

**PROCEDURE COVER SHEET**

<b>Princeton Plasma Physics Laboratory Procedure</b>		
<b>Procedure Title: NSTX-U Operations Training</b>		
<b>Number OP-NSTX-12</b>	<b>Revision: 5</b>	Effective Date: 11/1/14 Expiration Date: <i>(2 yr. unless otherwise stipulated)</i>
<b>Procedure Approvals</b>		
Author A. vonHalle		Date
ATI A. vonHalle		Date
RLM M. Williams		Date
Responsible Division: Engineering		
<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 (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 page 10)	Special archiving requested for completed Run Copies: _____
D-SITE SPECIFIC:		
	D-Site Work Permit (OP-AD-09)	Door Permit (OP-G-93)
	Tritium Work Permit (OP-AD-49)	USQD (OP-AD-63)
	Pre-job brief (OP-AD-79)	T-MOD (OP-AD-03)

<b>REVIEWERS</b> (designated by RLM)	
Accountable Technical Individual	<b>A. vonHalle</b>
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Independent Reviewer	
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Energy Conversion Systems	<b>E. Baker, M. Awad</b>
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Neutral Beam (Heating Systems Branch of Electrical Engineering)	<b>T. Stevenson/M. Cropper</b>
Radiofrequency (Heating Systems Branch of Electrical Engineering)	<b>E. Fredd/N. Greenough</b>
Diagnostics	
Environmental, Safety, & Health	
Training	<b>M. Gonzalez</b>

<b>TRAINING</b> (designated by RLM)			
No training required _____ <b>X</b> _____		Instructor _____	
Personnel (group, job title or individual name)	Read Only*	Instruction	Hands-On
<b>This Procedure describes training requirements and provides checklists for documenting training</b>			
Training Rep. _____			
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 procedure

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## 1.0 PURPOSE

This procedure describes the positions and training requirements for NSTX operations personnel.

## 2.0 SCOPE

This procedure applies to NSTX-U accessors and operator personnel, as identified in this document, and covers only the training necessary for access and operations. Training for jobs outside the scope of normal operations (radiation work, confined space entry, etc.) and for tour guide access are covered elsewhere.

## 3.0 REFERENCES

- 3.1 Policy P-008, "Staff Training"
- 3.2 Policy P-029, "Testing for Training Courses"
- 3.3 TR-001, "Laboratory Wide Training Program"
- 3.4 GEN-008, "Visits and Assignments to PPPL and Site Access Requirements"
- 3.5 TR-005, "Instructor Qualification and Requalification"
- 3.6 TR-006, "Establishing Qualification and Certification Requirements"

## 4.0 DEFINITIONS

- 4.1 Accessor - persons responsible for NSTX-U diagnostics, computer equipment or other ancillary systems within the NSTX-U experimental areas. This includes physicists, collaborators or skilled maintenance personnel. Accessors do not require escorts in the NSTX-U experimental areas.
- 4.2 Operators - persons responsible for manipulating NSTX-U controls, monitoring NSTX-U parameters, and operating NSTX-U equipment. The NSTX-U defined operator positions are:
  - Chief Operations Engineer (COE)
  - Vacuum Systems Operator
  - Water Systems Operator
  - Field Coil Power Conversion (FCPC) Operator
  - Motor Generator Operator (MG) Operator
  - Machine Systems Operator (also called a Machine Tech)
  - ECH-PI Operator
  - HHFW Operator
  - NB Beamline Subsystems Operator
  - NB Helium Refrigerator Operator
  - NB Ion Source Operator

NB Operations Supervisor

- 4.3 Operations Supervisors - persons with operator responsibilities and responsibilities for systems coordination, oversight, and operations safety. The NSTX defined Operations Supervisors are:

Chief Operating Engineer  
Physics Operator  
NB Operations Supervisor

## 5.0 RESPONSIBILITIES

- 5.1 NSTX-U Operations Head is responsible for implementing the requirements of this document.
- 5.2 The NSTX-U Project is responsible for managing training, keeping this document current and making necessary revisions to it.

