

**ORDER FOR SUPPLIES OR SERVICES**

IMPORTANT: Mark all packages and papers with contract and/or order numbers.


1. DATE OF ORDER	2. CONTRACT NO. (If any) 31310020D0002	6. SHIP TO:		
		a. NAME OF CONSIGNEE  NUCLEAR REGULATORY COMMISSION		
3. ORDER NO. 31310022F0080	4. REQUISITION/REFERENCE NO. RES-22-0330			
5. ISSUING OFFICE (Address correspondence to) US NRC - HQ  ACQUISITION MANAGEMENT DIVISION MAIL STOP TWFN-07B20M WASHINGTON DC 20555-0001		b. STREET ADDRESS NUCLEAR REGULATORY COMMISSION		
		c. CITY WASHINGTON	d. STATE DC	e. ZIP CODE 20555-0001
7. TO: MOHSEN KHATIB-RAHBAR		f. SHIP VIA		
a. NAME OF CONTRACTOR ENERGY RESEARCH INC		8. TYPE OF ORDER		
b. COMPANY NAME		<input type="checkbox"/> a. PURCHASE REFERENCE YOUR:		<input checked="" type="checkbox"/> b. DELIVERY
c. STREET ADDRESS PO BOX 2034		Except for billing instructions on the reverse, this delivery order is subject to instructions contained on this side only of this form and is issued subject to the terms and conditions of the above-numbered contract.		
d. CITY ROCKVILLE				
	e. STATE MD	f. ZIP CODE 208472034		
9. ACCOUNTING AND APPROPRIATION DATA See Schedule		10. REQUISITION NG OFFICE OFF OF NUCLEAR REG RESEARCH		

11. BUSINESS CLASSIFICATION (Check appropriate box(es))				12. F.O.B. POINT	
<input checked="" type="checkbox"/> a. SMALL	<input type="checkbox"/> b. OTHER THAN SMALL	<input type="checkbox"/> c. DISADVANTAGED	<input type="checkbox"/> d. WOMEN-OWNED	<input type="checkbox"/> e. HUBZone	
<input type="checkbox"/> f. SERVICE-DISABLED VETERAN-OWNED	<input type="checkbox"/> g. WOMEN-OWNED SMALL BUSINESS (WOSB) ELIGIBLE UNDER THE WOSB PROGRAM		<input type="checkbox"/> h. EDWOSB		
13. PLACE OF		14. GOVERNMENT B/L NO.	15. DELIVER TO F.O.B. POINT ON OR BEFORE (Date)		16. DISCOUNT TERMS
a. INSPECTION Destination	b. ACCEPTANCE Destination				30

**17. SCHEDULE (See reverse for Rejections)**

ITEM NO. (a)	SUPPLIES OR SERVICES (b)	QUANTITY ORDERED (c)	UNIT (d)	UNIT PRICE (e)	AMOUNT (f)	QUANTITY ACCEPTED (g)
	Contract 31310020D0002 Task Order: 31310022F0080  Title: Model Development and Technical Assistance to Support New Reactor and HBU/ATF Licensing and Review Continued					

SEE BILLING INSTRUCTIONS ON REVERSE	18. SHIPPING POINT		19. GROSS SHIPPING WEIGHT		20. INVOICE NO.		17(h) TOTAL (Cont. pages)	
	21. MAIL INVOICE TO:							
	a. NAME		FISCAL ACCOUNTING PROGRAM				\$0.00	
	b. STREET ADDRESS (or P.O. Box)		ADMIN TRAINING GROUP AVERY STREET A3-G BUREAU OF THE FISCAL SERVICE PO BOX 1328				\$1,194,362.69	
c. CITY PARKERSBURG			d. STATE WV	e. ZIP CODE 26106-1328		17(i) GRAND TOTAL		

22. UNITED STATES OF AMERICA BY (Signature)	08/19/2022	23. NAME (Typed)
		JEFFREY R. MITCHELL TITLE: CONTRACTING/ORDER NG OFFICER

