

At PPPL THIS WEEK

FRIDAY, JULY 3

**Lab closed for
Independence Day holiday**

UPCOMING

WEDNESDAY, JULY 15

**Annual Theory and Simulations
of Disruptions in Tokamaks
Workshop**

FRIDAY, JULY 17

Open Public Tour
10 a.m.

Email tours@pppl.gov

Lab Management Review

JULY 22

**Suspect & Counterfeit Items
Awareness Training**

MBG Auditorium

**Introductory Class 8:30
to 11:30 a.m.**

Refresher Class 1 to 3 p.m.

Contact Frank Malinowski,
fmalinow@pppl.gov, ext. 2203

SUMMER SCHEDULE FOR PPPL WEEKLY

The PPPL Weekly will move to a bimonthly schedule during the summer. The next issue will be on July 13.

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A positive review of lithium safety at PPPL with some recommendations for improvement

By Jeanne Jackson DeVoe

A peer review team gave PPPL's lithium safety program high marks for its safety culture after a three-day review that concluded on June 18. The team also made several recommendations to tighten up certain areas to prepare for plans to expand the use of lithium in the National Spherical Torus Experiment-Upgrade (NSTX-U).

The review committee's view of the Lab's current safety practices was very positive, said Richard Majeski, who heads the Lithium Tokamak Experiment (LTX). "The committee emphasized that they thought our safety measures were completely adequate for what we're doing now and what we intend to do in the short term, so the biggest recommendation was to keep up the good work," Majeski said.

The review was part of a U.S. Department of Energy "notable outcome" for the Laboratory for fiscal year 2015. The Lab plans to scale up its use of lithium in a decade to test and possibly install a flowing, recirculating liquid lithium "wall" in the interior of the NSTX-U vacuum vessel. This "wall" might use 10 times the amount of lithium that the NSTX previously used and that the NSTX-U will use when it begins plasma operations.

The four-member team included Robin Izzo, director of Environmental Health & Safety at Princeton University; Thomas Lin, a senior research associate emeritus at Penn State University; Steven Pawel, a senior research staff member in the Corrosion Science & Technology Group at Oak Ridge National Laboratory, and Dennis Youchison, a distinguished member of the technical staff at Sandia National Laboratories. Three DOE representatives observed the review. The team studied numerous documents and toured the NSTX-U and LTX facilities. The group also heard presentations and interviewed several staff members. It presented preliminary observations and recommendations on June 18th, with a final report to come in mid-July.

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Quest magazine highlights NSTX-U and research throughout PPPL

By Jeanne Jackson DeVoe

The new issue of Quest, PPPL's annual research magazine, features the new Laboratory era that is about to begin with completion of the \$94 million National Spherical Torus Experiment Upgrade (NSTX-U). On the cover is a striking photo by PPPL photographer Elle Starkman of technicians Dan Stevens and Scott Gifford examining the new center stack of NSTX-U.

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Lithium safety review

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PPPL a world leader

PPPL is considered a world leader in the use of lithium in fusion experiments. In addition to research on the LTX, researchers at PPPL have also collaborated on lithium research on the EAST and HT-7 fusion experiments in China; on DIII-D at General Atomics in San Diego; on the ASDEX-U device in Germany, and on the Dutch Magnum PSI facility that is currently being upgraded.

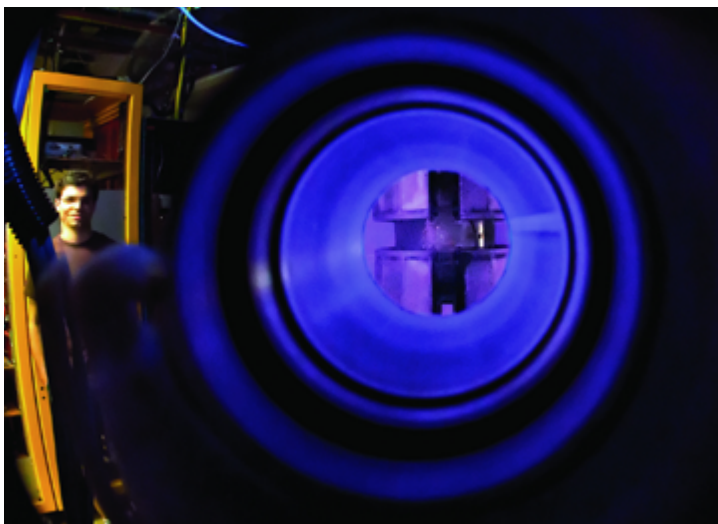
Lithium is a light, silvery metal perhaps best known for its use in batteries. Researchers have found that a thin layer of lithium between the plasma and the interior walls of the tokamak acts as a sponge that soaks up stray particles that can adversely affect fusion reactions. “Lithium can dramatically increase confinement in the plasma during fusion,” said Rajesh Maingi, manager of edge physics and plasma facing components, making the metal potentially very useful as a “wall” material in future fusion reactors.

