

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

PRINCETON PLASMA PHYSICS LABORATORY

**June 17, 2011
Draft 0**

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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, and the DOE Hoisting and Rigging Manual. Herein is our site specific Health and Safety Plan for this project.

A. INTEGRATED SAFETY POLICY AND PHILOSOPHY

The Integrated Safety Management Objective of this project is:

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 (7) 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

This Integrated Safety Management 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.

B. 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 the in-vessel passive plates with new ones

C. 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.

D. 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.

D.1 HAZARD ANALYSES

D.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, training

Possible Hazard: Ladders / scaffolds / manlifts
Control Measure: Fall protection, 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

D.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, training

Possible Hazard: Ladders / scaffolds / manlifts
Control Measure: Fall protection, 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

D.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, training

Possible Hazard: Ladders / scaffolds / manlifts
Control Measure: Fall protection, 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

D.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

Possible Hazard: Ionizing Radiation – tritium, trace activation

Control Measure: Radiation Work Permit; ventilation

Possible Hazard: Low level tritiated waste

Control Measure: Material and 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, training

Possible Hazard: Ladders / scaffolds / manlifts

Control Measure: Fall protection, 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

D.1e Task: Re-assembly of NB4 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: Material and 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, training

Possible Hazard: Ladders / scaffolds / manlifts

Control Measure: Fall protection, 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

D.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, training

Possible Hazard: Ladders / scaffolds / manlifts
Control Measure: Fall protection, 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

D.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, training

Possible Hazard: Ladders / scaffolds / manlifts
Control Measure: Fall protection, 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

D.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, training

Possible Hazard: Ladders / scaffolds / manlifts
Control Measure: Fall protection, 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

D.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, training

Possible Hazard: Ladders / scaffolds / manlifts
Control Measure: Fall protection, 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

D.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, training

Possible Hazard: Ladders / scaffolds / manlifts
Control Measure: Fall protection, 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

D.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, training

Possible Hazard: Ladders / scaffolds / manlifts
Control Measure: Fall protection, 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

D.11 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, training

Possible Hazard: Ladders / scaffolds / manlifts
Control Measure: Fall protection, 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

D.1m Task: Cleaning of the in-vessel tiles and 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, training

Possible Hazard: Ladders / scaffolds / manlifts
Control Measure: Fall protection, training

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

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

D.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, training

Possible Hazard: Ladders / scaffolds / manlifts
Control Measure: Fall protection, 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

D.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, training

Possible Hazard: Ladders / scaffolds / manlifts
Control Measure: Fall protection, 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

E. 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).
8. Efforts will be made to avoid all unnecessary trip hazards.

F. PPPL Directives and Procedures Related to Hazard Controls

1. PPPL Safety Manual, ESHD 5008,
<http://www.pppl.gov/eshis/ESHDMANUAL/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>

G. 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 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.

H. 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.

I. 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.

J. 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
