

Nuclear Safety Research and Development Proposal Review and Prioritization Process and Criteria



Nuclear Safety Research and Development Program

**Office of Nuclear Safety (EHSS-30)
Office of Environment, Health, Safety, and Security
U.S. Department of Energy**

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Nuclear Safety Research and Development Program

1. Introduction

Per the Department of Energy (DOE) *Nuclear Safety Research and Development (NSR&D) Program Operating Plan*, (referred to as the Operating Plan), the DOE NSR&D Program¹ annually implements processes to identify, prioritize, and fund NSR&D projects not already funded through DOE/National Nuclear Security Administration (NNSA) specific programs. These projects are intended to demonstrate the potential for DOE-wide benefit in support of safe nuclear facility design, construction, and/or operations.

The process described herein is designed to produce a prioritized and vetted list of proposals that will be considered for funding provided by the Office of Environment, Health, Safety and Security's (EHSS) Office of Nuclear Safety (EHSS-30), as well as for consideration by the potentially benefited Program Offices. The NSR&D Program will present the prioritized list of NSR&D proposals, along with proposed project selection, to EHSS-30 management for consideration based on the potential benefit to the broader DOE nuclear safety community. EHSS-30 management evaluation provides additional insights on the advantages or disadvantages of pursuing the NSR&D activities. EHSS-30 management may recommend changes to the projects that will be selected which will be considered by the NSR&D Committee in its decision-making process.

2. Annual Proposal Process Description

The NSR&D Program Manager is responsible for the processes conducted to review and prioritize the proposals submitted. In the event that the process noted herein needs to be modified or otherwise adjusted, the NSR&D Program Manager, in consultation with EHSS-30 management may, at any time modify the process as necessary. This annual proposal process was initially piloted in Fiscal Year (FY) 2013 and has been annually revised based on lessons learned gathered from proposers, Program Office personnel, and the NSR&D Committee.

Develop FY Specific Schedule

The first step in the process is to develop a schedule that is specific to the activities associated with the upcoming research and development proposal submittal, review, and approval cycle. A generic schedule is provided in section five. This generic schedule should be used by the NSR&D Program Manager in developing a schedule specific to each FY. The duration of each

¹ DOE's NSR&D Program is managed by EHSS-30 and is separate from the NNSA NSR&D Working Group's efforts.

element may be adjusted depending upon several factors, including funding for the NSR&D effort, NSR&D Committee member schedules, and the number of proposals received during the previous year's proposal cycle.

Issue Call for Proposals

The Call for Proposals (CFP) will be issued by the NSR&D Program Manager. The *Proposal Submittal Instructions* and *Proposal Review and Prioritization Process and Criteria* will accompany the CFPs. All proposals are to be submitted to the NSR&D Program no later than the date specified in the call for proposals. The CFPs will be sent to the following, as a minimum, with the expectation that they will further distribute the CFPs to the appropriate individuals at their respective Site/Field Offices and/or laboratories:

- NSR&D Committee;
- Program Secretarial Officers;
- Plant-Directed Research and Development Program Managers;
- Energy Facility Contractors Group's (EFCOG) Safety Analysis Working Group; and
- EFCOG's Engineering Practices Working Group.

The list of evaluation factors will continue to include the five main criteria with additional information provided in the instructions and criteria documents.

This year's call for proposals covers FY 2023 and FY 2024 with an approximate estimated total of \$2 million available. Projects selected for FY 2023 funding will be awarded mid CY 2023 while projects selected for FY 2024 funding will be awarded early CY 2024.

Proposals with a one-to-two-year project duration with an approximate cost of \$500,000 and covering one or more of the following seven research areas are being solicited:

- **Natural phenomena hazards (NPH) modeling and technology, including for seismic events and events induced by climate change to include extreme straight-line winds, tornadoes, hurricanes, wildland fires, and flood/precipitation with findings that demonstrate direct benefits and improvements to DOE-STD-1020, *Natural Phenomena Hazards Analysis and Design Criteria for DOE Facilities*, and related DOE NPH documents.**
- **Fire protection and fire performance of DOE facilities and equipment with findings that demonstrate direct benefits and improvements to DOE-STD-1066, *Fire Protection*.**
- **Safety basis analyses addressing reductions in uncertainty by demonstrating direct benefits and improvements to DOE-STD-3009, *Preparation of Nonreactor Nuclear Facility***

Documented Safety Analysis, and DOE-HDBK-1224, Hazard and Accident Analysis Handbook, and related DOE safety basis documents.

