

NSTX-U Weekly Report (April 14, 2017)

FY 2017 status: NSTX-U is in a maintenance and repair outage.

NSTX-U Recovery Project (R. Hawryluk)

The final Design Verification and Validation Review (DVVR), this one on Real Time Control and Protection, is being held on April 19th and 20th.

The PF1AU Coil Failure Root Cause Analysis team of Les Hill, Frank Malinowski, Irving Zatz, and experts from the firm of McCallum-Turner conducted interviews with members of the NSTX-U Project Team throughout the week.

Regarding test cell work, machining and fit-ups of the Poloidal-CHERS diagnostic in-vessel passive plates has been completed, and materials have been moved to the Vacuum Prep Lab to be prepped and baked before installation.

Two of the in-vessel neutral beam armor panels have been removed from the vessel for pressure testing, and the other two successfully completed vacuum leak checking in-situ. The first post-operations entry into Neutral Beam #1 for inspections indicated no problems with any of the beam impinged surfaces. An entry into NB #2 is planned for next week. Work continues in the Neutral Beam Clean Room on the assembly of a second spare ion source. Pre-op testing of the first spare ion source is nearing completion after successful electrical insulation testing this past week.

Recommissioning of the coil winding facility also continued with vacuum leak checking of the VPI vacuum mold and the PF1A mandrel at ambient and epoxy curing temperatures. A Management Safety Walkthrough of the coil winding facility was conducted on Friday afternoon.

Voith Hydro engineers will be on site next week to discuss plans for completing the D-Site MG lower guide bearing maintenance.

NSTX-U Research (J. Menard)

Four graphite tiles that were retrieved from NSTX-U after the last campaign. Cores samples have been obtained from these tiles under the supervision of PPPL Health Physics personnel. A total of forty-seven samples were removed in such a way that the plasma facing surface of the tiles were not contaminated by debris from the coring process. Twenty-two samples were provided to collaborators J.P. Allain and F. Bedoya from the University of Illinois at Urbana-Champaign for surface analysis. The remainder of the samples will be analyzed at PPPL and at the Imaging and Analysis Center (IAC) of the Princeton Institute for the Science and Technology of Materials (PRISM) housed in the Andlinger Center for Energy and Environment (ACEE) on campus.

Prof. W. Boeglin and grad student A. Netepenko from FIU visited PPPL during the week of Apr. 10 to assess the status of the NSTX-U Fusion Product diagnostic. W. Boeglin presented results from initial tests of the diagnostic on MAST and plans for the NSTX-U system at a NSTX-U EP-TSG meeting on 04/12. During the visit, plans have been discussed to use TRANSP modeling to

compute expected signal levels of the Fusion Product system for NSTX-U plasmas up to full-field, full-current scenarios. Short-term plans for re-deploying the system to MAST-U in FY-18 (during the NSTX-U outage) have also been discussed, including potential areas of collaboration for physics studies on fast ion redistribution by MHD instabilities and validation of fast ion transport models in TRANSP.

The paper “Unusual emission lines of carbon in the 170-190Å region on NSTX” has been published by J. K. Lepson, et al. in AIP Conference Proceedings 1811, 190008 (2017) [<http://dx.doi.org/10.1063/1.4975751>]. The abstract reads: “We measured the spectral emission of plasmas from the National Spherical Tokamak Experiment in the extreme ultraviolet region, typically dominated by M-shell iron lines. Although we found that most of the significant emission in the 170–270Å region emanates from iron, there are also some strong lines of carbon present. We show that the carbon lines are not produced by electron-impact excitation, and we speculate that they are formed instead by charge exchange.”