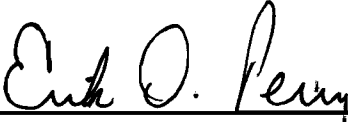


**Health and Safety Plan for
NSTX Upgrade Project Tasks
in the NSTX Test Cell**


PRINCETON PLASMA PHYSICS LABORATORY

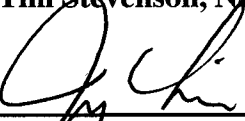
November 9, 2011

Rev 1

Prepared by:  11/9/11
Erik D. Perry

Reviewed by:  11/9/2011
Larry Dudek, NSTX Center Stack Manager

Reviewed by:  11/9/11
Tim Stevenson, NSTX Neutral Beam Manager

Reviewed by:  11/9/11
Jerry Levine, Environment, Safety, Health and Security Head

Reviewed by:  11/9/11
Bill Slavin, Safety Division Head

Approved by:  11/9/11
Al von Halle, Head of NSTX Engineering Operations

INTRODUCTION

This document describes the structure and implementation of the Health and Safety Plan for the NSTX Upgrade Project work in the NSTX Test Cell (NTC). Reference guides for this project include PPPL Construction Safety Policies, PPPL ES&H Respiratory Protection Directive, the Work Control Center Procedure and the DOE Hoisting and Rigging Manual. Herein is our site specific Health and Safety Plan for the work in the NSTX Test Cell for this NSTX Upgrade Project.

1.0 INTEGRATED SAFETY POLICY AND PHILOSOPHY

The Integrated Safety Management Objectives of this project are:

1. To integrate safety into all work management and work activities.
2. To follow the policies, programs and procedures that have been developed and are the structure for workers to fulfill environment, safety, and health responsibilities on this project.

The following seven principles are incorporated into the planning and performance of this work and all PPPL projects.

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

The five Integrated Safety Management (ISM) functions are also incorporated into the planning and performance of this work and all PPPL projects. This Plan describes the mechanisms, responsibility assignments, and implementation of ISM established for the work to be performed on this project based on the specific nature and hazards of the activities. Included are the PPPL policies, procedures and documents that outline how PPPL and subcontractors implement ES&H and perform the core functions of ISM.

2.0 HAZARDS, PROCEDURES, CONTROLS AND REQUIREMENTS

Scope of Work

The work to be performed includes the removal of items in the NSTX Test Cell to clear an area for the second Neutral Beam (NB2), the cutting of a large hole in the vacuum vessel so a new neutral beam nozzle can be installed, the cutting of a large hole in the vacuum vessel so a new Bay L nozzle can be installed, the relocation of the NB2 parts to the NSTX test cell (including any decontamination that is required as a result of this relocation), the re-assembly of NB2 in the NSTX Test Cell, the cutting of penetrations into the NTC for service runs, the connection of services to NB2, and reinstallation of items removed for the NB2 installation.

The work in the NTC also includes the removal and subsequent reinstallation of items to gain access to the center stack related work, modifications to the umbrella structures, modifications to the TF and PF coil supports, the removal of the old center stack, the installation of a new center stack, the cleaning of in-vessel tiles, the replacement of some of the in-vessel passive plates hardware.

3.0 RESPONSIBILITIES, AUTHORITIES, COMMUNICATIONS

The Work Control Center Procedure, D-NSTX-OP-AD-129, shows the organizational structure for this work and depicts the chain-of-command for the activities in the NSTX Test Cell. The telephone numbers for key individuals are:

NSTX Construction Manager (complete authority):	Erik Perry	x3016	(609) 731-3103
Work Control Center manager (stop-work authority):	Tom Meighan	x3053	%002
Construction Safety (stop-work authority):	Bill Slavin	x2533	%546
Lift Manager (stop-work authority):	Mike Viola	x3655	%243

Note: all employees have stop-work authority in regards to safety issues.

Daily coordination of activities shall occur between the Construction Manager and the other participants at the 8:00 Plan-of-the-day meeting.

Per ESHD 5008 Section 1, competent persons required by applicable OSHA standards are identified at <http://www-local.pppl.gov/eshis/OSHACPs.pdf>

4.0 WORK CONTROL CENTER RESPONSIBILITIES:

- 4.1 The following list describes *the responsibilities* of the Work Control Center.
 - 4.1.1 Scheduling *work activities* in the NSTX Test Cell. These activities include:
 - 4.1.1.1 Coordinate activities with D-site Shift Supervisor for such tasks, which require other facility interaction.
 - 4.1.1.2 Coordinate with Environmental, Safety, Health and Security, Engineering, Quality Assurance and Best Practices Departments for such activities as:
 - Health Physics, Industrial Hygiene, Electrical safety and Construction safety support
 - Disposition of property, materials for excess, and material control
 - Maintenance on utilities and site grounds affecting D-site construction areas.
 - QC Coverage of lifts/electrical and mechanical installations.
 - 4.1.1.3 Coordinate *all outage work activities* in the NSTX Test Cell.
 - 4.1.1.4 Coordinate *equipment storage*.
 - 4.1.1.5 Publish *weekly status* for all field activities.
 - 4.1.1.6 Coordinate all *activities* in the NSTX Test Cell.
 - 4.1.2 Along with the Construction Manager, conduct a *Plan of the Day meeting* to coordinate the day's activities and to resolve conflicts between the various work groups or activities.
 - 4.1.3 Reviewing engineering work packages for completeness.
 - 4.1.4 *Reviewing the Job Hazard Analysis (JHA)* for accuracy and completeness.
 - 4.1.5 *Obtain D-site Work Permit* prior to issuance of work packages into the field.

