

PROCEDURE COVER SHEET

Princeton Plasma Physics Laboratory Procedure		
Procedure Title: Start Up of NSTX-U		
Number OP-NSTX-02	Revision: 14	Effective Date: 11/1/14 Expiration Date: <i>(3 yr. unless otherwise stipulated)</i>
Procedure Approvals		
Author: A. vonHalle		Date
ATI: A. vonHalle		Date
RLM: M. Williams		Date
Responsible Division:		
Procedure Requirements designated by RLM		
LABWIDE:		
<input type="checkbox"/>	Work Planning Form # _____ (ENG-032)	Lockout/Tagout (ESH-016)
<input type="checkbox"/>	Confined Space Permit (5008, Sec. 8, Chap 5)	Lift Procedure (ENG-021)
<input type="checkbox"/>	Master Equip. List Mod (GEN-005)	ES&H Review (NEPA, IH, etc.)
<input type="checkbox"/>	RWP (HP-OP-20)	Independent Review
<input type="checkbox"/>	ATI Walkdown	Pre-job Brief
<input type="checkbox"/>	Post-job Brief	Hazard Analysis
<input checked="" type="checkbox"/>	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:		
<input type="checkbox"/>	D-Site Work Permit (OP-AD-09)	Door Permit (OP-G-93)
<input type="checkbox"/>	Pre-job brief (OP-AD-77)	USQD (OP-AD-63)
<input type="checkbox"/>		T-MOD (ENG-036)
<input type="checkbox"/>		

REVIEWERS (designated by RLM)	
Accountable Technical Individual	A.vonHalle
Test Director	
Independent Reviewer	
D-Site Shift Supervisor	C. Gentile, H. Carnevale, S. Langish
NSTX-COE's	W. Blanchard, R. Camp
D-Site Caretaking	
Vacuum	J. Winston
Computer	
Tritium	
Quality Assurance/Quality Control	
AC Power/MG	M. Awad
Maintenance and Operations Division	
Energy Conversion Systems	G. Baker, S. Ramakrishnan, J. Corl
Engineering	S. Raftopoulos
Environmental Restoration & Waste Management Division	
Water Systems	R. Herskowitz
Neutral Beam	T. Stevenson, M. Cropper
Radiofrequency (Heating Systems Branch of Electrical Eng)	E. Fredd/N. Greenough
Lithium Systems	R. Kaita
Environmental, Safety, & Health	
NSTX	C. Neumeyer, D. McBride, J. Chrzanowski, C. Such

TRAINING (designated by RLM)			
No training required _____		Instructor _____	
Personnel (group, job title or individual name)	Read Only*	Instruction	Hands-On
NSTX COE's	X		
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

1. PURPOSE

This procedure provides a set of criteria for confirming that preoperational test and startup activities have been successfully completed leading up to experimental operations of NSTX-U.

2. SCOPE

This procedure defines the criteria for confirming the completion of the preoperational testing of those work elements associated with plasma operations on NSTX-U:

Torus Vacuum Pumping System (TVPS)

Torus pumpdown and testing

Coil systems and associated hardware

AC Power Systems

Motor Generator Sets

Water Systems

Bakeout System

Control Systems

NTC Safety Interlock Systems

Energy Conversion Systems (ECS)

Diagnostic Systems

Glow Discharge Cleaning (GDC) System

Vessel Boronization Systems

Lithium Systems

RF Systems (HHFW & ECH)

Neutral Beam Injection Systems

Preparation of the machine Areas

Integrated System Testing

This procedure is separated into five sections:

A. Pump down, Test Cell Prep, and Initial Bake out.

B. Preparation and authorization for ISTP-001.

C. Preparation and authorization for NSTX-U CD-4 milestone.

D. Preparation for Neutral Beam CD-4 milestone

E. Preparation and authorization for NSTX-U plasma operations.

Confirmation of completion of preoperational test and startup activities is subject to the concurrence of both the Accountable Technical Individual (ATI) for the system in question and an NSTX-U Chief Operations Engineer (COE).

