

THIS WEEK

THROUGH APRIL 28

**Trenton Rescue Mission
Clothing Drive**
[See page 7 for details.](#)

TUESDAY, APRIL 11

**Nature Walk at the
Plainsboro Preserve**
12 p.m.
Contact Virginia Finley, vfinley@pppl.gov, ext. 2746, for more information.

THURSDAY, APRIL 13

**Lecture: "Blind Spot: Hidden
Biases of Good People"**
4:30 p.m. ♦ McCosh Health Center,
Room 50
Keynote speaker: Mahzarin Banajl,
Harvard University

UPCOMING

APRIL 17-21

Earth Week at PPPL
[See page 7 for details.](#)

MONDAY, APRIL 17

**Due date for PPPL Children's
Drawing Contest**
[See page 8 for details.](#)

THURSDAY, APRIL 27

**Revealing War: A Conversation
About Art and Journalism in the
21st Century**
5 p.m. ♦ 101 McCormick Hall,
Princeton University

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Hidden Biases Lecture **7**

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A technician for all seasons receives Achievement Award

By Jeanne Jackson DeVoe

When Bruce Berlinger began work at PPPL in 1978, Jimmy Carter was president, Apple II computers went on sale for the first time and in July, PPPL's Princeton Large Torus Experiment set a world record for ion temperatures of 60 million degrees Centigrade.

But Berlinger wasn't aware of PPPL's history or mission when he first came to the Laboratory. He had often passed the site on his way to work and was curious about what PPPL did. One day, he drove into the campus off Sayre Drive and walked into the personnel office to ask. And while he was there, he left a resume that was not typical for a job applicant. Berlinger was then a truck dispatcher with a college degree in philosophy who had done a stint teaching mathematics at Saint Anthony High School in Hamilton.



Bruce Berlinger, far right, was one of six to receive an achievement award from Princeton University President Christopher L. Eisgruber, center.
(Photo courtesy of Princeton University)

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DVVRs nearing completion: Recovery Team wraps up 3 of 4 final reviews

By Jeanne Jackson DeVoe

PPPPL's NSTX-U Recovery Team has now completed 11 of 12 design verification and validation reviews (DVVRs) designed to identify major gaps in the design and construction of the National Spherical Torus Experiment-Upgrade.

The final DVVR on real time control and protection will be held March 19 to 20 and will be chaired by Stefan Gerhardt, deputy head of engineering for the NSTX-U Recovery Project.

What follows is a brief summary of the last three DVVRs.

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A close-up look at the ambitious Exascale Computing Project

By John Greenwald

The Exascale Computing Project (ECP), with PPPL among the first participants, aims to accelerate delivery of supercomputers equipped with some 50 times more capability than today's top machines by the early 2020s. The nationwide project will advance systems for commercial, academic and government endeavors, as well as for national laboratories. The goal: to maximize the benefits of high-performance computing for U.S. economic competitiveness, national security and scientific discovery.

Describing this ambitious project, launched in 2015 by former president Obama as part of the National Strategic Computing Initiative (NSCI), was ECP Director Paul Messina, a senior strategic adviser at the Argonne Leadership Computing Facility. He spoke March 30 at a colloquium hosted by Amitava Bhattacharjee, head of the PPPL Theory Department. Lead agencies for the NSCI are the U.S. Department of Energy, the U.S. Department of Defense and the National Science Foundation.

ECP seeks to transform all U.S. high-performance computing, Messina said. The project is commissioning new applications, system software, hardware technologies and architecture, and aims to train a next-generation workforce of computational scientists, engineers and computer scientists. Already created is a council of 18 large companies to advise about their research needs.