- 4.1.6 *Arrange for pre-requisites* such as Safing operations as may be identified in the engineering procedures.
 - 4.1.7 *Issuance of complete Engineering Work Packages (EWP)* to Field Crews for all activities.
 - 4.1.8 *Maintaining a central "Lockout/Tagout Logbook"* for all NSTX TC outage related activities. (See section 9.4)
 - 4.1.9 Scheduling, chairing and documenting *Pre-job and Post-job Briefings* for each EWP
- 4.2 The following list identifies those activities, which are *not the responsibility* of the Work Control Center.
- 4.2.1 *Prepare Engineering Work Packages*, material list and long lead items. Engineering responsibility to order long lead items, requisition materials and provide open order/credit card item list to appropriate personnel.
 - 4.2.2 *Write procedures* for the removal and/or Safing of systems in support of the EWP's. (Engineering responsibility- reference ENG-030)
 - 4.2.3 *Prepare Work Planning Form's* for performing the removal activities. (Engineering responsibility-reference ENG-032)
 - 4.2.4 *Initiating the Job Hazard Analysis* for field activities. (Cognizant technical personal)/Lead Tech. IH review if required based on the hazards or required by the participants or their supervisors.
 - 4.2.5 *Review the technical content of procedures.* This is the responsibility of the engineering groups generating the EWP's.
 - 4.2.6 *Supervise* or inspect *Field Crew activities* for technical merit.
 - 4.2.7 *Determine the disposition of equipment/components* following removal from NSTX It is the responsibility of engineering to determine status of components prior to submitting package to the Work Control Center.
 - 4.2.8 *Activities outside of the NSTX Test Cell boundary* will be coordinated at the Rollover schedule meeting.
 - 4.2.9 *Obtaining* Hot work and Confined Space (responsibility of Lead Tech.& Construction Supervisors).

5.0 WORK CONTROL CENTER PERSONNEL RESPONSIBILITIES

This section identifies, by discipline, the individuals who are required to staff the Work Control Center.

- 5.1 **Work Control Center Manager:** Responsible for the overall operation of the Work Control Center. The duties of the WCC Manager include managing the center and attending the daily startup meetings. The WCC Manager is also responsible for assigning Engineering Work Packages (EWP's) to WCC Planners, and Field Supervisors.
- 5.2 **Scheduler:** Responsible for scheduling all activities. This individual will work closely with the other coordinators in the center helping to create both near term and overall schedules.

- 5.3 **Health Physics Representative:**** Responsible for coordinating with WCC, HP/ Waste Coordinator and Field Construction Group all health physics issues including ALARA, and the issuance of Radiation Work Permits (RWP's).
- 5.4 **Outage Industrial Hygiene Representative**:** Responsible for issuing Confined Space Permits and reviewing/approving Job Hazard Analysis (JHA) surveys. Provides IH technical support to the Work Control Center, Engineering, and outage Field Construction groups.
- 5.5 **NSTX Outage Construction Safety Representative**:** Responsible for reviewing and ensuring that all field activities are being performed safely and in accordance with PPPL safety requirements. Responsibilities include working with both, the WCC and Field Construction groups, making recommendations for types of safety equipment to be used and how to perform work more safely.
- 5.6 **WCC Planners:** Responsible for reviewing and processing each Engineering Work Package (EWP) assigned to them by the WCC Manager. Responsibilities include:
- Reviewing each Engineering Work Package (EWP) for completeness.
 - Obtaining a D-site Work Permit, and completing an Outage Work Order.
 - Verifying that Engineering has provided approved "Run Copies" of all necessary procedures with the package prior to issuing the EWP to the field.
 - Reviewing the Job Hazard Analysis (JHA) with field crews for accuracy.
 - Coordinating with Scheduler and the WCC Manager to place the job on the overall schedule.
 - Initiating the Pre-job briefings for Engineering Work Packages in the field and verifying that all attendees have signed Pre-job briefing sheet.
 - Responding to all field generated questions concerning the EWP.
 - Initiating Post-job briefings for Engineering Work Packages completed. Verifying that all attendees have signed the Post-job briefing sheet and that that a copy of Post Job Briefing is included with the EWP.
- 5.8 **Clerical Staff:** Responsible for supporting the general efforts of the Outage Group and Work Control Center. Work includes assisting scheduler, preparing work permits, word processing, expediting the review process for the Engineering Work Packages and obtaining Run Copies of approved procedures. Individual is also responsible for forwarding to the Training Office all original Pre- and Post- job briefings from- the closed EWP's.
- 5.9 **Construction Manager:** ** This individual is responsible for all field activities during the Outage, including managing the Field Supervisors, Lead Tech's and field crews performing outage activities. He/she will work with the WCC Manager in matching Engineering Work Packages with individual field crews.
- 5.10 **Field Supervisors:** ** The Field Supervisors report to the Construction Manager and are responsible for reviewing field activities in the NSTX Test Cell during the outage program. These activities include overall safety checks; in the field documentation reviews, (assuring that approved EWP's are being used in the field); and general overall coordination of all field activities. They will also assist the Lead Tech's in addressing EWP issues as they may arise.

5.11 **Lead Tech:** ** this individual is responsible for supervising the field crew activities as described in the EWP. They are responsible for communicating all questions and/or EWP concerns to the Field Supervisor. The Lead Tech is charged with returning the EWP's to the designated WCC EWP Area each day at the end of the shift for safekeeping. The Lead Tech reports to the cognizant Field Supervisor.

