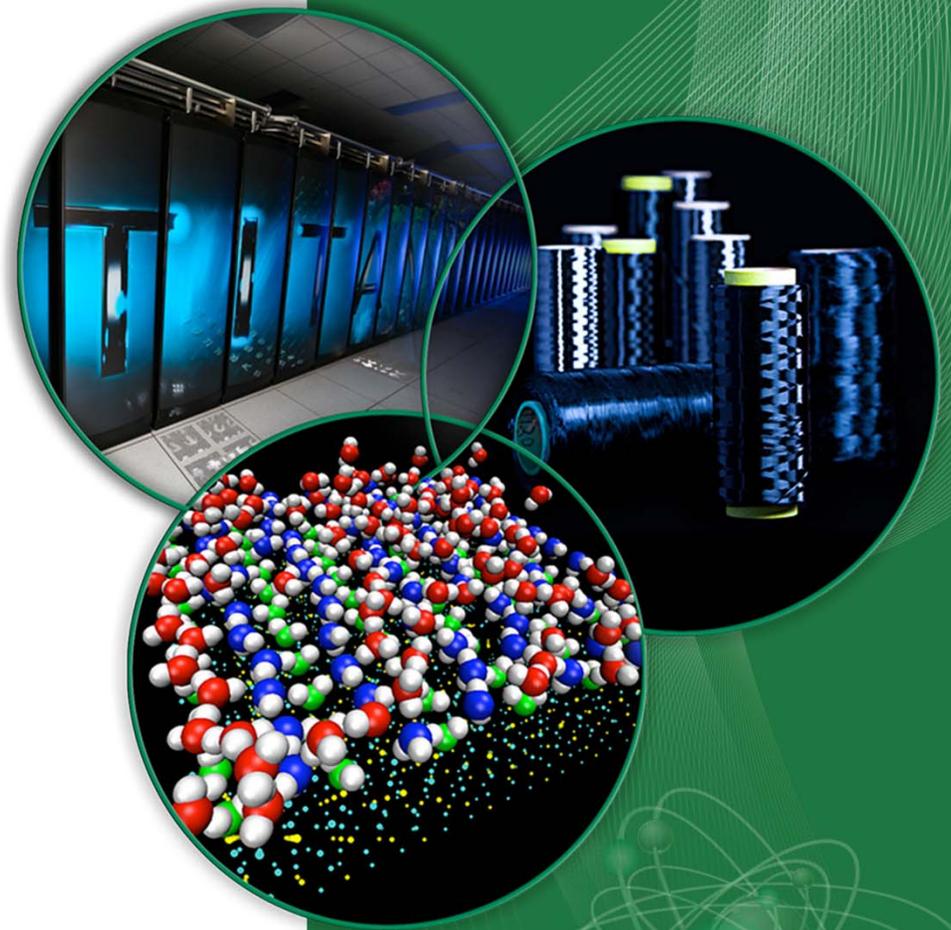


# NSED Monthly Report

April 2014

**Nuclear Science &  
Engineering Directorate**

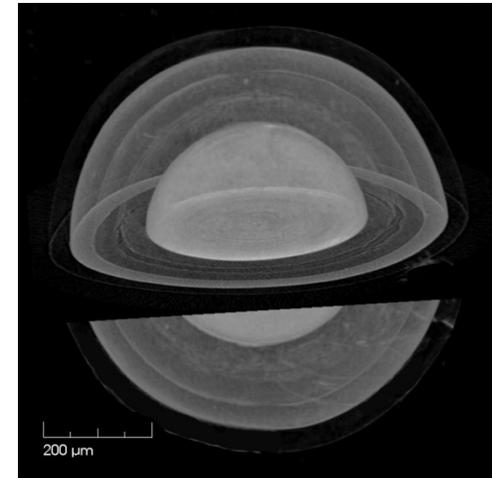


ORNL is managed by UT-Battelle  
for the US Department of Energy

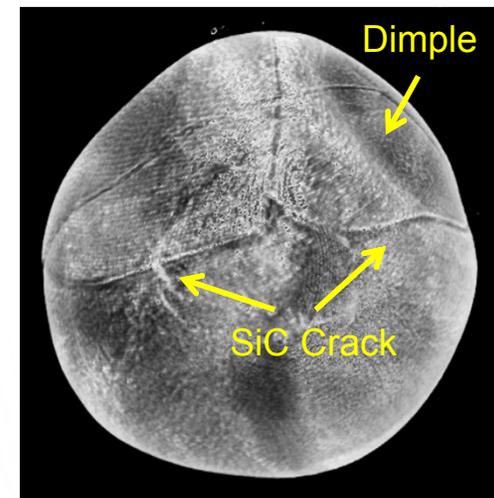
 **OAK RIDGE**  
National Laboratory

## Completed PIE on two more AGR-1 compacts

- Post-irradiation examination (PIE) of fuel compacts from the first Advanced Gas Reactor Irradiation Experiment (AGR-1) continues (examination has been completed on 12 compacts since 2011 and 6 more are in progress)
- Most recently examined compacts were heated in helium to 1600 or 1700°C for 300 hours to test performance of the fuel under simulated accident conditions and measure high-temperature release of radioisotopes
- Post-safety test PIE included deconsolidation and acid leaching of the compacts, gamma analysis of each particle, three-dimensional x-ray imaging, and materialographic analysis of numerous particles
- One particle (out of ~8250) experienced a breach through the SiC containment layer at 1600°C due to an abnormally- aspherical as-fabricated shape; this particle was extracted for detailed analysis
- A report (ORNL/LTR-2014/101) was issued to summarize the PIE results



Normal particle x-ray



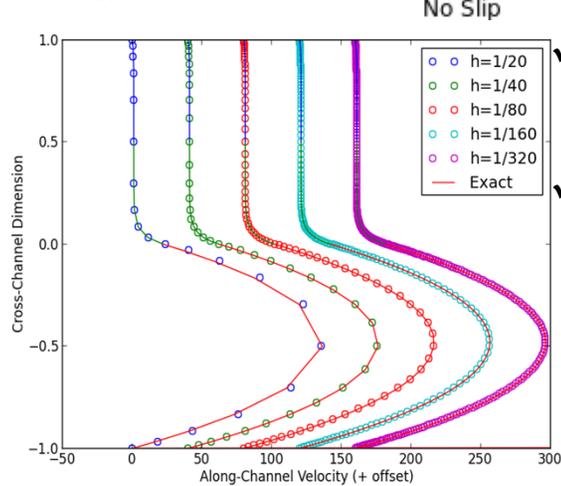
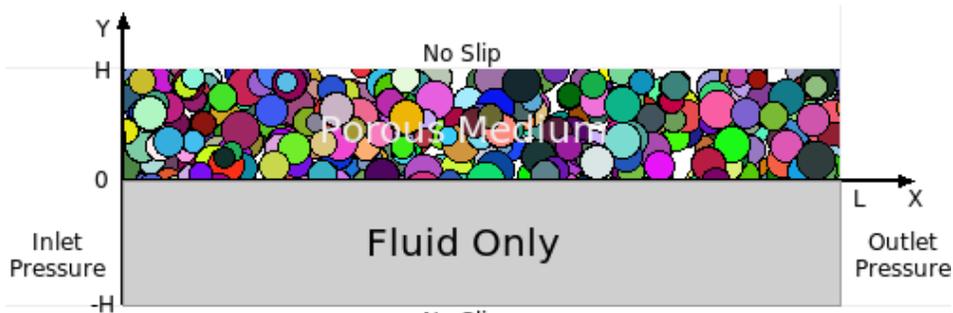
Defective particle x-ray highlighting cracked SiC

# New porous drag capability in CASL's Thermal Hydraulics Application (Hydra-TH) for modeling spacer grids

## Milestone Accomplishments

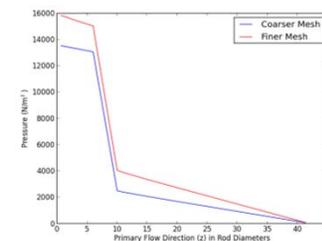
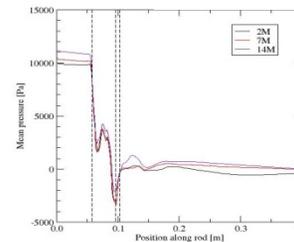
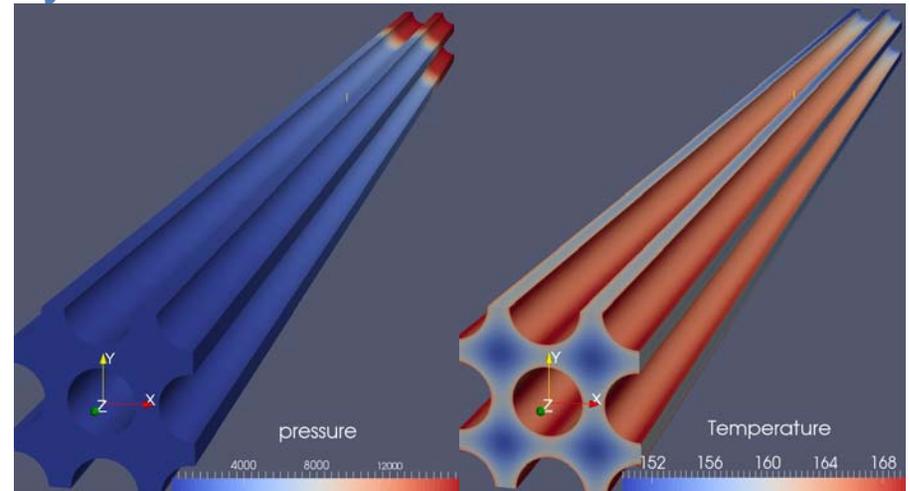
- Expose Porous Drag Capability in Hydra-TH
- Perform and document V&V tests
- Develop and document user test case of 3x3 rod bundle with spacer grid replaced by porous medium

