The PPPL Highlights for the week ending April 13, 2012, are as follows:

U.S. ITER FABRICATION (D. JOHNSON):

R. Feder participated as an Expert Panel Member in the Conceptual Design Review of the generic Interspace Support Structure (ISS) and the Port Cell Support Structure (PCSS). These modular structures support diagnostic components outboard of the ITER diagnostic port plugs. Examples of these components include waveguides, optical relay systems, vacuum extensions, stray field and radiation shielding, power supplies, detectors, and various cables and actuators. A quick-disconnect, modular approach is used to facilitate the de-installation of the ISS and PCSS, allowing access for the ITER remote handling cask to remove a port plug in need of repair.

NSTX (M. ONO):

NSTX-U is in the Upgrade Project outage in FY 2012.

The U.S. Transport Task Force (TTF) Workshop was held in Annapolis, Maryland from April 10-13, with 16 participants representing NSTX-U. Plenary talks were " Intrinsic Rotation Generation During L-H Transition in NSTX Ohmic Plasmas" by Jong-Kyu Park (PPPL) and "Evolution of the Pedestal Transport and Characterization of Edge Fluctuations During the ELM Cycle on NSTX" by Ahmed Diallo (PPPL). Oral talks were "Parametric Dependencies of Low-k Turbulence in NSTX H-mode Pedestals" by David Smith (U. Wisconsin), "Gas Puff Imaging Observations of ELM Precursors in NSTX" by Yancey Sechrest (U. Colorado), "Effects of Biased Electrodes in the Divertor Plate Region of NSTX" by Stewart Zweben (PPPL), "Fast Ion Energy Loss During TAE Avalanches in NSTX" by Eric Fredrickson (PPPL), "Stochastic Loss of Neutral Beam Ions During TAE Avalanches in NSTX" by Doug Darrow (PPPL), "Full Gyro-orbit Simulations of the Interaction Between Neutral Beam Ions and High Harmonic Fast Waves in NSTX" by Gerrit Kramer (PPPL). Posters were "Testing TGLF for Spherical Tokamaks" by Walter Guttenfelder (PPPL), "Study of Carbon and Lithium Neoclassical Transport in ELM-free H-mode Discharges in NSTX" by Filippo Scotti (PPPL), "Response of Electron Scale Turbulence and Thermal Transport to Continuous ExB shear Ramping-up" by Yang Ren (PPPL), "High Frequency Alfven Eigenmode Activity in the Presence of Low Frequency and Static Magnetic Perturbations on NSTX" by Alessandro Bortolon (UC Irvine), "Parametric Study of Chirping TAE Modes in NSTX" by Mario Podesta (PPPL), "The Steps by Which Lithium Wall Coatings Lead to ELM Suppression in NSTX" by Rajesh Maingi (ORNL), "Evolution of ELM-Free Pedestal Structure with Lithium Wall Coatings in NSTX" by Dennis Boyle (PPPL). Stan Kaye (PPPL) was the TTF Chair for this meeting.

Rob Goldston's paper, "Heuristic Drift-based Model of the Power Scrape-off Width in Low-Gas-Puff H-mode Tokamaks" was published in Nuclear Fusion. Since H-mode edge plasmas are reported to have neoclassical ion thermal conductivity, the possibility was investigated that the SOL density width is set by the competition between the magnetic (grad B and curv B) drifts and sonic parallel loss, at densities where the SOL remains attached to the divertor plate. If the temperature in the SOL is set by Spitzer electron thermal conduction, a closed-form heuristic result for the heat flux width results. This has been shown to be in remarkably good agreement with experiments on JET and ASDEX both in magnitude and scaling, and fits well to NSTX, DIII-D and C-Mod data. The paper in Nuclear Fusion 52 (2012) 013009 is available at iopscience.iop.org/0029-5515/52/1/013009.

NSTX Upgrade construction activities continued this week with the removal of all in-vessel upper passive plates for modifications needed for upgrade operating parameters, and the ongoing welding of additional support on the upper vacuum vessel ribs. The rib welding is now approximately 90% complete. The first of the new TF inner bundle conductor bars has arrived at PPPL, and three more are expected next week. A soldering station set up in the PPPL machine shop to solder the cooling tubes in to the TF conductors was successfully run through it's full range of temperatures this week, and shimming/alignments of the 24" long heating platform is in progress. Soldering of 6' long test pieces will be performed next week using final solder formulations and processes. Platforms have been constructed on the North side of the NSTX Test Cell, and installation of cryogenic lines for the second neutral beam is in progress. The refurbishment of the calorimeter for that beam-line, including the implementation of the new double bellows design, also continued. Also this week, the first phase of power testing of the prototype field coil power conversion rectifier firing generator was successfully completed, and included a full range of high current operation into a dummy load.