5.11.1 Quality Control: ** Responsible for performing independent inspections and surveillances when requested by project management or required by PPPL procedures or policies

** Identifies a close association with but not a member of the Work Control Center.

6.0 FLOW CHART OF WORK PACKAGE PROCESSING:

- 6.1 The Engineering Work Packages (EWP) are generated by the Cognizant engineering groups (electrical/mechanical) in conjunction with the Outage Engineering Manager. ***EWP's are required for all Outage activities in the NSTX Test Cell.*** However, exceptions to this rule would be field inspections or other minor activities as allowed by the Construction Manager. Included in each EWP will be:
- 6.1.1 **“Run Copy”** of the approved Outage procedure. (Reference **ENG-030** “Technical Procedure for Experimental Facilities”)
 - 6.1.2 An approved WP number (reference: **ENG-032** “Work Planning Procedure”) for the work activity being planned.
 - 6.1.3 If required, copy of the **“Engineering Change Notice”** (ECN) with authorized signatures and ECN number. The ECN shall include a list of drawings, which are to be voided or revised in association with the EWP. Marked up, revised or reference drawings to be included in the EWP shall be stamped **“Approved for Fabrication”**. (Reference: **ENG-010** “Control of Drawings, Software, and Firmware will be added to the EWP
 - 6.1.4 A completed **Engineering Work Package Checklist** with the approval signature of the Construction Manager. (See Appendix)
 - 6.1.5 An approved copy of any **Lift Procedure** that may be required. (Reference: **ENG-021** “Lifting and Hoisting”)
 - 6.1.6 A blank **“Job Hazard Analysis”** (JHA) which will be initiated by the Cognizant technical personal/Lead Tech, reviewed/approved by the IH Representative) if applicable.
- 6.2 The Engineering Groups submit the EWP to the Work Control Center Manager for processing.
- 6.3 The WCC Manager assigns a WCC number to each package and forwards the EWP to the appropriate WCC Planner.
- 6.4 The WCC Planner will review each EWP for completeness. They will also prepare a D-site Work Permit, Work Order and support the field to obtain the other field permits as required to complete the procedure activities for each EWP.
- 6.5 The reviewed EWP will be assigned a priority at an internal WCC meeting so that the Scheduler can schedule the tasks.
- 6.6 The EWP is then filed in a holding area until those tasks are ready to be performed.

- 6.7 EWP's, which are within 2 weeks of being performed, will be removed from the holding area and re-reviewed by the WCC Planner. The work activities will then be placed on the agenda for the Weekly Rollover Meetings.
- 6.8 At the appropriate time, the WCC Planner will schedule a Pre-job Briefing for the Engineering Work Package.
- 6.9 The Field Crews, under the immediate direction of an assigned Lead Tech, will perform the tasks as described in the approved procedure.
 - 6.9.1 All inquiries concerning the EWP being performed should be directed to the appropriate Field Supervisor or Construction Manager.
 - 6.9.2 The Lead Techs will return the EWP's to the designated WCC EWP Area each day at the end of their shift for safekeeping.
 - 6.9.3 Lead Tech with assistance from Work Control Center Manager; obtain necessary Flame and Confined Space Permits.
- 6.10 Once the Field Crew has completed the tasks as described in the EWP, the package must be returned to the WCC Planner.
- 6.11 The WCC Planner shall schedule a Post-job Briefing (Lessons Learned) with the parties involved to discuss the just completed EWP.
- 6.12 When the EWP has been completed, the WCC Planner will review the package for completeness and forward the finished package to the WCC Manager.
- 6.13 If sections of the EWP cannot be completed, due to any reason, the Lead Tech will return the EWP to the WCC Planner. The incomplete EWP will be placed back into the field for completion once issues preventing completion of the EWP have been addressed.
- 6.14 When the EWP has been completed, the WCC Manager will log out the EWP and forward the completed package to the Construction Manager for closeout and archiving.
- 6.15 The Construction Manager will notify the Central Cadd Design Group that the ECN can now be processed (void or modify drawings), and forward the EWP's to the PPPL Operations Center to be kept on file for future reference. (Reference: ENG-010, "Control of Drawings, Software, and Firmware" will be followed to effect the drawing changes

7.0 WORK CONTROL CENTER MEETINGS

- 7.1 Plan of the Day Meetings:
 - 7.1.1 There will be daily *Plan of the Day Meetings* to review inter-actions, planning, scheduling and commitments for all activities associated with the Outage project. These meetings will be held in the morning prior to the start of field activities and will address only that day's scheduled activities. The Construction Manager or designee will chair this meeting.
 - 7.1.2 Attendees should include WCC Manager, Construction Manager, WCC Planners, Field Supervisors, Lead Tech's, and Health Physics representatives, IH Representative, Construction Safety

Representative and QC. Note: this list of attendees will change depending upon the tasks being performed that day.

7.2 Weekly Progress Meetings:

7.2.1 The WCC Scheduler will provide the weekly held **PPPL Rollover Meeting** with a 4-week look ahead of activities being planned for the Outage. The Rollover Meeting will provide a forum for interaction, planning, scheduling and obtaining commitments for all D-site related activities.

7.3 Pre-Job Briefings

7.3.1 A Pre-job Briefing must be held prior to releasing any work into the field.

7.3.2 The responsible Work Control Center Planner will organize these briefings.

7.3.3 Those attending the briefing must include:

- 7.3.3.1 Work Control Center Planner.
- 7.3.3.2 Lead Tech and Field Crews.
- 7.3.3.3 Health Physics/ ES&H/IH (as required)
- 7.3.3.4 Construction Manager and/or Field Supervisor
- 7.3.3.5 QC (as required)

7.3.4 The pre-job briefing must include: (per **ENG-030**)

- 7.3.4.1 Specific work activities.
- 7.3.4.2 Responsibilities of the participants.
- 7.3.4.3 Review safety related issues. Include results of "Job Hazard Analysis".
- 7.3.4.4 Review Radiation Work Permits and contamination control where relevant.
- 7.3.4.5 Response to all questions and concerns of the participants.
- 7.3.4.6 Review all procedure prerequisites.
- 7.3.4.7 Disposition of Materials

7.3.5 If only parts of the engineering work package are to be executed, those steps in the procedure, which are not to be performed, shall have **N/A** written in all signoffs. Any sections, which will not be performed, shall be marked **N/A** and initialed by the **Construction Manager** prior to starting the work.

7.3.6 The Work Control Center Planner will document the meeting by obtaining a list of the attendees and attaching list to the EWP for archiving.