## Forced Convection Validation Test

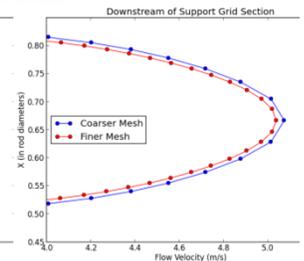
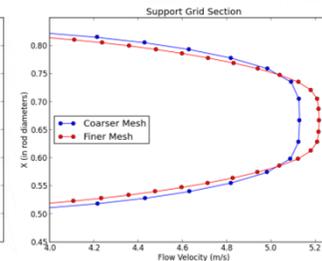
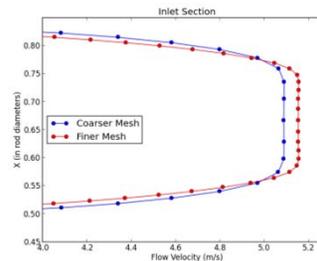


- ✓ Exact Solution Developed and  $L_2$  and  $L_\infty$  Error Considered
- ✓ Convergence on Uniform and Stretched Grids using both Semi-Implicit Projection-based time-stepping & fully-implicit time-stepping studied

## 3x3 Rod Bundle with Spacer Grid Replaced by Porous Medium



Can match LES pressure drop across spacer grid



Velocity Profile Upstream of Porous Medium is Turbulent whereas Downstream Profile is Laminar

# Wagner receives E. O. Lawrence Award and Penn State Alumnus Award



**PENN STATE awards**

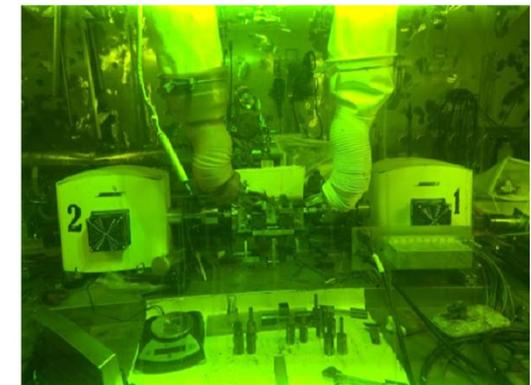
*John C. Wagner*

**2014 Outstanding Engineering Alumnus Award**

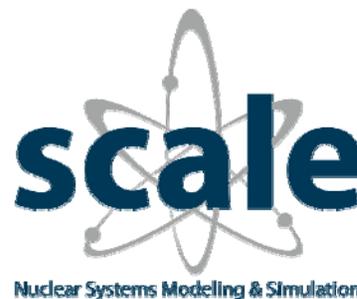
John, his wife Stephanie, and his two oldest children, Victoria and Luke, attended the Penn State festivities which included the awards ceremony, reception and dinner for the honored awards recipients and guests.

# U.S. Nuclear Regulatory Commission visit

- On April 29–May 1, Brad Rearden hosted visitors from the U.S. Nuclear Regulatory Commission (NRC) to review ongoing and planned activities sponsored by NRC
- The NRC visitors were Meraj Rahimi and Drew Barto from the Office of Nuclear Material Safety and Safeguards and Richard Lee, Mourad Aissa, and Don Algama from the Office of Nuclear Regulatory Research
- Recent accomplishments and planned activities for modernization of the SCALE Code System were discussed and the visitors toured the high-burnup fuel bending fatigue test that is jointly sponsored by DOE and NRC
- During the visit, NRC was provided the Beta3 release of SCALE Version 6.2 in fulfillment of a key milestone – The NRC staff will use this updated version to support license reviews and regulatory research activities



High-burnup fuel bending fatigue test in Bldg. 3525



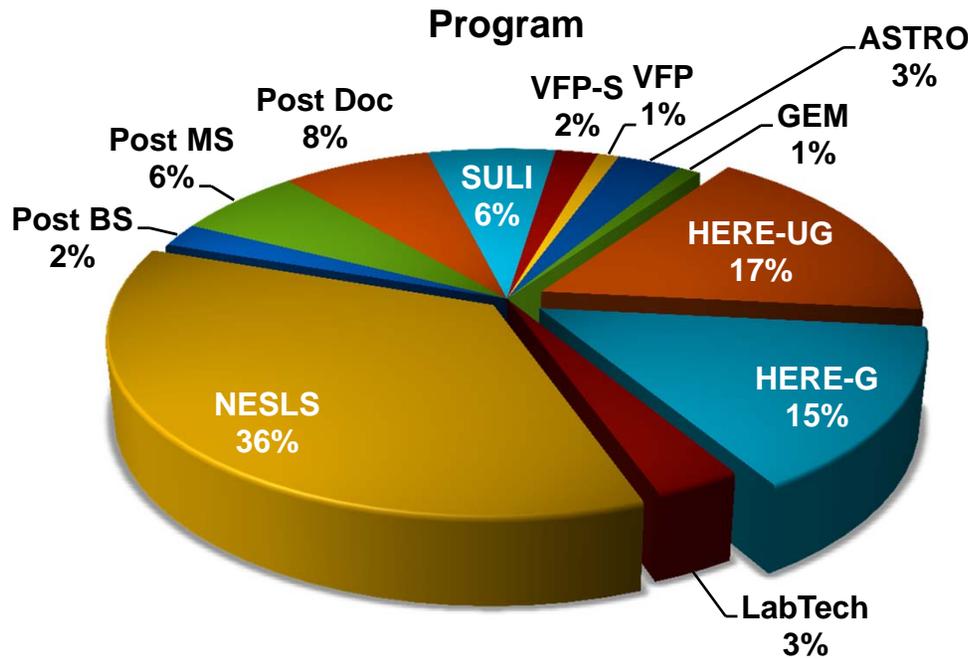
# NSED supported the University of Tennessee Big Orange STEM Symposium

Dr. Jeremy Busby and Joshua Scull provided presentations on the exciting science at ORNL, science careers, and paths for internships to an overflowing room at the Big Orange Stem Symposium held at the University of Tennessee

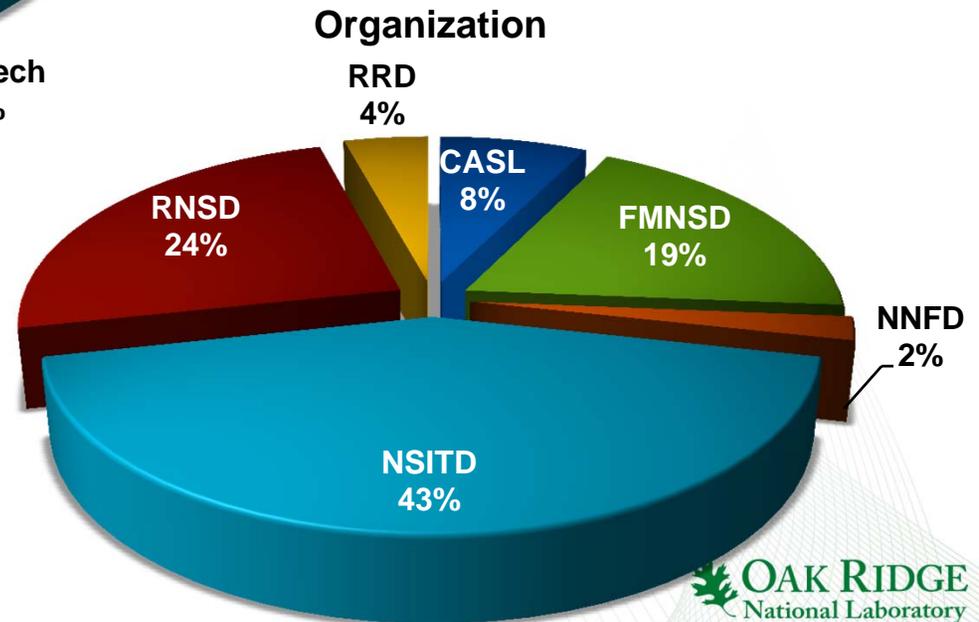


# FY 2014 interns

95 students/participants



<b>ASTRO</b>	Advanced Short Term Research Opportunity
<b>GEM</b>	Graduate Minorities in Engineering and Science
<b>HERE</b>	Higher Education Research Experience
<b>NESLS</b>	Nuclear Engineering Science Laboratory Synthesis
<b>SULI</b>	Science Undergraduate Laboratory Internship
<b>VFP-S</b>	Visiting Faculty Program-Students



# ORNL hosted World Nuclear University Alumni Assembly

- March 31<sup>st</sup> through April 4<sup>th</sup> approximately 60 WNU Alumni were in attendance
- Alumni were provided with technical presentations from ORNL speakers as well as international presenters
- Two-day special topic sessions were provide:
  - Research reactors & Isotope Production
  - Safeguards Training
  - Safety Culture
  - Security for the Technical Community
- Special lunch with Commissioner Magwood to discuss outreach activities



