



# Princeton Plasma Physics Laboratory

## Lithium Safety Program

Revision 0

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### SIGNATURES ON FILE

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## 1.0 Applicability

The PPPL Lithium Safety Program defines the hazards, controls, requirements and responsibilities for the safe usage, storage, handling, and disposal of lithium in operations now and in the future. This program applies to any PPPL onsite operation or experiment using or planning to use Lithium and applies to proposed changes to an operation or experiment that uses Lithium at PPPL. This program also applies to the fabrication and assembly of systems or components to be used on-site and sent to collaborators. It does not apply to the off-site assembly or operation of systems or components off-site at collaborator facilities, which are governed by the collaborator and their requirements and controls.

If processes, constructions or operations of systems or components have never been employed onsite, and if no onsite testing or development program for these systems is instituted the Lithium Experts Committee (LitEC) may state that the Lab lacks the expertise to predict the performance of a system and may make a recommendation to the ES&H Executive Board against proceeding with such work or projects.

### 1.1 Applicability of NFPA 484, Standard for Combustible Metals

NFPA 484 is applicable to PPPL laboratories that handle, use, or store more than 0.23 kg (1/2 lb) of alkali metals. Regarding Chapter 11 of the standard on alkali metals, the requirements of Sections 11.1.2 through 11.1.4 apply to new and existing lithium facilities. The requirements of other sections of Chapter 11 apply only to new facilities (i.e., approved for construction or installation on or after the effective date of NFPA 484-2015 on May 19, 2014), unless the authority having jurisdiction (AHJ) determines that an existing situation presents an unacceptable degree of risk and therefore applies retroactively any portions of Chapter 11 deemed appropriate. The AHJ for NFPA 484 is the DOE Princeton Site Office Manager, unless otherwise delegated. See also Section 6.2.2 of this document.

## 2.0 Introduction and Overview

Lithium is a highly reactive and flammable alkali metal that is used in experiments within PPPL. Lithium is corrosive to human tissue, highly reactive to body moisture and several reaction products are toxic as well. It requires special storage, handling, and work controls that are carefully reviewed and approved.

As is the case for all work at PPPL, lithium work activities require adherence with the PPPL programs for Integrated Safety Management, Worker Safety and Health, PPPL Work Planning and Control. This includes completing online Work Plans and related requirements per [ENG-032, Work Planning Procedure](#) and completing Job Hazard Analyses per [ESH-004, Job Hazard Analysis](#). Here are some facts that apply to lithium work at PPPL:

1. PPPL has a Lithium Safety Program that is administered by the Lithium Experts Committee and the ES&H Executive Board. Reference [O-045, Lithium Experts Committee Charter](#)
2. The Lithium Experts Committee (LitEC) must review any proposed onsite lithium work or storage involving more than 1 gram of lithium or any amount of finely divided lithium (such as powder). This applies to any operation or experiment using or planning to use Lithium and also to proposed changes to those operations and experiments.

3. Area limits (Maximum Allowable Quantities) for storage or usage of lithium in PPPL areas are prescribed in [ES&H Directive 5008, Section 8, Chapter 1, Chemicals , Part 1.13, Lithium](#). A limit of 5 pounds (2.26 kg) applies to most instances of lithium use onsite; but in some areas, depending on area use, a limit of 50 pounds (22.67 kg) applies.
4. Work Planning applies to onsite lithium work, whether performed for PPPL or for collaborations.
5. Work Planning forms must have the box checked for “Review of Materials for Lithium Impact and Safety (Email notifications)”. This will trigger awareness of the Lithium Experts Committee to review and become engaged with the work, as appropriate.
6. A Failure Modes and Effects Analysis (FMEA) is required for all lithium related designs whether for onsite use, or for collaborations. See procedure [ENG-008 \*Failure Modes and Effects Analysis\*](#).
7. Each use of Lithium may constitute very different conditions and requirements for safe use. Changes or Temporary Modifications for processes using Lithium must be planned following [ENG-036 \*Control of Temporary Modifications\*](#).
8. A pre-job brief is required prior to conducting any lithium related activity. Consideration should be given to include the Responsible Line Manager, Safety, Environmental Services, Site Protection, and representatives of the Lithium Experts Committee.
9. Lithium workers must complete Lithium Safety Training.
10. Workers in lithium areas must be briefed on the hazards and how to respond to emergencies.
11. Lithium workers must read and become familiar with the procedures for any lithium related activities before performing those activities.
12. Written Technical Procedures are required for each lithium activity at the Lab. Procedures shall follow the requirements set forth in PPPL Procedure [ENG-030, \*PPPL Technical Procedures\*](#) and address the requirements found in PPPL Procedure [ENG-055, \*Conduct of Operations\*](#).
13. Lithium Technical Procedures must be reviewed by the Lithium Experts Committee and can be presented to one of the Chairpersons.
14. Workers may not attempt to fight lithium fires or use Lith-X extinguishers unless they have successfully completed lithium firefighting training and don the required personal protective equipment (PPE). Workers who have not passed lithium fire fighting training must immediately exit the area if there is a lithium fire and notify Site Protection at phone number 3333.
15. Contact the Environmental Services Division (ESD) to arrange for disposal of Lithium in accordance with procedure [EWM-001, \*Hazardous Waste Management\*](#)
16. A Safety Assessment Document (SAD) is required for each project using > 1 gram of Lithium.