7.3.7 Should minor field changes be required, the Work Control Center Planner will write changes in the IP, initial and date.

7.4 Post-Job (Lessons Learned) Meetings:

7.4.1 A Post-job Briefing must be held at the conclusion of every EWP.

7.4.2 It is the responsibility of Work Control Center Planner to organize these meetings once the EWP has been completed.

7.4.3 Those attending the post-job briefing should include:

- 7.4.3.1 Work Control Center Planner.
- 7.4.3.2 Lead Tech and Field Crews (as required) associated with completed procedure.
- 7.4.3.3 Health Physics/ ES&H/IH (as required).

- 7.4.3.4 Construction Manager and/or Field Supervisor.
- 7.4.3.5 QC when involved in the EWP.

7.4.4 The post-job (*Lessons Learned*) meeting will include:

- 7.4.4.1 Identification of those parts of the EWP which went well
- 7.4.4.2 Identification of any improvements that could be made
- 7.4.4.3 Identification of any safety-related issues
- 7.4.4.4 Overall Lessons Learned

7.4.5 The WCC Planner shall document the meeting with minutes, including a list of attendees. A copy of this report along with attendees will be included in the EWP.

7.4.6 Once the EWP has been completed and returned to the Construction manager, he shall review the Post-Job Briefing minutes for Lessons Learned. They will then share any Lessons Learned as deemed appropriate with other parties in the Outage and the laboratory.

8.0 WORK CONTROL CENTER FACILITY REQUIREMENTS

8.1 The Work Control Center will be located at D-site close to the outage work activities. This location will enhance the efficiency of the WCC by improving both communications and the interactions required between the center and field activities.

8.2 A central meeting area is required with a capacity for 15-20 people. This area will be utilized for:

- 8.2.1 Plan of the Day Meetings
- 8.2.2 Internal Work Control Center meetings.
- 8.2.3 Pre-job and post-job briefings.
- 8.2.4 Training area for Outage related activities.

8.3 The WCC shall have an area for filing the processed Engineering Work Packages (EWP) until they reach the Field Crews and have been completed.

9.0 DOCUMENTATION FORMS:

9.1 *Outage Engineering Work Package Checklist*: The Engineering Manager will fill out this one page document (see attached WP Checklist). It will include:

- 9.1.1 Procedure numbers (Obtained by PPPL Central Files)
- 9.1.2 EWP activity title
- 9.1.3 Activity number from Primavera Schedule (Obtained from WCC Scheduler)
- 9.1.4 Checklist of basic requirements to perform work. Such as:
 - 9.1.4.1 Requiring system shutdown
 - 9.1.4.2 Safing operations and Lock out/Tag out
 - 9.1.4.3 Crane or forklift support

- 9.1.4.4 Quality Control
- 9.1.4.5 Mixed waste evaluation
- 9.1.5 Identification of permits which are required to process the procedure. Such as:
 - 9.1.5.1 Radiation Work Permit (RWP)
 - 9.1.5.2 Confined Space Permit
 - 9.1.5.3 Hot Work Permit
 - 9.1.5.4 Penetration Permit
 - 9.1.5.5 NEPA Certification NEPA planning form 1466 (should cover all Upgrade Project work)
- 9.1.6 Proposed disposition of removed hardware.
- 9.1.7 List of associated drawings to complete activity. A list of drawings that will be voided or revised will be included on Engineering Change Notice "ECN". Additional reference drawings should also be included.
- 9.2 **Job Hazard Analysis:** This document (see attached Job Hazard Analysis) will be used to assess the level of hazards associated with that particular EWP activity. The work crew will initiate the survey and it will be approved by the IH representative at the Pre-job Briefings.
- 9.3 **Outage Work Order:** This document (see attached Work Order) will be filled out by the WCC and be used to identify and authorize all work activities in the field. The main copy of this order will remain in the WCC, with a second copy traveling to the field as a part of the Engineering Work Package. It will include:
 - 9.3.1 Engineering Work Package Number
 - 9.3.2 Title of work to be performed
 - 9.3.3 Pertinent procedures and document numbers
 - 9.3.4 Personnel authorized to perform activities
 - 9.3.5 General work description
 - 9.3.6 Identification of permit type with ID numbers which are required to perform the procedure. Such as:
 - 9.3.6.1 Radiation Work Permit (RWP)
 - 9.3.6.2 Confined Space Permit
 - 9.3.6.3 Flame Permit
 - 9.3.6.4 Penetration Permit
 - 9.3.6.5 D-site Work Permit
 - 9.3.7 Master Equipment List Number.
 - 9.3.8 Identification of basic requirements for performing work. Such as:
 - 9.3.8.1 Requiring system shutdown
 - 9.3.8.2 Lockout/Tagout
 - 9.3.8.3 Crane support
 - 9.3.8.4 Quality Control support
 - 9.3.9 The signature of Work Control Center Manager, authorizing the start, and the conclusion of EWP activities in the field.

- 9.4 **LO/TO Logbook:** The Outage project will observe **ESH-016** for all LO/TO activities. In addition the following steps are to be followed:
- 9.4.1 The Construction Manager must authorize Safing /LO/TO for all Outage activities.
 - 9.4.2 Lockboxes containing keys and stubs must be turned over to the Construction Manager who will add his or her lock and place all lockboxes in a secure location in the WCC.
 - 9.4.3 A central LO/TO logbook shall be maintained in the WCC or designated area. Whenever possible the entries should be grouped by system.
 - 9.4.4 If the LO/TO is to be removed at a later date, the WCC will request the authorized employee to perform the removal.

