanishvili |

Appendix A.2 - GM/CA-CAT Personnel with Experiment Safety Approval Authority

As Director of GM/CA-CAT, I authorize the following personnel to conduct hazard evaluations of experimental activities, to specify required control measures, and approve such activities where specified controls have been implemented. (Upon updating this form, the CAT will provide a copy of the revised form to the APS User Safety Officer).

Dr. Robert F. Fischetti
Dr. Ruslan Sanishvili
Dr. Ward Smith

Dr. Janet L. Smith [Date]
CAT Director

Appendix B - Standard Procedures Used by GM/CA-CAT

Date: July 16, 2001

GM/CA-CAT has evaluated the hazards that will be encountered in its construction, commissioning and operations, and, to mitigate these hazards the CAT will follow the unmodified APS Standard Procedures listed below. (Links to these procedures can be found on the APS User Safety web page.)

Date: May 6, 2005

1. The Management of Hazardous Waste
2. APS Technical Update 23: Transportation of Small Quantities of Hazardous Materials (July 16, 1988)
3. APS Technical Update 15: Policy for Management of Low-Activity Sealed Radioactive Calibration Sources by APS Users (March 18, 1997)
4. Hand Tool and Portable Power Tool Usage
5. Guideline for Personal Protective Equipment
6. Work Area Demarcation, Warnings, and Controls
7. Electrical Safety Work Practices
8. Management of Chemicals
9. Hoisting and Rigging Operations
10. LOM Shop Usage
11. APS User Safety Guide (ANL/APS/TB-23)
12. APS Standard Safety Envelopes for Experiment Activities at the APS (April 14, 2000)

Appendix C - GM/CAT-CAT Specific Procedures

Date: July 16, 2001

GM/CA-CAT has evaluated the hazards that will be encountered in its operations, and, to mitigate these hazards, the CAT has developed and shall follow the procedures listed below.

Date: May 6, 2005

1. GM/CA CAT Sector Orientation

SECTOR ORIENTATION RECORD

GM/CA-CAT, Sector 23

- **Introduction to facilities**
 - Entrance and key card operation
 - Assembly area for evacuation
 - Lounge and food service
 - Restrooms
 - Floor coordinator
 - GM/CA LOM, offices
 - Note the location of fire extinguishers in the hall and on the floor
 - GM/CA stations
 - APS Stock room, hours, accounts
 - Biochemical lab, designated benches
 - Cold room

- **Safety policies and resources**
 - Introduction to the CAT's environmental, safety, & health plan (attached)
 - The plan itself is available
 - Introduction to the CAT Safety management personnel (attached)
 - Explanation of the ANL-East "stop work authority" policy

- **General safety information**
 - Experimental Safety Assessment Form
 - Response to Public Announcements, alarms and other warnings. Tornado shelter
 - Storage of items (e.g., objects may not be stored on top of cabinets at a height of >5 ft)
 - Restrictions on and proper use of electrical power strips and extension cords
 - Location and use of fire extinguishers
 - Emergency exits
 - Traffic in the experimental hall
 - Proper apparel

- **Biochemical laboratory safety information**
 - Location of safety documentation (including MSDSs and relevant procedures)
 - Personal Protection Equipment (eye protection, eye wash, shower, gloves, coats, cryoprotection)
 - Storage of chemicals and flammables
 - Labeling the chemicals and solutions
 - Disposal of waste, including hazardous waste and liquid nitrogen
 - Phone locations and the phone numbers, 911. Transportation of the injured
 - Cold room safety (LN₂)
 - Obtaining the liquid nitrogen