Proposals to upgrade lithium experiments

PPPL’s vision for the lithium program calls for upgrading and expanding the Lab’s lithium experiments. This includes support laboratories to safely store, prepare and transfer lithium to the NSTX-U and other facilities, and an upgrade for LTX proposed from 2016 to 2018. Also included is one or two liquid metal test stands to develop the science and technology of flowing lithium for fusion facilities. PPPL researchers are discussing with DOE officials how best to achieve the science and technology goals, which require implementation of these new elements.

The NSTX used a lithium coating that was evaporated into the vacuum vessel via a “lithium oven.” Researchers will use a similar process to cover the plasma-facing “wall” with lithium in NSTX-U.

Both NSTX-U and LTX will use relatively small amounts of lithium. LTX uses just 45 grams a year, while NSTX-U will use a kilogram or less when it begins operating and will expand to two kilograms in the next few years, according to Majeski. “As you begin to move toward liquid lithium systems that are more relevant for us in a prototypical fusion reactor, you inevitably find the requirements for the quantity go up,” Majeski said. “For a reactor, you would need to move to flowing lithium systems.” Such systems would create a flowing sheet of liquid lithium resembling a decorative wall fountain that would recirculate and reuse the lithium, he said.



Graduate student Dennis Boyle at the Lithium Tokamak Experiment.



Members of the review team, clockwise from left: Steven Pawel, Oak Ridge National Laboratory; Thomas Lin, Penn State University; Robin Izzo, Princeton University; and Dennis Youchison, Sandia National Laboratories.

The system would be tested in a smaller test stand before being used in NSTX-U or other experiments, Maingi said.

A challenging substance

Lithium is a challenging substance to work with because it is highly reactive and flammable and can easily react with other substances, including water. In 2011, an accident occurred at Sandia in which a lithium leak that started inside an apparatus fractured its wall and came in contact with water in a cooling pipe attached to it. “This caused an explosion that seriously damaged the experiment,” said Jerry Levine, head of Environment, Safety & Health (ES&H). Nobody was hurt but Sandia shut down the experiment. The Sandia incident and a minor incident at PPPL the following year led PPPL to establish a Lithium Experts Committee, or LitEC. The mission of the LitEC is to provide the expertise needed to review present and proposed lithium activities, and recommend ways to improve the safe handling of lithium at PPPL.

Last week’s review found that the LitEC has appropriate expertise and the ability to seek out additional expertise if needed. “They seem to have confidence that we have the capability of planning ahead and also know whom to consult if we don’t have the particular expertise,” said Robert Kaita, who co-chairs the LitEC with Majeski.

The review recommended that the LitEC be expanded to include a hazardous-waste expert from the ES&H staff and that the group consider adding a metallurgist as the use of lithium increases in the future. The review also recommended that the committee formally set up periodic meetings with the ES&H Executive Board and have more “overlap in membership” between the two groups.

High marks for emphasis on safety

The team gave high marks to PPPL for its emphasis on safety, saying that its “safety culture penetrates through all levels of the research and support staff.” The team also praised the Laboratory’s “strong, open, knowledgeable staff who genuinely care.”

The team also singled out the Lab’s “thoughtful and effective processes for planning, safety review, implementation and continuous improvement.”

