

**Princeton Plasma Physics Laboratory  
Procedure**

Procedure Title: **CONDUCT OF OPERATIONS**

Number: <b>D/D/SITE-OP-AD-39</b>	Revision: <b>7</b>	Effective Date: <i>7/22/16</i> (Ref. OP-AD-97) Expiration Date: <i>7/22/19</i> (3 yr. unless otherwise stipulated)
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**Procedure Approvals**

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Responsible Division: **Engineering Department**

**Procedure Requirements  
designated by RLM**

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 (GEN-005)	ES&H Review (NEPA, IH, etc.)
RWP (HP-OP-20)	Independent Review
ATI Walkdown	Pre-job Brief
Post-job Brief	Hazard Analysis
Run Copy Required (performance of procedure must be documented and archived per ENG-030)	Special archiving requested for completed Run Copies:

**D-Site Specific**

D-Site Work Permit (OP-AD-09)	Door Permit (OP-G-93)
Work on Tritium Contaminated Systems (OP-AD-77)	Activity Certification Committee Review
Pre-Job Brief (ENG-030)	T-MOD (ENG-036)

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<b>REVIEWERS (designated by RLM)</b>	
Accountable Technical Individual	A. vonHalle
Test Director	
Independent Reviewer	
D-Site Shift Supervisor	W. Blanchard, R. Camp, C. Gentile
NSTX	
D-Site Caretaking	
Vacuum	
Computer	
Tritium	
Quality Assurance/Quality Control	
AC Power	
Maintenance and Operations Division	
Energy Conversion Systems	
Engineering	T. Stevenson
Materials and Environmental Services	
Water Systems	
Neutral Beam (Heating Systems Branch of Electrical Engineering)	
Radiofrequency (Heating Systems Branch of Electrical Engineering)	
Diagnostics	
Environmental, Safety, & Health	

<b>TRAINING (designated by RLM)</b>			
No training required _____		Instructor _____	
Personnel (group, job title or individual name)	Read Only*	Instruction	Hands-On
NSTX-U Operators & those with NSTX Test Cell Card Access	X		
RLM _____			

\* "Read Only" training for Administrative, Alarm Response, and Emergency Operations procedures must be documented on a Record of Training form (attachment 6). The completed Run Copy will serve as the documentation of "Read Only" training for all other types of procedures.

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## 1.0 PURPOSE

The purpose of this procedure is to define appropriate conduct of operations for D site, in accordance with PPPL policies and procedures.

## 2.0 SCOPE

The scope of this procedure encompasses the definition of conduct, behavior, attitude, and responsibility of staff in performing work to ensure safe, professional, and consistent daily operations at D site. The scope of this procedure applies the principles outlined in the DOE order 5480.19 with a graded approach to activities at D site.

This procedure covers Control, Communication, Documentation, and Operations of activities at D site for all personnel. The intent of this procedure is to stipulate the standards, guidance, and requirements for proper execution of activities, operations, and work, and to reinforce the need for these standards as part of the daily work environment. The importance of good conduct of operations procedures is underscored by the fact that almost all unplanned events have as causal elements the lack of, or bypassing of controls, miscommunications, documentation errors, or complacent operating practices.

Access to D-Site shall be denied to any individual who demonstrates willful non-compliance with this or other procedures or Integrated Safety Management (ISM) principles.

## 3.0 REFERENCES

1. ES&H Manual ES&H 5008
2. PPPL Policies and Procedures
3. ENG-030, *PPPL Technical Procedures for Experimental Facilities*
4. ENG-032, *Work Planning Procedure*
5. ENG-038, *Control of Temporary Modifications*
6. ESH-004, *Job Hazard Analysis*
7. ESH-016, *Lockout Tagout*
8. GEN-006, *Occurrence Reporting and Processing of Operations Information*
9. OP-AD-09, *D Site Work Permits*
10. OP-AD-56, *Control of Equipment and Status*
11. DOE Order 422.1, *Conduct of Operations Requirements for DOE Facilities*
12. QA-012, *Corrective Action Request*
13. *ENG-055, Conduct of Operations*

## 4.0 DEFINITIONS

**Conduct:** the activity, the approach, the methods, the focus, and the deliberate actions of staff in performing work.

**Verify:** an act of double-checking an item, state, status, or position.

**Ensure:** actively determine to completion the desired circumstance.

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#### 4.0 DEFINITIONS (continued)

**Controls Area:** the area required by equipment that controls safety or environmental protection, and the space necessary to operate those controls.

**D Site Shift Supervisor:** the qualified, trained individual responsible to the D-Site Caretaking Manager for the status and care of D-Site and activities therein.

**Cognizant (or Cog):** An individual who is responsible for the job, operation equipment, or organizational unit involved in an activity. This individual has clear, daily, detailed information about a job such that informed decisions can be made regarding conduct of operations issues.

#### 5.0 RESPONSIBILITIES

This procedure shall be followed by all PPPL staff, supervisors, shift supervisors, operators, technicians, workers, ES&H staff, ER/WM staff, subcontractors, and collaborators in performing work at D site. Supervisors will ensure that this procedure guidance, these standards, and requirements are incorporated into work plans and is followed as part of the job. The D site Shift Supervisor will monitor activities for compliance with this procedure, and provide guidance to staff regarding any questions that might arise. The D site Caretaking Manager is the Accountable Technical Individual for this procedure, and will provide the necessary decisions regarding the implementation of this procedure and ensure that training is provided to appropriate staff. The D site Manager approves changes to this procedure through the review process defined by ENG-30.