Access to the NSTX test cell will be available only through previous arrangement with the Upgrade Work Control Center.

ITER & TOKAMAKS (R. WILSON):

D-IIID (R. Nazikian):

The DIII-D Fast Wave team installed a pre-match (quarter wave section) in both the 0 and 180 degree antenna coaxial transmission feed lines. The quarter wave center conductors starting points were located at the first high voltage point on the transmitter side of the antenna, approximately 40" from the feedthroughs. It took approximately one month for the 180 degree antenna and two weeks for the 0 degree antenna conversions with assistance from Dave Miller (PPPL) joining the on-site team for the effort. Antenna vacuum conditioning has gone smoothly this past two weeks, with line voltages approximately 30% lower than the antenna voltages. Antenna voltages on the 0 degree antenna are up to 26 kV and 180 antenna at 27 kV.

Alcator C-Mod (R. Ellis):

MSE diagnostic - Bob Mumgard measured the effect of varying the photoelastic multiplier (PEM) retardance on the measured polarization angle for one of the ISC linear polarizers.

Similar measurements are planned for the other three PEMs. This will enable compensation to be applied, should there be any drift in PEM retardance during operations.

X-ray Crystal Spectrometer – Calibrations were performed using a Cesium source. These calibrations will enable the crystal spectrometers to compensate for the spectral shift due to plasma rotation during operations.

Bob Ellis visited C-MOD to work on the hot outer divertor. Analysis of the MIT current shunt design, using toroidal strips of Inconel, was discussed with MIT engineers. At the weekly PPPL_MIT conference call, the overall electromagnetic analysis of the divertor was discussed. Specifically, the behavior of a simplified test model, containing one coil and a portion of the vacuum vessel, was discussed, and its results compared to closed-form solutions.

EAST (J. R. Wilson):

Joel Hosea, Gary Taylor and Randy Wilson visted the EAST tokamak at ASIPP from April 4-10. During the visit they interacted with the ICRF and LH groups planning experiments and advising on methods to couple more power to the plasma. They also talked with the ECE and ECH groups about future plans including the design of the planned ECH launchers, and with the EAST management about future collaboration opportunities.

ADVANCED PROJECTS (H. NEILSON):

A Project Agreement between DOE and Germany's Max Planck Institute for Plasma Physics (IPP) was signed this week, establishing a Collaborative Program to Design, Fabricate, and Test a Trim Coil System for Wendelstein 7-X (W7-X). The Agreement notes that the U.S. Fusion Energy Sciences (FES) program has a strong interest in understanding the control of three-dimensional, diverted toroidal plasmas due to its relevance to future next-step fusion devices, and has initiated a collaborative program with IPP using the W7-X facility centered on this topic. The Trim Coils are of high importance for the W7-X research program and the U.S. fusion program, in particular, from the initial phase of operations. As part of this collaboration, the U.S., starting from requirements and conceptual design data provided by IPP, will complete the design, fabrication, and testing of the W7-X trim coil system, and delivery to the W7-X site. The IPP will install the equipment. The Agreement is an important milestone in the long-standing U.S.-Germany collaboration in fusion research.

On April 13, David Gates presented a colloquium at the MIT Plasma Science and Fusion Center entitled "On the Origins of Tokamak Density Limit Scalings". The talk discusses the idea that radiation driven magnetic islands determine the well known empirically determined Greenwald density limit. The material presented is based on a paper of the same title, which was recently accepted for publication in Physical Review Letters.

FUSION SIMULATION PROGRAM (W. TANG):

Bill Tang participated in the invitation-only International Exascale Software Project (IES) meeting in Kobe, Japan on April 11-13. He gave an invited presentation summarizing progress on the six projects -- including the MFE "NuFuSE" Project -- within the G8-sponsored international "Interdisciplinary Program on Application Software towards Exascale Computing for Global Scale Issues."

