

Sanford Underground Research Facility



SCIENCE

EXPERIMENT IMPLEMENTATION

**Document-34478
Version 2
July 2016**

Table of Contents

Table of Contents	i
Version Control	ii
1.0 PURPOSE	1
2.0 SCOPE	1
3.0 INITIAL PLANNING AND COMMUNICATION	1
4.0 PROJECT DOCUMENTATION	1
4.1 Experiment Planning Statement	1
4.2 Memorandum of Understanding	2
4.3 Services Agreement(s)	2
4.4 Insurance	2
4.5 Decommissioning Plan	2
5.0 ENVIRONMENT, SAFETY AND HEALTH	2
5.1 Hazard Analysis	2
5.2 Inventories	3
5.2.1 Chemical	3
5.2.2 Electrical Equipment	3
5.2.3 Radioactive Materials	3
5.3 Training	3
6.0 REVIEW PROCESS	3
7.0 INTEGRATION	4
7.1 Facility Access	4
7.1.1 General	4
7.1.2 Underground Access	4
7.1.3 Facility Guides	4
7.1.4 Emergency Access	4
7.2 Planning and Communication	4
7.2.1 Shipping and Transport	4
7.2.2 Work Planning	4
7.2.3 Shift Reports	5
7.2.4 Incident Reports	5
7.2.5 Evacuation Drills	5
7.3 Science Integration	5
7.3.1 Project Mailing List	5
7.3.2 Science Integration Meetings	5
7.3.3 Management Meetings	5
7.4 External Review and Evaluation	5
8.0 AUTHORIZATION	5
9.0 REFERENCE AND RELATED DOCUMENTS	6
9.1 References	6
9.2 Related Documents	6
Appendix	7

Version Control

Responsible Person	Document Control Number	Document Version	Publication Date	Description of Change
Jaret Heise	Document-34478	1	08/22/2010	Initial release.
Jaret Heise	Document-34478	2	07/30/2016	Update categories and descriptions based on current practices and terminology, also update formatting.

1.0 PURPOSE

This document describes the framework for implementing a research project (experiment) at the Sanford Laboratory.

2.0 SCOPE

This document describes the process for implementing an experiment at the Sanford Laboratory. In particular, specific documentation is required in order to identify interfaces with the facility and any hazards within an approval framework. Research activities may only be conducted with authorization from Sanford Laboratory. While the level of review and extent of documentation is intended to be commensurate with the scope and complexity of a given project, the same process applies regardless of discipline or location (either surface or underground).

3.0 INITIAL PLANNING AND COMMUNICATION

Experiment representatives are encouraged to contact the Sanford Laboratory Science Liaison Director as early as possible as plans are developing for projects envisioned for the Sanford Laboratory. Ideally, communication would begin in the planning stages when projects are seeking funding to ensure that expectations can be met, including access to specific areas. In order to meet project goals, initial site-preparation details should be discussed, and there may be associated costs that need to be reflected in any funding proposal. As resources are available, Sanford Laboratory personnel may be able to assist with the development of cost estimates for performing work at the facility (including nominal estimates for contracted services).

If Sanford Laboratory determines that a project can be performed safely at the facility, a formal letter can be issued to support a funding request; in return Sanford Laboratory requests a copy of the final proposal narrative for our records.

Experiments are welcome at Sanford Laboratory even without prior interactions or a prior support letter.

4.0 PROJECT DOCUMENTATION

The documents that establish and define a relationship between an experiment and Sanford Laboratory are outlined below:

4.1. *Experiment Planning Statement:* The Experiment Planning Statement (EPS) is intended to allow Sanford Laboratory to understand experiment requirements as well as critical interfaces between the experiment and the facility. EPS elements include project summary, list of equipment, space and infrastructure needs, description of the hazards, personnel access requirements, project schedule and an initial decommissioning plan. The EPS will be reviewed by Operations (Underground Access and/or Facility Infrastructure) and Engineering personnel. Once iterations on content converge, the Science Liaison Director will sign for the receipt of the completed document. The EPS document will be updated annually or as necessary if significant changes are proposed to the baseline. Sanford Laboratory maintains a template for the EPS (see References section). For experiments with

a significant amount of equipment (several pallets or more), a manifest with detailed information on equipment arriving at the Sanford Laboratory is required, and a manifest template is available. What-If template is also available to understand an experiment's dependency on facility infrastructure.