**REDC Control Room visit**

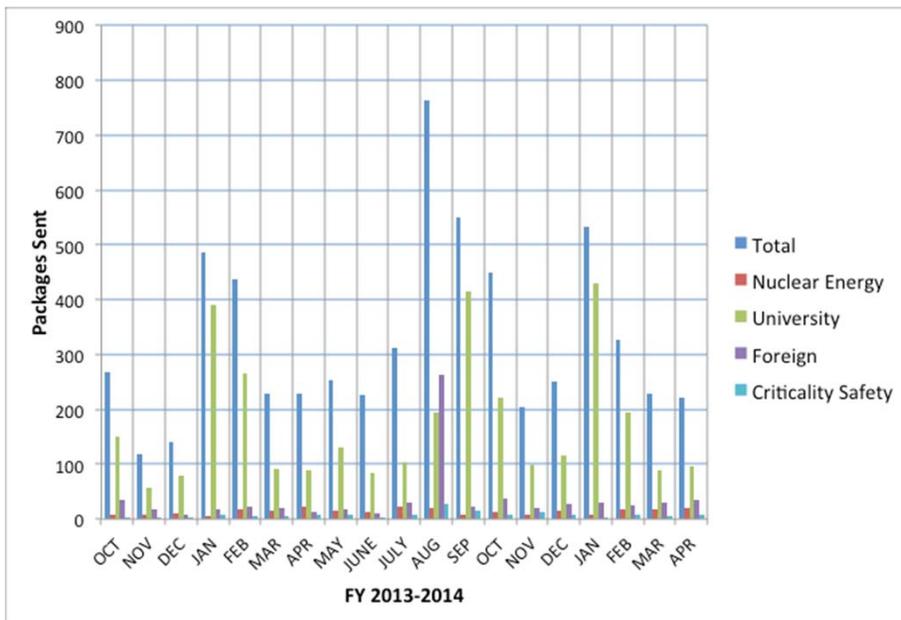
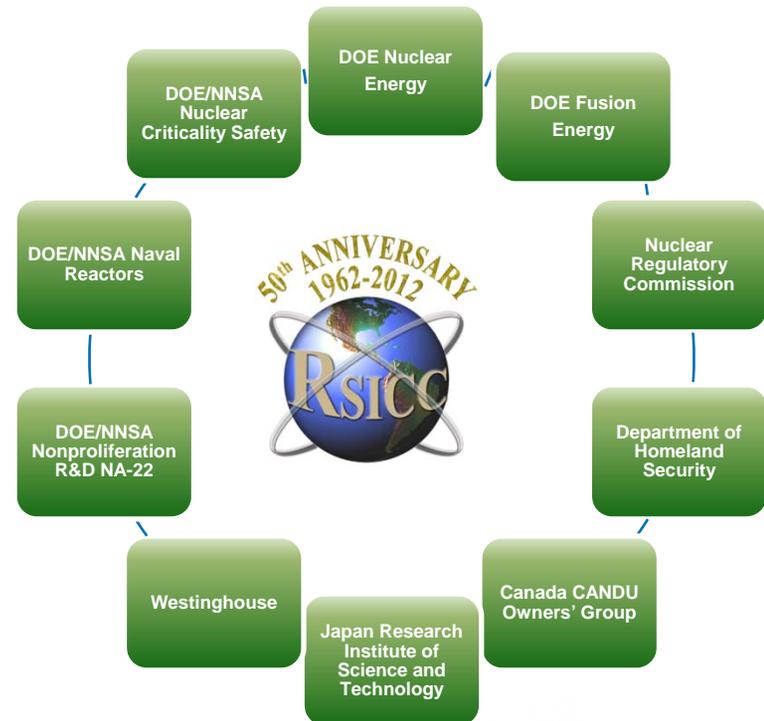
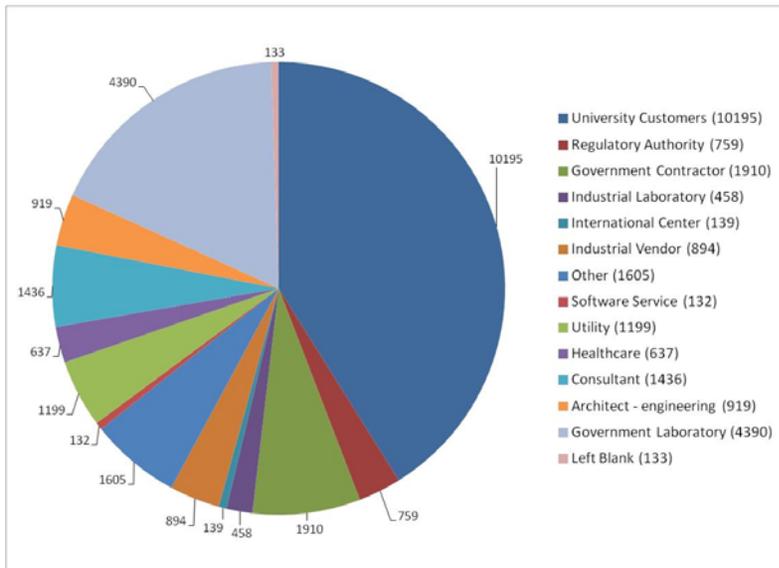
# Next Generation Safeguards Program

- Supported two workshops in the Safeguards Lab for UT-Knoxville's (UTK) "Radiation Measurements Laboratory"
- Provided four lectures and live Q&A sessions at UTK and through VTC for North Carolina State University
- Kim Gilligan and Sam Hinson visited University of Florida
  - conducted a mock Complementary Access for the NGSF supported, "Introduction to Safeguards" nuclear engineering class.
  - Hanson ran the ORNL created nonproliferation simulation as part of a Woman in Nuclear meeting
  - Gilligan and Hinson meet with professors throughout the department, while touring the labs and research reactor



**UF Students Role Playing Egypt  
in a Nonproliferation Simulation**

# Radiation Safety Information Computational Center (RSICC): Serving the scientific community for 50 years



- Software and data packages distributed FY 2014: 2216
- 2 package updates and revisions April 2014

# Radioisotope Production

## Cm Target Refurbishment

- The following equipment was installed and trial operations performed:
  - Pellet thermal cleaning furnace in Cubicle 3
  - Remote elastomeric swaging system in Cubicle 2
  - Remote target welding lathe in Cubicle 2
- Irradiation of targets delayed to June



Welding lathe installation  
in Cubicle 2

## Pu-238 Production Program

- Seven targets were loaded for irradiation
- New pellet location detector was tested and responded well



Completed array of sensors for  
pellet location detector (l) and  
targets in target holder (r)

## Ac-225 Program

- Completed three shipments to three customers with a total activity of 15.6 mCi



Ac-225 purification glove box line at  
the Radiochemical Engineering  
Development Center

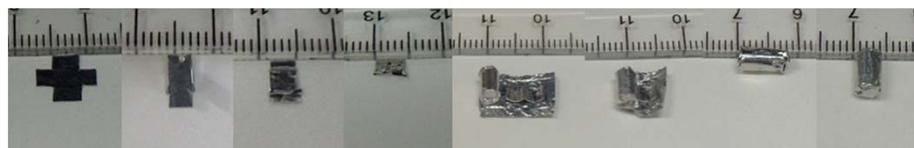
# Radioisotope Research & Development

## Proposals Under Development

- The following Isotope Program proposals for the LAB\_14-1099 Nuclear Physics call:
  - *Improving HFIR Heavy Actinide Production Capability Through Sensitivity-Informed Targets Design*
  - *Real-Time Monitoring of Elution Columns for Optimization of Actinide Separations*
  - *Development of High-Activity Thin-Film Fission Fragment Sources*
- LDRD Proposal:
  - *Optimizing HFIR Isotope Production through the Development of a Sensitivity-Informed Target Design Process using High-Fidelity Modeling and Simulation Capabilities*

## Transcurium Optimization Study

- Three Curium-244 targets and one Rhodium-103 target were fabricated
- Filter monitors were redesigned
- The four rabbits were assembled



New target design with integrated filters and filter monitors



Rabbit configuration.

# Enriched stable isotope technical services and shipping

Eleven shipments of 60 enriched stable isotopes were made in April

- 78 shipments of 276 enriched stable isotopes have been made in FY14 to date

Two custom technical services were completed in April

- 65 technical services have been completed in FY14 to date
- Shipment of He-3 (\$329K) to a customer
- Technical services included: Metals Sn-120 and Li-6

# Mobile Uranium Facility (MUF)

- Operation “Arctic Char” was completed in April testing the MUF in cold and snowy Alaska conditions
- Project Goals:
  - Ensure facility can be assembled and equipment is operational
  - Test the uranium handling procedures and equipment
  - Ensure the power generation units and heating systems are sufficient
  - Disassemble and return the facility to Oak Ridge



# Technical mission and engagement with Kuwait

International Safeguards Group Staff Member Kim Gilligan took part in a technical visit to provide Additional Protocol Complementary Access (CA) training for the Radiation Protection Department of Ministry of Health (RPD/MoH) and Kuwait Institute for Scientific Research, Kuwait City, State of Kuwait



*IAEA Senior Inspector Nick Doulgeris reviews the contents of the CA kit with RPD*



*Group Photo with NNSA/KISR/RPD Representatives*

This training was intended to fill a large knowledge gap and to lay the groundwork for deeper Additional Protocol cooperation with RPD

# Global Threat Reduction Initiative (GTRI) activities

## Transportation Training in Peru

GTRI Team members, Polly Ladd, Tim Welch and Rick Rawl, traveled to Peru to conduct transportation training for the local Ministry of Transportation. The significance of this event is the federal sponsor was able to participate and see the training product offered and FY14 plus-up funds were awarded.



*Photo from Transportation Training in Peru*

## NRC exercise

GTRI Team member Dave Duhamel participated as an observer in an NRC exercise. The significance of this event is the continued coordination between GTRI and NRC, identified in a recent GTRI GAO audit as a key element of future program success.



