FINANCIAL ASSISTANCE
FUNDING OPPORTUNITY ANNOUNCEMENT

U. S. Department of Energy

Idaho Operations Office

Fiscal Year 2023 Consolidated Innovative Nuclear Research

Funding Opportunity Announcement:
DE-FOA-0002732

Announcement Type: Initial – September 16, 2022

CFDA Number: 81.121

Issue Date: September 16, 2022

Informational Webinar: August 9-11, 2022
(Video links and presentations are available at www.NEUP.gov)

DOE Work Scope Office Hours: September 26-30, 2022 & October 3-7, 2022
(Video links and presentations are available at www.NEUP.gov)

Letter of Intent (Mandatory only for NSUF Applications)
Due Date: September 27, 2022 at 7 p.m. ET

R&D/NSUF Pre-Applications (Mandatory except for IRPs)
Due Date: October 11, 2022 at 7:00 p.m. ET

NSUF Preliminary Statement of Work
Due Date: November 30, 2022 at 7:00 p.m. ET

NSUF Final Statement of Work
Due Date: January 25, 2023 at 7:00 p.m. ET

Full R&D/NSUF and IRP Applications
Due Date: February 8, 2023 at 7:00 p.m. ET

NOTE: Deadlines are the dates/times by which DOE must receive the specified submittal.

Registration Requirements

There are several one-time actions applicants must complete in order to submit an application in response to this funding opportunity announcement (FOA) (e.g., register with the System for Award Management (SAM), obtain a Unique Entity Identifier, and create an account on NEUP.gov. Applicants, who are not registered with SAM, should allow up to five weeks to complete this requirement. It is suggested that the process be started as soon as possible.

If an applicant has not already done so, it must:

1. Register with the SAM: https://www.sam.gov/SAM/.

2. Obtain the Unique Entity Identifier (ID) number generated in SAM.gov.

3. Create an account on the NEUP.gov website at www.NEUP.gov using the 'Sign In' tab in the top right-hand corner. To create an account: 1) Click "Create a new account"; 2) Fill out the required information and click "Create User"; and 3) Fill out the information in the "My Information" section.

Questions

Questions regarding the content of this FOA must be submitted using the contact information found in Part VII, Section B of this FOA. DOE will try to respond to a question within three business days unless a similar question and answer have already been posted on the website.

Application Preparation

Applicants must prepare the application package and application forms from the NEUP.gov website: **https://neup.inl.gov/SitePages/Home.aspx**

Additional instructions are provided in Section IV of this FOA.

Application Submission

Apply for this FOA at www.NEUP.gov. Electronic applications and instructions are available at the NEUP.gov website. To access these materials: (1) go to www.NEUP.gov; (2) select "Sign In" from the top right hand corner of the screen; (3) enter your user credentials; (4) select "Applications" from the menu; and (5) click on "Create New Application" for the type of application you are creating. Apply at www.NEUP.gov. If you have any questions about your registration, contact the Innovative Nuclear Research (INR) Integration Office at 208-526-2123 or at neup@inl.gov.

CHECKLIST FOR AVOIDING COMMON ERRORS

Item	Issue
Page Limits	Strictly followed throughout application, including particular attention to: - Technical Abstract - Technical Narrative - CVs
Protected Personally Identifiable Information	Ensure none are present in the application.
Collaborators	List all collaborators in the Collaborators section of the application form, including name, organization, funding amount, phone, email, U.S. Person status and citizenship, country, state, city, and zip code. This includes any individual appearing in the project summary, technical narrative, benefit of collaboration, coordination and management plan, or budget documents.
Project Summary / Abstract	Name of applicant, Principal Investigator (PI), PI's institutional affiliation(s).
Budget	- Use current negotiated indirect cost and fringe benefit rates. - Include separate subaward budgets, if applicable.
Budget Justification	- Justify all requested costs. - Include separate subaward budget justifications, if applicable.
Current and Pending Support	Ensure complete disclosures of current and pending support for all PIs and other senior/key personnel named in the application.
Certifications and Assurances	Ensure that signatures are completed for both sections of the Certifications and Assurances documentation.
R&R Other Project Information	- If marking proprietary information, clearly mark the sections where proprietary information is in the narrative or other documents using the procedure outlined in the FOA. - If marking 'yes' to international collaboration, list all institutions and countries.

TABLE OF CONTENTS

LIST OF ACRONYMS

CFDA	Catalog of Federal Domestic Assistance
CFA	Call for Full Applications
CFR	Code of Federal Regulations
CINR	Consolidated Innovative Nuclear Research
COI	Conflict of Interest
DE	Department of Energy unique identifier FOA Number prefix
DMP	Data Management Plan
DOE	Department of Energy
FFATA	Federal Funding and Transparency Act of 2006
FFRDC	Federally Funded Research and Development Center
FOA	Funding Opportunity Announcement
FSRS	FFATA Subaward Reporting System
FWP	Field Work Proposal
FY	Fiscal Year
GAIN	Gateway for Accelerated Innovation in Nuclear
HBCU	Historically Black Colleges and Universities
ID	Identifier
IHE	Institute of Higher Education
IRP	Integrated Research Project
LOI	Letter of Intent
M&O	Management and Operating
M&TE	Measuring and Test Equipment
MSI	Minority Serving Institution
NCE	No Cost Time Extension
NE	Office of Nuclear Energy
NEUP	Nuclear Energy University Program
NFML	NSUF Nuclear Fuels and Materials Library
NSUF	Nuclear Science User Facilities
NNSA	National Nuclear Security Administration
OMI	Other Minority Institutions
PDF	Adobe Portable Document Format
PIE	Post-Irradiation Examination
PI	Principal Investigator
POC	Point of Contact
QA	Quality Assurance

R&D	Research and Development
RPA	Request for Pre-Applications
SAM	System for Award Management
SOW	Statement of Work
TCU	Tribal Colleges and Universities
U.S.	United States

PART I – FUNDING OPPORTUNITY DESCRIPTIONS

A. STATEMENT OF OBJECTIVES

This FOA is for Consolidated Innovative Nuclear Research (CINR) and is thus referred to in this document as the "CINR FOA".

A.1 Background and Objectives

The mission of the Department of Energy (DOE), Office of Nuclear Energy (NE) is to advance U.S. nuclear power to meet the nation's energy needs by:

1. Enhancing the long-term viability and competitiveness of the existing U.S. reactor fleet;
2. Developing an advanced reactor pipeline; and,
3. Implementing and maintaining the national strategic fuel cycle and supply chain infrastructure.

Collectively, all NE-sponsored activities support the Department's priorities to combat the climate crisis, create clean energy jobs with the free and fair chance to join a union and bargain collectively, and promote equity and environmental justice by delivering innovative clean energy technologies for nuclear energy systems.

All applications submitted under this CINR FOA must demonstrate a strong tie to at least one of these three mission priorities and highlight how it supports the DOE priorities.

NE conducts crosscutting nuclear energy research and development (R&D) and associated infrastructure support activities to develop innovative technologies that offer the promise of dramatically improved performance for its mission needs as stated above, while maximizing the impact of NE resources.

This CINR FOA addresses the competitive portion of NE's R&D portfolio, as executed through the Nuclear Energy University Program (NEUP) and the Nuclear Science User Facilities (NSUF). NEUP supports university-based infrastructure and R&D in areas relevant to the NE mission. By establishing the NSUF in 2007, NE opened access to material test reactors, beam lines, and post-irradiation examination facilities to researchers from U.S. universities, industry, and national laboratories, by granting no-cost access to world-class nuclear research facilities.

While this CINR FOA specifies many of NE's current and upcoming R&D priorities, NE reserves the right to respond to potential shifts in R&D priorities during Fiscal Year (FY) 2023 that may be driven by events, policy developments, or Congressional/budget direction. Further, NE reserves the right to fund all or part of an application to this CINR FOA.

A.2 NE Program Resources

For more information on current NE programs, please visit the following links provided in the sections below.

- **Fuel Cycle Technologies**: https://www.energy.gov/ne/initiatives/fuel-cycle-technologies

- **Reactor Technologies**: https://www.energy.gov/ne/nuclear-reactor-technologies
- **Crosscutting Technologies**: https://www.energy.gov/ne/nuclear-energy-enabling-technologies-neet
- **Nuclear Energy University Program (NEUP)**: https://neup.inl.gov
- **Nuclear Science User Facilities (NSUF)**: https://nsuf.inl.gov/

  NE funds the NSUF to facilitate the advancement of nuclear science and technology by providing access, at no cost to the user, to state-of-the-art experimental irradiation testing and Post-Irradiation Examination (PIE) facilities, as well as technical assistance, including the design and analysis of reactor experiments. This unique organization is best described as a distributed partnership with each facility bringing exceptional capabilities and expertise to the relationship, including reactors, beamlines, state-of-the-art instruments, hot cells, and, most importantly, expert technical and scientific assistance. Together, these capabilities and people create a nation-wide infrastructure that allows the best ideas to be proven using the most advanced capabilities. Through the NSUF, researchers and their collaborators are building on current knowledge to better understand the complex behavior of materials and fuels under irradiation.

  The NSUF allows research teams to obtain access to designated capabilities at various unique facilities detailed on the NSUF website at NSUF.inl.gov.

  Part I, Section B.2 of this CINR FOA describe application options for projects requiring NSUF capabilities.

  NOTE: Applicants requesting NSUF Access Only (with no R&D funding) will apply to one of the NSUF Access Only designated work scopes in Part 1, Table 1, a broader set of work scopes focused on NE priorities and tailored to align with NSUF capabilities.

  All NSUF research must be non-proprietary and awarded projects must publish their results at the DOE, Office of Scientific and Technical Information (OSTI) website for public access (https://www.osti.gov).

  NSUF Nuclear Fuels and Materials Library

  The NSUF Nuclear Fuels and Materials Library (NFML), which is owned by NE and curated by the NSUF, is a collection of specialized information and nuclear fuel and material specimens from past and ongoing neutron irradiation test campaigns, as well as real-world components retrieved from decommissioned power reactors, and donations from other sources. The NFML database can be accessed at NSUF.inl.gov. To continue the expansion of the NFML, any specimens created as the result of an awarded NSUF neutron irradiation project will be added to the NFML. The Principal Investigator (PI) will be given exclusive rights to the specimens for a three-year period of PIE following completion of the neutron irradiation portion of the project. The specimens will be listed as *Not Available* in the NFML throughout the three-year exclusivity period. To populate the NFML, the NSUF program office may recommend irradiating a larger number of

specimens than required for an awarded project. These extra specimens, not subject to the three-year exclusivity period, will be added to the NFML and made available for further research immediately after the completion of irradiation. PIs of all future awarded applications requesting specimens from previously awarded neutron irradiation tests are encouraged to contact the original PI(s) for potential collaboration. Although collaboration with the original PI(s) is encouraged, permission from the original PI(s) to use previously generated materials that are currently *Available* in the NFML is not required. It is strongly suggested that CINR FOA applicants contact the NFML Coordinator, listed at NSUF.inl.gov/Home/Staff, to confirm availability of specimens to be requested.

- **Gateway for Accelerated Innovation in Nuclear (GAIN)**: https://gain.inl.gov/

B. FUNDING OPPORTUNITIES

NE is seeking applications from U.S. universities, national laboratories, and industry to conduct nuclear energy-related research to help meet the objectives of the major NE funded research areas.

Specifically, this CINR FOA contains the following three separate funding opportunity areas:

1) U.S. University-led R&D Projects
2) U.S. University-led Integrated Research Projects (IRPs)
3) U.S. University-, National Laboratory-, or Industry-led Nuclear Science User Facilities (NSUF) Access Only Projects

These three funding opportunity areas are described in detail in Part I, Sections B.1-B.3 below:

B.1 U.S. University-led R&D Projects

The U.S. University-led R&D Projects funding opportunity area is available to U.S. university-led teams. In general, R&D is defined by the statement of objectives defined in the work scopes in Appendix A. R&D work must be directly tied to the NE mission. U.S. university PIs are invited to propose research projects in response to this area of the CINR FOA and the associated work scopes in Part IX, Appendix A of this CINR FOA

B.2 U.S. University-led IRPs

IRPs comprise a significant element of NE's innovative nuclear research objectives and represent significant needs to support the NE mission objectives. IRPs are significant projects within specific research areas. IRPs are intended to develop a capability within each area to address specific needs, problems, or capability gaps identified by NE. These projects are multidisciplinary and require multi-institutional partners. IRPs may include a combination of evaluation capability development, research program development, experimental work, and computer simulations. IRPs are intended to integrate several disciplinary skills to present solutions to complex systems design problems that cannot be addressed by a less comprehensive team.

Although a university PI must lead a proposing team and include at least one additional university collaborator, the proposed project team may include multiple universities and non-university partners (e.g., industry/utility, minority-serving institutions (MSIs), national laboratories, and international partners).

U.S. university PIs are invited to propose research projects in response to this area of the CINR FOA and the associated work scopes contained in Part IX, Appendix B of this CINR FOA.

B.3 U.S. University-, National Laboratory-, or Industry-led NSUF Access Only Projects

NSUF Access Only project applications require a Letter of Intent (LOI) in addition to the Pre-Application and, if invited (see Part V, Section B.1 of this CINR FOA), a Full Application. NSUF Access Only project applications will also require a feasibility review and readiness review in addition to the relevancy and technical reviews. Important aspects of NSUF Access Only applications are described in Appendix D of this CINR FOA and should be seriously considered when preparing applications. It is strongly recommended that all potential proposers review the contents of the NSUF website NSUF.inl.gov/ for vital information.

DOE intends to fully fund all awarded NSUF Access Only projects for the entire duration of the project, subject to any conditions or limitations contained in the award instruments. NSUF Access Only project attributes include:

- U.S. university, national laboratory, and industry PIs may apply for NSUF Access Only funding and by-way-of the associated work scope in Part IX, Appendix C of this CINR FOA. Applications must comply with the provisions of Part IX, Appendix D of this CINR FOA.

NSUF does not guarantee results but only access to NSUF capabilities. NSUF does not provide funding to the PI to support salaries, tuition, travel, or other costs typically supported via NE Program funds.

B.3.1 NSUF Readiness

Applicants must demonstrate readiness for NSUF access. ***In the NSUF Pre-Application, a summary (one or two paragraphs) of readiness is required. In the Full Application, a detailed description (up to one page) of readiness is required.*** Applications that do not adequately demonstrate readiness will not be considered for selection. Awarded projects that are found to not be ready for NSUF access may be cancelled. Additional information on the NSUF process is included in Part IX, Appendix D.

The following items must be completed prior to submitting a Pre-Application requesting NSUF access:

- Development, qualification, and demonstration of fabrication techniques, processes and methods on the materials to be studied;
- Pre-irradiation characterization (physical, mechanical, thermal, chemical and other applicable properties);
- Unirradiated material interaction studies (at irradiation temperature and chemistry);

- Unirradiated corrosion studies (at irradiation temperature and chemistry); and
- Pre-irradiation qualification of sensors, including functional and operational testing, and endurance testing at the irradiation environmental conditions (pressure, temperature, corrosion, etc.).

For projects utilizing fuels or materials coming from an on-going irradiation, the irradiation schedule at time of review rather than at the time of proposal submission will be taken into consideration for determining readiness of the project. A plan for delivery of fuel, material, or sensors must be addressed with specific attention to the following:

- Structural and cladding materials for neutron irradiation must be supplied to NSUF three months after project initiation for the material to be machined to proper sample configuration prior to encapsulation. Provide a statement of the supplier's commitments including lead times.
- For previously irradiated fuels and materials not residing in the NSUF NFML, the location (as specific as possible), condition, provenience, pedigree, radioactivity levels, isotopic content, material composition, configuration, ownership, and any other available information that will be needed to ship and/or prepare the fuel or material for examination must be identified.
- For PIE only awards, samples must be available to undergo PIE by October 1st following the award.
- For fuels and materials residing in the NSUF NFML, identify the specific specimen(s).
- For any fuels or materials supplied for the purpose of neutron irradiation, the applicant must own and have full authority to transfer ownership and title (free of any liens, claims of ownership, or other liabilities) to DOE.
- Supplier information and lead times for sensors need to be provided.
- For fuels or materials coming from other DOE programs (not NSUF), a statement of program commitment is required. If invited to submit a Full Application, a statement that includes concurrence from the appropriate DOE federal program manager or national technical director is to be attached in the Pre-Application in the section titled Post Submission Attachments.
    - Name File: 2023 Program Concurrence "Insert ID #"

Projects whose relevancy is based solely or primarily on fusion energy needs will not be considered. Pre-Applications must include a list of publications that resulted from previous NSUF supported projects.

NOTE: Access to NSUF capabilities will require agreement and final signature to the User Agreement (copy provided in Part IX, Appendix E). **The terms and conditions of the User Agreement are non-negotiable, and failure to accept the terms and conditions of the User Agreement will terminate processing and review of the NSUF applications.** To ensure compliance throughout the application review process, applicants must indicate in the LOI and Full Application submission that the User Agreement has been read, understood, and the terms and conditions are accepted. Further, submission of a Pre-Application and a Full Application indicates the applicant will comply with and agree to the terms and conditions of the User Agreement. Upon award of an NSUF supported project, the User Agreement must be signed

before activities will begin on the project. Failure to sign the non-negotiable User Agreement within 30 days of receipt of the User Agreement may result in cancellation of an awarded project.

Work scopes for the respective CINR FOA areas, with the indicated funding opportunities described above, may be found in the Part IX Appendices of this CINR FOA as follows:

- Appendix A: "Work scopes for U.S. University-led R&D Projects"
- Appendix B: "Work scopes for U.S. University-led IRPs"
- Appendix C: "Work scopes for U.S. University-, National Laboratory-, or Industry-led NSUF Access Only Projects"

Table 1. FY 2023 Work Scope Overview

Work Scope Code	Appendix	NSUF Access	Led by:			Work Scope Title
			University	National Laboratory	Industry	
Topic Area 1 – Reactor Development and Plant Optimization *(up to 3 years and up to $1,000,000)*						
RDO-1	A	No	X			Advanced Reactor Development
RDO-2	A	No	X			Improving Economic Competitiveness
RDO-3	A	No	X			Integrated Energy Systems and Industrial Applications
RDO-4	A	No	X			Remote Deployment/Dedicated Power Supplies Including Siting
RDO-5	A	No	X			Implementation of Artificial Intelligence and Machine Learning
RDO-6	A	No	X			Other Reactor Development and Plant Optimization
Topic Area 2 – Fuel Cycle Technologies *(up to 3 years and up to $1,000,000)*						
FC-1	A	No	X			Aqueous Separations Chemistry
FC-2	A	No	X			Molten Salt Separations and Solution Chemistry
FC-3	A	No	X			Spent Fuel and Waste Disposition: Disposal
FC-4	A	No	X			Spent Fuel and Waste Disposition: Storage and Transportation
FC-5	A	No	X			Other Fuel Cycle Technologies
Topic Area 3 – Fuels *(up to 3 years and up to $1,000,000)*						
FL-1	A	No	X			Accident Tolerant Fuels
FL-2	A	No	X			TRISO Fuels
FL-3	A	No	X			Metallic Fuels
FL-4	A	No	X			Other Fuels Topics
Topic Area 4 – Modeling and Simulation *(up to 3 years and up to $1,000,000)*						
M&S-1	A	No	X			Multi-scale Modeling
M&S-2	A	No	X			Verification and Validation/Uncertainty Quantification
M&S-3	A	No	X			Other Modeling and Simulation Topics
Topic Area 5 – Instrumentation and Controls *(up to 3 years and up to $1,000,000)*						
IC-1	A	No	X			Sensors and Instrumentation
IC-2	A	No	X			Advanced Control Systems
IC-3	A	No	X			Advanced Nuclear Cybersecurity
IC-4	A	No	X			Other I&C Topics

Work Scope Code	Appendix	NSUF Access	Led by:			Work Scope Title
			University	National Laboratory	Industry	
Topic Area 6 – Licensing and Safety *(up to 3 years and up to $1,000,000)*						
LS-1	A	No	X			Risk Informed Systems Analysis/Probabilistic Risk Assessment
LS-2	A	No	X			Safety Implications of Utilizing Process Heat
LS-3	A	No	X			Advanced Reactors and Fuel Cycle Facilities Materials, Accountancy, Control, and Physical Protection
LS-4	A	No	X			Advanced Reactor Licensing Topics
LS-5	A	No	X			Other Licensing and Safety Topics
Topic Area 7– Advanced Nuclear Materials *(up to 3 years and up to $1,000,000)*						
NM-1	A	No	X			LWR Core or Structural Materials
NM-2	A	No	X			Advanced Reactor Core or Structural Materials
NM-3	A	No	X			Advanced Manufacturing Technologies
NM-4	A	No	X			Material for Fuel Recycling Applications
NM-5	A	No	X			Other Advanced Nuclear Material Topics
Strategic Needs Blue Sky *(up to 3 years and up to $500,000)*						
SN-1	A	No	X			Thermal Hydraulics and Heat Transfer
SN-2	A	No	X			Reactor Physics
SN-3	A	No	X			Nuclear Chemistry
Integrated Research Projects						
IRP-1	B	No	X			Grand Challenge IRP – Accelerating Reactor Deployment
IRP-2*	B	No	X			Grand Challenge Research and Development at Minority Serving Institutions
Nuclear Science User Facilities - Access Only						
NSUF-1.1	C	Yes	X	X	X	Core and Structural Materials and Nuclear Fuel Behavior and Advanced Nuclear Fuel Studies
NSUF-1.2	C	Yes	X	X	X	High Performance Computing at Idaho National Laboratory

*University-led and collaboration with minority serving institutions (MSIs), historically black colleges and universities (HBCUs), or tribal colleges and universities (TCUs) is required. Please refer to Part I, Section B.2 for more information on and identification of MSIs.

PART II – AWARD INFORMATION

A. TYPE OF AWARD INSTRUMENT

DOE anticipates awarding grants under this CINR FOA with the exception of awards to national laboratories, which will be funded through field work proposals (FWPs), and NSUF Access Only Awards, which will be funded through an NSUF User Agreement.

B. ESTIMATED FUNDING

The estimated amounts identified for each of the CINR FOA areas are specified in Part II, Sections B.1-B.3 of this CINR FOA with ceilings and floors specified in Section C below. Funding for all awards is contingent upon the availability of funds appropriated by Congress for the purpose of this program.

B.1 U.S. University-led R&D Projects

NE currently estimates that it will fund approximately $41 million in awards for the U.S. University-led R&D Projects CINR FOA area.

B.2 U.S. University-led IRPs

NE currently estimates that it will fund approximately $6 million in awards for the U.S. University-led IRP Projects CINR FOA area.

B.3 U.S. University-, National Laboratory-, or Industry-led NSUF Access Only Projects

NE currently estimates that it will fund approximately $3 million in award value for the U.S. University-, National Laboratory-, or Industry-led Nuclear Science User Facilities Access Projects (NSUF Access Only) CINR FOA area.

C. MAXIMUM AND MINIMUM AWARD SIZE

The ceiling (i.e., the maximum amount for an individual award made under each area) and floor (i.e., the minimum amount for an individual award made under each area) for each of the three CINR FOA areas are identified in Part II, Sections C.1-C.3 below:

C.1 U.S. University-led R&D Projects

- Ceiling: up to $1,000,000 (3-year project), except as explicitly noted in individual work scopes.
- Floor: None.

C.2 U.S. University-led IRPs

- Ceiling: up to $3,000,000 (3-year project), except as explicitly noted in individual work scopes.
- Floor: None.

C.3 U.S. University-, National Laboratory-, or Industry-led NSUF Access Only Projects

- Ceiling: Irradiation/PIE Project: $4,000,000 NSUF Access Only Value (up to a 7-year project).
- Floor: None.

D. EXPECTED NUMBER OF AWARDS

The number of awards for each of the three CINR FOA areas is identified in Part II, Sections D.1-3 of this CINR FOA below. The number of awards is dependent on the size of the awards. DOE reserves the right to make more or fewer (or even no awards) depending on funding availability and/or the quality of the applications.

D.1 U.S. University-led R&D Projects

NE anticipates making approximately 43 awards under the U.S. University-led R&D Projects CINR FOA area.

D.2 U.S. University-led IRPs

NE anticipates making approximately 1 award under the U.S. University-led IRPs CINR FOA area.

D.3 U.S. University-, National Laboratory-, or Industry-led NSUF Access Only Projects

NE anticipates making approximately 2 or more awards under the U.S. University-, National Laboratory-, or Industry-led NSUF Access Only CINR FOA area.

E. ANTICIPATED AWARD SIZE

The anticipated award size for each of the three CINR FOA areas are identified in Part II Sections E.1-3 of this CINR FOA below. Amounts represent anticipated maximum per award.

E.1 U.S. University-led R&D Projects

DOE anticipates that awards will be up to $1,000,000 per award (except as explicitly stated in individual work scope areas).

E.2 U.S. University-led IRPs

NE anticipates that awards will be up to $3,000,000 for the U.S. University-led IRPs CINR FOA area, except as stated in individual work scopes.

E.3 U.S. University-, National Laboratory-, or Industry-led NSUF Access Only Projects

NE anticipates that award access value (funds not provided to the PI) should fall within the following ranges for U.S. University-, National Laboratory-, or Industry-led NSUF Access Only CINR FOA area:

- Neutron Irradiation only: $500,000 to $3,500,000, typically up to 3-year duration.
- Neutron Irradiation and PIE: $500,000 to $4,000,000, up to 7-year duration.

- Synchrotron or Neutron Beamline or PIE only: $50,000 to $750,000, typically up to 3-year duration.

- Ion or Gamma Irradiation only: $20,000 to $100,000, typically up to 3-year duration.

- Ion or Gamma Irradiation and PIE: $50,000 to $250,000, typically up to 3-year duration.