## 6.0 GENERAL REQUIREMENTS

### 6.1 Personnel Selection

Personnel are assigned to positions that support NSTX-U operations based upon an evaluation of their education, experience, previous training, and existing job skills and capabilities. It is the responsibility of management to assure that personnel assigned to a specific job function have the requisite background and/or receive sufficient training.

### 6.2 Exceptions to Training

Exceptions to training (individual training course exceptions and job incumbency exceptions) are granted in accordance with the requirements of TR-006, "Establishing Qualification and Certification Requirements".

### 6.3 Medical Examinations

- 6.3.1 Medical examinations are not required unless specifically identified as required within an individual training or operations procedure.
- 6.3.2 Medical examinations required by certain ES&H training courses (such as Respiratory Protection) shall be completed.

## 7.0 TRAINING REQUIREMENTS

### 7.1 Training Required for NSTX-U Accessors

The training required for D-Site access is defined in PPPL Procedure GEN-008, "Visits and Assignments to PPPL and Site Access Requirements." TR-002 is

supplemented by other D-Site procedures that define specific access requirements for other D-Site areas which must be met in order to gain access to those areas. The minimum training required for an unescorted NSTX-U Accessor includes:

- a. General Employee Training (GET)
- b. Radiation Safety Training
- c. Lockout/Tagout Training
- d. Basic Electrical Safety or Electrical Utilization Training
- e. Procedures Training on:
  - OP-AD-39, Conduct of Operations
  - OP-AD-56, Chain of Command
  - OP-AD-09, Work Permits
  - OP-AD-24, Control of Workplace Cleanliness
  - ENG-036, Temporary Modifications
  - OP-AD-117, NSTX-U Access

Completion of access training does not automatically grant access authorization. Once the required training is accomplished, the NSTX-U Operations Manager must authorize the card readers to allow entry to the Accessor. NSTX-U management retains the right to authorize or deny access at any time.

Personnel Accessing the NSTX-U test cell are expected to follow the requirements specified in the above procedures and of the Radiation Work Permits (RWPs) for the test cell in general or for specific activities. The NSTX-U Operations Manager will notify authorized accessors when a new general RWP is in force which then must be signed by each accessor prior to their next test cell entry.

## 7.2 Operator Training Requirements

- 7.2.1 Operators require training on the specific operating procedures of their systems. The attachments to this procedure show the Operator positions and their associated required operations procedures training.
- 7.2.2 Operators are required to receive instructional discussion from the systems cognizant engineer (Cog) as determined by the Head of NSTX-U operations. The cog will review, as necessary, system operations, controls, troubleshooting, alarm response and safety. The Cog will recommend in writing to NSTX-U Management, trained and knowledgeable personnel to be Operators.

## 7.3 Operations Supervisor Training Requirements

- 7.3.1 Operations Supervisors require training on the specific operating procedures of their systems and procedures related to personnel safety, environmental protection and emergency response. The attachments to this procedure show the Operations Supervisors positions and their associated required operations procedures training.

7.3.2 Operations Supervisors are required to receive instructional discussion on the major machine systems from the appropriate cognizant systems engineers. This discussion should cover system monitoring, critical parameters, system limits, controls, and alarm response, and should be documented on the attachments to this procedure.

#### 7.4 Maintenance of Training

7.4.1 Continuing training includes topics which require renewal at periodic intervals (such as GET and ES&H courses) or retraining when the governing document changes (such as procedure revisions).

7.4.2 Personnel are required to maintain training in those topics required to support their job function. If an individual does not maintain training, only that part of their job covered by the lapsed training is impacted. For example, if an individual's "confined space" training has lapsed, the individual cannot perform job duties in a confined space. Lapses in recurrent training do not void an operator's qualification.

7.4.3 The record of training on the attachments to this procedure are to be reviewed and approved in three year increments.