#### 6.0 CONDUCT OF OPERATIONS POLICIES AND PROCEDURES

This procedure has four categories: Controls, Communications, Documentation, and Operations. Each category represents an area of conduct of operations where recognized good practices exist for ensuring operations excellence. Many levels of interconnection exist between categories, but are not necessarily spelled out in this procedure.

D-Site Conduct of Operations implements the Integrated Safety Management objective of integrating safety into the management of all activities to ensure work is accomplished while protecting the workers and the environment. As such, PPPL adopts the following ISM principles:

- Line Management Responsibility for Safety
- Clear Roles and Responsibilities
- Competence Commensurate with Responsibilities
- Balanced Priorities
- Identification of Safety Standards and Requirements
- Hazards Controls Tailored to Work being performed
- Operations Authorization

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**6.0 CONDUCT OF OPERATIONS POLICIES AND PROCEDURES (continued)**

The following ISM core functions apply with a graded approach to all D-Site work activities using the following five steps:

- Define Work Scope
- Analyze Hazards (ESH-004)
- Develop and Implement Hazards Controls
- Perform Work within Controls
- Provide Feedback and Continuous Improvement

**6.1 CONTROLS**

Administrative, procedural, software, and hardware controls exist to protect the community, the environment, PPPL staff, and equipment from hazard. Operators and workers shall understand that actions on the job can affect these important groups and shall undertake work in a serious, professional, deliberate manner in keeping with procedures.

In performing work, all personnel should use self-checking practices, be aggressively suspicious, use multiple means of check, expect the unexpected, consider responses to the unexpected, and be ready to react.

- STOP and think
- LOCATE correct item
- ADDRESS specific item without incurring change
- VERIFY identity of item, correct state, appearance
- ANTICIPATE consequences of action
- PERFORM operation or activity if clear
- OBSERVE the outcome for correct response.

Procedures are used to implement policy, perform work, document results, and coordinate disparate work and groups in accordance with ENG-030. Control of procedures includes using run copies to perform work. The run copy shall accompany the worker in the field and shall not be simply a desk document to be referred to sporadically. The run copy shall be used as a field instrument for workers that controls, paces, guides, and appropriately stops the physical work as it has been approved therein, or until the work has been completed and that particular run copy has been signed off and filed. The procedure run copy document or checklist is not an afterthought, but rather, a critical tool in executing the work at hand.

Run copies are provided by the Operations Center and its satellite stations at D site. Run copies shall be returned promptly and in good condition when complete or no longer needed.

Procedure training prior to use of new procedures or revisions shall be performed using a training sheet, Attachment 6 of ENG-030.

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### **6.1.1 CONTROL OF EQUIPMENT AND STATUS**

Procedure OP-AD-56 exists with this title to define the flowchart for reporting information and status of equipment. The point of contact for most concerns is the D-Site Shift Supervisor, who will then follow the appropriate chain of command. It is the responsibility of every worker to follow the chain of command, and to initiate contact with the D-Site Caretaking Manager if the D-Site Shift Supervisor cannot be reached in a timely fashion.

All work at D-Site shall be analyzed for hazards per ESH-004, Job Hazard Analysis.

Configuration Control shall be implemented per ENG-032, Work Planning Procedure.

Temporary modifications to equipment and interlocks are permitted via OP-AD-03. T- mods must be issued and approved prior to implementations.

### **6.1.2 CONTROL OF MAINTENANCE ACTIVITIES**

Equipment shall be maintained using procedures to support project and experimental schedules. Preventative maintenance should be scheduled by system cognizants to ensure availability for upcoming experimental requirements. All work critical to other groups, that can impact the environment, safety, or health, or could affect operations of a project shall be scheduled in advance with the D site Caretaking Manager via D site Work Planning meetings. A work permit shall be used for work in the TFTR Test Cell, Test Cell Basement, the NSTX Test Cell, and in Tritium areas in accordance with OP-AD-09 when required. Maintained equipment shall be inspected for operability before return to service.

### **6.1.3 OVERSIGHT OF MANAGEMENT**

Management oversight consists of providing the direction, guidance, procedures, input, and review of all levels of management in authorizing and supervising work. Managers shall walk down their areas, the jobs in those areas, and make contact with those assigned to the work, to ensure compliance with work plans, procedures, and good work practices. Any ES&H deficiency noted shall be reported to the ES&H Department Head for tracking purposes. Any operations action invoked shall be logged in the system or operating logbook. Managers may annotate run copies of procedures to add remarks or comments for the job record. Management will periodically observe Operator Rounds to ensure proper execution and for changes needed to facility conditions.

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#### **6.1.4 ES&H PRACTICES**

All PPPL staff and contractors working at the PPPL site shall have the responsibility to question and, if necessary, stop any observed activity, which may not be safe to personnel, equipment, environment, and the public per PPPL Policy P-012. The activity shall be reviewed with other staff, a supervisor, or appropriate designees of ES&H to ensure safe conduct. The ES&H Manual 5008 shall be adhered to in preparation and implementation of all procedures, and during the actual activity.

