

DESIGN REVIEW DOCUMENTATION – RESULTS

Title: NSTX NB Upgrade Peer Review _____ **WP#:** 1497, 1505-1508, 1512 (ENG-032)

Type of Review: Peer CDR PDR FDR

Cog Individual: Tim Stevenson et al _____ **Date of Review:** 4/19/2011 _____

Review Board Members:

Invited attendees :

Chairperson A. vonHalle _____	W. Blanchard _____	J. Makiel _____
T. Dodson _____	M. Cropper _____	S. Ramakrishnan _____
L. Dudek _____	M. Denault _____	K. Tresemer _____
J. Edwards _____	V. Garzotto _____	_____
R. Strykowski _____	O. Guzman _____	_____
Regulatory Compliance _____		

Items Reviewed:

Sat. Unsat.

Comments

Appropriate requirements identified	<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____
Development plans and schedules	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Presented in overview _____
Regulatory compliance including USQD and NEPA	<input checked="" type="checkbox"/>	<input type="checkbox"/>	For Decontamination Activities _____
Disposition of CHITS from previous reviews	<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____
Cost objectives	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Presented in overview _____
Other review objectives addressed (attachment 4 of ENG-033)	<input type="checkbox"/>	<input type="checkbox"/>	N/A _____

SUMMARY OF RESULTS:

This was a peer review of the engineering progress made towards the final design of the NSTX Neutral Beam Upgrade (the addition of a second beam-line), and was considered to be a “dry run” of the external final design review scheduled for this June. The work covered in this review is divided into several work packages as defined in the following Work planning Forms:

- WPF # 1497, NBI Decontamination and Refurbishment
- WPF # 1505, NBI Beam-Line Services
- WPF # 1506, NBI BL2 Duct
- WPF # 1507, NBI BL2 Power and Controls
- WPF # 1508, NBI BL2 VV Armor
- WPF # 1512, Removals/Relocations in NTC for 2nd Neutral Beam

An overview of the project was presented and included summaries of the overall and various sub-system requirements and progress, as well as cost/schedule and earned value metrics for the various NSTXU NBI jobs.

Engineering details of the neutral beam refurbishment, relocation and needed services (water, SF6, vacuum, cryo, gas injection, etc.) have been completed including equipment/facility modifications, associated lifts and fixtures, routings, and both construction and operations scenarios. Final drawings are in progress for Duct –Vessel interfaces including port extensions, the transition duct, and the new vessel pumping system duct. Analysis is complete and drawings are being finalized for all vessel reinforcements. Again, presentations included construction plans, lift details, and alignment techniques. Thermal and mechanical analysis of proposed NB armor modifications has been performed, and final drawings/tile specifications are near completion. The design of the Torus vacuum Pumping System has also been completed, including the support stand, vacuum diagnostics (ion gauges, RGA, etc.), and specifications for the pumps and magnetic shielding. Layouts have been completed and lists of required materials generated to connect/restart the NBL4 power line-up and controls to support the operation of a second neutral beam on NSTX. Final drawings are in progress to duplicate the current NBI controls for two beam operation, and have been verified to include all upgrades made during NSTX operations. This new design will also add redundancy for critical interlocks.

There were three chits generated during this review as follows:

1. Flux weld outgassing properties should be documented and evaluated for use in high vacuum
2. A roughing valve should be added to pump the NSTX vessel
3. A section should be added to the FDR presentations on contamination control. Explain what measures will be taken, using examples/experience where applicable.

The review committee concurred with all chits and agreed that this project should proceed towards a Final Design Review in parallel with the resolution of these suggestions.

Disposition: [check one]

Acceptable

Acceptable pending resolution of concerns- CHITS identified above must be resolved prior to installation.

Incomplete - Additional design work is required prior to another design review.

Chairperson Signature: A. vonHalle **Date:** 4/26/11

Distribution: Review Board Members, Operations Center, Cognizant Design Engineer, System Engineer(s), Attendees, QA, ES&H, Security