10.0 RECORDS:

- 10.1 **EWP Completion:** Once a EWP has been completed, the WCC Planners shall review the package for completeness and submit the EWP to the WCC Manager. The WCC manager will also check the package for completeness prior to logging out the EWP and forwarding the completed package to the Construction Manager. The Head Fabrication and Operations will then process the EWP in the following manner. (Reference: **ENG-010**, "Control of Drawings, Software, and Firmware")

10.1.1 *Revised/Voiced Drawings:*

- 10.1.1.1 The Head, Fabrications and Operations or designee will remove all "Red Lined" drawings from the EWP and forward them to the Central Cad Room along with authorization to begin ECN changes associated with the completed EWP. Reference drawings in the EWP's will be removed from the package and discarded.
- 10.1.1.2 CADD Room Supervisor **MUST** acknowledge to the Head, Fabrications and Operations that the ECN authorization has been received.
- 10.1.1.3 Drawings, which are no longer valid due to the outage removals, will be voided. If the drawing was in hard copy format, the drawing will be electronically scanned and "VOIDED". The original hard copy will be disposed of. A copy of the voided drawing will be posted on the Project Engineering Web Site. If the drawing was originally cad generated, it will be voided and posted on the Project Engineering Web Site
- 10.1.1.4 Drawings, which contain systems, equipment, etc. which will remain will be revised and posted on the Project Engineering Web Site.

- 10.1.2 **Processed Engineering Work Packages:** The Head, Fabrications and Operations will review all completed EWP's. The original copies of the Pre-and Post Job Briefings will be removed and forwarded to the PPPL Training Office. A copy of those briefings will remain with the EWP. The completed EWP will then be forwarded to the PPPL Operations Center for archiving. Each EWP will contain:

- 10.1.2.1 Processed "Run Copies" of IP's with appropriate approvals
- 10.1.2.2 Any processed Lift Procedures
- 10.1.2.3 The Outage Work Order (Blue, Yellow or.....)
- 10.1.2.4 All permits signed off, (original or copy) required to compete the EWP. (D-site Work Permit; Confined Space Permit; RWP; etc)

- 10.1.2.5 A copy of the ECN list identifying the status of all drawings associated with the EWP (voided or revised).
- 10.1.2.6 A copy of the Pre and Post-job attendance list along with the Post Job Briefing (Lessons Learned) report

10.2 The **PPPL Operations Center** will be responsible for:

- 10.2.1 Issuing and filing **RUN COPY** procedures.
- 10.2.2 Developing an electronic database identifying the EWP title, number and IP's inside of the EWP's.
- 10.2.3 Providing sufficient storage area for processed EWP's used during Outage activities. Records should be kept for a minimum period of ten years.

11.0 HAZARDS

It is imperative that all activities for this project be performed safely. Several hazards have been identified and are indicated in the following Hazard Analysis. Employing the principles and functions of Integrated Safety Management, all hazards that are encountered during this project must be identified, analyzed and controlled by engineering and/or administrative controls. Where additional hazards are identified during the course of this project, a hazard analysis will be performed prior to commencement of any related work activity. The hazards and analyses will be documented into the plan for record and review.

11.1 HAZARD ANALYSES

11.1a Task: Clear area in NSTX Test Cell for NB2

Possible Hazard: Uneven working surfaces

Control Measure: Install platforms for workers; mark uneven surfaces

Possible Hazard: Elevated work

Control Measure: Fall protection, ladder safety, manlift and scaffold training

Possible Hazard: Ladders / scaffolds / manlifts

Control Measure: Fall protection, ladder safety, manlift and scaffold training

Possible Hazard: Cranes, rigging, forklifts

Control Measure: Trained/qualified personnel

Possible Hazard: Welding / grinding

Control Measure: Hot Work Permit, flame retardant clothing

Possible Hazard: Electrical

Control Measure: Lockout/tagout, arc flash analysis, GFCI, trained personnel

Possible Hazard: Eye hazards

Control Measure: Safety glasses / goggles

Possible Hazard: Ergonomic – repetitive motions, lifting, awkward postures

Control Measure: Work breaks, lifting aids, redesign of tasks

Possible Hazard: Chemical use
Control Measure: Hazard Communication training

11.1b Task: Cutting large hole in vacuum vessel and welding new nozzle in

Possible Hazard: Uneven working surfaces
Control Measure: Install platforms for workers; mark uneven surfaces

Possible Hazard: Elevated work
Control Measure: Fall protection, ladder safety, manlift and scaffold training

Possible Hazard: Ladders / scaffolds / manlifts
Control Measure: Fall protection, ladder safety, manlift and scaffold training

Possible Hazard: Cranes, rigging, forklifts
Control Measure: Trained/qualified personnel

Possible Hazard: Welding / burning / grinding
Control Measure: Hot Work Permit, flame retardant clothing

Possible Hazard: Confined space
Control Measure: Confined Space Permit, safety watch

Possible Hazard: Eye hazards
Control Measure: Safety glasses / goggles
Possible Hazard: Ergonomic – repetitive motions, lifting, awkward postures
Control Measure: Work breaks, lifting aids, redesign of tasks

Possible Hazard: Chemical use
Control Measure: Hazard Communication training

11.1c Task: Move of parts to NSTX Test Cell

Possible Hazard: Ionizing Radiation – tritium, trace activation
Control Measure: Radiation Work Permit; ventilation

Possible Hazard: Uneven working surfaces in/on Neutral Beam Injector
Control Measure: Install platforms for workers; mark uneven surfaces

Possible Hazard: Elevated work
Control Measure: Fall protection, ladder safety, manlift and scaffold training

Possible Hazard: Ladders / scaffolds / manlifts
Control Measure: Fall protection, ladder safety, manlift and scaffold training

Possible Hazard: Cranes, rigging, forklifts
Control Measure: Trained/qualified personnel

Possible Hazard: Confined space when working in Neutral Beam Enclosure
Control Measure: Confined Space Permit, safety watch