Workers and supervisors are reviewed and evaluated in part based on compliance with ES&H policy and procedure. Performance with regard to ES&H controls shall be considered as part of every job and shall include a Job Hazard Analysis per ESH-004.

The responsibility for the housekeeping of areas rests with PPPL staff. The Supervisors and Facility Managers assigned segment of work areas shall closely monitor the state of cleanliness, neatness, and orderliness of those assigned areas, and may authorize personnel to stop other work to resolve housekeeping issues.

Work activities at D-Site may include radiological hazards. Safety of workers includes the concept of "As Low As Reasonably Achievable (ALARA) with respect to radiation exposure.

#### **6.1.5 EVENT INVESTIGATION AND NOTIFICATION**

For events or conditions, which may adversely affect personnel, equipment, the environment, or the public, or the DOE mission, formal occurrence reporting may be necessary. Facility Managers who are trained to report occurrences will characterize situations as events or occurrences in accordance with Occurrence Reporting procedure GEN-006. All staff are responsible to follow chain of command (per OP-AD-56) and report situations, which may warrant D Site Shift Supervisor or Facility Manager interest, and are also responsible to provide prompt, accurate information in any investigation.

#### **6.1.6 CONTROL OF INTERRELATED PROCESSES**

Interrelated processes, such as the motor-generator and FCPC operations that support running shots, are controlled by concurrent operating personnel, often at the same console. When an adverse event occurs in one system, action such as shutdown or cutoff must be executed in some associated systems.

Interrelated processes are treated as concurrent projects managed as part of a system. Examples for NSTX-U are Motor-Generator and DC power, water, gas, neutral beam, helium refrigeration, Physics measurements, and Physics control, all of which must function simultaneously to perform experiments.

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A Daily Operations Meeting (Monday through Friday) is used to co-ordinate daily and near-term work activities and interrelated processes on site, including project, infrastructure and engineering work activities.

A Weekly Engineering Rollover Meeting is held to review and schedule longer term plans and work activities for co-ordination, authorization, impact assessment and resource allocation. This meeting utilizes department schedules and Gantt charts to plan work activities and identify any necessary changes or challenges in work scheduling.

## **6.2 COMMUNICATIONS**

The criticality of communication for proper conduct of operations cannot be overstated. The communication process starts with clearly stating the identity of the parties involved and their function. Visual, written, and verbal communication should be clear, concise, and correct. In the event that information is discovered to be incorrect, the individual must state so clearly and communicate correct information. Both or all parties shall ensure that the message is understood before proceeding with activities. If, for example, a hand signal is not clear, then actions should pause while misunderstandings are resolved. In the case of procedures, documents, drawings, and other written information, anomalies must be sorted out prior to further use. In the case of conversations, telephone, and radio communiqués, participants shall have certainty that the instructions and information is clear, concise, and correct before proceeding. Checking intent, repeating wording, sending facsimiles, and requesting that the message be repeated prior to further shall be routine practice to ensure proper conduct and compliance with procedures.

Announcements and signals made via the D site address/emergency alert and evacuation system shall be considered valid unless otherwise announced as a drill, test or maintenance process. The Emergency Voice and Evacuation System (EVES) primary purpose is to promptly alert facility personnel to emergencies. Secondary use includes paging employees, making announcements, and providing information to the facility in a timely manner. The EVES system shall not be used for point-to-point conversations in lieu of radios or telephones.

The closure of communications is as critical as the content. Reports back to the appropriate party that the order, action, or status is as requested, is vital to the smooth running of operations. Care shall be taken to close the communication loop in a timely fashion.

### **6.2.1 REQUIRED READING**

At times it may be necessary for management or supervisors to circulate material for staff to read. A standard training sheet should be used to document that the material has been read. Any staff assigned such reading is required to read, question, understand, and apply the material as part of job performance.

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### **6.2.2 STANDING AND DAILY ORDERS**

Various project activities; status of plant, and ES&H criteria may be communicated by orders. Significant restrictions may be placed on areas, operations, or specific activities through these orders. The orders must be made in writing to the D site Shift Supervisor, signed and dated by the D site Caretaking Manager, or appropriate Project Manager, and placed on file with the D site Shift Supervisor for implementation. These orders will be communicated at the appropriate morning musters and at shift changeover as necessary. When lifted, the orders shall be so noted and resigned as expired by the cognizant authority. Changes to the orders must be made by the original signing authority or by the D site Manager.

### **6.2.3 CERTIFICATION, QUALIFICATION, AND TRAINING**

Selected operating positions, project positions, and worker roles require specific certification, training, and/or qualifications prior to covering operating shift activities. These training criteria must be met following an approved procedure to ensure uniformity of training. The trainee may operate controls as part of training under the tutelage of another qualified operator or supervisor. The trainee is not permitted to stand a shift as the lone operator assigned to the controls. Supervisors are responsible for ensuring that requisite training has taken place when scheduling work.

## **6.3 DOCUMENTATION**

For the purposes of record keeping, future reference, event analysis, and research knowledge, documentation shall be maintained and stored in such a way as to be accessible if needed. Documentation includes those called for by ENG-030 for procedures, ENG-032 for design changes, and other lab procedural requirements.