**ORDER FOR SUPPLIES OR SERVICES**  
**SCHEDULE - CONTINUATION**

**IMPORTANT:** Mark all packages and papers with contract and/or order numbers.

DATE OF ORDER	CONTRACT NO. 31310020D0002	ORDER NO. 31310022F0080
---------------	-------------------------------	----------------------------

ITEM NO. (a)	SUPPLIES/SERVICES (b)	QUANTITY ORDERED (c)	UNIT (d)	UNIT PRICE (e)	AMOUNT (f)	QUANTITY ACCEPTED (g)
	Accounting Info: 2022-X0200-REIM-60-60D003-60B302-1302-11-R-7 27-251A-FCA-CSARP-001-46-11-R-727-1302 Period of Performance: 08/18/2022 to 10/31/2026					

TOTAL CARR ED FORWARD TO 1ST PAGE (ITEM 17(H))

\$0.00

- A - Solicitation/Contract Form .....4
  - A.1 NRC SPECIFIC INFORMATION.....4
- B - Supplies or Services/Prices .....5
  - B.1 BRIEF PROJECT TITLE AND WORK DESCRIPTION.....5
  - B.2 CONSIDERATION AND OBLIGATION—COST-PLUS-FIXED-FEE ALTERNATE I .....5
- C - Description/Specifications .....6
  - C.1 STATEMENT OF WORK.....6
- D - Packaging and Marking .....16
  - D.1 PACKAGING AND MARKING .....16
  - D.2 BRANDING .....16
- E - Inspection and Acceptance.....17
  - E.1 INSPECTION AND ACCEPTANCE BY THE NRC (SEP 2013).....17
- F - Deliveries or Performance .....18
  - F.1 PLACE OF DELIVERY-REPORTS .....18
  - F.2 TASK/DELIVERY ORDER PERIOD OF PERFORMANCE (SEP 2013).....18
- G - Contract Administration Data .....19
  - G.1 2052.215-71 CONTRACTING OFFICER REPRESENTATIVE AUTHORITY. (OCT 1999)  
.....19
  - G.2 2052.215-78 TRAVEL APPROVALS AND REIMBURSEMENT (OCT 1999) -  
ALTERNATE I (OCT 1999) .....21
- H - Special Contract Requirements.....22
  - H.1 KEY PERSONNEL. (JAN 1993) .....22
- J - List of Documents, Exhibits and Other Attachments .....23

**A - Solicitation/Contract Form**

**A.1 NRC SPECIFIC INFORMATION**

**CONTRACTOR ACCEPTANCE OF TASK ORDER 31310022F0080**

Acceptance of Task Order No: 31310022F0080 should be made by having an official, authorized to bind your organization.

\_\_\_\_\_ Name

\_\_\_\_\_ Title

\_\_\_\_\_ Date

**B - Supplies or Services/Prices**

**B.1 BRIEF PROJECT TITLE AND WORK DESCRIPTION**

(a) The title of this project is: Model Development and Technical Assistance to Support New Reactor and HBU/ATF Licensing and Review

(b) Summary work description: The objectives of the work are to (1) support staff in the development and application of MELCOR models and develop extensive documentation in support of those models, (2) support the assessment of source term methodologies, and (3) provide continuing technical support.

**B.2 CONSIDERATION AND OBLIGATION—COST-PLUS-FIXED-FEE ALTERNATE I**

(a) The total estimated cost to the Government for full performance of this contract is [REDACTED], of which the sum of \$ [REDACTED] represents the estimated reimbursable costs, and of which \$ [REDACTED] represents the fixed-fee.

(b) There shall be no adjustment in the amount of the Contractor's fixed fee.

(c) The amount currently obligated by the Government with respect to this contract is [REDACTED], of which the sum of [REDACTED] represents the estimated reimbursable costs, and of which [REDACTED] represents the fixed-fee.

(d) It is estimated that the amount currently obligated will cover performance through [REDACTED]

(e) This is an incrementally-funded contract and FAR 52.232-22 - "Limitation of Funds" applies.