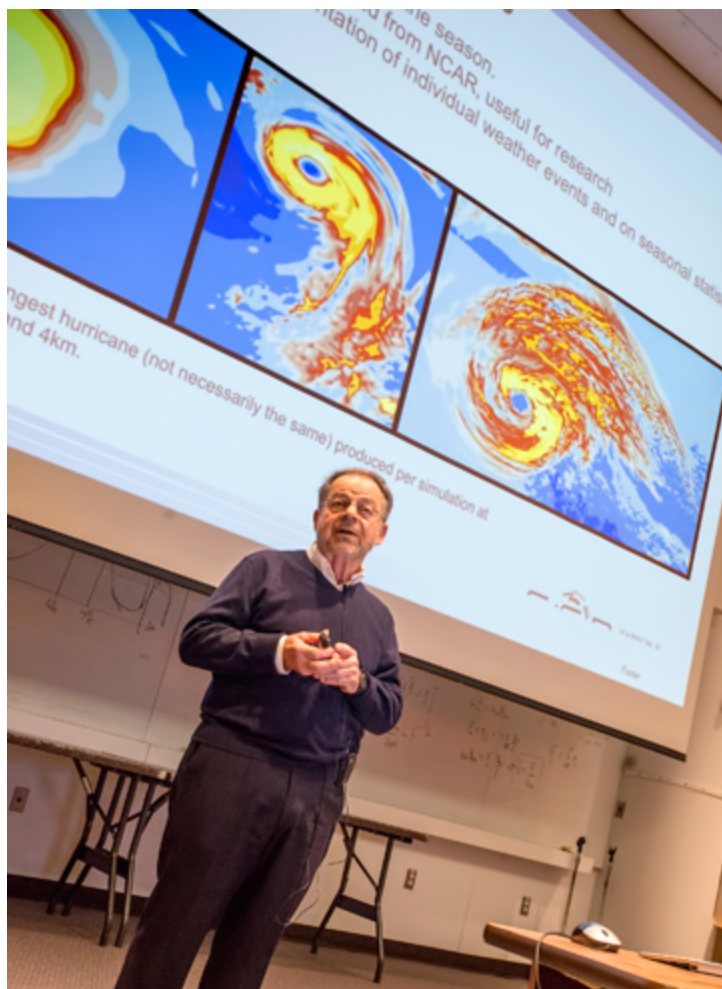
Exascale computers will perform a billion billion (10¹⁸) operations per second, compared with a thousand billion (10¹⁵) for the most powerful U.S. computers now in use. The first exascale computer is scheduled for delivery in 2021, with a second expected to be delivered in 2022 and deployed the following year. The DOE has not yet chosen sites for the systems.

A key motive for the project is U.S. competitiveness, Messina said. China has produced the world's most powerful supercomputer since 2013 and plans to deploy an exascale prototype in 2017. China's goals range from economic competitiveness and national security to exporting exascale systems and asserting national dominance. "It's important for us to be up there too," said Messina.



Paul Messina at the colloquium.
(Photo by Elle Starkman)

The U.S. exascale project will address the gamut of scientific challenges, ranging from nuclear stockpile stewardship to the hunt for dark matter to acceleration of cancer research. Applications will cover national, energy and economic security, together with scientific discovery, Earth system modeling and health care. "Computational scientists have an insatiable need for more powerful computers that are faster and able to handle more data," Messina said.



Paul Messina, director of the Exascale Computing Project, speaks at a March 30 colloquium.
(Photo by Elle Starkman)

When ECP selected the first developers of exascale applications, the project sought research centers that "want not only faster computers, but computers that can solve things 50 times better than can be done today." Among the first 15 fully funded developers was PPPL. Its four-year, multi-institutional effort seeks to combine simulations of core and edge plasmas to produce the first holistic view of an entire plasma — a task that requires exascale power.

Included in Messina's talk was a brief history of computational development, starting with Enrico Fermi's use of slide rule calculations in 1942 to eliminate fear of a runaway chain-reaction before the first nuclear chain-reaction at the University of Chicago's Stagg Field. Eleven years later Argonne National Laboratory commissioned its first digital computer, based on a prototype developed by John von Neumann at the Institute for Advanced study, which operated 100,000 times faster than a desktop calculator.

The greatest acceleration of processing speed in recent decades has come from parallel computing, which employs multiple cores to attack highly complex problems simultaneously. The results overshadow the benefits of Moore's Law, which holds that reductions in the size of transistors doubles the number that can fit on a chip every two years. However, the impact on computer speed has flattened out, since nanometer-sized transistors leak current and heat.

Parallel computation will need to be a thousand-times greater in exascale systems than in today's computers, said Messina, and memory and storage efficiencies must be consistent with the increased speed. Other technical challenges include reliability that enables adaptation and recovery from faults in exascale systems, and power usage that would not be prohibitively expensive in the new machines.