Documentation for the projects shall be kept in accordance with project procedures and Operations Center practices. Procedure run copies, signed forms authorizing work, drawings, and other documents shall kept in good condition and filed promptly when no longer needed.

Use clear printing and legible ink, preferably black for best photocopying results. Errors should be crossed out and corrected on the next line or space. Erasures are to be avoided. Entries shall be made in a complete fashion, such that another peer can readily understand the entry, and the entry must be initialed and dated.

In a run copy of a procedure, all steps must be completed and initialed or otherwise annotated, leaving no blank spaces. In the case where a step or steps clearly do not apply to the evolution required because the procedure detours around certain conditional steps, the steps shall be annotated as not applicable (N/A) by the operator and shall not be initialed as if performed, or otherwise marked or left blank. Refer to procedure ENG-030 for proper use of procedures.

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### **6.3.1 LABELING**

In that labels are often used to implement complex and critical evolutions in operations of equipment, any labeling of equipment (in addition to original equipment manufacturer's labels,) shall be done with the same formality and approval as other design changes. Handwritten informal labels are not permitted.

Labeling of equipment will be done by the system engineer or RLM as appropriate. Labels will conform to facility labeling standards and be appropriately placed and uniquely numbered, and the numbers will match facility and Engineering documentation. Label standards and interpretation will be included in operator training.

New piping labels will be done using ANSI A 13.1 as guidance. Arrows shall be used to indicate direction of flow.

Composition of labels will be such that the labels withstand the environment in which they are placed so that the labels remain attached and retain legibility over time. Temporary new or replacement labels may be used in an emergency but they must meet all other standards for content, color, placement and legibility.

### **6.3.2 OPERATOR AIDS**

Operator aids are posted information of any type, which may be used as memory aids or reference material to assist operators in performing work. A supervisor may post these aids when the information has been signed, dated, and approved by appropriate authority, usually the system division head. The supervisor is responsible for ensuring that the information is current, and for updating operator aids on a regular basis, minimally at the beginning of a run period following a maintenance period. Updated operator aids should be logged in the system's operator logbook or other similar file.

### **6.3.3 OPERATOR LOGKEEPING**

Operator logs, logbooks, computer logs, data entry sheets, round sheets, and other types of logs shall be kept clearly, neatly, and in chronological order. Log control is the responsibility of the operator and supervisor. Logs may be examined at any time by the D site Shift Supervisor, other managers, or facility managers in the case of events. Operating personnel shall retain logbooks after becoming filled, and clearly numbered or dated as new logs are implemented. Crossing out unused lines or blank space is critical to the integrity of the log. It is appropriate for a supervisor or manager to make an initialed and dated log entry when examining a log. Logs should be examined by supervisors at the beginning of run periods to ensure proper types of entries are being made by operators who are once again standing operating shifts, and at the end of run periods before maintenance begins to assure complete entries and information prior to system changes.

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Training forms (ENG-030 Attachment 6) shall be used to document training for classes, attendance of pre-job briefs (unless included in the body of the procedure), and procedure training on new, revised, or modified procedures.

#### **6.4 OPERATIONS**

Operations of equipment, subsystem components, major systems, or complete plasma physics research devices shall comply with operating procedures, using trained, qualified, or certified operators, in a manner consistent with best management, operating, and ES&H practices. Personnel shall not attempt any activity, which they do not understand, or are not qualified to perform. Instead, personnel shall report to their supervisors any doubts or questions that might arise.

Control rooms shall be kept neat and properly dispositioned for operations at all times. Control areas where controls are manipulated shall be kept free of excess personal belongings, extraneous paper, and unnecessary equipment. Operators may have paperwork and logs, other reference materials, refreshment, and manuals or reference books present if minimized. In cases where horizontal, tilted or flat control or push-button panels are used as controls, no liquids or other such materials may be present. Control Areas that control personnel, equipment, environmental, or public protective devices shall be noted as such and posted such that only authorized persons may approach the "at the controls" area and the space required to operate the controls.

Operators shall not run equipment in such a way as to routinely challenge interlocks. Operators shall not manipulate controls in an extreme manner, or with undue force, frequency, or in faulted condition. When faults are annunciated, circumspect care shall be taken in clearing the fault so as to understand, rectify, and record the fault prior to its removal. No operations maneuvers shall be considered routine. The operator shall remain alert and focused regardless of the repetitions involved in the job, shall anticipate potential problems, shall plan for contingencies, and shall examine paperwork associated with the upcoming portions of the job for completeness and understanding.

Status, anomalies, difficulties, alarms, or conflicts shall be reported to the operator on duty, the shift supervisor of the system, the D site Shift Supervisor, or the correct technical supervisor, in accordance with OP-AD-56.

Control room noise shall be minimized except that which is required to operate the plant, equipment, machine, support, and protective equipment. Communications are expected to be professional.

##### **6.4.1 FITNESS FOR DUTY**

An individual scheduled to operate shall arrive on station rested and alert, ready to perform a shift changeover, and in compliance with the PPPL Fitness for Duty Program Personnel Manual section 40. Consumption of alcohol during work hours, breaks inclusive, is not permissible. If illness requires

prescription or non-prescription drugs, which may cause drowsiness, the operator shall notify his/her supervisor and request relief. The Occupational Medicine Office may make a determination for fitness for duty.