Possible Hazard: Eye hazards

Control Measure: Safety glasses / goggles

Possible Hazard: Ergonomic – repetitive motions, lifting, awkward postures

Control Measure: Work breaks, lifting aids, redesign of tasks

Possible Hazard: Chemical use

Control Measure: Hazard Communication training

11.1d Task: Decontamination of pieces for re-work or re-use

Possible Hazard: Chemicals – hydrogen peroxide (3%), ozone

Control Measure: MSDS's available; IH to review use; ventilation; Hazard communication training

Possible Hazard: Ionizing Radiation – tritium, trace activation

Control Measure: Radiation Work Permit; ventilation

Possible Hazard: Low level tritiated waste

Control Measure: Environmental Services Division to handle per approved procedures

Possible Hazard: Uneven working surfaces in/on Neutral-Beam Injector

Control Measure: Install platforms for workers; mark uneven surfaces

Possible Hazard: Elevated work

Control Measure: Fall protection, ladder safety, manlift and scaffold training

Possible Hazard: Ladders / scaffolds / manlifts

Control Measure: Fall protection, ladder safety, manlift and scaffold training

Possible Hazard: Cranes, rigging, forklifts

Control Measure: Trained/qualified personnel

Possible Hazard: Confined space when working in Neutral Beam Enclosure

Control Measure: Confined Space Permit, safety watch

Possible Hazard: Ergonomic – repetitive motions, lifting, awkward postures

Control Measure: Work breaks, lifting aids, redesign of tasks

11.1e Task: Re-assembly of NB4 in BL2 position in NSTX Test Cell

Possible Hazard: Ionizing Radiation – tritium, trace activation

Control Measure: Radiation Work Permit; ventilation

Possible Hazard: Low level tritiated waste

Control Measure: Environmental Services Division to handle per approved procedures

Possible Hazard: Uneven working surfaces in/on Neutral Beam Injector

Control Measure: Install platforms for workers; mark uneven surfaces

Possible Hazard: Elevated work

Control Measure: Fall protection, ladder safety, manlift and scaffold training

Possible Hazard: Ladders / scaffolds / manlifts
Control Measure: Fall protection, ladder safety, manlift and scaffold training

Possible Hazard: Cranes, rigging, forklifts
Control Measure: Trained/qualified personnel

Possible Hazard: Welding / grinding
Control Measure: Hot Work Permit, flame retardant clothing

Possible Hazard: Electrical
Control Measure: Lockout/tagout, arc flash analysis, GFCI, trained personnel

Possible Hazard: Confined space when working in Neutral Beam Enclosure
Control Measure: Confined Space Permit, safety watch

Possible Hazard: Eye hazards
Control Measure: Safety glasses / goggles

Possible Hazard: Ergonomic – repetitive motions, lifting, awkward postures
Control Measure: Work breaks, lifting aids, redesign of tasks

Possible Hazard: Chemical use
Control Measure: Hazard Communication training

11.1f Task: Cutting on penetrations in walls and floor of NSTX Test Cell

Possible Hazard: Ionizing Radiation – tritium, trace activation
Control Measure: Radiation Work Permit; ventilation

Possible Hazard: Uneven working surfaces
Control Measure: Install platforms for workers; mark uneven surfaces

Possible Hazard: Elevated work
Control Measure: Fall protection, ladder safety, manlift and scaffold training

Possible Hazard: Ladders / scaffolds / manlifts
Control Measure: Fall protection, ladder safety, manlift and scaffold training

Possible Hazard: Cranes, rigging, forklifts
Control Measure: Trained/qualified personnel

Possible Hazard: Electrical
Control Measure: Lockout/tagout, arc flash analysis, GFCI, trained personnel

Possible Hazard: Eye hazards
Control Measure: Safety glasses / goggles

Possible Hazard: Ergonomic – repetitive motions, lifting, awkward postures
Control Measure: Work breaks, lifting aids, redesign of tasks

Possible Hazard: Chemical use
Control Measure: Hazard Communication training

11.1g Task: Connection of services to NB2

Possible Hazard: Uneven working surfaces in/on Neutral Beam Injector
Control Measure: Install platforms for workers; mark uneven surfaces

Possible Hazard: Elevated work
Control Measure: Fall protection, ladder safety, manlift and scaffold training

Possible Hazard: Ladders / scaffolds / manlifts
Control Measure: Fall protection, ladder safety, manlift and scaffold training

Possible Hazard: Cranes, rigging, forklifts
Control Measure: Trained/qualified personnel

Possible Hazard: Welding / grinding
Control Measure: Hot Work Permit, flame retardant clothing

Possible Hazard: Electrical
Control Measure: Lockout/tagout, arc flash analysis, GFCI, trained personnel

Possible Hazard: Confined space when working in Neutral Beam Enclosure
Control Measure: Confined Space Permit, safety watch

Possible Hazard: Eye hazards
Control Measure: Safety glasses / goggles

Possible Hazard: Ergonomic – repetitive motions, lifting, awkward postures
Control Measure: Work breaks, lifting aids, redesign of tasks

Possible Hazard: Chemical use
Control Measure: Hazard Communication training

11.1h Task: Reinstallation of items removed for the NB2 installation

Possible Hazard: Uneven working surfaces
Control Measure: Install platforms for workers; mark uneven surfaces

Possible Hazard: Elevated work
Control Measure: Fall protection, ladder safety, manlift and scaffold training

Possible Hazard: Ladders / scaffolds / manlifts
Control Measure: Fall protection, ladder safety, manlift and scaffold training

Possible Hazard: Cranes, rigging, forklifts
Control Measure: Trained/qualified personnel

Possible Hazard: Welding / grinding
Control Measure: Hot Work Permit, flame retardant clothing

Possible Hazard: Electrical
Control Measure: Lockout/tagout, arc flash analysis, GFCI, trained personnel

Possible Hazard: Confined space
Control Measure: Confined Space Permit, safety watch

