

THIS WEEK

WEDNESDAY, JAN. 31

Council Café Lunch

12 p.m. ♦ Cafeteria

David Carle

Head of Facilities and Site Services

SATURDAY, FEB. 3

Science on Saturday

9:30 a.m. ♦ MBG Auditorium

Synthetic Muscle

for Deep Space Travel

Lenore Rasmussen, Ras Labs

UPCOMING

WEDNESDAY, FEB. 7

Colloquium

4:15 p.m. ♦ MBG Auditorium

High power beta electron devices - Beyond betavoltaics

William Ayers, WMA Associates

FRIDAY, FEB. 9

Employee Tour

Contact tours@pppl.gov
to register

SATURDAY, FEB. 10

Science on Saturday

9:30 a.m. ♦ MBG Auditorium

Electromagnetic Screening for Airport Security

Carey Rappaport,
Northeastern University

FEB. 23-24

Science Bowl

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New Quality Assurance Program and procedures aim for rigorous conduct and oversight of projects

By Jeanne Jackson DeVoe

P PPL has revised its quality assurance (QA) program and the quality assurance and engineering procedures needed to implement the new QA requirements for all work and projects at the Laboratory, including the recovery and restart of the National Spherical Torus Experiment-Upgrade (NSTX-U). The goal is to put in place more structured and rigorous oversight of a project based on its potential risk of failing.

The U.S. Department of Energy (DOE) approved the new Quality Assurance Program Description (QAPD) on Dec. 29. The Laboratory Leadership Council and staff in Engineering, Quality Assurance and Procurement, will attend orientations on the newly structured program starting this week and there will be additional outreach to the rest of the Laboratory in the weeks to come.

The implementation of the new program and approach “ensures that resources and the level of rigor used in completing work corresponds to the importance and potential impact to the Lab – it’s a tool to manage risk,” said Les Hill, project manager of the Integrated Corrective Action Plan (ICAP) that is implementing the QAPD. “These are principles that we’re applying to all aspects of project delivery from design through operation.” Hill said.

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Physicists David Johnson and Charles Skinner named ITER Scientist Fellows

By John Greenwald



Charles Skinner, left, and David Johnson on a hiking trip to Lake Louise in the Canadian Rockies, with Cirque Peak in the background.
(Photo taken with a self-timer)

David Johnson and Charles Skinner, principal research physicists at PPPL, have been appointed to three-year terms as ITER Scientist Fellows. They will join a network of internationally recognized researchers who will consult with ITER, the international fusion experiment under construction in France, on plans and components for the project, which is designed to demonstrate the practicality of fusion energy.

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QAPD

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The QAPD is the first of many initiatives in the ICAP coming out of an extent of cause investigation last year into the underlying policies, procedures, and practices that contributed to several incidents, including the failure of a coil that halted operation of the NSTX-U in 2016.

A graded approach

The QAPD is accessible to all PPPL employees and is posted on PPPL's website at <https://sportal.pppl.gov/bp/pppldocs/Plans/Quality Assurance Program Description.pdf>. It outlines a new graded approach that bases the amount of oversight on the risk to PPPL's mission. "It's the alignment of rigor with the importance and potential consequences to the Laboratory," said Valeria Riccardo, head of Engineering, who rewrote some of the engineering procedures to align with the QAPD.

The QAPD defines the quality level of each project and rates it A-1, A-2 or A-3 based on a graded approach. Each project is rated according to the consequences of a possible failure, including potential hazards and risks to employees and the public, impact to PPPL's research mission, and the cost. A-1 is the highest level on this scale, for example, and would be given the highest levels of attention and oversight. The quality level will then be used to determine the level of analysis, documentation, inspection and independent oversight required to complete projects. This includes design, design reviews, fabrication, installation, testing



Les Hill
(Photo by Elle Starkman)

and managing changes, even after operation has started. The Lab's graded approach will also extend to the design and manufacture of components by subcontractors and vendors.