THEORY (A. BOOZER):

On April 5, Dr. Maxime Lesur gave a seminar on "Phase-Space Turbulence, and Nonlinear Instabilities Driven by Self-Organized Structures." A new theory was described in which the growth of coherent phase-space structures, called holes and clumps, can drive the wave by direct momentum exchange due to dissipation. Also discussed was numerical evidence of breakdown of the quasi-linear theory in the presence of structures, which showed that coalescing holes survive much longer than the classical quasilinear diffusion time and dominate the nonlinear evolution.

On April 6, Prof. Zhihong Lin gave a special theory seminar on "Gyrokinetic Particle Simulations of Kinetic-MHD processes." The presentation summarized the status of first-principle simulations of kinetic-MHD processes using the gyrokinetic particle code (GTC). Recent progress in the studies of nonlinear wave-particle interactions underlying the transport processes was also outlined, including: convective flux driven by the constraint of the longitudinal invariant in the trapped electron mode turbulence; nonlinear frequency oscillation of Alfven eigenmodes induced by phase space coherent structures; and scaling of energetic particle transport due to wave-particle decorrelation and orbit-averaging.

The paper "Magnetohydrodynamic Simulations of Edge Poloidal Flows" by L. Guazzotto and R. Betti was accepted for publication in Nuclear Fusion.

Allan Reiman wrote, and submitted to DOE, the Second Quarter Report on the FY 2012 FES Theory Milestone. The work in the second quarter focused on equilibrium calculations for two DIII-D shots by four codes: VMEC, IPEC, MARS and the linearized version of M3D-C1. Significant differences were seen between the nonlinear and linearized equilibrium solutions, and progress was made in developing an understanding of the sources of those differences. The participants in the second quarter research were N. Ferraro (GA), M. Lanctot (LLNL), E. Lazarus (ORNL), S. Lazerson (PPPL), J.K. Park (PPPL), A. Reiman (PPPL), and A. Turnbull (GA).

COMPUTATIONAL PLASMA PHYSICS GROUP (S. JARDIN):

The split-implicit algorithm in the3D nonlinear extended MHD code M3D-C1 involves three independent large sparse-matrix solves each time step for (1) the velocity matrix, (2) the pressure matrix, and (3) the magnetic field matrix. When the normalized ion skin depth, d_i, is non-zero (i.e. two-fluid MHD) the magnetic field matrix becomes non-normal (non-symmetric with complex eigenvalues) and the iterative solve becomes time-consuming and may not converge at

all for certain parameters. We have computed all the eigenvalues of the magnetic field matrix for some typical cases with non-zero d_i and found that while the same block-Jacobi preconditioner used in the velocity matrix solve reduces the spectral radius of a problem with over 3500 degrees-of-freedom (DOF) from over 10^8 to around 30, the matrix solve using GMRES will not converge for d_i larger than about 0.05. We have now introduced another preconditioner stage (based on the differential approximation form of the equations) that further reduces the spectral radius somewhat (about a factor of 2), but more importantly, introduces large symmetric terms into the matrix, making it less non-normal. With this new preconditioner, all cases of physical interest will now converge in an acceptable number of iterations.

At the request of the UKAEA MAST team, the `get_fbm' program (TRANSP post-processing software) has been extended to include an option to produce simulated 2-D distributions of neutron production rates over the plasma cross-section. These are now output in convenient NetCDF format on the irregular spatial grid used in the Monte Carlo NUBEAM package, with the cylindrical (R,Z) coordinates of the grid vertices being specified. This new capability was requested to help with the interpretation of data from the most recent experimental campaign in which a new neutron camera was installed.

ENGINEERING AND INFRASTRUCTURE (M. WILLIAMS):

NSTX Upgrade (R. Strykowsky, E. Perry, L. Dudek, T. Stevenson):

The first TF Bundle Conductor bar has been completed and delivered to PPPL on April 13. EWI has delivered three more to Major Tool for final machining. Bar #2 is in deburring process, #3 in machining and #4 is staged to begin as soon as the machining station opens up. Major Tool expects to ship bars 2, 3 and 4 next week for arrival at PPPL on Thursday. EWI expects to ship five more bars to Major Tool on April 19.

Soldering tests continue, the new power supply has been tested with the soldering hotplate and was easily able to reach the required temperature once the feed was increased to 300 amp service. The ventilation system installation has commenced and is expected to be completed by Wednesday next week.