(f) In accordance with FAR 52.216-8 - Fixed Fee, it is the policy of the NRC to withhold payment of fee after payment of 85 percent of the fee has been paid in order to protect the Government's interest. The amount of fixed-fee withheld from the contractor will not exceed 15 percent of the total fee or \$100,000, whichever is less. Accordingly, the maximum amount of fixed-fee that may be held in reserve is [REDACTED]

## **C - Description/Specifications**

### **C.1 STATEMENT OF WORK**

#### **1. PROJECT TITLE**

Model Development and Technical Assistance to Support New Reactor and HBU/ATF Licensing and Review

#### **2. Background**

The U.S. Nuclear Regulatory Commission (NRC) is preparing for the review of submittals for the licensing of emerging reactor designs, technologies and anticipated fuel concepts that include, but are not limited to:

- Accident tolerant fuel (ATF), high burnup (HBU), and High-Assay Low-Enriched Uranium (HALEU) for Light Water Reactors (LWRs), and
- Small Modular Reactor (SMR) and Research and Test Reactor (RTR) LWRs
- Non-LWR designs such as high-temperature gas cooled reactors (HTGRs), sodium fast reactors (SFRs), molten salt reactors (MSRs), Fluoride Salt-Cooled High Temperature Reactor (FHR), including micro-reactor variants, etc.

Regulatory source terms are deeply embedded in the NRC's regulatory policy and practices, as the current licensing process has evolved over the past 50 years. The licensing process is based on the concept of defense-in-depth, in which power plant design, operation, siting, and emergency planning comprise independent layers of nuclear safety for example. This approach encourages nuclear plant designers to incorporate several lines of defense in order to maintain the effectiveness of physical barriers between radiation hazards and workers, members of the public, and the environment – for both normal operation and accident conditions. Design basis accidents establish and confirm the design basis of the nuclear facility, including its safety-related structures, systems, and components and items important to safety. This ensures that the plant design meets the safety and numerical radiological criteria set forth in regulations and subsequent guidance. The various regulatory source terms, used in conjunction with the DBAs, establish and confirm the design basis of the nuclear facility, including items important to safety, ensuring that the plant design meets the safety criteria set forth in the U.S. Code of Federal Regulations (CFR) (e.g., 10 CFR 100.11, 10 CFR 50.67, 10 CFR 50.34).

NRC staff are currently engaged in pre-application activities for the NuScale NPM-20 standard design approval application (SDA) and the General Electric BWRX-300 construction permit. Topical reports for these SMR designs may include severe accident management and source term evaluation. NRR staff review of these topical reports require confirmatory calculations be performed to ensure that all relevant phenomenological processes are adequately represented when compared to the analyses by the applicant. These confirmatory calculations will be performed using design specific MELCOR models.

It is also anticipated that vendors will be submitting topical reports and license applications for advanced reactor, non-LWR technologies as well. Currently, the USNRC research staff have identified four general classes of such non-LWR designs to include, but not limited to: (1) High Temperature Gas-Cooled Reactor (HTGR), (2) Sodium Fast Reactor (SFR), (3) Molten Salt Reactor (MSR), and (4) Fluoride Salt-Cooled High Temperature Reactor (FHR); including micro-reactor variants. Technical support and confirmatory analyses may also be required for these non-LWR in accident and source term analysis

There are a variety of accident tolerant fuels that are being considered by industry. Near term concepts are Iron-Chromium-Aluminum claddings (FeCrAl), Chromium coated zirconium claddings, and chromium doped fuels. Long-term concepts include Silicon Carbide claddings and uranium nitride fuels. HALEU is defined as enrichments between 5-20wt%, but there can also be intermediate levels with Incremental Enrichment (IE) between ~5-7wt%, Extended Enrichment (EE) between ~7-10wt%. The use of HALEU is expected to be combined with increasing burnups, denoted High Burnup (HBU). There is ongoing research being conducted to assess the impact of ATF and HBU/HALEU on the containment source term.

This effort is intended to support Office of Nuclear Regulatory Research staff to understand and evaluate radionuclide and hazardous material, including associated systems behavior in the nuclear fuel cycle. Support is required in developing, validating, and maintaining extensive MELCOR input decks, identify and communicating problems to code developers, and analysis for use in licensing and other regulatory activities.