7.4.4 Procedure training must be completed prior to implementing the requirements of the affected procedure.

### 8.0 TRAINING RECORDS

The Office of Human Resources shall receive and maintain all training and examination records required to support the training, qualification, and certification, of personnel.

### 9.0 ATTACHMENTS

9.1	NSTX-U Chief Operating Engineer (COE)	page 8
9.2	Machine Technician	page 10
9.3	Vacuum Systems Operator	page 11
9.4	Water Systems Operator	page 13
9.5	Motor Generator (MG) Operator	page 14
9.6	Field Coil Power Conversion (FCPC) Operator	page 15
9.7	Neutral Beam Operations Supervisor (NBOS)	page 16
9.8	Neutral Beam Ion Source Operator	page 18
9.9	Neutral Beam He Refrigerator Operator	page 19
9.10	Neutral Beam-Line Subsystem Operator	page 21
9.11	HHFW Source Operator	page 22
9.12	ECH-PI Operator	page 23

**NSTX-U COE QUALIFICATION**

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**Accessor Training**

	Train. off. Init.
General Employee Training (GET)	
Lockout/Tagout Training	

	Train. off. Init.
Radiation Safety Training	
Basic Electrical Safety	

**Procedures**

OP-AD-39, Conduct of Operations	
OP-AD-09, Work Permits	
OP-AD-24, Experimental Area Cleanliness	

OP-AD-56, Chain of Command	
ENG-036, Temp. Modifications	
OP-AD-117, NSTX Access	

**COE Operating Procedures Training**

OP-NSTX-01, Preparations of Experimental Areas for Machine Operations	
OP-NSTX-02, Start up of NSTX	
ESHD 5008 Section 5, Chapter 7 Fire Prevention Practices	

OP-NSTX-14, NSTX Operations Guide for Startup and Shutdown	
OP-NSTX-15, HPP Daily Operations	
ISTP-NSTX-01, Coil Energization Tests	

**Emergency and Alarm Response Procedures**

OP-EO-02, Loss of AC Power at D-Site	
OP-EO-34, MG Loss of AC Power	

EPIP#4, Emergency Electrical De-energization	
OP-AR-12, D-Site fire Alarm Response Procedure	



**NSTX-U COE QUALIFICATION**

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**COE Instructional Discussion by Cognizant Engineer**

Hardwired Control System	
Access Systems Kirk Keys	
NSTX Scrub	
NSTX Daily Operations	
Digital Coil Protection System	
FCPC Systems	
Gas Injection System	
GDC Systems	
EPICS Control Systems	
Communications Systems	
AC Power	
NB Systems	
CHI Systems	

Access Control System	
Hot Access	
NSTX Startup/ Shutdown	
NSTX E-Stops	
Vacuum System	
Water Systems	
MG Systems	
Coil Systems	
Diagnostic Systems	
MDS Data Acquisition Systems	
Lithium Systems	
Grounding Systems	

**Recommendations**

I recommend \_\_\_\_\_ as a qualified NSTX Chief  
Operating Engineer.

Concur \_\_\_\_\_ Cognizant Engineer Date \_\_\_\_\_

Approved \_\_\_\_\_ NSTX-U Operations Head Date \_\_\_\_\_

**NSTX-U MACHINE SYSTEMS OPERATOR**

**Accessor Training**

	Train. off. Init.
General Employee Training (GET)	
Lockout/Tagout Training	

	Train. off. Init.
Radiation Safety Training	
Basic Electrical Safety	

**Procedures**

OP-AD-39, Conduct of Operations	
OP-AD-09, Work Permits	
OP-AD-24, Experimental Area Cleanliness	

OP-AD-56, Chain of Command	
ENG-036, Temp. Modifications	
OP-AD-117, NSTX Access	

**Machine Systems Operator Training**

Hazards Communication (Right-to-Know)	
OP-NSTX-14, NSTX Operations Guide for Startup and Shutdown	

OP-NSTX-01, Preparations of Exp. Areas for Machine Operations	

**Machine Systems Operator Instructional Discussion by Cog. Eng.**

Access Systems Overview	
Access Systems Kirk Keys	
NSTX Scrub	
Lithium Systems	

Access Systems Control	
Hot Access	
NSTX Startup and Shutdown	
Diagnostic Systems	

**Recommendations**

I recommend \_\_\_\_\_ as a qualified Machine Systems Operator.