- ARF/RF testing, modeling and assessment by **demonstrating direct benefits and improvements** to DOE-HDBK-3010, *Airborne Release Fractions/Rates and Respirable Fractions for Nonreactor Nuclear Facilities*, and related DOE documents.
- Improvements to nuclear protective equipment and/or instrumentation, including nuclear air cleaning, HEPA filtration media and technology **demonstrating direct benefits and improvements** to DOE-STD-3020, *Specification for HEPA Filters Used by DOE Contractors*, DOE-STD-3025, *Quality Assurance Inspection and Performance Testing of HEPA and ULPA Filters*, DOE-STD-1269, *Air Cleaning Systems in DOE Nuclear Facilities*, DOE-HDBK-1169, *Handbook for Use with DOE-STD-1269-2022, "Air Cleaning Systems in DOE Nuclear Facilities,"* and related DOE documents.
- Technical bases for developing updated or new nuclear safety Directives, Technical Standards or guidance that **improves effectiveness and efficiency of regulatory or technical approach, reduces unnecessary burden, or otherwise demonstrates direct benefits and improvements to quality assurance or safety basis requirements** affecting nuclear safety of Hazard Category 1, 2, or 3 DOE nuclear facilities.
- Risk assessment and risk-informed performance-based approaches to safety assessment.

Proposals that address areas not included in the above list will still be considered; however, the review process will note that the proposal is outside the targeted research areas.

The manner in which this is to be done is specified in the rating process in Appendix A.

Screening of Proposals

Upon receipt of the proposals, the NSR&D Program Manager, assisted by program staff, will perform a simple review to ensure that proposal content is in compliance with the *Proposal Submittal Instructions* and *Proposal Review and Prioritization Process and Criteria*, and includes an endorsement from the local Site/Field Office or Headquarters Program Office. The endorsement letter should, if appropriate, address why the proposal was not selected for direct program funding, indirect (site) funding, laboratory-directed and program directed research and development funding. If the proposal is determined to be missing significant information requested in the *Proposal Submittal Instructions*, it will be removed from further consideration. If minor deficiencies are found, supplemental information will be requested by e-mail from the proposer, to be provided as soon as possible.

Review and Prioritize Proposals

Review by NSR&D Committee

NSR&D Proposal Review and Prioritization Process and Criteria

The NSR&D Program Manager will ensure that all proposals are distributed to the NSR&D Committee members at least four weeks prior to conducting a proposal ranking meeting. During these four weeks, the NSR&D Committee members will individually review each of the proposals and complete the NSR&D FY23/24 Summary Ranking Sheet (Appendix B) using the criteria and guidance provided in Appendix A. This ranking sheet is an informal working paper (or Excel worksheet) and is intended for proposal ranking consolidation by the NSR&D Program and for individual NSR&D Committee member use during the ranking meeting.

To ensure a comprehensive technical review is completed for each proposal, the NSR&D Program will seek independent subject matter expertise to assist in the review to gain a better understanding of direct impacts and immediate benefits to DOE technical standards and directives managed by EHSS-30. Subject matter experts should be from sites other than that of the proposed Principal Investigator (PI). The Committee members are responsible for completing the summary ranking sheets for each proposal. All ranking sheets should be submitted to the NSR&D Program Manager prior to conducting the summary meeting with EHSS-30 management. The Committee members' proposal rankings will be used to identify the combined set of top-ranked proposals.

Conduct EHSS-30 Ranking Meeting

The NSR&D Program will conduct a summary ranking meeting in accordance with the meeting criteria contained in the NSR&D Committee Charter. The NSR&D Program Manager will develop the combined list of top-ranked proposals, which will be discussed during the meeting, based on the summary ranking sheets submitted. At the meeting, the objective is to develop a consensus set of the highest-ranked proposals, not to exceed five. When consensus is not attainable, a majority vote may be conducted verbally or via e-mail as long as a quorum² is present. The inputs for the initial ranking meeting shall include:

1. Proposal packets;
2. Summary list of ongoing program-funded NSR&D activities (if available);
3. Available NSR&D funding for the upcoming FY;
4. NSR&D Committee member's NSR&D FY23/24 Summary Ranking Sheets; and
5. Combined list of top-ranked proposals, based on Committee members rankings.