### 3. PROJECT DESCRIPTION AND OBJECTIVE(S)

The objectives of the work are to (1) support staff in the development and application of MELCOR models and develop extensive documentation in support of those models, (2) support the assessment of source term methodologies, and (3) provide continuing technical support.

### 4. STATEMENT OF WORK TASKS

The scope of work is focused on supporting NRC staff in developing, applying, assessing, documentation of MELCOR input decks as applied to problems in the fuel cycle, and performing analysis and review of source terms. Application cases may include LWR, SMR, non-LWR, etc. reactors and ATF (e.g. HBU/HALEU, FeCrAl, etc.).

The types of analyses will include those phenomena as covered by the MELCOR computer code, such as accident progression, source-term estimation, containment and equipment performance, radiological and non-radiological hazardous material and energy release and transport, etc.

The contractor shall provide all resources necessary to accomplish the tasks and deliverables described in this Statement of Work (SOW). The contractor's key staff must have the ability to handle and have prior experience with proprietary information. The contractor's key staff should also be able to handle Export Controlled Information (ECI) (i.e., **be U.S. citizens or permanent residents**).

Lessons learned should be documented such that MELCOR developers are able to assess. Contractor shall submit interim versions with input decks for staff testing.

It is expected that there will be built-in kick off meetings held virtually between relevant NRC staff and the contractor prior to the start of each activity.

#### Task 1. Model Development and Accident Analysis

This task involves technical support required for both SMR light water reactors and non-LWR

reactor analyses in support of new reactor license applications. The contractor will support staff in the development, application, and detailed documentation of MELCOR input decks (1-2 per year) for the purpose of evaluating severe accidents and containment performance. MELCOR will be used for evaluating transport of radioactive and non-radioactive hazardous material and systems performance of a nuclear fuel cycle facility under a range of normal and off-normal conditions. In general, this can include for example core damage progression starting from core overheat through to the various stages of melt progression, including safety system responses and eventually containment performance. In non-power facilities this may include predicting the generation and distribution of hazardous material in an enrichment facility after an abnormal occurrence, and in transport configurations this includes predicting source-terms from a spent fuel cask.

In general, the fuel cycle analyses are driven by reactor designs such as LWR, SMR, micro-reactors, RTRs, and non-LWR reactor designs. The types of analyses will include those phenomena as covered by the MELCOR computer code, such as accident progression, code assessment, source-term estimation, containment and equipment performance, radiological and non-radiological hazardous material and energy release and transport, etc.

Technical support on LWR-specific designs may include work to:

- 1) Generate MELCOR input models using proprietary design information provided by the applicant.
- 2) Perform benchmark calculations to exercise the input models to confirm their accuracy and fidelity to the design.
- 3) Execute MELCOR input models to assess severe accident including in-vessel and ex-vessel accident progression, containment thermal-hydraulics, and fission product release and transport.

Deliverable: Contractor shall develop and test MELCOR input decks, develop detailed documentation (including for decks developed by Sandia National Laboratories (SNL)), and support staff deck development. The final decks will be reviewed by both the NRC and the MELCOR code developers at SNL. Lessons learned should be documented such that MELCOR developers are able to improve the code. Contractor shall submit interim versions with input decks for staff testing.

Completion Date: 9/30/2026

## Task 2. Support for Source Term Evaluation

Regulatory source terms are developed based on the radionuclide release determined for postulated, accident scenarios and are deeply embedded in the U.S. Nuclear Regulatory Commission's (NRC's) regulatory policy and practices. Source terms are developed based on data and analyses to estimate radionuclide magnitude, mix and timing. Ongoing research efforts are underway to expand the applicability of Regulatory Guide (RG) 1.183 "ASTs for Evaluating DBAs at Nuclear Power Reactors" to accommodate higher burnup and increased enrichment (HALEU) targets as well as ATF claddings. To this end, mechanistic source terms to containment are currently being developed for HALEU/HBU fuels and near-term ATF concepts. The contractor shall provide support as needed in the review and assessment of source terms (1-2 per year). This may come in the form of (1) organizing a peer review panel to assess the



methodology and results (e.g. for chromium-coated ATF source term), (2) providing expert judgement on an applicant's source term methodology topical report, (3) performing confirmatory MELCOR calculations, (4) providing other technical support related to source term evaluation.