**Lithium use and storage locations that have been reviewed are listed at**

**<http://www-local.pppl.gov/esh/LithiumSafety.html>**

### 3.0 References

DOE Order O422.1 Conduct of Operations

DOE Hdbk	1081-2014 Primer on Spontaneous Heating and Pyrophoricity
O-021	ES&H Executive Board Charter
O-045	Lithium Experts Committee Charter
P-003	Environmental, Safety and Health Policy
P-039	Hazard Analysis and Controls
P-048	Safety Analysis and Review System Program
P-085	Environment, Safety and Health Policy for Off-site Work
GEN-006	Investigation and Follow-up of Adverse Events and Conditions including Occurrence Reporting and Price Anderson Amendment Act Reviews
ESH-004	Job Hazard Analysis
ESH-015	Hazard Assessment by Emergency Response Zone
EWM-001	Hazardous Waste Management
ENG-008	Failure Modes and Effects Analysis
ENG-030	PPPL Technical Procedures
ENG-032	Work Planning Procedure
ENG-036	Control of Temporary Modifications
ENG-055	Conduct of Operations
TR-001	Laboratory Training Program
MC-005	Shipment of Equipment, Materials and Supplies to Off-Site Location
PPPL Integrated Safety Management Systems Description	
ESHD 5008	Section 5 Chapter 5 Fire Safety Assessments
ESHD 5008	Section 5 Chapter 9 Fire Protection For Special Hazards
ESHD 5008	Section 8 Chapter 1 Chemicals
ESHD 5008	Section 8 Chapter 3 Chemical in Laboratories
ESHD 5008	Section 11 Chapter 1 Operations Hazard Criteria
ESHD 5008	Section 11 Chapter 2 Safety Certification System
OSHA 29 CFR 1910 Subpart H Hazardous Materials	
OSHA 29 CFR 1910 Subpart Z Toxic and Hazardous Substances	
FMC Safe Handling Guide for Lithium Metal	
NFPA 1	Fire Code
NFPA 101	Life Safety Code
NFPA 484	Standard for the Combustible Metals
NFPA 5000	Building Construction and Safety Code
LLNL 21.14	Safe Handling of Alkali Metals
SDS	QS-SDS-037 Lithium

## 4.0 Responsibilities

### 4.1 Responsible Line Manager

Responsible Line Managers/Department heads are responsible for ensuring the implementation of this program within their areas. The RLM is also responsible for maintaining and annually updating the quantity, training and control data for each area where the Lithium is to used or stored.

### 4.2 Principal Investigator

The Principal Investigator is responsible for:

- A. Developing the Chemical Hygiene Plan per ESHD 5008 Section 8 Chapter 3 addressing the specific use of Lithium within the operation.
- B. Developing the Safety Assessment Document (SAD) for the operation.
- C. Ensuring the Lithium Training, described in Section 8 of this document, covers the needs for the operation.

- D. Developing the Operating Procedures for the operation.
- E. Developing the JHA(s) and other information for the laboratory and/or experiment which will be using Lithium.
- F. Ensuring all workers have been trained in the use of Lithium, the associated hazards, controls and emergency response requirements and that the controls are implemented and used properly.
- G. The Principle Investigator will be considered as the Lithium Owner for the project and storage of Lithium.

