

# Audit Status Report

## All Items - Audit 1510

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NSTX-U Readiness for Operation Review

In CA/Verification

PPPL

Conducted: 12/9/2014 - 12/11/2014

12/15/2014

### 1 Finding: Review the FMEA

**Status:** Closed - Completed      **Priority:** High  
(3/31/2015)

#### Corrective Actions:

##### 1.1 CA: (Subject: NSTX-U FMEA) Identify four(4) external experts (with appropriately broad expertise) to review our FMEA.

**Status:** Closed - Completed (3/31/2015)

**Assigned To:** Engineering & Infrastructure    Mechanical    Titus P

#### Description:

Review the FMEA and provide your independent comments and suggestions. The comments and suggestions should be documented and incorporated in a revised FMEA. The revised FMEA should be approved by the end of January 2015.

#### Comments:

1/29/15: Peter Titus email on 1/29; Status: Four Reviewers for the FMEA have been identified. Three have provided responses: Dirk Naujoks, IPP W7X- comments received, more documentation (SAD and Structural Criteria) sent to Tim Stevenson helped with some responses. Dave Terry, MIT PSFC- comments received and distributed to mostly NSTX Power Engineers for resolution. Tim Scoville, GA DIII-D- No response yet, but the request for review was acknowledged. Lee Gadwalader, INEL - comments received. Pete will set up review and resolution like a CHIT spreadsheet and work on resolution and revisions to the FMEA.  
1/29/15: Mike Williams email 1/29: requesting two weeks extension to 2/14/15, providing enough time for Pete to complete.  
2/4/15: Due date extended to 2/14/15 with concurrence of John Delooper.  
3/30/15: Peter Titus email on 3/30; Status: FMEA has been revised and signed off completely on 3/26/15. Item completed and a copy on QA Server.  
3/30/15: Closed with concurrence of Mike Williams.  
3/31/15: Closed with concurrence of John Delooper.

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### 2 Finding: Actions in Response to the NSTX-U Readiness for Operation Review, December 9-11,2014.

**Status:** Implement CA      **Priority:**

#### Corrective Actions:

#### 2.1 CA: ( Subject: NSTX-U FMEA) Develop a Commissioning Schedule That identifies the sequence of tests necessary to lead us to the start of the ISTP.

**Status:** Closed - Completed (1/19/2015)

**Assigned To:** Engineering & Infrastructure    NSTX Upgrade    Strykowski R

#### Description:

Ron Strykowski and Al VonHalle to identify the tests that are necessary (from OP-NSTX-02). This schedule should also identify ACC hold points (work with Charlie Gentile). Should have this in place by January 16,2015.

#### Comments:

1/14/15: Ron Strykowski email on 1/14; Status: "Develop a Commissioning Schedule that identifies the sequence of tests necessary to lead us to the start of the "ISTP" has been prepared. Steve Langish has converted and loaded project NU02 into P6 for integration into the rollover. A copy of the plan is on the QA Server. Concurrence for closure received by Mike Williams.  
1/19/15:Closed with concurrence of John Delooper.

#### 2.2 CA: ( Subject: NSTX-U FMEA)Revising the Safety Assessment Document to more clearly identify the Safety Envelope and associated controls

**Status:** Closed - Completed (2/9/2015)

**Assigned To:** ESH&S    ESH&S Dept Office    Levine J

#### Description:

The SAD (Safety Assessment Document) revision should also include additional hazards (such as ODH's), the role of the ACC in SAD QA, a description of the operating organization, identification of maximum credible incidents, a better description of RF system hazards and inclusion of software quality assurance. Completed and in placed by February 6, 2015.

#### Comments:

2/6/15: Jerry Levine's email on 2/6; Status: The NSTX-U Safety Assessment Document (SAD) has been signed off. Note that Appendix 1 of the SAD (the FMEA) requires separate signature. copy of the SAD is on QA Server.  
2/9/15: closed with concurrence of Mike Williams.  
2/9/15: Closed with concurrence of John Delooper.

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### 2.3 CA: (Subject: DCPS) Develop the criteria and burn-in requirements for newly implemented DCPS components.