The deliverable from the initial ranking meeting is a list of the highest-ranked proposals. Meeting minutes shall document both the top-ranked and highest ranked proposals.

Notification of Decision to PIs

² Quorum is defined in the NSR&D Committee Charter.

The NSR&D Program Manager will formally notify the PIs of the Committee's decision on their proposals after completion of the final ranking list. The notification of proposals selected for funding will include the process for funding transfer and the necessary steps for project initiation. Once the PIs have been notified, the selected proposals will then be considered projects and will be tracked by the NSR&D Program.

Identify Lessons Learned

Annually, the NSR&D Program will request feedback on the submittal and review process from the NSR&D Committee, each PI, and any others involved in the process. It is expected that improvements will be identified that can be implemented in the following year(s). The NSR&D Committee will hold a meeting to compile and discuss lessons learned. In the meeting, the Committee will also discuss any feedback received from the PIs. The outcome of the lessons learned meeting should be documented in meeting minutes for reference when planning begins for the next proposal cycle.

3. Review of Research Deliverables

In order to ensure that the NSR&D Committee selects worthwhile projects, research deliverables (e.g., publications and/or inventions) will be reviewed by the NSR&D Program and/or subject matter experts, as appropriate. Reviews should commence at project milestones identified by the PI or DOE. The NSR&D Program will conduct a review after completion of the project's final draft report(s) for consistency with the project objective, tasks, and deliverables noted in the project statement of work (SOW). The makeup of the review team should be commensurate with the technical detail of the project. This review should be completed within 60 days after it commences and should consider, as well as the technical outcome, whether the scope, completeness, increase in safety, and management of the project adhered to the description presented in the proposal.

4. Criteria and Guidance for Ranking Proposals

This section is intended to assist the NSR&D Committee members in evaluating the NSR&D proposals. Appendix A contains five criteria that will be used to rank proposals. The five criteria are (1) Nuclear Safety Benefit/Risk Reduction, (2) Technical Approach, (3) Project Management and Execution, (4) Multi-Site/Multi-Program Office Benefit, (5) Proof of Concept/Commercial Applicability/Cost Sharing. The suggested weighting of each criterion is included. Each criterion includes considerations to help guide the reviewer in ranking the proposal, as well as brief descriptions for each ranking. Research topics should be limited to

NSR&D Proposal Review and Prioritization Process and Criteria

those in support of safe nuclear facility design, construction, and/or operations for DOE/NNSA nuclear facilities, nuclear explosives, and environmental restoration activities.

5. Basic Schedule Template

The schedule below is intended as a resource for the NSR&D Program Manager in developing a schedule specific for upcoming proposal process. Each of the Activities in the schedule corresponds to a section in this process

Time Frame (Est. Schedule)	Activity	Responsibility
(November)	Develop FY Specific Schedule	NSR&D Program Manager
8 weeks (Early-February 2023)	Issue CFPs ³	NSR&D Program Manager
6 weeks (Late March)	Proposals due to nsrdprogram@hq.doe.gov (EHSS-30).	Applicants
1 week (Early April)	Screening of proposals for conformance with Proposal Submittal Instructions. Additional information will be requested for proposals with minor deficiencies.	NSR&D Program Manager
1 week (Mid-April)	Additional information provided for proposals, if needed.	Applicants
1 week (Late April)	Hold call and distribute proposal packages to the NSR&D Committee Members.	NSR&D Program Manager
4 weeks (Late April through late May)	Review proposal packages, perform individual rankings, and submit FY23/24 Summary Ranking Sheet to NSR&D Program Manager.	NSR&D Committee Members
1 week (Late May)	Initial EHSS-30 summary ranking meeting to determine highest-ranking proposals.	NSR&D Program
2 weeks (mid-June)	Final EHSS-30 summary ranking meeting with presentations on the highest-ranking proposals, if needed, to determine prioritization.	NSR&D Program
(Late June 2023)	Notify proposal PIs of FY 2023 funding decision and path forward for selected projects.	NSR&D Program Manager

³ A joint CFP process for both FY23 and FY24 will be distributed in February 2023.