The Outer TF structure components continue to arrive. The passive plate bushings are also being received in small batches, 800 pieces have been received to date.

All passive plates have been removed from the vessel for modification and replacement of mounting hardware.

Additional rib welding is 90% complete and should be fully completed in another week.

All of the upper TF clevis pads have been removed from the vessel and removal of the lower ones is in progress.

Cryogenic line work on the north wall of the NSTX Test Cell is underway. The north door has been taken out of service because of this work.

Electrical removals in support of removing TF10 and TF11 is underway.

The project is evaluating options for reducing M&S expenditures to meet an anticipated costing overrun of the NSTX program as a whole.

The project schedule is being analyzed to quantify and respond to near term welder shortages.

The next Lehman review is scheduled for May 2-3 with dry-runs planned for April 24.

NBI Upgrade: Management attended the IPT meeting this week. Consideration of welding needs is in progress. Preparation of the penetration procedure and procurement package led to an effort to relocate several penetrations to simplify work, avoid problems in containing drilling water and debris, and insure proper clearances to other equipment and platforms and labyrinth. Minor rework of some drawings will be required to accommodate changes. Effort was devoted to advanced planning of the summer schedule to mesh with the Construction schedule. Details were identified that still needed Construction Manager approval and inclusion in the General Arrangement drawings so a doublecheck of NBI items going into the NTC is in progress.

NBI Armor: The drawing and procurement package for armor tile machining is being developed. Rescheduling of future in vessel access needs associated with fit-up using the backing plates is in progress. Heating/cooling line manifold fabrications were delayed at the vendor due to problems with tooling but delivery is still expected in keeping with project plans and needs.

NBI Relocation: Fabrication of the BL lift fixture continues in the Tech Shop.

NBI Refurbishment: Calorimeter modifications continue in the TTC including water line welding and strut installation. Calorimeter parts modification for as-built conditions continues in the NBI shop.

NBI Services: Fabrication of Helium and Nitrogen cryogenics line continues in NBPC. A scaffold for LN manifold installation on the NTC North wall has been installed and inspected. Manifold installation has begun. Penetration locations and installation procedures are being developed. Water penetration locations are being reconsidered in light of possible impediments in the MER.

NBI Power: Penetration locations and installation procedures are being revised to take advantage of shield block locations and avoid problems associated with drilling.

NBI Controls: Fabrication of the Gradient Grid Resistive divider fiberglass frames and the resistor rods continues. Switchyard remote switch control modifications continued on N4ABC switchgear. Modifications on N4ABC Local Control Center wiring continues.

NBI Duct and TVPS: The Bay JK cap delivery is expected by the end of the month. Steady progress is reported by the vendor. Port extension fabrication is also in progress at the same vendor. The rectangular bellows end flange welding job continues in the Tech Shop. Two different Spool section work orders have gone to the shop for fabrication also. Duct Support drawings are in review and approval and will go to the shop this week. Circular bellows evaluation of possibilities continues.

Office of Project Management (T. Stevenson):

Testing of Phase V Work Planning online system changes continued this week in the development area and nears completion. Additional ideas were implemented for incorporation with this upgrade. Some troubleshooting and fixes were performed also. Rollout of the updated system to the production area will go into operation starting next week barring unforeseen difficulties with the transition. An announcement of changes and features will be made to COGs and RLMs.

The COG/RLM training package has been released and response is ongoing. This package is posted on the HR Training online web site. The Training Office is receiving and retaining the record of training. The Project Management web page was updated to include the new slides for the training package for reference. This action also addresses QA Audit finding 1103-1 for collaborations.

The Project Status Review Board meeting took place with 9 major jobs reporting progress and good performance with no major issues at this time. The PSRB Status Report was posted online.

The next Work Planning Review Board meeting has been scheduled for next week. Approximately 20 new WPs will be reviewed.

BUSINESS OPERATIONS (E. WINKLER):

Tony Bleach participated in a conference call with Scott Mironov, the Princeton University Director, Disbursement Services and other members of the Office of Finance and Treasury. The purpose of the call was to provide PPPL with an update on a change in Princeton University's payroll organization structure and that they intend to use the services of Ceridian Corporation for filing and paying payroll taxes.