**Status:** Closed - Completed (2/26/2015)

**Assigned To:** Engineering & Infrastructure Office of Project Management Stevenson T

**Description:**

This should result in conducting burn-in tests and identification of spare components necessary for sustained operation of this critical equipment. Should be completed by February 13,2015. The DCPS components have been burned in with board,chassis,rack and system PTPs. The burn-in time from testing has been documented in the individual PTP run copies for power on and power on under testing hours. Actual accumulated burn-in-times are very substantial due to all of the time under test and far beyond typical industry standard. No thermal burn-in was require because all of the areas are climate controlled. The Concurrent computers are burned in at the factory but they also experience substantial burn-in-time during software and hardware PTPs.

Spare parts were considered and purchased at time of fabrication for most hardware. Adding additional spares will be revisited and burn-in completed with bench testing per PTPs. A Concurrent computer for development purposes has been ordered and would serve as a hot spare. Warthog is our backup.

**Comments:**

2/18/15: Tim Stevenson's email on 2/18; Status: All DCPS burn in times have been captured and added to the PTP run copies. Additionally, an Engineering Standard for electronics testing,bur in, and spares has been drafted and will go out for review shortly. Item completed.

2/26/15: Closed with concurrence of John Delooper.

### 2.4 CA: (Subject: Conduct of Ops) Revise the appropriate documents to show a more detailed Chain-of-Command for the D-Site Facility.

**Status:** Closed - Completed (3/20/2015)

**Assigned To:** Engineering & Infrastructure Electrical Von Halle

**Description:**

This should include more detailed description n of the COE and Shift Supervisory positions and responsibilities (including SAD controls) and authorities. The training documents for COEs should include training in the SAD. Completed and in-placed by February 13,2015.

**Comments:**

2/13/15: Al Von Halle email on 2/13/15; Status: D-Site Administrative Procedure OP-AD-56, Control of Equipment and Systems Status has been revised to include more detailed descriptions of the COE and Shift Supervisor positions and responsibilities. Additionally, OP-AD-09, D-Site Work Permits, and OP-AD-24, Control of Workplace Cleanliness around D-Site Experimental Areas, were revised for consistency with OP-AD-56. All three procedures are approved and in the Ops Center, and are posted on the NSTX-U web page as required training for access to the NSTX Test Cell. Also, NSTX-U procedure, NSTX-U HPP Daily Operations has been revised to include a new action prescribed in the NSTX-U Safety Assessment Documents (SAD). Item completed and copies of revised procedures on QA Server.

2/16/15: Closed with concurrence of Mike Williams.

2/18/15: Emails exchanged between Delooper and Von Halle and it was decided to reopen this CA 1510, 2.4 and extend the due date to 3/6/2015.

2/24/15:Delooper, Von Halle and Williams concurred to the extension with the due of 3/6/2015.

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3/9/15: Al Von Halle email on 3/19; Status: After reviewing the Draft NSTX-U Safety Certificate, which was expanded to include the relevant NSTX-U Administrative and Operations Procedure. The NSTX-U Operator training Matrix has also been modified to include SAD Safety Envelope, and Safety Certificate training for the appropriate operating position. Copy on QA Server.

3/9/15: Concurrence for closure received from Mike Williams.

3/20/15: Closed with concurrence of John Delooper

### 2.5 CA: (Subject: Procedures) Initiate revision to our governing documents to provided "sustainability"

**Status:** Closed - Completed (4/2/2015)

**Assigned To:** Engineering & Infrastructure Office of Project Management Stevenson T

**Description:**

To ensure that adequate detail is provided to allow less knowledgeable people to understand as well as allowing the procedures to serve as better training documents, procedure qa (are they being used correctly) and identify where maintenance requirement are necessary as a prerequisite to follow-up on activities (e. g., PTP's, OP-NSTX-01, etc.) This is a post CD-4 recommendation. this will require revision to ENG-030 Technical Procedures to include sustainability information. These changes would include in COG/RLM Training.

**Comments:**

3/31/15: Tim Stevenson's email on 3/31; Status: Rev 4 of ENG-030 Tech Procedures have been completed and posted.

4/2/15: Closed with concurrence of J. Delooper; ENG-030 with a date of 3/13/15 is posted on the web and addresses these issues.

4/2/15: Closed with concurrence of M. Williams.