Some elements of the QAPD have already been applied in the NSTX-U Recovery Project during the early stages of planning, which incorporated more rigorous procedures in anticipation of the revised QA requirements. For example, the Recovery Project followed a design review process similar to, but slightly stricter than the one outlined in the new procedure. The Recovery team is holding design reviews for numerous separate components of the project and has identified the most crucial elements according to the risk to PPPL. The processes the Recovery Project has followed so far will be compared to the QAPD to identify any major gaps but there are unlikely to be any substantive issues, Riccardo said.

These practices are now being used for building prototype coils. The Recovery Project has assigned engineers to oversee the manufacturing of four prototype coils in England, France, Pennsylvania, and at PPPL. Quality assurance staff also will check the manufacturing process. "We are putting in extra independent oversight on our own activities as well as on the contractors," said Surendra Tiwari, PPPL's new head of QA.



Valeria Riccardo
(Photo by Elle Starkman)

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At-A-Glance

The Quality Assurance Program Description (QAPD) approved in December 2017 rewrites the rules of how PPPL approaches work at PPPL. Here are some QAPD requirements at a glance:

- More structured requirements for determining and applying the level of rigor applied to items or work.
- Rigor based on the importance of project and consequences of the project's failure.
- Level of rigor means the extent of required
 - Analyses
 - Documentation
 - Inspections
 - Testing
 - Oversight
- Defines three graded approach categories from highest to lowest levels of importance and consequences to PPPL for items and work
- A-1 for high importance or high consequence
- A-2 for intermediate
- A-3 for lower level
- A-1, A-2 and A-3 graded approach categorization based on well-defined factors including:
 - Importance to safety, safeguards, and security
 - Magnitude of/importance to radiological and non-radiological hazards
 - Impacts or consequences to PPPL mission
 - Cost
 - Impact to the public or DOE
- Projects require final design review and approval of design changes
- Applies to all work performed at the Laboratory and at contractor or vendor facilities
- Chief engineer oversees engineering activities
- PPPL experts called "technical authorities" who are not involved in a project are assigned to review design and design changes
- Eliminates position of responsible line manager and redistributes duties
- Enhanced document control
- Clearly defined controls (e.g. analysis and testing) for the development and use of crucial software

In addition to Tiwari, the Laboratory will hire a chief engineer who will work under Riccardo and oversee design activities at the Lab. PPPL has also designated technical authorities that will assist the chief engineer to make sure that project requirements are flowing down to the work.

The role of the responsible engineer is also a new position. “The responsible engineers own assigned systems and components,” Hill said. “They provide cradle-to-grave continuity for the equipment in their charge.” The role of responsible line manager has been eliminated and the responsibilities divided mainly between the responsible engineer and project manager.

Independent reviewers

One of the fundamental principles of the QAPD is to ensure that the roles of those involved in the day-to-day design, construction and operation of a project are separate from those overseeing and approving those activities. The chief engineer and staff members in a new position called a “technical authority” will provide independent oversight to make sure that key project decisions are based on all factors, including cost and schedule. Their oversight roles, as defined in the QAPD, will be based on the importance and risk of a project based on the graded approach, depending on whether a project is rated A-1, A-2 or A-3. The chief engineer and technical authorities will provide a much-needed

set of “fresh eyes” in that they are to be experts who are not directly involved in the project, Hill said. “Successful project management goes well beyond delivering on cost and schedule goals,” he added. “It involves delivering against all PPPL, DOE and end-user expectations including safety, performance, and reliability.”

The new and enhanced controls and approvals that are included in the QAPD and are being incorporated in the Lab-wide implementing procedures will result in more thorough and deliberate work processes and more detailed documentation, said Jim Graham, of Quality Assurance, who also helped develop the QAPD.

The QAPD and revised procedures were put in place to meet DOE requirements, Hill said. “They are very important commitments to our DOE customer and must be followed,” Hill added. “Our programs and procedures are useful tools and we will monitor them very closely and work with our DOE partner if changes are needed.”

While several positions and procedures have changed, the basic work processes have not, Hill said. Most of the changes are focused on the review and approval processes. “There are only so many ways to do engineering, so the basic building blocks are not a lot different,” he said. “What is different is that there are certain things now required that were previously discretionary, that are not discretionary any more.”