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I AM THE LAB

Subrahmanya Ramakrishnan

Long-time engineer considers working a hobby

When Subrahmanya (Raki) Ramakrishnan came to the Lab in 1976 as an engineer with Ebasco, which was then designing the Tokamak Test Fusion Reactor (TFTR), he already had an impressive resume. A native of India, he majored in electrical engineering as an undergraduate and received a master's degree in electrical engineering from the Indian Institute of Technology. He graduated first in his class in both. He worked as a power systems manager at Hindustan Steel Ltd. in India and at the English Electric Co. in the United Kingdom before coming to the United States. He later went on to get a master's in engineering management from the New Jersey Institute of Technology in 1996. He received a certificate in Fusion Reactor Technology from Princeton University in 1986 through a program that has since been discontinued. Ramakrishnan is a registered professional engineer in New Jersey.

In addition to working on the design of TFTR's power systems for Ebasco, Ramakrishnan worked on the Laguna Verde Nuclear Power Project in Mexico for four years and on the Saint Lucie Nuclear Power Station in Florida. In 1988, Ramakrishnan left Ebasco and joined PPPL. He designed the power systems for each of PPPL's major experiments, including the NSTX-U. He walks to work every day and is at his desk each day by 7:30 a.m.

"Raki is a very special individual," said Tim Stevenson, head of project management, who has worked with Ramakrishnan for decades. "He is the consummate electrical engineer and has always been a great colleague. His determination and attention to detail is legendary. After about four decades here working tirelessly on TFTR, NSTX, and NBI (neutral beam injectors), Raki's focus is still remarkable, his energy stays as high as ever, and his enthusiasm remains very strong."

Ramakrishnan and his wife of 43 years, Renuka, have two grown daughters: Rajini, an environmental engineer in New York, and Ramya, a physician specializing in nephrology, who lives in Brooklyn.

How has PPPL changed since you began working here?

When I first came to PPPL, it was a sort of university laboratory. But the way in which it has improved is in the areas of safety – industrial rules and regulations and compliance. That is a very good accomplishment for an academic institution that was not quite familiar with the industrial set-up.

What do you like to do in your spare time?

Working is a hobby for me. I enjoy working. But I do watch music shows at home – any type of popular



or classical music. I am a fan of PBS [the Public Broadcasting System]. I always watch their programs. I also like walking around my development and on weekends I sometimes go to New York City and walk around there.

Why do you like working at PPPL so much?

I enjoy working. There's no doubt about that. This Laboratory I consider to be another family.

Working is the greatest thing I enjoy. The intellectual landscape is so great. It's so rich and it's always a pleasure to discuss and exchange ideas—to learn more and to learn something new every day.

You have so much institutional knowledge. How can employees just starting out benefit from what you have learned?

What I am trying to do is to pass on this information to the next generation of people. I am trying to scan and put in the computer system certain important details, which will benefit new employees. That's what I'm trying to do.

What words of wisdom do you have for employees who are just starting here?

The wisdom should be to work hard, try to learn as much as you can, do things safely, and try to enroll yourself in courses to enhance your knowledge and acquire more qualifications.

What do you tell people about your work?

I say PPPL is engaged in research that will help mankind. When I explain to them that the mission for the Lab is to create a miniature sun on earth, they understand.

Do you have any plans to retire?

There's a plan but it's not ready to be executed. 🗨️

Quest highlights

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The 20-page full-color glossy, edited by Science Editor John Greenwald, will be polybagged and mailed to the 93,000 subscribers of the Princeton Alumni Weekly (PAW) with PAW's July issue. Quest will also be distributed to PPPL staffers and members of the fusion and scientific communities, and will be available on the PPPL website in PDF format as well.

Greenwald credits Starkman's photos and the design by the Digital Print Center in the Print and Mail Services unit of Princeton University with the magazine's attractive look. "It's amazing the amount of work that goes into the magazine from a design standpoint," Greenwald said. "If people want to know what's happening at PPPL, this magazine will fill them in."

Featured articles on the NSTX-U describe how the upgrade has made the facility the most powerful spherical tokamak worldwide, and the challenges that were met in constructing and installing the new components. These challenges included flying a 70-ton neutral beam machine over a 22-foot wall and building the 29,000-pound new center stack.