#### **4.3 Supervisor**

Line Supervisors are responsible for:

- A. Reviewing the type of work to be performed.
- B. Ensuring that employees are not being exposed to air concentrations of Lithium compounds over the materials' Permissible Exposure Limit (PEL) and Threshold Limit Value (TLV).
- C. Providing proper and safe storage for all chemical substances.
- D. Instructing their workers about:
  - i. The possible hazards associated with the chemicals.
  - ii. The safety precautions that must be observed.
  - iii. The consequences of an accident.
  - iv. The proper actions to take if an accident were to occur.
- E. Properly disposing of Lithium and Lithium containers.
- F. Verifying that all workers in the area have been properly trained on Lithium Hazards.

#### **4.4 Industrial Hygiene of the Safety Division**

Industrial Hygiene (IH) is responsible for:

- A. Assisting supervisors and workers with information on the hazardous properties of materials.
- B. Recommending methods for controlling the hazards of specific operations.
- C. Training supervisors and workers regarding the proper way to handle Lithium in order to minimize hazards.
- D. Monitoring the work environment to assess employees' exposures to Lithium compounds, using only American Industrial Hygiene Association (AIHA) Accredited Laboratories for sample analysis.
- E. Reviewing and approving/disapproving procedures and facilities used for Lithium handling.

#### **4.5 Lithium Experts Committee**

The Lithium Experts Committee is responsible for:

- A. Providing expertise for reviewing safety aspects of PPPL lithium activities, and for evaluating improved approaches for safe lithium handling.
- B. Reviewing the safety aspects of proposed new experiments using lithium, and significant modifications to existing lithium experiments.
- C. Promoting the development of improved approaches to lithium handling.
- D. Performing other tasks as directed by the ES&H Executive Board Chairperson or the LitEC Chairperson.
- E. Documenting key decisions and recommendations made by the committee and sending those documents to the Head of ES&H to be kept with records of the ES&H Executive Board.

#### **4.6 Workers**

Area workers are responsible for:

- A. Wearing and using personal protective and other equipment issued to them in accordance with instructions and training provided by their supervisors and IH that have been designated and approved for that particular job.
- B. Cleaning, maintaining and properly storing the protective equipment (see ESHD 5008 Section 8, Chapter 6, "Personal Protective Equipment").
- C. Following handling instructions in accordance with procedures defined for the operation.
- D. Reporting malfunctioning engineering controls and ventilation systems to their supervisors.
- E. Completing required lithium training prior to working in areas where lithium is used.

#### **4.7 Occupational Medicine Office**

The Occupational Medical Office is responsible for having a treatment action plan covering the exposure of employees to Lithium, ready and available to implement in the case of exposure to Lithium or Lithium products of combustion.

#### **4.8 Site Protection**

The Site Protection Division is responsible for:

- A. Ensuring that all locations using and storing Lithium have been identified per ESHD 5008 Section 5 Chapter 5, Fire Safety Assessments and that response plans are in place if an event requiring a response occurs.
- B. All requirements of ESHD 5008 Section 5 Chapter 9, Fire Protection for Special Hazards are current and in place.

#### **4.9 Procurement**

Procurement is responsible for assuring that all orders for Lithium have been approved by Industrial Hygiene (IH) of the Safety Division and that personnel placing the orders are approved for ordering Lithium.

#### **4.10 Environmental Services Division**

The Environmental Services Division is responsible for the packaging and transport of Lithium waste to meet Federal and State regulations.

#### **4.11 Fire Protection Engineer**

The Fire Protection Engineer is responsible for advising the Lithium Experts Committee that the location for Lithium use meets the applicable criteria described in NFPA 484 for Alkali Metals (see Sections 1.1 and 6.2.2).

### **5.0 Safety Guidelines**

#### **5.1 Safety Assessment Document**

A Safety Assessment Document (SAD) is required for each project using > 1 gram of Lithium. Safety assessments are performed to systematically identify the hazards of a project, to describe and analyze the adequacy of the measures taken to eliminate, control or mitigate identified hazards, and to analyze and evaluate potential accidents and their associated risks. Guidelines in ESHD 5008 Section 11 Chapter 1 are to be followed for SADs. The contents of SADs for specific operations using lithium are to be developed in consultation with members of the Lithium Experts Committee and the ES&H Department. Reviews and approvals of lithium-related SADs and authorizations for projects must follow the appropriate requirements in ESHD 5008 Section 11, and should include involvement of the Lithium Experts Committee.

