NCSX
Training Plan
NCSX-PLAN-TRNG
Revision 1
December 6, 2004

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NCSX Training Plan

Record of Revisions

Revision	Date	Description of Changes
0	11/23/2004	Initial Issue
1	12/6/2004	Incorporated Construction Engineer comments.

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NCSX Training Plan

1 INTRODUCTION

1.1 Purpose

The National Compact Stellarator Experiment (NCSX) is a proof-of-principle-scale facility for studying the physics of compact stellarators, an innovative fusion confinement concept. The facility will include the stellarator device and ancillary support systems. NCSX is a joint project of the Oak Ridge National Laboratory (ORNL) Fusion Energy Division and the Princeton Plasma Physics Laboratory (PPPL) Advanced Projects Department.

Quality assurance requirements for DOE non-nuclear facilities are described in the DOE Order on quality assurance, DOE O 414.1. The NCSX Quality Assurance Plan (QAP) documents how the project will satisfy the requirements of this Order. Specifically, Criterion 2 of this order contains the following training requirements:

- "Personnel must be trained and qualified to ensure they are capable of performing their assigned work."
- "Personnel must be provided continuing training to ensure that job proficiency is maintained."

The purpose of this plan is to provides the general training requirements framework of the NCSX training program and how this training program will be implemented during the design, fabrication, and construction phases of the project. At the same time, this plan will address how QA criterion will be satisfied. Operational training requirements will be addressed at a later time.

1.2 Applicable Documents

This Training Plan implements the requirements of the documents listed below (latest issues):

DOE Documents

- DOE O 414.1, Quality Assurance

PPPL Documents

- PPPL Institutional Quality Assurance Plan
- P-008, Staff Training and Development
- P-028, Subcontractor Training Requirements
- P-087, Roles and Responsibilities in PPPL Organizations
- TR-001, Laboratory Training Program
- ESH-004, Job Hazard Analysis
- ENG-030, PPPL Technical Procedures for Experimental Facilities
- ENG-032, Work Planning Procedure

NCSX Documents

- NCSX Quality Assurance Plan (NCSX-PLAN-QAP)

1.3 NCSX Training Web Page

NCSX training information is included on the NCSX Training Web Page:

http://ncsx.pppl.gov/SystemsEngineering/Training/NCSX_Training_Index.htm

This web page includes:

- A link to the latest revision of this NCSX Training Plan;
- Links to NCSX task-specific training matrices;
- Links to the NCSX Training Modules; and
- A link to the Human Resources Training Page

2 RESPONSIBILITIES AND TYPES OF TRAINING

2.1 The PPPL Training Program

The Human Resources Training Office is the coordinator of all training programs at the Laboratory. They are responsible for ensuring that proper training requirements are defined and that proper training records are maintained for each individual performing work at the laboratory. In addition, the Training Office assists projects such as NCSX by providing PPPL courses and working with the respective project to develop project specific courses and training opportunities.

2.2 Responsibilities

Training is a line management responsibility. It is the direct responsibility of each line manager to define and ensure that each of the personnel assigned under him or her, whether from PPPL, ORNL, or a subcontractor, is properly trained, including familiarization and understanding of PPPL and NCSX Project plans, processes, and procedures, as relevant to the work, before granting access or assigning work in specific areas of the laboratory that requires specialized training. Line management includes both home organization and specific NCSX Project management and supervision (e.g., design, fabrication and assembly, etc.).

NCSX line management is responsible to confirm that all individuals have the appropriate related training, whether the responsibility of the home organization or the Project, prior to actually doing work. For NCSX fabrication, this responsibility is assigned to the engineer having lead responsibility for the fabrication. For NCSX construction in the NCSX Test Cell, this responsibility is assigned to the NCSX Construction Manager. For NCSX construction outside the NCSX Test Cell (e.g., the Modular Coil Manufacturing Facility, etc.), the respective RLM will be assigned responsibility. For NCSX design, the responsibility is assigned to the associated WBS manager.