The Procurement Division compiled the Laboratory's cumulative small business subcontracting plan results through March 31 (the first half of FY 2011). The results are: Overall Small Business, 72.93% (Goal 50.2%); Disadvantaged Business, 14.75% (Goal 5.5%); Women Owned, 8.33% (Goal 7.0%); HUBZone, 5.81% (Goal 3.5%); Service Disabled Veteran Owned, 2.36% (Goal 3.0%). Because the Laboratory is at slightly less than its target percentage in awards to service disabled veteran owned businesses, Procurement will be putting additional emphasis on sourcing in that category in the second half of the year.

The Procurement Division provided DOE-PSO with a list of all FY 2012 small business awards to date, together with recommendations and concerns regarding the possible assignment of PPPL small business subcontracts to DOE to assist the Department in achieving its prime contracting small business goals.

Marie Iseicz participated in a conference call led by DOE-HQ of the B&R Restructuring Working Group. It was reported that DOE does not plan to proceed with the FY2013 B&R restructuring for DOE funds as there is no longer a significant benefit to making the change. B&R restructuring will proceed for new orders of reimbursable work as this change is being

driven by OMB's requirement to report reimbursable work by mission. A final decision on the restructuring is expected to be issued by the DOE prior to the end of April.

Dawn Horner participated in a DOE training seminar on PCard approval processing settings and workflow processes.

Dawn Horner notified all PCard Holders and Approving Officials who did not attend the March 15 refresher training session that makeup training materials are now available at HR's training web site. Makeup training should be completed within 30 days of the notification.

Rod Templon participated in the monthly Procurement Evaluation and Reengineering Team (PERT) teleconference. The agenda included status reports on the logistics and planning for upcoming peer reviews at various DOE sites. Also, seven PERT process improvement subcommittee chairs reported the status of their initiatives.

ENVIRONMENT, SAFETY, HEALTH & SECURITY (J. LEVINE):

Office of Export Control

The second session of Export Controls General Awareness training was conducted on April 11. The March 21 and April 11 training sessions provided in-depth training on export control regulations and PPPL's policy/procedures to 57 people from PPPL and Princeton University's main campus.

Site Protection Division

Ambulance 166 responded to two mutual aid calls to Plainsboro.

The ORPS (Occurrence Reporting and Processing System) Quarterly Performance Analysis Report for CY 2012 First Quarter was submitted to DOE/PSO.

The Quarterly Report for PTENS (Princeton Telephone and E-Mail Notification System) was submitted to Business Operations.

The PPPL Parking and Traffic Regulations has been updated and posted to the Employee Services (internal) Home Page (http://www-local.pppl.gov/pdf/parking_traffic.pdf). The regulations were strengthened to improve safety for bicyclists.

The Access Control Request Form has been updated and posted to the Employee Services (internal) Home Page in the Forms & Manuals Section: http://www-local.pppl.gov/AccessControlRequestFormPDF.PDF). Complete this form to request unescorted access to specified restricted areas within the Laboratory. These areas are accessible by card reader only. The NBPC first Floor Machine Shop was added to the form.

ESOs Chris Pietsch and Paul Sobke attended EMS Refresher training on 4 consecutive evenings (April 12-16) at the Delran Emergency Squad headquarters.

ESO Ani Malool attended EMT Continuing Education at the Morris County EMS Training Academy on April 11.

ESO Jon Bain attended Fire Training on Live Fire Tactics at the Monmouth Fire Academy on April 13.

ESU Platoon C and SPD Administration participated in a training session to review the new "Princeton Tritium Observatory for Light, Early Universe, Massive Neutrino Yield" (PTOLEMY) experiment. Charlie Gentile provided an overview and walk-down of the area and the planned operations, showed where hazards may exist and discussed possible emergency procedures.

Safety Division

A management safety walkthrough of the LSB 2nd & 3rd floors west wing and penthouses was conducted on April 11. Safety conditions were found to be good to excellent in these areas.

INFORMATION TECHNOLOGY (S. BAUMGARTNER):

An instrumentation PC was configured and ordered to support Sullenberger's LDRD surface analysis research.

Software migration needed to retire an obsolete NSTX EPICS I/O controller was completed. Final test is immanent.

Testing of the software framework for NSTX-U Neutral Beam CAMAC replacement has begun.

Adam Kelley and Chitra Venkatraman participated in meetings and review sessions with TAKE Solutions on the PPPL SharePoint pilot project.

