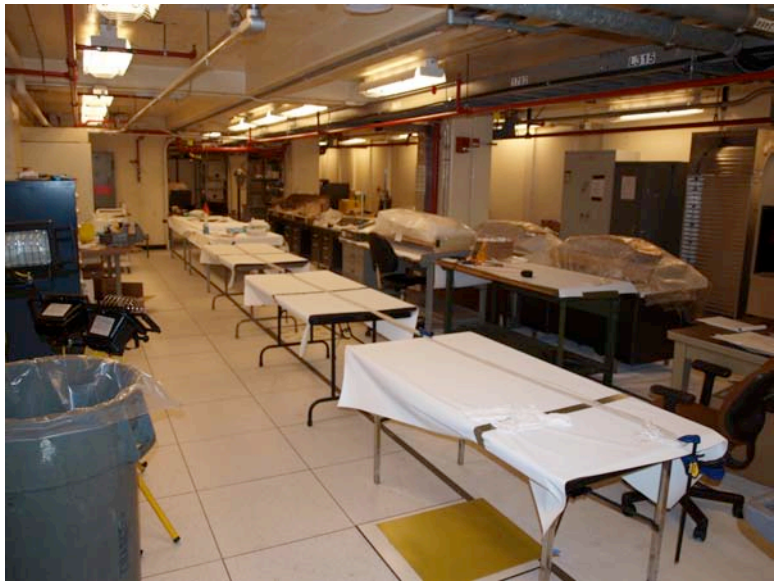
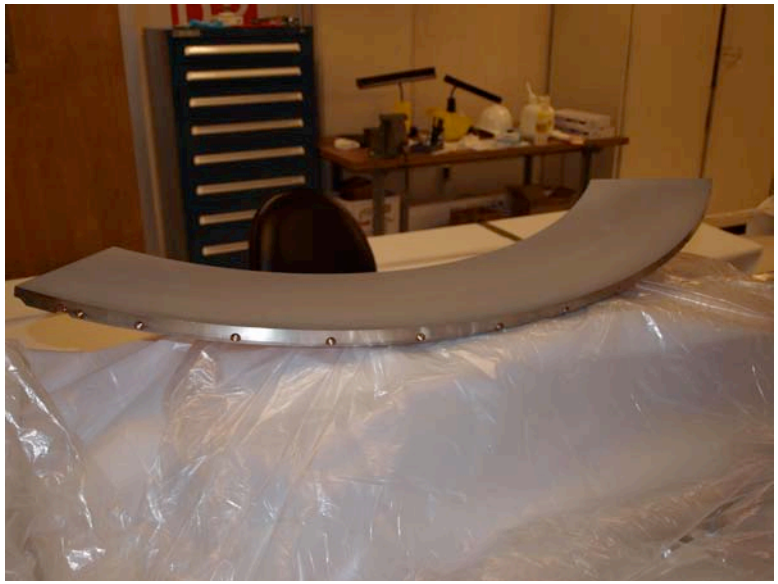
Research Operations Division
Boundary Physics *(H. Kugel)*

- LLD system being prepared for installation this outage
  - Received 6 plates fabricated by SNL and coated with Mo by PPI
    - Best four chosen for installation
  - Set up assembly area in U-DARM for installing heaters, thermocouples, cooling lines, mounting hardware and cabling





Research Operations Division
Boundary Physics *[2]*

- Received rack with LLD control equipment from SNL
  - Completing wiring and implementing control scheme at PPPL
- Tested LLD heaters and control schemes in L-245 lab.
- Software development for controls now underway
- Diagnostics for LLD are being purchased and/or fabricated

- Dual LITERs used extensively throughout the run
  - Loaded 7 times
  - Evaporated total of >600g nominally, ~300g onto PFCs during run
  - After run, emptied LITER-K (at -50g) but some lithium remained in LITER-F (at -40g)
    - Plan to autopsy both units to investigate cause of discrepancy
  - New LITERs are being prepared for (re)filling the LLD next year
    - Purchasing 2 new bellows motion drives to allow quicker turnaround

Research Operations Division
Boundary Physics *[3]*

- Used lithium powder droppers (Bays C & I) on 4 run days, 42 shots
  - Bay-C dropper “leaked” its load into its vacuum chamber before main experiment started
  - Also dropped tungsten dust from a specialized mini-dropper at Bay I
- New **Surface Sample Probe** (Purdue U.) at Bay-J produced data
  - Analyzed deposition with in-situ TDS
  - Also used a “dust-bin” head to investigate launching of accumulated dust into plasma (ITER).