Sections may be performed in any order. Authorizations for ISTP-001, CD-4, plasma ops, or the use of new machine capabilities are defined in “HOLD POINTS”

3. REFERENCES

NSTX Safety Assessment Document (SAD)

ESH-5008 Environmental, Safety, and Health Manual

ESH-014 NEPA Review System

ESH-016 Control of Hazardous Energy Sources Via Lockout/Tagout of Energy Isolation Devices

ENG-030 PPPL Technical Procedures for Experimental Facilities

ENG-032 PPPL Work Planning Procedure

ENG-033 PPPL Engineering Design Verification

ENG-036 Control of Temporary Modifications

OP-AD-77 Operation and Maintenance of Tritium Contaminated Systems.

OP-AD-97 Administrative Control of D-Site Procedures

OP-AD-39 D-Site Conduct of Operations

OP-AD-56 Control of Equipment and System Status (chain of command)

OP-AD-09 D-Site Work Permit System

OP-AD-24 Control of Workplace Cleanliness Around D-Site Experimental Areas

OP-AD-75 Access to the TFTR Exhaust Stack Area

OP-ADX-02 Machine Proposals for NSTX

OP-ADX-03 Experimental Proposals for NSTX

OP-AD-117 Operation of the NSTX Access System

OP-AD-115 Moving Radioactive/Contaminated Material to/from D-Site

HP-OP-20 Radiation Work Permit Procedure

Test Cell

OP-AD-115 Moving Radioactive/Contaminated Material to/from D-Site

HP-OP-20 Radiation Work Permit Procedure

OP-NSTX-01 Preparations of Experimental Areas for Machine Operations.

OP-NSTX-12 NSTX Training Matrix

OP-NSTX-14 NSTX Operations Guide for Startup and Shutdown

OP-NSTX-15 HPP Daily Operations.

Vacuum Vessel and Support Structure

NSTX-OP-G-05 Procedure to vent vacuum spaces behind TIV's
NSTX-OP-G-151 Daily Hi-Pot Test of the NSTX Inner/Outer Vacuum Vessel
NSTX-OP-G-165 Venting, Purging and Safing NSTX Vacuum Vessel for Entry
NSTX-OP-G-170 Venting and pumping down NSTX for calibrations and diagnostics
OP-VV-732 Leak Checking of NSTX

Plasma Facing Components

NSTX-OP-G-155 NSTX Boronization using TMB
NSTX-OP-G-157 TMB GDC Daily

TVPS

NSTX-OP-G-158 TVPS Start-Up after an outage

Gas Delivery Systems

PTP-NSTX-FGDS-TBD Fueling Gas Delivery System Pre-Op Testing

Bake-Out Systems

NSTX-OP-G-156 NSTX Integrated Machine Bake-out Operations

Cooling Systems

PTP-WS-08 NSTX De-Ionized Water/ System Testing

Coil Systems

PTP-NSTX-CL-28 HiPot of NSTX Coil Sys from SDS in FCPC
PTP-CL-NSTX-26 NSTX Coil System Preoperational Tests
D-NSTX-OP-G-141 Changing Polarities on NSTX Coil Systems

Hardwired Interlock Systems

OP-NSTX-05 Testing the NSTX HIS with Areas Safe for Access
OP-NSTX-08 Testing the NSTX Emergency Stop System
OP-NSTX-09 Safety Lockout Device Test Procedure

Energy Conversion Systems

OP-KK-26 ECS Kirk key Test
OP-KK-28 NSTX SLD Kirk Key Test
AP-ECS-01 FCPC System Access
AP-NSTX-03 RWM SPA Access Procedure

MP-ECS-09 Rectifier Maintenance

- MP-ECS-05 Rectifier Disconnect Maintenance
- PTP-ECS-34 PSRTC Simulation Tests
PTP-ECS-35 PSRTC I/O Tests
PTP-ECS-43 Pulse Duration Period Timer Tests
PTP-ECS-39 FCPC Dummy load tests
PTP-ECS-45 ECS HiPot Tests
PTP-ECS-65 RWM PLC to SDS Operation and Kirk Key Test
PTP-ECS-70 ECS HCS Upgrade Preliminary Test procedure
PTP-ECS-71 ECS HCS OH Upgrade Preliminary Test procedure
- OP-PC-44 ECS HCS Input/Output Interface testing
OP-PC-45 ECS Interlock and Level 1 Display testing
OP-PC-46 SDS Preoperational testing
OP-PC-48 ECS Critical Interlocks
OP-PC-49 ECS Ground Fault testing
OP-PC-734 Rectifier Reactivation
OP-ECS-245 FCPC Daily Startup/Shutdown Procedure
- OP-NSTX-17 PDP Trip Control Settings