Concur \_\_\_\_\_ Machine Technician Supervisor Date \_\_\_\_\_

Concur \_\_\_\_\_ Cognizant Engineer Date \_\_\_\_\_

Approved \_\_\_\_\_ NSTX-U Operations Head Date \_\_\_\_\_

**NSTX-U VACUUM SYSTEMS OPERATOR**

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**Accessor Training**

	Train. off. Init.
General Employee Training (GET)	
Lockout/Tagout Training	

	Train. off. Init.
Radiation Safety Training	
Basic Electrical Safety	

**Procedures**

OP-AD-39, Conduct of Operations	
OP-AD-09, Work Permits	
OP-AD-24, Experimental Area Cleanliness	

OP-AD-56, Chain of Command	
ENG-036, Temp. Modifications	
OP-AD-117, NSTX Access	

**Vacuum Operator Training**

Hazards Communication (Right-to-Know)	
D-NSTX-OP-G-156, NSTX Bakeout	
D-NSTX-OP-G-158, Preparation and initial Ops of the NSTX Vacuum systems after an outage	
D-NSTX-OP-G-170, Venting and Pumping Down NSTX for Calibrations and diagnostics	

OP-NSTX-14, Operation guide for vacuum system Startup and Shutdown	
D-NSTX-OP-G-155, Boronization	
D-NSTX-OP-G-165, Venting, Purging, and Safing the NSTX Vacuum Vessel for entry	
D-NSTX-OP-G-05, Procedure to vent vacuum spaces behind Torus Interface Valves	

**Vacuum Operator Instructional Discussion by Cognizant Engineer**

Vacuum Systems Overview	
Vacuum System Valving	
Vacuum System diagnostics	
GIS Overview, Control & Valving	
Lithium Systems	

Vacuum System Pumps	
Vacuum System Control	
Vacuum System Alarm Response	
GIS Alarm Response	

**NSTX-U VACUUM SYSTEMS OPERATOR**

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**Recommendations**

I recommend \_\_\_\_\_ as a qualified Vacuum Systems Operator.

Concur \_\_\_\_\_ Machine Technician Supervisor Date: \_\_\_\_\_

Concur \_\_\_\_\_ Cognizant Engineer Date: \_\_\_\_\_

Approved \_\_\_\_\_ NSTX-U Operations Head Date: \_\_\_\_\_

**NSTX-U WATER SYSTEMS OPERATOR**

**Accessor Training**

	Train. off. Init.
General Employee Training (GET)	
Lockout/Tagout Training	

	Train. off. Init.
Radiation Safety	
Basic Electrical Safety	

**Procedures**

OP-AD-39, Conduct of Operations	
OP-AD-09, Work Permits	
OP-AD-24, Experimental Area Cleanliness	

OP-AD-56, Chain of Command	
ENG-036, Temp. Modifications	
OP-AD-117, NSTX Access	

**Water Systems Operator Training**

Hazards Communication (Right-to-Know)	
NSTX-OP-G-156, Integrated Machine Bake-out Operations	

PTP-WS-08, NSTX De-ionized Water System Testing	

**Water Systems Operator Instructional Discussion by Cognizant Eng.**

Water Systems Overview	
Cooling Tower Water System	
Demineralized Water System	
Component Cooling Water System	
Field Coil Power Conversion Cooling Water System	

Water System Alarm Response	
NSTX Cooling Water Systems	
Pump and Valve Fundamentals	
NSTX Bakeout System	

**Recommendations**

I recommend \_\_\_\_\_ as a qualified Water Systems Operator.