If the scope of work for the lithium activity changes, the SAD must be revised. The SAD should include topics such as:

- A. Area access controls,
- B. Emergency actions,
- C. Compatibility of materials,
- D. Building/room compatibility for Lithium,
- E. Ventilation needs,
- F. Lithium containment,
- G. Fire protection,
- H. Humidity and water control.

The PPPL ESHD 5008 Section 11 Chapter 1, Operations Hazards Criteria, should be used to assist in the classification of the operation's Hazard level (Low, Moderate or High) for each operation that requires the use of Lithium.

The Safety Assessment Document (SAD) shall be reviewed by:

- A. Lithium Experts Committee
- B. PPPL Safety Review Committee (SRC)
- C. Project Activity Certification Committee (ACC), if appointed
- D. Associate Director for Engineering and Infrastructure (or his designee(s))
- E. Fire Protection Engineer
- F. Head of ES&H
- G. Head of Safety
- H. Deputy Director for Research
- I. Deputy Director for Operations, (Chair, ES&H Executive Board)
- J. Department Head for the proposed research
- K. Any other persons deemed necessary by the SRC or Head, ES&H Executive Board.

The use of this analysis along with the specific requirements cited in this document will be used to develop the controls required for the safe use of Lithium for each operation using it. It is notable that while a classification of a Low Hazard level normally does not require a SAD, the use of >1 gram of Lithium will always require the development of a SAD to ensure a safe environment and handling controls are in place to reduce or eliminate exposure to this hazardous material.

Procedure ESH-004, Job Hazard Analysis, and the hazard analysis guidelines in ESHD 5008 Section 11 Chapter 1 is to be used to determine all potential hazards and risks for the operation. For the purposes of this program, all handling steps for Lithium must be documented and reviewed. Analysis of the impact of possible Lithium events shall be based on the maximum amount of Lithium expected to be present during the operation and/or storage.

**Note: Any operation that has in use or in storage 1 Kg or more of Lithium cannot be classified as a Low Hazard.**

## 5.2 Facility Requirements

### 5.2.1 General

The Safety Analysis (SAD) should include a description of the facility the Lithium is to be used in. The description includes the operation's equipment, the types of systems in use (e.g., Vacuum, Compressed Gas, etc.), the processes to be used, the environment (e.g., open lab space, enclosed experimental space, etc.), and equipment used to assure safe operations. The use of any existing

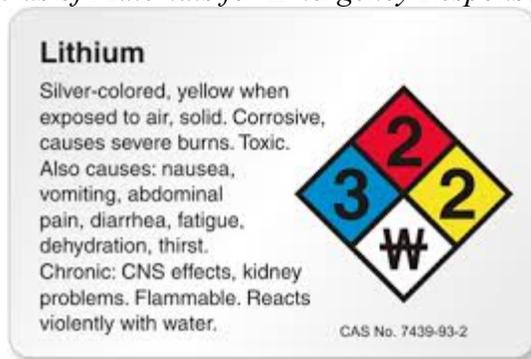
facility for Lithium storage or operations must be approved by the LitEC and meet required safety criteria for existing facilities.

Items such as fume hoods, glove boxes, storage cabinets, current fire suppression equipment and systems, HVAC systems and alarm activation controls as needed for safe lithium operations should be defined. Provide details of capabilities applicable for each system (air flow, temperature control, physical dimensions, etc.) to provide reviewers with an understanding of the operations capabilities to safely use Lithium. All areas that use > 1 gram of lithium shall have controls on access to the area.

### 5.2.2 Specific Requirements for Lithium Facilities (based on NFPA 484)

These requirements apply to new Facilities, and are to be used where practicable for existing Facilities that handle, use, or store more than 0.23 kg (1/2 lb) of lithium.