Volunteer for the Science Bowl Feb. 23 to 24

Please sign up and volunteer for one or both
2018 NJ Regional Science Bowls on Feb. 23-24!

Technical volunteer role (Staff Researcher and/or Engineer):

- Moderator will read questions aloud and make final decisions should a rules or questions conflict arise. Moderator may acknowledge a player that buzzes in to answer a question.
- Science Judge will read along with Moderator and/or take turns reading questions aloud. Science Judge will assist Moderator with pronunciation, and help clarify rules. Science Judge may acknowledge a player that buzzes in to answer a question.

Non-technical volunteer role:

- Time/Score keeper
- Registration and/or lunch assistant
- Runner (deliver paper, pencils, water, etc. to competition rooms)
- Set-up and/or breakdown (before/after competitions)
- Other stuff as needed

Contact Deedee Ortiz, dortiz@pppl.gov, ext. 2785 for more information

ITER Fellows

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Both physicists expressed excitement on learning of their appointments. "It's always fun to be recognized and I am looking forward to contributing to design review activities and other areas," Skinner said. For Johnson, the position creates a new opportunity "for forging new territory, and that can be exciting."

The appointments, approved by ITER Director-General Bernard Bigot, bring to three the number of PPPL scientists named to the prestigious positions. PPPL Physicist Francesca Poli became an ITER Scientist Fellow last year.

Fusion, the merging of light elements that powers the sun and most stars, creates massive amounts of energy. Scientists seek to replicate fusion on Earth in a "star in a jar" for a virtually inexhaustible supply of power to generate electricity.

Johnson and Skinner, who are retiring this year, have extensive experience developing and employing diagnostic

instruments to measure the behavior of the hot, charged plasma that fuels fusion reactions. Johnson, 69, a 42-year veteran of PPPL, served as head of the PPPL diagnostics division from 1997 to 2006 and head of the laboratory's ITER Fabrication Department from 2006 to 2015. Skinner, 68, a 37-year veteran, conducted the first-ever measurements of tritium in the Tokamak Fusion Test Reactor (TFTR), which used the hydrogen isotope and its sister deuterium as plasma ingredients in the 1990s to generate 10 million watts of fusion power.

The two physicists have worked together on projects at PPPL and enjoy hiking trips together (See photo page 1.) Johnson is retiring Feb. 1; Skinner will leave in July following the biennial International Conference on Plasma-Surface Interactions in Controlled Devices that will be held in June at Princeton University. Skinner chairs the local organizing committee for the week-long event.

Here is a brief look at some of the two scientists' PPPL achievements:

David Johnson

An international leader in the field of high temperature plasma diagnostics, David Johnson has contributed diagnostic measurements to major fusion devices at PPPL since 1975, with emphasis on development of what are called high-resolution Thomson scattering systems. During TFTR deuterium-tritium experiments he served



David Johnson

as deputy head of TFTR diagnostics in charge of some 30 systems. He has managed diagnostic development for the National Spherical Tokamak Experiment (NSTX), which has since been upgraded, and has led development of diagnostic equipment that the United States is supplying to ITER. Since 2015 he has continued to work part-time providing technical expertise and oversight to the ITER diagnostic project.

Charles Skinner

Charles Skinner was raised in the United Kingdom, where he earned his doctorate. As a diagnostician and inventor, he developed a laser-based method for rapid tritium removal from TFTR tiles. He has also developed a detector that led to the first detection of dust during experimental operations on NSTX, and a method for assessing



Charles Skinner

techniques for cleaning mirrors in optical diagnostic systems and detecting any surface damage. More recently, he has devoted attention to such activities as studying the use of boron and lithium to condition plasma-facing components. He was elected a fellow of the American Physical Society in 2013, with the APS citing his "innovations in magnetic fusion issues" and "seminal contributions" to fields ranging from x-ray lasers to plasma-lithium interactions. [📄](#)

What is the STOP program?