Deliverable: Reports supporting the contractor's technical positions and reviews, as needed, are expected to be provided in WORD and/or PDF. If calculations are performed, the final decks will be reviewed by both the NRC and the MELCOR code developers at SNL.

Completion Date: 9/30/2026\_

### Task 3. Technical Support for Staff

The contractor shall provide technical support to the NRC on an as needed basis on issues related to aspects of the Task 1 and Task 2 effort, which includes all phases of the severe accident progression, as applied to the fuel cycle, and staff training. This support shall include: (1) developing basis for staff technical positions (estimated 1-3 per year); (2) reviewing and developing related documents (estimated 1-3 per year); (3) responding to user questions and resolving difficulties, (4) supporting ACRS meetings (estimated 1-3 per year), and (5) providing any specific technical training (estimated 1 per year) that is requested by the NRC COR.

Deliverable: Reports supporting staff technical positions and technical reviews, as needed, are expected to be provided in WORD and/or PDF. Training materials, such as slide decks, and hold training sessions.

Completion Date: 9/30/2026

## **5. APPLICABLE DOCUMENTS AND STANDARDS**

The contractor is expected to have a thorough understanding of the basis of accident progression regulations, which includes the following and will be relied upon during this work:

Regulations:

1. 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities"
  - a. Appendix A, "General Design Criteria for Nuclear Power Plants"
  - b. Appendix K, "ECCS Evaluation Models"
2. 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plant"
3. 10 CFR Part 100, "Reactor Site Criteria"

Technical and Guidance Documents:

1. Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition
2. Regulatory Guide 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Plants"
3. Regulatory Guide 1.216, "Containment Structural Integrity Valuation for Internal Pressure Loadings Above Design Basis"
4. Regulatory Guide 1.7, "Combustible Gas Control for Nuclear Power Plants"
5. TID-14844, "Calculation of Distance Factors for Power and Test Reactor Sites"
6. WASH-1400, "The Reactor Safety Study"
7. NUREG-900, "Nuclear-Power-Plant Severe-Accident Research Plan"
8. NUERG-1150, "Severe Accident Risks: An Assessment for Five U.S. Nuclear Power

## Plants”

9. NUREG-1465, “Accident Source Terms for Light-Water Nuclear Power Plants”
10. NUREG-1935, “State-of-the-Art Reactor Consequence Analyses Main Report”
11. NUREG-2161, “Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel Pool for a U.S. Mark I Boiling Water Reactor”
12. NUREG-2206, “Technical Basis for the Containment Protection and Release Reduction Rulemaking for Boiling Water Reactors with Mark I and Mark II Containments”
13. NUREG/CR-7110, “State-of-the-Art Reactor Consequence Analyses Volume 1: Peach Bottom Integrated Analysis”
14. NUREG/CR-7110, “State-of-the-Art Reactor Consequence Analyses Volume 2: Surry Integrated Analysis”
15. NUREG/CR-7245, “Sequoyah Integrated Deterministic and Uncertainty Analyses”

## ATF/HALEU-HBU:

- Assessment of Existing Transportation Packages for Use with HALEU (ML21040A518)
- Isotopic and Fuel Lattice Parameter Trends in Extended Enrichment and Higher Burnup, Volume 1: PWR Fuel (ML21088A336)
- Isotopic and Fuel Lattice Parameter Trends in Extended Enrichment and Higher Burnup, Volume 2: BWR Fuel (ML21088A354)
- Extended-Enrichment ATF Isotopic and Lattice Parameter Trends (ML21088A254)
- Review of Accident Tolerant Fuel Concepts with Implications to Severe Accident Progression and Radiological Releases (ML20287A477)
- Phenomena Identification Ranking Tables for Accident Tolerant Fuel Designs Applicable to Severe Accident Conditions (ML21113A277)

## Non-LWRs:

- “NRC Non-Light Water Reactor (Non-LWR) Vision and Strategy, Volume 3 – Computer Code Development Plans for Severe Accident Progression, Source Term, and Consequence Analysis” (ML20030A178), and
- “NRC Non-Light Water Reactor (Non-LWR) Vision and Strategy, Volume 5 – Radionuclide Characterization, Criticality, Shielding, and Transport in the Nuclear Fuel Cycle” (ML20308A744).