"Our goals are very ambitious," Messina said of the overall project. "We need the best minds to be able to accomplish them." 📌

Berlinger

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But it was no doubt Berlinger's lifetime passion and ability for all things mechanical that got him the job. As a youngster, he was the kind of kid who took apart engines and motors and he was already building and racing his own motorcycles. As a technician at PPPL, Berlinger worked on all of the Laboratory's flagship experiments, from the Princeton Large Torus to the National Spherical Torus Experiment-Upgrade (NSTX-U). Dozens of graduate students also appreciate him for his help with smaller experiments in the Graduate Student Laboratory. And he has worked closely with physicist Sam Cohen on his research on the Princeton field-reversed configuration (PFRC-2) device.

Berlinger's outstanding work was recognized on March 28 when Princeton University President Christopher L. Eisgruber bestowed the 2016 President's Achievement Award on Berlinger and five other University staff members at Princeton University's staff recognition luncheon. He is the fifth PPPL technician to win the award since it began in 1997. Previous award winners were Bob Cutler in 2013, Joe Winston in 2010, Dave Cylinder in 2004 and Jim Taylor in 1998.

"Bruce's astounding technical expertise is matched by his tremendous dedication to the mission of the Lab and his willingness to work with personnel at all levels — maintenance staff, facilities technicians, engineers, students, researchers and faculty — to move projects forward," Eisgruber said during the ceremony. "Creative and resilient, Bruce can be counted on to work around technical and financial challenges to craft elegant and cost-saving solutions."



Bruce Berlinger, seated in plaid shirt, was among those cheering at the TFTR first plasma early Christmas Eve morning in 1982, and from left: Phil La Rue, seated, Jim Sinnis, Dale Meade, Nelson Grace, unidentified, Sam Goldfarb, Harold Furth, Don Grove, and Robert Woolley.



Bruce Berlinger, second from left, with his supervisor, Tim Stevenson, far left, along with other honorees. To Berlinger's right is Andy Carpe, celebrating 25 years at PPPL/Princeton University; Art Wise, 45 years; Margaret Kevin-King, and Mike Kalish, both 25 years. (Photo by John Lacenere).



Jaclyn Wollett, of Princeton University's Human Resources, hand-delivers a letter informing Berlinger of the award, as Terry Brog, left, PPPL's interim director, and physicist Sam Cohen look on. (Photo by Elle Starkman)

Berlinger himself was appreciative but low key about the honor. "It's very nice," he said. "I have been very fortunate."

In his recommendation, Cohen, who has worked closely with the technician for two decades, noted that Berlinger became an Eagle Scout 45 years ago. "The character traits he displayed to receive this esteemed title — citizenship in community, the nation, and the world, communication, teamwork and emergency preparedness — have been evident through his time at PPPL," Cohen said.

"Bruce consistently and effectively brings his immense technical expertise to bear on multiple facets of the Laboratory's mission," said physicist Clayton Myers in his recommendation of Berlinger. "Talented technicians like Bruce Berlinger are the engines that drive innovation and productivity at an institution like PPPL."

Self-taught skills

Cohen noted that Berlinger's skills are all the more remarkable because he acquired them on his own. He taught himself computer-aided design, for example, and he has learned enough about plasma physics that he was first author on a paper and a contributing author to several more. Cohen said he often gives Berlinger his scientific papers to proofread.

Berlinger has worked the 7 p.m. to 7 a.m. shift four days a week for most of his career. He worked on the Princeton Large Torus from 1978 to 1982. He was the second technician, after Joe Winston, to switch from that machine to the Tokamak Fusion Test Reactor. It was a challenging job, he recalled. "During the early days there was so much going on and a lot of the job was being clever and figuring out how to make it work," he said. As a second shift lead technician, Berlinger was responsible for preparing the neutral beam system during four years of deuterium-tritium (DT) operations, said physicist Joel Hosea, who was then head of Tokamak Operations. "The entire TFTR campaign benefited from Bruce's outstanding and distinguished operations, technical, and conduct-of-operations skills and discipline," Hosea wrote in his recommendation.