Fitness for duty limitations apply to working hours. Operating and working time shall be limited to 16 hours in one 24 hour day, a total of 24 hours in 48 hours, a total of 72 hours in 7 days, or a total of 14 consecutive days without two days off. Any operating assignment in excess of these limits must have D site manager written approval.

#### **6.4.2 SHIFT RESPONSIBILITIES**

Managers and supervisors shall ensure that appropriate individuals with proper training are scheduled to cover operations. Supervisors shall ensure fitness for duty. Supervisors shall alert operating personnel to changes, restrictions, and special conditions. Supervisors may assign on-shift training of a trainee to an operator. Operating personnel in the control areas of control rooms shall engage in activities carefully, shall remain on station until relieved by another qualified individual, or until required to leave in the event of an emergency.

Workers, operators, and supervisors shall be held appropriately accountable for performance of the device in their purview. Operators shall ensure that their immediate area is secure and fit for operations. Control areas shall consist of the panels and floor area immediately adjacent to any personnel or environmental safety equipment (ex: Hardwired Interlock Station).

Operators shall ensure that no unwarranted manipulations of controls, log entries, or other actions will take place. Individual devices shall be properly aligned per operating procedures, startup and shutdown procedures, access procedures, and checklists. The operation and status of valves, breakers, dampers, switches, throttles, locks, and other devices shall be subject to manufacturer's recommendations, operating instructions, and good technical practices. All personnel shall adhere to facility postings, signs, signals, warning devices, or other information.

Operators shall attempt to determine the cause of protective device trips (Breakers, fuses, relief valves, safety systems, etc.). Supervisors and management shall provide guidance on addressing protective device trips; normally, devices are reset only after assuring that no abnormal condition exists that would cause a trip. Management will investigate protective system trips and unplanned shutdowns.

In the event of emergencies, workers, operators, and supervisors have the responsibility to take immediate action without prior approval to protect the safety of personnel, equipment, the environment, and the public. Minimal action includes calling x3333 to report the emergency, alerting the D Site Shift Supervisor, and if possible and appropriate, stabilizing the condition.

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### 6.4.3 SHIFT PRACTICES

When a facility, plant, or device is in operating, many controls and status evolutions, actions, precautions, and procedures may be required to implement work plans. Pre-job briefs and Post-job briefs may be used to coordinate activities, to establish plans, priorities, and limitations, and to review responses. These briefs should be documented per ENG-030, in appropriate logs or shift supervisor records, or as sign offs in the procedure in use.

A shift consisting of several people may be assigned operating tasks, experiments, procedures, monitoring, repairs, maintenance, or any other work necessary for safe progress. A shift supervisor or cognizant person shall be designated to lead jobs if not otherwise specified by procedure. Upon completion of work, the shift must be summarized and turned over to the next shift, or clearly described for the next day's shift.

Operators should not become comfortable with the status of the plant or allow extended operations with alarm or abnormal conditions. Annunciators shall be considered valid until proven otherwise. Comparisons shall be made to crosscheck data, interlocks, limit switches and the like for operability. Operators shall be sensitive to unexplained changes, and shall not bypass alarms, interlocks, or limit switches unless authorized by procedure, and unless prior notification has been made to the system or shift supervisor.

### 6.4.4 OPERATOR ROUNDS

Operator rounds are scheduled physical inspections made to ascertain the operability, the integrity, and the status of equipment and plant, including annunciator and alarm functionality. These rounds should be documented using round sheets or a procedure checklist, which may be carried with the operator, but which are then incorporated into logs or procedure files. An operator should also make routine walkthroughs in addition to scheduled rounds. These informal rounds should be noted in operating logs.

Operators shall show ownership for areas. Inspections should be an active engagement of the senses, in which potential problems are identified, situations of concern are ameliorated when possible, and maintenance or repair items are noted and logged. Round sheets should be considered as part of the procedure process and records kept accordingly.

Security and radiation safety controls are to be coordinated so that these considerations do not restrict operator rounds.

### 6.4.5 INDEPENDENT VERIFICATION

In some evolutions or procedures, independent review and verification of the operation or evolution of status of plant or equipment is necessary to safeguard operations, personnel, environment, or the public. In such cases, an independent verification shall be made by a separate individual other than the

performing agent of the procedure at hand. This verification may also be separate in time or proximity to the performing agent, but shall check each item ascribed in its final state in the evolution.

The independent verification shall be by a person of the same position or higher than that of the performing personnel. Independent verification shall be waived if the radiation exposure would be excessive. Discrepancies require immediate contact of the system supervisor or D-Site Shift Supervisor for resolution. Independent verification does not require the repeat operation of alignments because the second action nullifies the first and therefore serves no purpose. The independent verifier does not change the position of a component if found in error, rather, the independent verifier confirms the identity of the device and contacts the supervisor. The supervisor shall then determine what portion of the procedure must be repeated, what correction needs to take place in a procedure, or what remedial training needs to be performed for operators.

Instruments that are determined to provide inaccurate readings shall have a Work Order submitted for their repair.