The NCSX Cognizant Engineer and Responsible Line Manager are responsible to assure that necessary training requirements specific to a planned work activity have been

identified and documented in the technical procedures and that involved personnel have completed the required training.

The Home organization, in consultation with the Human Resources Training Office and the NCSX Project Team, will decide on the appropriate media for the training (e.g., classroom, read only, in field, etc.).

2.3 Categories of Training

There are three general categories of training that impact personnel assigned to the NCSX Project. While this Training Plan will focus details on the NCSX-specific training programs, the other two categories of training are include in summary format to provide a complete picture of the overall training of NCSX personnel. These are:

2.3.1 General Site Access Training

Everyone working on-site at PPPL for more than 40 hours per year must take General Employee Training (GET). For the NCSX project, ORNL personnel, as part of the project partnership, will physically work at both ORNL and PPPL on project work activities. When working at PPPL, a manager at PPPL must be assigned the responsibility to assure that the GET training is completed. For subcontractors, the PPPL technical representative is assigned this responsibility. This training plan focuses only on the training required of all personnel working at the PPPL site and includes the general overview of the administrative, safety, and security regulations and policies for PPPL. It is generally administered and/or coordinated by the staff of the Human Resources Department. *This NCSX Training Plan will not address these requirements as they are covered elsewhere in PPPL policies and procedures.* The table below provides some additional information on the GET training requirements:

Module	Title	Attendees	Topic Matter
General Site Access Training	General Employee Training	All Project Personnel and Subcontractors working on site for more than 40 hours per year	General overview of the administrative, safety and security regulations, and the policies outlined for PPPL

2.3.2 Department/Division Training

Line managers, are responsible to assure that individuals assigned to their departments and divisions are trained to perform their typical PPPL work activities. The requirements for training are usually dictated by the specific site location, experiment safety requirements, and/or tasks or functions the individual may perform. They work with the staff of the Human Resources Department in defining, creating, and delivering this home line organization-specific training. This training is usually documented in PPPL qualification procedures, training matrices or training plans, which are maintained by the Human Resources Training Office. Matrices are periodically updated. *This NCSX*

Training Plan will not address these requirements as they are covered elsewhere in PPPL policies and procedures.

The table below provides general information on the Department/Division training:

Module Module	Title	Attendees	Topic Matter
Department/Division Training	Required training, and qualification requirements. Defined in home organizations training plans, matrices, or procedures	Engineering Personnel Assigned to NCSX Project	• Access training • PPPL procedures training • Formal courses and/or on-the-job training determined by department and/or division head • Courses designed to enhance or maintain job skills needed (may include new courses such as metrology and cryogenic safety) • Department/Division Procedures and operating procedures training

2.3.3 NCSX Specific Training

2.3.3.1 Overview

Home organizations are responsible to assure that individuals within their organizations matrixed to the NCSX project are trained to perform their typical PPPL work activities. In addition, the NCSX Project is responsible for defining specific NCSX Project training needed by personnel assigned to the Project. This may take the form of providing training to understand the processes and procedures to be used in the design and construction phases of NCSX and NCSX-specific technical procedures to perform installation, manufacturing, and testing activities for the Project. The project specific training falls into one of two general categories: training on the NCSX processes, in general, such as the use of IntraLink, and training required for a specific work activity, such as performing the winding of the modular coils.

2.3.3.2 NCSX Processes and Procedures

The NCSX Engineering Web page (http://ncsx.pppl.gov/NCSX_Engineering/) is the site where the vast majority of the guidelines and requirements for the NCSX Project are contained. The NCSX Processes are generally outlined in the set of NCSX-specific

plans and procedures. All NCSX engineering personnel will be trained in the content and on how to navigate the NCSX Engineering Web page. *This NCSX Training Plan will focus on this category of training.*

2.3.3.3 NCSX Technical Procedures

PPPL Engineering Procedure ENG-030, *PPPL Technical Procedures for Experimental Facilities*, defines the lab-wide requirements for the format and content of several types of technical procedures, including, installation and test procedures, etc. The NCSX Project will comply with the requirements contained in ENG-030, including the requirements to identify in detail the type and method of training necessary for the personnel assigned to perform the specific task or job. *This NCSX Training Plan will not address these requirements as they are covered elsewhere in PPPL policies and procedures.*