Besides focusing on NSTX-U, the magazine features significant Laboratory research and engineering developments

and collaborations over the past year. Articles include pieces about a \$4.3 million U.S. Department of Energy award to study the role of plasma in synthesizing nanoparticles, and a breakthrough finding on how magnetic reconnection turns magnetic energy into particle energy.

Other articles focus on collaborations ranging from PPPL's role in designing trim coils and power supplies for Germany's new Wendelstein 7-X stellarator, to the use of 3D printing to fabricate a water-cooled mirror for the Korea Supercomputing Tokamak Advanced Research (KSTAR) facility, to the Laboratory's work with the U.S. Department of Agriculture to develop a method for pasteurizing eggs in the shell.

Also covered in Quest are topics including awards to staff members, educational and outreach programs and the PhD Comics video featuring PPPL physicists that was filmed at the Lab last year. The overall magazine "acts as a calling card for the Laboratory," Greenwald said. 📄

2015 Annual PPPL Bluefishing Trip Aboard the 80' Suzie Girl

Date: Friday August 21st 2015

Departure: 5 p.m. SHARP!!!

Location: Belmar Marina Hwy. 35, Belmar, NJ 07719

Cost: \$80 Per person ALL INCLUSIVE. Cost includes everything—rods, bait, fish cleaning, food, beverages, prizes, etc. All you need to do is show up!



**Money due by Friday July 25th,
NO REFUNDS**

Contact Andy Carpe, ext. 2118, acarpe@pppl.gov,
or Bob Tucker Jr., ext. 3190, rltucker@pppl.gov.

Lithium safety review

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“The team has a sense of confidence that we’re doing things well and safely, that our researchers have the expertise necessary to use lithium not only now but in the future, and that we have safe practices in place,” said James Graham, head of Best Practices. “Most of their recommendations were to encourage continuous improvement of our current practices. For example, they recommended that we increase our expertise on lithium-related fire protection codes so that we appropriately apply the codes to safely design future experiments and facilities that will use greater amounts of lithium.”

The team found that PPPL’s training on safe lithium practices and safe operations was “appropriate and adequate,” and that its reviews and requirements were comparable to best practices at universities, laboratories and industry. However, the team criticized the Lab’s documentation of training, saying that there was no quick way to determine what training an individual has received. “Training documentation is lagging behind universities and laboratories,”

the committee said in its draft review. The committee suggested PPPL consider a software program, for example, that will compile and update all training results so that anyone can easily check what training an individual has.

Looking to the future, the review team found that the Laboratory would have to make “significant facility upgrades and safety improvements” if it wants to pursue lithium research beyond what is planned for the next five-to-10 years. Such changes would include rooms separate from office areas that have better humidity control, steel floors, and other features required of a facility dedicated to lithium experiments.

“If you are going to think seriously about long-term applications of lithium, we really need to get more experts involved in planning what new lithium facilities are going to look like,” said Kaita. 🗨️

The Safety Or Suggestion Box

The Safety Or Suggestion Box (SOS Box) is a way to increase workplace safety in a simple yet vital manner. Employees may submit suggestions, comments, near misses, hazards, or similar suggestions or praises directly to the ES&H department via the Employee Information & Services Page (see link to SOS Box below). The ES&H department uses the submittals to help prevent hazards or injuries, and

it brings attention to practices that may need to be improved. During the upcoming quarter (July-September 2015), everyone is encouraged to utilize this reporting mode. Everyone who submits a valid actionable safety post (specific enough to fix, with the submitter’s name included) to ES&H via the SOS Box will be entered into a drawing for a chance to win a \$20 gift certificate to the Plasma Hutch!

http://www-local.pppl.gov/eshis/Drop_box_link.html

People Soft unavailable July 16 to early July 21

Due to a planned upgrade, PeopleSoft Self Service will be unavailable from 3 a.m. Thursday, July 16 until 6 a.m. Tuesday, July 21.



