The PPPL Highlights for the week ending October 3, 2020, are as follows:

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

Recovery (J. Galayda):

Coils — Five production coils (PF1B#1, PF1C#1, PFC#2, PF1A#1, and PF1A#2) are at PPPL. Three coils passed low-power electrical tests on site, and the remaining three are currently completing testing. In France at Sigmaphi, PF1B#2 was shipped on Sept. 24 and is expected to arrive at PPPL early next week. In addition, PF1C-S (spare) has completed VPI and is curing. PF1A-S and PF1B-S have completed winding.

Center Stack Casing (CSC) — The CSC is in Camden, NJ, for the final seven weeks of finish machining. Additionally, welding of the organ pipes occurred at Turtle Creek, along with welding of the mockup bellows to the flange. The production bellows have completed post-machining vacuum testing and were being boxed for shipment to Turtle Creek for installation.

IVPS — Parts requiring leak testing were cleaned in the vacuum prep lab so that leak testing could be completed and installation could start.

Machine Core Structure (MCS) — Many fabrication activities continued at the three facilities currently making sling parts. Precision Boring in Michigan continued fabrication of the PF1A and PF1B capture and common flanges. The lower PF1C capping flange arrived at PPPL, and the Upper PF1C capping flange was packaged and awaited disposition of an NCRs prior to shipping in the next few days. In South Carolina, Carolina Fabricators’ production of PF1A sling parts continued, with shipment of the lower parts expected on Oct. 1. Also, G. J. Oliver added components to the machined PF1C supports and will ship the supports out for coating in the near term. Delivery of the lower PF1C support is scheduled for early October. Additional procurement activities to award contracts for the remaining MCS components neared completion. The on-site mockup activities continued and will wrap up in the next two weeks, with the output to be incorporated into assembly procedures. PF1B lower slings were welded together, with PF1A lower slings to follow.

Field Scope VVHW Vessel Support Column Notch Cut Peer Review — A peer review (PR) was held Oct. 1 to review the detailed inspection results on the clearance of the vessel support column and the TF outer legs, deviation from the FDR design decisions, and relevant structural clearance in addressing chits related to ex-VV components. It was found during a walkthrough of the field scope procedure review that only one of two
existing welded vessel columns initially planned to be notched needs to be cut to meet clearance requirements for the protection of the TF outer legs.

ITER PROJECTS (H. NEILSON)

Low Field Side Reflectometer — LFSR (A. Zolfaghari, S. Shirey):

The Laboratory has approved a program of manufacturing development proposed by LFSR partner General Atomics (GA) and GA’s machining partner Martinez and Turek. Under this program, the GA team will develop critical manufacturing, inspection, and assembly processes that will be used in the manufacture of the LFSR in-vessel antenna assembly. Special attention will be paid to the accurate drilling of long channels that will carry cooling water through the plasma-facing structures and to the sealing of those channels with welded plugs. Inspection procedures that can verify the accuracy and long-term integrity of these features must be tested to ensure that the project will be able to conclusively demonstrate compliance of the antenna assembly with specified requirements.

A re-examination of stray steady-state ECH power reaching the LFSR antenna openings has led to a realization of significantly increased margins in the thermal and structural integrity of the LFSR in-port systems. High-power incident microwaves can propagate back along the waveguides and cause heating and thermal stresses of the waveguides and their supporting structures that must be managed. The reduced power loads ameliorates those issues and provides margin that can be used to improve the manufacturing feasibility of the design.

Toroidal Interferometer Polarimeter — TIP (M.-A. De Looz):

Neutronics calculation data for Equatorial Port 12 (EP12) was provided by the Central Team for PPPL’s use in designing components and structures inside Equatorial Port 9 (EP09). The calculated neutron and gamma power deposition from these calculations is used as input to the heating and the induced thermal expansions of the EP09 structures and tenant systems including TIP. The TIP team began a preliminary evaluation of structure thermal deflections to help guide mirror design and mirror mounting. The initial study shows that for several mirror locations, angular deflections are less than a fraction of a milliradian, and within tolerances for the TIP active beam alignment system. Though further study is needed, this is a promising result in the initial redesign of mirrors and mirror mountings to the port plug structural elements.
Diagnostic Residual Gas Analyzer — DRGA (C. Klepper, ORNL):

The DRGA team continues to make progress toward closure of a final design review held in 2015 prior to a prolonged work suspension. The team is responding to several chits that remain open, making plans to complete key structural calculations, and completing documentation including one, a Periodic Test and Inspection Plan for DRGA, that was submitted to the Project Office after reviews by the Diagnostics team.

Motional Stark Effect — MSE (A. Cohen):

The MSE team reviewed updated space reservations for components in Equatorial Port 3 (EP03). Possible solutions to resolve clashes with a neighboring diagnostic tenant were identified. Thermal analysis of front-end mirrors has clarified the importance of accurate modeling of the mirror geometry and appropriate representation of the resulting thermal deformations in order to assess the impact on optical performance. An improved fit to the biconic geometry is being developed. Recent thermal analysis data from EP12 shows a lower ambient temperature in the mirror region. The new geometry and new boundary conditions will be incorporated into the next set of mirror thermal analyses.

COMMUNICATIONS & PUBLIC OUTREACH (A. ZWICKER)

Communications (L. Bernard):

The Office of Communications posted one press release to the PPPL website. It reported that H. Park, a renowned Korean physicist who developed a key diagnostic system for fusion plasmas while a principal researcher at PPPL, has won the prestigious 2020 Subramanyan Chandrasekhar Prize for Plasma Physics. The award from the Division of Plasma Physics of the Association of Asia Pacific Physical Societies (AAPS-DPP) honors Park for unprecedented new physics results through his original and pioneering works in fusion plasma diagnostics, which has produced an essential diagnostic tool for tokamak fusion facilities throughout the world.

A. Zwicker participated remotely in the Council for Fusion Communications monthly meeting on Sept. 30.

DIRECTOR’S OFFICE (S. COWLEY)

S. Cowley participated virtually in the Academic and Administrative Managers Group (AAMG) meeting, which is hosted by Princeton University’s Office of the Executive Vice President, on Sept. 29.
J. Menard and D. Graves participated in the Quantum XLab-Global Communications, Transportation, and Navigation webinar on Sept. 30.

M. Zarnstorff participated in a webinar titled, “Eurofusion: Alternative Divertors.”

S. Cowley participated virtually in the National Laboratory Director’s Council meeting (NLDC) on Oct. 2.

J. Menard participated virtually in the National Virtual Biotechnology Laboratory (NVBL) Working Group call on Oct. 2.

This report is also available on the following web site:

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