### 2.6 CA: Obtain agreement with the local DOE office regarding Laboratory implementation of DOE422.1

**Status:** In Progress **Due Date:** 9/30/2015

**Assigned To:** Best Practices & Outreach Best Practices Morrison A

**Description:**

Obtain agreement with Local DOE office regarding Laboratory implementation of DOE422.1 and , if required, revise our governing documents for Conduct of Operations accordingly. This is a post CD-4 recommendation.

**Comments:**

12/16/14: T. Stevenson email; Andy Morrison has agreed to perform a gap analysis on the ConOps matrix on O422.1 and our own ENG-055, OP-AD-39, and our lab and project procedures and supporting documents at the laboratory. The matrix gap analysis, and remedial corrective actions if any are identified would have a preliminary completion of 6/30/15 and a forecast completion of corrective actions by 9/30/15. Concurrence by Mike Williams on 12/16/14.

### 2.7 CA: Revision to our governing documents to include a notification link to the ACC from the Work Planning form.

**Status:** Closed - Completed (6/18/2015)

**Assigned To:** Engineering & Infrastructure Office of Project Management Stevenson T

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### Description:

Would like to initiate revisions to our governing documents to include a notification link to the ACC from the Work Planning form (when appropriate) . This is a post CD-4 recommendations.

With regard to ACC notification in the Work planning online system, Chritra and I discussed a path forward per your suggestion. This ACC selection will provide a pull down menu for NEW and active ACCs. The selection will queue an Email notification to the Chair of the selected ACC. When the RLM approves the WP all Email notifications will be sent including ACC as with other Email notifications. This change is feasible but not minor as it will involve a new look up table and other changes to site admin in addition to the changes to the form, Email itself, and approval steps. Chitra estimates that this change can start after the Holiday break and will take approximately three months including testing and rollout by March 31,2015. The new details will be included in the next COG/RLM training package.

### Comments:

4/9/15: Charlie Gentile 4/9 email revising due date until 5/31/2015: Reason: This is a Post CD-4 recommendation which CD-4 has not occurred at this time.

4/9/15: Concurrence for extension received from Mike William's changing the due date to 6/30/15 which will give Tim enough time to complete. Copy on QA Server.

4/10/15: Due date revised with concurrence of John Delooper

5/8/15: Tim Stevenson's email on 5/8; Status: Everything noted above has been completed. The content will be included in the next COG/RLM training package which is in the development.

5/21/15: Close with concurrence of Mike Williams.

5/21/15: Close with concurrence of John Delooper.

## 2.8 CA: Develop an engineering test plan.

**Status:** Closed - Completed (8/26/2015)

**Assigned To:** Engineering & Infrastructure Mechanical Titus P

### Description:

Develop an engineering test plan to provide ongoing verification of the algorithms (in DCPS) that serve as the basis for machine protection ( and therefore validates the analyses that were performed). This is a post CD-4 recommendation.

### Comments:

3/30/15: Peter Titus email on 3/30; Status: Benchmark instrumentation PTP is being work on. It is not needed for CD-4 and thus is being put off by other priorities, however, as part of the task I have been encouraging installation connection, testing and calibration of FISO sensors and accelerometers. The in-vessel accelerometers are installed, outside accelerometers are being positioned near the passive plate mounting hardware. Signals from these have not been checked yet. I need thermal expansion data from the CTD OH test specimens to evaluate the preload LVDT- When Steve Jurczynsky is available he will do a simple alpha test. The PTP in place when we have results from currents in the coils and signals from the instrumentation's available.

3/30/15: Mike Williams email on 3/30; requesting extension until 6/30/15 which should give enough time to complete the alpha test.

3/31/15: Due date revised with concurrence of John Delooper.

7/16/15: At the monthly AAI meeting, Tim Stevenson will follow-up with Peter on submitting the documents QA needs to close out this action item.

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8/21/15: Peter Titus email on 8/21; Status: Engineering Test Plan " Test Procedure Benchmark Instrumentation Procedure" which completed this item.

8/26/15: Close with concurrence of John Delooper.

### 2.9 CA: Develop an implementing procedure that describes the Activity Certification Committee and its activities.

**Status:** In Progress      **Due Date:** 9/30/2015

**Assigned To:** Engineering & Infrastructure    Engrg & Infrs Dept Office    Gentile C

**Description:**

This should include the skills required for committee make-up, the utilization of outside experts(as appropriate) and identify any training requirements necessary to perform ACC duties. As this is a post-CD4 recommendation.