F. PERIOD OF PERFORMANCE

NE anticipates making awards for up to three years for each of the CINR FOA areas with the exception of awards involving NSUF access***, which may take up to seven years if neutron irradiation and PIE is requested.*** Assuming NE makes awards under this CINR FOA by September 2023, funded projects shall begin no later than October 1, 2023. Proposing different start dates for the project and budget periods may make the application ineligible for award. If a different project start date, other than October 1, 2023, is necessary for the successful performance of the project, it must be fully documented and justified in the application for consideration by NE.

G. TYPE OF APPLICATION

DOE will accept only new applications for each of the three CINR FOA areas defined in Part I, Section B of this FOA. Applications made to previous FOAs will not be considered. Previous applications can be resubmitted as a new application to this CINR FOA.

PART III – ELIGIBILITY INFORMATION

A. ELIGIBLE APPLICANTS

DOE has restricted eligibility for award in accordance with the Code of Federal Regulations, 2 CFR 910.126(b). This eligibility restriction does not apply to subrecipients, subawards, vendors, or team members of the prime/lead applicant. This CINR FOA is open to only U.S. universities, national laboratories, and industry entities.

NE strives to ensure energy justice and is fully committed to broadening the inclusion and contribution of those communities that have been historically underserved within its programs. NE strongly encourages diversifying its research portfolio through effective teams and/or partnerships with MSIs, including Historically Black Colleges and Universities (HBCUs) and Tribal Colleges and Universities (TCUs), or institutions located in a disadvantaged community, which may receive funding support from the project. The application must originate from the lead institution. All lead PIs must have an active account in the NEUP.gov website submittal system.

Information on Minority Serving Institutions (MSI) can be found at https://www2.ed.gov/about/offices/list/ope/idues/eligibility.html#tips. This information predominately covers institutions that have been awarded grants through the Department of Education and does not include all institutions that may meet the definition of an MSI. **This resource is not an exhaustive list of minority-serving institutions.**

For purposes of identifying MSIs in NE's application system, NE is using a directory based off of 2020 U.S. Department of Education data compiled by Rutgers University's Center for MSIs, which can be found here: https://www2.ed.gov/about/offices/list/ope/idues/2022eligibilitymatrix.xlsx. This list is also not an exhaustive list of MSIs but will be used as a starting point for auto-identifying MSIs.

If applicants believe that their institution qualifies as an MSI and is not listed, please contact neup@inl.gov with an explanation for how the university meets the conditions of being considered an MSI.

Research consortiums may be composed of diverse institutions including academia, national laboratories, non-profit research institutes, industry/utilities, and international partners. Research teams should strive to achieve the synergies that arise when individuals with forefront expertise in different methodologies, technologies, disciplines, and areas of content knowledge approach a problem together, overcoming impasses by considering the issue from fresh angles and discovering novel solutions.

This CINR FOA provides award opportunities to U.S. owned entities as defined in 2 CFR 910.124:

2 CFR 910.124(b) definitions include:

> United States means the several States, the District of Columbia, and all commonwealths, territories, and possessions of the United States.

United States-owned company means:

(1) A company that has majority ownership by individuals who are citizens of the United States, or

(2) A company organized under the laws of a State that either has no parent company or has a parent company organized under the laws of a State.

2 CFR 910.124(c):

A company shall be eligible to receive an award of financial assistance under a covered program only if DOE finds that -

(1) Consistent with § 910.124(d), the company's participation in a covered program would be in the economic interest of the United States; and

(2) The company is either -

(i) A United States-owned company; or

(ii) Incorporated or organized under the laws of any State and has a parent company which is incorporated or organized under the laws of a country which -

(A) Affords to the United States-owned companies opportunities, comparable to those afforded to any other company, to participate in any joint venture similar to those authorized under the Act [Section 2306 of the Energy Policy Act of 1992, 42 U.S.C. 13525];

(B) Affords to United States-owned companies local investment opportunities comparable to those afforded to any other company; and

(C) Affords adequate and effective protection for the intellectual property rights of United States-owned companies.

2 CFR 910.124(d):

Determining the economic interest of the United States. In determining whether participation of an applicant company in a covered program would be in the economic interest of the United States under § 910.124(c)(1), DOE may consider any evidence showing that a financial assistance award would be in the economic interest of the United States including, but not limited to -

(1) Investments by the applicant company and its affiliates in the United States in research, development, and manufacturing (including, for example, the manufacture of major components or subassemblies in the United States);

(2) Significant contributions to employment in the United States by the applicant company and its affiliates; and

(3) An agreement by the applicant company, with respect to any technology arising from the financial assistance being sought –

(i) To promote the manufacture within the United States of products resulting from that technology (taking into account the goals of promoting the competitiveness of United States industry); and

(ii) To procure parts and materials from competitive suppliers.

While international partners are encouraged to participate, no U.S. Government funding will be provided to entities incorporated outside of the United States or to a foreign government or any entity owned or controlled by a foreign government. Foreign government ownership means direct ownership of the applicant entity, its parent organization (e.g., trust, holding company, corporation, etc.), and any and all other entities in the corporate structure regardless of the applicant entity's place of incorporation and operation. NE will evaluate the benefit and contribution of any such proposed partnerships as part of its evaluation of the relevancy to the NE mission.

A collaborator is an individual that makes a defined, material contribution that is critical to the success of the project and/or contributing to joint publications. Any individual appearing in the project summary, technical narrative, benefit of collaboration, coordination and management plan, or budget documents should be listed directly as collaborators on the application form. All collaborators must be added to the application form with complete information. **Any individuals that do not meet these criteria should not be listed as collaborators on the application.** Applicants must have the full consent of each collaborator prior to listing them on an application form. Non-university collaborators (except in NSUF Access Only CINR FOA areas), in composite, can have no more than 20% of the total funds provided by the Government. An employee with a joint appointment between a university and a DOE national laboratory can apply through the institute of higher education (IHE) if the institution pays his or her salary and provides his or her benefits.

Part IV, Section I of this CINR FOA outlines funding restrictions for this CINR FOA.

A.1 Domestic Entities

For-profit entities, educational institutions, and nonprofits[1] that are incorporated (or otherwise formed) under the laws of a particular state or territory of the United States are eligible to apply for funding as a prime or subrecipient (only educational institutions may apply as a prime recipient for U.S. university-led projects).

[1] Nonprofit organizations described in section 501(c)(4) of the Internal Revenue Code of 1986 that engaged in lobbying activities after December 31, 2005, are not eligible to apply for funding.

State, local, and tribal government entities are eligible to apply for funding as a subrecipient (for U.S. university-, national laboratory-, or industry-led projects only).

DOE/National Nuclear Security Administration (NNSA) Federally Funded Research and Development Centers (FFRDC) and DOE Government-Owned Government-Operated laboratories are eligible to apply for funding as a prime recipient, team member, or subrecipient in the NSUF Access Only CINR FOA area. If an FFRDC is proposed as a team member or subrecipient, the requirements contained in Part III, Section C, apply.

Non-DOE/NNSA FFRDCs and non-DOE Government-Operated Government-Owned laboratories are eligible to apply for funding as a subrecipient but are not eligible to apply as a prime recipient.

Federal agencies and instrumentalities (other than DOE) are eligible to apply for funding as a subrecipient but are not eligible to apply as a prime recipient.

A.2 U.S. Incorporated Foreign Entities

U.S. incorporated foreign entities, whether for-profit or otherwise, are eligible to apply for funding under this CINR FOA as either a prime recipient or subrecipient subject to the requirements in 2 CFR 910.124.

A.3 Incorporated Consortia

Incorporated consortia, which may include domestic and/or foreign entities, are eligible to apply for funding as a prime recipient (U.S. university- or national laboratory-led projects only) or subrecipient. For consortia incorporated (or otherwise formed) under the laws of a State or territory of the United States, please refer to "Domestic Entities" in Part III, Section A.1 above. For consortia incorporated in foreign countries, please refer to the requirements in "U.S. Incorporated Foreign Entities" Part III, Section A.2 above.

A.4 Unincorporated Consortia

Unincorporated consortia, which may include domestic and foreign entities, must designate one member of the consortium to serve as the prime recipient/consortium representative (U.S. university- or national laboratory-led projects only). The prime recipient/consortium representative must be incorporated (or otherwise formed) under the laws of a State or territory of the U.S. The eligibility of the consortium will be determined by the eligibility of the prime recipient/consortium representative.

B. APPLICATION RESTRICTIONS

U.S. university PIs may submit up to six Pre-Applications (three of those applications may be as lead PI).

A PI may have no more than one IRP, or three R&D projects (excluding NSUF Access Only projects) funded at any time and may not submit more Full Applications than would be allowed by these restrictions.

PIs cannot submit the same application to multiple work scope areas, including the NSUF Access Only CINR FOA area.

NSUF Access Only projects are not bound by these eligibility restrictions, unless specified above.

NOTE: Procurement regulations require that applications submitted to this CINR FOA will be awarded to the applicant entity listed and will not be transferred pre-award to another institution if a lead PI changes institutions. Following the date set in this CINR FOA for receipt of applications, PIs that are moving from one institution to another during the CINR review time period are subject to the DOE-ID Changing Principal Investigator and Related Changes/Revisions Policy which is explained at www.NEUP.gov. Post award revision must adhere to the requirements of 2 CFR 200.308.

NOTE: Due to the COVID-19 pandemic, FY 2017-2019 active projects will not be counted toward eligibility restrictions.

The following application restrictions apply to lead PIs:

B.1 R&D Application Restrictions

Applicants are ineligible to submit an R&D application to this CINR FOA as a lead PI under any of the following circumstances:

- The PI has a currently funded IRP that will be active after December 31, 2023.
- The PI has three or more R&D projects that will still be active after December 31, 2023, excluding NSUF Access Only projects.
- The PI has a no-cost extension on any NE funded project (excluding Infrastructure) that will still be active beyond December 31, 2023, excluding extensions caused by NSUF.

B.2 IRP Application Restrictions

Applicants are ineligible to submit an IRP application to this CINR FOA as a lead PI under any of the following circumstances:

- The PI has a currently funded IRP that will be active after December 31, 2023.
- The PI has a no-cost extension on any NE funded project (excluding Infrastructure) that will still be active beyond December 31, 2023, excluding extensions caused by NSUF.
- The applicant is designated as PI for more than one currently funded NE project that will be active beyond December 31, 2023. Applicants with only one currently funded R&D project are eligible to apply for an IRP.
- If a PI chooses to submit an IRP application to this CINR FOA and has no currently funded R&D projects that will still be active after December 31, 2023, excluding NSUF Access Only projects, that PI is allowed to submit up to one R&D application as the lead. In the event that both the IRP and R&D applications are successful, only one award will be made with priority given to the IRP project.

C. COST SHARING

For applications led by universities, cost sharing is not required, but may be proposed. If cost sharing is provided, see 2 CFR part 200 for the applicable cost sharing guidance and Part VIII, Section G, of this CINR FOA below. Cost sharing is **NOT** a scored review criterion.

For applications led by all other entities (i.e., other than universities, nonprofit institutions/organizations, and FFRDCs), the provisions of the Energy Policy Act of 2005, Section 988, apply. Cost share of at least 20% of the total allowable costs of the project (i.e., the sum of the government share, including FFRDC contractor costs if applicable, and the recipient share of allowable costs equals the total allowable costs of the project) and must come from non-Federal sources, unless otherwise allowed by law. (See 2 CFR 200.29 for more information on the cost sharing requirements.)

Although the DOE/NNSA FFRDC contractor cost is not included in the total approved budget for the award, DOE will pay the DOE/NNSA FFRDC contractor portion of the effort under an existing DOE/NNSA contract. Recipient is not responsible for reporting on that portion of the total estimated cost that is paid directly to the DOE/NNSA FFRDC contractor.

By accepting federal funds under this award, you agree that you are liable for your percentage share of allowable project costs, even if the project is terminated early or is not funded to its completion. After award, failure to provide the cost share required may result in the subsequent recovery by DOE of some or all the funds provided under the award.

Cost sharing requirements do not apply to the value of the NSUF access.

D. OTHER ELIGIBILITY REQUIREMENTS

D.1 FFRDC Contractors

FFRDC contractors may be proposed as a lead institution (except as otherwise prohibited by this CINR FOA) or team member on another entity's application subject to the following guidelines:

Authorization for non-DOE/NNSA FFRDCs. The Federal agency sponsoring the FFRDC contractor must authorize in writing the use of the FFRDC contractor on the proposed project and this authorization must be submitted with the application. The use of an FFRDC contractor must be consistent with the contractor's authority under its award.

Authorization for DOE/NNSA FFRDCs. The cognizant contracting officer for the FFRDC must authorize in writing the use of a DOE/NNSA FFRDC contractor on the proposed project and this authorization must be submitted with the application. The following wording is acceptable for this authorization:

> "Authorization is granted for the Fill-in 1: [Name] Laboratory to participate in the proposed project. The work proposed for the laboratory is consistent with or complimentary to the missions of the laboratory, will not adversely impact execution of the DOE/NNSA assigned programs at the laboratory."

NOTE: The FFRDC's participation in the proposed project is subject to the terms and conditions of its management and operating (M&O) contract with DOE. Participants requiring access to the FFRDC facilities are subject to the FFRDC's policy and DOE regulations.

NOTE: If all FFRDC/non-FFRDC management has been notified of all submissions and acknowledgment of all participants are identified, individual Letters of Authorization may be submitted or submitted as blanket permission Identification of participants by name is to be included in the body or as a separate list.

NOTE: Letter of Authorization is not required for NSUF Technical Leads unless the Technical Lead is designated as a collaborator on the application and is requesting R&D funding support under this CINR FOA.

- **Value/Funding**: The value of, and funding for, the FFRDC contractor portion of the work will not normally be included in the award to a successful applicant. Usually, DOE will fund a DOE FFRDC contractor through the DOE FWP system and other non-DOE FFRDC contractors through an interagency agreement with the sponsoring agency.
- **Cost Share**: On industry led applications, the applicant's cost share requirement will be based on the total cost of the project (excluding NSUF access value). FFRDC costs are included as part of the Government cost share.
- **FFRDC Contractor Effort** (except for project(s) in support of NSUF):
  - The scope of work to be performed by the FFRDC contractor may not be more significant than the scope of work to be performed by the prime applicant.
  - The FFRDC contractor effort, in aggregate, shall not exceed 20% of the total estimated costs of the projects.
- **Responsibility**: The applicant, if successful, will be the responsible authority regarding the settlement and satisfaction of all contractual and administrative issues, including but not limited to, disputes and claims arising out of any agreement between the applicant and the FFRDC contractor.

Table 2 provides a summary of Parts II and III of this CINR FOA.

Table 2. Summary of Parts II and III

CINR FOA Areas	Applicable Work scope Appendix	Estimated Available Budget	Maximum Award Size	Project Duration	Cost Share	Collaboration
R&D	Appendix A	$41,000,000	$1,000,000	Up to 3 years, unless otherwise noted	Permitted but not required	University, national laboratory, industry, and foreign collaborations are encouraged, but no U.S. funding can go to entities that are not incorporated in the U.S.
IRPs	Appendix B	$6,000,000	$3,000,000	Up to 3 years, unless otherwise noted		
NSUF Access Only	Appendix C	N/A	No R&D Component	Refer to Part II, E.2		

PART IV – APPLICATION AND SUBMISSION INFORMATION

NOTE: The following requirements apply to all three areas defined in Part I, Section B, of this CINR FOA unless specific requirements are identified.

A. ADDRESS TO REQUEST APPLICATION PACKAGE

Electronic applications and instructions are available at the NEUP.gov website. To access these materials: (1) go to www.NEUP.gov; (2) select "Sign In" from the top right hand corner of the screen; (3) enter your user credentials; (4) select "Applications" from the menu; and (5) click on "Create New Application" for the type of application you are creating. Apply at: www.NEUP.gov.

Paper copies of the application package may be requested at:

INR Integration Office
Attn: Anna Podgorney
PO Box 1625 MS 3730
Idaho Falls, ID 83415

Telephone: 208-526-2123
Fax: 208-526-1844

B. DOCUMENT FORMAT REQUIREMENTS

All non-budget documentation (use templates where provided) is to be prepared using standard 8.5" × 11" paper with 1-inch margins (top, bottom, left, right) and a font size no smaller than Times New Roman 11 point. This is a requirement for all pages included in the document (i.e., table of contents, references, etc.). The preferred file format is Adobe Portable Document Format (PDF) for all documents except for spreadsheets. All spreadsheets are to be uploaded in Excel file format to the online application. Do **NOT** lock any cells in the spreadsheet.

Applicants must comply with all pertinent page limitations. Any text (including references and data tables) in a document that does not adhere to the requirements listed above (except graphics, graphs, charts, and equations) will be removed from the document and will not be reviewed. DOE reserves the right to dismiss applications that violate formatting requirements. Signature blocks must be signed by the designated official.

Documents should be saved using the document naming suggestion at the bottom of each document description. The tracking ID will automatically be generated by the application system and can be found at the top of the application form under "Tracking ID."

DOE reserves the right to dismiss applications which it deems, after initial review, to lack enough detail for reviewers to adequately judge technical merit. Applications submitted with corrupted, incomplete, or incorrect files may be dismissed without further review.

C. NSUF ACCESS ONLY APPLICATION SUBMITTAL INSTRUCTIONS

C.1 Letter of Intent (LOI)

LOIs are a requirement for projects needing NSUF access. LOIs must be submitted by the date and time specified in Part IV, Section G.1.

C.1.1 LOI Submittal Instructions

Application forms and instructions are available at the NEUP.gov website. To access these materials: (1) go to www.NEUP.gov; (2) select "Login" from the top right hand corner of the screen; (3) enter your user credentials; (4) select "Applications" from the menu; and (5) find "FY 2023 NSUF Letter of Intent" and click on "Create New Application" for the type of application you are creating.

LOIs should include the following:

- Title of project;
- Applicable work scope;
- Identification of NSUF Technical Lead(s), if known;
- Identification of NSUF facilities;
- Proposing PI and associated institution, if known; and
- A brief (<300 words) project description covering only the NSUF scope of the project.

Points of contact (POCs) for the NSUF facilities, as well as facility descriptions, are provided on the NSUF website at NSUF.inl.gov/Page/Partners. NSUF Partner Institution contacts are also the Technical Leads. Idaho National Laboratory (INL) Technical Leads are assigned by the NSUF Program Office. For assistance in identifying a NSUF Technical Lead or facility POC, please contact NSUF staff members listed on the website.

- 2-page limit, 11-point font.

Name File: 2023 LOI "Insert ID #"

C.1.2 Agreement Requirements

Access to NSUF capabilities will require agreement and final signature to the User Agreement (copy provided in Appendix D). **The terms and conditions of the User Agreement are non-negotiable and failure to accept the terms and conditions of the User Agreement will terminate processing and review of NSUF applications.** To ensure compliance throughout the application review process, applicants must indicate in the LOI that the User Agreement has been read, understood, and the terms and conditions are accepted. Further, submission of a Pre-Application and a Full Application indicates the applicant will comply and agree to the terms and conditions of the User Agreement. Upon award of an NSUF supported project, the User Agreement must be signed before activities will begin on the project. An applicant cannot submit an LOI without checking the "I Agree" checkbox. Failure to sign the non-negotiable User Agreement within 30 days of receipt of the User Agreement may result in cancellation of an awarded project.

C.2 Pre-Application

Refer to Part IV, Section D of this CINR FOA for Pre-Application requirements.

When completing the Pre-Application form via www.NEUP.gov, it is important that you link the LOI to the Pre-Application to retain the same tracking identification number. To link the LOI and Pre-Application, you must select your application from the Pre-Application drop-down list. Doing this assigns the same tracking identification number to the Pre-Application that is used for the LOI. The Pre-Application must be submitted from the same user account that the LOI was submitted under. **Do not start a new Pre-Application.**

NOTE: A summary of readiness is required in the Pre-Applications in accordance with Part I, Section B.3.1 of this CINR FOA.

C.3 NSUF Preliminary Statement of Work (Prelim SOW)

NSUF applicants are required to provide a Prelim SOW in support of their NSUF Pre-Application. The Prelim SOW must be submitted at NEUP.gov using the provided Statement of Work Template.

The Prelim SOW is necessary to inform the NSUF feasibility review and determine a preliminary value (cost) for NSUF access. The document is not used for the merit or readiness reviews. The Prelim SOW will be appended to the already submitted Pre-Application. To append the Prelim SOW: 1) Find the submitted Pre-Application in the "My Applications" section of the submission website; 2) Open the submitted Pre-Application by using the 'pencil' icon; 3) Scroll to the bottom of the application form; and 4) Click "Attach File" on the "Post Submission Attachment" section and attach the Prelim SOW.

Any submissions uploaded or altered after the deadline outlined in the CINR FOA will be disregarded. Do not make changes to the Prelim SOW after the submission deadline, as the upload timestamp is used to confirm timely submission:

Name File: 2023 Prelim SOW "Insert ID #"

NOTE: Do not resubmit the Pre-Application. A timestamp will appear in the "File Upload Date" area, which is confirmation that the Prelim SOW was appended correctly.

C.4 NSUF Final Statement of Work (Final SOW)

If an NSUF applicant is invited to submit a Full Application, a Final SOW is required, prior to the submittal of their Full Application. Final SOW documents are submitted at NEUP.gov using the provided Statement of Work Template.

The Final SOW is necessary to complete the NSUF feasibility review and determine a value (cost) for NSUF access. The document is not used for the merit or readiness reviews. The Final SOW is not included in the technical peer review. Technical details that will inform a peer reviewer must be included in the 15-page technical narrative.

Final SOW documents are submitted as an additional document to the already submitted NSUF Pre-Application. To append the Final SOW: 1) find the submitted Pre-Application in the "My Applications" section of the submission website; 2) Open the submitted Pre-Application by using the 'pencil' icon; 3) Scroll to the bottom of the application form; and 4) Click "Attach File" on the "Post Submission Attachment" section and attach the Final SOW.

NOTE: Do not resubmit the Pre-Application. A timestamp will appear in the "File Upload Date" area, which is confirmation that the Statement of Work was appended correctly:

Name File: 2023 FinalSOW "Insert ID #"

C.5 Full Application

Refer to Part IV, Section E of this CINR FOA for Full Application requirements.

NOTE: A detailed summary of readiness is required in the Full Application in accordance with Part I, Section B.3.1 of this CINR FOA.

D. CONTENT AND FORM OF ALL PRE-APPLICATIONS (Mandatory except for IRPs)

Pre-Applications are a mandatory requirement for R&D and NSUF Access Only Projects (in Appendices A and C of this CINR FOA) for U.S. University-, National Laboratory-, or Industry-led projects. Pre-Applications must be submitted by the date and time specified in Part IV, Section G.2 of this CINR FOA.

The PI and named collaborators identified in the Pre-Application may not be changed in the Full Application without adequate justification and consent of the Contracting Officer.

The following information shall be provided for all Pre-Applications:

D.1 Pre-Application Narrative

Applicant shall provide a narrative that addresses the specific information below:

- Title of project.
- Technical work scope identification (e.g., NM-1). The PI is responsible for selecting the appropriate work scope, and this may not be changed between the Pre-Application and Full Application.
- Name of PI(s) and associated organization(s).
- A summary of the proposed project, including a description of the project and a clear explanation of its importance and relevance to the objectives in Part I Section A.
- Major deliverables and outcomes the R&D will produce.
- Estimated cost of project (not including value of any NSUF access).
- Timeframe for execution of proposed project (specify the time period for R&D, one-, two-, or three-year period or up to seven years for NSUF).

- Specific facilities and equipment access requirements (for the NSUF access portion only).
- A clear and concise summary of the readiness of the project for NSUF access (as described in Part I, Section B.3.1 of this CINR FOA).
- Proprietary data, such as chemical composition or physical properties of a material, that the applicant wishes to protect during the irradiation or PIE phase of the project. This may negatively impact the selection of the project.

Pages outside the specified page limits and font size, including references, will be redacted and unavailable for evaluators to review.

- 5-page limit, 11-point font.

Name File: 2023 Pre-Application Narrative "Insert ID #"

D.2 Benefit of Collaboration

Applicant shall provide a narrative that includes an explanation of the contribution that will be made by the collaborating organizations and/or facilities to be utilized. It may contain brief biographies of staff and descriptions of the facilities wherein the research will be conducted. Please indicate within this section whether the application has benefit or influence on other ongoing or proposed NE R&D projects (e.g., modeling and simulation in one application and effect validation in a separate application).

This document is required unless the application only has a single principal investigator.

Pages outside the specified page limits and font size, including references, will be redacted and unavailable for evaluators to review.

- 4-page limit, 11-point font.

Name File: 2023 RPA Benefit of Collaboration "Insert ID #"

D.3 Publications

Applications must include a list of publications that resulted from previous NE (NEUP, NEET, NSUF) funded projects. A reference to the project that supported each publication should be included. If the PI has not led an NE (NEUP, NEET, NSUF) project, this document is not required.

- No page limit.

Name File: 2023 RPA NE Supported Publications "Insert ID #"

D.4 Principal Investigator Vitae

The lead PI shall provide a brief curriculum vitae (CV) that lists the following:

- Contact information.
- Education and Training: provide institution, major/area, degree, and year for undergraduate, graduate, and postdoctoral training.

- Research and Professional Experience: beginning with the current position list, in chronological order (newest to oldest), professional/academic positions with a brief description.
- Publications: Provide a list of up to 10 publications most closely related to the proposed project. For each publication, identify the names of all authors (in the same sequence in which they appear in the publication), the article title, book or journal title, volume number, page numbers, year of publication, and website address if available electronically.
- Patents, copyrights, and software systems developed may be provided in addition to or substituted for publications.
- Synergistic Activities: List no more than five professional and scholarly activities related to the effort proposed.

Pages outside the specified page limits and font size, including references, will be redacted and unavailable for evaluators to review.

- 2-page limit, 11-point font.