Research Operations Division
Diagnostics *(R. Kaita, B. Stratton)*

- Most diagnostics performed very well in support of experiments
- New capability: time-resolved X-ray spectra: XEUS, LOWEUS (LLNL)
  - Contribute to understanding impurity behavior during lithium operation
- Problems encountered with high-k scattering diagnostic
  - Data obtained for Darrow and Tritz XPs in “interferometric” mode
  - Noise problem related to carcinotron solved near end of run
    - Immediate solution: maintenance on schedule for aging carcinotron
    - Goal for this opening: determine feasibility of replacement with solid state source – tests underway
  - Full remote mirror control deferred to next run
- Post-run calibrations will continue up to 9/25, if necessary
  - MPTS calibrations (full Rayleigh/Raman) already performed
  - CHERS calibrations may be deferred by lithium restrictions

Research Operations Division
Diagnostics *[2]*

- BES (collaboration with Univ. Wisconsin)
  - In-vessel fitups of collection lens assemblies (lab tested) underway
  - Procuring fiber optic bundles, designing fiber aperture plates
  - UWisc designing, fabricating detector boxes: 2 by year's end
- MSE-LIF (collaboration with Nova Photonics)
  - Design for DNB, chamber, flight tube nearly complete; lab. tests u'way
  - Plan to modify Bay G port for viewing optics and shutter
  - Bay G bolometer modification underway to avoid interference
- MPTS:
  - Realign 3 (or more) existing polychromators during 2009 shutdown
  - Planning to install 12 new channels during 2010 shutdown
    - Primarily in pedestal region

Research Operations Division
RF systems *(J. Hosea)*

- Completed HHFW upgrade to provide antisymmetric end feed in June
- Began HHFW experiments on July 6, ran on 8 days: ~240 shots
  - XP-944 (L-mode), XP-946 (H-mode), XP-941 "L-H Threshold: D vs He"
- Conditioned in vacuum and with plasma to remove lithium on antenna
  - Expect this to be needed for next campaign too
- Coupled up to 4 MW and 1 MJ and produced L-H transitions in He
  - Did not increase end-to-end voltage limit substantially
  - Current limit on the straps may be limiting power
- T_e up to ~5.6 keV, maintained through the RF pulse
- Maintained coupling through L-H transition, large repetitive ELMs in relatively high density NB-heated D plasma
  - P_{HHFW} ~ 2.5 MW at antenna phases of -90° and -150°

Research Operations Division
Physics Operations *(D. Mueller)*

- Banner-year after slow start due to remnants of last year's lithium
  - Shot rate improved with elimination of HeGDC through LITER use
- Control system operated well with little down-time
  - Demonstrated NB control from PCS
    - Both pre-programmed NB power waveforms and
    - Real-time feedback to control β_N
    - Achieved reproducible $\kappa \sim 2.7$, $\beta_N \sim 5$, ~1.3s pulse scenario
    - PCS-EPICS interface for restoring and editing NBI waveforms
  - Implemented real-time feedback control on strike-points and X-point
    - Developed discharge scenarios for LLD experiments
    - Changed basis functions used by rt-EFIT to provide better boundary and β calculations

Research Operations Division
Physics Operations *(cont.)*

- Implemented new capabilites for CHI experiments
  - Used CHI rectifier for long discharges to condition electrodes
  - Powered upper absorber nulling coils for suppressing absorber arcs
  - Demonstrated inductive flux saving equivalent to 0.2MA with CHI
- Successfully operated with reversed TF
  - H-mode access was easier in USN than LSN discharges
  - In general USN performed better with less MHD than LSN discharges
  - EFC coils used to correct error fields and prevent mode locking
    - Optimal n=3 correction (of error field from PF5) was unchanged
    - Optimal n=1 correction phase shifted by ~50°, likely due to changes in the field helicity