Possible Hazard: Eye hazards
Control Measure: Safety glasses / goggles

Possible Hazard: Ergonomic – repetitive motions, lifting, awkward postures
Control Measure: Work breaks, lifting aids, redesign of tasks

Possible Hazard: Chemical use
Control Measure: Hazard Communication training

11.1i Task: Removal of items to gain access to the center stack related work

Possible Hazard: Uneven working surfaces
Control Measure: Install platforms for workers; mark uneven surfaces

Possible Hazard: Elevated work
Control Measure: Fall protection, ladder safety, manlift and scaffold training

Possible Hazard: Ladders / scaffolds / manlifts
Control Measure: Fall protection, ladder safety, manlift and scaffold training

Possible Hazard: Cranes, rigging, forklifts
Control Measure: Trained/qualified personnel

Possible Hazard: Welding / grinding
Control Measure: Hot Work Permit, flame retardant clothing

Possible Hazard: Electrical
Control Measure: Lockout/tagout, arc flash analysis, GFCI, trained personnel

Possible Hazard: Confined space
Control Measure: Confined Space Permit, safety watch

Possible Hazard: Eye hazards
Control Measure: Safety glasses / goggles

Possible Hazard: Ergonomic – repetitive motions, lifting, awkward postures
Control Measure: Work breaks, lifting aids, redesign of tasks

Possible Hazard: Chemical use
Control Measure: Hazard Communication training

11.1j Task: Modifications to the umbrella structures

Possible Hazard: Uneven working surfaces in/on Neutral Beam Injector
Control Measure: Install platforms for workers; mark uneven surfaces

Possible Hazard: Elevated work
Control Measure: Fall protection, ladder safety, manlift and scaffold training

Possible Hazard: Ladders / scaffolds / manlifts
Control Measure: Fall protection, ladder safety, manlift and scaffold training

Possible Hazard: Cranes, rigging, forklifts
Control Measure: Trained/qualified personnel

Possible Hazard: Welding / grinding
Control Measure: Hot Work Permit, flame retardant clothing

Possible Hazard: Confined space
Control Measure: Confined Space Permit, safety watch

Possible Hazard: Eye hazards
Control Measure: Safety glasses / goggles

Possible Hazard: Ergonomic – repetitive motions, lifting, awkward postures
Control Measure: Work breaks, lifting aids, redesign of tasks

Possible Hazard: Chemical use
Control Measure: Hazard Communication training

11.1k Task: Modifications to the coil and bus supports

Possible Hazard: Uneven working surfaces
Control Measure: Install platforms for workers; mark uneven surfaces

Possible Hazard: Elevated work
Control Measure: Fall protection, ladder safety, manlift and scaffold training

Possible Hazard: Ladders / scaffolds / manlifts
Control Measure: Fall protection, ladder safety, manlift and scaffold training

Possible Hazard: Cranes, rigging, forklifts
Control Measure: Trained/qualified personnel

Possible Hazard: Welding / grinding
Control Measure: Hot Work Permit, flame retardant clothing

Possible Hazard: Eye hazards
Control Measure: Safety glasses / goggles

Possible Hazard: Ergonomic – repetitive motions, lifting, awkward postures
Control Measure: Work breaks, lifting aids, redesign of tasks

Possible Hazard: Chemical use
Control Measure: Hazard Communication training

11.1l Task: Removal of the old center stack and installation of the new one

Possible Hazard: Uneven working surfaces

Control Measure: Install platforms for workers; mark uneven surfaces

Possible Hazard: Elevated work

Control Measure: Fall protection, ladder safety, manlift and scaffold training

Possible Hazard: Ladders / scaffolds / manlifts

Control Measure: Fall protection, ladder safety, manlift and scaffold training

Possible Hazard: Cranes, rigging, forklifts

Control Measure: Trained/qualified personnel

Possible Hazard: Welding / grinding

Control Measure: Hot Work Permit, flame retardant clothing

Possible Hazard: Confined space

Control Measure: Confined Space Permit, safety watch

Possible Hazard: Eye hazards

Control Measure: Safety glasses / goggles

Possible Hazard: Ergonomic – repetitive motions, lifting, awkward postures

Control Measure: Work breaks, lifting aids, redesign of tasks

Possible Hazard: Chemical use

Control Measure: Hazard Communication training

11.1m Task: Cleaning of in-vessel surfaces

Possible Hazard: Uneven working surfaces

Control Measure: Install platforms for workers; mark uneven surfaces

Possible Hazard: Elevated work

Control Measure: Fall protection, ladder safety, manlift and scaffold training

Possible Hazard: Ladders / scaffolds / manlifts

Control Measure: Fall protection, ladder safety, manlift and scaffold training

Possible Hazard: Confined space

Control Measure: Confined Space Permit, safety watch

Possible Hazard: Eye hazards

Control Measure: Safety glasses / goggles

Possible Hazard: Ergonomic – repetitive motions, lifting, awkward postures

Control Measure: Work breaks, lifting aids, redesign of tasks

Possible Hazard: Chemical use
Control Measure: Hazard Communication training

11.1n Task: Replacement of the passive plates

Possible Hazard: Uneven working surfaces
Control Measure: Install platforms for workers; mark uneven surfaces

Possible Hazard: Elevated work
Control Measure: Fall protection, ladder safety, manlift and scaffold training

Possible Hazard: Ladders / scaffolds / manlifts
Control Measure: Fall protection, ladder safety, manlift and scaffold training

Possible Hazard: Cranes, rigging, forklifts
Control Measure: Trained/qualified personnel

Possible Hazard: Welding / grinding
Control Measure: Hot Work Permit, flame retardant clothing

Possible Hazard: Confined space
Control Measure: Confined Space Permit, safety watch

Possible Hazard: Eye hazards
Control Measure: Safety glasses / goggles

Possible Hazard: Ergonomic – repetitive motions, lifting, awkward postures
Control Measure: Work breaks, lifting aids, redesign of tasks