- A. In areas where lithium is stored, handled, or processed, floors shall be a solid surface and shall be constructed with materials that are compatible and nonreactive with lithium and capable of providing containment of molten lithium resulting from fire.
- B. All processes that utilize liquid Lithium must have a double containment system capable of shielding Lithium from the atmosphere and capable of containing liquid Lithium.
- C. Floor drains shall not be permitted.
- D. Non process piping that can contain water or steam under normal use (e.g., domestic water pipes, roof drains, waste pipes) shall not be permitted in areas containing alkali metals.
- E. Water pipes required for processing and safety operations shall be permitted.
- F. Piping permitted by 6.2.2. E. shall be equipped with an emergency shutoff that is identified and located outside the area.
- G. The floor shall be sloped in such a manner to prevent water from entering the alkali metals area.
- H. Alkali metal handling, processing, and storage areas having quantities greater than 2.3 kg (5 lb) shall have diamond markings as specified in NFPA 704, *Standard System for W 2012 Edition the Identification of the Hazards of Materials for Emergency Response*, to make emergency responders aware of the presence of water reactive materials within the area.
- I. The diamond markings shall be at least 457.2 mm (18 in.) on each side with appropriate size numbers and symbols as specified in NFPA 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response* and depicted in this figure.



Lithium CAS Sign

- J. Fire-extinguishing agents compatible for the hazards present shall be readily available.
- K. Only listed, Class D (Lith-X) extinguishing agents and those agents shown to be effective for controlling combustible metal fires shall be provided in areas.
- L. Lithium metals shall be stored only on the ground floor.
- M. Proper ventilation for Hydrogen shall be required for all Lithium areas.



requirements found in PPPL Procedure ENG-055, Conduct of Operations, and must include the following, as applicable (from ESHD 5008 Section 8 Subchapter 1.13.4):

- A. General equipment set-up and preparation.
- B. An assessment of fault modes and their mitigation or elimination.
- C. Fall-back, hold points and exit strategies at key steps in the activity
- D. Cleanup process for removal of excess lithium and for closure of the activity, as well as handling and/or final disposition of equipment.
  - i. Dust collector (vacuum) filter media made from synthetic fabrics that accumulate static electric charges shall not be used.
  - ii. Vacuum cleaners shall be used only if listed or approved for use with Group E dusts and shall be identified as for use with metal dusts only.
- E. Handling of additional lithium related hazards such as:
  - i. Water cooling or other water sources near lithium.
  - ii. Molten lithium, especially above 220 Celsius, since lithium will ignite spontaneously with air at this temperature.
  - iii. Work with liquid lithium above 320 Celsius in an oxygen depleted atmosphere, as it will form solid nitride on contact with nitrogen, creating hazardous system blockages. If the partial pressure of nitrogen is sufficiently high, lithium will burn with nitrogen in the absence of oxygen.
  - iv. Pressurization of liquid lithium that could result in rupture or release.
- F. Training and qualification requirements for personnel performing the procedure.

A pre-job brief is required prior to conducting any lithium related activity. Consideration should be given to include the Responsible Line Manager, Safety, Environmental Services, Site Protection, and representatives of the LitEC. A template for Lithium Technical Procedures can be found in Attachment 1.

## **7.0 Training Requirements for Lithium Exposure and Usage**

The following requirements apply to all areas where > 1 gram of Lithium is used or handled.

- A. General Lithium Hazard Awareness Training has been developed and is maintained by the Lithium Experts Committee and is required for all employees working in Lithium areas. This training is available on line on the Training Human Resources e-learning page at: [Lithium Safety](#). This training does not constitute qualification for working with lithium operations.
- B. Training to qualify for Lithium procedures requires the operator to read the operation procedure, advise the RLM the operation procedure has been read and to follow a previously qualified operator through the procedure at least once.
- C. All employees in areas handling Lithium shall be trained initially and annually in the following:
  - i. Instruction on behavior and procedures in case of fire or explosion
  - ii. The means of safe and proper evacuation of the work area.
  - iii. Equipment operation, start up and shutdown and response to alarm or upset conditions.
  - iv. The importance of housekeeping in minimizing hazards.
- D. Any employee designated as a fire watch for Lithium operations shall have training in the utilization of Lithium fire-extinguishing equipment, procedures for fighting Lithium fires and what is the proper PPE to be used when fighting a Lithium fire.
- E. All ESU personnel shall be trained in how to react to any type of Lithium event.