Concur \_\_\_\_\_ Cognizant Engineer Date \_\_\_\_\_

Approved \_\_\_\_\_ NSTX-U Operations Head Date \_\_\_\_\_

**D-SITE MG OPERATOR**

**D-Site Training**

	Train. off. Init.
General Employee Training (GET)	
Lockout/Tagout Training	

	Train. off. Init.
Electric Utilization Training	

**Procedures**

OP-AD-39, Conduct of Operations	
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OP-AD-56, Chain of Command	
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**MG Operator Training**

Hazards Communication (Right-to-Know)	
OP-MG-07, MG Operations	
OP-EO-01, Fire/Co2 Discharge in MG Pit	
OP-EO-34, Loss of AC Power at MG	

OP-MG-203, Access to MG Pit	
OP-MG-205, Access to Reactor Cages	
OP-EO-02, Loss of AC Power at D-Site	

**MG Operator Instructional Discussion by Cognizant Engineer**

MG Controls	
MG Auxilliary Systems	
MG Protection Systems	
Associate Systems Alarms	
Starting and Shutdown Sequences	

Pulse Operation	
Normal Shift Monitoring	
Logkeeping	
Housekeeping	
Troubleshooting	

**Recommendations**

I recommend \_\_\_\_\_ as a qualified Motor Generator Operator.

Concur \_\_\_\_\_ Cognizant Engineer Date \_\_\_\_\_

Approved \_\_\_\_\_ NSTX-U Operations Head Date \_\_\_\_\_

**NSTX-U FCPC SYSTEMS OPERATOR**

**D-Site Training**

General Employee Training (GET)	Train. off. Init.
Lockout/Tagout Training	

Electric Utilization Training	Train. off. Init.

**Procedures**

OP-AD-39, Conduct of Operations	

OP-AD-56, Chain of Command	
ENG-036, Temp. Modifications	

**FCPC Operator Training**

Hazards Communication (Right-to-Know)	
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OP-ECS-245, ECS Daily Operational Start-up/Shutdown	
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**FCPC Operator Instructional Discussion by Cognizant Engineer**

FCPC Rectifier Systems	
Rectifier AC Feeder Breakers	
FCPC Kirk Key System	
Areas requiring Access Procedures	
<b>FCPC Routine Operations</b> PreOperational Morning Walkdown SLD Configuration & Operation PreOperational HiPot AC Breaker Rack-in/Rack-out Configuring FCPC for HPP "Pringle Bypass" of a Rectifier Operational System Shutdown	

FCPC SDS Systems	
EFDS HiPotting System	
FCPC EPICS & PLC Controls	
E-Stops in FCPC Area	
SPA Systems	

**Recommendations**

I recommend \_\_\_\_\_ as a qualified FCPC Systems Operator.

Concur \_\_\_\_\_ Cognizant Engineer Date \_\_\_\_\_

Approved \_\_\_\_\_ NSTX-U Operations Head Date \_\_\_\_\_

**NSTX-U NB OPERATIONS SUPERVISOR**

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**Accessor Training**

	Train. off. Init.
General Employee Training (GET)	
Lockout/Tagout Training	

	Train. off. Init.
Radiation Safety Training	
Basic Electrical Safety	

**Procedures**

OP-AD-39, Conduct of Operations	
OP-AD-09, Work Permits	
OP-AD-24, Experimental Area Cleanliness	

OP-AD-56, Chain of Command	
ENG-036, Temp. Modifications	
OP-AD-117, NSTX Access	

**Operating Procedures Training**

OP-NB-70, LHE Regen of the NSTX NB Enclosure	
OP-NB-97, Preparations of NB Areas and Equipment for daily operations	
OP-NB-235, OP-NB-238 SF6 Reclamation and filling of a NSTX NB High Voltage Enclosure	
OP-NB-64, Pumpdown of a NB Enclosure	
PTP-NB-11, NSTX NB LPIS Startup Procedure	

OP-NB-79, NSTX LPIS Startup and daily operations using local control	
OP-NB-232, SF6 Reclamation and filling of a NSTX NB Ion Source Enclosure	
OP-NB-710, Startup and Shutdown of the NB Water Systems	
OP-NB-66, Cooldown of a NB Enclosure	