NSR&D Proposal Review and Prioritization Process and Criteria

Time Frame (Est. Schedule)	Activity	Responsibility
(Jan 2024)	Notify proposal PIs of FY 2024 funding decision and path forward for additional selected projects.	NSR&D Program Manager

Appendix A. NSR&D Ranking Criteria

Criterion #1: Nuclear Safety Benefit / Risk Reduction (Weight: 30%)	Ranking⁴ and Description
<p>This criterion evaluates the benefit to improving nuclear safety through risk reduction by better understanding existing or developing new approaches and technologies.</p> <p>Proposals that do not address one of the technical areas specified in the Call for Proposals should have 1 point deducted from their scores (before weighting) for this criterion.</p> <p>Considerations when evaluating:</p> <ul style="list-style-type: none"> • The proposed project supports safe nuclear facility design, construction, and/or operations for DOE/NNSA nuclear facilities, nuclear explosives, and/or environmental restoration activities. • The results of the proposed project are expected to reduce uncertainties in current nuclear safety analyses (providing higher confidence in the results or cost savings on engineering or administrative controls by reducing excessive conservatism). • The results of the proposed project are time-critical (e.g., needed to support new construction activities, new mission requirements, Department commitments, etc.). • The results of the proposed project demonstrate clear, direct benefits and improvements to the nuclear safety knowledge base and/or the technical bases for DOE Directives and Technical Standards specific to standards and handbooks listed within the seven research areas. 	<p>Nuclear Safety Benefit:</p> <p>0 - Provides minimal risk/safety benefit</p> <p>1 - Research will establish foundation for safety/risk benefit, but further research is needed for implementation</p> <p>2 -</p> <p>3 - Safety benefit/risk reduction can be realized in the near term, but impact is limited</p> <p>4 -</p> <p>5 - Results will have an immediate and broad-based impact on risk magnitude and/or uncertainty, or produce an immediate safety or cost benefit</p>

⁴ Ranking scores 2 and 4 on all criteria are intended as range scores in between descriptions for ranking scores 1 to 3 and 3 to 5, respectively.

Appendix A: NSR&D Ranking Criteria

- The proposed project cost is in line with the perceived or estimated benefit.
- The proposed project provides a potential for a high benefit/cost ratio.

Appendix A: NSR&D Ranking Criteria

Criterion #2: Technical Approach (Weight: 25%)	Ranking and Description
<p>This criterion evaluates the soundness and technical rigor of the research methodology.</p> <p>Considerations when evaluating:</p> <ul style="list-style-type: none"> • The overall scientific and technical merit of the proposed project is clearly identifiable. • The proposed project clearly identifies the depth of the research that will be conducted, and the proposed approach can be substantiated by calculations, test data, and references. • The proposed project is expected to produce defensible results that can withstand peer review and challenges by organizations with opposing interests. • The proposed project can be feasibly/technically accomplished within the proposed time frame. 	<p>Technical Approach:</p> <p>0 - Proposed approach is unsubstantiated</p> <p>1 - Proposed approach is unclear in some respects</p> <p>2 -</p> <p>3 - Technical approach is clear but not feasible in proposed time frame</p> <p>4 -</p> <p>5 - Technical approach is clear, substantiated, and can be accomplished in proposed time frame</p>

Appendix A: NSR&D Ranking Criteria

Criterion #3: Project Management and Execution (Weight: 15%)	Ranking and Description
<p>This criterion evaluates the degree to which the proposal includes a comprehensive, logical, orderly, and concise plan that indicates major tasks, milestones, critical paths, go/no-go decision points and key events, leading to the completion of the project in the proposed period.</p> <p>Considerations when evaluating:</p> <ul style="list-style-type: none"> • The proposed project includes a comprehensive, logical, orderly, and concise plan that indicates major tasks, milestones, critical paths, go/no-go decision points, and key events, leading to the completion of the project in the proposed period. • The proposed cost is reasonable and appropriate for the technical complexity of the work described. • Successful completion of the proposed project is likely (based on success of previous similar work, expertise/experience of researchers, etc.). • The proposed project does not repeat previous or ongoing research completed by DOE/NNSA line organizations or other agencies, unless there is a demonstrated need to validate, verify, or extend such research. • Short-duration projects are preferred, but flexibility is permitted in ranking of longer-term projects if the benefit to DOE is significant and commensurate with the duration/cost. 	<p>Project Management and Execution:</p> <p>0 - Costs/schedules are not adequately specified and/or there are no deliverables or milestones until project is completed.</p> <p>1 - Costs/schedules are incomplete and/or listed deliverables/milestones are not adequate for scope of proposed work.</p> <p>2 -</p> <p>3 - Costs/schedules and/or deliverables/milestones are reasonable, but additional details would be useful.</p> <p>4 -</p> <p>5 - Costs/schedules and deliverables/milestones are completely specified and reasonable for scope of proposed work.</p>