## 8.0 Lithium Control Measures

### 8.1 Engineering Controls

The following engineering controls shall be used when developing procedures for Lithium use:

- A. Lithium shall be transferred for experimental use within glove boxes or glove bags with controlled atmospheres.
- B. An adequate ventilation system shall be in place where Lithium activities occur to provide exhaust for Hydrogen gases that may be created while using Lithium.
- C. Transport and equipment designed for use with Lithium shall include features allowing dismantling and decontamination.
- D. When an inert gas is used for blanketing Lithium activities, Oxygen levels shall be monitored at all times where employees may be at risk.
- E. Lithium storage and use locations shall meet all applicable NFPA facility requirements (see Section 1.1) unless a waiver has been granted by the LitEC and the Authority Having Jurisdiction (AHJ), where required by the NFPA standard.
- F. Waste disposal shall follow all applicable hazardous waste regulations for Lithium.
- G. Decontamination of tools and equipment in contact with Lithium shall occur in a suitable lab hood.
- H. Access to Lithium areas shall be card reader controlled.

### 8.2 Administrative Controls

The following administrative controls shall be utilized as applicable :

- A. A Safety Assessment Document for Lithium operations when using >1 gram of Lithium.
- B. A Procedure shall be written for all Lithium activities.
- C. Industrial Hygiene review of JHA's for Lithium use.
- D. All employees handling lithium shall have had all required Training.
- E. Lithium shall be kept away from incompatible materials.
- F. Procurement will ensure only specified persons may acquire Lithium.
- G. Any changes to written Procedures shall require additional review.
- H. Lithium workers will exercise stop work authority (per P-012) if conditions require.
- I. No food or beverages are allowed in Lithium rooms.
- J. Waste Lithium will be stored in designated containers and will be limited in work areas.
- K. All Lithium areas shall have a current posted CLASP sign.

### 8.3 Personal Protective Equipment

- A. Requirements for PPE shall be based on a documented JHA analysis of the potential for Lab personnel to be exposed to hazards from combustible and molten metals during Lab operations and maintenance activities.
- B. The PPE hazard analysis shall determine which operations and activities warrant use of primary PPE for molten metals, primary PPE for dust flash fires, and secondary PPE for general work and maintenance in facilities with combustible metals.
- C. Secondary PPE for general work areas near or containing combustible metals:
  - i. Safety glasses with side shields and hard hats shall be required as part of the secondary PPE.
  - ii. Outer garments worn as secondary PPE shall be designed to prevent potential accumulations of combustible metal dust by not having exposed pockets or cuffs, and shall have a smooth outer surface that allows dust to be readily brushed off.
  - iii. Secondary PPE shall have some measure of flame resistance determined as part of the PPE hazard analysis.

- iv. When worn in areas containing dusts with minimum ignition energies less than 100mJ, secondary PPE shall be made of static-dissipative materials.
  - v. Secondary PPE worn in areas containing alkali metals shall have an external clothing layer that is impervious to body moisture.
- D. Proper protective clothing, respiratory protection, and adequate eye protection shall be used by all responding fire-fighting personnel assigned to a combustible metal fire equipped to the requirements of NFPA 600, *Standard for Industrial Fire Brigade Member Professional Qualifications*.

#### **8.4 Hazardous Waste Disposal**

Disposal of Lithium is handled according to EWM-001 by the Environmental Services Division (ESD). All Lithium users must contact the ESD for pickup and disposal of waste Lithium. The preferred disposal method for Lithium metal is by submerging it in dry mineral oil and completing a Hazardous Waste ID tag as per procedure EWM-001.