Possible Hazard: Chemical use
Control Measure: Hazard Communication training

11.1o Task: Reinstallation of items removed for access to center stack related tasks

Possible Hazard: Uneven working surfaces
Control Measure: Install platforms for workers; mark uneven surfaces

Possible Hazard: Elevated work
Control Measure: Fall protection, ladder safety, manlift and scaffold training

Possible Hazard: Ladders / scaffolds / manlifts
Control Measure: Fall protection, ladder safety, manlift and scaffold training

Possible Hazard: Cranes, rigging, forklifts
Control Measure: Trained/qualified personnel

Possible Hazard: Welding / grinding
Control Measure: Hot Work Permit, flame retardant clothing

Possible Hazard: Electrical

Control Measure: Lockout/tagout, arc flash analysis, GFCI, trained personnel

Possible Hazard: Confined space when working in Neutral Beam Enclosure

Control Measure: Confined Space Permit, safety watch

Possible Hazard: Radiological conditions in Neutral Beam Enclosure

Control Measure: Radiation Work Permit, safety watch

Possible Hazard: Eye hazards

Control Measure: Safety glasses / goggles

Possible Hazard: Ergonomic – repetitive motions, lifting, awkward postures

Control Measure: Work breaks, lifting aids, redesign of tasks

Possible Hazard: Chemical use

Control Measure: Hazard Communication training

12.0 Hazard Controls, Performance of Work within Controls, Oversight and Lessons Learned.

The following is a list of general controls and responsibilities relating to these hazards and to general operational procedures.

1. Operation of the overhead crane will be by a qualified overhead crane operator.
2. A PPPL Industrial Hygiene Representative shall periodically inspect the work site to determine that sufficient safety practices and equipment are in use. Work activities shall be subject to frequent surveillance by PPPL and DOE personnel to assure protection of the environment, safety and health. Toolbox safety meetings will be held each week to discuss general safety issues. When a new task is begun and prior to each lift, a short pre-job briefing will be held to discuss procedures and the associated Job Hazard Analysis.
3. Electric hazards are present in the work area and shall be controlled in accordance with PPPL lockout/tagout procedures and general electrical safety procedures. GFCI extension cords shall be used for all 110v power tool connections. The site supervisor shall identify the known electric hazards and inform the crews of the existence of each hazard.
4. We anticipate the use of welding. A PPPL hot work permit is required for each hot work operations such as welding, plasma torch cutting, grinding and brazing.
5. Chemical substances shall not be brought to the site unless Material Safety Data Sheets (MSDS) have previously been submitted for each substance and reviewed and approved by Industrial Hygiene at least 24 hours in advance.
6. Required PPE in construction areas shall be as follows:
Hard hats
Safety glasses as posted
Steel-toed safety shoes as posted
7. All personnel must complete General Employee Training (GET) and Radiation Safety Training.
8. Efforts will be made to avoid all unnecessary trip hazards.

13.0 PPPL Directives and Procedures Related to Hazard Controls

1. PPPL Safety Manual, ESHD 5008, http://www.pppl.gov/eshis/ESHD_MANUAL/sm.html
2. ENG-021 Hoisting and Rigging Program, <http://www.pppl.gov/eshis/procedures/eng021.pdf>
3. ENG-028 Core Boring, Cutting and Drilling, <http://www.pppl.gov/eshis/procedures/eng028.pdf>
4. ENG-037 General Welding & Brazing Requirements, <http://www.pppl.gov/eshis/procedures/eng037.pdf>

14.0 GENERAL INFORMATION

1. Work hours shall normally be between 6:00 AM and 5:00 PM, Monday through Friday. Work during other hours will be scheduled only with the written approval of the Construction Manager and only once sufficient support by Health Physics, Industrial Hygiene and QA has been assured.
2. Debris and salvage materials shall be loaded into containers and disposed of in accordance with all federal, state and local regulations. C&D demolition debris (cleared where required as non-radioactive) shall be transported to G.R.O.W.S. landfill in Morrisville, PA.
3. A daily briefing for all persons working on this effort shall be held by the Field Supervisors early each shift. If there is a change in supervisory personnel or procedures, such changes shall be introduced and reviewed at the daily briefing.
4. Employees joining the project shall be briefed by the Construction Manager or one of the Field Supervisors on the particulars of this project.
5. Nonconformance occurrences, safety and health issues, incidents and/or accidents shall be promptly reported to the Construction Manager for appropriate resolution, documentation and notifications.
6. Upon completion of the project, the Work Control Center Manager will conduct a review of the work to determine and compile lessons learned. This information shall be available to PPPL and DOE if requested.

15.0 EMERGENCY ACTION PLAN

In the event of an emergency during the course of this Project, the following steps shall be taken and procedures implemented:

1. Emergency occurs
2. Personnel gather at designated muster location for head count and to receive further instructions from supervisor. In the event that the supervisor is unavailable, his designee shall step in.
3. Crew will follow the PPPL established Emergency Action Procedures in the event of a major emergency.

If a medical emergency occurs while working on this project, all work shall immediately stop. The Field Supervisor shall evaluate the injury and determine its severity. If emergency assistance is required, he shall

first call Emergency Services at extension 3333 and follow their instructions. All injuries must be reported to the Construction Manager and to the PPPL Occupational Medicine Office.

16.0 LIFT PLANS

The Work Control Center Planners will evaluate each proposed lift and complete the PPPL Critical Lift Procedure document. This will be performed either prior to requesting lift review by the PPPL Lift Engineer or in conjunction with him. A qualified crane operator will operate the overhead crane. Lifts designated as Critical shall not be performed without the presence of the PPPL Lift Engineer or his designee.

17.0 LIST OF CHEMICALS

Hydrogen Peroxide (3%)
Ozone
Cutting fluids already approved for use in PPPL shops
Cable pulling lubricants
Windex
Citro-clean
Alcohol
Vinegar
Distilled water