# Nuclear materials management

## INMM Spring Workshop

The Institute of Materials Management (INMM) Central Regional Chapter sponsored a Spring Workshop entitled, “75 Years of Securing Nuclear Material - Reflections on the Past, Lessons from the Nuclear Experts, and the INMM Future Vision”. This event was held at the Baker Center, UT Campus and included speakers from ORNL, Y-12 and former IAEA staff. Safeguards & Security Technology Group Leader, Chris Pickett, was a featured speaker and Linda Paschal was chair of this event.

## Strategic Trade Control Enforcement Seminar



**Terry Donaldson** (front row left) was a co-facilitator for a regional workshop on strategic trade controls enforcement in Abuja, Nigeria, April 1-3, 2014. The seminar was sponsored by the World Customs Organization (WCO) for the Central and West Africa region. About a dozen participants attended from five countries in the region. The seminar was held by WCO as one of several activities to increase assistance to member countries to enhance enforcement of strategic trade controls in support of nonproliferation of WMD.

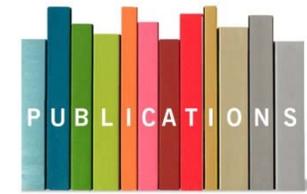
## Nondestructive Analysis (NDA) Applications Training

During the February-April timeframe, ORNL staff provided NDA training in the Safeguards Laboratory to 77 participants from Morehouse University, North Carolina State University, Clemson, University of Tennessee, University of Georgia, Mercyhurst, and University of Florida.

# Next Generation Safeguards Initiative (NGSI) Human Capital Development (HCD) program - April highlights

- Supported the World Nuclear University (WNU) Alumni Assembly May 31 – April 4th, placing emphasis on the safeguards training portion of the event.
- Supported two workshops in the Safeguards Lab for the University of Tennessee’s “Radiation Measurements Laboratory” class on April 7th and the 14th.
- Supported ORNL subject matter experts giving guest lectures and live Q&A sessions at the University of Tennessee, Knoxville and through VTC for North Carolina State University.
  - Bill Toth, “Nuclear Nonproliferation Program Overview ” for UTK’s Nonproliferation Course April 2nd
  - Mabelle Sumner, “Second Line of Defense” for NCSU on April 9th
  - Len Philips, “Export Control” for NCSU on April 9th
  - Andy Worrall and Louise Evans, “Career Perspectives from Working Professionals,” for NCSU INMM Student Chapter on April 10th
- Visited the University of Florida on April 22 – 23. Conducted a mock Complementary Access for the NGSI supported, “Introduction to Safeguards” nuclear engineering class. Ran the ORNL created nonproliferation simulation as part of a Woman in Nuclear meeting. Met with professors throughout the department, while touring the labs and research reactor. Discussed the newly created Florida Institute for National Security.
- POC Kim Gilligan met with UF professor Sedat Goluoglu and a Rensselaer Polytechnic Institute representative this month at ORNL. She also represented NGSI in the directorate education and outreach committee meeting.

# Publications



NSITD

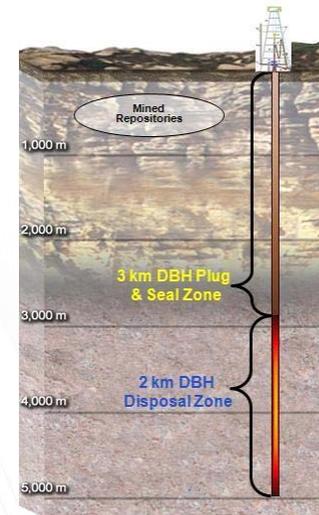
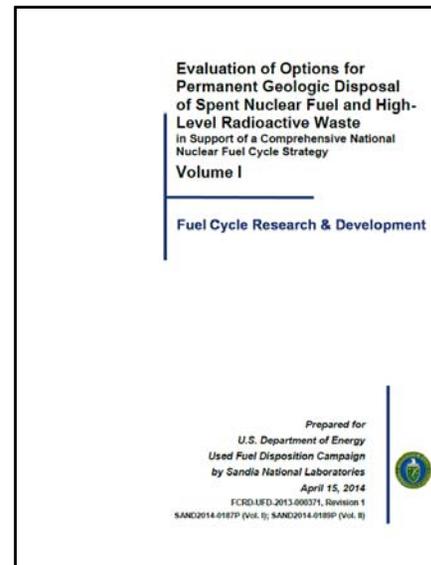
- ORNL/TM – 1

- Klaus-Peter Ziock, Joshua B. Braverman, Lorenzo Fabris, Mark J. Harrison, Donald E. Hornback, and Jason Newby, *Event Localization in Bulk Scintillator Crystals Using Coded Apertures*, ORNL/TM-2014/51.

# Used fuel systems in support of DOE Office of Nuclear Energy



- **Spent Nuclear Fuel (SNF) Railcar Request for Information/Sources Sought released**
  - Subject notice was posted in FedBizOps as an initial step in the process to design, test, and certify rail cars (cask car, buffer car and escort car) for large-scale shipment of SNF from origin sites.
  
- ***Evaluation of Options for Permanent Geologic Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste***
  - RNSD staff contributed to a study “*Evaluation of Options for Permanent Geologic Disposal of SNF and High-Level Radioactive Waste,*” which provides a technical basis for informing policy decisions on potential strategies



# SCALE decay heat validation study published in *Nuclear Engineering and Design*

- Validation of the ORNL SCALE nuclear analysis code system capabilities in predicting decay heat for commercial used fuel applications has been performed using recent decay heat measurements of PWR and BWR fuel assemblies
- Measurements were performed at the Swedish Central Interim Storage Facility for Spent Fuel (Clab)
- Experimental data were available through collaboration between ORNL and the Swedish Nuclear Fuel and Waste Management Company (SKB) that manages Clab

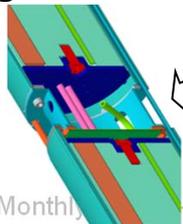


# Materials irradiation – April 2014

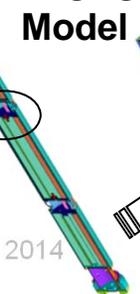
Project	Format	Sponsor	Stage					Notes
			Newly proposed	In Design	In Fabrication	In Reactor	Removed	
Steel Screening	Rabbit					5		Cycle 451
Titan Metal	Rabbit	DOE, FE US-Japan				1	29	Tungsten and steel
Composite Flexure	Rabbit	DOE, FE				8		SiC
Mini-Composite	Rabbit	DOE, FE				3	1	SiC
Round-bar Tensile	Rabbit	DOE, FE		4+		TBD 2013		Steel
Hydrided Clad	Target	DOE, NE					4	Zircaloy
Ibiden	Rabbit	WFO, Ibiden				19	19	Graphite
Nippon	Rabbit	WFO, Nippon				30, Cycle 452		Graphite
Toyo Creep	Target	Toyo Tanso				2, Cycle 449		Graphite
Inconel springs	Rabbit	AECL		11	4	Cycle 454	6	
Graphite Creep	Rabbit	EDF			4	4	5	Irr. Graphite
SHINE	Rabbit	DOE						Mo-99
Exotic Ceramic	Rabbit	DOE, FE				3	6	
SiC Joining tests	Rabbit	DOE, FE		21	5	Cycle 453		SiC
HTV Capsule	Target	DOE NE		1		2014		Graphite
FCR&D Rabbits	Rabbit	DOE NE		1	5	Cycle 454		DU fuel samples
FeCrAlY	Rabbit	Fusion				2, Cycle 450	3	FeCrAlY
EPRI Rabbits	Rabbit	EPRI				7 Cycle 453		
TOYO Rabbits	Rabbit	TOYO TANSO				4 Cycle 454, 17	23	Graphite
EPRI VXF	VXF Target	EPRI				3		Steel Weld Coupons
Superconducting Tapes	Rabbit	Fusion		2		Cycle 454		
Bulk Metallic Glass	Rabbit	Fusion		4				
PXW Rabbits	Rabbit	Fusion		6				Tungsten
IMR Rabbits	Rabbit	Fusion		11				Ceramic composites
SCF	Rabbit	Fusion		12				SiC

## Experiment Design

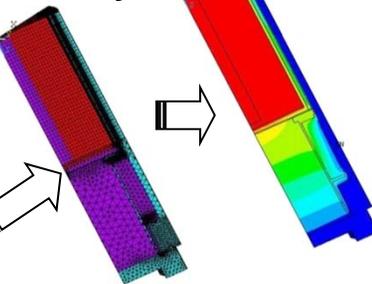
### Design Detail



### ANSYS Model



### Thermal Analysis



## Experiment Fabrication



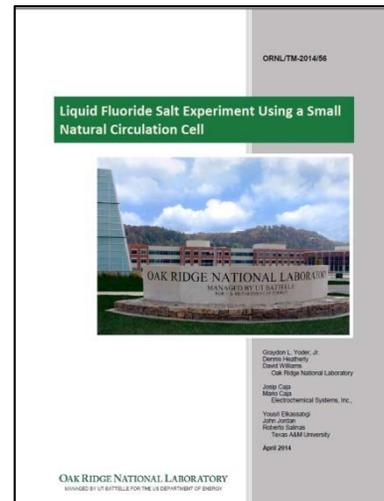
## Irradiation



# Publications



- Conference Paper - 1
- Letter Reports – 4
- ORNL TM Reports – 1
- Journal Articles - 6

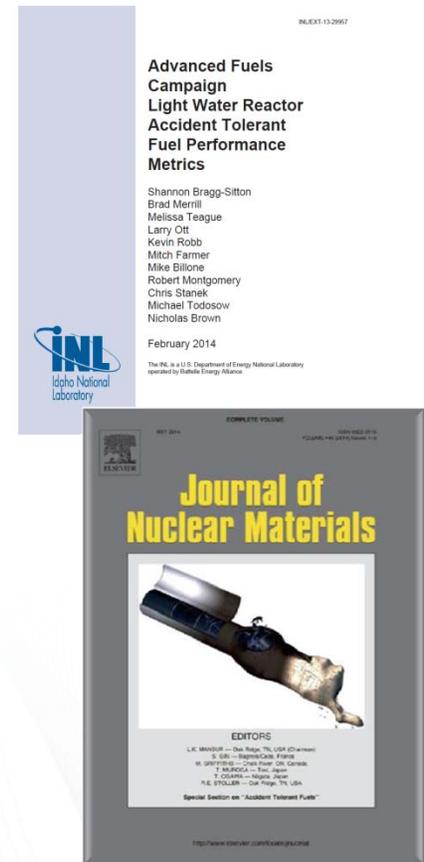


Graydon L. Yoder, Jr., Dennis Heatherly, David Williams, Yousri Elkassabgi, Joseph Caja, Mario Caja, John Jordan, and Roberto Salinas, *Liquid Fluoride Salt Experiment Using a Small Natural Circulation Cell*, ORNL/TM-2014/56, UT-Battelle, LLC, Oak Ridge National Laboratory, April 2014.