2.3.4 Training on NCSX Processes and Procedures

Like many projects, NCSX has specific ways in which the NCSX Project does its business. NCSX is responsible to assure that personnel working on the project have training that is specific to the project, as applicable to their work. This responsibility covers all NCSX specific processes and procedures. This may include administrative plans and procedures or specific technical procedures unique to the project. The Project is responsible for working with the staff of the Human Resources Department to define what project-specific training is needed, to determine the best methods of delivery, to create the training course content, and to deliver the material.

Appendix I to this plan provides an outline of the training modules on the NCSX Processes and Procedures.

2.4 Requirements for NCSX Training

Personnel assigned to work on the NCSX Project are expected to be fully trained to perform the tasks assigned to them. To achieve this goal, personnel will be required to complete the necessary training identified above; General Site Access Training, Safety Training, Home Organization Training, and NCSX Project-specific Training. The Human Resources Training Department will work with NCSX Project management team personnel to identify training requirements for each person assigned to NCSX.

Appendix II to this plan provides a series of tables that describe in general terms the various NCSX Positions and overviews of the NCSX Project training requirement guidelines. These tables are included as guidelines only – specific training requirements will be determined by the cognizant job manager and assigned RLM for a specific task.

- Table II-1 –NCSX positions

- Table II-2 - provides the training requirements for personnel on the NCCS management plans and processes
- Table II-3 - provides the training requirements on the unique and NCSX-specific technical procedures and processes for performing NCSX tasks.
- Table II-4 - provides the recommended list of the minimum training in PPPL procedures that personnel assigned to NCSX should complete. While much of this will be accomplished under the category of Home Organization Training, personnel assigned to NCSX are required to receive this training, whether through their home organization or specifically for NCSX. The home organization, in consultation with the NCSX RLM, shall determine specific PPPL procedure training requirements needed for NCSX.
- Table II-5 - provides the recommended list of the minimum safety training that personnel assigned to NCSX should complete. This training is highly dependent on the location and type of work the individual will be performing. The home organization, in consultation with the NCSX RLM, shall determine specific safety training requirements for NCSX.

In addition, NCSX will develop task-specific training matrices that will be approved on a case by case basis. These approved matrices will be posted on the NCSX Training web page.

NCSX Training Plan
Appendix I – NCSX Processes and Procedures Training Outline

Table App-1 NCSX Training Modules

Module	Title	Proposed Attendees	Topic Matter
1	The NCSX Project Web	See Appendix II	• General review of the content of the NCSX web page and its subwebs: o NCSX Team Directory o NCSX Publications o Project Office o Physics o Engineering o Manufacturing
2a	Overview of Web-Based Project Engineering System	See Appendix II	• General review of content of web page • Sections to stress in this module: o WBS Dictionary o Specs and SOWs – especially purpose and format guidelines o Design Reviews – especially guidelines for conducting, CHITs, and closeout procedures. o Electronic models and drawings on NCSX – especially the Pro/INTRALINK Users Guide and PROC-007 o NCSX work planning - especially ENG-032 and PROC-004
2b	The NCSX Engineering Web Page – Continuation of the Overview	See Appendix II	• Sections to stress in this continuation module: o ECPs – forms and where to find approved ECPs o Interfaces o NCSX Plans and Procedures o Fab, Installation, & Assy Plans o Procurement Guide o Electronic Signatures
3	Specs and SOWS and Design Criteria Documents	See Appendix II	• Review where to find guidelines • Specs – where to find latest approved specs (GRD, Developmental and Product Specs) and format guidelines, • SOWs – where to find latest approved SOWs and format guidelines • Procurement Guide • Structural and Cryogenics Design Criteria

Table App-1 NCSX Training Modules
(Continued)

