National Spherical Torus eXperiment Upgrade

NSTX-U Configuration Controlled Safeguard Requirements

NSTX-U-RQMT-RD-027-01

November 25, 2019

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Record of Revisions

Date	Version	Brief Description of Changes
6/12/19	Rev 0	Initial Release
11/25/19	Rev 1	Modest revision

References

[1] NSTX-U-RQMT-GRD-001, NSTX-U General Requirements Document

[2] NSTX-U-RQMT-SRD-012, NSTX-U SRD – Operations and Safety Systems

[3] ASO-180529-SPG-01, PRELIMINARY CONCLUSIONS REGARDING THE PROCESS AND FORMAT OF RISK ANALYSIS IN THE NSTX-U SAD

[4] OPS-181205-JM-01, Hazard Analysis for the Personnel Safety Systems (PSS) CDR

1: Scope

a. This document provides implementation requirements for the NSTX-U Configuration Managed Safeguards (SBS # 1.7.3.9)

b. System requirements are provided in Operations and Safety Systems System Requirements Document [2].

c. This document lists specific locations and systems requiring Configuration Managed Safeguards.

d For the purpose of this discussion, the technologies of safeguards fall into three bins of Table 1-1.

***Table 1-1**: Technological categories for safeguards*

	Safeguard Technology	Example/Note
1	Flexible Insulating Materials[1]	Salisbury Insulating Blanket
2	Fixed Safeguards (bolted)	Bolted cover on a rack
3	Movable safeguard (TKS interfaced)	Hinged cover on a rack, entryways to cages, TKS interfaced in all cases

2: Safeguard Locations

2.1: Caged Areas (SBS 1.7.3.9.1)

a. The cages in Table 2.1-1 shall be constructed.

***Table 2.1-1** Cages required as part of the Configuration Managed Safeguards Program*

	Area
1	The TVPS racks in the north gallery
2	The NB racks in the east gallery
3	The gaseous He skid in the pump room
4	TFTR TCB caged area
5	Machine Perimeter Safeguards[2]

[1] Not a credited control and installed to conform with PPPL standard ESH 5008

[2] Machine perimeter safeguards refers to a set of clear shields placed at a distance around NSTX-U. The exact details of these shields will be determined during the design phase

2.2: Bus Work Guards & Exposed Conductors >50V Guards (SBS 1.7.3.9.2)

a. The electrical bus work in Table 2.2-1 shall be covered by the Configuration Managed Safeguards.

Table 2.2-1 *Protection against electrical hazards required as part of the Configuration Managed Safeguards Program*

	System	Configuration Control Method
1	Removed in REV1	
2	PF-2U coil terminals and exposed bus work components	Bolted Safeguards and/or Flexible Insulating Materials
3	PF-3U coil terminal and exposed bus work components	
4	PF-4U coil terminal and exposed bus work components	
5	PF-5U coil terminal and exposed bus work components	
6	PF-2L coil terminals and exposed bus work components	
7	PF-3L coil terminal and exposed bus work components	
8	PF-4L coil terminal and exposed bus work components	
9	PF-5L coil terminal and exposed bus work components	
10	GDC electrode electrical connections on the NSTX-U vessel	
11	Emissive filament electrical connections on the NSTX-U vessel	
12	PCTS Safeguard	Bolted Safeguards and Movable Safeguards

Note: it may be possible to design a single safeguard that covers more than one components in Table 2.2-1

2.3: Helium Piping Guards (SBS 1.7.3.9.3)

The exterior surface of any reachable hot-He piping shall be <= 60 C and non-rigid insulating materials shall be protected by a solid touch-safe cover.