

**NATIONAL COMPACT STELLARATOR
EXPERIMENT**

(NCSX)

OPERATIONAL READINESS ASSESSMENT

(ORA)

PLAN

DRAFT

Prepared By

Reviewed By

Approved By

1.0 Scope

The scope of the NCSX Operational Readiness Assessment (ORA) process is to determine the readiness of the NCSX device to operate in a safe and efficient manner. Items associated with personnel safety, machine safety, and facility safety shall be assessed by the NCSX ORA Team. In addition items associated with regulatory compliance will also be addressed.

2.0 Discussion

In order to provide necessary assurances that NCSX can be started and operated in a safe and efficient fashion the PSO Manager, in accordance with referenced documents (section 3 of this plan) shall initiate an Operational Readiness Assessment. The purpose of the ORA is to make prudent judgments on the effectiveness of NCSX operational controls, safety, and engineering, in support of safe startup and plasma operations.

3.0 References

Princeton Site Office Procedure 2-6 “ Procedure for performing Readiness Assessments”

DOE Order 425.1 “ Startup and Restart of Nuclear Facilities”

4.0 ORA Membership

ORA membership shall be determined by the Princeton Site Office (PSO) Manager. The team should consist of a Team Leader and several cognizant individuals familiar with DOE programmatic requirements for the safe startup of fusion energy research devices. Membership may include cognizant staff from; Office of Fusion Energy Science (OFES), other DOE laboratories, PSO, and PPPL.

It is expected that the formal ORA review process will take approximately 5 working days in concert with the NCSX Startup Flow Chart (Addendum 1). It is expected that 3 days will be required for in field (sub-systems) and document reviews, and 2 days for ORA report generation.

5.0 NCSX Systems

The ORA team should assess the readiness of the following systems required for first plasma and subsequent safe plasma operations. Such assessments(s) may include; a physical inspection of the sub-system(s), documentation review(s), discussions with NCSX project management, discussions with cognizant sub-system personnel, review of applicable test documentation / data, and formal presentations made by NCSX cognizant staff members to the ORA team.

- NCSX Vacuum Pumping System (TVPS)
- Coil systems and associated hardware
- Safety Interlock Systems (Personnel & Hardware)
- AC Power Systems
- Motor Generator Sets
- Water Systems
- Cryogenic System
- Control Systems / E-Stops
- NCSX Test Cell Safety Interlock Systems
- Energy Conversion Systems (ECS)
- NCSX Test Cell Fire Protection Systems
- NCSX Test Cell Boundary Radiation Detection Instrumentation
- NCSX Test Cell HVAC System (dew point control)

6.0 Documentation

The following documents should be in place and should be available to the NCSX ORA team to assess the effectiveness of the documentation to support NCSX safe startup and efficient plasma operations.

NCSX-SAD	Safety Assessment Document
NCSX-XX,	Administrative Control of Procedures
OP-AD-39,	Conduct of Operations
OP-AD-56,	Control of Equipment and System Status (chain of command)
OP-AD-03,	Experimental Proposals for NCSX
OP-AD-117,	Operation of the NCSX Access System
NCSX-OP-X,	Preparations of Experimental Areas for Machine Operations
NCSX-OP-XX,	Operation of the NCSX TVPS
NCSX-OP-XX,	Testing the NCSX HIS with Areas Safe for Access
NCSX-OP-XX,	Testing the NCSX Emergency Stop System
NCSX-OP-XX,	Safety Lockout Device Test Procedure
NCSX-OP-XX,	Hot Access Requirements

NCSX-OP-XX, Testing of the Hot Access and HIS Systems with SLD Pressurized

NCSX-OP-XX, NCSX Training Matrix

NCSX-OP-XX, NCSX Operations Guide for Startup and Shutdown

NCSX-OP-XX, HPP Daily Operations

NCSX-OP-XX, Changing the Trip Control Settings of the RIS Protective Circuit for the NCSX Field Coils

NCSX-OP-XX, ACP & PDP Trip Control Settings

NCSX-OP-G-X, Preparation for NCSX pump-down

NCSX-OP-G-X, Daily Hi-Pot Test of the NCSX Inner/Outer Vacuum Vessel

NCSX-OP-G-X, Cryogenic Operation

ISTP-NCSX-01, Coil Energization Tests

OP-KK-28, NCSX SLD Kirk Key Test

NCSX-OP-G-X, MPTS Personnel Safety Interlock Test Procedure

OP-MG-07, D-Site MG Operation in support of NCSX

OP-PC-44, ECS HCS Input/Output Interface Testing

OP-PC-45, ECS Interlock and Level 1 Display Testing

OP-PC-46, SDS Preoperational Testing

OP-PC-48, ECS Critical Interlocks

OP-PC-49, ECS Ground Fault Testing

OP-PC-735, Rectifier Settings

OP-ECS-245, FCPC Daily Startup/Shutdown Procedure

NCSX-XX, Leak Checking of NCSX

NCSX-PTP-XX, HiPot of NCSX Coil Sys from SDS in FCPC

PTP-ECS- XX, NCSX/ECS Continuity, Resistance, Inductance, & Meggar

PTP-ECS- XX, NCSX/Halmar (DCCT) & Shunt System Pre-op testing

PTP-ECS- XX, NCSX/RIS Tests

PTP-ECS- XX, NCSX/ACP Tests

PTP-ECS- XX, NCSX/Pulse Duration Period Timer Tests

PTP-ECS- XX, NCSX/FCPC Dummy load tests

PTP-ECS- XX, NCSX/ECS HiPot Tests

PTP-NCSX-XX, NCSX De-Ionized Water/System Testing

PTP-NCSX-XX, NCSX Coil System Preoperational Tests

PTP-NCSX-XX, ECS to NCSX Machine Coil Link Installation

7.0 REPORT GENERATION

The ORA team should document and submit a report to the PAO Manager within 1 week of the conclusion of the completed ORA activity. The PAO manager should then convey items associated with the NCSX ORA to the Office of The PPPL Director, The NCSX project head, and other cognizant individuals. Items that require action prior to NCSX startup should be identified as such.

8.0 ADDENDUM

NCSX STARTUP FLOWCHART

