NSTX Weekly Report (June 1, 2007)

FY 2007 NSTX plasma operations started on Feb. 19, 2007.
Planned: 10 weeks
Completed: 9.18 weeks with 1,297 plasma discharges (through May 30, 2007)

M. Peng (ORNL) and C. Neumeyer attended two meetings at Culham, UK, during the week of 21 May. The first was a working meeting about the Component Test Facility (CTF) concept, where requirements and implementation options were discussed. The second was a meeting concerning the role of Spherical Tokamaks (STs) in the context of the EU fusion program, where the past, present, and future of STs was discussed. Presentations from the meetings will be posted soon on a web site to be announced. (C. Neumeyer)

There will be an NSTX Physics Meeting on Monday, 6/4 at 1:30 pm in LSB252 (NOTE CHANGE OF LOCATION). We will have summaries of XPs run last week, and a presentation on analysis and results from XP-707 " NPA Vertical Scanning Measurement of Energetic Ion Redistribution or Loss in NSTX" by Sid Medley. (S. Kaye)

Physics Analysis (S. Kaye)

10 hybrid-like discharges run in the 2006 experimental campaign were submitted to the ITPA international H-mode database. This brings the total number of hybrid-like NSTX discharges in that database to 14. These, along with hybrid discharges from other devices, will form the basis for a confinement scaling study to be presented at the upcoming IAEA H-mode workshop in Tsukuba, Japan at the end of September. (S. Kaye)

Run Coordination (D. Gates, M. Bell)

On Thursday May 24th XP-730 entitled “ELMs vs. Resonant magnetic perturbations” was run. T. Evans from General Atomics was the seesion leader for this experiment which investigated the effect of the application of n-3 resonant magnetic perturbations on edge localized modes. When n=3 fields were applied to a plasma with large Type I ELMs, the ELMs were observed to persist.

In the morning of Friday May 25th XP-713 entitled “Beta-scaling of confinement of weakly shaped plasmas was run. A neutral beam power scan was completed in a plasma with elongation ~2 and low triangularity.

In the afternoon of the 25th, XP-738 entitled “Injection and dispersion of Li powder in the NSTX discharges” was run. The pellet injector was used to launch sabots filled with lithium powder into NSTX discharges. The effect of the powder on the subsequent discharges was significant, increasing electron temperature and decreasing the electron density. The increase in impurity accumulation that has often been associated with the ELM-free H-mode was not observed.

On Tuesday May 29th XP-701 entitled “Assessment of intrinsic error fields after TF centering” was run. n=1 and n=3 error fields were applied in varying phases to assess the status of intrinsic error fields.

On Wednesday May 30th XP-702 entitled “Optimization of RFA and RWM detection algorithms” was run. The RWM feedback algorithm was optimized with systematic scans of the feedback parameters in plasmas with beta above the no-wall limit.

Engineering Operations (A. von Halle, C. Neumeyer)

NSTX Operations continued this past week using the lithium pellet injector to inject Li powder in an experiment to compare improvements in plasma confinement with the use of lithium evaporation. All three neutral beam ion sources were used in an experiment on the beta scaling of confinement in ITER shaped plasmas, and on another in an assessment of the machine's error fields after TF centering. This was followed by an experiment on the optimization of Resonant Field Amplification (RFA) and Resistive Wall Mode (RWM) detection and suppression by amplifying the error fields and then attempting to correct through feedback control. Neutral beam power levels were varied to support another experiment to characterize the evolution of NBI driven plasma current. Also this week, time was used in the evenings to inspect the lithium evaporator (LITER) to verify its readiness for further experimental operations, and to commission a third electrode on the Biased Electrode and Probe (BEaP) system.

The NSTX test cell will be in restricted access during plasma operations this coming week, with plans to extend the run day to from 5PM to 7PM on Tuesday and Thursday. Access to the test cell will be available from the end of the run day to 10PM each evening.

Research Operations (M. Bell)

Boundary Physics Operations (H. Kugel)

• The Lithium Pellet Injector was used to support XP-738 on the Injection and Dispersion of Li Powder in NSTX Discharges. (T. Czeizinger, D. Mansfield)

• Visual inspection and photographic documentation of LITER-1d found it to be normal.

• The following LLD Design talks were given:
"Review of the Results from the NSTX Edge Physics - ETG Meeting on Adoption of the LLD Radius and Width", H. Kugel
"Operational and Design Space of LLD for Li /Mo Capillary Porus System (CPS) and Li /SS/Cu Plate", L. Zakharov