The technician helped build the National Spherical Torus Experiment and worked on the first installation of the neutral beam system. When a second beam was added for the National Spherical Torus Experiment-Upgrade, he worked with cryogenics engineer Vic Garzotto to design and build the cryogenic pipes for the main neutral beam line. He worked on the cryogenic systems that cool the neutral beams for both NSTX and NSTX-U.

Since 1998, Berlinger has also worked with Cohen on the PFRC-2, which investigates the physics of small fusion reactors that potentially could be used for space travel. The technician often finished his shift at 7 a.m. and then came to

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Berlinger

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PFRC to work for a few hours before heading home, Cohen said. Berlinger has designed, fabricated and installed many components for the device, including the probe, vacuum vessel, and diagnostics. Cohen had applied for a \$2 million grant from the American Recovery and Reinvestment Act, but the project only received \$300,000. Not to be deterred, Berlinger built the components himself or had them built on site over four years and managed to keep the project within the budget, Cohen said.

An innovative idea

Berlinger was responsible for the idea of using a clear plastic called Lexan for the vacuum vessel of the PFRC-2, Cohen said. He took measurements over several weeks to test the material after the vacuum vessel was fabricated in PPPL's machine shop. Berlinger was the first author of an article on using the material.

Berlinger often does his own machining but he also knows whom to call on for certain tasks, Cohen said. "He knows how to make the best use of people's skills," Cohen said.

In addition to those responsibilities, Berlinger has worked for many years to repair, refurbish and adapt plasma experiments in the Graduate Student Laboratory. "He's been instrumental to every graduate student who enters this Lab," said graduate student Charles Swanson. "Most graduate students in other programs have to submit detailed plans to their graduate advisors if they want to change a device and then wait for someone who can construct the device," Swanson said. "With Bruce, you can say, 'How difficult would it be to put a mirror in the vacuum vessel to see the other side?' and the next time you come back, there's a mirror."



A poster of Berlinger at the Service Awards Luncheon. (Photo by John Lacenere)

Berlinger has also spent much of his free time outside work building things. For many years, he built his own motorcycles and raced them in races called "East Coast flat tracking." When the cost of that hobby got too high, he did road racing for many years. He lives in Allentown with his wife, Carol, a nurse. The couple has six grown children.

Berlinger said he still enjoys coming to work every day. "Over time I've been in a position that people trust me enough that I get to work on interesting stuff," Berlinger said. "There's still interesting research being done here and I'm lucky enough to get a chance to put my hand in." 📺

New training module on reporting sexual misconduct

[A new training module](#) for PPPL employees on what to do if you experience or witness sexual misconduct or other illegal activity has been posted on PPPL's Human Resources website, hr.pppl.gov.

The module advises PPPL staff members of available resources at PPPL and Princeton University for anyone who is the victim of sexual misconduct or who witnesses or learns of such conduct or other illegal activities. The module was developed by Michael Gonzalez, of PPPL's HR Department.

The video reminds PPPL staff to call PPPL's Emergency Services Unit immediately at ext. 3333 from PPPL phones or 609-243-3333 from non-campus phones if they are the victim of or witness a crime or other emergency. Princeton University policy states that all staff members have an obligation to report sexual misconduct to the University's Human Resources Department.

The University also has a confidential hotline at 866-478-9804 as well as several other confidential resources. Additional information is available at <http://sexualmisconduct.princeton.edu>.

DVVR

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Diagnostics DVVR is 11th of 12

Last week, responsible engineer Robert Ellis presented a DVVR on NSTX-U diagnostics, the numerous devices attached to the NSTX-U vacuum vessel that allow physicists to measure and analyze what is taking place during plasma experiments.

Some of the issues raised were related to the NSTX-U magnets and vacuum vessel. One issue, for example, focused on the use of Rogowski coils, an electrical device that measures currents or pulses. Some of the Rogowski coils were damaged when the center stack of the NSTX-U was installed and engineers said the coils should be evaluated to determine whether new ones are needed.

Another issue centered on the CAMAC computer system, which does not have enough memory to record 5-second plasma experiments. Previous DVVRs have noted that the system is very old and that spare parts are difficult to procure to keep the system running.

The diagnostics DVVR was chaired by Riccardo. External committee members were David Brower, UCLA, Réjean Bolvin, General Atomics; Dan Den Hartog, University of Wisconsin-Madison and Brian LaBombard, of MIT's Plasma Science and Fusion Center who attended remotely.