Name File: 2023 RPA "Last Name of Individual" "Insert ID #"

D.5 Collaborators

A collaborator is an individual who makes a defined, material contribution that is critical to the success of the project and/or contributing to joint publications. Any individual appearing in the project summary, technical narrative, benefit of collaboration, coordination and management plan, or budget documents should be listed as a collaborator directly on the application form. The applicant must have the full consent of all collaborators prior to submitting an application. **Any individuals that do not meet these criteria should not be listed as collaborators on the application.**

D.6 Agreement Requirements

Institutions will be expected to follow Quality Assurance (QA) principles and requirements in conducting R&D activities. If the application is successful, the integrity of R&D products and their usability by NE is predicated on meeting QA requirements, as they apply to a specific scope of work and associated deliverables. Further, each institution serving as a team member to the proposed project shall be identified in the Pre-Application with its commitment made to collaborate in the CINR FOA process.

If applicable, access to NSUF capabilities will require agreement and final signature to the User Agreement (copy provided in Part IX, Appendix E of this CINR FOA). **The terms and conditions of the User Agreement are non-negotiable, and failure to accept the terms and conditions of the User Agreement will terminate processing and review of NSUF applications.** To ensure compliance throughout the application review process, applicants must state, during the NSUF Access Only and Full Application submission processes, that the User Agreement has been read, understood, and the terms and conditions are accepted. Further, submission of a NSUF supported Pre-Application and a Full Application indicates the applicant will comply and agree to the terms and conditions of the User Agreement. Upon award of an

NSUF supported project, the User Agreement must be signed before activities will begin on the project. Failure to sign the non-negotiable User Agreement within 30 days of receipt of the User Agreement may result in cancellation of an awarded project.

E. CONTENT AND FORM OF ALL FULL APPLICATIONS

Applicants must provide all information requested. Forms and optional templates may be used to provide the information in accordance with the instructions below. Files that are attached must be in PDF format, unless otherwise specified in this announcement. Optional document templates can be found on the NEUP.gov website by clicking the 'Documents' button at the bottom of the front page (https://neup.inl.gov/SitePages/Related_Documents.aspx).

You must save the Full Application before a tracking ID number will be generated.

E.1 Conflict-of-Interest (COI) Acknowledgement

The DOE interim Conflict of Interest Policy for Financial Assistance (COI Policy) can be found at Financial Assistance Letter No. FAL 2022-02 | Department of Energy. This policy is applicable to all non-Federal entities applying for, or that receive, DOE funding by means of a financial assistance award (e.g., a grant, cooperative agreement, or technology investment agreement) and, through the implementation of this policy by the entity, to each Investigator who is planning on participating in, or is participating in, the project funded wholly or in part under the DOE financial assistance award. DOE's interim COI Policy establishes standards that provide a reasonable expectation that the design, conduct, and reporting of projects funded wholly or in part under DOE financial assistance awards will be free from bias resulting from financial conflicts of interest or organizational conflicts of interest. The applicant is subject to the requirements of the interim COI Policy and within each application for financial assistance, the applicant must certify that it is, or will be by the time of receiving any financial assistance award, compliant with all requirements in the interim COI Policy. The applicant must flow down the requirements of the interim COI Policy to any subrecipient non-Federal entities.

The applicant is required to disclose, manage, and report conflicts of interest as per the DOE interim COI Policy. Check the appropriate box on the application form certifying compliance with the COI Policy. If any disclosures need to be made, upload a COI document to the COI disclosure area of the application form.

Name File: 2023 CFA COI "Insert ID #"

E.2 SF-424 Research and Related (R&R)

Applicants shall complete the SF-424, R&R form, available at www.NEUP.gov and upload a completed and signed PDF copy of the form with the application.

Name File: 2023 CFA SF424RR "Insert ID #"

E.3 R&R Other Project Information

Applicants shall complete items 1–6 on the R&R Other Project Information form available at www.NEUP.gov, and upload a completed PDF copy of the form. Items 7-12 will be completed in the application form and do not need to be completed here.

Name File: 2023 CFA R&R Other Project Information "Insert ID #"

E.4 Project Summary/Abstract

(Use Provided Template on Application Site)

The project summary/abstract must contain a summary of the proposed activity, suitable for dissemination to the public. It should be a self-contained document that identifies the following: the name of the applicant; the name of the PI(s); the project title; a list of major deliverables; the scope and objectives of the project; a description of the project, including major tasks (phases, planned approach, etc.) and methods to be employed; the potential impact of the project (i.e., benefits, outcomes); and the names of major participants (for collaborative projects). This document must not include any proprietary or sensitive business information as NE may make it available to the public after awards are made.

Pages outside the specified page limits and font size, including references, will be redacted and unavailable for evaluators to review.

- 1-page limit for R&D, 11-point font. (Appendix A Template) (Appendix C Template)
- 2-page limit for IRPs, 11-point font. (Appendix B Template)

Name File: 2023 CFA Technical Abstract "Insert ID #"

E.5 Project Narrative

Applicant shall provide a written narrative addressing the strategy to execute R&D that supports the specified Technical Work Scope. The documentation provided shall include the items specified below:

- Application title.
- Final Technical Work Scope Identification (FL-1, IC-1, etc.).
- Project Objectives: Provide a clear, concise statement of specific objectives/aims of the proposed project in support of the NE mission.
- Proposed scope description.
- Logical path to accomplishing scope, including descriptions of tasks. This section will provide a clear, concise statement of the specific objectives/aims of the proposed project. This section should be formatted to address each of the merit review criterion and sub-criterion listed in Part V, Section A. Provide sufficient information so that reviewers will be able to evaluate the application in accordance with these merit review criteria. **DOE has the right to evaluate and consider only those applications that separately address each of the merit review criteria**.
- Relevance and Outcomes/Impacts: This section will provide a clear explanation of its importance and relevance to the NE mission as described in the objectives in Part I Section A.
- Schedule: Define timelines for executing the specified work scope, including all important activities or phases of the project. Successful applicants must use this schedule when reporting project progress.

- Milestones and deliverables.
- Type/Description of facilities that will be used to execute the scope (if applicable).
- The roles and responsibilities of each partnering organization in the execution of the work scope. Describe the role and work to be performed by each participant/investigator, the business arrangements between the applicant and participants, and how the various efforts will be integrated and managed.
- Unique challenges to accomplishing the work and planned mitigations.
- Information, data, plans, or drawings necessary to explain the details of the application.
- Source, scope, and duration of R&D funding (i.e., support for the PI), if applicable, associated with request for NSUF Access Only.
- A stand-alone detailed description of the readiness of the project for NSUF Access Only (as described in Part I, Section B.3.1)
- Proprietary data, such as chemical composition or physical properties of a material, that the applicant wishes to protect during the irradiation or PIE phase of the project. This may negatively impact the selection of the project (NSUF Access Only).

Page limits include cover page, table of contents, charts, graphs, maps, photographs, tables, references and other pictorial presentations while complying with the document format instructions in Part IV, Section B. **Pages outside the specified page limits and font size, including references, will be redacted and unavailable for evaluators to review.**

- All R&D Projects: 10-pages, 11-point font.
- All IRP Projects: 50-pages, 11-point font.
- All NSUF Projects: 15-pages, 11-point font.

Do not include any internet addresses (URLs) that provide information necessary to review the application; information contained in these sites will not be reviewed.

Name File: 2023 CFA Technical Narrative "Insert ID #"

E.6 Vitae (Technical Expertise and Qualifications)

Applicant shall name all teaming partners by name and organization, as well as their proposed roles and responsibilities. For collaborators (including senior key person), who will contribute in a substantial, measurable way to the project (including for subrecipients and consultants), the applicant shall provide brief vitae that list the following:

- Contact information.
- Education and Training: provide institution, major/area, degree, and year for undergraduate, graduate, and postdoctoral training.
- Research and Professional Experience: beginning with the current position list, in chronological order (newest to oldest), professional/academic positions with a brief description.

- Publications: provide a list of up to 10 publications most closely related to the proposed project. For each publication, identify the names of all authors (in the same sequence in which they appear in the publication), the article title, book or journal title, volume number, page numbers, year of publication, and website address if available electronically.
- Patents, copyrights, and software systems developed may be provided in addition to or substituted for publications.
- Synergistic Activities: list no more than five professional and scholarly activities related to the effort proposed.

Pages outside the specified page limits and font size, including references, will be redacted and unavailable for evaluators to review.

- 2-page limit, 11-point font.

Name File: 2023 CFA "Last Name of Individual" "Insert ID #"

Technical expertise and qualifications are to be provided for individual participants, whether the participant is receiving funding or not (including consultants or national laboratory personnel). All participants making a defined, material contribution that is critical to the success of the project must be listed as collaborators on the online application. Applicants must have the full consent of all collaborators prior to submitting the application.

NOTE: The above criteria do not include NSUF support staff.

E.7 Benefit of Collaboration

The applicant shall provide a narrative that includes an explanation of the contribution that will be made by the collaborating organizations and/or facilities to be utilized. Please indicate within this section whether the application has benefit or influence on other ongoing or proposed NE R&D projects (e.g., modeling and simulation in one application and effect validation in a separate application).

This document is required unless the application only has a single principal investigator.

Pages outside the specified page limits and font size, including references, will be redacted and unavailable for evaluators to review.

- 4-page limit, 11-point font.

Name File: 2023 CFA Benefit of Collaboration "Insert ID#"

E.8 Capabilities

Provide information on the following, as applicable:

- Infrastructure Requirements: The applicant shall identify the infrastructure (e.g., facilities, equipment, instrumentation, and other resources) required to execute the proposed scope of work, including applicant's location, availability, capabilities, and

how they will be used in the project. Describe the non-labor (e.g., facilities, equipment, and instrumentation) resources that are available and accessible to the applicant and are required to execute the scope of work. Describe any unique equipment and facilities that are needed, are accessible, and will be used to execute the scope of work. Discuss the adequacy of these resources and identify any gaps and how these will be addressed.

- Adequate financial resources (if cost sharing).
- Ability to comply with the required or proposed performance schedule, taking into consideration all existing commercial and governmental business commitments.
- A satisfactory record of performance, integrity, and business ethics.
- Necessary organization, experience, accounting and operational controls, or the ability to obtain them (including, as appropriate, such elements as property control systems, quality assurance measures, and safety programs).

This CINR FOA allows the applicant to propose the purchase of any needed equipment to conduct the proposed work. If equipment purchases are proposed, describe comparable equipment, if any, already at the institution and explain why it cannot be used.

Pages outside the specified page limits and font size, including references, will be redacted and unavailable for evaluators to review.

- 2-page limit, 11-point font.

Name File: 2023 CFA Capabilities "Insert ID #"

E.9 Letters of Support (IRPs only), if applicable

A letter of support from non-Federal, non-academic partners (industry/utility, international) is recommended to describe the level and type of support (e.g., financial or in-kind contributions) contemplated for the project. Letters of support must be on company stationery and signed by an authorized company official.

Name File: 2023 CFA Letter of Support "Insert ID #"

E.10 Budget Documents

E.10.1 R&R Lead Budget Form: (TOTAL FED & NON-FED)

(Required for all lead institutions; Not required for NSUF Access Only applications)

Complete the Research and Related Budget (Total Fed & Non-Fed) form in accordance with the following instructions contained in Part IV, Section E.

A separate budget must be completed for each year of requested support. The form will generate a cumulative budget for the total project period. Complete all the mandatory information on the form. Funds may be requested under any of the categories listed if the item and amount are

necessary to perform the proposed work, meet all the criteria for allowability under the applicable Federal cost principles, and are not prohibited by the funding restrictions in this announcement (see Part IV, Section I of this CINR FOA).

NOTE: Successful applicants may be requested to participate in an annual program review meeting and should budget travel accordingly.

NOTE: Do **NOT** lock the cells when saving this document. Applications containing budget forms with **locked cells** may not be evaluated further.

Name File: 2023 CFA Budget "Insert ID #".xls

E.10.2 R&R Subaward Budget Form: (TOTAL FED & NON-FED)

(Required for University and Industry collaborators; Not required for NSUF Access Only applications)

Budgets for subrecipients, other than DOE FFRDC Contractors. Applicant must provide a separate cumulative SF-424 budget for each subrecipient that is expected to perform work estimated to be more than $250,000 or 50% of the total work effort (whichever is less). Use up to 10 letters of the subrecipient institution's name as the file name.

NOTE: Do **NOT** lock the cells when saving this document. Applications containing budget forms with LOCKED CELLS may not be evaluated further.

Name File: 2023 CFA Subaward Budget "Insert ID #".xls

E.10.3 Budget for DOE/NNSA Federally Funded Research and Development Center (FFRDC) Contractor

(Required for National Laboratory participants; Not required for NSUF Access Only applications)

If using a DOE/NNSA FFRDC contractor, the FFRDC must provide a DOE Field Work Proposal in accordance with the requirements in DOE Order 412.1A, Administrative (Admin) Change 1, Work Authorization System dated 05/21/2014. FWPs can be obtained from respective laboratory financial administrators.

FFRDCs are permitted to propose costs in accordance with their established DOE contracts (e.g., overhead, fees, etc.).

Name File: 2023 CFA FWP "Insert ID #"

E.10.4 Budget Justification

(Required for all University and Industry participants; Not required for NSUF Access Only applications)

The Budget Justification Supporting Documentation is available at NEUP.gov. Provide the required supporting information for all costs required to accomplish the project, including the

following costs: labor; equipment; domestic and foreign travel; participant/trainees; material and supplies; publication; consultant services; automated data processing/computer services; subaward/consortium/contractual; equipment or facility rental/user fees; alterations and renovations; and indirect cost type. Provide any other information you wish to submit to justify the budget request.

A budget justification is required for the lead applicant and all sub-awardees. The justification can be combined into one document or submitted as separate files.

Foreign travel must be included in the budget justification request. Any foreign travel not added to the budget justification will not be approved upon issuance of the grant.

If cost sharing is required or voluntarily proposed, provide an explanation of the source, nature, amount, and availability of any proposed cost sharing.

Third Parties Contributing to Cost Sharing Information (if applicable):

A letter from each third party (i.e., a party other than the organization submitting the application) contributing to the cost share, at the time the application is submitted. The letter must state that the third party is committed to providing a specific minimum dollar amount of cost sharing. Submitting the letters with the application provides assurance that the letters of commitment have been signed.

In an appendix to the Budget Justification, the following information for each third party contributing to cost sharing must be identified: (1) the name of the organization; (2) the proposed dollar amount to be provided; (3) the amount as a percentage of the total project cost; and (4) the proposed cost sharing - cash, services, or property. Successful applicants must provide the signed letters of commitment outlined in Part IV, Section F, Submission from Successful Applicants.

Name File: 2023 CFA Budget Justification "Insert ID #"

E.11 Additional Attachments

E.11.1 Current and Pending Support

Current and pending support is intended to allow the identification of potential duplication, overcommitment, potential conflicts of interest or commitment, and all other sources of support. As part of the application, the principal investigator and each senior/key person at the prime applicant and any proposed subaward level must provide a list of all sponsored activities, awards, and appointments, whether paid or unpaid; provided as a gift with terms or conditions or provided as a gift without terms or conditions; full-time, part-time, or voluntary; faculty, visiting, adjunct, or honorary; cash or in-kind; foreign or domestic; governmental or private-sector; directly supporting the individual's research or indirectly supporting the individual by supporting students, research staff, space, equipment, or other research expenses. All involvement in foreign government-sponsored talent recruitment programs must be identified in current and pending support.

For every activity, list the following items:

- The sponsor of the activity or the source of funding.
- The award or other identifying number.

- The title of the award or activity. If the title of the award or activity is not descriptive, add a brief description of the research being performed that would identify any overlaps or synergies with the proposed research.
- The total cost or value of the award or activity, including direct and indirect costs and cost share. For pending proposals, provide the total amount of requested funding.
- The award period (start date – end date).
- The person-months of effort per year being dedicated to the award or activity.

If required to identify overlap, duplication of effort, or synergistic efforts, append a description of the other award or activity to the current and pending support.

Details of any obligations, contractual or otherwise, to any program, entity, or organization sponsored by a foreign government must be provided on request to either the applicant institution or DOE. Supporting documents of any identified source of support must be provided to DOE on request, including certified translations of any document.

The information may be provided in the format approved by the National Science Foundation (NSF), which may be generated by the Science Experts Network Curriculum Vitae (SciENcv), a cooperative venture maintained at https://www.ncbi.nlm.nih.gov/sciencv/, and is also available at https://www.nsf.gov/bfa/dias/policy/nsfapprovedformats/cps.pdf. The use of a format required by another agency is intended to reduce the administrative burden to researchers by promoting the use of common formats.

Each current and pending support disclosure must be signed and dated and include the following certification statement:

> I, [Full Name and Title], certify to the best of my knowledge and belief that the information contained in this Current and Pending Support Disclosure Statement is true, complete, and accurate. I understand that any false, fictitious, or fraudulent information, misrepresentations, half-truths, or omissions of any material fact, may subject me to criminal, civil or administrative penalties for fraud, false statements, false claims or otherwise. (18 U.S.C. §§ 1001 and 287, and 31 U.S.C. 3729-3733 and 3801-3812). I further understand and agree that (1) the statements and representations made herein are material to DOE's funding decision, and (2) I have a responsibility to update the disclosures during the period of performance of the award should circumstances change which impact the responses provided above.

If the fillable PDF NSF format is used, the individual must still include a signature, date, and a certification statement using the language included in the paragraph above. If the online version is used in SciENcv, a signature, date, and a certification statement must be attached until the SciENcv website automatically attaches a certification statement.

Definitions:

Current and pending support – (a) All resources made available, or expected to be made available, to an individual in support of the individual's RD&D efforts, regardless of (i) whether the source is foreign or domestic; (ii) whether the resource is made available through the entity applying for an award or directly to the individual; or (iii) whether the resource has monetary value; and (b) includes in-kind contributions requiring a commitment of time and directly supporting the individual's RD&D efforts, such as the provision of office or laboratory space, equipment, supplies, employees, or students. This term has the same meaning as the term Other

Support as applied to researchers in NSPM-33: For researchers, Other Support includes all resources made available to a researcher in support of and/or related to all of their professional RD&D efforts, including resources provided directly to the individual or through the organization, and regardless of whether or not they have monetary value (e.g., even if the support received is only in-kind, such as office/laboratory space, equipment, supplies, or employees). This includes resource and/or financial support from all foreign and domestic entities, including but not limited to, gifts provided with terms or conditions, financial support for laboratory personnel, and participation of student and visiting researchers supported by other sources of funding.

Foreign Government-Sponsored Talent Recruitment Program – An effort directly or indirectly organized, managed, or funded by a foreign government, or a foreign government instrumentality or entity, to recruit science and technology professionals or students (regardless of citizenship or national origin, or whether having a full-time or part-time position). Some foreign government-sponsored talent recruitment programs operate with the intent to import or otherwise acquire from abroad, sometimes through illicit means, proprietary technology or software, unpublished data and methods, and intellectual property to further the military modernization goals and/or economic goals of a foreign government. Many, but not all, programs aim to incentivize the targeted individual to relocate physically to the foreign state for the above purpose. Some programs allow for or encourage continued employment at U.S. research facilities or receipt of federal research funds while concurrently working at and/or receiving compensation from a foreign institution, and some direct participants not to disclose their participation to U.S. entities. Compensation could take many forms including cash, research funding, complimentary foreign travel, honorific titles, career advancement opportunities, promised future compensation, or other types of remuneration or consideration, including in-kind compensation.

Senior/key personnel – an individual who contributes in a substantive, meaningful way to the scientific development or execution of a research, development and demonstration (RD&D) project proposed to be carried out with DOE award.[2]

Name File: 2023 CFA Current and Pending Support "Insert ID #"

E.11.2 Coordination and Management Plan

Multiple PIs (multiple individuals i.e., Lead PI, Co-PI, etc.): The applicant, whether a single organization or team/partnership/consortium, must state whether the project will include multiple PIs. This decision is solely the responsibility of the applicant. If multiple PIs will be designated, the application must identify the Contact PI/Project Coordinator and provide a "Coordination and Management Plan" that describes the organization structure of the project as it pertains to the designation of multiple PIs. This plan should, at a minimum, include:

- Process for making decisions on scientific/technical direction;

[2] Typically, these individuals have doctoral or other professional degrees, although individuals at the masters or baccalaureate level may be considered senior/key personnel if their involvement meets this definition. Consultants, graduate students, and those with a postdoctoral role also may be considered senior/key personnel if they meet this definition.

- Publications;
- Intellectual property issues;
- Communication plans;
- Procedures for resolving conflicts; and
- PIs' roles and administrative, technical, and scientific responsibilities for the project.

Name File: 2023 CFA CMP "Insert ID #"

E.11.3 Letter of Authorization for DOE/NNSA FFRDCs

(Required for all National Laboratory participants listed on the application regardless of funding level or tier)

The cognizant contracting officer for the FFRDC must authorize in writing the use of DOE/NNSA FFRDC and non-DOE/NNSA FFRDC contractors on the proposed project, and this authorization must be submitted with the application. The following wording is acceptable for this authorization.

> "Authorization is granted for the Fill-in 1: [Name] Laboratory to participate in the proposed project. The work proposed for the laboratory is consistent with or complimentary to the missions of the laboratory, will not adversely impact execution of the DOE/NNSA assigned programs at the laboratory, and will not place the laboratory in direct competition with the domestic private sector."

NOTE: Individual Letters of Authorization may be submitted, if all FFRDC/non-FFRDC management has been notified of all submissions, and all participants are identified, may be submitted as a blanket permission.

NOTE: Letter of Authorization is not required for NSUF Technical Leads unless the Technical Lead is requesting R&D funding support under this CINR FOA.

Name File: 2023 CFA CO Authorization "Insert ID #"

E.11.4 Project/Performance Site Location(s)

Indicate lead and collaborating site(s) where R&D work will be performed. Note the Project/Performance Site Congressional District is entered in the format of the 2-digit state code, following by the 3-digit Congressional district code (e.g., AA-001).

Name File: 2023 CFA Site Location "Insert ID #"

E.11.5 Environmental Checklist

An environmental checklist will be required at the time of award negotiations. If selected for award negotiations, please fill out the Environmental Checklist.

E.11.6 Data Management Plan (DMP)

A Data Management Plan (DMP) will be required within 90 days of award notification that:

1. Should describe whether and how data generated in the course of the proposed research will be shared and preserved. If the plan is not to share and/or preserve certain data, then the plan must explain the basis of the decision (for example, cost/benefit considerations, other parameters of feasibility, scientific appropriateness, or limitations discussed in #4). At a minimum, DMPs must describe how data sharing and preservation will enable validation of results, or how results could be validated if data are not shared or preserved.
2. Should provide a plan for making all research data displayed in publications resulting from the proposed research open, machine-readable, and digitally accessible to the public at the time of publication. This includes data that are displayed in charts, figures, images, etc. In addition, the underlying digital research data used to generate the displayed data should be made as accessible as possible to the public in accordance with the principles stated above. This requirement could be met by including the data as supplementary information to the published article, or through other means. The published article should indicate how these data can be accessed.
3. Should consult and reference available information about data management resources to be used in the course of the proposed research. In particular, DMPs that explicitly or implicitly commit data management resources at a facility beyond what is conventionally made available to approved users should be accompanied by written approval from that facility.
4. DMPs must protect confidentiality, personal privacy, Personally Identifiable Information, and U.S. national, homeland, and economic security; recognize proprietary interests, business confidential information, and intellectual property rights; avoid significant negative impact on innovation, and U.S. competitiveness; and otherwise be consistent with all applicable laws, regulations, and DOE orders and policies. There is no requirement to share proprietary data.

E.11.7 Disclosure of Lobbying Activities

(Required for ALL applicants)

Applicants must complete and attach the SF-LLL, "Disclosure Form to Report Lobbying," which is available at the application site document library. Applicants must identify any funds, other than federally appropriated funds, that have been paid or will be paid, to any person for influencing, or attempting to influence, an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the grant.

Name File: 2023 CFA SF-LLL “Insert ID #”

E.11.8 Certifications and Assurances

(Required for all University leads; Not required for NSUF Access Only applications)

Applicants must complete and attach the Certifications and Assurances form found on the DOE Financial Assistance Forms Page at: http://energy.gov/management/downloads/certifications-and-assurances-use-sf-424.

Name File: 2023 CFA Cert & Assurances "Insert ID #"

E.11.9 Foreign Government Ownership Disclosure (Required for all leads)

Applicants must complete and attach the Foreign Government Ownership Disclosure template.

Name File: 2023 CFA Foreign Government Ownership Disclosure "Insert ID #"

Table 3. Summary of Full Application Required Information.

Name of Document	Format	Required From	Signature Required
Conflict-of-Interest	Checkbox	Certified by Lead Applicant for all Participants	
SF-424 (R&R)	Form	Lead Applicant	Yes
Research and Related Other Project Information	Form	Lead Applicant	
Project Summary/Abstract	PDF	Lead Applicant	
Project Narrative	PDF	Lead Applicant	
Other Attachments			
Vitae - Technical Expertise and Qualifications (2 pages each)	PDF	All Leads and Collaborators	
Benefits of Collaborations (4 pages)	PDF	Lead Applicant	
Capabilities (2 pages)	PDF	Lead Applicant	
SF-424 (R&R) Lead Budget Form (Total Fed + Non-Fed)	Form	All Lead Applicants*	
SF-424 (R&R) Subaward Budget (Total Fed + Non-Fed), if applicable	Form	Collaborators who meet minimum requirements (work estimated to be $250,000 or more or 50% of the total work effort, whichever is less)*	
Budget for DOE National Laboratory Contractor or FFRDC, if applicable	PDF	National Laboratory Leads and Collaborators*	Yes
Budget Justification	PDF	University Leads	
Subaward Budget Justification, if applicable	PDF	Collaborators who meet minimum requirements (work estimated to be $250,000 or more or 50% of the total work effort, whichever is less) *	
Current and Pending Support	PDF	All University and Industry Applicants	
Coordination and Management Plan	PDF	Lead Applicant	
Authorization for DOE/NNSA FFRDCs, if applicable	PDF	National Laboratory Applicants (including non-funded collaborators)	Yes
Project/Performance Site Location	PDF	All sites performing work	
SF-LLL Disclosure of Lobbying Activities	PDF	Lead Applicant	Yes
Certifications and Assurances	Form	University Leads*	Yes

Name of Document	Format	Required From	Signature Required
Foreign Government Ownership Disclosure	PDF	University and Industry Leads	

*Not required for applications to the NSUF Access Only CINR FOA area. The applicant will need to upload a document that states "*Not required for NSUF Access Only applications*" in these upload fields.