At the discretion of the RLM, independent verification exemptions may be applied to specific components whose mispositioning does not affect system performance, whose mispositioning is immediately known to operators, or where significant radiation exposure would be required for verification.. Alternate means of determining position will be considered. Any such exemptions are approved by RLM or Shift Supervisor.

The Operator or RLM shall file a Work Order Request when instruments are determined to provide inaccurate readings.

#### **6.4.6 SHIFT TURNOVER**

Precise shift changes of personnel shall be performed at all times during operations. A shift turnover shall consist of oncoming and off-going personnel meeting face to face except as noted below, reviewing a summary of the ending shift activity and equipment status, reviewing upcoming assignments, complexities, and anomalies, and a formal sign in by the oncoming operator in the appropriate logs. This handoff of information and control shall be made at any time that an operator leaves the controls to another qualified operator. Any procedure checklist in progress may be handed to the oncoming operator, as long as the new operator initials the checklist at the point where it is received.

Informal turnover information is to be avoided. Notes made to conduct a shift turnover should become part of a log entry, binder, or file, and kept for project and supervisor review. Discussions shall be focused and shall not include extraneous personal information during the turnover process.

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Shift changes do not require a face-to-face shift turnover when operating equipment has been stopped, or shut down per an approved procedure. Operating personnel may leave their stations without a face-to-face shift turnover once the procedure has been completed. However, all logs and notes must be completed and placed in view so startup shift personnel can readily find and use any appropriate information as would occur in a face to face shift turnover. In emergencies that require operators to leave stations, supervisors and operators shall take direct action to stand down and leave equipment in a safe state, preferably disarmed. In emergencies, supervisors and operators shall take those steps necessary to protect personnel, equipment, the environment, and the public without prior approval.

### **6.5 LOCKOUT/TAGOUT (LO/TO) IMPLEMENTATION**

In order to safely manage energy and protect workers, locks and tags are used per ESH-016. To implement this procedure, Lockout/Tagout logs are called for as part of good practice and OSHA regulations for all group LO/TOs. Like any other log, the LO/TO logs shall be kept accessible, neat, easily copied, up to date, and in chronological order. Supervisors shall conduct routine inspections of LO/TO logs. These inspections should occur at the beginning and end of any major outage, and may occur more often if the LO/TO log is in heavy use.

## **Appendix 1: Conduct of Operations Elements**

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Appendix 1

Requirement/Element	Notes/Citation	NSTX-U Conduct of Ops Implementation
Organization and Administration	Director's Office is responsible for establishing and maintaining the overall Laboratory organization and its departments. The ADEI is responsible for assigning Responsible Line Managers and approving their selection, See also ENG-057, <i>COG, RLM and Project Manager Selection and Training</i> .	Sections 6.1, 6.1.1, 6.1.2, 6.1.3
Investigation of Abnormal Events, Conditions, and Trends	Laboratory procedure GEN-006, <i>Investigation and Follow-up of Adverse Events and Conditions including Occurrence Reporting and Price Anderson Amendment Act Reviews</i> . Operating personnel periodically review alarms, trends, and Action Statements in effect for proper implementation.	OP-G-176, <i>NSTX-U COIL PROTECTION SYSTEM RESPONSE</i> Sections 6.1.5, 6.1.4
Notifications	Laboratory procedure GEN-006, <i>Investigation and Follow-up of Adverse Events and Conditions including Occurrence Reporting and Price Anderson Amendment Act Reviews</i> . See also <i>Information Technology Division Policies and Procedures</i> .	Section 6.1.5
Lockouts and Tagouts	ESH-016, <i>Control of Hazardous Energy (Lockout/ Tagout)</i>	Sections 6.5, 6.1.4
Control of Interrelated Processes	Interrelated processes are authorized through the Engineering Rollover Meeting and the 8:30 AM meeting, discussed in ENG-055, <i>Conduct of Operations</i> as well as ENG-032, <i>Work Planning Procedure</i> and ENG-049, <i>Project Status and Oversight</i> . Content of COG, RLM and PM training shall include interrelated processes, reading and interpreting instrument readings.	Sections 6.2, 6.2.2, 6.1.x in general, 6.1.6 in specific, ENG-055
Technical Procedures	Laboratory procedure ENG-030, PPPL Technical Procedures	Sections 6.1, 6.1.2, 6.1.3, 6.2, 6.3

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Appendix 1

<p>Shift Routines and Operating Practices</p>	<p>Ensuring shift operators are alert, informed and operate properly;          Prompt notification to operating personnel and supervisors of changes in facility status, abnormalities or difficulties;          Adherence by operating personnel and other workers to establish safety requirements;          Awareness by operating personnel of the status of equipment through inspection, conducting checks, and periodic supervisory reviews of round sheets or inspection logs;          Procedures for protecting operators from personnel hazards, e.g. chemical, radiological, laser, noise, electromagnetic, toxic or nano-scale materials;          Prompt response to instrument indications, including the use of multiple indications to obtain parameters;          Procedures for resetting protective devices;          Authorization to operate facility equipment;          Designating shift operating bases and providing equipment for them;          Professional and disciplined operator performance of duties;          Management of shift and operator workload to keep administrative activities a minor part of shift responsibilities, and provision of a second operator when pressing administrative tasks compete for operator attention;          Scheduled inspection rounds by a separate employee of equal or higher grade as the operator to verify all instrument readings and readouts critical to safety and operation as defined in Technical Procedures, Round Sheets, Checklists and logs; and          Situations requiring caution tags are brought to the attention of responsible managers, who approve them if necessary.</p>	<p>ESH-004 Job Hazard Analysis Sections 6.1.1, 6.1.2, 6.1.3, 6.1.4, 6.2.2, 6.4.1, 6.4.2, 6.4.3, 6.4.4, 6.4.6</p>
<p>Control Area Activities</p>	<p>Establishing and implementing operations practices that promote orderly, business-like control area operations and addressing:          Control-area access;          Formality and discipline in the control and at-the-controls areas;          Surveillance of control panels and timely response to determine and correct the cause</p>	<p>Section 6.4</p>