Digital Coil Protection System

- PTP-DCPS-001 Digital Coil Protection System (DCPS) Testing
PTP-DCPS-002 Interconnection Subsystem Checkout
PTP-DCPS-003 DCPS PC Board tests
PTP-DCPS-004 DCPS Real World Tests
OP-NSTX-779 DCPS Set-Up/Start-Up Procedure

Motor Generator Systems

- OP-KK-24 MG Reactor Kirk Key Test
OP-KK-27 MG CO2 Kirk Key Test
MP-MG-079 MG QC Inspection/ Pre-Start Checks
OP-MG-07 D-Site MG Operation in support of NSTX
OP-MG-203 MG Pit Access procedure
OP-MG-205 MG Reactor Cage Access Procedure

Coil Energization Systems

- ISTP-NSTX-01 NSTX Coil Energization Tests

ECH Pre-ionization

PTP-RF -44 NSTX ECH-PI Pre-Operations testing

HHFW

OP-KK-90 ICRF System 3&4 Kirk Key and Local E-Stop Test
OP-KK-266 ICRF System 5&6 Kirk Key and Local E-Stop Test
OP-KK-267 ICRF System 1&2 Kirk Key and Local E-Stop Test
OP-RF-277 HHFW Leakage Survey Procedure
OP-RF-140 HHFW System 1&2 Operating Procedure
OP-RF-149 HHFW System 3&4 Operating Procedure
OP-RF-274 HHFW System 5&6 Operating Procedure
OP-RF-746 NSTX HHFW System Operation: Daily
AP-RF-01 ICRH Sources 1 & 2 Access Procedure
AP-RF-02 ICRH 40-80MHz Sources 3 & 4 Access Procedure
AP-RF-03 ICRH 40-80Mhz Sources 5 & 6 Access Procedure

Neutral Beams

NSTX-OP-G-144 Neutral Beam Kirk Interlock Testing
OP-NSTX-22 Verification of Interlocks and Administrative Controls
required for NB Ops into NSTX
OP-NSTX-23 Verification of Interlock Readiness for operation of the NB Injection
System
PTP-NB-11 NB Long Pulse Ion Source Startup Procedure
PTP-NB-212 NB Power Supply Test procedure
OP-NB-64 Pumpdown of a NB enclosure
OP-NB-66 Cooldown of a NB enclosure
OP-NB-70 LHe Regen of the NSTX NB Enclosure
OP-NB-79 NB Long Pulse Operation: Ion Source Accel Startup & Daily
Operations using local control
OP-NB-97 Preparations of NB Areas and Equip for daily operations
OP-NB-134 Ion Source Rate of Rise Measurement
OP-NB-229 Startup/operations of the 1070W helium refrigerator
OP-NB-230 Beamline liquid helium operations
OP-NB-232 SF6 Reclamation and filling of a NSTX NB Ion Source Enclosure
OP-NB-235 Evacuation and Filling of a NB HVE
OP-NB-238 Reclamation of SF6 from a NSTX NB HVE
OP-NB-710 Startup and Shutdown of the beamline water systems
AP-NB-01 Neutral Beam Surge Room Access Procedure

AP-NB-02 Neutral Beam Mod/Reg Access Procedure
AP-NB-03 Neutral Beam Decel Supply Access Procedure
AP-NB-04 Neutral Beam Switchgear Access Procedure
AP-NB-05 Neutral Beam HVE/Ion Source Access Procedure
AP-NB-06 Neutral Beam LCC Access Procedure
AP-NB-07 Neutral Beam Power Distribution Access Procedure
AP-NB-08 Neutral Beam Shutdown/Safing Procedure

CHI

AP-NSTX-02 CHI/RWM Kirk Interlock Access Procedure
NSTX-OP-CHI-759 CHI Cap Bank Operating Procedure
AP-NSTX-01 CHI Cap Bank Access Procedure

Over-Voltage Protection Circuitry as shown on Dwg. B-4F1005, sheet 1575

MPTS

NSTX-OP-G-142 MPTS Personnel Safety Interlock Test Procedure

Diagnostics

NSTX-OP-G-05 Procedure to vent vacuum spaces behind TIV's

Lithium Systems

PTP-CCD-016 Pre-Op Test for the LITER-1 Inst. And Controls
ISTP-278 NSTX LITER-1 Integrated System Test
OP-VAC-762 NSTX LITER-1 Operating Procedure

MSE-LIF Diagnostic Neutral Beam (DNB)

DNB-04 DNB pre-operational testing and start-up

Massive Gas Injector (MGI)

PTP-NSTX-MGI-TBD MGI Pre-Op Testing

4. PRECAUTIONS

Precautions for the various activities defined in this procedure are covered in the individual operating documents.

