Weekly HIGHLIGHTS

PPPL PRINCETON PLASMA PHYSICS LABORATORY

U.S. DEPARTMENT OF ENERGY

The PPPL Highlights for the weeks ending December 28, 2019, and January 4, 2020, are as follows:

NSTX-U RECOVERY (J. GALAYDA) AND RESEARCH (S. KAYE)

Recovery (J. Galayda):

Coils — The vendor reported that the first PF1A mandrel is installed in the winding line. The PF1A line manufacturing readiness review (MRR) is complete and approval was given to begin winding. The winding procedure will begin with the application of insulation and G11 fillers. The PF1B mandrel is being checked for leaks and will be installed in winding line 2 when this is complete. The manufacturing readiness review for line #2 is scheduled for Jan. 7. The PF1C-1 #1 mandrel has been leak-checked. Fabrication of PF1C #2 has been completed in China.

NSTX-U Test Cell — Subcontractor Powers Electric continued installation of the test cell radiation monitoring system this reporting period. Final inspection of the test cell labyrinth roof shield block was completed as well, and shipment of the blocks to PPPL is expected next week.

Research (S. Kaye):

Nothing to report

U.S. ITER FABRICATION (H. NEILSON)

Integration of the Low Field Side Interferometer (LFSR) design with that of Equatorial Port 11 (EP11) was a major task for the Laboratory's ITER diagnostics team, extending over most of 2019 and involving an intense collaboration with the Russian Federation's (RF) Port Integration team. On Dec. 20, at the last meeting of the year between the LFSR and EP11 teams, agreements were reached on resolving the main outstanding in-port interference issues. The LFSR waveguide feeds are supported by clamps attached to the the enclosing diagnostic shield module (DSM) structure. The clamps must be strong enough to limit waveguide deflections during disruptions, but also flexible enough to accommodate thermal expansion under a combination of heat loads. The location, orientation, and attachment of support clamps is constrained by assembly considerations, the configuration of nearby LFSR components, the location of cooling channels in the DSM structure, and the ALARA-driven requirements to fill as much of the volume as possible with shield material. The LFSR team, including key contributions from partner General Atomics, presented solutions to four key outstanding interference

issues; the solutions were judged by the RF team to be compatible with their requirements and constraints.

ITER & TOKAMAKS (R. NAZIKIAN)

DIII-D (B. Grierson)

Operations:

A. Nagy was named a Distinguished Engineering Fellow at the annual State of the Lab Address in December. He was honored for "creative designs of plasma heating and fueling systems employed in fusion devices worldwide." The fellowship is part of PPPL's Distinguished Research and Engineering Fellow Program. Among numerous accomplishments, Nagy led a team of technicians and engineers at DIII-D to develop a steerable neutral beam as part of the DIII-D upgrade completed in 2018. The more-than-50-ton neutral beam system can be moved to various positions to allow researchers to vary the precise angle at which neutral beams can be injected into the plasma to control and heat the plasma to the super-hot temperatures necessary for fusion experiments. In addition, Nagy, along with A. Bortolon and D. Mauzey, expanded the capabilities of a powder dropper originally invented at PPPL for lithium injection to a device that can inject any other powdered materials into plasma during DIII-D experiments to improve performance. Now Nagy is developing a toroidal-field-reversing switch for DIII-D that will be able to reverse the direction of the toroidal magnetic field in one minute between plasma pulses.

COMMUNICATIONS & PUBLIC OUTREACH (A. ZWICKER)

Communications (L. Bernard):

The Office of Communications posted two press releases to the PPPL website. The first focused on research by R. Lunsford and others about injecting boron powder into fusion plasmas. The second was a collection of must-read PPPL news stories from 2019 "in case you missed it." Both stories were also posted to the *Newswise* and *EurekAlert* press release distribution services.

This report is also available on the following web site:

http://www.pppl.gov/publication-type/weekly-highlights