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	<p>of abnormalities/out-of-specification conditions;</p> <p>Limitation of the number of concurrent evolutions and duties; and</p> <p>Authorization to operate control area equipment.</p>	
Communications	<p>Establishing and implementing operations practices that ensure accurate, unambiguous communications among operations personnel and addressing:</p> <p>Provision of communications systems for emergency and normal operations;</p> <p>Administrative control of communications equipment, including authorization to use the public address system and allowable locations for purposes for radio use;</p> <p>Methods for control areas to contact operators and supervisors;</p> <p>Communication of changes of status to all appropriate personnel;</p> <p>Use of abbreviations and acronyms;</p> <p>Use of oral instructions and communications, including use of repeat-backs and sender/receiver identification;</p> <p>All Facility Emergencies are communicated to all facility personnel with the public address system using special alarm tones to begin each such announcement. Emergency communications have priority over other communications;</p> <p>Communications systems, include facility-wide public address system, the Control Room and public address system, and the hand-held radios of C Site and D Site, shall be periodically tested as directed by the Facilities Manager and the ES&amp;H Director;</p> <p>Choice of channel shall be determined by need, availability, and the requirements of the communication message (timeliness, multiple recipients) in increasing order of precedence:</p> <ol style="list-style-type: none"> <li>1. Voice,</li> <li>2. Telephone,</li> <li>3. Radio,</li> <li>4. Facility-wide public address system (Emergency Voice and Evacuation System (EVES)).</li> </ol> <p>Operators, COGs and RLMs shall use Voice, Telephone or Radio for routine</p>	Sections 6.1.5, 6.2

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	<p>communications;</p> <p>Personnel may use any available means to communicate with the Control Room. The D Site Address/Emergency Alert and Evacuation System is preferred for emergency alerts;</p> <p>Access to emergency notification channels is posted in appropriate areas; and</p> <p>Radio usage is controlled to prevent electronic interference with facility equipment. Radio prohibited areas are defined and marked.</p>	
On-Shift Training	<p>Establishing and implementing operations practices that control on-shift training of facility operators, prevent inadvertent or incorrect trainee manipulation of equipment and address:</p> <p>On-shift training program;</p> <p>Authorization and documentation of training activities;</p> <p>Supervision and control of personnel under instruction by qualified personnel;</p> <p>Facility conditions and controls for conduction training during operational activities, including suspension of training during unanticipated or abnormal events; and</p> <p>Scope of training shall include Independent Verification, and the Operator Aids process and the proper use of operator aids.</p>	Sections 6.2.1, 6.2.2, 6.2.3, 6.3.2, 6.4.2, 6.4.6
Control of Equipment and System Status	<p>Establishing and implementing operations practices for initial lineups and subsequent changes to ensure facilities operate with known, proper configuration as designed and addressing:</p> <p>Authorization for, and awareness of, equipment and system status changes;</p> <p>Initial system alignment, and maintaining control of equipment and system status through startup, operation, and shutdown, and documentation of status;</p> <p>Use and approval of lockouts and tagouts for administrative control of equipment status (see lockout and tagouts);</p> <p>Operational limits compliance and documentation;</p> <p>Management of equipment deficiencies, maintenance activities, post-maintenance testing, and return to service;</p> <p>Awareness and documentation of control panel</p>	Sections 6.1.1, 6.1.2, 6.1.3, 6.1.4, 6.1.5, 6.5

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	<p>and local alarm issues;  Control of temporary equipment modifications and temporary systems;  Equipment or systems that are tripping alarms or otherwise having repetitive problems will require investigations to determine and correct the cause(s);  Configuration control and distribution of engineering documents; and  Awareness of equipment and system status and changes, and authorization to intervene were appropriate, including assuming control of automated systems.</p>	
<p>Independent Verification</p>	<p>Establishing and implementing operations practices to verify that critical equipment configuration is in accordance with controlling documents and addressing:  Structures, systems, components, operations, and programs requiring independent verification;  Situations requiring independent verification;  Methods for performing and documenting independent verification;  Schedules routine inspections to routinely achieve independent verifications during normal testing and operation;  Situations, if any, allowing concurrent dual verification;  Methods for performing concurrent dual verification, if used;  Reasonable exemptions from verification shall be allowed where unnecessary because mispositioning or variance in reading is immediately known to operators or, or safety considerations prevent verification;  Ensure independence, including having each check include identification of the component and determining both its required and actual position, and minimizing interactions between operators positioning components and those verifying position, except in special situations for throttled valves or to reduce radiation or toxic exposure (concurrent dual verification);  Check throttled valves using local mechanical position indicators, scribe marks, or other</p>	<p>Sections 6.4.5, 6.4.4</p>