The STOP program is a method for reinforcing good safety behaviors and correcting unsafe behaviors.

**Safety first:
Use the STOP program!**

South Korean high school students learn about plasma science

Physicist C.S. Chang gave a lecture on plasma science and computer simulations on super computers to 44 students from Jeohyeon High School in South Korea, located in the suburbs of Seoul. Jessica Guttenfelder gave the students a brief tour.



Students listen to the talk by C.S. Chang in the M.B.G. Auditorium. (Photo by Raphael Rosen)



C.S. Chang lectures to students from Jeohyeon High School in South Korea. (Photo by Raphael Rosen)



A Korean tour guide translates at the model stellarator as Jessica Guttenfelder looks on. (Photo by Jeanne Jackson DeVoe)



Guttenfelder gives students a tour of the NSTX-U Control Room. (Photo by Jeanne Jackson DeVoe)

Submit your questions for Plasma 101 Lunch & Learn

Please submit your questions about fusion energy, plasma, or any of the research we do here in the box in the LSB lobby.


Sample questions:

What is plasma?

How is what we do different from “nuclear power?”

Why don't we have fusion energy on the grid yet?

“Improbable Research” is focus of Science on Saturday talk

Marc Abrahams, editor of the *Annals of Improbable Research*, gave a talk on “Improbable Research and the Ig Nobel Prizes” at the Jan. 20 Ronald E. Hatcher Science on Saturday Lecture Series. 



Marc Abrahams begins his talk as host Andrew Zwicker, left, head of Communications and Outreach, looks on. (Photo by Elle Starkman)



Abrahams at the Science on Saturday lecture. (Photo by Elle Starkman)



An audience member asks a question. (Photo by Elle Starkman)



Audience members talk to Abrahams after the lecture. (Photo by Elle Starkman)

Ronald E. Hatcher Science on Saturday LECTURE SERIES

Feb. 3

Synthetic Muscle for Deep Space Travel
Lenore Rasmussen, Ras Labs

Feb. 10

Electromagnetic Screening for Airport Security
Carey Rappaport, Northeastern University

Feb. 17

Self-Driving Cars and AI: Transforming our Cities and our Lives
Jeff Schneider, Carnegie Mellon University

Saturdays at 9:30 a.m., MBG Auditorium

Council Café Lunch

This Week:
David Carle,
Head of Facilities
and Site Services



Wednesday, Jan. 31
12 p.m., PPPL Café

Feb. 14: Hutch Neilson

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 Jan. 29	Tuesday Jan. 30	Wednesday Jan. 31	Thursday Feb. 1	Friday Feb. 2
COMMAND PERFORMANCE Chef's Feature	Stuffed Shells with Roasted Vegetable Sauce and Garlic Bread	Veal Osso Bucco Stew over Egg Noodles	Chicken Gyro served with Greek Salad	Curry Chicken with Peas served over Rice	Super bowl "Fill Your Box" Meal
Early Riser	Apple-Cinnamon Pancakes	Greek Breakfast Wrap	Chicken Omelette	Frittata of the Day	2 Eggs, Choice of Breakfast Meat & Tater Tots
Country Kettle	Spring Vegetable	Chicken Noodle	Tuscan Bean	Split Pea	New England Clam Chowder
Deli Special	Liverwurst with Onion and Stone Ground Mustard	The Carnegie — Pastrami, Corned Beef, Swiss, Russian Dressing and Cole Slaw on Rye	Roasted Vegetable Wrap with Hummus	Turkey with Cheddar, Bacon, and Cranberry Mayo	
Grill Special	The Plasma — Chicken, bacon, and Swiss on French Bread	Beef Quesadilla	BBQ Pork Sandwich with Cheddar and Onion Straws	The Simple Man Burger	Super bowl "Fill Your Box" Meal
Panini	4 Cheese Panini	Spicy Pepperoni Ciabatta	Pretzel Melt with Ham and Swiss	Falafel Wrap	

MENU SUBJECT TO CHANGE WITHOUT NOTICE

HEART HEALTHY

VEGETARIAN OPTION

WEEKLY

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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/>.