Appendix A: NSR&D Ranking Criteria

Criterion #4: Multi-Site / Multi-Program Office Benefit (Weight: 15%)	Ranking and Description
<p>This criterion evaluates the degree to which the results of the proposal affect nuclear safety activities across multiple sites or Program Offices within DOE.</p> <p>Considerations when evaluating:</p> <ul style="list-style-type: none"> • The results of the proposed project are expected to have a DOE-wide benefit. • The proposed project addresses issues that could impact a significant number of DOE nuclear facilities and/or nuclear operations. • Specific DOE sites and their varying missions affected and benefiting from the proposed project are clearly noted in the proposal. 	<p>Multi-site / Multi-Program Office Benefit:</p> <p>0 - Benefit to DOE nuclear sites is unclear or not evident</p> <p>1 - Benefit to one site or program</p> <p>2 -</p> <p>3 - Benefit to multiple sites within one program</p> <p>4 -</p> <p>5 - Benefit to multiple sites and multiple programs</p>

Criterion #5: Proof of Concept/Commercial Applicability through Cost Sharing Resources (Weight: 15%)	Ranking and Description
<p>This criterion evaluates the degree to which the results of the proposal clearly notes a promising proof of concept with near-term commercial application leveraged with cost sharing resources from internal or external sources.</p> <p>Considerations when evaluating:</p> <ul style="list-style-type: none"> • The results of the proposed project demonstrate clear improvement changes <u>to DOE nuclear safety regulations, Directives, or Technical Standards based on an improved understanding of risk.</u>⁵ • The results of the proposed project are expected to <u>demonstrate proof of concept with a near-term or immediate design concept or business proposal demonstrating a</u> reduction of risk for high-consequence, low-probability events. • The results of the proposed project <u>will benefit high profile DOE nuclear safety issues demanding immediate attention.</u> • The proposed project clearly articulates <u>how the research will advance DOE’s nuclear safety program and objectives.</u> • The transition plan for the proposed research product(s) <u>provides a clear understanding of how the project’s results will transition to implementation, either directly, through future demonstrations, or future development.</u> • The proposed project <u>makes use of cost sharing and/or leveraged resources</u> with other DOE or Federal organizations. • The potential cost/benefit, cost sharing, and/or leveraging of resources is described. 	<p>Proof of Concept/Commercial Applicability/Cost Sharing Benefit:</p> <p>0 - Overall proof of concept/commercial applicability/cost sharing benefit are unclear or not evident</p> <p>1 - Proof of concept is noted but commercial applicability and cost sharing are not indicated</p> <p>2 -</p> <p>3 - A general mention of proof of concept/commercial applicability/cost sharing are noted with a simple description.</p> <p>4 -</p> <p>5 - A detailed, clear description of a proof of concept with definite, immediate commercial applicability coupled with a breakdown of</p>

⁵ See pages 3-4 on description to seven main topical areas of research

Appendix A: NSR&D Ranking Criteria

	cost sharing resources are all provided.
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Appendix B. Sample NSR&D FY23/24⁶ Summary Ranking Sheet

Proposal ID	Proposal Title	Nuclear Safety Benefit/Risk Reduction	Technical Approach	Project Management and Execution	Multi-Site/ Multi-Program Office Benefit	Proof of Concept / Commercial Applicability through Cost Sharing	Total (Sum of scores multiplied by rating factors)
CFP23/24-01							
CFP23/24-02							
CFP23/24-03							
CFP23/24-04							
CFP23/24-05							
CFP23/24-06							
CFP23/24-07							
CFP23/24-08							
CFP23/24-09							
CFP23/24-10							
CFP23/24-11							
CFP23/24-12							
CFP23/24-13							
CFP23/24-14							
CFP23/24-15							

⁶ CFP23/24 to be jointly reviewed