**Emergency and Alarm Response Procedures**

OP-AR-02, NB Alarm Response Procedure for Security	
Cryogenic Line failure response procedure (OP-EO-31)	

OP-AR-04, NB Alarm Response Procedure for NB Ops Personnel	
OP-EO-18, NB Refrigerator loss of AC Power	



**NSTX-U NB Operations Supervisor**

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**Instructional Discussion by Cognizant Engineer**

Neutral Beam Vacuum Systems	
Neutral Beam Power Systems	
NB Control Station	
NB Plasma Interlocks	

Neutral Beam Cryogenic Systems	
Neutral Beam Ion Sources	
RS View Software	
Neutral Beam Water Systems	

**Recommendations**

I recommend \_\_\_\_\_ as a qualified NSTX NB Operations Supervisor.

Concur \_\_\_\_\_ Head, Heating Systems Branch Date \_\_\_\_\_

Approved \_\_\_\_\_ NSTX-U Operations Head Date \_\_\_\_\_

**NSTX-U NB ION SOURCE OPERATOR**

**Accessor Training**

	Train. off. Init.
General Employee Training (GET)	
Lockout/Tagout Training	

	Train. off. Init.
Radiation Safety Training	
Basic Electrical Safety	

**Procedures**

OP-AD-39, Conduct of Operations	
OP-AD-09, Work Permits	
OP-AD-24, Experimental Area Cleanliness	

OP-AD-56, Chain of Command	
ENG-036, Temp. Modifications	
OP-AD-117, NSTX Access	

**Ion Source Operator Training**

OP-NB-79, NSTX LPIS Startup and daily operations using local control	
PTP-NB-11, NSTX NB LPIS Startup Procedure	

OP-NB-97, Preparations of NB areas and equip for daily ops	

**Ion Source Operator Instructional Discussion by Cognizant Engineer**

NB Power Systems	
Local Control Consoles	

NB Ion Sources	

**Recommendations**

I recommend \_\_\_\_\_ as a qualified NB Ion Source Operator.

Concur \_\_\_\_\_ NB Operations Supervisor Date \_\_\_\_\_

Concur \_\_\_\_\_ Head, Heating Systems Date \_\_\_\_\_.

Approved \_\_\_\_\_ NSTX-U Operations Head Date \_\_\_\_\_.

**NSTX-U NB HELIUM REFRIGERATOR OPERATOR**

**Accessor Training**

	Train. off. Init.
General Employee Training (GET)	
Lockout/Tagout Training	

	Train. off. Init.
Radiation Safety Training	
Basic Electrical Safety	

**Procedures**

OP-AD-39, Conduct of Operations	
OP-AD-09, Work Permits	
OP-AD-24, Experimental Area Cleanliness	

OP-AD-56, Chain of Command	
ENG-036, Temp. Modifications	
OP-AD-117, NSTX Access	

**Refrigerator Operator Training**

OP-NB-229, Startup/Operations of the 1070W helium refrigerator	
OP-AR-02, NB Alarm Response Procedure for Security	
Cryogenic Line failure response procedure (OP-EO-30,31)	
Compressed Gases & Cryo Safety	
Hazard Communication	
Ladder Safety	

OP-NB-230, Beamline Liquid helium operations	
OP-AR-04, NB Alarm Response Procedure for NB Ops Personnel	
OP-EO-18, NB Refrigerator loss of AC Power	
Fall Protection	
Hearing Conservation	

**Refrigerator Operator Instructional Discussion by Cognizant Engineer**

NB Cryogenic Systems	
NB Water Systems	

NB Vacuum Systems	
Refrigerator Operations	

**NSTX-U NB HELIUM REFRIGERATOR OPERATOR**

Page 1 of 2

**Recommendations**

I recommend \_\_\_\_\_ as a qualified LHE Refrigerator Operator.