# Recent publications support DOE-NE Accident Tolerant Fuel (ATF) development



- ORNL working with other labs on the ATF program has resulted in five recently released publications.
- K. Robb and L. Ott contributed to multi-lab technical report on performance metrics for ATF:
  - *Advanced Fuels Campaign Light Water Reactor Accident Tolerant Fuel Performance Metrics (INL/EXT-13-29957)*
- Four articles in the Journal of Nuclear Materials (Vol. 448)
  1. *Accident tolerant fuels for LWRs: A perspective* (pp 374–379)  
S. J. Zinkle, K. A. Terrani, J. C. Gehin, L. J. Ott, L. L. Snead
  2. *The effect of fuel thermal conductivity on the behavior of LWR cores during loss-of-coolant accidents* (pp 512–519)  
K. A. Terrani, D. Wang, L. J. Ott, R. O. Montgomery (PNNL)
  3. *Preliminary assessment of accident-tolerant fuels on LWR performance during normal operation and under DB and BDB accident conditions* (pp 520–533)  
L. J. Ott, K. R. Robb, D. Wang
  4. *Scoping assessments of ATF impact on late-stage accident progression including molten core–concrete interaction* (pp 534–540)  
M. T. Farmer (ANL), L. Leibowitz (ANL), K. A. Terrani, K. R. Robb



# CASL and NEAMS collaborating with a small business (Kitware) on simulation workflow tools

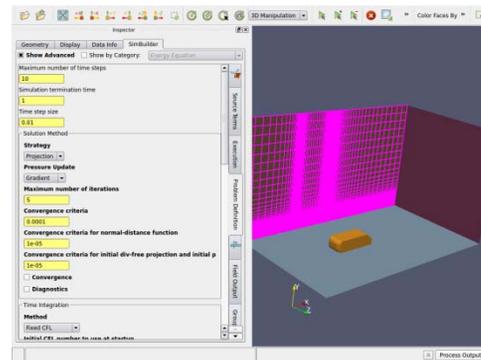
CASL

## CMB pre-processing tool

- Update on latest developments for creating Hydra input from CMB
- Configurable XML file for specifying Hydra input parameters
- Python script for generating Hydra input file
- Beta users to improve Hydra integration

Contributors:

A. Bauer, Kitware

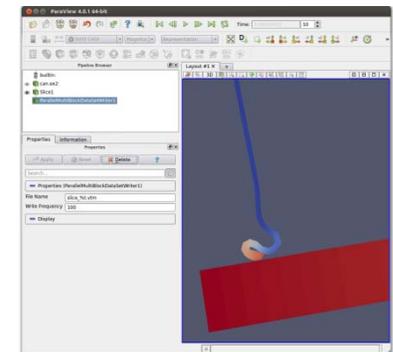


## ParaView tutorial

- Introduction to use
- Dealing with large data in parallel
- Connecting to HPC machines
- Python scripting for repeated tasks
- Catalyst for *in situ* analysis and visualization

Contributors:

D. DeMarle,  
Kitware

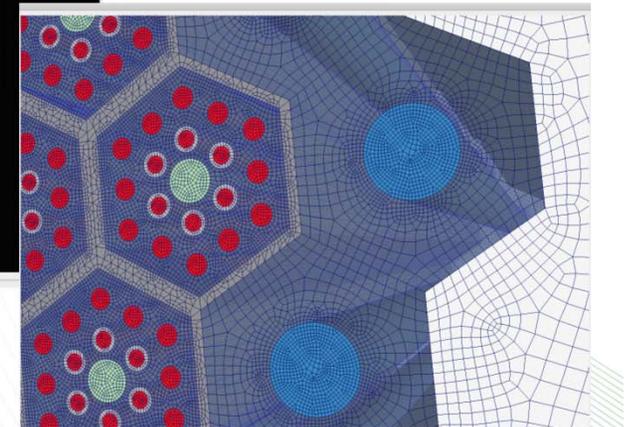
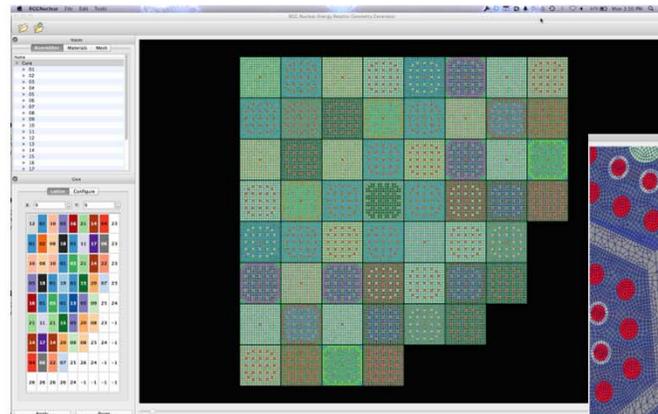


## RGG Application Tool

- Pin Editing
- Creating and Modifying Assemblies
- Creating and Modifying Cores
- Integration with MeshKit/RGG Tools
- Mesh Generation and Visualization

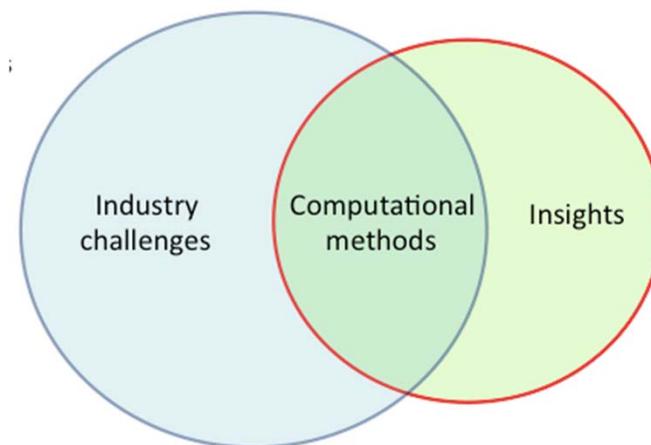
Contributors:

R. Jain, Argonne  
B. O'Bara, Kitware



# CASL is coordinating R&D needs with DOE Office of Nuclear Energy NEAMS Program

- DOE/NE Vision is for CASL to leverage NEAMS development and bring it to Industry
- Meeting at April NEAMS PI meeting to discuss CASL Needs. Example items:
  - Continue and expand fuels modeling (INL's BISON)
  - Support coupling methods development
  - Research on radiation transport algorithms
- Positive engagement with new NEAM leadership (New NEAMS NTD Marius Stan)
- Must consider new NEAMS approach to defining research
  - Defining “High Impact Problems” (or HIPS) what have a cost-sharing customer



# Improving coordination of the Energy Innovation Hubs

CASL

- Third annual Energy Innovation Hub meeting was held at Cal Tech on April 3-4 in Pasadena, CA
  - Management teams from the four remaining Hubs attended
  - Alex Larzelere was the only DOE participant
  - Meeting hosted by JCAP
- Outcomes
  - Value in working to create a Hub brand
    - *Hope is that common branding will help the Hubs become recognizable as unique project constructs (similar to ARPA-E and EFRC )*
  - Discussion about the need for tailored project management, milestone planning, and performance metric development
  - There's an obvious need for improved interaction between DOE and the Hubs
    - *CASL has much stronger support than other Hubs*
  - Agreed to continue looking for opportunities to coordinate activities between Hubs
    - *Examples include "Hub Day on the Hill" and finding ways to support development of the DOE Hub Leadership Council*



 OAK RIDGE  
National Laboratory

# CASL Activities

## CASL

- **Vera Release & Licensing**
- Phase 2 - Scope Definition (Milestone & Budget)
- Plan of Record-9 Document Development Update – All Focus Areas
- Education Program
- Kitware ParaView Training
- Hydra-TH Computational Model Builder (CMB)
- RGG/MeshKit Training
- Mamba/Hydra Integration Update and Development
- Peregrine Milestone Review
- Journal of Computational Physics
- VOCC VidoDesktop 3 Training
- Phase 2 - Proposal Preparation
- COBRA CTF Milestone Review
- Baseline Integration Milestone Review
- Core Simulator
- EPRI Test Stand Discussion
- Milestone or ACTS for PIRTS
- Insilico PCMM
- Evaluation of Coupling Approaches Milestone Review
- COBRA-TF Working Group Meeting
- EPRI Test Stand



## VOCC Tours

**6 tours for  
April 2014**

- William Magwood (Commissioner), NRC
- NEAMS Spring PI Meeting
- INL Laboratory Operations Leadership for RNSD
- World Nuclear Alumni for RNSD