Module	Title	Proposed Attendees	Topic Matter
4	NCSX Work Planning Processes	See Appendix II	• PROC-004 and ENG-032 synergies • Relationships of WP to WAFs • NCSX RLMs
5	NCSX Design Review Processes	See Appendix II	• Review where to find the design review guidelines • Review PPPL procedures and format for design reviews • CHIT preparation and closeout
6	NVSX Electronic Models and Drawings	See Appendix II	• Overview of Pro/INTRALINK Users Guide and PROC-007 • General review of configuration controls within INTRALINK
7	NCSX Configuration Control Processes	See Appendix II	• Configuration Control Plan (CMP) and PROC-002 • What is under configuration control and when • ECP forms • Approved ECPs posted
8	NCSX Interface Control Processes	See Appendix II	• Interface Control Management Plan (ICMP) and PROC-003 • Types of interfaces • Scope sheets • ICDs – when needed • Alternates to ICDs
9	NCSX WBS Dictionary and Plans	See Appendix II	• Review of major NCSX Project Administrative Plans o PEP o DMP o DOC o QAP • WBS Dictionary
10	NCSX Electronic Signatures	See Appendix II	• PROC-005 • Electronic signature process and security • Updating signatures
11	NCSX Manufacturing Web and the Supplier FTP Site	See Appendix II	• Purpose of Manufacturing Web and information available • Purpose of Supplier FTP Site and information available

NCSX Training Plan
Appendix II
NCSX Positions and General Training Requirements Guidelines

Table App II- 2 NCSX Positions

Positions	Description
Project Management Team	Typically involved in overall project and engineering management (WBS8, with the exception of QA/QC personnel and construction safety engineers – see below).
Design Engineers/Scientists	Typically involved in the design of systems and associated hardware for the Stellarator Core Systems (WBS 1), Auxiliary Systems (WBS 2), Diagnostic Systems (WBS 3), Power Systems (WBS 4), Central I&C Systems (WBS 5), Facilities Systems (WBS 6), and Machine Assembly Systems (WBS 7). These engineers and scientists may be from ORNL or PPPL.
Field Period Assembly Engineers (FPA Eng) and Technicians (FPA Tech)	Typically involved in the work covered by WBS 18.
Construction Engineer (Const Eng) and Construction Technicians	Typically involved in Test Cell Preparation and Machine Assembly covered by WBS 7
Quality Assurance Engineers (QA Eng) and Quality Control Inspectors (QC Insp)	All QA and QC work is performed under the scope of WBS 83. QA Engineers perform quality functions for the project, s.a., oversight of NCSX Procurements or development of NCSX systems and QC Inspectors perform quality oversight of NCSX field work. The general training requirements for this position are defined in Q-005, available at: http://www-local/qa/QAIntPol_Proc/Pol&ProcIndex.shtml.
NCSX Construction Safety Engineer (Constr. Safety Eng)	NCSX Construction Safety Engineer (Constr. Safety Eng) – Performs construction safety oversight of NCSX field work under WBS 83. The general training requirements for this position are available at: http://www-local.pppl.gov/esh/index.shtml The only additional training requirement is the four-day course on OSHA 510: Occupational Safety and Health Standards for the Construction Industry.

NCSX Training Plan
Appendix II
NCSX Positions and General Training Requirements Guidelines

Table App II-3 -NCSX Management Plans and Processes Training Requirements

NCSX Project Training	Project Mgmt	Design Eng	FPA Eng	FPA Tech	Const. Eng	Const. Tech	QA Eng	QC Inspector	Const Safety Eng
Overview of Web-Based Project Engineering System	X	X	X		X		X		X
NCSX Systems Engineering Management Plan (SEMP)	X	X					X		
NCSX Quality Assurance Plan	X	X	X		X		X		X
NCSX Glossary (PROC-001)	X	X	X		X		X		X
NCSX Configuration Management • Configuration Management Plan (CMP) • Configuration Control (PROC-002)	X	X	X		X		X	X	X
NCSX Data and Records Management • Data Management Plan (DMP) • Document and Records Management (DOC)	X	X	X		X		X	X	X
NCSX Interface Control Management • Interface Control Management Plan (ICMP) • Interface Control (PROC-003)	X	X					X	X	
NCSX Risk Management Plan (RMP)	X	X					X		
NCSX Reliability, Availability, and Maintainability (RAM) Plan	X	X							
NCSX Test and Evaluation Plan (TEP)	X	X					X		
NCSX Work Planning Process (PROC-004)	X	X	X		X	X	X		X
NCSX Electronic Signatures (PROC-005)	X	X	X		X		X		
NCSX Supplier Site Postings (PROC-006)	X	X			X		X		
NCSX Structural and Cryogenic Design Criteria (GUID-CRYO)	X	X	X		X		X		X