Robert Ellis, the responsible engineer for diagnostics, during a tour of the NSTX-U vacuum vessel on April 5. (Photo by Elle Starkman)

10th DVVR focuses on bakeout system

The DVVR on the bakeout system on March 30 identified issues with the bakeout system of the vacuum vessel that must be remedied to ensure the system operates safely. The bakeout inserts helium gas into the vacuum vessel in order to heat the tiles and other components to 350 degrees Centigrade to remove water from the tiles. At the same time, the exterior of the vacuum vessel is heated and cooled by a system of water tubes intended to keep the vessel at a temperature of 150 degrees Centigrade or less during bakeout.

"The bakeout has some issues that we have to address," said Richard Hawryluk, head of the NSTX-U Recovery Team. "It's a credit to the engineers who identified these issues. I view that as a positive."

Engineers found that the water system used to heat and cool the exterior of the vacuum vessel does not have the proper controls to regulate water pressure. The system was originally purchased for the original NSTX and it was designed for oil, not water. The system does not have the proper controls to regulate water pressure or to monitor water pressure remotely, the engineers found. This is a problem because water heated to high temperatures can cause steam to rapidly form in the pipes, potentially causing enough pressure to burst the pipes.



Touring NSTX-U during the Vacuum and Fueling DVVR are left to right, William Blanchard, the responsible engineer, Paul LaMarche, of Princeton University, and Mark Cropper, lead technician. (Photo by Raphael Rosen)


The review concluded that the system needs to be revised to conform to industry standards.

The bakeout DVVR was chaired by Valeria Riccardo, PPPL's head of engineering. The responsible engineer was Joseph Petrella. External committee members were Bill Beck, Jim Irby, and William Burke, of MIT's Plasma Science and Fusion Center, and Rob Bamber from CCFE, who attended remotely.

9th DVVR: vacuum systems and fueling

The 9th DVVR, on the vacuum systems and fueling, was presented March 23 to 24 by responsible engineer William Blanchard and focused on the pumping systems that maintain a vacuum in the NSTX-U, as well as the four systems that inject gas into the vacuum vessel to initiate a plasma.

Some of the issues raised were the need for a group of pumps to be replaced in the torus vacuum pumping system. Engineers also said the HVAC cooling water does not supply sufficient pressure for new pumps. Some engineers also raised the issue of having better alarms in case of oxygen deficiency and recommended increased training and safety drills.

The vacuum and fueling DVVR was chaired by Stefan Gerhardt, deputy director of engineering for the NSTX-U Recovery Project, external committee members were Matt Hansink, of General Atomics, Jim Irby and Rui Viera, of MIT's Plasma Science and Fusion Center; and Paul LaMarche, Princeton University, a former physicist at PPPL. 



The Bakeout DVVR Committee, left to right seated: William Burke, of MIT's Plasma Science and Fusion Center, PPPL engineer Mike Kalish, and Stefan Gerhardt, deputy head of engineering for the NSTX-U Recovery Project; first row: lead technician Mark Cropper, Jim Irby, MIT's Plasma Science and Fusion Center; Valeria Riccardo, head of PPPL engineering; Joseph Petrella, the responsible engineer for the bakeout system; Charles Neumeyer, head of engineering for the NSTX-U Recovery Project; back row, engineers Marc Sibilia, left, and Pete Titus. (Photo by Elle Starkman)

Employees honored for their service to PPPL at Recognition Luncheon

PPPL honored employees for their years of service at a Service Recognition Luncheon on April 6.

Art Wise, a power systems technician, was honored for 45 years of service.

Eight employees were recognized for 40 years of service: Mounir Awad, Dennis Mueller, Lena Scimeca, Stephen C. Jardin, Robert Clark, John Krommes, Nevell Greenough and Vincent Smith.

PPPLers with 35 years of service were: Michael Anderson, Paul Sichta, Robert Ellis and Anthony Bleach.

Thirty-year employees were: Stephen Tureikas, Art Brooks, Daren Stotler, Jim Hirsch and Greg Hammett.