#### **Attachments**

Attachment 1 Lithium Technical Procedure Template

# Attachment 1

## Template for Lithium Technical Procedures

<b>Princeton Plasma Physics Laboratory Procedure</b>			
<b>Procedure Title:</b>			
<b>Number</b>	<b>Revision:</b>	Effective Date:	
		Expiration Date: <i>(2 yr. unless otherwise stipulated)</i>	
<b>Procedure Approvals</b>			
Author			Date
ATI			Date
RLM			Date
LitEC			Date
Responsible Division:			
<b>Procedure Requirements designated by RLM</b>			
LABWIDE:			
	Work Planning Form # _____ (ENG-032)		Lockout/Tagout (ESH-016)
	Confined Space Permit (5008, Sec. 8, Chap 5)		Lift Procedure (ENG-021)
	Master Equip. List Mod (MC-002/MC-003)		ES&H Review (NEPA, IH, etc.)
	RWP (HP-OP-20)		Independent Review
	ATI Walkdown		Pre-job Brief
	Post-job Brief		Job Hazard Analysis – JHA (ESH-004)
	Run Copy Required (performance of procedure must be documented and archived per ENG-030 page 10)		Special archiving requested for completed Run Copies: _____
	Lithium Safety Program		
D-SITE SPECIFIC:			
	D-Site Work Permit (OP-AD-09)		Door Permit (OP-G-93)
	Work on Tritium Contaminated Sys. (OP-AD-77)		Activity Certification Committee Review
	Pre-job brief (ENG-030)		T-MOD (ENG-036)

The principles and functions of Integrated Safety Management should be considered when developing procedures. The guiding principles are line management responsibility for safety, clear roles and responsibilities, competence commensurate with responsibilities, balanced priorities, identification of safety standards and requirements, and hazard controls tailored to work being performed. The functions are to define the work, analyze the hazard, develop/implement controls, perform the work, and provide feedback and improvement.

## **Section A Purpose**

A brief statement explaining the purpose of the equipment or system to which it applies, the reason the procedure is being run, and the purpose of the document.

## **Section B Scope**

A summary of what the procedure covers or includes, any special circumstances deemed necessary to perform the procedure, and any limitations on the applicability of the procedure for given facility conditions or systems.

## **Section C Responsibilities**

Responsibilities of the various positions involved in the procedure.

## **Section D Definitions**

## **Section E References**

A listing of documents that may need to be accessed and that have information or instructions relevant to the procedure. Unnecessary references should be avoided. References may include appropriate codes and standards (NFPA 484), design drawings, procedures, vendor manuals, etc.

## **Section F Background**

Background information relevant to the procedure g) Special Tools, Equipment, and Materials: List of equipment, tools, apparatus, and consumables needed to perform the procedure which may not be readily available. For each tool that is required to be calibrated, this section must include the associated tool identifier as well as the most recent calibration date.

## **Section G Special Tools, Equipment and Materials**

Special Tools, Equipment, and Materials: List of equipment, tools, apparatus, and consumables needed to perform the procedure which may not be readily available. For each tool that is required to be calibrated, this section must include the associated tool identifier as well as the most recent calibration date.

## **Section H Precautions/Limitations**

Provide a list of potential hazards and how they should be mitigated. This alerts the individuals to the concerns or dangers that may or will exist during execution of the procedure and the safeguards which should or must be implemented. The appropriate warnings and cautions required to protect personnel and equipment are inserted in the procedure prior to the step to which they pertain.

## **Section I Prerequisites**

A list of specific activities or special plant conditions which must be performed or exist prior to execution of the procedure. The supporting systems required to be operational for the procedure should be listed. Verification of performance of prerequisite tests should be listed and documented by a check-list. Prerequisites identified should be clear, concise instructions, each written as a single task. Always include the Lithium area training.

## **Section J Step by Step Instructions**

Instructions for the procedure. Test criteria for test procedures.

## **Section K Acceptance Criteria**

Relevant for test procedures only.

## **Section L Emergency Actions**

Emergency Actions For any anticipated emergencies, steps required to leave system in safe state.

## **Section M Records**

Records required to be maintained

## **Section N Final Conditions**

Final conditions that the system should be left in at the end of the procedure.

## **Section O Completion Signoff Signatures**

Completion Signoff Signatures of ATI, system engineer, physicist, as appropriate, to acknowledge that work has been properly completed and that the implementation and documentation in the run copy of the procedure and any data collected are professional, acceptable, and compatible with proper Conduct of Operations.

## **Section P Appendices**

Appendices For forms, checklists, test data sheets, calibration sheets etc.

## **Section Q Qualifications and Training Requirements**

List all qualification and training requirements, including area training, for those who will execute the procedure.

## **Section R Clean Up**

Any hazardous waste must be identified for disposal. The Environmental Services Section is used to define how all hazardous waste products from the procedure are to be handled. Waste products may include items such as Lithium and Lithium compounds, cleaning solutions (contaminated water or vinegar), rags and wipes and PPE.