F. SUBMISSION FROM SUCCESSFUL APPLICANTS

If selected for award, DOE reserves the right to request additional or clarifying information for any reason deemed necessary including but not limited to, the following:

- Indirect cost information;
- Other budget information;
- Name and phone number of the Designated Responsible Employee for compliance with national policies prohibiting discrimination (*See* 10 CFR Part 1040.5);
- Representation of Limited Rights Data and Restricted Software, if applicable;
- Commitment Letter from Third Parties Contributing to Cost Sharing, if applicable; and
- Environmental Checklist.

G. SUBMISSION DATES AND TIMES

G.1 NSUF LOI Due Date

(Mandatory only for NSUF Access Only Projects)

LOIs for NSUF access are required by September 27, 2022, no later than 7:00 p.m. Eastern Time (ET). The LOI shall be submitted as required in Part IV, Section C.1 of this CINR FOA.

G.2 R&D/NSUF Pre-Application Due Date

(Including R&D and NSUF Access Only) (Mandatory except for IRPs)

Pre-Applications are required by October 11, 2022, no later than 7:00 p.m. ET. The Pre-Application shall be submitted as required in Part IV, Section C.2 of this CINR FOA. Applicants who fail to submit a Pre-Application, will be determined non-responsive and ineligible for a comprehensive merit review.

G.3 NSUF Preliminary Statement of Work Due Date

(Required only for NSUF Access Only)

Applicants requesting NSUF access must submit a Preliminary SOW by November 30, 2022, no later than 7:00 p.m. ET. The preliminary SOW shall be submitted as required in Part IV, Section C.3. Applicants who fail to submit a preliminary SOW will be determined non-responsive and ineligible for further consideration.

G.4 NSUF Final Statement of Work Due Date

(Required only for NSUF Access Only)

Applicants requesting NSUF access must submit a Final Statement of Work by January 25, 2023, no later than 7:00 p.m. ET. The final SOW shall be submitted as required in Part IV, Section C.4. Applicants who fail to submit a final SOW will be determined non-responsive and ineligible for further consideration.

G.5 IRP Application Due Date

IRPs must be received by February 8, 2023, no later than 7:00 p.m. ET. Applicants are encouraged to transmit their applications well before the deadline. Applications received after the deadline will not be reviewed or considered for award.

G.6 Full R&D/NSUF Application Due Date

(Including R&D and NSUF Access Only)

Full R&D/NSUF applications (including program concurrence for applicable NSUF projects, see Part I, B.3.1) must be received by February 8, 2023, no later than 7:00 p.m. ET. Applicants are encouraged to transmit their applications well before the deadline. Applications received after the deadline will not be reviewed or considered for award.

G.7 Late Submissions, Modifications, and Withdrawals of Pre-Applications, Applications, and NSUF Statement of Work

Applicants are responsible for submitting any/all required submissions specified in this CINR FOA, including LOIs, applications, statements of work, and any modifications or withdrawals thereto, so as to reach the Government office designated in the CINR FOA by the date/time specified in the CINR FOA.

Any required CINR FOA submittal, modification, or withdrawal received at the Government office designated in the CINR FOA after the exact time specified for receipt of that submittal is "late" and will not be considered.

A late modification of an otherwise successful submittal or application that makes its terms more favorable to the Government will be considered at any time it is received and may be accepted.

Acceptable evidence to establish the time of receipt at the Government installation includes the time/date stamp of that installation on the required electronic submission, other documentary evidence of receipt maintained by the installation, or oral testimony or statements of Government personnel.

If an emergency or unanticipated event interrupts normal Government processes such that the required submittal cannot be received at the Government office designated for receipt of the submittal by the exact time specified in the CINR FOA, and urgent Government requirements preclude amendment of the CINR FOA, the time specified for receipt of the required submittal will be deemed to be extended to the same time of day, as specified in the CINR FOA, on the first work day on which normal Government processes resume.

Applications and other submittals may be withdrawn by written notice (sent electronically to NEUP@inl.gov) received at any time before the exact time set for receipt of that submittal. A required submittal may be withdrawn in person by an applicant or its authorized representative, if, before the exact time set for receipt of that submittal, the identity of the person requesting withdrawal is established and the person signs a receipt for the submittal.

If electronic applications cannot be submitted, applicants can contact:

INR Integration Office
Attn: Anna Podgorney
PO Box 1625 MS 3730
Idaho Falls, Idaho. 83415

Telephone: 208-526-2123
Fax: 208-526-1844

H. INTERGOVERNMENTAL REVIEW

This program is not subject to Executive Order 12372, "Intergovernmental Review of Federal Programs."

I. FUNDING RESTRICTIONS

Funding for all awards is contingent upon the availability of funds appropriated by Congress for the purpose of this program in current and future fiscal years.

I.1 Prohibition related to Foreign Government-Sponsored Talent Recruitment Programs

a. Prohibition

Persons participating in a *Foreign Government-Sponsored Talent Recruitment Program of a Foreign Country of Risk* are prohibited from participating in projects selected for federal funding under this FOA. Should an award result from this FOA, the recipient must exercise ongoing due diligence to reasonably ensure that no individuals participating on the DOE-funded project are participating in a *Foreign Government-Sponsored Talent Recruitment Program of a Foreign Country of Risk*. Consequences for violations of this prohibition will be determined according to applicable law, regulations, and policy. Further, the recipient must notify DOE within five (5) business days upon learning that an individual on the project team is or is believed to be participating in a foreign government talent recruitment program of a foreign country of risk. DOE may modify and add requirements related to this prohibition to the extent required by law.

b. Definitions

1. **Foreign Government-Sponsored Talent Recruitment Program** - An effort directly or indirectly organized, managed, or funded by a foreign government to recruit science and technology professionals or students (regardless of citizenship or national origin, and whether having a full-time or part-time position). Some foreign government-sponsored talent recruitment programs operate with the intent to import or otherwise acquire from abroad, sometimes through illicit means, proprietary technology or software, unpublished data and methods, and intellectual property to further the military modernization goals and/or economic goals of a foreign government. Many, but not all, programs aim to incentivize the targeted individual to physically relocate to the foreign state for the above purpose. Some programs allow for or encourage continued employment at U.S. research facilities or receipt

of Federal research funds while concurrently working at and/or receiving compensation from a foreign institution, and some direct participants not to disclose their participation to U.S. entities. Compensation could take many forms including cash, research funding, complimentary foreign travel, honorific titles, career advancement opportunities, promised future compensation, or other types of remuneration or consideration, including in-kind compensation.

2. **Foreign Country of Risk** - DOE has designated the following countries as foreign countries of risk: Iran, North Korea, Russia, and China. This list is subject to change.

I.2 Cost Principles

Costs must be allowable, allocable, and reasonable in accordance with the applicable Federal cost principles referenced in 2 CFR part 200, as adopted and amended by 2 CFR part 910. The cost principles for for-profit organizations are in FAR part 31.

NOTE: For for-profit organizations, 2 CFR 910.352 incorporates the cost principles located at the Federal Acquisition Regulation (FAR) part 31.

I.3 Pre-Award Costs

Recipients may charge to an award, resulting from this announcement, pre-award costs that were incurred within the ninety (90) calendar day period immediately preceding the effective date of the award, if the costs are allowable in accordance with the applicable Federal cost principles. Recipients must obtain the prior approval of the contracting officer for any pre-award costs that are for periods greater than this 90-day calendar period.

Pre-award costs are incurred at the applicant's risk. DOE is under no obligation to reimburse such costs if for any reason the applicant does not receive an award or if the award is made for a lesser amount than the applicant expected.

J. OTHER SUBMISSION AND REGISTRATION REQUIREMENTS

J.1 Where to Submit

NOTE: Submit applications through www.NEUP.gov to be considered for award.

Submit electronic applications through the "Applications" function at www.NEUP.gov. For problems with completing the registration process or submitting your application, call Anna Podgorney at 208-526-2123 or send an email to NEUP@inl.gov.

J.2 Application Validity Timeframe

By submitting an application in response to this CINR FOA, applicants agree that their applications are valid for at least one year from the date set forth for receipt of applications to this CINR FOA. DOE reserves the right (with concurrence of the applicant) to use the submitted application(s) to make additional awards for up to a one year, even after DOE's initial selection announcement has occurred.

PART V – APPLICATION REVIEW INFORMATION

NOTE: The following requirements apply to all CINR FOA areas unless specific requirements are identified.

A. CRITERIA

A.1 Pre-Application Review (only for R&D and NSUF Access Only)

At the Pre-Application review stage, DOE will invite selected applicants to provide Full Applications, based on relevance to NE mission and technical merit, provided below in Part V, Sections A.1 of this CINR FOA.

All Pre-Applications, as described in Part IV, Section C.2 submitted under this CINR FOA will be reviewed and scored, as described below in Part V, Sections A.1 of this CINR FOA.

A.1.1 Initial Review Criteria of Pre-Applications

Prior to a comprehensive merit evaluation, DOE will perform an initial review to determine the following: (1) the applicant is eligible for an award; (2) the information required by the announcement has been submitted; and (3) all mandatory requirements are satisfied. Only applications meeting these Pre-Application initial review criteria will be considered during the Pre-Application technical review process.

A.1.2 Relevancy Criteria

Following the Pre-Application initial review, programmatic experts will assess those applications that have met the Pre-Application initial review criteria for relevance to the NE mission. All applications that meet the objectives of the FOA will move forward to technical review.

A.1.3 Technical Review Merit Criteria

Several technical experts/peers will assess each application on its technical merit. Reviewers will review the technical basis of the application, assigning the application a merit category as described below. During this technical review, applications will be evaluated as meeting all, most, or some expectations for that merit category.

- **High Merit:** The project unquestionably advances the technical state of knowledge and understanding of the NE mission or relevant work scope area and is creative and based largely on original concepts. The scope can be executed fully in the facilities available.
- **Moderate Merit:** The project advances the technical state of knowledge and understanding of the NE mission or relevant work scope area and is based on some established concepts, although several creative and original concepts are presented. The scope may be executed fully in the facilities available.
- **Some Merit:** The project incrementally advances the technical state of knowledge and understanding of the NE mission or relevant work scope area, and is based predominately on established concepts, with some creative, original concepts. The scope may be difficult to execute fully in the facilities available.
- **Low Merit:** The project recognizes the technical state of knowledge and understanding of the mission or relevant work scope area and is only marginally creative and contains

few original concepts. The scope will require resources not named in the project or will require additional facilities or resources to execute.

- **No Merit:** The project does not advance or recognize the technical state of knowledge and understanding of the NE mission or relevant work scope area and is not creative or original. The scope cannot be executed fully in the facilities available.

After considering the overall evaluation scores, available funding, and the other selection factors (see Part V, Section A.7 of this CINR FOA) as needed, DOE will make a final determination of applicants, who will be invited to provide Full Applications.

Applicants, other than NSUF Pre-Application, who are not specifically invited to submit Full Applications may still do so at their own risk. There is no guarantee that uninvited Full Applications will receive a full review; however, all Full Applications will be re-reviewed for NE mission relevance. Only those uninvited Full Applications that demonstrate relevance to the NE mission will be forwarded for technical peer review during the evaluation phase for Full Applications described below in Part V, Section A.4.

NSUF Pre-Applications that do not receive an invitation to submit are not permitted to submit a Full Application.

A.1.4 Diverse Team Review

Up to 3 points may be contributed to the overall score during the merit review process based on the degree to which an application is led by or effectively partners with MSIs, HBCUs, and/or TCUs. (For a directory of MSIs, please visit: https://www2.ed.gov/about/offices/list/ope/idues/2022eligibilitymatrix.xlsx.)

NOTE: Diverse teams and partnerships are not required for projects to be evaluated as unquestionably relevant; however, diverse teams and partnerships will increase the average overall score by up to 3 points, based on the project meeting one of the following criteria: (1) the project has a substantive contribution by MSIs, HBCUs, and/or TCUs as lead or collaborator; (2) the project has a demonstrable contribution by MSIs, HBCUs and/or TCUs as lead or collaborator; or (3) the project has some relevant partnership with MSIs, HBCUs, and/or TCUs as lead or collaborator.

A.2 Feasibility Review (only for NSUF Access Only Projects)

The feasibility review is a very important part of the NSUF Pre-Application review process. Many factors will be considered as part of the feasibility review including the following: type of project; duration of project; experimental degree of complexity; types of samples; number of samples; need for shipping and containment; potential needed capability or facility enhancement or upgrade; project schedule, and cost.

To ensure that a Pre-Application and eventual application is submitted with the highest possible degree of feasibility, it is imperative that potential proposers establish contact with an NSUF Technical Lead at the earliest possible time. The NSUF Technical Lead will have knowledge of and direct access to the facility or facilities where the work will be performed. It is intended that the Technical Lead should be an integral collaborator on the project and contribute strongly to the application preparation. The Technical Lead will provide guidance in establishing the scope

of the project in negotiation with the facility to produce a cost estimate. Should the project be awarded, the Technical Lead will be the primary POC to best ensure the project is performed on schedule and within budget.

Applications deemed not feasible or high risk by the NSUF Program Office will not be considered.

A.3 Readiness Review (only for NSUF Access Only Projects)

Prior to final selection, Pre-Applications and Full Applications for NSUF access will be reviewed by the NSUF Program Office to verify the project is ready for NSUF access, as discussed in Part I, Section B.3.1 of this CINR FOA. Pre-Applications and Full Applications deemed not ready for NSUF access will not be considered.

A.4 Initial Review Criteria of Full Applications

Prior to a comprehensive merit evaluation, DOE will perform an initial review to determine: (1) the applicant is eligible for an award; (2) the named applicant, PI(s) and collaborators have not changed from the Pre-Application to the Full Application or, if they have, DOE's Contracting Officer has provided signed approval; (3) the information required by the announcement has been submitted; and (4) all mandatory requirements are satisfied. Only applications meeting these initial review criteria will be considered during the merit review and award selection decision.

A.5 R&D Merit Review Criteria: Full Applications (for R&D and NSUF Access Only)

Selection will be made in accordance with the review criteria identified for each area and the program policy factors (other selection factors) listed in Part V, Section A.7 of this FOA. The criteria for the respective FOA areas are identified below along with the relative importance of each criterion or sub-criterion, if applicable. All applications will be point scored and ranked. Applications must be fully responsive to each of the following criteria.

Review of Full Applications shall be based on how well the applications meet or exceed the technical merit criteria provided below and as weighted as described in Table 4. All invited Full Applications submitted under this CINR FOA will be reviewed and scored as described in this CINR FOA. A panel of experts will assess each Full Application's relevance to the NE mission. Multiple technical peer reviewers will evaluate the project for technical merit. Effective partnerships will be incorporated into the overall score, as described in Part V, Section A.1.4.

A.5.1 Relevancy Criteria

Same criteria used for the R&D Pre-Application (including R&D and NSUF Access Only) evaluation phase applies to Full Applications. See Part V, Sections A.1 of this CINR FOA.

A.5.2 Technical Review Merit Attributes

Applications will be subjected to formal merit review and will be evaluated against the following criteria.

- **Criterion 1 – Advances the State of Knowledge and Understanding and Addresses Gaps in Nuclear Science and Engineering Research**: DOE will evaluate the technical merit of the proposed R&D project, including the extent to which the project advances the state of knowledge and understanding and addresses gaps in nuclear science and engineering research. Evaluation will consider how important the proposed project is to advance knowledge and understanding within the area selected and how well the proposed project advances, discovers, or explores creative, original, or potentially transformative concepts.
- **Criterion 2 – Technical Quality of the Proposed R&D Project**: DOE will evaluate the overall quality/acceptability of the proposed R&D project. In evaluating this criterion, DOE may consider the following: (1) merit, feasibility, and realism of the proposed methodology and approach to the project; (2) schedule, including sequence of project tasks, principle milestones, and times for each task; (3) planned assignment of responsibilities; (4) proposed project efficiencies; and (5) technical expertise available to the applicant in carrying out the project.
- **Criterion 3 – Applicant Team Capabilities, Risks, and Experience**: DOE will evaluate the extent to which the applicant team provides objective evidence that it has the resources and abilities to successfully complete the R&D project in a technically defensible manner. Current activities, relevance and depth of the organization's experience and capabilities, past performance, together with that of the PI, and the adequacy of the requested resources and their supporting justification will all be evaluated as they relate to the likely successful completion of the R&D objectives.

In evaluating criterion 3, DOE will consider the extent to which the application demonstrates the following:

- That the capabilities and qualifications of engineering and scientific personnel, PI, and other key contributors are such that they can successfully accomplish the technical scope of the proposed project.
- That the applicant or respective team members have demonstrated successful experience/past performance, knowledge, and understanding of the business and regulatory requirements for projects of similar size, scope, and complexity in achieving project technical success on time with no significant, unresolved safety and quality issues.
- The applicant team's identification of, and work with nuclear energy stakeholders, to gain perspective and technical knowledge important to project decisions, and how the applicant will work with stakeholders to best achieve the objectives of this FOA and the project.

Table 4. R&D and NSUF Access Only Pre-Applications and Full Applications - Weighting of Evaluation Scores

Criterion	
Technical Application – Peer Review	Percentage of Peer Review Score
Pre-Applications	
Technical Merit Category	100%
Full Applications	

Criterion	
Criterion 1: Advances the State of Scientific Knowledge and Understanding and Addresses Gaps in Nuclear Science and Engineering Research	35%
Criterion 2: Technical Quality of the Proposed R&D Project	35%
Criterion 3: Applicant Team Capabilities, Risks, and Experience	30%
Peer Review Score	Sum of ratings x weights
Relevancy to the NE mission	Yes/No
Diverse Team Review	Up to 3 points

A.6 IRP Merit Review for Full Applications

Selection for the IRP for U.S. university-led projects will be based on the following relevancy and technical merit attributes and criteria and sub-criteria in Part V, Section A.6.1-A.6.3. The criteria are equally important. Review of Full Applications shall be based on how well the applications meet or exceed the technical merit criteria and relevance to the NE mission, as weighted and described in Table 5.

A.6.1 Relevancy Attributes

Same criteria used for the R&D Pre-Application (including R&D and NSUF Access Only) evaluation phase applies to IRPs. See Part V, Section A.1.1 – A.1.2 of this CINR FOA.

A.6.2 Technical Merit Attributes

- **Criterion 1 – Scientific and/or Technical Merit of the Project:** DOE will evaluate the scientific and technical merit of the proposed IRP, including the extent to which the project advances the state of scientific knowledge and understanding relative to the IRP and addresses key scientific challenges and shifts in research directions towards promising developments. Evaluations will consider how important the proposed project presents a balanced and comprehensive program of research that, as needed, supports experimental, theoretical, and computational efforts and develops new approaches in these areas.
- **Criterion 2 – Appropriateness of the Proposed Method or Approach:** DOE will evaluate the appropriateness of the proposed IRP method or approach, including risk posed by the approach, as well as the extent to which the strategy and plan for the development and operation of the proposed IRP identifies an acceptable approach involving senior/key personnel, the means for achieving integration on the IRP, and plans for leadership and guidance for the scientific and technical direction. DOE shall consider whether the applicant presents a comprehensive management plan for a world-class program that encourages research, including high-risk, high-reward, as well as synergisms among investigators. The organization structure should delineate the roles and responsibilities of senior/key personnel and describes the means of providing external oversight and guidance for scientific and technical direction and approval of the research program. Additionally, DOE will also consider the following:

- The applicant's plans (if any) for education, outreach, and training in the proposed IRP are appropriate and, if needed, described as part of the scope.
- Appropriateness and reasonableness of applicant's plans (if any) for external collaborations and partnerships.
- The roles and intellectual contributions of the IRP lead PI, other investigator(s), and each senior/key person.
- Maximizing the use of other available facilities and existing equipment.
- Relation to existing and planned research programs at the host or collaborator institution.

- **Criterion 3 – Applicant Team Capabilities, Risks, and Experience:** DOE will evaluate the extent to which the applicant team provides objective evidence that it has or can obtain the professional resources and abilities to successfully complete the IRP project in a technically defensible manner. Current activities, relevance, and depth of the organization's experience and capabilities, together with that of the PI, will be evaluated as it relates to the likely successful completion of the IRP. DOE will evaluate risk posed by the applicant team. In evaluating this criterion, DOE will consider the extent to which the application demonstrates the following**:**

  - Maximizing the use of other available facilities and existing equipment.
  - The proposed access to existing research space, instrumentation, and facilities at the host institutions and its partners are likely to meet the needs of the proposed IRP.
  - There is adequate access to experimental and computational capabilities as needed to ensure successful completion of the proposed research.
  - The lead institution and the senior/key personnel for the IRP have proven records of success in project, program, and personnel management for projects of comparable magnitude.
  - The plan for recruiting any additional scientific and technical personnel including new senior staff, students, and post-docs is reasonable and appropriate.
  - The IRP leadership has the capability to communicate effectively with scientists of all required disciplines.
  - The IRP lead PI and senior/key personnel will be adequately involved in the proposed IRP, particularly taking into account their potential involvement in other major projects.

A.6.3 Diverse Team Review

DOE may allocate up to 3 points to the average overall score during the merit review process based on the degree to which an application is led by or effectively partners with MSIs, HBCUs, and/or TCUs. (For a directory of MSIs, please visit: https://www2.ed.gov/about/offices/list/ope/idues/2022eligibilitymatrix.xlsx.)

NOTE: Diverse teams and partnerships are not required for projects to be evaluated as unquestionably relevant; however, diverse teams and partnerships will increase the average overall score by up to 3 points, based on the project meeting one of the following criteria: (1) the project has a substantive contribution by MSIs, HBCUs, and/or TCUs as lead or collaborator; (2) the project has a demonstrable contribution by MSIs, HBCUs and/TCUs as lead or collaborator; or (3) the project has some relevant partnership with MSIs, HBCUs, and/or TCUs as lead or collaborator.

Table 5. IRP Full Applications - Weighting of Evaluation Scores

Criterion	
Technical Application – Peer Review	Percentage of Peer Review Score
Criterion 1: Scientific and/or Technical Merit of the Project	35%
Criterion 2: Appropriateness of the Proposed Method or Approach	35%
Criterion 3: Applicant Team Capabilities, Risks, and Experience	30%
Peer Review Score	Sum of ratings x weights
Relevance to the NE mission	Yes/No
Diverse Team Review	Up to 3 points, not to exceed the maximum relevancy points available.

A.7 Other Selection Factors

Program Policy Factors. The Selection Official may consider the following program policy factors in the selection process:

- Degree to which proposed project optimizes/balances/maximizes use of available DOE funding to achieve DOE program goals and objectives, including how those R&D and IRP projects support DOE research. It may also include research portfolio diversity, geographic distribution and/or how the projects support other complementary efforts that, when taken together, will best achieve program research goals and objectives.
- Application selection may optimize appropriate mix of projects to best achieve DOE research goals objectives.
- Cost/Budget considerations, including availability of funding.
- Extent that the applicant has awards in progress, or not completed, from DOE, from a previous year's FOA, or has existing no cost extensions.
- Demonstrated ability of the applicant to successfully complete projects (including relevant prior projects) and do so within budget and within the specified timeframe of the award.
- Applicability across multiple reactor technologies, including future design types. Proposed cost share that exceeds minimum required amounts on the part of the applicant may be given preferential consideration.

- Potential to enhance U.S. nuclear infrastructure may be given preferential consideration.
- Consistent and conformant work proposed in the application with current Office of Nuclear Energy Congressional appropriations.
- Foreign government ownership, if any, of the applicant, the applicant's parent companies, or any entity owned or controlled by a foreign government, may be considered in making the award.
- Applications that have national security concerns.
- Whether the entity is located in an urban and economically distressed area including a Qualified Opportunity Zone (QOZ) or the proposed project will occur in a QOZ or otherwise advance the goals of QOZ. The goals include spurring economic development and job creation in distressed communities throughout the United States.
- Whether the proposed project may directly or indirectly benefit disadvantaged communities or exhibits team member diversity with participants including but not limited to those from Minority Serving Institutions (e.g., Historically Black Colleges and Universities (HBCUs) /Other Minority Institutions (OMIs)), Minority Business Enterprises, Minority Owned Businesses, Woman Owned Businesses, Veteran Owned Businesses, or members within disadvantaged communities.

The Selection Official may consider any of the above factors independently in determining the optimum mix of applications that will be selected for support. These factors, while not indicators of the application's merit, may be essential to the process of selecting the application(s) that, individually or collectively, will best achieve the program objectives. Such factors are often beyond the control of the applicant. **Applicants should recognize that some very good applications might not receive an award because of program policy factors and available funding.** Therefore, the Selection Official may use the above factors to assist in determining which applications shall receive DOE funding support.

B. SUMMARY OF THE REVIEW AND SELECTION PROCESS

B.1 R&D and NSUF Access Only Pre-Applications

DOE will evaluate Pre-Application projects against the technical criteria and relevance to the NE mission described in this CINR FOA. This evaluation process will produce a list of recommended projects for each work scope. DOE will consider the overall evaluation results and program policy factors to select a final set of invited projects to provide a Full Application.

NOTE: Applicants not requesting NSUF access, who do not receive a formal invitation from DOE to submit Full Applications in response to the Pre-Application review process may still do so at their own risk. There is no guarantee uninvited Full Applications will receive a full review; however, all Full Applications received will be re-reviewed for relevance to the NE mission. Only uninvited Full Applications determined to be relevant to the NE mission will receive a technical peer review during the evaluation phase for Full Applications.

NOTE: Applicants requesting NSUF access who are not specifically invited by DOE to submit Full Applications will NOT be allowed to submit Full Applications. Due to resource limitations within the NSUF, the feasibility review, which is a critical element of NSUF access,

will continue only for applications that are specifically invited. An uninvited NSUF application without a complete NSUF feasibility review is incomplete and cannot be re-reviewed for NE mission relevancy.