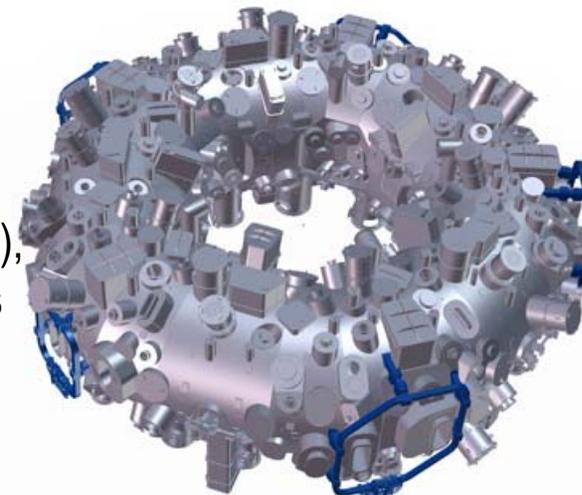
## Meetings

- **Energy Innovation Hub Meeting, Pasadena, CA, April 3-4**
- HPC Applications, Gleneden bch, OR, April 21-24
- **NEAMS PI Meeting, ORNL, April 29**
- CASL Phase 2 Renewal Proposal

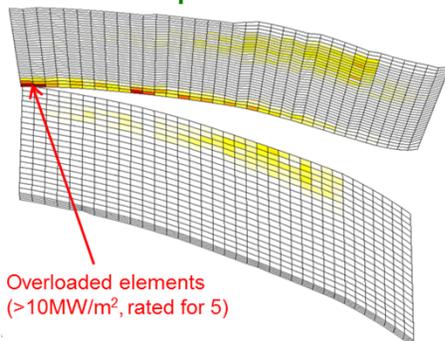
# W7-X scraper element

Dean McGinnis, Arnold Lumsdaine, Jeremy Lore, Jeff Harris

Wendelstein 7-X (W7-X) is a large superconducting stellarator in Greifswald, Germany scheduled to begin operation in June 2015



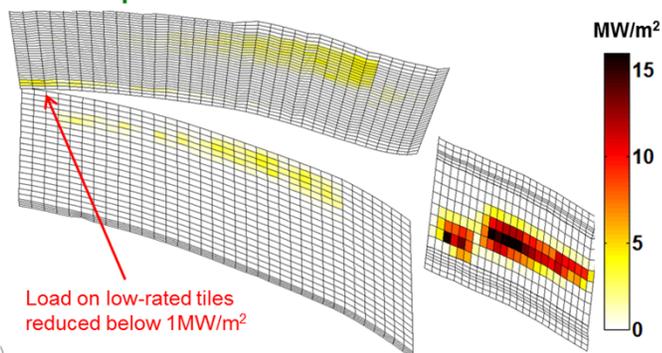
Without scraper



Overloaded elements (>10MW/m², rated for 5)

In long-pulse operation (beginning 2019), some water cooled divertor components can receive heat loads that are above allowable limits

With scraper

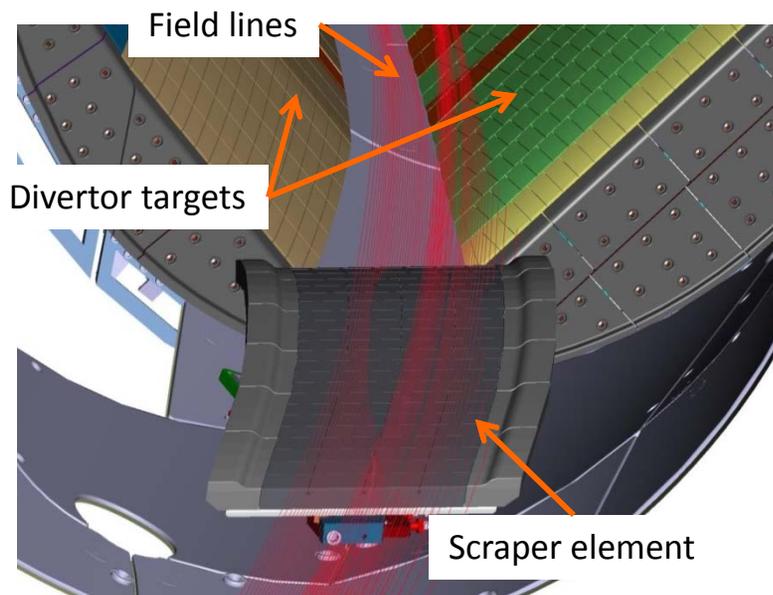


Load on low-rated tiles reduced below 1MW/m²

ORNL has been collaborating with the W7-X project to design a water cooled “scraper element” to capture some of this heat load (up to 20 MW/m²)

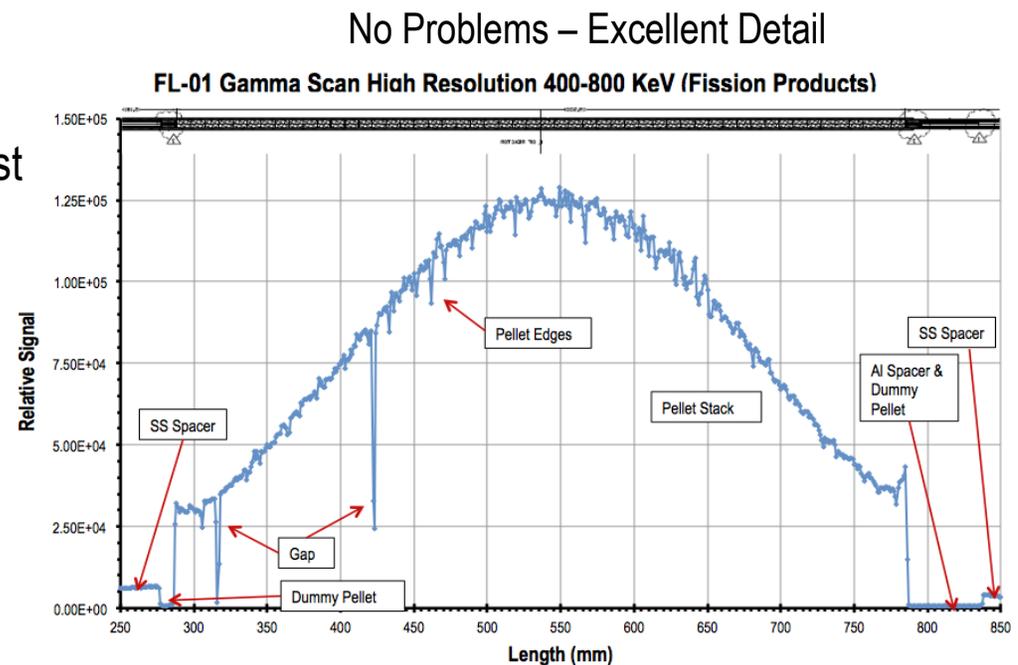
An uncooled prototype scraper element is being designed by ORNL that will be installed in W7-X early in 2017

A conceptual design review was successfully completed on April 9, 2014



## Pu-238 target pellet swelling investigated by gamma scanning – excellent detail – results verify design

- Pellet swelling can result in an increase in the pellet stack height and in extreme cases may exert forces on the ends of the targets
- Any forces must be well below the strength of the target clad and end welds to ensure reliable operation
- The first set of Pu-238 production targets were gamma scanned at Building 3525 to determine the pellet stack height and any pellet stack gaps
- The pellet stack height was nearly the same as the initial loading
- When the gaps are considered: pellets first shrink; then grow with increasing neutron flux
  - Still modeling pellet behavior
- This target has sufficient room for continued irradiation
- Future targets will use this information for internal clearances

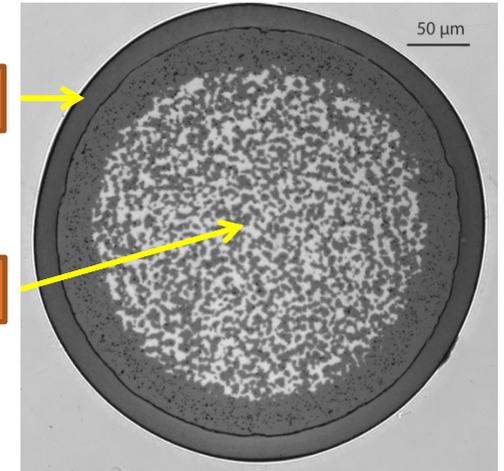


# Irradiation of AGR-3/4 Designed-to-Fail (DTF) coated particle fuel complete

- In 2011, the ORNL Advanced Gas Reactor (AGR) Fuel Development and Qualification Team completed fabrication of AGR-3/4 irradiation test compacts containing DTF fuel particles created for studying radioactive fission product diffusion from exposed kernels and retention in the kernel and surrounding carbon [Hunn et al., Nucl. Eng. and Design 271 (2014) 123-130]
- The AGR-3/4 irradiation experiment was removed from the Advanced Test Reactor on April 21, 2014, having reached its targeted burnup after approximately 369 effective full-power days; this successfully completed a Level 2 milestone for this test
- The DTF particles performed as intended; thin pyrocarbon seal coats ruptured as irradiation dose increased throughout the experiment, releasing Kr-85 bursts that were detected by the sweep gas monitoring system
- High-quality tristructural isotropic (TRISO) driver fuel particles surrounding the DTF provided representative fuel operating conditions throughout the experiment
- Post-irradiation examination of the fuel and surrounding graphite and compact matrix test rings is scheduled to begin in FY15