	<p>authorized methods (preferred over shutting and then opening a prescribed number of turns). If shutting/opening is necessary, use concurrent dual verification;</p> <p>Use direct local position checks rather than surveillance testing to show component positions. If surveillance tests are used, they must conclusively prove component position and must be specifically approved by operations management;</p> <p>In order to determine if Independent Verification is required, use of accepted safety analysis methods such as fault tree, probability risk analysis, or with participation of expert opinion (such as RLM), are used to develop the list of equipment/components that require independent verification of specifications, configuration, settings, and/or operation;</p> <p>Shift supervisor or other appropriate manager shall be notified of any observed misalignments, and charges the manager with determination of the proper remedial or correction to take in immediate operations and in operator training and;</p> <p>Verification readings include procedures ensure independence, including having each check include identification of the component and determining both its required and actual position, and minimizing interactions between operators positioning components and those verifying position, except in special situations for throttled valves (using local mechanical indicators, scribe marks, etc.), methods that conclusively prove component position, or to reduce radiation or toxic exposure (concurrent dual verification).</p>	
Logkeeping	<p>Establishing and implementing training and operations practices to ensure thorough, accurate, and timely recording of equipment information for performance analysis and trend detection, and addressing:</p> <p>Narrative logs at all key positions, as defined by management, for the recording of pertinent information;</p> <p>Prompt and accurate recording of information;</p> <p>Type, scope, and format for log entries;</p>	Sections 6.3, 6.3.3, 6.4.6

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	<p>Method for recording late entries and correcting erroneous entries without obscuring the original entry;</p> <p>Periodic supervisory reviews for accuracy, adequacy, and trends;</p> <p>Document retention requirements; and</p> <p>Scope of log entries includes, but is not limited to:</p> <ul style="list-style-type: none"> <li>• Compliance with operational limits, and</li> <li>• Corrective actions for out-of-limits readings, alarm conditions, and safety trips.</li> </ul>	
Turnover and Assumption of Responsibilities	<p>Establishing and implementing operations practices for thorough, accurate transfer of information and responsibilities at shift or operator relief to ensure continued safe operation and addressing:</p> <p>Definitions for all key positions requiring a formal turnover process;</p> <p>Turnover of equipment/facility status, duties, and responsibilities that results in the safe and effective transfer of equipment status and in progress or planned activities from one shift or workgroup to the next; and</p> <p>Process for relief during a shift.</p>	Sections 6.4.1, 6.4.2, 6.4.3, 6.4.4, 6.4.6
Required Reading	<p>Establishing and implementing operations practices for an effective required reading program to keep operators updated on equipment or document changes, lessons learned, or other important information, and addressing:</p> <p>Identification of material to be distributed via required reading;</p> <p>Periodic reviews shall be conducted to remove obsolete items from distribution;</p> <p>Identification of which personnel are required to read specific required reading items; and</p> <p>Distribution of required reading to appropriate personnel and documentation of their timely completion.</p>	Sections 6.2.1, 6.2.3
Timely Instructions/Orders	<p>Establishing and implementing operations practices for timely written direction and guidance from management to operators, addressing:</p> <p>Appropriate circumstances for the use of timely instructions/orders,</p> <p>Designated levels of review and approval prior to issuance,</p>	Sections 6.1.3, 6.2.2, 6.4.2, 6.4.3, 6.4.6

	<p>Configuration control of timely instructions/orders, and</p> <p>Distribution of timely instructions/orders to appropriate personnel and documentation of their receipt and understanding.</p>	
Operator Aids	<p>Establishing and implementing operations practices to provide accurate, current, and approved operator aids, addressing:</p> <p>Technical evaluation and management approval of operator aids;</p> <p>Operator aids serve as conveniences, not operational requirements;</p> <p>Operator aids do not obscure equipment;</p> <p>Administrative control of installed operational aids;</p> <p>Operator Aids shall be sturdy, and securely mounted or stowed, and waterproof or appropriately resistant to their installed operating environment as appropriate;</p> <p>Periodic reviews ensuring conformance of Operator Aids with approved list, and updating of Operator Aids as needed to ensure continued conformance and accurate reflection of source material; and</p> <p>Operator Aids shall not alter procedures; procedure revisions shall be in accordance with ENG-030.</p>	Sections 6.3, 6.3.1, 6.3.2
Component Labeling	<p>Establishing and implementing operations practices for clear, accurate equipment labeling, addressing:</p> <p>Components that require a label;</p> <p>Label information that uniquely identifies components and is consistent with regulations, standards and facility documents;</p> <p>Durable and securely attached labels that do not interfere with controls or equipment;</p> <p>Administrative control of labels, including a process for promptly identifying and replacing lost or damaged labels, preventing unauthorized or incorrect labels, and control of temporary labels;</p> <p>All new piping (As of 9/1/2015) will be identified using the labeling requirements of ANSI A13.1 as the guidance standard; and</p> <p>Labels will have unique identification numbers.</p>	Sections 6.3, 6.3.1, 6.3.2

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