**A. TORUS PUMPDOWN, WATER SYSTEM START-UP, AND
NTC PREP FOR COIL TESTS**

A.1. NSTX-U TORUS PUMPDOWN

A.1.1 Preliminary Vacuum Vessel High-Pots successfully completed
(OP-G-151)

ATI: _____

A.1.2 Clear the Lockout/Tagout of the NSTX-U Vessel (D-NSTX-OP-G-165)

ATI: _____

A.1.3 TVPS Start-Up complete (D-OP-G-158)

ATI: _____

A.1.4 Leak checking of Vacuum Vessel successfully completed in preparation
(OP-VV-732)

ATI: _____

A.1.5 Additional activities required for Torus pumpdown:

A.2. WATER SYSTEMS

A.2.1 NSTX De-Ionized Water System Testing complete (PTP-WS-08)

ATI: _____

A.2.2 Additional Cooling Water test activities:

A.3. TEST CELL PREPARATIONS FOR COIL SYSTEM TESTING

A.3.1 Insulation tests (HiPots) of NSTX-U Coil Systems as appropriate (PTP-NSTX-CL-28)

ATI: _____

A.3.2 Vacuum Vessel High-Pots successfully completed (NSTX-OP-G-151)

ATI: _____

A.3.3 Complete Machine Area scrubs (OP-NSTX-01)

ATI: _____

A.3.4 Review and close out NSTX-U work permits as appropriate

Shift Supervisor/COE: _____

A.3.5 Review and close out NSTX-U Installation Procedure Run Copies as appropriate.

NSTX Eng Ops Head: _____

A.3.6 Review status of temporary modifications to NSTX-U operating equipment

COE: _____

A.3.7 Bus/Coil/Power System Walkdown complete

NSTX-U Eng Ops Head: _____

A.3.8 ECS SLD, HIS, HCS Interlock Testing complete (OP-PC-48)

ATI: _____

A.3.9 ECS/SLD System Kirk Interlock testing complete (OP-KK-28)

ATI: _____

A.3.10 Testing of the Hardwired Interlock Systems (HIS) with areas safe for access completed (OP-NSTX-05)

ATI: _____

A.3.11 Safety Lockout Device (SLD) testing complete (OP-NSTX-09)

ATI: _____

A.3.12 Emergency Stop system testing complete (OP-NSTX-08)

ATI: _____

A.3.13 Additional Test Cell Preparation activities:

B. Preparations for ISTP-001

B.1. ENERGY CONVERSION SYSTEMS (ECS) & MG READY FOR ISTP

B.1.1 MG System Kirk Interlock testing complete (OP-KK-24, OP-KK-27)

ATI: _____

B.1.2 MG QC Inspection/Pre-Start Checks complete (MP-MG-079)

ATI: _____

B.1.3 MG System Operations resumed per OP-MG-07

ATI: _____

B.1.4 ECS Kirk Lock System tested and ready for operations (OP-KK-26)

ATI: _____

B.1.5 RWM PLC to SDS Operation and Kirk Key Test (PTP-ECS-65)

ATI: _____

B.1.6 Rectifier and Disconnect Maintenance Complete per MP-ECS-05/09

ATI: _____

B.1.7 Rectifier reactivation complete per OP-PC-734

ATI: _____

B.1.8 SDS Preoperational testing completed (OP-PC-46)

ATI: _____

B.1.9 ECS HCS Input/Output Interface Testing complete (OP-PC-44)

ATI: _____

B.1.10 ECS HCS Upgrade Preliminary Test Procedure (PTP-ECS-70/71)

ATI: _____

B.1.11 ECS Critical Interlock Testing (OP-PC-49)