B.2 R&D and NSUF Access Only Full Applications

Multiple peer reviewers will independently evaluate the applications in accordance with the technical review evaluation criteria described in this CINR FOA. Also, DOE will complete a Relevancy Criteria Review in accordance with the criteria described above. DOE will consider the overall evaluation results and subjective programmatic factors to ultimately recommend a final set of applications for approval by the Selection Official.

B.3 IRP Full Applications

Multiple technical experts independently evaluate the applications in accordance with the review criteria as described above. Also, DOE will complete a Relevancy Criteria Review in accordance with the criteria described above. Following individual review, reviewers meet as a panel for final recommendation to DOE. DOE will consider the overall evaluation results and program policy factors to ultimately recommend applications for approval by the Selection Official.

Due to the expected complexity of these projects, DOE may require clarification on the contents of application(s) and an opportunity to ask questions regarding the proposed project. As part of the evaluation and selection process for any review cycle, DOE may elect to do pre-selection clarifications. These pre-selection clarifications, if done, will be used for the purposes of clarifying the applications, not supplementing the applications. Use of such pre-selection clarifications neither obligates DOE to make an award nor to use a clarification process for successive review cycles.

B.4 Reporting of Matters Related to Recipient Integrity and Performance

DOE, prior to making a Federal award with a total amount of Federal share greater than the simplified acquisition threshold, is required to review and consider any information about the applicant that is in the designated integrity and performance system accessible through SAM (currently FAPIIS) (see 41 U.S.C. § 2313).

The applicant, at its option, may review information in the designated integrity and performance systems accessible through SAM. The applicant may comment on any information about itself which a Federal awarding agency previously entered that is currently in the designated integrity and performance system accessible through SAM.

DOE will consider any written comments by the applicant, in addition to the other information in the designated integrity and performance system, in making a judgment about the applicant's integrity, business ethics, and record of performance under Federal awards when completing the review of risk posed by applicants as described in 2 CFR 200.205 - Federal awarding agency review of risk posed by applicants.

C. ANTICIPATED NOTICE OF SELECTION

DOE anticipates making selection announcements no later than July 31, 2023.

PART VI – AWARD ADMINISTRATION INFORMATION

A. AWARD NOTICES

A.1 Notice of Selection

DOE will notify applicants selected for award. This notice of selection is not an authorization to begin performance. (See Part IV, Section I.2 of this CINR FOA with respect to the allowability of pre-award costs.) Organizations whose applications have not been selected will be advised as promptly as possible. This notice will explain why the application was not selected.

A notice of Federal award, signed by the DOE Contracting Officer, is the authorizing award document for any grants awarded as a result of this CINR FOA. A post-selection/pre-award process will occur prior to issuing the actual award. This process includes such activities as a responsibility review/review of risk posed by the selected applicant, a technical and budget review of the selected applicant's proposed budget, etc. Once approved, DOE will provide the actual award notice to the recipient by electronic means.

A.2 Nondisclosure and Confidentiality Agreements Representations

In submitting an application in response to this CINR FOA, the Applicant represents that:

- It does not and will not require its employees or contractors to sign internal nondisclosure or confidentiality agreements or statements prohibiting or otherwise restricting its employees or contractors from lawfully reporting waste, fraud, or abuse to a designated investigative or law enforcement representative of a Federal department or agency authorized to receive such information.
- It does not and will not use any Federal funds to implement or enforce any nondisclosure and/or confidentiality policy, form, or agreement it uses unless it contains the following provisions:

  ‘‘These provisions are consistent with and do not supersede, conflict with, or otherwise alter the employee obligations, rights, or liabilities created by existing statute or Executive order relating to (1) classified information, (2) communications to Congress, (3) the reporting to an Inspector General of a violation of any law, rule, or regulation, or mismanagement, a gross waste of funds, an abuse of authority, or a substantial and specific danger to public health or safety, or (4) any other whistleblower protection. The definitions, requirements, obligations, rights, sanctions, and liabilities created by controlling Executive Orders and statutory provisions are incorporated into this agreement and are controlling.’’

- The limitation and representations above in Part VI, Section A.2 of this CINR FOA shall not contravene requirements applicable to Standard Form 312, Form 4414, or any other form issued by a Federal department or agency governing the nondisclosure of classified information.

Notwithstanding the limitation and representations listed Part VI, Section A.2 of this CINR FOA above, a nondisclosure or confidentiality policy form or agreement that is to be executed by a

person connected with the conduct of an intelligence or intelligence-related activity, other than an employee or officer of the U.S. Government, may contain provisions appropriate to the particular activity for which such document is to be used. Such form or agreement shall, at a minimum, require that the person will not disclose any classified information received in the course of such activity, unless specifically authorized to do so by the U.S. Government. Such nondisclosure or confidentiality forms shall also make it clear that they do not bar disclosures to Congress, or to an authorized official of an executive agency or the Department of Justice, that are essential to reporting a substantial violation of law.

A.3 Notice of Award

An assistance agreement issued by the Contracting Officer is the authorizing award document (excludes NSUF Access Only awards). It normally includes, either as an attachment or by reference, the following: (1) special terms and conditions; (2) applicable program regulations, if any; (3) application as approved by DOE; (4) DOE assistance regulations at 2 CFR part 200, as amended by 2 CFR part 910; (5) National Policy Assurances to be incorporated as award terms; (6) Budget Summary; and (7) Federal Assistance Reporting Checklist, which identifies the reporting requirements.

If an award is made to a DOE national laboratory, it will be made against their existing prime M&O contract with DOE through the work authorization system as outlined in DOE O 412.1A, Admin Change 1. DOE national laboratories remain bound by the terms and conditions of their contract with DOE. DOE O 481.1E., Strategic Partnership Projects, is not applicable.

B. ADMINISTRATIVE AND NATIONAL POLICY REQUIREMENTS

B.1 Administrative Requirements

The administrative requirements for DOE grants and grants are contained in 2 CFR part 200, as amended by 2 CFR part 910 (See: http://ecfr.gov). Grants made to universities, non-profits, and other entities subject to Title 2 CFR are subject to the Research Terms and Conditions located on the National Science Foundation website at http://www.nsf.gov/bfa/dias/policy/rtc/index.jsp.

B.1.1 Unique Entity ID and SAM Requirements

Additional administrative requirements for DOE grants are contained in 2 CFR part 25 (see http://www.ecfr.gov/cgi-bin/ECFR?page=browse). Prime awardees must be registered in SAM before submitting an application and must continue to maintain a SAM registration with current information at all times during which it has an active Federal award or an application or plan under consideration by DOE under this CINR FOA. Primes and subawardees at all tiers must obtain Unique Entity ID numbers and provide it to the prime awardee before the subaward can be issued. The prime will provide this valid Unique Entity ID in its application. DOE may not make a Federal award to an applicant until the applicant has complied with all applicable unique entity ID and SAM requirements and, if an applicant has not fully complied with the requirements by the time DOE is ready to make the award, DOE may determine that the applicant is not qualified to receive an award and use that determination as a basis for making an award to another applicant.

B.1.2 Subaward and Executive Reporting

Additional administrative requirements necessary for DOE grants to comply with the Federal Funding and Transparency Act of 2006 (FFATA) are contained in 2 CFR, part 170 (see http://www.ecfr.gov/cgi-bin/ECFR?page=browse). Prime awardees must register with the new FFATA Subaward Reporting System (FSRS) database and report the required data on their first tier subawardees. Prime awardees must report the executive compensation for their own executives as part of their registration profile in the SAM.

B.2 Special Terms and Conditions and National Policy Requirements

The DOE special terms and conditions for use in most grants are located at http://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms under "Award Terms".

If the Federal share of any Federal award may include more than $500,000 over the period of performance, post award reporting requirements reflected in 2 CFR part 200, Appendix XII—*Award Term and Condition for Recipient Integrity and Performance Matters*, may also apply to any resultant award made under this CINR FOA.

The National Policy assurances to be incorporated as award terms are located at http://www.nsf.gov/bfa/dias/policy/rtc/appc.pdf and at http://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms under Award Terms.

Quality Assurance (QA) to be incorporated as award terms (applicable to educational institutions only). While DOE will normally rely on the institution's quality assurance (QA) system, below are general guidelines that those systems should adhere to, as applicable, for the type of work being done. No separate deliverable is required by this provision, unless the institution's existing QA systems are not compliant with these guidelines, or in the case that the institution identifies that the work to be performed has any special or unique QA requirements. The DOE has the right of access to the university facilities and records for surveillance or inspection. Any surveillance or inspections will be coordinated with the PI.

Test Planning, Implementation, and Documentation (Research Planning)

- Test methods and characteristics shall be planned and documented, and the approaches and procedures recorded and evaluated. Characteristics to be tested and test methods shall be specified. The test results shall be documented and their conformance to acceptance criteria evaluated.
- Documentation shall be developed to ensure replication of the work. The researcher/developer shall document work methods and results in a complete and accurate manner. The level of documentation shall be sufficient to withstand a successful peer review. Protocols on generation and safeguarding of data and process development from research shall be developed for consistency of R&D work.
- Laboratory notebooks shall be controlled by a university documented procedure/process. Also, the process for development of intellectual property documentation shall be controlled under university document control procedures/processes.

- If the university identifies any special or unique QA requirements for Test Planning, Implementation, and Documentation, the university shall submit a Test Plan/Research Plan to the funding organization for review and concurrence prior to use.

Equipment Calibration and Documentation

The researcher shall specify the requirements of accuracy, precision, and repeatability of measuring and test equipment (M&TE). Depending upon the need for accuracy, precision, and repeatability of M&TE used in research, standard university documented procedures shall be implemented. During the process development stage, and for all R&D support activities, M&TE shall be controlled. The degree of control shall be dependent on the application of the measurement. The university shall have available calibration records documenting instrument calibration to a national standard.

Procurement Document Control

University documented procurement document control procedures/processes shall be implemented, if results of initial research work are expected in the next stage of work, and if the pedigree of materials being used could influence the usefulness of the research work results. Procurement document specifications shall be controlled. For development and support activities, the level of procurement document control shall be applied to support a design basis (i.e., engineering design system criteria). If procurement document control requirements apply, the university shall have a documented procedure/process for control of suspect/counterfeit items (S/CI) and have available for submission for DOE review material pedigree records.

Training and Personnel Qualification

Personnel performing research activities shall be trained per university documented requirements to ensure work is being conducted properly to prevent rework or the production of unacceptable data. The university shall have available personnel training records for submission for DOE review.

Records

In many cases, the notebook or journal of the researcher is the QA record. These documents shall be controlled in accordance with university documented procedure/process, e.g., maintain notebook as a controlled document, maintain copies of critical pages or access-controlled filing when not in use to preserve process repeatability and the QA record. Electronic media may be used to record data and shall be subject to documented administrative controls for handling and storage of data. Work activity records shall be maintained by the university and available for DOE review, upon request, within sixty (60) days of completion of the work scope.

Data Acquisition/Collection and Analysis

When gathering data, the researcher shall ensure that the systems and subsystems of the experiment are operating properly. Software systems used to collect data and operate the experiment requires verification that it meets functional requirements prior to collection of actual data. Data anomalies require investigation. When performing data analysis, define the following: (1) assumptions and the methods used; (2) the results obtained so that independent qualified experts can evaluate how data was interpreted; (3) methods used to identify and

minimize measurement uncertainty; (4) the analytical models used; and (5) whether the R&D results have been documented adequately and can be validated.

Peer Review

Peer reviews shall be performed in accordance with peer review best practices as described in Part V of this CINR FOA. The peer reviews shall be documented and maintained by the university. Peer review documentation and results shall be provided to DOE.

B.3 Intellectual Property Provisions

The standard DOE financial assistance intellectual property provisions applicable to the various types of recipients are located at http://energy.gov/gc/standard-intellectual-property-ip-provisions-financial-assistance-awards.

B.4 Interim Conflict of Interest Policy for Financial Assistance

The DOE interim Conflict of Interest Policy for Financial Assistance (COI Policy) can be found at Financial Assistance Letter No. FAL 2022-02 | Department of Energy. This policy is applicable to all non-Federal entities applying for, or that receive, DOE funding by means of a financial assistance award (e.g., a grant, cooperative agreement, or technology investment agreement) and, through the implementation of this policy by the entity, to each Investigator who is planning to participate in, or is participating in, the project funded wholly or in part under the DOE financial assistance award. DOE's interim COI Policy establishes standards that provide a reasonable expectation that the design, conduct, and reporting of projects funded wholly or in part under DOE financial assistance awards will be free from bias resulting from financial conflicts of interest or organizational conflicts of interest. The applicant is subject to the requirements of the interim COI Policy and within each application for financial assistance, the applicant must certify that it is, or will be by the time of receiving any financial assistance award, compliant with all requirements in the interim COI Policy. The applicant must flow down the requirements of the interim COI Policy to any subrecipient non-Federal entities.

B.5 Lobby Restrictions

By accepting funds under this award, the applicant agrees that none of the funds obligated on the award shall be expended, directly or indirectly, to influence congressional action on any legislation or appropriation matters pending before Congress, other than to communicate to Members of Congress as described in 18 U.S.C. § 1913. This restriction is in addition to those prescribed elsewhere in statute and regulation.

B.6 Corporate Felony Conviction and Federal Tax Liability Representations

In submitting an application in response to this CINR FOA, the applicant represents that:

- It is not a corporation that has been convicted (or had an officer or agent of such corporation acting on behalf of the corporation convicted) of a felony criminal violation under any Federal law within the preceding 24 months; and
- It is not a corporation that has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that

is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.

For purposes of these representations the following definitions applies:

- A corporation includes any entity that has filed articles of incorporation in any of the 50 states, the District of Columbia, or the various territories of the United States (but not foreign corporations); and
- It includes both for-profit and non-profit organizations.

B.7 Statement of Federal Stewardship

DOE/NNSA will exercise normal Federal stewardship in overseeing the project activities performed under this award. Stewardship activities include, but are not limited to, conducting site visits; reviewing performance and financial reports; providing technical assistance and/or temporary intervention in unusual circumstances to correct deficiencies which develop during the project; assuring compliance with terms and conditions; and reviewing technical performance after project completion to ensure that the award objectives have been accomplished.

The recipient's responsibilities are listed in Part VI, Section B.6 below:

Recipient's Responsibilities. The recipient is responsible for:

- Complying with all award requirements, including performing the activities supported by this award, including providing the required personnel, facilities, equipment, supplies and services.
- Defining approaches and plans as may be required by this award, submitting the plans to DOE for review, and incorporating DOE's comments.
- Managing and conducting the project activities, including coordinating with DOE management and operating (M&O) contractor(s) as required and as proposed in the recipient's project plan on activities performed under the M&O contract(s) that are related to the project.
- Attending annual program review meetings and reporting project status, if requested by the program.
- Submitting technical reports as stated in the Federal Assistance Reporting Checklist and incorporating DOE comments.
- Completing reporting requirements as outlined in the instructions provided in the awards Attachment B "Federal Assistance Reporting Checklist and Instructions" including:
    - **NE Program Information Collection System (PICS:NE):** NE CINR R&D award PIs are required to complete reporting requirements as outlined in the instructions provided in the awards Attachment B "Federal Assistance Reporting Checklist and Instructions". Information provided in required award reporting will be utilized to populate PICS:NE (PICS:NE data entry will be done by DOE using information provided by the PI). PIs may be asked by the DOE PICS:NE representative for additional information during the initial work package setup process to accurately document the project plan, as well as through the award's project period to populate information in PICS:NE. PIs may be requested to provide additional assistance for

clarification purposes in assuring accuracy of the information being entered into PICS:NE.

- **NE Program Accrual Information:** DOE policy requires the monthly tracking of uncosted obligations on financial assistance awards in the DOE accounting system to assist DOE in accomplishing more accurate project management and to more accurately recognize Department liabilities to the recipient. DOE personnel do this internally by subtracting paid costs and any costs accrued (yet to be paid incurred costs of the recipient) from the amounts obligated on the financial assistance award. In accomplishing this, DOE may request the recipient provide additional cost accrual information to accurately estimate/document the accrual in the DOE accounting system. If such information is needed, it will typically be done on awards over $1M and DOE will normally do this using an e-mail to the recipient requesting the recipient identify the dollar value of work it has performed each month but not yet invoiced (or done a Treasury system draw on) as of month end. Recipients will cooperate with DOE in providing the needed cost accrual information.

NOTE: There are limitations on recipient responsibilities and authorities in the performance of the project activities. Performance of the project activities must be within the scope of the Statement of Objectives, the terms and conditions of the grant, and the funding and schedule constraints.

C. REPORTING

Reporting requirements are identified on the Federal Assistance Reporting Checklist, DOE F 4600.2, attached to the award agreement. A sample checklist is available at http://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms under Award Forms.

NOTE: A new award may be delayed due to delinquent reporting, including delinquent final reports for past awards.

NOTE: The DOE F 4600.2 identifies in box 4.E "Other Reporting", a marked checkbox titled "Other (see special instructions)", which requires submission of the following:

- **Work Package Template** (one time submission) – Completed and submitted by the PI to assist DOE with populating general award information in the PICS:NE system. The template is due no later than 10/31/2023 for awardees in the above listed areas. The Work Package should contain milestones that are appropriate, meaningful and measurable, over the life of the project.
- **Quad Chart** (semi-annual submission) – The chart is completed and submitted by the PI to provide NE program managers and technical leads with a quick "snap-shot" look at R&D progress.

PART VII – QUESTIONS/AGENCY CONTACTS

A. QUESTIONS

Interested parties are encouraged to ask questions as early in the CINR FOA process as possible. Questions and comments concerning this CINR FOA shall be submitted no later than five (5) business days prior to the application due date. Questions submitted after that date may not allow the Government sufficient time to respond.

Questions regarding the content of this CINR FOA must be submitted to the Agency Contact listed in Part VII, Section B of this CINR FOA. PIs are not allowed to contact Federal or Technical Points of Contact. Questions regarding work scopes may be submitted to NEUP@inl.gov and a response from the applicable DOE federal and technical POCs will be relayed back to the inquirer. Inquiries regarding work scopes and technical questions can be submitted in this manner until Full Applications are submitted. Questions pertaining to items such as application processes, eligibility, or application document requirements should also be directed to NEUP@inl.gov.

Questions relating to the registration process, system requirements, how an application form works, or the submittal process, must be directed to NEUP@inl.gov.

Answers to submitted questions containing information about the CINR FOA, work scopes and technical questions, or the FOA process that would be necessary for the preparation of applications will be posted to www.NEUP.gov as soon as practical. Information provided to a potential applicant in response to its request will not be disclosed if doing so would reveal the potential applicant's confidential business strategy and/or is otherwise protected. DOE will try to respond to a question within three (3) business days unless a similar question and answer have already been posted on the website.

B. AGENCY CONTACT

Name: Andrew Ford
E-mail: fordaj@id.doe.gov

C. INFORMATIONAL WEBINAR

DOE holds a webinar each year to discuss the structure and execution of this FOA, including major updates from previous years, including work scopes. Applicants can watch and participate in the live webinars and submit questions, through the GoToWebinar interface, to be answered in real time. Registration information and webinar presentations are available on www.NEUP.gov for review by applicants.

PART VIII – OTHER INFORMATION

A. AMENDMENTS

Notices of any amendments to this announcement will be posted on www.FedConnect.net and www.Grants.gov and will also be posted as a courtesy on www.NEUP.gov. It is recommended that the website is checked frequently at www.NEUP.gov to ensure you receive timely notice of any amendments or other announcements.

B. GOVERNMENT RIGHT TO REJECT OR NEGOTIATE

DOE reserves the right, without qualification, to reject any or all applications received in response to this announcement and to select any application, in whole or in part, as a basis for negotiation and/or award.

C. COMMITMENT OF PUBLIC FUNDS

The Contracting Officer is the only individual who can make awards or commit the Government to the expenditure of public funds. A commitment by anyone other than the Contracting Officer, either explicit or implied, is invalid.

Funding for all awards is contingent upon the availability of funds appropriated by Congress for the purpose of this program.

D. PROPRIETARY APPLICATION INFORMATION

Patentable ideas, trade secrets, proprietary or confidential commercial or financial information, disclosure of which may harm the applicant, should be included in an application only when such information is necessary to convey an understanding of the proposed project. The use and disclosure of such data may be restricted, provided the applicant includes the following legend on the first page of the project narrative and specifies the pages of the application which are to be restricted:

> "The data contained in pages [Insert pages] of this application have been submitted in confidence and contain trade secrets or proprietary information, and such data shall be used or disclosed only for evaluation purposes, provided that if this applicant receives an award as a result of or in connection with the submission of this application, DOE shall have the right to use or disclose the data herein to the extent provided in the award. This restriction does not limit the government's right to use or disclose data obtained without restriction from any source, including the applicant."

To protect such data, each line or paragraph on the pages containing such data must be specifically identified and marked with a legend similar to the following:

> "The following contains proprietary information that (name of applicant) requests not be released to persons outside the Government, except for purposes of review and evaluation."

E. EVALUATION AND ADMINISTRATION BY NON-FEDERAL PERSONNEL

In conducting the merit review evaluation, the Government may seek the advice of qualified non-Federal personnel as reviewers. The Government may also use non-Federal personnel to conduct routine, nondiscretionary administrative activities. The applicant, by submitting an application, consents to the use of non-Federal reviewers/administrators. Non-Federal reviewers must sign COI and non-disclosure agreements prior to reviewing an application. Non-Federal personnel conducting administrative activities must sign a non-disclosure agreement.

F. INTELLECTUAL PROPERTY DEVELOPED UNDER THIS PROGRAM

Patent Rights. Domestic small businesses and domestic nonprofit organizations will receive the patent rights clause at 37 CFR 401.14, i.e., the implementation of the Bayh-Dole Act. This clause permits domestic small business and domestic non-profit organizations to retain title to subject inventions.

Class Patent Waiver. For applicant's that are not domestic small businesses or nonprofit organizations, the Office Nuclear Energy (NE) Class Patent Waiver W(C) 2020-002 may be applicable to an award made under this announcement. The class patent waiver will provide applicants, not subject to the Bayh-Dole Act, the option to retain title to their own inventions, subject to the same government retained rights identified in the Act above. To receive the class waiver, an applicant, must agree to provide statutory minimum cost share required under the award and agree to substantially manufacture technology created under the award in the U.S., or provide other economic benefits to the U.S. in accordance with the U.S. Competitiveness provision set forth in the above-referenced class patent waiver.

Rights in Technical Data. Normally, the Government has unlimited rights in technical data created under a DOE agreement. Delivery or third-party licensing of proprietary software or data developed solely at private expense will not normally be required except as specifically negotiated in a particular agreement to satisfy DOE's own needs or to ensure the commercialization of technology developed under a DOE agreement.

Special Protected Data Statutes. This program is covered by a special protected data statute. These special protected data statutes apply to only those applicants who cost share. The provisions of the statute provide for the protection from public disclosure, for a period of up to five (5) years from the development of the information, of data that would be a trade secret, or commercial or financial information that is privileged or confidential, if the information had been obtained from a non-Federal party. Generally, the provision entitled, Rights in Data - Programs Covered Under Special Protected Data Statutes (Item 4 under 2 CFR 910, Appendix A to Subpart D), would apply to an award made under this announcement. This provision will identify data or categories of data first produced in the performance of the award that will be made available to the public, notwithstanding the statutory authority to withhold data from public dissemination, and will also identify data that will be recognized by the parties as protected data.

Copyright. The recipient and subrecipients may assert copyright in copyrightable works, such as software, first produced under the award without DOE approval. When copyright is asserted, the government retains a paid-up nonexclusive, irrevocable worldwide license to reproduce, prepare derivative works, distribute copies to the public, and to perform publicly and display publicly the

copyrighted work. This license extends to contractors and others doing work on behalf of the government.

U.S. Manufacturing. On June 07, 2021, DOE approved a DETERMINATION OF EXCEPTIONAL CIRCUMSTANCES (DEC) UNDER THE BAYH-DOLE ACT TO FURTHER PROMOTE DOMESTIC MANUFACTURE OF DOE SCIENCE AND ENERGY TECHNOLOGIES. In accordance with this DEC, all awards, including sub-awards, under this FOA shall include the U.S. Competitiveness Provision in accordance with Intellectual Property Provisions referenced at B.3. The Provision requires that any products embodying any subject invention or produced through the use of any subject invention will be manufactured substantially in the United States unless the recipient can show to the satisfaction of DOE that it is not commercially feasible. A copy of the DEC can be found at ttps://www.energy.gov/gc/determination-exceptional-circumstances-decs. Pursuant to 37 CFR § 401.4, any nonprofit organization or small business firm as defined by 35 U.S.C. 201 affected by any DEC has the right to appeal it by providing written notice to DOE within 30 working days from the time it receives a copy of the determination.

G. UNDERSTANDING COST SHARING REQUIREMENTS (Cost sharing is not required for universities and FFRDCs)

Department-wide cost sharing requirements are established by Section 988 of the Energy Policy Act of 2005. The DOE Financial Assistance Rules at 2 CFR part 200 and 2 CFR part 910 implement cost sharing requirements (see 2 CFR 200.306 and 2 CFR 910.130).

In accordance with section 988 (d) of the Energy Policy Act of 2005, Calculation of Amount, when calculating the amount of the non-Federal contribution, the Government:

1. May include the following costs as allowable in accordance with the applicable cost principles:
    a. Cash.
    b. Personnel costs.
    c. The value of a service, other resource, or third-party in-kind contribution determined in accordance with the applicable circular of the Office of Management and Budget [**Note**: In-kind contributions, like any other cost, need to be incurred during the award project period, e.g., cannot give credit for costs incurred prior to the award, including prior development costs, unless otherwise authorized by the applicable cost principles].
    d. Indirect costs or facilities and administrative costs.
    e. Any funds received under the power program of the Tennessee Valley Authority (except to the extent that such funds are made available under an annual appropriation act).

