

Title: Passive Plate Bracket Modification Peer ReviewCAT: A1 ☒ A2 ☐ A3 ☐Type of Review: ☒ Peer ☐ CDR ☐ PDR ☐ FDRCognizant Individual: A. Jatiwala Date of Review: 7 February 2020

Review Board Members: See

Invited Attendees:

Other Attendees:

attached report

Chairperson _____

RE _____

TA (Subject) Name _____

TA (____) _____

QA _____

ESH _____

Regulatory Compliance _____

Items Reviewed:

Sat.

Unsat.

Comments or n/a if not applicable

Appropriate requirements identified



Development plans and schedules



Reg. compliance incl. USI/USID and NEPA



Disposition of CHITS from previous reviews



Calculations (all listed are signed and filed)



Cost objectives



Other review objectives addressed

**SUMMARY OF RESULTS:** Please see attached report.

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.☐ **Unsuccessful** - Corrective actions must be taken and another review process must be initiated.

Design Review Chair Person _____ Date: _____

Cognizant Individual Acceptance _____ Date: _____

Distribution: Review Board Members, Operations Center, Responsible Engineer (RE), Cognizant Individuals, Project Manager, Project Director, relevant Technical Authorities (TAs), Chief Engineer (CE), Fire Protection Engineer, Attendees, QA, ES&H, Security, Requesting & Performing Dept. Head

Passive Plate Bracket Weld Peer Review Report

February 7, 2020

Attendance: R. Ellis (Chair and CE), A. Jariwala, J. Winston, S. Gifford, A. Castaneda, M. Safabakhsh (Manufacturing TA), M. Styer, Y. Zhai, T. Stevenson, S. Gerhardt, N. Gerrish (ES&H), M-A deLooa, G. Loesser, P. Titus (Analysis TA), A. Khodak, A. Brooks, S. Raftopoulos (RE Magnets)

Summary

The final design review for the passive plates was held, successfully, in August 2019. During a final check of calculations, we discovered that one of the support points of the passive plates, which was assumed to provide restraint in the radial and vertical directions, did not. Removing this constraint from the structural model resulted in higher stresses in the welds in one of the new brackets. The remedy for this problem is twofold: first, a block and long shoulder screw are added at the location of that support that restrict radial and vertical motion to .03 inches. Second, improved weld geometries and additional 7/16"-20 bolts joining the new bracket to the existing bracket are used to reinforce the welds.

This peer review, along with the upcoming peer review of the current shunts, closes out the final design review of the passive plates.

Ankita Jariwala presented the implementation of the design, showing the block and shoulder bolt at the support, and the extra bolts and load bearing plates at the upper corners of the passive plates. A. Khodak presented structural analysis showing that, even if a crack in the upper bracket weld extends half the length of the weld, the bolts have adequate stress margin. A. Brooks presented a fracture mechanics calculation showing that, after a crack propagates as far as described above, it is in a compressive zone and does not grow further.

There were three chits, two requesting calculations to be properly filed, and one requesting a check of hole clearances in the passive plates.

The review was deemed successful pending resolution of concerns.

TO: A. JARIWALA

FROM: Y. ZHAI

**SUBJECT: CHARGE FOR PASSIVE PLATES REPAIR SUPPORT BRACKET
MODIFICATION PEER REVIEW**

1 Introduction

The NSTX-U passive plates provide plasma MHD stabilization via induced currents for high performance plasma operations. The complete passive plate assembly is complex and composed of mounted on copper and stainless steel support structure weldments.

During in-vessel inspections, it was noticed that some of the passive plate support structure elements were loose and could be moved by a technician. This issue was investigated further and, through the 2017 DVVR and CAP process, several passive plate as-built deficiencies were identified and investigated. These deficiencies included issues with some welds of the brackets to the vacuum vessel. The Conceptual Design Review was held on June 8, and Preliminary Design Review was held on July 26, 2018. The Final Design Review (FDR) was held on August 21, 2019.