Concur \_\_\_\_\_ NB Operations Supervisor Date \_\_\_\_\_

Concur \_\_\_\_\_ Head, Heating Systems Date \_\_\_\_\_

Approved \_\_\_\_\_ NSTX-U Operations Head Date \_\_\_\_\_.

**NSTX-U NB BEAMLINE SUBSYSTEMS OPERATOR**

**Accessor Training**

	Train. off. Init.
General Employee Training (GET)	
Lockout/Tagout Training	

	Train. off. Init.
Radiation Safety Training	
Basic Electrical Safety	

**Procedures**

OP-AD-39, Conduct of Operations	
OP-AD-09, Work Permits	
OP-AD-24, Experimental Area Cleanliness	

OP-AD-56, Chain of Command	
ENG-036, Temp. Modifications	
OP-AD-117, NSTX Access	

**Operating Procedures Training**

OP-NB-70, LHE Regen of an NSTX Neutral Beam	

OP-NB-134, Ion Source rate of rise measurement	

**Ion Source Operator Instructional Discussion by Cognizant Engineer**

NB Vacuum Systems	

NB Cryogenic Systems	

**Recommendations**

I recommend \_\_\_\_\_ as a qualified Beamline Subsystems Operator.

Concur \_\_\_\_\_ NB Operations Supervisor Date \_\_\_\_\_

Concur \_\_\_\_\_ Head, Heating Systems Date \_\_\_\_\_

Approved \_\_\_\_\_ NSTX Operations Head Date \_\_\_\_\_

**NSTX-U HHFW SOURCE OPERATOR**

	Train. off. Init.
General Employee Training (GET)	
Lockout/Tagout Training	

	Train. off. Init.
Electric Utilization Training	

**Procedures**

OP-AD-39, Conduct of Operations	
ENG-036, Temp. Modifications	

OP-AD-56, Chain of Command	

**HHFW Source Operator Training**

D-NSTX-OP-RF-746 NSTX HHFW Systems Operation: Daily	
OP-RF-277 HHFW RF Leakage Survey	

OP-RF-140, OP-RF-149 and OP- RF-274 Source Ops Procedures	

**ECH Operator Instructional Discussion by Cognizant Eng.**

HHFW HIS/ESTOP Interface	
HHFW PLC Operator Terminal	
HHFW EPICS Controls Overview	
Pre-Operational Morning Walkdown	
C-Site DI RF Water System	

HHFW DAS Overview	
HHFW AC Power System	
HHFW RF Transmission Line	
RF Yard 4160 VAC Status	

**Recommendations**

I recommend \_\_\_\_\_ as a qualified NSTX HHFW Source Operator.

Concur \_\_\_\_\_ Cognizant Engineer Date \_\_\_\_\_

Approved \_\_\_\_\_ NSTX-U Operations Head Date \_\_\_\_\_

**NSTX-U ECH-PI OPERATOR**

	Train. off. Init.
General Employee Training (GET)	
Lockout/Tagout Training	

	Train. off. Init.
Basic Electrical Safety	

**Procedures**

OP-AD-39, Conduct of Operations	
ENG-036, Temp. Modifications	

OP-AD-56, Chain of Command	

**ECH-PI Operator Training**

PTP-RF-044 NSTX ECH-PI Pre-Operations Testing	


**ECH Operator Instructional Discussion by Cognizant Eng.**

ECH HIS/ESTOP Interface	
ECH PLC Operator Terminal	
ECH EPICS Controls Overview	
Pre-Operational Morning Walkdown	
Klystron Rack Power Up/Down	

ECH DAS Overview	
ECH AC Power System	
ECH RF Transmission Line	
ECH 480 Volt Starter Status	

**Recommendations**

I recommend \_\_\_\_\_ as a qualified NSTX ECH-PI Operator.

Concur \_\_\_\_\_ Cognizant Engineer Date \_\_\_\_\_

Approved \_\_\_\_\_ NSTX-U Operations Head Date \_\_\_\_\_