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 June 29	Tuesday June 30	Wednesday July 1	Thursday July 2	Friday July 3
COMMAND PERFORMANCE Chef's Feature	Breaded Chicken Cutlet with Pasta, Garlic & Oil Served with Cucumber Tomato Salad	Cheese Ravioli with Roasted Veggies in a Pink Vodka Sauce served with Garlic Bread	COMMAND PERFORMANCE Oriental Stir Fry	Carved Beef Brisket with Mashed Potatoes & Roasted Carrots	Happy Independence Day! LAB CLOSED
Early Riser	Steak, Egg & Cheese Quesadilla	Scrambled Eggs & Cheese Pita	Eggs Benedict	Cranberry Pancakes served with Choice of Breakfast Meat	
Country Kettle	Chicken Noodle	Lemon Asparagus	Hot Dog Stew	Chicken & Broccoli Alfredo Soup	
Grille Special	Coney Island Chili Dog	Hot Pastrami & Cheddar on French Bread	Sriracha Shrimp Rolls	Open-Faced Sloppy Tom	
Deli Special	Peppers & Egg Torpedo with Cheddar Cheese & Potatoes	Roast Beef, Swiss, Spinach, Roasted Peppers & Honey Mustard	Muffaletta	Tuna Burger with Lettuce & Tomato on a Kaiser Roll	
Panini	BBQ Pork Carnitas Nachos	Seafood Quesadilla	Caribbean Jerk Chicken Wrap	Eggplant Parm Sandwich	

	Monday July 6	Tuesday July 7	Wednesday July 8	Thursday July 9	Friday July 10
COMMAND PERFORMANCE Chef's Feature	Chicken Enchilada served with Rice & Beans	Cheese Manicotti served with Garlic Bread	COMMAND PERFORMANCE Create Your Own Cajun Gumbo Over Rice	Country Fried Steak with Mashed Potatoes, Country Gravy, Collard Greens & Cheddar Biscuit	Seafood Stuffed Portobello Mushroom with Cheese Ravioli in a Pink Sauce
Early Riser	Egg McMuffin with Ham served with Hash Brown	Chicken & Cheddar Omelet with Spinach & Home Fries	Bagel with Lox & Cream Cheese	Italian Omelet with Sausage, Peppers, Onions, Mozzarella, Sauce & Hash Brown	Corned Beef Hash & 2 Eggs any Style
Country Kettle	Potato Leek	Coconut Curry Chicken Soup	Black Bean	Turkey Barley	Cream of Wild Mushroom
Grille Special	Classic Burger Patty Melt	Pork Carnitas Taco with Pickled Onions & Slaw	Steak Sandwich with Cheese, Roasted Peppers & Onion on French Bread	Pulled Chicken, Broccoli Rabe & Provolone Cheese on French Bread	Homemade Black Bean Burger on a Whole Wheat Roll
Deli Special	Grilled Vegetable on Whole Wheat Roll with Goat Cheese, Kalamata Olives & Sundried Tomato Pesto	Corned Beef & Swiss on Rye with Russian Dressing & Slaw	Turkey Club Sandwich	Caesar Salad with Grilled Tuna Steak Served with Garlic Texas Toast	Turkey & Smoked Gouda on a Kaiser Roll
Panini	Gyro	Fried Fish Torpedo with Bang Bang Sauce	Buffalo Chicken Wrap	Tofu Parmesan Sub	Cubano-Roast Pork, Ham, Swiss, Pickles & Dijonnaise on Ciabatta Bread

MENU SUBJECT TO CHANGE WITHOUT NOTICE

Menu Item is in keeping with American Heart Association (AHA) and U.S. Department of Agriculture (USDA) guidelines.

VEGETARIAN OPTION

WEEKLY

Editor: **Jeanne Jackson DeVoe** ♦ Layout and graphic design: **Kyle Palmer**
Photography: **Elle Starkman** ♦ Science Editor: **John Greenwald** ♦ Webmaster: **Chris Cane**

The PPPL WEEKLY is published by the [PPPL Office of Communications](#) on Mondays throughout the year except for holidays.

DEADLINE for calendar item submissions is noon on WEDNESDAY. Other stories should be submitted no later than noon on TUESDAY.

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

Summer schedule for PPPL Weekly: The PPPL Weekly will move to a bimonthly schedule during the summer. The next issue will be on July 13.