Table App II -3 NCSX Management Plans and Processes Training Requirements (Continued)

NCSX Project Training	Project Mgmt	Design Eng	FPA Eng	FPA Tech	Const. Eng	Const. Tech	QA Eng	QC Insp	Const Safety Eng
NCSX Engineering Conventions, as available	X	X	X	S	X		X	R	
INTRALINK System • Pro/INTRALINK Users Guide (GUID-PRO) • Release and Approval of Fabrication Drawings (PROC-007)	R	X					R	R	

Table App II-4 NCSX Technical Procedures and Processes Training Requirements

NCSX Project Training	Project Mgmt	Design Eng	FPA Eng	FPA Tech	Const. Eng	Const. Tech	QA Eng	QC Insp	Const Safety Eng
NCSX Specialized Tooling	S	X	S				X	R	
Metrology Systems • FARO Arm • Roemer Laser Tracker	R	S	S	S			R	X	R
NCSX Winding Facility • Coil Winding Facility • Autoclave	R	S	X	X			R	X	X
NCSX Coil Test Facility	R	S	X	X			R	X	X

NCSX Training Plan
Appendix II
NCSX Positions and General Training Requirements Guidelines

Table App II- 5 Minimum PPPL Procedures Training Requirements

NCSX Project Training	Project Mgmt	Design Eng	FPA Eng	FPA Tech	Const. Eng	Const. Tech	QA Eng	QC Insp	Const Safety Eng
Hazard Awareness	X	X	X		X		X	X	X
NEPA review System (ESH-014)	X	X	X		X		X		
Review and Approval of Specifications, and Statements of Work (ENG-006)	X	X			X		X		
Failure Modes and Effects Analysis (ENG-008)	X	X					X		
Control of Drawings, Software, and Firmware (ENG-010)	X	X					X		
Hoisting and Rigging Program (ENG-021)				X	X	X		X (classroom only)	X
Technical Definitions and Acronymns (ENG-029)	R	R	R				X	X	
PPPL Technical Procedures for Experimental Facilities (ENG-030)	R	X					X	X	
Work Planning (ENG-032)	X	X			X		X		X
Design Verification (ENG-033)	X	X			X		X		
Control of Nonconformances (QA-005)	R	X							R
Corrective Action Requests (QA-012)	R	X							R

NCSX Training Plan
Appendix II
NCSX Positions and General Training Requirements Guidelines

Table App II-6 Minimum Safety Training Requirements

NCSX Project Training	Project Mgmt	Design Eng	FPA Eng	FPA Tech	Const. Eng	Const. Tech	QA Eng	QC Insp	Const Safety Eng
Radiation Training*	X	X	X	X	X	X	X	X	X
CPR			X	X		X			X
Confined Space (prior to entering a confined space)					X	X	X	X	X
Fire Extinguisher/Fire Watch			X	X	X	X			X
Compressed Gases/Cryo Liquids			X	X	X	X			X
Aerial Boom Lift			R	S		S			X
Fall Protection				X	X	X			X
Forklift				S		S			X
Scissor Lifts			R	S		S			X
Ladder Safety			R	X	X	X		X	X
Penetration Drilling & Sealing (ENG-024, ENG-027, ENG-028)				S	X	S		X	X
Electrical Utilization				S	X	S		X	X
Construction Safety (OSHA 510)					X				

*** Radiation Training required for unescorted access to TFTR Test Cell and Basement (access currently linked although TFTR Basement is not a radiation area)**