ATI: _____

B.1.12 ECS Ground Fault Detector Testing completed (OP-PC-49)

ATI: _____

B.1.13 ECS High Pot Testing completed (PTP-ECS-45)

ATI: _____

B.1.14 PSRTC Simulation & I/O testing completed (PTP-ECS-34/35)

ATI: _____

B.1.15 Pulse Duration Period Timer Tests (PTP-ECS-43)

ATI: _____

B.1.16 Digital Coil Protection System (DCPS) Testing Complete (PTP-DCPS-01/02/03/04)

ATI: _____

B.1.17 DCPS Set-Up/Start-Up Complete (OP-DCPS-779)

ATI: _____

B.1.18 Dummy load testing completed as appropriate (PTP-ECS-39)

ATI: _____

B.1.19 Transrex Supply Protection Settings applied per ISTP-001

ATI: _____

B.1.20 ECS start up and Hi-Pot of the NSTX-U Coil Systems completed (OP-ECS-245)

ATI: _____

B.1.21 Additional ECS System test activities:

B.2. COIL ENERGIZATION OPERATIONS PREPARATION

B.2.1 Vacuum Vessel Hi-Pot successfully completed (NSTX-OP-G-151)

ATI: _____

B.2.2 Coil Polarities (Bus Links) established (D-NSTX-OP-G-141)

ATI: _____

B.2.3 Coil System preoperational Test Complete (PTP-CL-NSTX-26)

ATI: _____

B.2.4 NSTX-U prepared for operations per the daily start-up procedure (OP-NSTX-14)

ATI: _____

B.2.5 NSTX-U prepared for HPP operations (OP-NSTX-15)

ATI: _____

B.2.6 NSTX-U Data Acquisition ready for ISTP operations.

ATI: _____

B.2.7 NSTX-U Magnetics Diagnostics ready for ISTP operations.

ATI: _____

B.2.8 Additional Coil Energization test activities:

HOLD POINT

(Sections A and B must be completed before proceeding with ISTP-NSTX-001 tests)

The following committee has reviewed the completion of preparations for Coil Energization and concur that systems and procedures are in place and ready.

NSTX-U Project Eng. _____

Head, NSTX Ops _____

Head, NSTX-U Physics Ops _____

Head, Engineering & Infrastructure _____

Coil Energization may proceed per ISTP-NSTX-001

C. ISTEP-001 LEADING TO NSTX-U CD-4 OPERATIONS**C.1. PREPARATIONS FOR BAKEOUT OPERATIONS**

C.1.1 Scrub machine (OP-NSTX-01)

ATI: _____

C.1.2 Vacuum Vessel High-Pots successfully completed (NSTX-OP-G-151)

ATI: _____

C.1.3 Bakeout Systems ready for operation per D-NSTX-OP-G-156

ATI: _____

C.1.4 NSTX-U Cooling Systems restored per D-NSTX-OP-G-156

ATI: _____

C.1.5 Vacuum vessel boronization (if appropriate) performed per
D-NSTX-OP-G-155

ATI: _____

C.1.6 Daily TMB GDC (as required) per D-NSTX-OP-G-156

ATI: _____

C.1.7 Additional Bake Out System test activities:

C.2 Preparations for CD-4 Combined Field/Plasma Operations

C.2.1 Review status of NSTX-U Operator and Access training per OP-NSTX -12

NSTX Eng Ops Head: _____

C.2.2 Fuel Gas Delivery System Pre-Op Tests complete (PTP-FGDS-TBD)

ATI: _____

C.2.3 PDP Trip Control Settings Complete (OP-NSTX-17)

ATI: _____

C.2.4 NSTX-U ECH-PI Pre-Operational Testing (PTP-RF-044,Appendix A)

ATI: _____

C.2.5 Coil Energization tests complete (ISTP-NSTX-001)

ATI: _____

HOLD POINT

The following committee has reviewed the completion of preparations for CD-4 Plasma Operations and concur that systems and procedures are in place and ready.