Shall not include:

    f. Revenues or royalties from the prospective operation of an activity beyond the time considered in the award.
    g. Proceeds from the prospective sale of an asset of an activity.
    h. Other appropriated Federal funds.

The terms and conditions of the grant will include appropriate provisions on allowable costs.

The Federal share shall not be required to be repaid as a condition of award. Royalties should not be used to repay or recover the Federal share but may be used as a reward for technology transfer activities.

Cost share is often confused with some form of cost matching. The key to understanding how cost share works is to understand the base from which the cost share percentage is calculated. Cost share percentage is a percentage of the total allowable costs of the project. Note that it is NOT a percentage of the DOE funds, but rather the entire project, including all awardee funds, DOE funds, and all FFRDC requirements.

When determining the cost share requirement in dollars, it is first necessary to determine the entire project cost. Initially, no consideration would be given as to where the funds would come from. An applicant would determine that a certain cost (e.g., hours, travel, supplies, etc.) would be needed to complete the project as proposed in the application. Once the project cost is determined, an applicant can then calculate the cost share requirement by multiplying the cost share percentage by the project cost. The resulting dollar figure would be the dollar requirement that the applicant must provide as cost share.

Below are several examples of how the cost share amount would be calculated:

Example 1

The applicant determines that the following budget requirements are needed to carry out the work described in its application to DOE:

Direct Labor	$100,000
Travel	$3,000
Equipment	$17,000
Supplies	$10,000
Subcontract	$20,000
Total Project Cost	**$150,000**

A cost share requirement of 20% was specified in the funding announcement.
Cost Share = (cost share percentage) × (***total project cost***)
Cost Share = (20%) × ($150,000)
Cost Share = $30,000

The applicant must now identify $30,000 of $150,000 as Cost Share.
The applicant would then request DOE funding in the amount of $120,000.

DOE Share = $120,000 **Awardee Share = $30,000**

Example 2

The applicant determines that the following budget requirements are needed to carry out the work described in its application to DOE:

Direct	$200,000
Labor	$10,000
Travel	$20,000
Equipment	$10,000
Supplies	$60,000
Total Project	**$300,000**

A cost share requirement of 20% was specified in the funding announcement.

Cost Share = (cost share percentage) × (total project cost)
Cost Share = (20%) × ($300,000)
Cost Share = $60,000

The applicant must now identify $60,000 of $300,000 as Cost Share. DOE would pay $60,000 directly to the FFRDC. The applicant would then request DOE funding in the amount of $180,000.

DOE Share = $180,000 (funds to Awardee) + $60,000 (FFRDC) = $240,000

Awardee Share = $60,000

NOTE: FFRDC funds are paid directly to the FFRDC by DOE. The work provided by the FFRDC is still considered part of the total project cost; therefore, it is included in the base from which the awardee cost share is calculated.

In all cases, the applicant must specify the individual costs that make up each part of the total project cost and indicate whether DOE or non-DOE funds will be used to cover the cost.

The budget from **Example 1** might look something like the following:

		DOE	**Non-DOE**
Direct Labor	$100,000	$70,000	$30,000
Travel	$3,000	$3,000	$0
Equipment	$17,000	$17,000	$0
Supplies	$10,000	$10,000	$0
Subcontract	$20,000	$20,000	$0
Total Project Cost	**$150,000**	**$120,000**	**$30,000**

The application forms in this CINR FOA will facilitate the identification of funding sources.

H. NOTICE REGARDING ELIGIBLE/INELIGIBLE ACTIVITIES

Eligible activities under this program include those which describe and promote the understanding of scientific and technical aspects of specific energy technologies, but not those that encourage or support political activities such as the collection and dissemination of information related to potential, planned, or pending legislation.

I. NO-COST TIME EXTENSIONS

Unilateral no-cost time extensions will NOT be permitted to awards made under this CINR FOA. All no-cost time extensions must provide adequate justification and receive approval from the Contracting Officer. No-cost time extensions should be requested as soon as the need is identified within the last year of the award.

A request for a no-cost time extension on existing NE funded projects must only be made between October 1 - April 15. Any request outside of this period will need to be substantially justified and receive approval from the Contracting Officer. One no-cost time extension request may be granted for up to 12 months, pending review and approval. No-cost time extensions should be submitted only during the period of October 1 – April 15 to NEUP@inl.gov.

J. REBUDGET REQUEST

Any rebudget request where the cumulative amount of such change is expected to exceed 10 percent of the total budget as last approved by the Federal awarding agency must be requested in writing (see 2 CFR 200.308). The request must include a detailed budget justification, and an updated budget in the same format that was used in the original application. Any request for the purchase of equipment exceeding $5,000 must be requested in writing to include a valid quote, and justification for purchase.

Budget forms can be found at: https://www.energy.gov/management/downloads/sf-424-research-and-related-budget-rr

K. CONFERENCE SPENDING

The recipient shall not expend any funds on a conference not directly and programmatically related to the purpose for which the grant was awarded that would defray the cost to the United States government of a conference held by any executive branch department, agency, board, commission, or office for which the cost to the United States government would otherwise exceed $20,000, thereby circumventing the required notification by the head of any such executive branch department, agency, board, commission, or office to the inspector general (or senior ethics official for any entity without an inspector general), of the date, location, and number of employees attending such conference.

PART IX – APPENDICES/REFERENCE MATERIAL

Appendix A: Work Scopes for U.S. University-led R&D Projects

Appendix B: Work Scopes for U.S. University-led IRPs

Appendix C: Work Scopes for U.S. University-, National Laboratory-, or Industry-led NSUF Access Only Projects

Appendix D: Accessing Nuclear Science User Facilities

Appendix E: Draft Nuclear Science User Facilities User Agreement

Appendix A: Work Scopes for U.S. University-led R&D Projects

TOPIC AREA 1 - REACTOR DEVELOPMENT AND PLANT OPTIMIZATION

NE supports existing and advanced reactor designs and technologies to enable industry to address technical challenges with maintaining the existing fleet of nuclear reactors and to promote the development of a robust pipeline of advanced reactor designs and technologies and supply chain capabilities. Advances in reactor development, design, and testing that improve technical, cost, safety, and security issues associated with the existing commercial light water reactor fleet and advanced reactor technologies, such as small modular reactor (SMR) and microreactor designs, fast reactors using liquid metal coolants, and high temperature reactors using gas or liquid salt coolants are of interest. NE is also interested in research related to plant optimization including, but not limited to, siting, economics, construction and scheduling outcomes, reducing cost and deployment timelines, remote deployment of reactors, environmental justice and equity considerations, and secure operations, among other relevant topics.

For investigators applying to a Topic Area 1: Reactor Development and Plant Optimization work scope, incremental funding is potentially available through participation in the Department of Energy's interactions with the Organization for Economic Cooperation and Development (OECD) Nuclear Energy Agency (NEA) Nuclear Education, Skills and Technology (NEST) program. NEST ties together university research projects across multiple countries to provide students a fuller professional experience as they pursue their degree. NEST funds are provided to allow travel for students to interact with colleagues in other NEST countries in accordance with NEST program rules. Applications submitted to this work-scope do not require NEST participation. Access to NEST funds do require investigators to agree to participate in NEST. Investigators must clearly indicate in their application if they are willing to join as a NEST project or not.

NOTE: Anticipated budget requirements for NEST participation must not be included in an application submitted to this topic area. NEST funding received by successful applicants will not be included or tracked as part of the overall project budget and not subject to inclusion in project financial reporting. Additionally, participation in NEST will not be a factor considered in the review of applications.

Reactor development and plant optimization related applications should be submitted to one of the following reactor deployment categories:

RDO-1: ADVANCED REACTOR DEVELOPMENT
(FEDERAL POC – JANELLE EDDINS)
(ELIGIBLE TO LEAD: UNIVERSITIES ONLY)
(UP TO 3 YEARS AND $1,000,000)

Advanced reactor concepts have the potential to offer significant benefits, including possible lower costs, enhanced safety and security, greater resource utilization and simplified operations. NE performs research and development (R&D) to support innovative reactor concepts, including high temperature gas-cooled reactors (HTGRs), fast reactors, molten salt reactors (MSRs) and microreactors. Proposals are being sought for activities that could help reduce the technical risks associated with these designs. Proposals should clearly identify the challenge being addressed and how proposed activities will support the development, demonstration, and future deployment of advanced reactor concepts. Some potential challenges that could be addressed include, but are not limited to, advanced reactor component development and testing; transient and safety analysis; thermophysical and thermochemical properties determination of molten salts associated with Ab Initio Molecular Dynamics simulations; graphite-salt interaction studies; innovative reactor core and system design optimization or modifications; and characterization of bypass flow for pebble bed reactors.

RDO-2: IMPROVING ECONOMIC COMPETITIVENESS
(FEDERAL POC – JASON TOKEY)
(ELIGIBLE TO LEAD: UNIVERSITIES ONLY)
(UP TO 3 YEARS AND $1,000,000)

The existing nuclear fleet continues to face economic pressures, which are resulting in premature plant

TOPIC AREA 1 - REACTOR DEVELOPMENT AND PLANT OPTIMIZATION

shutdowns, and advanced reactors must prove their economic competitiveness against nascent technologies for widespread deployment to be successful. Proposals are being sought for innovative solutions to improve the economic competitiveness of existing and future nuclear power plants.

RDO-3: INTEGRATED ENERGY SYSTEMS AND INDUSTRIAL APPLICATIONS
(FEDERAL POC – JASON MARCINKOSKI)
(ELIGIBLE TO LEAD: UNIVERSITIES ONLY)
(UP TO 3 YEARS AND $1,000,000)

Nuclear reactors are an attractive technology to power multiple applications, particularly hydrogen, synthetic fuels, polymers, chemicals, minerals production, refineries, and district heating, where clean, reliable energy, or high-quality heat is needed with very high availability. Nuclear reactors offer the ability to provide heat and electricity at the location where it is needed, greatly reducing the cost to transmit/distribute energy. For commercial deployment in these areas, it is critical to consider thermal and electrical requirements for the industrial application to determine the infrastructure needed to connect the nuclear plant to the industrial application. Proposals are sought to develop reference designs for nuclear-integrated industrial systems. Proposed tasks could include, but are not limited to, chemical/industrial process models for integrating nuclear energy inputs; design of thermal, electrical, and chemical distribution and storage systems, including control system components and sensors; and innovative designs for physical protection, barriers, and nuclear and industrial plant layouts. Proposals for new reactor designs are not within scope. Instead, applicants are encouraged to reference publicly available design information for the reactor being proposed as part of the reference nuclear-integrated industrial systems.

RDO-4: REMOTE DEPLOYMENT/DEDICATED POWER SUPPLIES INCLUDING SITING
(FEDERAL POC – DIANA LI)
(ELIGIBLE TO LEAD: UNIVERSITIES ONLY)
(UP TO 3 YEARS AND $1,000,000)

Some advanced reactors, such as microreactors, are uniquely suited for servicing non-traditional energy markets such as off-grid communities, remote locations, military bases, and disaster relief missions. Additionally, new large electrical loads pose several challenges to the U.S. electric power grid that could potentially be addressed through use of microreactors or small advanced reactors to serve as dedicated power sources. Proposals are sought for the identification of high value opportunities for advanced reactors to service non-traditional energy markets and/or provide a dedicated supply of heat and/or electricity when compared to power sources. Areas of interest include but are not limited to, techno-economic analysis; environmental justice considerations in siting advanced nuclear projects; technical interface considerations and regulatory analysis; details on reactor type, size, variability of loads, thermal and electrical output capacity; startup and shutdown requirements under planned and unplanned conditions; site requirements such as containment, methods and capacity to transfer heat to the environment in various operating conditions, access, and physical security boundaries, operator and security staff. Proposals for completely new reactor designs are not within this scope.

RDO-5: IMPLEMENTATION OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
(FEDERAL POC – DANIEL NICHOLS)
(ELIGIBLE TO LEAD: UNIVERSITIES ONLY)
(UP TO 3 YEARS AND $1,000,000)

Both artificial intelligence and machine learning (AI/ML) have been identified as critical tools to support optimization of a wide variety of systems pertinent to the growth and sustainability of the nuclear industry. These tools can expedite development and deployment of nuclear reactors, lower costs, and provide faster solutions to unique problems. To foster the implement of AI/ML techniques to the nuclear industry, the Office of Nuclear Energy seeks proposals that leverage these highly advantageous tools to solve problems such as, but not limited

TOPIC AREA 1 - REACTOR DEVELOPMENT AND PLANT OPTIMIZATION

to, structural design optimization, process optimization, economic optimization, manufacturing optimization, hazard detection, and non-nominal condition monitoring. Our goal is to promote interest growth from the AI community while focusing on supporting the Office of Nuclear Energy's mission.

RDO-6: OTHER REACTOR DEVELOPMENT AND PLANT OPTIMIZATION (ELIGIBLE TO LEAD: UNIVERSITIES ONLY) (UP TO 3 YEARS AND $1,000,000)

Proposals that are not easily categorized into one of the above sub-topic areas of Topic Area 1 (Reactor Development and Plant Optimization) should be submitted to the "other" sub-topic area.

TOPIC AREA 2 - FUEL CYCLE TECHNOLOGIES

NE develops used nuclear fuel management strategies and technologies to support meeting Federal Government responsibility to manage and dispose of the Nation's commercial used nuclear fuel and high-level waste and to develop sustainable fuel recycling technologies and options that improve resource utilization and energy generation, reduce waste generation, enhance safety, and limit proliferation risk. Current challenges where continued foundational research is needed, include, but are not limited to, exploiting actinide coordination chemistry and interactions at the interface, understanding structure and properties of molten salts solution, intensifying separations through selective removal of key fission product, and external forces and fields, developing real-time characterization technologies for the development of simplified materials recovery technologies. Additional challenges involve used fuel management (including storage, transportation, and disposal), proliferation risk reduction methods, and development of processes and tools to evaluate sustainable fuel cycle system and used fuel management options that can be communicated effectively to stakeholders.

Fuel cycle technology related applications should be submitted to one of the following fuel cycle technology categories:

FC-1: AQUEOUS SEPARATIONS CHEMISTRY
(FEDERAL POC – STEPHEN KUNG)
(ELIGIBLE TO LEAD: UNIVERSITIES ONLY)
(UP TO 3 YEARS AND $1,000,000)

Sustainable nuclear energy can be achieved with repeated recycling of fissile and fissionable material into advanced reactors. Currently, aqueous recycling technologies exist but are hampered by high capital and operating costs. The multiple purification cycles needed to obtain sufficiently pure products for recycling is a significant driver for the high costs involved. This topic focuses on innovative approaches that improve our fundamental understanding of aqueous separation chemistry to enable simplifying aqueous processing.

FC-2: MOLTEN SALT SEPARATIONS AND SOLUTION CHEMISTRY
(FEDERAL POC – JIM WILLIT)
(ELIGIBLE TO LEAD: UNIVERSITIES ONLY)
(UP TO 3 YEARS AND $1,000,000)

Molten salts have unique composition–dependent chemical, thermodynamic, thermophysical, and neutronic properties that make them well-suited for applications on front and back ends of fuel cycle as well as for thermal storage. These unique properties are determined by speciation and atomic level structures of the salt solution. This topic seeks proposals on innovative modeling and experimental approaches that improve our fundamental understanding of molten salt solution chemistry and properties at the atomic level to enable a broad scope of molten salt applications.

FC-3: SPENT FUEL AND WASTE DISPOSITION: DISPOSAL RESEARCH
(FEDERAL POC – PRASAD NAIR)
(ELIGIBLE TO LEAD: UNIVERSITIES ONLY)
(UP TO 3 YEARS AND $1,000,000)

The mission for the Office of Spent Fuel and Waste Science and Technology is to provide a sound technical basis for the safety and security of long-term storage, transportation, and disposal of used nuclear fuel and wastes from the nuclear energy enterprise. Within this mission. Disposal Research is tasked with developing a sound technical basis for assurance that the U.S. has multiple viable disposal options available when national policy is ready, identify and research generic sources of uncertainty that challenge the viability of disposal concepts, increase confidence in robustness of generic disposal concepts to reduce the impact of site-specific complexity, and develop the science and engineering tools required to address these needs. The areas of highest priority for the

TOPIC AREA 2 - FUEL CYCLE TECHNOLOGIES

mission are described in the following document: Sevougian, et al. 2019, 'DOE SFWST Campaign R&D Roadmap Update Rev. 1' SAND2019-9033R, which can be found at https://www.osti.gov/biblio/1559571. Proposals are sought for research activities that can contribute to our knowledge in the areas described therein, including i) waste package failure modes, ii) post closure criticality, iii) radio geochemistry, iv) buffer materials, v) modeling & simulation, or vi) other areas.

FC-4: SPENT FUEL AND WASTE DISPOSITION: STORAGE & TRANSPORTATION (FEDERAL POC – JOHN ORCHARD) (ELIGIBLE TO LEAD: UNIVERSITIES ONLY) (UP TO 3 YEARS AND $1,000,000)

The mission for the Office of Spent Fuel and Waste Science and Technology is to provide a sound technical basis for the safety and security of long-term storage, transportation, and disposal of used nuclear fuel and wastes from the nuclear energy enterprise. Within this mission, Storage and Transportation is tasked with developing the technical bases to demonstrate used fuel integrity for extended storage periods, to ensure fuel retrievability and transportation after extended storage, and to transport high burnup fuel. The areas of highest priority for the mission are described in the following document: Teague et al. 2019, 'Gap Analysis to Guide DOE R&D in Supporting Extended Storage and Transportation of Spent Nuclear Fuel: An FY2019 Assessment', SAND2019-15479R, which can be found at https://www.osti.gov/servlets/purl/1592862. Proposals are sought for research activities that can contribute to our knowledge in the areas described therein, including i) Chlorine Induced Stress Corrosion Cracking in the Canister Wall, ii) Canister Internal Environment Monitoring, iii) Fuel Cladding Degradation, iv) Stresses and Strains on Fuel Bundle Components due to Transportation or Seismic Loads, or v) other areas.

FC-5: OTHER FUEL CYCLE TECHNOLOGIES (ELIGIBLE TO LEAD: UNIVERSITIES ONLY) (UP TO 3 YEARS AND $1,000,000)

Proposals that are not easily categorized into one of the above sub-topic areas of Topic Area 2 (Fuel Cycle Technologies) should be submitted to the "other" sub-topic area.

TOPIC AREA 3 - FUELS

Advancements in fuel systems, fabrication processes, cladding concepts, and evaluation techniques are important to continue progress already achieved in increasing improvement of fuel performance. NE solicits proposals that focus on LWR or advanced reactor applications that advance existing fuels concepts and enhancing performance or resilience of existing fuels including accident tolerant fuels, TRISO-particle fuels, metallic fuel, and other relevant concepts. NE also plans to support next generation LWR fuel and advanced reactor applications. All aspects of fuel design, testing, and evaluation will be considered.

Fuels related applications should be submitted to one of the following categories:

FL-1: ACCIDENT TOLERANT FUELS
(FEDERAL POC – FRANK GOLDNER)
(ELIGIBLE TO LEAD: UNIVERSITIES ONLY)
(UP TO 3 YEARS AND $1,000,000)

A key NE mission is to support the existing fleet of light water reactors (LWRs) via the Accident Tolerant Fuel (ATF) program. The ATF program activities are meant to enhance the safety and performance of existing LWRs. NE is teaming with the U.S. fuel suppliers to develop accident tolerant fuel concepts in the near term that include coated zirconium cladding and doped UO2 pellets. Longer term concepts include iron-chromium-aluminum cladding, silicon carbide composite cladding, and high uranium density fuels. Proposals are sought in areas that can contribute to enhancing LWR safety and performance including, but are not limited to: investigating if ATF concepts can enable LWR coolant CRUD reductions; investigating if ATF concepts, when coupled with fuel enriched to greater than 5% and qualified for use at higher burnup levels, can support reactor power uprates; investigating if the use of ATF concepts can be applicable to SMRs and advanced reactor applications; and investigating innovative nondestructive examination techniques for the manufacturing of silicon carbide composite cladding.

FL-2: TRISO FUELS
(FEDERAL POC – MATT HAHN)
(ELIGIBLE TO LEAD: UNIVERSITIES ONLY)
(UP TO 3 YEARS AND $1,000,000)

TRISO-particle fuel is a fuel form that has demonstrated robust safety performance for high temperature applications. Numerous U.S. companies are pursuing the use of TRISO fuel in their advanced high temperature reactor concepts. Proposals are sought for activities that enable the goal of licensing and operating nuclear reactors that utilize TRISO fuel. Potential focus areas could include, but are not limited to, a comprehensive understanding of fuel and fuel matrix properties under irradiated conditions; addressing unique challenges associated with the use of TRISO fuel in non-typical environments, such as molten salt environments and microreactor applications; and activities to evaluate or develop novel TRISO-fuel forms, including new fuel kernel compositions.

FL-3: METALLIC FUELS
(FEDERAL POC – KEN KELLAR)
(ELIGIBLE TO LEAD: UNIVERSITIES ONLY)
(UP TO 3 YEARS AND $1,000,000)

Metallic fuels for advanced reactors can operate in open or closed fuel cycles. Open cycle metallic fuel topical areas include the optimization of fuel life and energy output, as well as storability and disposability. Reactor concepts are advanced in nature regarding temperature and coolant and are usually fast spectrum. Chemically reactive or liquid bonds are to be avoided in this group due to complications with storage and disposal. Closed cycle metallic fuels topical areas include maximizing fuel burnup to support an efficient and economic fuel cycle;

TOPIC AREA 3 - FUELS

facilitating reprocessing; and geologic repository burden minimization. Fuel/clad bonding is acceptable in this group as long as it does not hinder reprocessing operations. Both fuel applications place a high priority on manufacturability, economics, safety, and resource utilization. Proposals are sought for metallic fuel modeling interests including first principles understanding, predictive capability, design streamlining, and licensing support.

FL-4: OTHER FUELS TOPICS
(ELIGIBLE TO LEAD: UNIVERSITIES ONLY)
(UP TO 3 YEARS AND $1,000,000)

Proposals that are not easily categorized into one of the above sub-topic areas of Topic Area 3 (Fuels) should be submitted to the "other" sub-topic area.

TOPIC AREA 4 – MODELING AND SIMULATION

Science-based, verified, and validated modeling and simulation capabilities are essential for the design, implementation, and operation of nuclear energy systems. This topic areas focuses on nuclear energy related modeling and simulation projects that improve the tools and frameworks for many different modeling and simulation activities including, but not limited to: high fidelity reactor modeling, including neutronics, structural dynamics, and thermal hydraulics; multi-scale, multi-physics models for characterizing complex neutron kinetics, dynamics, microstructural, and thermomechanical phenomena; verification and validation; Uncertainty quantification; and flow modeling, among other relevant areas.

Modeling and simulation applications should be submitted to one of the following categories:

M&S-1: MULTI-SCALE MODELING
(FEDERAL POC – DAVID HENDERSON)
(ELIGIBLE TO LEAD: UNIVERSITIES ONLY)
(UP TO 3 YEARS AND $1,000,000)

Capabilities to accurately model transport phenomena, materials, fuels, and fluid behavior at lower-length scales and reliably translate the effects to the component and/or system level can significantly reduce the amount of experimentation needed to realize new technologies. Proposals should demonstrate knowledge of existing tools and methods and clearly articulate the specific capability to be developed/added and the remaining gap that will exist at completion.

M&S-2: VERIFICATION AND VALIDATION/UNCERTAINTY QUANTIFICATION
(FEDERAL POC – DAVID HENDERSON)
(ELIGIBLE TO LEAD: UNIVERSITIES ONLY)
(UP TO 3 YEARS AND $1,000,000)

Historically, nuclear technology has followed a path to product maturation that involves continuous prototyping and measurement that has provided the software validation data needed for nuclear regulatory licensing. At each prototype stage, bounding analysis for regulatory approval has relied on both conservatism and data to establish uncertainties in predicted safety parameters. Because of a lack of data, the use of modeling and simulation with a high focus on uncertainty in predicted safety parameters will be increasingly important. Higher fidelity coupled multiphysics reactor simulation has the potential to accelerate the introduction of advanced nuclear technology by reducing the need for experimental validation in many instances. Proposals are sought for the development of novel methodologies and approaches for software verification, validation, and establishment of uncertainties for high-fidelity, multiphysics coupled code systems. Since neural networks are being increasingly applied in nuclear applications, techniques/methods are sought for understanding, detecting, and flagging to the user when a neural network goes from predicting an interpolated state (i.e. within the validity of the training data provided) to an extrapolated state (i.e. outside the validity of the training data) as this knowledge is critically important, and large extrapolations with NN can potentially create large prediction errors that are important for reactor safety. Novel approaches for validation and verification of single physics codes and models may also be proposed. Proposals should address the issue of establishing uncertainties for safety parameters of interest for a given technology within the framework of regulatory licensing.

M&S-3: OTHER MODELING AND SIMULATION TOPICS
(ELIGIBLE TO LEAD: UNIVERSITIES ONLY)
(UP TO 3 YEARS AND $1,000,000)

Proposals that are not easily categorized into one of the above sub-topic areas of Topic Area 4 (Modeling and Simulation) should be submitted to the "other" sub-topic area.

TOPIC AREA 5 – INSTRUMENTATION AND CONTROLS

This topic area focuses on the research and development on sensors, instrumentation, controls and infrastructure technology that are necessary to address critical technology gaps to monitor and control both existing and advanced reactors. This topic area invites proposals that cover the development of reliable and cost-effective sensors and detectors to provide real-time, accurate and high-resolution measurements of the performance of existing and advanced reactors' cores, fuel cycle systems, and plant systems; control algorithms to enable real-time control of plant or experimentation process variables to enhance plant reliability, availability, thermal performance, and resilience; communication technologies to enable real-time transmission of sufficient data for online monitoring and advanced data analytics; machine learning and artificial intelligence capabilities to enable semi-autonomous operations and maintenance by design; and other relevant topics related to instrumentation and controls (I&C).