Seal Coat

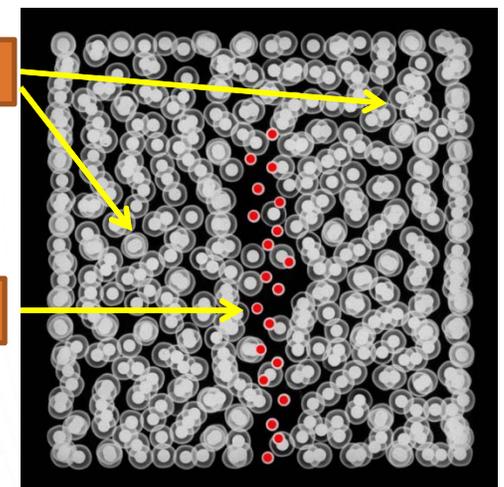
Kernel



DTF particle

Driver Fuel

DTF



DTF compact x-ray

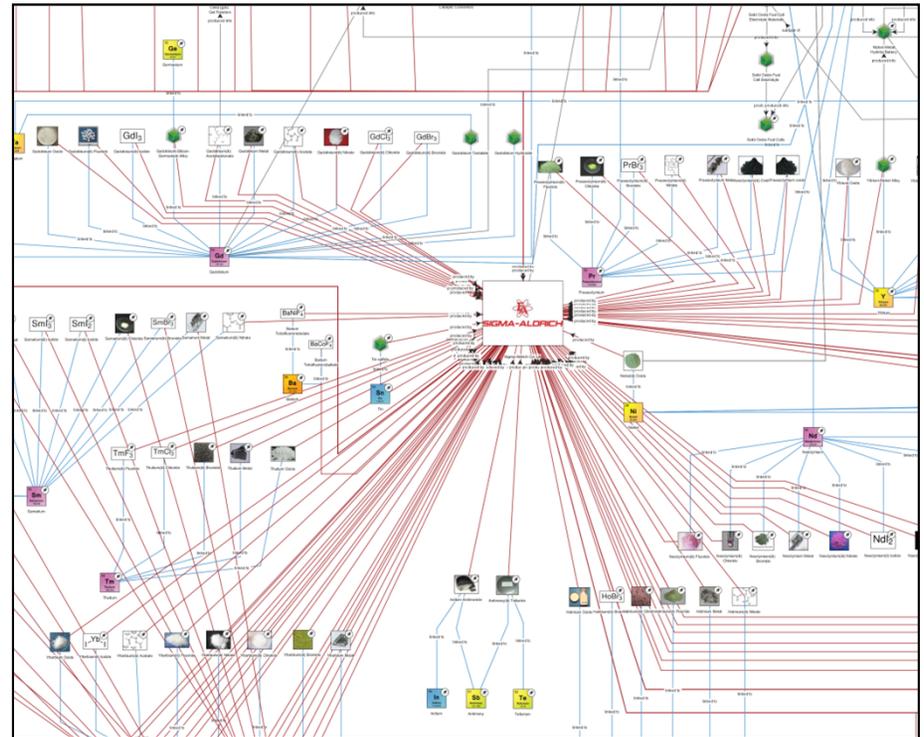
# Defense Logistics Agency (DLA) WFO Mercury Stockpile Stewardship Program – Major milestone completed

- Mobile Mercury Transfer System construction and acceptance testing were completed to ORNL specifications this year
- In April, a major milestone to train seven DLA operators on all equipment systems and program elements was completed by five ORNL MMTS experts at the Hawthorne Army Depot, Nevada
  - Ten specially prepared notebooks on specific subjects, 26 procedures, and hands-on training were delivered and reviewed with several hours of video recorded for use in future training of government staff
  - Personnel were trained on all aspects of facility operation and safety
- ORNL-prepared Nevada Chemical Action Prevention Program met
- Milestone critical to obtaining Permit to Operate in Nevada as planned in FY14



# Strategic Materials WFO Program continues through FY15

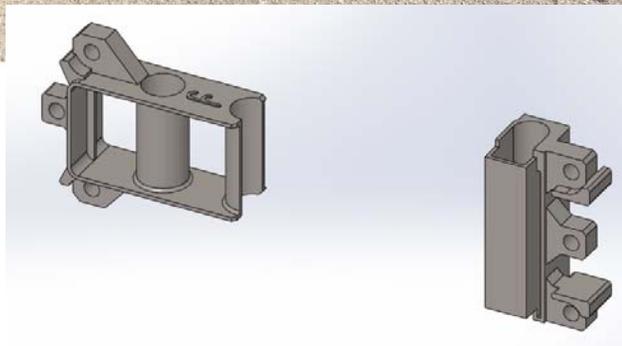
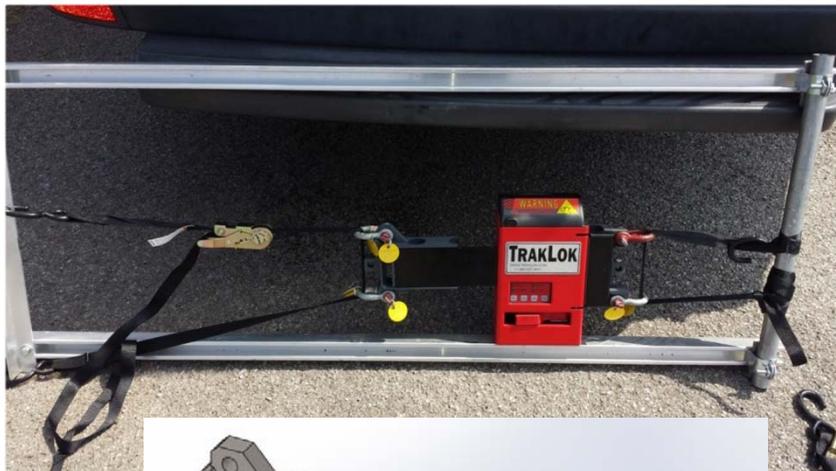
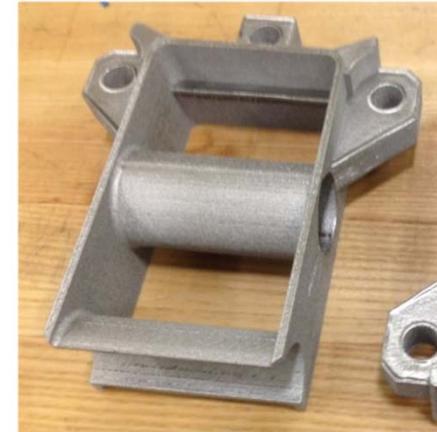
- ORNL's contract with Defense Logistics Agency – Strategic Materials has been amended to extend the period of performance of the program through FY15, with funding to be provided end FY14
- Extension allows year-long contracts with vendors in support of the Strategic Materials Analysis & Reporting Topography (SMART) system
- Also in April, ORNL contracted Sigma Aldrich to provide data on their material sources and customers
  - Distributer and manufacturer of specialty materials with unique knowledge of the global supply chain
  - To reduce the sensitivity of this information, the material sources are listed only as country and customers identified by associated North American Industry Classification System (NAICS) code



SMART System Displaying Sigma-Aldrich  
Material Connections

# Invention disclosure on GTRI transportation security device adapter

- Global Threat Reduction Initiative (GTRI) Team members Adam Aaron (FMNSD) and Paul Singley (NSITD) submitted invention disclosure to ORNL Intellectual Property in April for patentable design



- Invention allows GTRI Team to take devices designed for lock bars on cargo containers and apply them to flexible tie-down scenarios
- Produced at Manufacturing Demonstration Facility (MDF) using 3D printing rapid prototyping in plastic first, and finally metal
- ORNL pursuing patent and will develop in upcoming months

## Multi-Program High Bay Facility (7625/7627)

- Continued facility support for ITER resonant ring/line operations; Proto-MPEX reconfiguration; and Proto-MPEX magnet power supply system testing
- F&O began specifying and procuring materials for new fused disconnect switches for Hazard Category 3 breaker panels
- Released three new equipment-specific LOTO procedures and facility Administrative Control Procedure
- Installed Supervisory Control and Data Acquisition (SCADA) system enclosure in Building 7627
- Initiated efforts to salvage unneeded equipment currently being stored in 7041 and 7627
- Replaced leaking deionized water system pump
- Site visits by ORNL Deputy of Operations; ITER Safety, Health, and Quality managers

Liquid Helium Dewar Delivery to Cable Test Lab

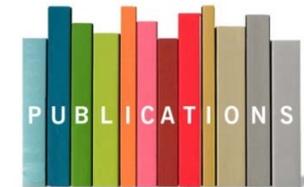


Rigging Proto-MPEX Components



5 MVA Transformers for Proto-MPEX Magnet Power Supply

# Fusion & Materials for Nuclear Systems Division publications



FMNSD

## Journals

- J. D. Hunn, R. A. Lowden, J. H. Miller, B. C. Jolly, M. P. Trammell, A. K. Kercher, F. C. Montgomery, and C.M. Silva, "*Fabrication and Characterization of Driver Fuel Particles, Designed-to-Fail Fuel Particles, and Fuel Compacts for the US AGR-3/4 Irradiation Test,*" *Nucl. Eng. and Design* 271 (2013) 123-130.
- C.A. Baldwin, J.D. Hunn, R.N. Morris, F.C. Montgomery, C.M. Silva, and P.A. Demkowicz, "*First Elevated Temperature Performance Testing of Coated Particle Fuel Compacts from the AGR-1 Irradiation Experiment,*" *Nucl. Eng. and Design* 271 (2013) 131-141.
- S.A. Ploger, P.A. Demkowicz, J.D. Hunn, J.S. Keyn, "*Microscopic analysis of irradiated AGR-1 coated particle fuel compacts,*" *Nucl. Eng. and Design* 271 (2013) 221-230.