NSTX-U Project Eng. _____

Head, NSTX-U Ops _____

Head, NSTX-U Physics Ops _____

Head, Engineering & Infrastructure _____

CD-4 plasma operations at approved parameters may begin. (Coil current and I²T allowables per ISTP-NSTX-001)

C.2.6 Additional Integrated System test activities:

D. PREPARATIONS FOR NSTX-U NB CD-4 OPERATIONS

D.1. NEUTRAL BEAM #2 VACUUM/CRYOGENIC SYSTEMS

D.1.1 Beamline #2 Pumpdown/Leak Check successful (OP-NB-64)

ATI: _____

D.1.2 NB Water Systems start up complete (OP-NB-710)

ATI: _____

D.1.3 Beamline #2 LN2 Cooldown complete (OP-NB-66)

ATI: _____

D.1.4 Start up/Operations of the 1070W helium refrigerator successful (OP-NB-229)

ATI: _____

D.1.5 Beamline #2 Liquid Helium Operations (OP-NB-230)

ATI: _____

D.1.6 Additional Neutral Beam #2 Vac/Cryo system test activities:

D.2. NEUTRAL BEAM #2 POWER SYSTEM TESTING

D.2.1 Neutral Beam Kirk Interlock testing complete (D-NSTX-OP-G-144)

ATI: _____

D.2.2 NSTX-U Hardwired Interlock System (HIS) testing for NBI complete (OP-NSTX-05)

ATI: _____

D.2.3 NSTX-U Emergency Stop system testing for NBI complete (OP-NSTX-08)

ATI: _____

D.2.4 SF6 detectors calibrated (Manufacturer supplied procedures)

ATI: _____

D.2.5 NB #2 Power Supply Testing Complete (PTP-NB-212)

ATI: _____

D.2.6 Additional NB #2 Power System preoperational test activities:

D.3. NEUTRAL BEAM #2 ION SOURCE OPERATIONS

D.3.1 NB #2 areas and equipment prepared for daily operations per OP-NB-97

ATI: _____

D.3.2 Initial Ion Source conditioning complete (PTP-NB-11)

ATI: _____

D.3.3 Verification of Interlock Readiness for operation of the NB Injection System (OP-NSTX-23)

ATI: _____

D.3.4 Beam #2 operation into the beamline calorimeter (OP-NB-79)

ATI: _____

D.3.5 Verification of Interlocks and Administrative Controls required for NB #2 Ops into NSTX (OP-NSTX-22)

ATI: _____

HOLD POINT

The following committee has reviewed the completion of preparations for CD-4 neutral beam operations and concur

that systems and procedures are in place and ready for initial injection into the NSTX-U Vessel.

NSTX-U Project Eng. _____

Head, Heating Systems Branch _____

Head, NSTX-U Ops _____

Head, NSTX-U Physics Ops _____

Head, Engineering & Infrastructure _____

CD-4 neutral beam operations into NSTX-U beam armor at approved parameters may begin (per OP-NSTX-22).

D.3.7 Additional preparations NB #2 injection operations:

Neutral Beam injection CD-4 milestone met. NB operations into NSTX-U plasmas at parameters established on the NSTX-U Safety Certificate and ISTEP-NSTX-001.

E. PREPARATION AND AUTHORIZATION FOR NSTX-U PLASMA OPERATIONS IN SUPPORT OF EXPERIMENTS

NSTX-U EXPERIMENTAL PLASMA OPERATIONS IN NOW ALLOWED WITHIN PARAMETERS ESTABLISHED ON THE NSTX-U SAFETY CERTIFICATE AND ISTEP-NSTX-001. ADDITIONAL CAPABILITIES MAY BE BROUGHT INTO SERVICE AS THE FOLLOWING SECTIONS ARE COMPLETED.

E.1. MPTS DIAGNOSTIC OPERATIONS

E.1.1 Testing of the MPTS Personnel Safety Interlocks complete (D-NSTX-OP-G-142)

ATI: _____

E.1.2 Additional activities in preparation for MPTS operations:

E.2. BAKEOUT/BORONIZATION OPERATIONS

E.2.1 Scrub machine (OP-NSTX-01)

ATI: _____

E.2.2 Vacuum Vessel High-Pots successfully completed (NSTX-OP-G-151)

ATI: _____

E.2.3 Bakeout Systems ready for operation per D-NSTX-OP-G-156

ATI: _____

E.2.4 Vacuum vessel boronization performed per D-NSTX-OP-G-155

ATI: _____

E.2.5 NSTX-U Cooling Systems restored per D-NSTX-OP-G-156

ATI: _____

E.2.6 Daily TMB GDC (as required) per D-NSTX-OP-G-156

ATI: _____

E.2.7 Additional Bake Out System test activities:

E.3. LITHIUM EVAPORATOR (LITER) INSTALLATION AND OPERATION

E.3.1 Instrumentation, control and interlock system pre-operational testing of the LITER subsystems complete (PTP-NSTX-CCD-016)

ATI: _____

E.3.2 Introduction of lithium into NSTX via LITER may proceed per ISTEP-278 and OP-VAC-762

ATI: _____

E.3.3 Additional activities in preparation for daily LITER operations:

E.4. HHFW SYSTEMS

E.4.1 ICRF System 1&2 Kirk Key and Local E-Stop Test (OP-KK-267)

ATI: _____

E.4.2 ICRF System 3&4 Kirk Key and Local E-Stop Test (OP-KK-90)

ATI: _____

E.4.3 ICRF System 5&6 Kirk Key and Local E-Stop Test (OP-KK-266)

ATI: _____

E.4.4 ICRF System 1&2 Start-Up/Operations (OP-RF-140)

ATI: _____

E.4.5 ICRF System 3&4 Start-Up/Operations (OP-RF-149)

ATI: _____

E.4.6 ICRF System 5&6 Start-Up/Operations (OP-RF-274)

ATI: _____

E.4.7 RF Leakage Surveys complete (OP-RF-277)

ATI: _____

E.4.8 Additional HHFW System test activities:

E.5. CHI CAPACITOR BANK OPERATIONS

E.5.1 CHI/RWM System Kirk Interlock testing complete (AP-NSTX-02)

ATI: _____

E.5.2 Cap Bank Accessors qualified on the use of the CHI Cap Bank Access procedure (AP-NSTX-01)

ATI: _____

E.5.3 Inner/Outer Vacuum Vessel HiPots completed per current revision of OP-G-151

ATI: _____

E.5.4 Capacitor Bank and overvoltage protection circuitry for CHI transient CHI start-up configured per drawing B-4F1005, Sheet 1575

ATI: _____

E.5.5 NSTX-U configured for operations using the capacitor bank operating procedure D-NSTX-OP-CHI-759

ATI: _____

E.5.6 Additional activities in preparation for NSTX-U CHI operations:

E.6 MSE-LIF DIAGNOSTIC NEUTRAL BEAM (DNB) OPERATIONS

E.6.1 System interlocks tested per Diagnostic Personnel Safety Interlock Procedure (NSTX-OP-G-142)

ATI: _____

E.6.2 DNB Emergency Stops tested per OP-NSTX-08

ATI: _____

E.6.3 DNB start-up and pre-operational testing completed per DNB-04

ATI: _____

E.6.4 Additional activities in preparation for MSE-LIF DNB operations:

E.7 MASSIVE GAS INJECTOR (MGI) OPERATIONS

E.7.1 MGI Pre-Operational Testing Complete (PTP-NSTX-MGI-TBD)

ATI: _____

E.7.2 Additional activities in preparation for MGI operations:

**E.8 ADDITION OF NEUTRAL BEAM #1 FOR 2 BEAM NSTX-U OPERATIONS
(ASSUMES COMPLETION OF SECTION D, NB CD-4 OPERATION)**

E.8.1 Beamline #1 Pumpdown/Leak Check successful (OP-NB-64)

ATI: _____

E.8.2 Beamline #1 LN2 Cooldown complete (OP-NB-66)

ATI: _____

E.8.3 Beamline #1 Liquid Helium Operations (OP-NB-230)

ATI: _____

E.8.4 NB #1 Power Supply Testing Complete (PTP-NB-212)

ATI: _____

E.8.5 NB #1 areas and equipment prepared for daily operations per OP-NB-97

ATI: _____

E.8.6 Initial NB #1 Ion Source conditioning complete (PTP-NB-11)

ATI: _____

E.8.7 Verification of Interlock Readiness for operation of the NB #1 Injection System (OP-NSTX-23)

ATI: _____

E.8.8 Beam #1 operation into the beamline calorimeter (OP-NB-79)

ATI: _____

E.8.9 Verification of Interlocks and Administrative Controls required for NB #1
Ops into NSTX (OP-NSTX-22)

ATI: _____

E.8.10 Additional preparations NB #2 injection operations:
