



NUCLEAR SAFETY RESEARCH AND DEVELOPMENT (NSR&D) PROGRAM UPDATE

EFCOG Workshop – February 2020

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AU-NSR&D PROGRAM BACKGROUND



- On May 21, 2004, the Defense Nuclear Facilities Safety Board (DNFSB) issued Recommendation 2004-1, Oversight of Complex, High-Hazard Nuclear Operations.
- In this Recommendation, the DNFSB noted DOE/NNSA should take steps to "ensure continued integration and support of research, analysis, and testing in nuclear safety technologies."
- Accordingly, DOE's Implementation Plan for Recommendation 2004-1 (October 12, 2006) committed to the following for NSR&D with the NNSA as the responsible organization:
- "Commitment 7: Develop processes to identify needed safety research and development needs across the DOE/NNSA and to determine if and to what extent those research needs are being addressed through current plans and budgets"; and
- "Commitment 8: Develop a method to ensure that nuclear safety research and development needs are identified and integrated into DOE/NNSA programming, planning, budgeting, and execution processes including methods to share the results of completed research and development."
- May 2011 - Office of Nuclear Safety was created within the Office of Health, Safety and Security (HSS).
- August 2011 - Program management responsibility transferred from NNSA to HSS to meet DOE's implementation plan commitments to establish NSR&D
- Since then, NSR&D has played an integral role as part AU-30



AU-NSR&D PROGRAM - OBJECTIVES



The objectives of the NSR&D Program are to:

- Carryout the DOE's Implementation Plan to *Improve Oversight of Nuclear Operations* written to address Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 2004-1, Oversight of Complex, High-Hazard Operations.
- Utilize the benefits of NSR&D in further preventing and/or reducing high consequence-low probability hazards/risks posed by DOE and NNSA activities
- Foster a DOE culture embracing NSR&D as a standard business practice to continually improve in nuclear facility safety
- Initiate, fund, and manage specific research and development activities that support implementation of DOE requirements



AU-NSR&D PROGRAM – FY20



What are we doing in FY20?

Dec 2019 – Issued FY20 Call for Proposals (CFP20)

- Annual Program Budget - \$1 million
- Six (6) Research Areas:
 - - Natural phenomena hazards (NPH), including seismic modeling and technology
 - - Fire protection (FP) and fire performance of DOE facilities and equipment
 - - Risk assessment and risk-informed approaches to safety assessment
 - - ARF/RF testing and modeling, including computer code development/assessment
 - - Improvements to nuclear protective equipment and/or instrumentation
 - - Technical bases for developing updated or new nuclear safety directives or guidance
- Feb 2020 – Received 21 proposals; Under Preliminary Review
- May 2020 – Decisions/Notifications to Proposal PI's.



AU-NSR&D PROGRAM – CURRENT ACTIVITIES



Current Activities:

- Ongoing AU-funded and managed NSR&D projects
 - SNL - NSRD-18 and -23, Fire-Contaminant Source Terms and Viability of Testing Surrogates
 - LANL - NSRD-19, Toward Development of Site-specific Vertical Ground Motions for Resiliency of Nuclear Facilities
 - LLNL - NSRD-20, Functional Testing of Novel MTC HEPA Filtration Media
 - Purdue/SRNL - NSRD-21, Novel, Low-cost Alpha Spectrometer
 - LLNL - NSRD-22, Incorporation of Dense Gas Capability to EPIcode Chemical Dispersion Model
- Most-Recently-Selected from the FY 2019 Call for Proposals
 - (PNNL) - Risk-informed, Performance-based Methodology to Manage Fire Protection Systems
 - (PNNL) - Compounding Risks from Natural Phenomena Hazards
 - Guidance Development for Incorporation of Kinematic Soil-Structure Interaction in the Seismic Design of DOE Nuclear Facilities (LANL/UNR)
 - Nuclear Safety Personnel Instrumentation for Monitoring/Tracking in Extreme & Normal Radiation Field Environments (PNNL/Purdue)
 - Improved PARE (Pressurized Airborne Release Equipment) for Powder Venting ARF/RF Testing (LANL)
 - Fire Contaminant Entrainment Modeling Improvements for Actinide Surrogate Development and Data Interpretation (SNL)



AU-NSR&D PROGRAM - ACCOMPLISHMENTS (TO DATE)



Program Accomplishments (to date since FY13):

- A 30 total NSR&D-funded efforts from AU-30;
- 17 project efforts completed (NSRD-01 to NSRD-17)
- 11 ongoing efforts (NSRD-18 – NSRD-30)
- NSRD-01 – LANL - New Glovebox-Glove – Implementation Effort Moving; Passed LANL Inspection; Glove mold deployment
- NSRD-17 – Purdue/ORNL - Neutron-Detector Dosimeter; DOE interest from EFCOG 2019;



AU-NSR&D PROGRAM - ACCOMPLISHMENTS (TO DATE)



Program Accomplishments (to date since FY13):

- Although not a specific objective of the NSR&D Program, but the collaboration between universities and the DOE laboratories has led to increased opportunities for:
 - (a) university students collaborating with professional staff members
 - (b) summer internships for student researchers
 - (c) full-time DOE lab employment for students who worked on NSR&D projects have joined DOE laboratory staffs following the completion of their university degrees (LLNL, INL, Purdue/PNNL)



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