

NCSX PROJECT TRAINING MATRICES

Based on the NCSX Training Plan (NCSX-PLAN-TRNG)

Revision 3

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Record of Changes

| Revision | Date | Description of Changes |
|----------|-----------|--|
| 0 | 2004 | Initial NCSX Training Matrix for CD-1 |
| 1 | 2/16/2006 | Annual Review and Revision |
| 2 | 3/9/2006 | Reformatted and consolidated training matrices |
| 3 | 5/8/2008 | Annual review and update to reflect Audit 802 findings (Finding 3.1) – Table 3 modified to reference specific Manufacturing/Field Period Assembly/Machine Assembly training matrices. Tables 4 (Manufacturing Facility) and 5 (Field Period Assembly) deleted since the specific modular coil winding and field period assembly training requirements are specified in the specific training matrices. |

NCSX Project Training Matrices

Overall Training Philosophy:

The following tables provide guidelines the minimum training in technical procedures and processes training requirements. NCSX, as a matrixed organization, where everyone assigned to the NCSX Project has a home line organization, assumes that those personnel will have been appropriately trained on the PPPL plans and procedures and that training is properly documented by the respective home line organizations.

As stated in PPPL Policy P-008 (Staff Training and Development):

“Line management has the overall responsibility to ensure that all their personnel are trained, qualified or certified to perform their specific jobs. Line management is also responsible for ensuring that employees have completed required training in ES&H prior to performing affected work duties. In a case where a staff member from a Department is assigned (“matrixed”) to a Project, the Project’s management is responsible for including that individual in the Project organization and ensuring that any additional Project-specific training requirements are established and fulfilled.”

However, for NCSX-specific processes and procedures, the NCSX Project is responsible for ensuring that the specific NCSX training is accomplished and properly documented. For manufacturing facility, field period assembly operations, and machine assembly operations the training matrices for those activities shall delineate specific training requirements.

NCSX Project Training Matrices

Table -1 NCSX Position Descriptions

| 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. |
| Manufacturing Facility Engineers (MF Eng) and Technicians (MF Tech) | Typically involved in the work involving coil assembly and field period assembly in the NCSX Manufacturing Facility |
| 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. |

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Table -2 NCSX Plans and Processes Training Requirements¹

| | Mgmt | Admin | RLM | Job Mgr | PTR | Engr, QA, or ES&H Rep | Field Supvr, Tech or Designer | Physicist | DOE & Other ² | PQA or Procmnt |
|---|------|-------|-------------|-------------|-------------|-----------------------------|-------------------------------------|-----------|-----------------------------|----------------|
| Mod 1 – NCSX Web Overview | X | X | X | X | X | X | X | X | N/A | X |
| Mod 2A – NCSX Engineering Web Part I | X | X | X | X | X | X | X | X | N/A | X |
| Mod 2B – NCSX Engineering Web Part II | X | X | X | X | X | X | X | X | N/A | X |
| Mod 3 – Specifications/SOWs/Design Reviews | | | X | X | X | X | X | | | X |
| Mod 4 – Work Authorization Processes o Completing the Work Planning Form (Annex 4-1) | | | X X | X X | X X | X X | X X | | | |
| Mod 5 – Design Review Processes | | | X | X | X | X | X | | | X |
| Mod 6 – Electronic Drawings & Models | | | X | X | X | X | X | | | X |
| Mod 7 – Configuration Control Processes | | | X | X | X | X | X | | | |
| Mod 8 – Interface Control (TBD) | | | X | X | X | | | | | |
| Mod 9 – WBS Dictionary & NCSX Mgmt Plans, including the following annexes: o Systems Engineering Processes (Annex 9-1) o Configuration Management Processes (Annex 9-2) | | | X X X | X X X | X X X | | | | | |
| Mod 10 – ES&H, QA, and Other o Quality Assurance Processes & Procedures (Annex 10-1) o ES&H Processes & Procedures (Annex 10-2) | | | X X X | X X X | X X X | X X X | X X X | | | |
| Mod 11 – The Manufacturing, Procurement & Supplier Web Sites | | | X | X | X | | | | | X |
| Mod 12 – Administrative Processes | X | X | X | X | X | X | X | X | | |
| Mod 13 – Procurement Technical Representative Responsibilities | | | X | X | X | | | | | X |
| Mod 14 – Manufacturing Plans and Procedures (TBD) | | | X | X | X | X | X | | | X |

Notes: ¹Each module represents a major section on the NCSX Engineering Web. As needed Annexes to each module will be developed to provide a greater level of detail in the plans, procedures, and processes.

²DOE and other non-NCSX Project personnel may be trained as deemed necessary.

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Table 3 Minimum Technical and Safety Training Requirements Guidelines¹

| Recommended Training | Project Mgmt | Design Eng | Manuf. Facility Engineer ² | Manuf. Facility Technician ² | Const. Eng ² | Const. Tech ² | Metrology Personnel ² | QA Eng/QC Inspectors ³ | Const Safety Engineers ³ |
|---|--------------|------------|---------------------------------------|---|-------------------------|--------------------------|----------------------------------|-----------------------------------|-------------------------------------|
| Radiation Training ⁴ | X | X | | | | | | | |
| General Employee Training (GET) ⁴ | | | | | | | | | |
| CPR | | | | | | | | | |
| Confined Space - prior to entering a confined space | | | | | | | | | |
| Aerial Boom Lift – as involved | | | | | | | | | |
| Forklift – as involved | | | | | | | | | |
| Scissor Lifts – as involved | | | | | | | | | |
| Fall Protection – as involved | | | | | | | | | |
| Ladder Safety – as involved | | | | | | | | | |
| Penetration Drilling & Sealing (ENG-024 & ENG-027) – prior to working on seals | | | | | | | | | |
| Electrical Utilization - As required by ES&HD 5008, Sec. 2, Table 3.3 | | | | | | | | | |
| Construction Safety (OSHA 510) | | | | | | | | | |
| Metrology Systems (FARO Arm & Roemer Laser Tracker) qualification – if involved | | X | | | | | | | |
| NCSX Specialized Tooling – as involved | | X | | | | | | | |

Note: ¹Training may be accomplished in small group meetings in which the applicable plan or procedure is read and discussed, non-PPPL training programs, or PPPL training programs sponsored by Human Resources (e.g., fire extinguishers). In all instances, training records are maintained and forwarded to Human Resources.

²Training requirements for Manufacturing Facility Engineers and Technicians, Construction (Field Period Assembly and Machine Assembly Engineers and Technicians, and Metrology personnel shall be identified in the respective Manufacturing Facility, Field Period Assembly, and Machine Assembly training matrices.

³QA Engineers /Inspectors and Construction Safety Engineers are trained in accordance with requirements specified in the PPPL QA and ES&H Division Training Manuals.

⁴GET & Radiation Training required for unescorted access to TFTR Test Cell and Basement (access currently linked although TFTR Basement is not a radiation area).