Nuclear Science User Facilities (NSUF) Overview and Status

J. Rory Kennedy, Ph.D. Director, NSUF Idaho National Laboratory

Nuclear Academics Discussion Meeting University of Liverpool, UK September 4-5, 2018



ŝ

NSUF Historical

- Established 2007 as US DOE Office of Nuclear Energy (DOE-NE) user facility. Intended to support the mission of DOE-NE by linking national intellectual capital with DOE-NE infrastructure.
- Irradiation Effects in Nuclear Fuels and Materials
- Founded at Idaho National Laboratory initially intended as a single institution user facility. INL remains lead and primary institution.
- NSUF operates as typical US user facility (no cost to user, competitive proposal processes, no funding to users) but also some unique aspects.
- Generally select projects through open competitive proposal processes
 - Consolidated Innovative Nuclear Research (CINR FOA, 1 call/year)
 - Irradiation + PIE (\$1.0M \$4.0M, up to 7 years) includes design, analyses, fabrication, transport, irradiation, disassembly, PIE, disposition
 - PIE only (~\$500K, up to 3 years)
 - Irradiation only (\$500K \$3.5M)
 - Beamlines at other user facilities
 - Possibility to also receive user R&D funding on limited work scopes
 - Rapid Turnaround Experiments (RTE, 3 calls/year, limited \$\$, executed within 9 months)

Proposals welcome from university, government laboratory, industry, and small business researchers. Only non-proprietary projects accepted. All awarded projects are fully forward funded.





NSUF Organization Chart





NSUF Capabilities Offer Research Opportunities





NSUF Projects Summary

FY 2007 – FY2018

- > Total of 39 CINR type projects executed
- Total of 30 CINR type projects currently ongoing
- Total of 222 RTEs executed
- Total of 78 RTEs ongoing
- > 369 total projects awarded
 - 229 projects to 44 US universities
 - 109 projects to 6 national laboratories
 - 14 projects to industry
 - 17 projects to 8 international (Oxford U., Manchester U., Liverpool U., ANSTO, CEA Seclay, Institutio Italiano di Technologia, NNL, SCK-CEN)

FY 2018

- Total of ~\$216M in DOE support (2007-2018)
- Effective FY2018 budget: ~\$30M (same as FY17)
- Total effective FY 2018 budget allocated to projects: ~\$12M direct (CINR + RTE) + ~\$3.4M supporting (PIE coordination, experiment managers, experiment analyses, shipping, SCK-CEN pilot projects)





Interest and Support Continue to Grow



CINR type projects support

Graphics created by Brenden Heidrich

- FY 2014 \$400K, 8 full proposals, 3 awards
- FY 2015 \$4.1M, 41 LOIs, 31 pre-proposals, 17 full proposals, 5 awards
- FY 2016 \$10M, 80 LOIs, 67 pre-proposals, 32 full proposals, 13 awards
- FY 2017 ~\$11M, 124 LOIs, 108 pre-proposals, 50 full proposals, 15 awards
- FY 2018 ~\$10M, 71 access requests, 21 full proposals, 9 awards

NSUF Publications



- Continuing to see results from early irradiation tests
- Increase in RTE awards.
- H-index score of 17
- > Journal of Nuclear Materials is by far the most published in journal.

NSUF International Relations

- VK National Nuclear User Facility (NNUF)
 - Ongoing for ~4 years
 - Continued strong interest in linked NFML. UK received authorization to "save" some specimens from decommissioning.
 - US invited to Nuclear Academics Discussion Meeting (NADM) and Executive Committee Meeting of National Nuclear User Facility (NNUF)
 - Access to NSUF facilities provided to UK researchers
 - Access to NNUF facilities not (yet) provided to US researchers (no proposal process)
 - NSUF would like affiliation agreement with NNUF but US-UK agreement stalled
- SCK-CEN BR-2 Reactor (Belgium)
 - DOE SCK/CEN MOU and Belgium Nuclear Research Centre INL CRADA signed in early FY 2017
 - 4 projects with in-kind contributions)
 - SCK-CEN continues to pursue EU-NSUF organization
- Halden Reactor Project (OECD-NEA, Norway)
 - Halden Reactor will shut down.
 - What should NSUF do?



Database Expansion and Linkage Combined Materials Experiment Toolkit (CoMET)



Quantifying the Impact of NSUF Fuels and Materials Understanding Scale (FaMUS)