Enjoying the presentation were, clockwise from left: Bill Bryan, 15 years; Jim Hirsch, 30 years; Lena Scimeca, 40 years; Marc Cohen, Stephane Ethier, 20 years; Ashwini Borkar, 10 years, Chitra Venkatraman, 10 years, and Kristen Ferraro, 10 years. (Photo by Elle Starkman)

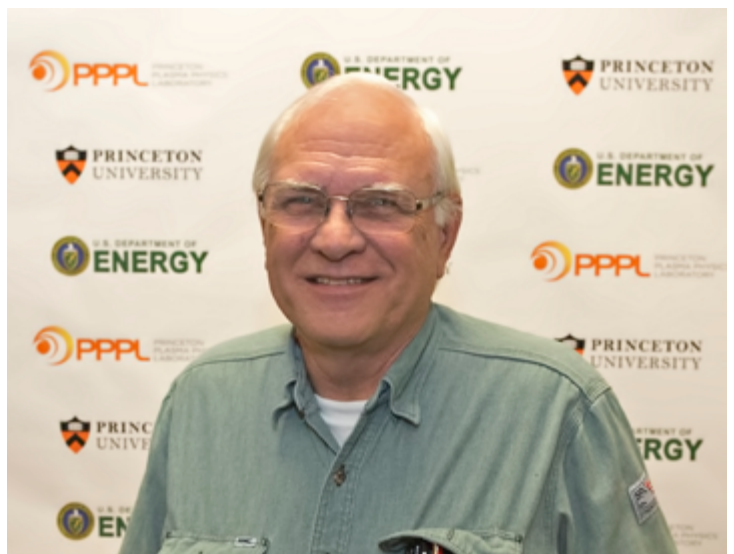
Employees with 25 years of service were: George Ascione, Andy Carpe, Frank Malinowski, Margaret Kevin-King, George Ochs and Michael Kalish.

Stephane Ethier was recognized for 20 years of service.

Recognized for 15 years of service were: Eliot Feibush, Erik Gilson, Hans Schneider, Chun Kung, Stephen J. DePasquale, Joshua Breslau, Weixing Wang, William Bryan, Charles Sands, Robert Tucker, Marianne Tyrrell, and Jan Trafalski.



Recognized for 40 years of service were, from left, Bob Clark, Nevell Greenough, Lena Scimeca and Mounir Awad. (Photo by Elle Starkman)



Art Wise was honored for 45 years of service. (Photo by Elle Starkman)

Ten years of service: Alba Castano, Paul Sobke, Michael Palmer, Jennifer Jones, Daniel Stevens, Ashwini Borkar, Kyron Jones, Glenn Anderson, Kristen Ferraro, Neil Gerrish, Chitra Sairam Venkatraman, and Michael Bernardo.

Five years: Ani Malool, Daniel Goresh, Peter Porazik, Donald Harrison, Akeem Robinson, Devon Battaglia, Myrna Arias, Yuhu Zhai, Rory Perkins, Nicola Bertelli, Choongseok Chang, and Xingqiu Yuan. 🎉

Safety Training Observation Program (STOP) class

Sessions will be held:

Wed., April 19 — 9:30-11:30 a.m., Mod 6 conference room

Fri., April 28 — 9:30-11:30 a.m., Mod 6 conference room

Tues., May 2 — 1:30-3:30 p.m., Mod 6 conference room

Please contact Dorothy Strauss, x3072, dstrauss@pppl.gov, to enroll.

Hidden Biases lecture at Princeton University

“Blind Spot: Hidden Biases of Good People”

Thursday, April 13 at 4:30 p.m. — McCosh Health Center, Room 50

Keynote speaker: Mahzarin Banajl, Harvard University

PPPL Celebrates Earth Month

April 4-28

Trenton Rescue Mission Clothing Drive

Drop off used or new donations at the Old Security Entrance. If you have any questions, please contact Margaret King, mking@pppl.gov, ext. 3568, or Dana Eckstein, deckstei@pppl.gov, ext. 2588.

April 5

Due date for Green Machine Award nominations

[See page 8 for details.](#)

April 11

Nature Walk at the Plainsboro Preserve

12 p.m.

[Sign up here.](#) Contact Virginia Finley, vfinley@pppl.gov, ext. 2746, for more information.