- 4.2. Memorandum of Understanding:** The Memorandum of Understanding (MOU) establishes an initial baseline relationship between the South Dakota Science and Technology Authority (Operator of the Sanford Underground Research Facility) and the experiment and outlines general expectations of both the Sanford Laboratory and the experiment, including insurance requirements, adherence to the applicable requirements defined in the Environment, Safety and Health manual, and a nominal decommissioning plan. The MOU is not legally binding and may be signed by experiment representatives or institutional administrators. The MOU document will be updated as necessary if significant changes are proposed to the baseline, including a change of location. Occupancy of shared laboratory space(s) will be coordinated by Sanford Laboratory. Sanford Laboratory maintains a template for the MOU (see References section). The MOU is signed by the Sanford Laboratory Director.
- 4.3. Services Agreement(s):** A General Services Agreement (GSA) outlines obligations and associated costs for each party per occupied space. GSA documentation aligns with Sanford Laboratory fiscal year (Oct 1 – Sep 30) and is updated annually. Some charges (e.g., significant utility usage) may be billed for non-DOE research groups. Smaller groups (DOE or otherwise) with modest needs may not need this type of agreement. Commercial entities are charged fees based on space occupancy and operations as well as for project personnel access and for any Sanford Laboratory personnel acting on behalf of the project. Contracts may be needed for specific labor or non-labor arrangements (e.g., labor requiring Sanford Laboratory to backfill capacity, site-preparation activities and materials, etc). Services agreements (GSA and/or contracts) are signed by the Laboratory Director.
- 4.4. Insurance:** Evidence of both Workers' Compensation and general liability coverage are required from each institution with personnel performing work at the Sanford Laboratory. The Sanford Laboratory risk manager will assess liability requirements. Sanford Laboratory will deny site access to individuals who do not have current insurance coverage. A Sanford Laboratory memo is available that covers details of the insurance requirements (see References section). Experiment representatives are also asked to provide Human Resource contacts to expedite any emergency communication.
- 4.5. Decommissioning Plan:** An initial plan for how the experiment will be decommissioned is required in the Experiment Planning Statement, and prior to the end of a project a more complete description of decommissioning is required. Authorization is required for decommissioning. Sanford Laboratory maintains a template for the Decommissioning Plan (see References section).

5.0 ENVIRONMENT, SAFETY AND HEALTH

- 5.1. Hazard Analyses:** Work planning and hazard analysis are required for all work, including research activities. Experiments are required to document work steps and associated hazard mitigation in a procedure or job hazard analysis (JHA). Procedures are reviewed by appropriate ESH personnel, subject matter experts (including Engineering representatives) as well as the Science Liaison Director (or designate). An Experiment Hazard Assessment

Summary is required for projects with significant hazards and Sanford Laboratory maintains a template (see References section); the hazard assessment document is reviewed by the Experiment Health & Safety Manager and the Science Liaison Director (or designate). Science-related safety policies and procedures are addressed in Chapter 8000 of the Sanford Laboratory ESH manual and include review considerations, cryogen safety and radiation safety. Separate hazard analyses, including quantitative analysis, may be required for some hazards such as for oxygen deficiency hazards (ODH). Certifications are required for some equipment such as pressure systems.

5.2. Inventories: Experiments are required to maintain inventories of potentially hazardous items, including chemicals, electrical equipment and radioactive materials. Specific additional considerations are addressed below:

5.2.1. Chemicals: All chemicals must be approved and added to the chemical inventory before they can be brought onsite. Approved chemicals must have a Safety Data Sheet (SDS) on file. Appropriate storage must also be considered. Sanford Laboratory maintains an inventory template for chemicals (see References section).

5.2.2. Electrical Equipment: Electrical equipment requires an inspection prior to use. Sanford Laboratory maintains an inventory template for electrical equipment (see References section).