I&C related applications should be submitted to one of the following I&C categories:

IC-1: SENSORS AND INSTRUMENTATION
(FEDERAL POC – DANIEL NICHOLS)
(ELIGIBLE TO LEAD: UNIVERSITIES ONLY)
(UP TO 3 YEARS AND $1,000,000)

Both the existing reactor fleet and advanced reactor concepts will play a vital role in providing clean energy for the United States. To support nuclear power plants in the current and future fleet, proposals are sought that focus on the development of new, or the enhancement of existing sensor technologies. Sensor technologies focused on the existing reactor fleet should address needs which help extend the plant operable lifetime and provide additionally capabilities to increase safety, reliability, and operational efficiency. Technologies for advanced reactor concepts should tailor efforts towards accommodating the unique qualities of the future fleet such as smaller form factor, increased operating temperatures, and working fluid compatibility. Applicants to this scope should identify the type of instrumentation to be developed, or enhanced, and should specify the relevant reactor conditions for which their technology is applicable; radiation tolerance, temperature tolerance, pressure tolerance, and working fluid compatibility (if applicable). Applicants may propose new sensor concepts or leverage existing technologies with the intent to enhance capabilities. Proposals are encouraged to include development and demonstration of the instrumentation system, with data acquisition, under relevant conditions.

IC-2: ADVANCED CONTROL SYSTEMS
(FEDERAL POC – DANIEL NICHOLS)
(ELIGIBLE TO LEAD: UNIVERSITIES ONLY)
(UP TO 3 YEARS AND $1,000,000)

The development of semi-autonomous operations has been proposed to reduce costs for the next generation of nuclear reactors. To investigate and ultimately facilitate this capability, advancements are needed to enable semi-autonomous operation, fault-tolerant control systems, load-following, and load balancing of multi-unit nuclear power plants. Two necessary and important considerations for these control systems will be the coupling of digital twin assets and incorporating robust cybersecurity into the design. Proposals are sought for novel control system approaches, designs and component innovations which enable semi-autonomous operation for advanced reactor concepts.

IC-3: ADVANCED NUCLEAR CYBERSECURITY
(FEDERAL POC – REBECCA ONUSCHAK)
(ELIGIBLE TO LEAD: UNIVERSITIES ONLY)
(UP TO 3 YEARS AND $1,000,000)

TOPIC AREA 5 – INSTRUMENTATION AND CONTROLS

Cybersecurity of nuclear power plants is a rapidly evolving field, as the existing fleet seeks cost-effective means of managing advanced threats through advanced technologies under development which require unique I&C cybersecurity solutions. Examples of novel technologies and use cases under consideration include

- the use of machine learning, digital twins, and other advanced data analytics tools to support design, maintenance and/or operations;
- the use of advanced cybersecurity analytics tools for attack detection and/or response; remote and/or autonomous operations;
- the use of advanced manufacturing tools or techniques that rely on data analytics for quality assurance and/or regulatory acceptance of nuclear plant components;
- integration of electric and non-electric power applications at the same power plant (e.g., hydrogen production, process heat); and
- the use of wireless sensors and/or controls in-plant for safety- or security-related functions.

Applicants are encouraged to offer 1) technical solutions to cybersecurity challenges associated with any advanced technologies or use cases, whether or not listed here; or 2) solutions to improve the economics and/or effectiveness of cybersecurity management in the existing fleet. While cybersecurity may also be important as a consideration or feature in other technical areas, the intent for this topic is to offer solutions to cybersecurity challenges specifically.

IC-4: OTHER I&C TOPICS
(ELIGIBLE TO LEAD: UNIVERSITIES ONLY)
(UP TO 3 YEARS AND $1,000,000)

Proposals that are not easily categorized into one of the above sub-topic areas of Topic Area 5 (I&C) should be submitted to the "other" sub-topic area.

TOPIC AREA 6 – LICENSING AND SAFETY

There is a continued need for enhancing understanding of licensing and safety requirements as they apply to the safe and secure operations of reactors and all fuel cycle related facilities. This area focuses on better understanding nuclear reactor and recycling plant safety and safeguards margins, physical security system response, and materials accountancy system response using risk-informed frameworks, probabilistic risk assessment, the reliability of passive systems and components, and the integration with materials accountancy and physical protection measures. This includes advancement of modeling and simulation capabilities to develop, verify and validate next-generation safety systems codes. This topic covers additional aspects of licensing and safety including flexible plant design, operations, cyber security, physical security and material control and accountancy, plant automation and modernization, human/machine interface challenges, among other relevant topics.

Licensing and safety related applications should be submitted to one of the following categories:

LS-1: RISK INFORMED SYSTEMS ANALYSIS/PROBABILISTIC RISK ASSESSMENT (FEDERAL POC – BILL WALSH) (ELIGIBLE TO LEAD: UNIVERSITIES ONLY) (UP TO 3 YEARS AND $1,000,000)

The use of probabilistic risk assessment (PRA) serves as a fundamental element of nuclear plant operations. However, application of legacy tools and methods have demonstrated that complexity, high modeling resource requirement, and lengthy analysis times are limiting the potential application of this technology. Proposals are sought to enhance the applicability, usability and efficiency of PRA tools or other innovative risk assessment methodologies. Major areas of concern are quantification speed and memory limitations to process large PRA models, Human Reliability Analysis (HRA) dependency analysis, and quantification and result output from the combined hazard PRA models where external hazards are included in a single model (i.e., internal flood, fire, seismic, high winds PRA models).

LS-2: SAFETY IMPLICATIONS OF UTILIZING PROCESS HEAT (FEDERAL POC – JASON MARCINKOSKI) (ELIGIBLE TO LEAD: UNIVERSITIES ONLY) (UP TO 3 YEARS AND $1,000,000)

Using thermal and electrical energy from nuclear reactors for industrial process heat can decarbonize industrial processes with a reliable energy source at a low cost. Additionally, economic pressure arising from decreased natural gas cost combined with an increase in renewable-energy capacity on the power grid, has raised interest in exploring high-value off-grid applications of nuclear energy with reduced transmission costs. To expand the use of clean, reliable nuclear energy for decarbonizing industrial processes, the Office of Nuclear Energy is evaluating the feasibility of directly using energy from a nuclear power plant (NPP) for use in off-grid industrial processes to include physical placement of chemical plants with existing LWRs; colocation of advanced reactors at industrial sites; and regulatory research and review for licensing and permitting. The feasibility of installing a modification to an existing nuclear plant, or installing a system in an advanced nuclear plant, to export heat to an industrial facility will rely, in part, on the performance of a safety analysis that demonstrates conformance with Nuclear Regulatory Commission (NRC) regulations. Proposals are being sought to evaluate the safety implications of utilizing heat from both existing NPPs and future advanced NPPs for industrial applications. This work will involve developing requirements for mutual protection from industrial and nuclear plant hazards, engineering of conceptual systems to address the requirements as a basis for safety analysis, and assessments of the impacts of both nuclear and industrial system maintenance and operations on the integrated nuclear-industrial system.

LS-3: ADVANCED REACTORS AND FUEL CYCLE FACILITIES MATERIALS ACCOUNTANCY, CONTROL, AND PHYSICAL PROTECTION (FEDERAL POCS – SAVANNAH FITZWATER & TANSEL SELEKLER)

TOPIC AREA 6 – LICENSING AND SAFETY

(ELIGIBLE TO LEAD: UNIVERSITIES ONLY)
(UP TO 3 YEARS AND $1,000,000)

Advanced nuclear reactors, including small modular reactors and microreactors, and associated fuel cycle facilities, face challenges in meeting domestic Materials Control and Accountability (MC&A) and physical protection system (PPS) requirements while still maintaining cost-effectiveness. Proposals are sought for new and novel approaches to improve the efficiency of process monitoring, to develop new MC&A methods and tools for advanced reactors, and fuel fabrication and recycling processes (e.g., salt synthesis, TRISO fuel fabrication, and electrochemical recycling), physical protection, or potential cross over areas between reactors and fuels.

LS-4: ADVANCED REACTOR LICENSING TOPICS

(FEDERAL POC – JANELLE EDDINS)
(ELIGIBLE TO LEAD: UNIVERSITIES ONLY)
(UP TO 3 YEARS AND $1,000,000)

Successful licensing of advanced reactors will require establishment of an advanced reactor regulatory framework, including the R&D necessary to establish the associated licensing technical requirements. Proposals are sought for activities that address technology specific gaps in licensing technical requirements for advanced reactors and reduce the regulatory risks associated with those designs.

For investigators applying to LS-4, incremental funding is potentially available through participation in the Department of Energy's interactions with the Organization for Economic Cooperation and Development (OECD) Nuclear Energy Agency (NEA) Nuclear Education, Skills and Technology (NEST) program. NEST ties together university research projects across multiple countries to provide students a fuller professional experience as they pursue their degree. NEST funds are provided to allow travel for students to interact with colleagues in other NEST countries in accordance with NEST program rules. Applications submitted to this work-scope do not require NEST participation. Access to NEST funds do require investigators to agree to participate in NEST. Investigators must clearly indicate in their application if they are willing to join as a NEST project or not.

NOTE: Anticipated budget requirements for NEST participation must not be included in an application submitted to this topic area. NEST funding received by successful applicants will not be included or tracked as part of the overall project budget and not subject to inclusion in project financial reporting. Additionally, participation in NEST will not be a factor considered in the review of applications.

LS-5: OTHER LICENSING AND SAFETY TOPICS

(ELIGIBLE TO LEAD: UNIVERSITIES ONLY)
(UP TO 3 YEARS AND $1,000,000)

Proposals that are not easily categorized into one of the above sub-topic areas of Topic Area 6 (Licensing and Safety) should be submitted to the "other" sub-topic area.

TOPIC AREA 7 – ADVANCED NUCLEAR MATERIALS

Identification, investigation, and research and development of revolutionary technologies in crosscutting materials science areas have the potential for radical improvement in reactor or fuel cycle performance, safety, and economics. This topical area invites applications that cover key materials science topics to better understand core and structural materials, advanced materials manufacturing techniques, qualifications and/or testing of existing materials, new classes of materials not yet developed for nuclear reactors, fuel recycle, environmental effects, thermal effect, and irradiation effects, among other relevant areas including materials to efficiently immobilize fission products and off-gas capture species.

Advanced Nuclear Materials applications should be submitted into one of the following materials science categories:

NM-1: LWR CORE OR STRUCTURAL MATERIALS
(FEDERAL POC – SUE LESICA)
(ELIGIBLE TO LEAD: UNIVERSITIES ONLY)
(UP TO 3 YEARS AND $1,000,000)

Understanding materials degradation in the current fleet of reactors is vital to their continued operation. Proposals are sought to further understand and predict environmentally assisted fatigue of LWR core or structural materials, a damage mechanism that may limit extended operation of the LWR fleet.

NM-2: ADVANCED REACTOR CORE OR STRUCTURAL MATERIALS
(FEDERAL POC – SUE LESICA)
(ELIGIBLE TO LEAD: UNIVERSITIES ONLY)
(UP TO 3 YEARS AND $1,000,000)

Ensuring a pipeline of qualified materials to facilitate the economical deployment and efficient operation of advanced reactors is vital to the Department's decarbonization goals. Proposals are sought to develop a fundamental understanding of the damage mechanisms of creep-fatigue and their interactions in the advanced reactor environment, at both microstructural and structural mechanics levels. This understanding can be leveraged to utilize materials developed in other industries or to design new material systems for code qualification. This would be a significant improvement over the current approach of relying on time-consuming and extensive test programs to determine the adequacy of the creep-fatigue performance of a structural material.

NM-3: ADVANCED MANUFACTURING TECHNOLOGIES
(FEDERAL POC – DIRK CAIRNS-GALLIMORE)
(ELIGIBLE TO LEAD: UNIVERSITIES ONLY)
(UP TO 3 YEARS AND $1,000,000)

This effort seeks to transform materials, processing, and fabrication techniques to significantly change the nuclear manufacturing cost curve. This includes but is not limited to the state of practice of processing and fabrication of composites and concrete, metals, joining and repair, as well as emerging capabilities developed within the advanced manufacturing enterprise for components, sub-systems, systems, and structures.

NM-4: MATERIAL FOR FUEL RECYCLING APPLICATIONS
(FEDERAL POC – KIMBERLY GRAY)
(ELIGIBLE TO LEAD: UNIVERSITIES ONLY)
(UP TO 3 YEARS AND $1,000,000)

Advanced Waste Form Materials and Sorbent Materials for Off-gas Capture. Developing materials for fission product immobilization and sorbent materials for capturing off gas chemical species generated through the reprocessing of used nuclear fuel.

TOPIC AREA 7 – ADVANCED NUCLEAR MATERIALS

NM-5: OTHER ADVANCED NUCLEAR MATERIALS TOPICS (ELIGIBLE TO LEAD: UNIVERSITIES ONLY) (UP TO 3 YEARS AND $1,000,000)

Proposals that are not easily categorized into one of the above sub-topic areas of Topic Area 7 (Advanced Nuclear Materials) should be submitted to the "other" sub-topic area.

STRATEGIC NEEDS BLUE SKY
Maintaining fundamental skills and knowledge in key nuclear engineering topics is important to maintain and establish research excellence and expertise. Sub-topic areas are intentionally broad to allow for flexibility in response. A response should address innovative research in the identified area and could include any aspect (experiments, modeling, etc.) that is necessary to accomplish the proposed scope. **SN-1: THERMAL HYDRAULICS AND HEAT TRANSFER** **(FEDERAL POC – JENNA PAYNE)** **(ELIGIBLE TO LEAD: UNIVERSITIES ONLY)** **(UP TO 3 YEARS AND $500,000)** **SN-2: REACTOR PHYSICS** **(FEDERAL POC – JENNA PAYNE)** **(ELIGIBLE TO LEAD: UNIVERSITIES ONLY)** **(UP TO 3 YEARS AND $500,000)** **SN-3: NUCLEAR CHEMISTRY** **(FEDERAL POC – JENNA PAYNE)** **(ELIGIBLE TO LEAD: UNIVERSITIES ONLY)** **(UP TO 3 YEARS AND $500,000)**

Appendix B: Work Scopes for U.S. University-led IRPs

INTEGRATED RESEARCH PROJECTS

IRP-1: GRAND CHALLENGE IRP – ACCELERATING REACTOR DEPLOYMENT (FEDERAL POC – BRIAN ROBINSON) (ELIGIBLE TO LEAD: UNIVERSITIES ONLY) (UP TO 3 YEARS AND $3,000,000)

NE's goal of demonstrating several advanced reactor types within this decade resulting in advanced reactor deployment in the 2030s, is a core aspect of addressing U.S. clean energy climate change goals. One of the primary challenges is reducing overall capital and operating and maintenance (O&M) costs while also de-risking the technologies for more rapid adoption by industry. NE solicits applications for this scope that take a holistic, multi-disciplinary approach to reactor deployment considerations for specific reactor technologies. Applications can cover a wide variety of topics including innovative component, instrumentation, and fuel handling systems; design optimization including integrated systems or reducing the size of the core or number of components; technologies to reduce the cost and schedule for construction; and siting infrastructure considerations for remote applications and transition from fossil generation sources, including environmental justice considerations. Proposals that suggest innovative ideas for cost reduction or shortening the deployment timeline by developing a holistic, multi-faceted approach, including a focus on key technical needs areas, like nuclear economics, accelerated testing, and reactor/plant design expertise, are desired.

For investigators applying to this work scope, incremental funding is potentially available through participation in the Department of Energy's interactions with the Organization for Economic Cooperation and Development (OECD) Nuclear Energy Agency (NEA) Nuclear Education, Skills and Technology (NEST) program. NEST ties together university research projects across multiple countries to provide students a fuller professional experience as they pursue their degree. NEST funds are provided to allow travel for students to interact with colleagues in other NEST countries in accordance with NEST program rules. Applications submitted to this work-scope do not require NEST participation. Access to NEST funds do require investigators to agree to participate in NEST. Investigators must clearly indicate in their application if they are willing to join as a NEST project or not.

NOTE: Anticipated budget requirements for NEST participation must not be included in an application submitted to this work scope. NEST funding received by successful applicants will not be included or tracked as part of the overall project budget and not subject to inclusion in project financial reporting. Additionally, participation in NEST will not be a factor considered in the review of applications.

IRP -2: GRAND CHALLENGE RESEARCH AND DEVELOPMENT AT MINORITY SERVING INSTITUTIONS (MSI) (FEDERAL POC – JENNA PAYNE) (ELIGIBLE TO LEAD: UNIVERSITIES ONLY) (UP TO 3 YEARS AND $1,500,000)

NE's mission is to advance nuclear energy science and technology to meet U.S. energy, environmental, and economic needs. Toward this mission, NE has identified goals to address challenges in the nuclear energy sector, to help realize the potential of advanced technology, and to leverage the unique role of the government in spurring innovation:

1. Enable continued operation of existing U.S. nuclear reactors
2. Enable deployment of advanced nuclear reactors
3. Develop advanced nuclear fuel cycles and spent nuclear fuel management options

This opportunity is restricted to MSI lead institutions, including historically black colleges and universities (HBCUs), tribally controlled colleges and universities, (TCCUs), Asian American and Native American Pacific Islander-serving institution (AANAPISI) and Hispanic-serving institutions (HSIs), as defined in Title III and Title V of the Higher Education Act. This scope solicits applications that address one or more NE mission related technical areas that advance nuclear engineering research and development at MSI institutions.

INTEGRATED RESEARCH PROJECTS
NE is allowing a flexible framework for consortia construction and recognizes several viable and effective models including partnering in a multi-MSI consortia style model, partnering with national laboratories, other institutions of higher education, or industry collaborators. This scope is intended to develop nuclear expertise and capabilities at Minority Serving Institutions. Therefore, 80% of the total budget request should directly support lead or collaborating partners that are MSIs. Other institutions of higher education, national laboratories, or industry may participate in a supporting capacity at no more than 20% of total budget in composite. Applications should focus on addressing an important NE mission related topic area with a particular focus on broad student involvement and capacity building to support the next-generation workforce in nuclear energy.

Appendix C: Work Scopes for U.S. University-, National Laboratory-, or Industry-led NSUF Access Only Projects

NUCLEAR SCIENCE USER FACILITIES (NSUF) ACCESS ONLY

Applicants interested in utilizing Nuclear Science User Facilities (NSUF) capabilities only should submit "access only" applications under this sub-topic areas. Applications under the NSUF-1 work scope must support the Department of Energy Office of Nuclear Energy's mission. Capabilities available through the NSUF can be found on the website at NSUF.inl.gov.

Experiments with x-ray synchrotron radiation may be proposed. The NSUF has access to beam time at the X-ray Powder Diffraction beamline at the National Synchrotron Light Source II (NSLS-II), as well as, starting in October 2024, the HEXM and other beamlines at the Advanced Photon Source (APS).

NOTE: Access to NSUF capabilities will require agreement and final signature to the User Agreement (copy provided in Part IX, Appendix E). The terms and conditions of the User Agreement are non-negotiable, and failure to accept the terms and conditions of the User Agreement will terminate processing and review of the application. To ensure compliance throughout the application review process, applicants must indicate in the Letter of Intent (LOI) and full application submission that the User Agreement has been read, understood, and the terms and conditions are accepted. Further, submission of a pre-application and a full application indicates the applicant will comply with and agree to the terms and conditions of the User Agreement. Upon award of an NSUF supported project, the User Agreement must be signed before activities will begin on the project. Failure to sign the non-negotiable User Agreement within 30 days of receipt of the User Agreement may result in cancellation of an awarded project.

NSUF-1.1: CORE AND STRUCTURAL MATERIALS AND NUCLEAR FUEL BEHAVIOR AND NSUF-1.1: CORE AND STRUCTURAL MATERIALS AND NUCLEAR FUEL BEHAVIOR AND ADVANCED NUCLEAR FUEL DEVELOPMENT

(FEDERAL POC – MELISSA BATES)
(ELIGIBLE TO LEAD: UNIVERSITY, NATIONAL LABORATORY, OR INDUSTRY)
(UP TO 7 YEARS)
(NSUF READINESS REQUIREMENTS APPLY)

This NSUF element is focused on fundamental understanding of irradiation effects in core and structural materials and the behavior of nuclear fuels (including cladding) in reactor and research into advanced nuclear fuels and improving the performance of current fuels. For the core and structural materials aspect of the work-scope, areas of interest include material aging and degradation mechanisms (e.g., creep, fatigue, embrittlement, void swelling, fracture toughness, IASCC processes and mitigation, and corrosion), testing alternate and/or radiation resistant materials for application in current and future fission reactors, and materials from alternate or advanced manufacturing techniques (including welding and joining). For the nuclear fuels aspect of the work-scope, areas of interest include the fundamental physics and chemistry of nuclear fuels and other radioactive materials, irradiation and thermal effects on microstructure development and the effects on, for example, thermophysical and thermomechanical properties as well as chemical interactions. Proposed projects may involve research in the areas of fuels and materials irradiation performance and combined effects of irradiation and environment on fuels and materials. Advanced fuel types extend to fast spectrum transmutation systems, coated particle fuels for high-temperature reactor systems, robust fuels for light water reactors including accident tolerant fuels, and fuel for small modular, micro-, and other advanced reactor concepts. Activities can be aimed at irradiation experiments (neutron steady state or transient, ion, and gamma) and post irradiation examination that investigate fundamental aspects of fuel performance such as radiation damage, amorphization, fuel restructuring, species diffusion and migration, and fission product behavior. Separate effects testing focused on validation of specific modeling and simulation issues is encouraged. Proposals that advocate duplicating previous or on-going NSUF supported irradiation studies will not be considered. A complete list of NSUF awards made under CINR funding opportunities can be found under the R&D flag on the website NEUP.inl.gov. Projects whose relevancy is based solely or primarily on fusion energy needs will not be considered. Applications coupling experimental methods with modeling and simulation are strongly encouraged.

NSUF-1.2: HIGH PERFORMANCE COMPUTING AT IDAHO NATIONAL LABORATORY
(FEDERAL POC – MELISSA BATES)
(ELIGIBLE TO LEAD: UNIVERSITY, NATIONAL LABORATORY, AND INDUSTRY)
(LIMITED TO 3 YEARS)
(NSUF READINESS REQUIREMENTS APPLY)

The Nuclear Science User Facilities (NSUF) High-Performance Computing (HPC) resources offered through Idaho National Laboratory provide scientific computing capabilities to support advanced modeling and simulation. Applications may address a wide range of research activities, including performance of materials in harsh environments (including the effects of irradiation and high temperatures), performance of existing light water and advanced nuclear reactors, and multiscale multi-physics analysis of nuclear fuel performance.
Current HPC capabilities include:

Sawtooth: INL's newest supercomputer operates with a LINPACK rating of 5.6 petaflops and is ranked #37 on the November 2019 TOP500 list. The HPE SGI 8600 system comprises 99,792 cores with 403 TB of memory. The system also includes dedicated GPU capability with 108 NVIDIA V100 GPUs.
Lemhi: A Dell 6420-based system operating on an OmniPath fat tree network. It contains 20,160 cores and 94 total terabytes of memory. Lemhi is rated at 1 petaflop and ranked #427 on the November 2018 TOP500 list.
Hoodoo: A Lambda Hyperplane deep learning distributed memory system with 44 NVIDIA A100 tensor core GPUs and 7.2 TB of total memory.
Storage: 3 Petabytes of disk storage including a WORM (Write-once read-many) filesystem for use in multi-year archiving of data.

HPC support includes access to INL HPC systems, assistance with system login and running code, high performance visualization, data archiving, basic HPC training, and software support and expertise as requested. Software includes an assortment of tools in the areas of: Computer Aided Engineering, Chemistry, Code Development, Data Manipulation, Math, MPI, Neutronics and Transport, Numerical Libraries, Programming, and Visualization. Access to HPC resources through this FOA does not provide licenses to software. INL MOOSE-based tools are available subject to license approval. Use of DOE-developed software from the NEAMS programs is encouraged.

Appendix D: Accessing Nuclear Science User Facilities

As previously described in this document, the NSUF provides access, at no cost to the user, to DOE, University, and Industry facilities. Access to these facilities includes the support of the technical staff at each facility to ensure that the applicant is able to successfully complete their research. Requesting NSUF access funding is more complex than requesting R&D funding through this FOA. Figure D-1 depicts the process for requesting NSUF access from the perspective of the Lead Applicant. Note that NSUF Rapid Turnaround Experiments (RTEs) are not part of this FOA, for information on RTEs see NSUF.inl.gov/. A list of NSUF work scopes can be found on the work scope index on Table 1.

Unlike the other work scopes in this FOA, the applicant will not be able to provide cost information without the involvement of the NSUF facilities and staff. The effort to develop a firm cost estimate requires effort on the applicant's part, as well as the NSUF facilities and staff and must be started at the earliest possible date. To get this process started, the applicant may need to contact the NSUF Program Office to identify the NSUF technical lead(s), (points of contact for NSUF partner institutions are the Technical Leads listed on NSUF.inl.gov/Page/Partners. INL Technical Leads are assigned by the NSUF Program Office). The applicant is required to submit a NSUF Letter of Intent (LOI) and Pre-Application to apply for the FOA. The applicant will work with the NSUF Technical Lead(s) to prepare the Pre-Application. If invited to submit a Full Application, the applicant and NSUF Technical Lead(s) will work together to develop the application and define the scope of the application and estimate the cost.

For all applications, the NSUF Technical Lead(s) will work with the applicant to define the scope in the form of a Statement of Work (SOW). A Preliminary SOW will be submitted as a "post submission document" in the Pre-Application. If invited to submit a Full Application, a Final SOW will be submitted prior to the Full Application as a "post submission document" attachment in the Pre-Application. At a minimum, the SOW will include the following (as applicable):

- Facilities and equipment required to conduct the experiment,
- Specific requirements for specimen acquisition (e.g., material location, material condition, and fabrication or preparation requirements),
- Specific requirements for irradiation or beam-time (e.g., neutron, gamma or ion beam energy spectrum, target temperature, flux and fluence [or burn-up/dpa] for each specimen, in-pile instrumentation, etc.) including a detailed test matrix; and,
- Specific requirements for post-irradiation examination (PIE) of each specimen (e.g., visual examination, dimensional examinations, tensile testing, radiography, microscopy, etc.) including a detailed test matrix.