April 17

Due date for PPPL Children’s Drawing Contest

[See page 9 for details.](#)

April 18

PPPL Sitewide Campus Cleanup 10:30 a.m.

A pizza lunch will be served after the clean-up in Mod 6. [Sign up here.](#) The rain date is April 20.

April 19 — Earth Day Celebration

Unicor Home Electronics Collection

7:30 a.m. to 10 a.m.

Warehouse roll-up door
across from the ESU building

Contact Kyron Jones, kjones@pppl.gov, ext. 3326, for more information,

Vendor displays

11 a.m.

LSB Lobby

Includes Children’s Art show
and succulent office plant giveaways

Green Machine Awards

11:30 a.m.

MBG Auditorium

Snacks and raffle prizes.

Go to PPPL’s [Environmental Services Division Earth Week page](#) for up-to-date information.

May is National Bike Month

Join PPPL’s Bike Month Challenge. Teams are forming now. Go to <https://goo.gl/WfyTcU> to register, or contact Robert Sheneman, x3392, rshenema@pppl.gov, for more information.

PPPL Children's Art Poster Contest for Earth Day

The Green Team is sponsoring an art poster contest for PPPL staff members' children and grandchildren, from kindergarten through eighth grade, in honor of Earth Day.

Children can submit 11-by-17-inch art on white drawing paper in any medium by April 17. Winners will receive a special prize and their drawings will be displayed in the LSB lobby on April 19.

Please contact Virginia Finley, vfinley@pppl.gov, ext. 2746, for more information or to pick up paper.

BROCK

NICK PETTI
Chef Manager



BREAKFAST 7 a.m. • 10 a.m.
CONTINENTAL BREAKFAST 10 a.m. • 11:30 a.m.
LUNCH 11:30 a.m. • 1:30 p.m.
SNACK SERVICE until 2:30 p.m.

	Monday April 10	Tuesday April 11	Wednesday April 12	Thursday April 13	Friday April 14
COMMAND PERFORMANCE Chef's Feature	Baked Chicken Thighs with Roasted Potatoes and Carrots	Baked Manicotti with Garlic Bread	Caprese Chicken with Orzo Pilaf	GUEST CHEF MENU Chili-Rubbed Pork Chops with Grilled Pineapple Salsa, Caesar-Roasted Broccoli and Crispy Zucchini and Potato Pancake	Fish and Chips
Early Riser	Bacon, Egg and Cheese English Muffin	Mexican Breakfast Burrito	Potato, Roasted Pepper & Sundried Tomato Casserole with 2 Eggs any style	Cinnamon-Raisin Pancakes with Homemade Apple Compote	French Toast Sticks
Country Kettle	Manhattan Clam Chowder	Vegetable	Chicken Noodle	Tomato Soup	Chili Bean
Deli Special	Spring Chicken Salad Wrap	Asiago Roast Beef with Grilled Onion Tomato & Horseradish on Pumpernickel	Southwest Ham Ciabatta	Turkey Sloppy Joe	Liverwurst with Onion
Grill Special	Grilled Ham and 3 Cheeses on Challah Bread	Chipotle BBQ Pulled Pork Sandwich with Fries and Slaw	Cheese Calzone with Marinara Sauce	Burgerlicious Buffalo Turkey Burger	Teriyaki Chicken Cheesesteak
Panini	Eggplant Parmigiana Sandwich	Fried Fish Torpedo with Cheddar, Tomato & Tartar Sauce	Pastrami and Swiss on Marble Rye	Breaded Chicken Cutlet with Ham, Swiss Cheese, Lettuce & Honey Mustard on Ciabatta	Grilled Peanut Butter and Jelly

MENU SUBJECT TO CHANGE WITHOUT NOTICE

HEART HEALTHY

VEGETARIAN OPTION

WEEKLY Editor: **Jeanne Jackson DeVoe** ♦ Layout and graphic design: **Kyle Palmer** ♦ Photography: **Elle Starkman** ♦ Science Editor: **John Greenwald** ♦ Science Writer: **Raphael Rosen** ♦ Webmaster: **Chris Cane** ♦ Communications Director: **Larry Bernard**

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Comments: commteam@pppl.gov ♦ PPPL WEEKLY is archived on the web at: <http://w3.pppl.gov/communications/weekly/>.