Business Computing is currently assisting key Great Plains users with end-user testing for the upgrade of SQL2000 to SQL2005.

Work Planning Phase V enhancements have been completed and will be available April 16.

The IDL maintenance contract was negotiated with Excelis, Inc. providing five years of ongoing support for IDL software. A 94% discount was negotiated on this software, a critical component for the NSTX project.

New servers have been delivered to augment the Dawson cluster, and are being installed this week.

OFFICE OF COMMUNICATIONS: (K. MACPHERSON):

Greg Czechowicz designed and produced posters for Communiversity. He also produced posters for the Lab's upcoming Earth Day event.

Chris Cane participated in a monthly conference call with digital media experts at DOE press headquarters in Washington, DC. He posted items to the external web site.

John Greenwald's story about the novel design of a reflectometer for ITER was posted on the PPPL home page. He notified communications officers at U.S. ITER, General Atomics, UCLA and ITER headquarters in Europe that the piece was available and online.

Kitta MacPherson assisted Washington Post science reporter Brian Vastag with an information request.

Elle Starkman responded to numerous media requests for photos of the ceremony between Princeton, PPPL, and the Max Planck Society. She also photographed winners of the Green Machine awards, Paul Henderson and the Greene cluster, and Truman Scholarship winner Paul Schmitt.

Patti Wieser organized the following tours:

On April 6, Bob Kaita provided a tour of the NCSX components and the NSTX Control Room to 20 high school students and their parents, and Andrew Zwicker gave a science presentation and hands-on demos to about eight younger students and their parents in the Auditorium and Science Education Laboratory.

On April 11, Charles Gentile took 18 Villanova physics students and professors on a tour of the NCSX components and the NSTX Control Room.

BEST PRACTICES & EXTERNAL AFFAIRS (J. DELOOPER):

The following PPPL Reports were posted to the web.

Applying Alpha-Channeling to Mirror Machines PPPL-4746
Authors: A.I. Zhmoginov and N.J. Fisch
Submitted to: Physics of Plasmas (March 2012)

Free MHD Shear Layers In The Presence Of Rotation And Magnetic Field PPPL-4747
Authors: E.J. Spence, A.H. Roach, E.M. Edlund, P. Sloboda and H. Ji
Submitted to: Physics of Plasmas (December 2011

Geometric Integration Of The Valsov-Maxwell System With A Variational Particle-in-cell Scheme PPPL-4748
Authors: J. Squire, H. Qin and W.M. Tang
Submitted to: Physical Review Letters (March 2012)

Experimental Evaluation of Multi-spacecraft Data Analysis Techniques in a Laboratory Plasma PPPL-4749
Authors: Jongsoo Yoo and Masaaki Yamada
Submitted to: Journal of Geophysical Research Space Physics (March 2012)

Layout And Results From The Initial Opeeration Of The High-resolution X-ray Imaging Crystal Spectrometer On The Large Helical Device PPPL-4750
Authors: N.A. Pablant, M. Bitter, L. Delgado-Apricio, M. Goto, K.W. Hill, S. Lazerson, S. Morita, A.L. Roquemore, D. Gates, D. Monticello, H. Neilson, A. Reiman, M. Reinke, J.E. Rice and H. Yamada
Submitted to: Review of Scientific Instruments (March 2012)

Feedback Control Of An Azimuthal Oscillation In The ExB Discharge of Hall Thrusters PPPL-4751
Authors: Martin E. Griswold, C.L. Ellison, Y. Raitses and N.J. Fisch
Submitted to: Physics of Plasmas (March 2012)

Delta f Monte Carlo Calculation Of Neoclassical Transport In Perturbed Tokamaks PPPL-4752
Authors: Kimin Kim, Jong-Kyu Park, Gerrit Kramer and Allen H. Boozer
Submitted to: Physics of Plasmas (April 2012)

DIRECTOR'S OFFICE (B. SOBEL):

On April 10, Adam Cohen attended the Integrated Management Meeting in Washington, DC.

On April 11, Dr. Mitchell D. Erickson, US Department of Homeland Security presented a colloquium entitled "Science and Technology at DHS: Resiliency of our Physical and Social Infrastructure".

On April 13, the quarterly meeting of the Laboratory Management Review was held.

This report is also available on the following web site:
http://www-local.pppl.gov/director/highlights/2012-highlights.htm