In addressing and closing the FDR chits, inconsistencies were found between the as-built conditions and assumptions used in the FDR analysis models for the passive plate support bracket. The as-built deficiency findings shall be included adequately in the passive plate structures analysis. The Peer Review will evaluate the technical solution for the support bracket design modification, along with analysis validation of FDR design solutions.

Design review methodology will conform to the latest version of ENG-033 (Rev. 8) based on A1 risk classification.

2 Purpose

This Peer Review will evaluate technical solution for the support bracket design modification per the as-built deficiency findings under all loads on the passive plate structures. The Peer Review addresses the development of the design solution since FDR.

3 Requirements

- NSTX-U-RQMT-GRD-00,1 “General Requirements Document”
- NSTX-U-RQMT-SRD-004, “Systems Requirements Document Vacuum Vessel and Internal Hardware”
- NSTX-CRIT-0001-02, “NSTX Structural Design Criteria”
- NSTX-U-RQMT-RD-003, “Disruption Analysis Requirements”
- VVIH-180605-SPG-01, “Passive Plate Requirements”

4 Scope

The scope of the Peer Review only includes design modification of the passive plate support brackets to ensure consistency between as-built deficiencies and assumptions in the analysis model.

5 Methodology

The Peer Review shall be conducted in accordance with existing PPPL procedure ENG-033 “Design Verification,” supplemented by the participation of the NSTX-U Project Engineer.

Peer Reviews are used to examine detailed aspects of a design or procedure. They may be performed to cover stand-alone scope and review of specific implementation of aspects of a design that has already passed a Final Design Review. Inputs to a Peer Review will include a subset of the Requirements and load specifications.

The following are the objectives/deliverables for this particular Peer Review:

- Ensure that proper requirements are identified and satisfied by the design or procedure
- Identify hazards associated with the work or its impact on operations and appropriate mitigation
- Identify SAD/ASE considerations
- Alert impacted organizations or system changes

Review materials shall be presented at T-1 to the Design Review Chair and Project Engineer for acceptance, and then distributed to the review committee.

6 Review Committee

The Design Review Committee shall be constituted as follows:

R. Ellis	Chairperson + Chief Engineer
S. Gerhardt	NSTX-U System Integration + Experimental Research Ops.
M. Safabakhsh	Manufacturing TA
Machine Assembly	J. Winston or S. Gifford
D. Loesser	Mechanical TA
P. Titus	Analysis TA
T. Stevenson	Head for Operations
Y. Zhai	NSTX-U Project Engineer
QA Representative	A. Castaneda or F. Malinowski
ES&H Representative	W. Slavin or N. Gerrish or H. Wetzel

7 Agenda

The peer review shall be accomplished over one half day, scheduled for Friday, February 7, 2020, with the following preliminary agenda:

2/7/2020	Passive Plate FDR Agenda		
Start	Duration	Topic	Speaker
13:00	15	Introduction	A.Jariwala
13:15	30	PP Bracket Mod – Design, analysis and installation Plan	Jariwala / Khodak / Brooks
13:45	10	Schedules & Cost, Procurement	W.Gattoni
13:55	10	Chits Review	DRC
14:05	Adjourn		

cc:

A. Castaneda	D. Loesser
M. De Looz	F. Malinowski
A. Brooks	J. Winston

R. Ellis	A. Khodak
J. Galayda	M. Safabakhsh
W. Gattoni	G. Swider
S. Gerhardt	W. Slavin
N. Gerrish	T. Stevenson
S. Gifford	P. Titus
R. Hawryluk	H. Wetzel
L. Hill	Y. Zhai
A. Jariwala	

PPPL QA

NSTX-U File

PR ☒ PDR ☐ CDR ☐ FDR ☐

Design Review Title: Passive Plate Bracket Peer Review

Date: 2/7/20

[illegible]

PR ☒PDR ☐CDR ☐FDR

Design Review Title:

Date:

[illegible]