The Preliminary and Final SOW (Statement of Work Template) will be utilized by the NSUF facility technical staff to develop an execution plan and cost.. Execution Plan details may be included in the final SOW at the discretion of the NSUF Technical Lead and typically addresses the following elements (as applicable):

- Concept for the irradiation device including fabrication and assembly plans;

- Irradiation position and duration (if known);
- Experiment shipping;
- Disassembling and cataloging the experiment;
- Specimen preparation and shipping;
- Specimen examination details;
- Waste disposal; and,
- Resource loaded schedule.

NSUF Access Values will be entered in the corresponding data field in the Full Application by a NEUP.gov website administrator. This is expected to occur after Full Applications are submitted.

After award announcement, several steps will be required prior to initiation of work. The successful applicant's institution will be required to sign a Non-Proprietary User Agreement with Battelle Energy Alliance. Appendix D contains the standard User Agreement. **The User Agreement is not negotiable.** The SOW will be an appendix in the User Agreement in order to bind the PI to the SOW and to define the NSUF policies applicable to the scope of work. A subcontract(s) or work authorization(s), with a total value equal to the previously developed cost estimate, will be placed with NSUF institutions performing the work defined in the SOW and experiment execution plan.

NSUF Quality Assurance Requirements

Irradiation of materials in test reactors requires additional rigor and quality assurance requirements beyond those described in other sections of this FOA. Specific requirements will depend on the reactor license, the irradiation vehicle design, and specimen constituents. NSUF Technical leads will assist the PI in understanding the specific requirements early in the process.

Budget Development for NSUF Applications

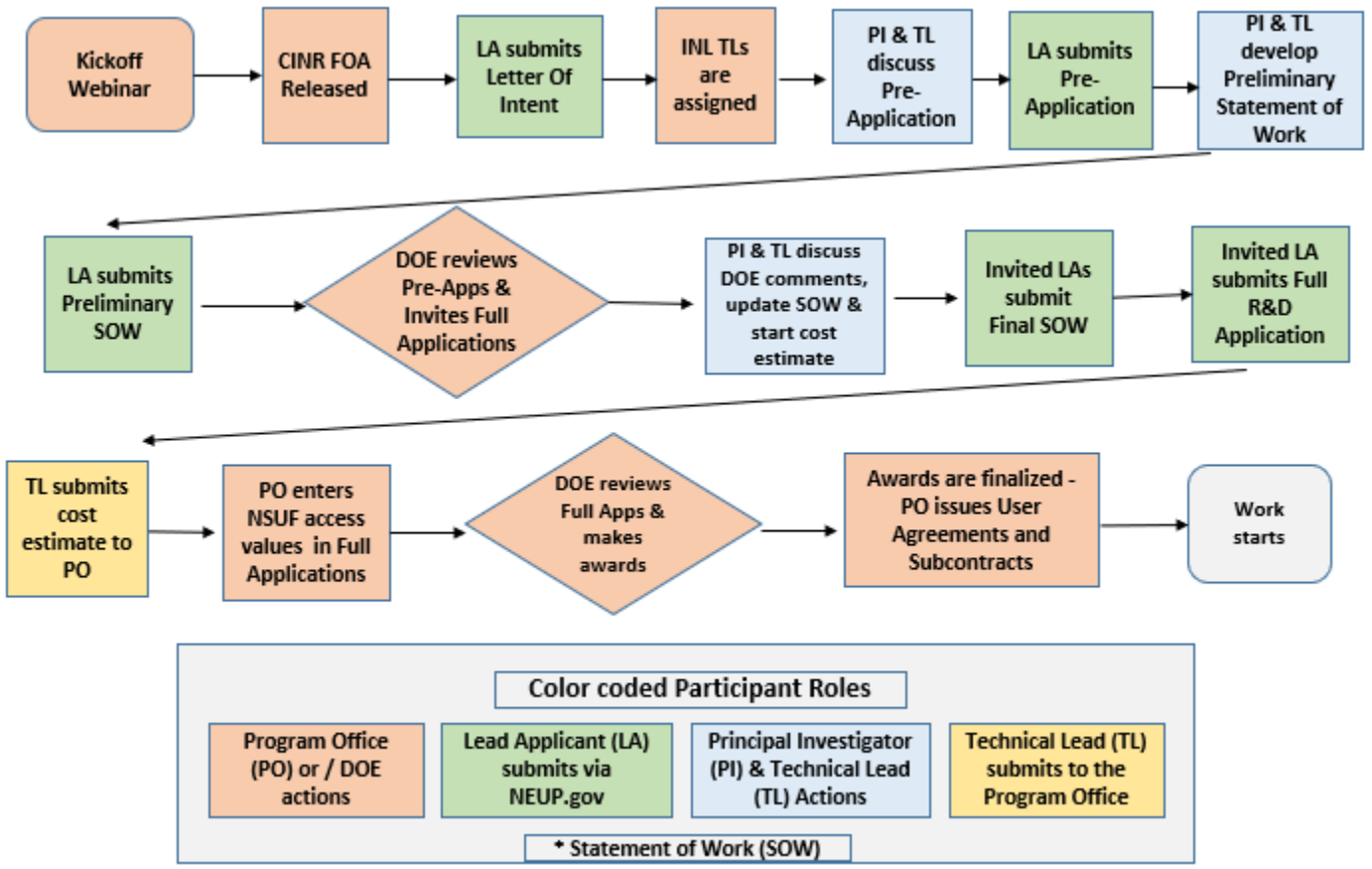
Applicants are responsible for costs similar to these which are not allowed in NSUF Access Only work scopes:

- Travel costs to NSUF facilities for facility access training, technical meetings, examinations, experiment loading, etc.;
- Applicant salary support;
- Graduate student support;
- Post-doctoral or other researcher support; and,
- Materials and supplies support at the PI's work location.

Cancellation of an Award

If the project or any part of the project falls two years or more behind the schedule established in the final SOW, DOE reserves the right to cancel the project or any part of the project without concurrence of the Principal Investigator.

- Figure D-1. Process for NSUF applications.



Appendix E: Draft Nuclear Science User Facilities User Agreement

NOTE: Access to NSUF capabilities will require agreement and final signature to the User Agreement (copy provided in Part IX, Appendix D). **The terms and conditions of the User Agreement are non-negotiable, and failure to accept the terms and conditions of the User Agreement will terminate processing and review of the NSUF applications.** In order to ensure compliance throughout the application review process, applicants must indicate in the LOI and Full Application submission that the User Agreement has been read, understood, and the terms and conditions are accepted. Further, submission of a pre- application and a Full Application indicates the applicant will comply with and agree to the terms and conditions of the User Agreement. Upon award of an NSUF supported project, the User Agreement must be signed before activities will begin on the project.

Failure to sign the non-negotiable User Agreement within 30 days of receipt of the User Agreement may result in cancellation of an awarded project.

NOTE: For Public Institutions residing in the State of Colorado, a version of the User Agreement, compliant with Colorado statute, is available. Contact the NSUF program office for more information.

Non-Proprietary User Agreement

User Facility Agreement No. xxxxx BETWEEN

BATTELLE ENERGY ALLIANCE, LLC

(" CONTRACTOR")
Operator of The Idaho National Laboratory (hereinafter "Laboratory") under U.S. Department of Energy (DOE) Contract No. DE-AC07-05ID14517

AND

XXXXXXXXXXXXXXXXX

("USER")

(Collectively, "the Parties")

The obligations of the above-identified DOE Contractor may be transferred to and shall apply to any successor in interest to said Contractor continuing the operation of the DOE Non-Proprietary User Facility involved in this User Agreement.

ARTICLE I. FACILITIES AND SCOPE OF WORK

Subject to the terms and conditions of this Agreement, CONTRACTOR will make available to employees, consultants and representatives of USER (hereinafter called "Participants") certain Laboratory Non-Proprietary User facilities, which may include equipment, services, information and other material, with or without Laboratory scientist collaboration, for purposes as described in the attached Scope of Work and in accordance with the attached Funding Statement, both of which are incorporated by this reference and are made a part of this Agreement. Amendments to the attached Scope of Work and Funding Statement may be submitted by USER for identifying facilities and purposes during the term of this Agreement (see Article II). Such amendments will be considered to be part of this Agreement upon written acceptance by CONTRACTOR. The attached Scope of Work sets forth a specific project, including deliverables, to be performed pursuant to this Agreement. The Scope of Work and abstracts thereof, shall not be considered proprietary information and shall be publicly releasable. The Parties agree that an initial abstract of the work to be performed shall be

deliverable under this Agreement.

ARTICLE II. TERM OF THE AGREEMENT

This Agreement shall have a term of X years from the effective date. The term of this Agreement shall be effective as of the date on which it is signed by the last of the Parties.

ARTICLE III: COST

Each Party will bear its own costs and expenses associated with this Agreement unless otherwise agreed to by the Parties or as may otherwise be agreed to by the User and DOE.

ARTICLE IV: ADMISSION REQUIREMENTS

USERs and Participants are subject to the administrative and technical supervision and control of CONTRACTOR; and will comply with all applicable rules of CONTRACTOR and DOE with regard to admission to and use of the User facility, including safety, operating and health-physics procedures, environment protection, access to information, hours of work, and conduct. Participants shall execute any and all documents required by CONTRACTOR acknowledging and agreeing to comply with such applicable rules of CONTRACTOR. Participants will not be considered employees of CONTRACTOR for any purpose.

ARTICLE V: PROPERTY AND MATERIALS***

USER may be permitted by Contractor to furnish equipment, tooling, test apparatus, or materials necessary to assist in the performance of its experiment(s) at the USER facility. Such items shall remain the property of USER, except as otherwise provided in this Article. Unless the Parties otherwise agree, all such property furnished by USER or equipment and test apparatus provided by USER will be removed by USER within sixty (60) days of termination or expiration of this Agreement or will be disposed of as directed by USER at User's expense. Any equipment that becomes integrated into the facility shall be the property of the Government. USER acknowledges that any material supplied by USER may be damaged, consumed or lost. USER will return facilities and equipment utilized in their original condition except for normal wear and tear.

CONTRACTOR shall have no responsibility for USER's property in CONTRACTOR's possession other than loss or damage caused by willful misconduct or gross negligence of CONTRACTOR or its employees.

Personal property produced or acquired during the course of this Agreement shall be disposed of as directed by the owner at the owner's expense.

USER represents that it owns and has full authority to transfer ownership and title to any materials it supplies for the purpose of irradiation under this Agreement and those said materials are free of any liens, claims of ownership, or other liabilities. Transfer of materials for irradiation and/or examination under this Agreement, shall constitute a transfer of title of said materials from User to DOE upon delivery of the materials at the Nuclear Science User Facility

(NSUF) unless otherwise specified.

After the material has been irradiated, transferred to an examination facility and extracted from the encapsulation and/or holders, the USER will be notified by the CONTRACTOR that the irradiated material is available for examination. The USER will have exclusive research rights to the irradiated material for a period of three (3) years from the date of notification. After the three (3) years, DOE and CONTRACTOR have full discretion to make the irradiated material available to the general research community, maintain possession, transfer possession, or dispose of the irradiated material. DOE may transfer title to the material at its discretion.

ARTICLE VI: SCHEDULING***

USER understands that CONTRACTOR will have sole responsibility and discretion for allocating and scheduling usage of the User Facilities and equipment needed for or involved under this Agreement.

ARTICLE VII: INDEMNITY AND LIABILITY***

A. Personnel Relationships - USER shall be responsible for the acts or omissions of Participants.

B. Product Liability - To the extent permitted by US and US State law, if USER utilizes the work derived from this Agreement in the making, using, or selling of a product, process or service, then USER hereby agrees to hold harmless and indemnify CONTRACTOR and the United States Government, their officers, agents and employees from any and all liability, claims, damages, costs and expenses, including attorney fees, for injury to or death of persons, or damage to or destruction of property, as a result of or arising out of such utilization of the work by or on behalf of USER, its assignees or licensees.

C. General Indemnity - To the extent permitted by US and US State law, USER hereby agrees to indemnify and hold harmless CONTRACTOR and the United States Government, their officers, agents and employees from any and all liability, claims, damages, costs and expenses, including attorney fees, for injury to or death of persons, or damage to or destruction of property, to the extent such liability, claims, or damages is caused by or contributed to the negligence or intentional misconduct of USER or its employees or representatives during the performance of the work under this Agreement.

D. Patent and Copyright Indemnity—Limited - *To the extent permitted by US and US State law, USER shall fully indemnify the Government and CONTRACTOR and their officers, agents, and employees for infringement of any United States patent or copyright arising out of any acts required or directed or performed by USER under the Agreement to the extent such acts are not normally performed at the facility.*

E. The liability and indemnity provisions in paragraphs B, C and D above shall not apply unless USER shall have been informed as soon as practicable by CONTRACTOR or the Government of the suit or action alleging such infringement, and such indemnity shall not apply to a claimed infringement that is settled without the consent of USER unless

required by a court of competent jurisdiction.

F. General Disclaimer -

THE GOVERNMENT AND CONTRACTOR MAKE NO EXPRESS OR IMPLIED WARRANTY AS TO THE CONDITIONS OF THE USER FACILITY FURNISHED HEREUNDER. IN ADDITION, THE GOVERNMENT, CONTRACTOR AND USER MAKE NO EXPRESS OR IMPLIED WARRANTY AS TO THE RESEARCH OR ANY INTELLECTUAL PROPERTY, GENERATED INFORMATION, OR PRODUCT MADE OR DEVELOPED UNDER THIS AGREEMENT, OR THE OWNERSHIP, MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE OF THE RESEARCH OR RESULTING PRODUCT; THAT THE GOODS, SERVICES, MATERIALS, PRODUCTS, PROCESSES, INFORMATION, OR DATA TO BE FURNISHED HEREUNDER WILL ACCOMPLISH INTENDED RESULTS OR ARE SAFE FOR ANY PURPOSE INCLUDING THE INTENDED PURPOSE; OR THAT ANY OF THE ABOVE WILL NOT INTERFERE WITH PRIVATELY OWNED

RIGHTS OF OTHERS. THE GOVERNMENT, CONTRACTOR AND/OR USER SHALL NOT BE LIABLE FOR SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES ATTRIBUTED TO USE OF SUCH FACILITIES, RESEARCH OR RESULTING PRODUCT, INTELLECTUAL PROPERTY, GENERATED INFORMATION, OR PRODUCT MADE OR DELIVERED UNDER THIS AGREEMENT.

ARTICLE VIII: PATENT RIGHTS***

A. Definitions

1. “Subject Invention” means any invention or discovery conceived or first actually reduced to practice in the course of or under this Agreement.

2. "USER Invention" means any Subject Invention of USER.

3. “CONTRACTOR Invention” means any Subject Invention of CONTRACTOR.

4. "Patent Counsel" means the DOE Counsel for Intellectual Property assisting the DOE Contracting activity.

B. Subject Inventions

CONTRACTOR and USER agree to disclose their Subject Inventions, which includes any inventions of their Participants, to each other, concurrent with reporting such Subject Inventions to DOE.

C. CONTRACTOR’s Rights

Except as provided below in the case of joint inventions, CONTRACTOR Inventions will be governed by the provisions of CONTRACTOR’S Prime Contract for operation of the User facility.

D. USER's Rights

Subject to the provisions herein, USER may elect title to any USER Invention and in any resulting patent secured by USER within one year of reporting the subject invention to DOE. The USER shall file a US patent application within a reasonable period of time. Where appropriate, the filing of patent applications by USER is subject to DOE security regulations and requirements.

E. Joint Inventions

For Subject Inventions conceived or first actually reduced to practice under this Agreement that are joint Subject Inventions made by CONTRACTOR and USER, each Party shall have the option to elect and retain title to its undivided rights in such joint Subject Inventions.

F. Rights of Government

1. USER agrees to timely assign to the Government, if requested, the entire right, title, and interest in any country to each USER Invention where USER:

a. Does not elect to retain such rights; or

b. Fails to timely have a patent application filed in that country on the USER Invention or decides not to continue prosecution or not to pay the maintenance fees covering the Invention; or

c. At any time, no longer desires to retain title.

2. USER shall provide the Government a copy of any application filed by USER promptly after such application is filed, including its serial number and filing date.

3. USER hereby grants to the Government a nonexclusive, nontransferable, irrevocable, paid-up license to practice or have practiced for or on behalf of the United States the USER Invention made under said project throughout the world.

4. USER acknowledges that the DOE has certain March-in Rights to any USER Inventions elected by the USER in accordance with 48 C.F.R. 27.304-1(g) and that the USER is subject to the requirements with respect to preference for U.S. industry pursuant to 35 U.S.C. § 204 to any USER Inventions elected by the USER.

5. The USER agrees to include, within the specification of any U.S. patent applications and any patent issuing thereon covering a USER Invention, the following statement: "The Government has rights in this invention pursuant to a USER Agreement (specify number) between (USER name) and (CONTRACTOR Name), which manages and operates (name of Laboratory) for the US Department of Energy."

6. USER agrees to submit on request periodic reports to DOE no more frequently than annually on the utilization of USER Inventions or on efforts to obtain such utilization that are being made by USER or its licensees or assignees.

7. Facilities License: USER agrees to and does hereby grant to the Government a nonexclusive, nontransferable, irrevocable, paid-up license in and to any inventions or discoveries, regardless of when conceived or actually reduced to practice or acquired by USER, which are incorporated in the User Facility as a result of this Agreement to such an extent that the facility is not restored to the condition existing prior to the Agreement (1) to practice or to have practiced by or for the Government at the facility, and (2) to transfer such licenses with the transfer of that facility. The acceptance or exercise by the Government of the aforesaid rights and license shall not prevent the Government at any time from contesting the enforceability, validity or scope of, or title to, any rights or patents herein licensed.

G. Invention Report and Election

USER shall furnish the Patent Counsel a written report concerning each USER Invention within six months after conception or first actual reduction to practice, whichever occurs first. If USER wished to elect title to the Invention, a notice should be submitted with the report or within one year of such date of reporting.

ARTICLE IX: RIGHTS IN TECHNICAL DATA***

A. Definitions:

1. "Technical Data" means recorded information regardless of form or characteristic, of a scientific or technical nature. Technical Data as used herein does not include financial reports, costs analyses, and other information incidental to Agreement administration.
2. "Proprietary Data" means Technical Data which embody trade secrets developed at private expense, outside of this agreement, such as design procedures or techniques, chemical composition of materials, or manufacturing methods, processes, or treatments, including minor modifications thereof, provided that such data:
   - **a.** Are not generally known or available from other sources without obligation concerning their confidentiality.
   - **b.** Have not been made available by the owner to others without obligation concerning their confidentiality
   - **c.** Are not already available to the CONTRACTOR or the Government without obligation concerning their confidentiality.
   - **d.** Are marked as “Proprietary Data.”
3. "Unlimited Rights" means right to use, duplicate, or disclose Technical Data, in whole or in part, in any manner and for any purpose whatsoever, and to permit others to do so.

B. Allocation of Rights

1. The Government shall have Unlimited Rights in Technical Data first produced or specifically used in the performance of this Agreement except as otherwise provided in this Agreement.
2. USER shall have the right to use for its private purposes, subject to patent, security or other provisions of this Agreement, Technical Data it first produces in the performance of this Agreement provided the data delivery requirements of this Agreement have been met as of the date of the private use of such data; and Technical Data first produced by CONTRACTOR, if any, under this Agreement. USER agrees that to the extent it receives or is given access to Proprietary Data or other technical, business or financial data in the form of recorded information from DOE or a DOE contractor or subcontractor, USER shall treat such data in accordance with any restrictive legend contained thereon, unless use is specifically authorized by prior written approval of the Contracting Officer.

C. Deliverables

1. USER agrees to furnish to DOE or CONTRACTOR those data, if any, which are (a) specified to be delivered in Appendices, (b) essential to the performance of work by CONTRACTOR personnel or (c) necessary for the health and safety of such personnel in the performance of the work. Any data furnished to DOE or CONTRACTOR shall be deemed to have been delivered with unlimited rights unless marked as "Proprietary Data" of USER.

2. Upon completion or termination of the project, USER agrees to deliver to DOE and CONTRACTOR a nonproprietary report describing the work performed under this Agreement.

D. Legal Notice

The following legal notice shall be affixed to each report or publication resulting from this Agreement which may be distributed by USER:

DISCLAIMER NOTICE

This document was prepared by __ as a result of the use of facilities provided through the U.S. Department of Energy (DOE) Nuclear Science User Facilities program, which is managed by Battelle Energy Alliance, LLC, acting under Contract No.DE-AC-07-05ID14517. Neither Battelle Energy Alliance, LLC, DOE, the U.S. Government, nor any government contractors, nor other persons and facilities performing work under this Agreement or acting on behalf of any of the above: (a) make any warranty or representation, express or implied, with respect to the information contained in this document; or (b) assume any liabilities with respect to the use of, or damages resulting from the use of any information contained in the document.

E. Copyrighted Material

1. USER agrees to, and does hereby grant to the Government, and to its officers, agents, servants and employees acting within the scope of their duties:

a. A royalty-free, nonexclusive, irrevocable license to reproduce, translate, publish, use, and dispose of and to authorize others so to do, all copyrightable material first produced or composed in the performance of this Agreement by USER, its employees or any individual or concern specifically employed or assigned to originate and prepare such material; and

b. A license as aforesaid under any and all copyrighted or copyrightable works not first produced or composed by USER in the performance of this Agreement but which are incorporated in the material furnished or delivered under the Agreement, provided that such license shall be only to the extent USER now has, or prior to completion or final settlement of the Agreement may acquire, the right to grant such license without becoming liable to pay compensation to others solely because of such grant.

2. USER agrees that it will not knowingly include any copyrightable material furnished or delivered under this Agreement without a license as provided for in subparagraph 1(b) hereof, or without the consent of the copyright owner, unless it obtains specific written approval of the Contracting Officer for the inclusion of such copyrighted materials.

F. Disclosure of Proprietary Data

In the absence of a properly executed and effective non-disclosure agreement between USER and CONTRACTOR, the USER shall not bring Proprietary Data into the USER facility except at USER's own risk and any such data, regardless how it is marked, shall be deemed Technical Data and shall be treated according to this article of this Agreement.

ARTICLE X: LABORATORY SITE ACCESS, SAFETY AND HEALTH***

As a precondition to using CONTRACTOR facilities, Participants must complete all CONTRACTOR Site Access documents and requirements. USER and participant shall take all reasonable precautions in activities carried out under this Agreement to protect the safety and health of others and to protect the environment. Participants must comply with all applicable safety, health, access to information, security and environmental regulations and the requirements of the Department and CONTRACTOR, including the specific requirements of the User Facility covered by this Agreement. In the event that USER or Participant fails to comply with said regulations and requirements, CONTRACTOR may, without prejudice to any other legal or contractual rights, issue and order stopping all or any part of USER's activities at the User Facility.

Article XI: PERSONNEL RELATIONSHIPS***

Participants will remain employees or representatives of the USER at all times during their participation in the work under this Agreement and shall not be considered employees of CONTRACTOR or DOE for any purpose. Participants shall be subject to the administrative and technical supervision and control of CONTRACTOR during and in connection with the Participant's activities under this Agreement.

ARTICLE XII: EXPORT CONTROLS***

USER acknowledges that the export of goods or Technical Data may require some form of export control license from the U.S. Government and that failure to obtain such export control license may result in criminal liability under the laws of the United States.

ARTICLE XIII: PUBLICATIONS***

A. USER and CONTRACTOR will provide each other copies of articles of any publication of information generated pursuant to this Agreement for review and comment fourteen (14) days prior to publication.

B. USER will not use the name of CONTRACTOR or the United States Government or their employees in any promotional activity, such as advertisements, with reference to any product or service resulting from this Agreement, without prior written approval of the Government and CONTRACTOR.

ARTICLE XIV: DISPUTES***

The parties will attempt to jointly resolve all disputes arising under this agreement. If the parties are unable to jointly resolve a dispute within a reasonable period of time, either party may contact the laboratory's Technology Transfer Ombudsman (TTO) to provide assistance. The TTO may work directly to resolve the dispute or, upon mutual agreement of the parties, contact a

third-party neutral mediator to assist the parties in coming to a resolution. The costs of the mediator's services will be shared equally by the parties. In the event that an agreement is not reached with the aid of the ombudsman or mediator, the parties may agree to have the dispute addressed by neutral evaluation. The decision rendered by the neutral evaluator shall be nonbinding on the parties, and any costs incurred there from shall be divided equally between the parties. Upon mutual agreement, the parties may request a final decision by the DOE Contracting Officer. Absent resolution, either party may seek relief in a court of competent jurisdiction.

ARTICLE XV: CONFLICT OF TERMS***

This Agreement constitutes the primary document which governs the work described in the attached Appendices. In the event of any conflict between the terms of this document and any other document issued by either Party, the terms of this document shall prevail.

ARTICLE XVI: TERMINATION***

Either Party may terminate this Agreement for any reason at any time by giving not less than thirty (30) days prior written notice to the other Party. Notice will be deemed made as of the day of receipt. The obligations of any clause of this Agreement, which by their nature extend beyond its termination, shall remain in full force and effect until fulfilled.

BATTELLE ENERGY ALLIANCE, LLC (CONTRACTOR):

BY: _____

Signature

NAME: _____

Printed

TITLE: Deputy Laboratory Director, Science & Technology

DATE: _____

User's Formal Name (USER):

BY: _____

Signature

NAME: _____

Printed

TITLE: _____

DATE: _____

ADDRESS: _____

TELEPHONE: _____

User Principal Investigator Acknowledgment

I, XXXXXXXX, have read and hereby acknowledge the above terms and conditions.

BY: _____

Signature

TITLE: _____

DATE: _____

ADDRESS: _____

TELEPHONE: _____

***** Any changes to the *** or substantive changes to the non *** provisions will require formal written approval by DOE.**