**Comments:**

7/16/15: At the monthly AAAI meeting, a discussion was made to extend the due on until 9/30/15 per Mike Williams and Adam Cohen.

### 2.10 CA: Review the Situation of multiple responsibilities and succession planning as it applies to NSTX-U operations

**Status:** Closed - Completed (8/3/2015)

**Assigned To:** Engineering & Infrastructure    Engrg & Infrs Dept Office    Williams M

**Description:**

Provide guidance, as appropriate, for future actions. As these are post-CD4 recommendations.

**Comments:**

7/8/15: Mike Williams email on 7/8; noting Al Von Halle and I have meet several times regarding this subject action. Al, as Head of NSTX-U Engineering Operations, is now maintaining a list of NSTX-U operating positions identifying the personnel, their qualification and gaps when they exist. In cases where there are gaps, personnel requisitions have or shortly will be generated to provide sustainable bench strength. Item completed.

7/31/15: John Delooper's email on 7/31; Status: Based on Al's email (copy on QA Server) 2.10 can be closed.

### 2.11 CA: Need to develop a database for tracking required Preventative Maintenance (PM) for NSTX-U

**Status:** In Progress      **Due Date:** 8/31/2015

**Assigned To:** Engineering & Infrastructure    Electrical    Camp R

**Description:**

Develop a subsystem by subsystem checklist, as part of the NSTX-U startup, that provides confirmation(signature from the ATI) that all applicable subsystem maintenance has been performed for this startup. This can be incorporated in OP-NSTX-02 or be a standalone document that becomes a prerequisite for OP-NSTX-02. This is a pre CD-4 recommendation. Develop a database for tracking required for PM(Preventative Maintenance) for NSTX-U, especially as it applies to the

**\*\*\*OVERDUE\*\*\***

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Safety Envelope. This is a post CD-4 recommendation.

### Comments:

12/16/14: T. Stevenson email with regard to Critical systems PM database, Ray Camp has agreed to take critical systems as will be identified in the SAD for the Safety Envelope, develop and document PM required, build a database for COEs similar to his AC Power database, and then own the PM per ENG-016 and OP-NSTX-02. Give input from the SAD by March 31, 2015 and completion of this item would be 6/30/15.

2/5/15: Mike Williams email on 2/5; Status: Requesting additional description to be added to the CA along with changing the due date.

3/12/15: Ray Camp's 3/12 email requesting extension until 4/30/15: Reason: The NSTX-U Operations not fully defined yet.

3/12/15: Mike Williams email on 3/12: The first part of recommendation 2.11 (Pre-CD-4) has already been completed by revision of OP-NSTX-02 per Al Von Halle. The second part (Post-CD-4), which is Ray's part can be deferred to 4/30.

3/12/15: Due date revised with concurrence of John Delooper.

7/9/15: Ray Camp's email 7/9; requesting extension until 8/31/15. Ray needs to develop a database for tracking preventive maintenance for NSTX-U, which applies to the Safety Envelope. Ray's plan is the following:

Total neutrons generated annually

Bakeout being operated within temperature limits

Total TC TMB inventory

TC Lithium at-risk inventory

Daily operation with OP-NSTX-014.

Ray propose to establish a matrix that describes the limitation, the name of the COG involved, the technical details of the method of surveillance and the periodicity of the surveillance, the implementing procedure and any other pertinent details.

7/9/15: Due date revised with concurrence of Mike Williams.

7/9/15: Due date revised with concurrence of John Delooper.

### 2.12 CA: Revision to our governing documents to include SAD impact in determining the WP risk category as well as in the body of the WP. Revise procedure ENG-032.

**Status:** Closed - Completed (4/2/2015)

**Assigned To:** Engineering & Infrastructure Office of Project Management Stevenson T

### Description:

Add SAD to the Work Planning and risk chart ENG-032. Also, to include the SAD Reference in ENG-033 Design Verification and ENG-030 Technical Procedures.

### Comments:

3/31/15: Tim Stevenson's email on 3/31; Status: TCRs were completed and posted for ENG-032 and ENG-033 to add SAD to the WP and risk chart also include SAD reference. ENG-030 Rev 4 to include the changes. Item can be closed.

4/2/15: Closed with concurrence of John Delooper; ENG-030 revised and TCRs added to ENG-032 AND ENG-033.

4/2/15: Closed with concurrence of Mike Williams.