5.2.3. Radioactive Materials: Radioactive materials (including NRC-exempt sources) need to be included on an inventory and transportation of radioactive sources (including NRC-exempt sources) to or from Sanford Laboratory property must be coordinated with the Sanford Laboratory Radiation Safety Officer (RSO). Only individuals approved by the Sanford Laboratory RSO can handle radioactive sources on Sanford Laboratory property. Except in special circumstances, all radiation sources must be locked in a safe when not in use. Sanford Laboratory maintains an inventory template for radioactive materials (see References section).

5.3. Training: Some ES&H hazards identified in the experiment hazard analysis may be mitigated through training. The experiment is required to identify, manage and track training for individual workers, including task-specific training. Sanford Laboratory provides some general safety and awareness training (“General Safety – Basic” and associated Annual Refresher Training for those individuals onsite for 40 hours or more per year) as well as site-specific training for laboratories and other areas accessed by researchers. Full waivers for general safety training are not given for MSHA or OSHA certification. Sanford Laboratory tracks training that it provides but since additional experiment resources may be needed in order to provide some required training, Sanford Laboratory training records may not be complete. Experiment representatives must be able to provide proof of training if requested by Sanford Laboratory. An example of a matrix used for tracking personnel training is maintained by the Sanford Laboratory (see References section). All personnel coming onto Sanford Laboratory property are required to sign the “Acknowledgement of Risk” and “Release, Agreement Not to Sue and Waiver”.

6.0 REVIEW PROCESS

Considerations for safety reviews are outlined in the Sanford Laboratory ES&H manual (Chapter 8000). Generally, experiment reviews are commensurate with the associated hazards. All

hazards are reviewed by appropriate ES&H and Science personnel, with other Sanford Laboratory resources identified as appropriate (e.g., Engineering). The Science Liaison Director may convene a Safety Readiness Review Committee for complex projects or those with significant hazards. One or more reviews may be held for a given experiment and may align with specific stages or locations. Recommendations or action items resulting from reviews are tracked using Sanford Laboratory database tools and are closed with concurrence by both the Science Liaison and ES&H Directors.

7.0 INTEGRATION

A number of resources are involved in integrating an experiment and its associated personnel into Sanford Laboratory operations and for maintaining and sustaining a strong relationship throughout the lifetime of the experiment.

7.1. Facility Access

- 7.1.1. **General:** Forms are available in order to gather basic personal information, sign-up for scheduled training classes and to receive IT accounts. Once researchers complete the “General Safety – Basic” training class, they are eligible to be issued a personal facility access badge with appropriate access permissions.
- 7.1.2. **Underground Access:** The Sanford Laboratory currently offers a 4-day work week (alternating Mon-Thu and Tue-Fri) and can accommodate 24-hour access as requested. Cage schedules are maintained indicating specific times when researchers can go down or up (see References section). Currently, personnel and materials are transported via the Yates Shaft.
- 7.1.3. **Facility Guides:** Enhanced emergency response training is available to enable researchers to be authorized as a Facility Guide (see ESH Manual), which allows groups additional scheduling flexibility, especially for facility holidays or non-standard shifts.
- 7.1.4. **Emergency Access:** Sanford Laboratory recognizes that conditions may arise requiring emergency access to experiment equipment, and processes have been developed to accommodate researchers (see References section).

7.2. Planning and Communication

- 7.2.1. **Shipping and Transport:** The Sanford Laboratory receives materials for many groups from many vendors. Guidelines for shipping materials to the Sanford Laboratory are available and an online tool is available for scheduling transport underground. A special form has been developed for high-value items to ensure expectations for both researchers and facility personnel are identified (see References section).
- 7.2.2. **Work Planning:** Details of research activities need to be communicated to Sanford Laboratory, including the proposed location(s) and cage times, personnel, work procedures, materials and any facility support that is required to accomplish the work. A work plan template is maintained (see References section), which is used by Sanford Laboratory personnel to approve a trip and to enter the relevant details in

the Sanford Laboratory Trip Plan database; specific representatives from some research groups may interact directly with the Trip Plan database.