## Letter Report

- J. D. Hunn, "*PIE on Safety-tested AGR-1 Compacts 4-1-2 and 4-4-3,*" ORNL/LTR-2014/101.

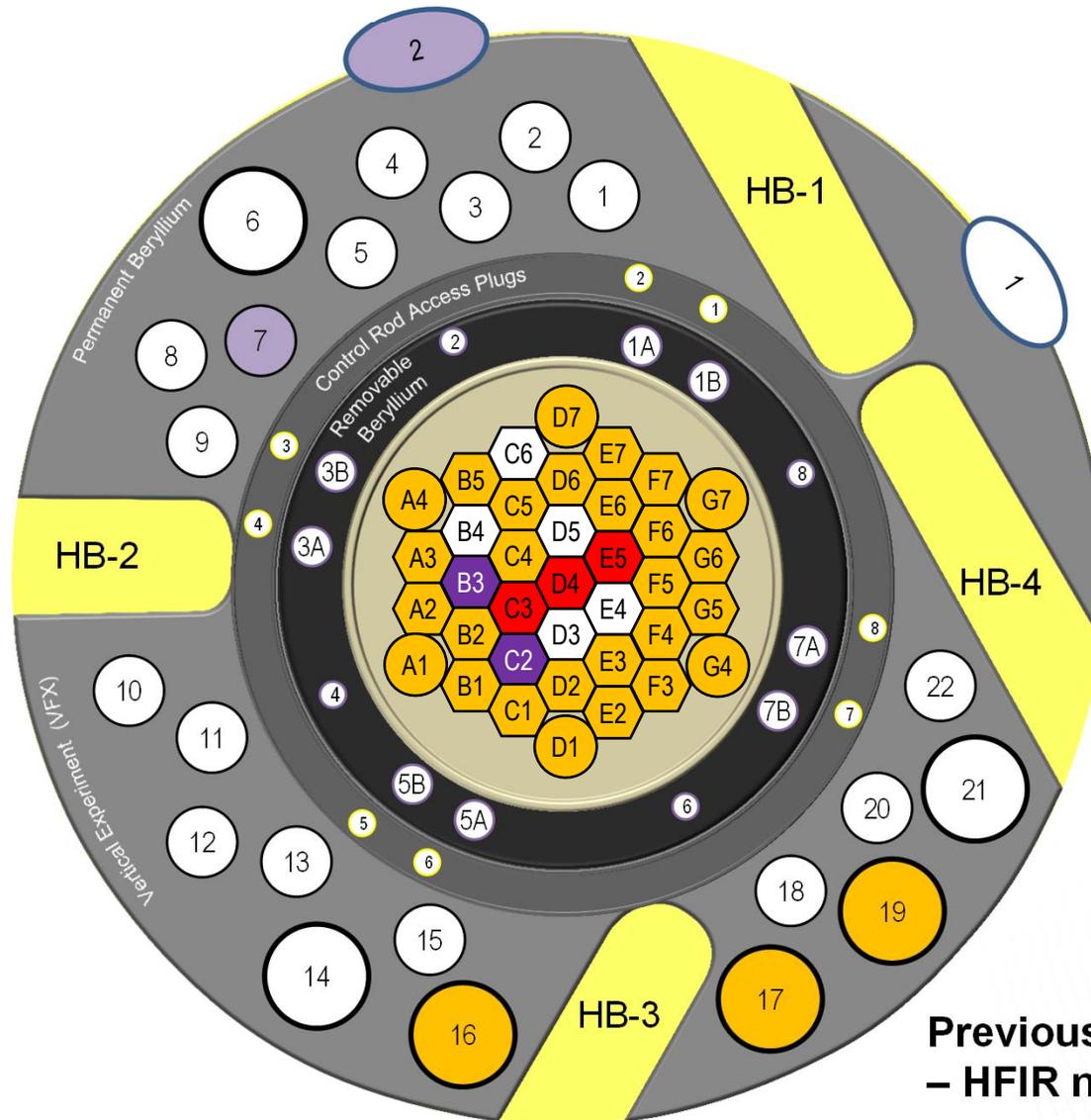
# End-of-Cycle 452 outage continued through April

HFIR

April 2014						
SU	M	T	W	TH	F	SA
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

Reactor OFF

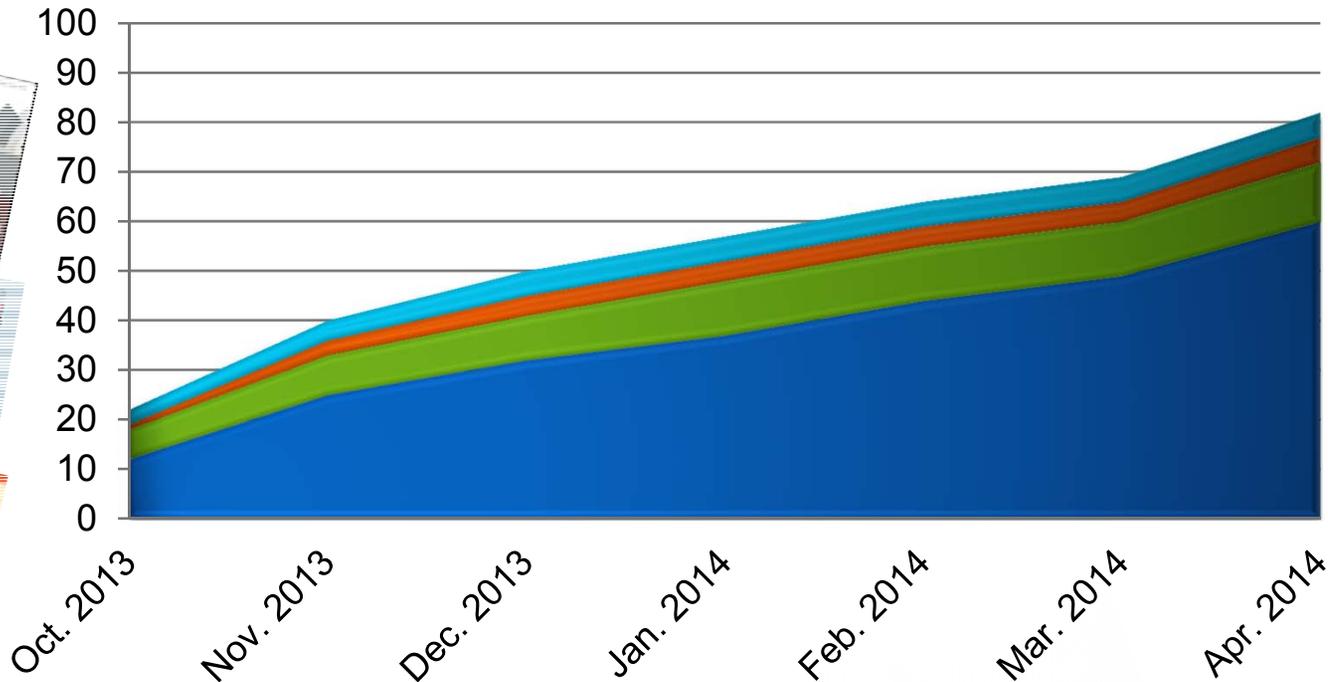
Reactor ON



- Isotope Production
- Isotopes for Research
- Materials Experiment
- Fuels Experiment
- Pneumatic Facility NAA
- Hydraulic Facility
- Neutron Scattering
- Available Positions

Previous cycle 452 graphical summary – HFIR not operating in April

# 13 new publications in April that cite HFIR in neutron scattering and materials science



- Modeling, Simulation and Reactor Operations (Cumulative)
- Isotope Production and Research (Cumulative)
- Materials Science (Cumulative)



# NNFD FY 2014 cumulative facility metrics

## Hot Cell Availability

<b>Bldg. 7920 April</b>	<b>99.8%</b>
<b>Cumulative</b>	<b>96.0%</b>
<b>Bldg. 7930 April</b>	<b>95.0%</b>
<b>Cumulative</b>	<b>97.7%</b>
<b>Bldg. 3525 April</b>	<b>90.0%</b>
<b>Cumulative</b>	<b>98.3%</b>
<b>Bldg. 3025E April</b>	<b>100%</b>
<b>Cumulative</b>	<b>97.1%</b>

## Facility Upgrades and Maintenance Activities

### 7920

- Programmed maintenance operations
  - AJ-124 HVAC System re-heat coil and AJ-111 HVAC System steam coil repaired.
  - Facility Semi-Annual Fire Protection System inspection, testing, and maintenance.
  - IPLT of COG, VOG, HCSA, and LA HEPA Filters.
  - Diesel Generator replacement in progress.
- 
- Glove Box Installations and Removal Operations / Installation of Glove Box Shields.

### 7930

- Programmed maintenance operations
  - Continued with Par Phase 1 facility electrical modifications in progress.
  - Completed S-15 Control Valve pressure boosting relay installation.
  - Completed installation of G64 Monitrons.
- 
- Cell F packages 10-year inspections underway.

### 3525

- Programmed maintenance operations
  - Completed upgrades to cell exhaust (K15) alarm transmitters
- 
- Continue glove box upgrades
- 

### 3025E

- Programmed maintenance operations
- Repaired MSM units
- Completed air handler maintenance
- Completed PM on roof exhaust fan
- I&C Technician completed ventilation system instruments annual calibrations
- Completed remaining H&R inspections

# NNFD FY 2014 business volume by customer metrics

## ORNL Hot Cell Usage by Sponsor (12-month period ending March 31, 2014)