- 7.2.3. Shift Reports:** Each research group is expected to document their activities after completion of a shift according to the shift report template (see References section). In particular, the shift report includes a summary of the research activities as well as any comments, recommendations, irregularities near-misses or incidents. Acts of safety are also strongly encouraged. The personnel hours recorded in the experiment shift reports are compiled by the Sanford Laboratory and serve a number of purposes including for safety statistics.
- 7.2.4. Incident Reports:** Injuries or significant operational upsets qualify as an incident and must be reported to the Sanford Laboratory (see ESH Manual). Sanford Laboratory personnel can assist with investigations as necessary. Relevant facility incidents will be shared with researchers.
- 7.2.5. Evacuation Drills:** The Sanford Laboratory is committed to conducting regular evacuation drills that involve facility staff as well as researchers. Sanford Laboratory recognizes that it is important to minimize the impact these drills have on research activities and in particular it do not want to compromise valuable progress and/or equipment. Guidelines for conducting evacuation drills are available (see References section).

7.3. Science Integration

- 7.3.1. Project Mailing List:** A project mailing list called “Project Team” is intended as a way of communicating information on various general topics to all Sanford Laboratory stakeholders, including researchers who register.
- 7.3.2. Science Integration Meetings:** Regular meetings are held between facility representatives (including representatives from Science, Operations, ESH and management) and representatives from the main research groups to discuss both facility and experiment logistics items. Key elements from all of the recent shift reports are shared with the group; the researcher representatives are expected to communicate important items with their respective collaborations.
- 7.3.3. Management Meetings:** Regular meetings are held between facility management (including the Science Liaison, Laboratory and Executive Directors) and experiment management/PIs for the main research groups to identify and resolve any critical issues that arise.

7.4. External Review and Evaluation: A Sanford Laboratory scientific program advisory committee may review/evaluate experiments when appropriate. Although there have been scientific program advisory committees in the past, there is not one currently.

8.0 AUTHORIZATION

Experiments request authorization for specific activities or phases of their project, including initial installation, key phases with significant hazards (e.g., cryogenics, lead, use of radioactive materials) as well as decommissioning (Sanford Laboratory maintains a template of the generic authorization request memo; see References section). The experiment request is evaluated and based on the status of various implementation elements the Science Liaison Director submits a

recommendation memo with concurrence of the ES&H Director to the Sanford Laboratory Director. The Sanford Laboratory Director issues the formal Authorization To Proceed (ATP) memo.

9.0 REFERENCE AND RELATED DOCUMENTS

9.1. References

- Experiment Planning Statement Template (Document-34460); also <http://www.sanfordlab.org/science/new-experiment-information>
- Manifest Template (Document-127051)
- Experiment/Facility Requirements What-If Template (Document-99303)
- Experiment Memorandum of Understanding Template (Document-69417)
- Experiment Insurance Requirements (Document-60095)
- Experiment Decommissioning Plan Template (Document-125942)
- Experiment Hazard Assessment Summary Template (Including Worksheet) (Document-98635)
- Chemical Inventory Template (Document-58346)
- Electrical Equipment Inventory Template (Document-82383)
- Radioactive Materials Inventory Template (Document-82391)
- Experiment Training Matrix Example (Document-98644)
- Yates Shaft Cage Schedule (Document-85910)
- Experiment Access Instructions (Document-118029)
- Shipping Instructions (Document-116863)
- Yates Manifest: https://docs.sanfordlab.org/cfide/mtl_view.cfm
- High-Value Handling Form (Document-82438)
- Work Plan Template (Document-69078)
- Trip Plan: https://docs.sanfordlab.org/cfide/ta_view.cfm
- Shift Report Template (Document-69079)
- Science Evacuation Drill Memo (Document-133579)
- Experiment Authorization To Proceed Request Memo Template (Document-127061)

9.2. Related Documents

- Sanford Laboratory ESH Manual (Collection-15104); also <http://www.sanfordlab.org/ehs/manual>

Appendix

Schematic showing routes for communication and authorization. Solid lines indicate formal responsibility, dashed lines informal routes.