## Facilities/SFP/etc:

- Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants (NUREG-1738; ML010430066)
- Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel Pool for a U.S. Mark I Boiling Water Reactor (NUREG-2161, ML14255A365)
- MELCOR Modeling of Accident Scenarios at a Facility for Aqueous Reprocessing of Spent Nuclear Fuel (NUREG/CR-7266; ML20030B798)

**6. DELIVERABLES AND DELIVERY SCHEDULE/REPORTING REQUIREMENTS**

The contractor shall provide the deliverables stated in the table below, both in hard copy and electronic format unless directed by the COR. The electronic format shall be provided using a Microsoft-based product, (e.g., Outlook, Word, Excel, PowerPoint) unless the COR and the contractor specifically agree on another format. All deliverables shall be in the format of draft version, revision version with redline/strikeout with a change-control appendix, and a revised version which can be the final version. The contractor shall maintain appropriate revision control

in an electronic format.

The contractor is responsible for structuring the deliverables to current agency standards. The contractor shall submit deliverables free of spelling and grammatical errors and that conform to requirements stated in this section.

<b>Deliverable/Task Number</b>	<b>Deliverable and Acceptance Criteria</b>	<b>Deliverable Format</b>	<b>Due Date</b>
1	MELCOR input models and detailed documentation	-MELCOR input decks -ASCII or SNAP decks -WORD or PDF input deck documentation	Due Date will be mutually agreed upon with the COR depending on the design.
2	Detailed documentation and (if applicable) MELCOR input models	-WORD or PDF documentation, PPT, and Excel. -MELCOR input decks	Due Date will be mutually agreed upon with the COR depending on the task.
3	Detailed documentation, training, and training materials,	-WORD or PDF input deck documentation, PPT, and Excel.	Due Date will be mutually agreed upon with the COR depending on the task.
All	Per SOW Section 8.1, Monthly Letter Status Reports (MLSRs) Acceptance Criteria: Report contains all required information per Section 8.1.	Microsoft Word or PDF	NLT than 20th of the following month

The contractor shall develop, maintain, and control data, files, information, and deliverables pursuant to this task order

The above deliverables shall be submitted to the task order CO and task order COR. Unless otherwise directed by the COR or the CO, the contractor must provide all deliverables except the Monthly Letter Status Reports (MLSR) as draft products. The COR will review all draft deliverables (and coordinate any internal NRC staff review, if needed) and provide comments back to the contractor. The contractor shall revise the draft deliverable based on the comments provided by the COR and then deliver a revised version of the deliverable, which will then be considered the Final Version. When mutually-agreed upon between the contractor and the COR, the contractor may submit preliminary or partial drafts to help gauge the contractor’s understanding of the particular work requirement. More than one round of drafts may be needed if the contractor does not successfully incorporate the COR’s comments on the previous draft.

**7. REQUIRED LABOR CATEGORIES/ ESTIMATED LEVEL OF EFFORT (Except for Information Technology Services)**

Personnel working under this agreement/order shall meet all the minimum requirements for experience and education, as follows:

Labor Category	Minimum Requirements	Key Personnel* (yes or no)
Senior Research Scientist/Engineer	<ul style="list-style-type: none"> <li>· Doctor of Philosophy or Master’s in engineering in the field of Nuclear, Chemical, Materials or Mechanical engineering, or demonstrated equivalent, e.g. Physics. Degrees from an ABET accredited institution, including those defined by ABET’s Mutual Recognition Agreement and Memorandum of Understanding list are preferred.*</li> <li>· Demonstrated in-depth knowledge of nuclear fuel behaviour, core damage progression, fission product transport, combustion phenomena, and containment response under severe accident conditions.</li> <li>· Demonstrated knowledge and experience in simulations with MELCOR input decks for licensing scenarios. This includes how data is generated and passed to MELCOR from SCALE (kinetics parameters, power distributions, decay heats, inventory, etc.), and how MELCOR data is passed to MACCS</li> <li>· Demonstrated capability in developing and writing detailed input deck documentation under a quality assured environment.</li> <li>· Excellent technical writing skills as demonstrated by lead-authorship on publications in peer-reviewed technical journals.</li> <li>· Demonstrated ability to work closely with computer code developers for efficient results</li> <li>· Demonstrated knowledge of the basis documents listed in Applicable Documents and Standards.</li> </ul> <p>Education and Skillsets that are not Required, but Desired for this Task Order Requirement:</p> <ul style="list-style-type: none"> <li>· Demonstrated in-depth knowledge of NRC fuel safety and system criteria and their technical basis including documentation provided in Section 5.</li> </ul>	Yes

<p>Research Scientist/Engineer</p>	<ul style="list-style-type: none"> <li>· Doctor of Philosophy or Master’s in Engineering in the field of Nuclear, Materials or Mechanical engineering or demonstrated equivalent, e.g. Physics. Degrees from an ABET accredited institution, including those defined by ABET’s Mutual Recognition Agreement and Memorandum of Understanding list are preferred.*</li> <li>· Demonstrated knowledge of nuclear fuel and cladding behaviour under severe accident conditions.</li> <li>· Demonstrated experience in simulating LWR severe accident behaviour with the MELCOR code</li> <li>· Demonstrated capability in developing and writing detailed input deck documentation under a quality assured environment</li> <li>· Demonstrated knowledge of the basis documents listed in Applicable Documents and Standards .</li> </ul>	<p>Yes</p>

\*An Engineering curriculum shall be accredited and internationally recognized, preferable by the Accreditation Board for Engineering and Technology (ABET). Less desired but acceptable, by documenting how you meet the minimum OPM qualification standards for the 800 Occupational Series, or demonstrated equivalent.

Note: It is the contractor’s responsibility to furnish documentation that verifies the basic education and professional knowledge requirements; in the absence of such documentation, one would be rated not qualified.

**8. GOVERNMENT-FURNISHED PROPERTY**

Government property is not expected to be furnished unless in accordance to handle proprietary information.

**9. PLACE OF PERFORMANCE**

Contractor should perform work locally and have technical staff available to support development of MELCOR input decks, technical approaches, meetings, and workshops.

**10. SPECIAL CONSIDERATIONS**

**TRAVEL/MEETINGS**

Contractor will be authorized travel expenses consistent with the substantive provisions of the Federal Travel Regulation (FTR) and the limitation of funds specified in this contract/order. All travel requires written Government approval from the CO, unless otherwise delegated to the COR.

Travel will be reimbursed in accordance with FAR 31.205-46, "Travel costs" and the General Services Administration's Federal Travel Regulations at: <http://www.gsa.gov/portal/content/104790>.

All travel requires prior written approval from the COR.

Travel is possible to support staff in meetings and for training purposes. For estimate purposes One domestic trip to attend a workshop or ACRS meeting is anticipated for each fiscal year (FY22 through FY25). Decisions on travel and who will attend shall be determined through discussion with the COR.

### **Export Controlled Information**

It is anticipated that work described in this SOW will involve the use of Sensitive Unclassified Non-Safeguards Information (SUNSI), i.e., Export Controlled Information (ECI), and/or proprietary data. Information marked as ECI will strictly be restricted to only persons with a defined Need-to-Know (NTK) and must be handled *only* by U.S. citizens or permanent residents. Information marked as proprietary, but not ECI, will be restricted *only* to persons with a defined NTK. Any unauthorized disclosure of ECI must be reported within 1 hour to the USNRC contracting officer (CO) for immediate next steps. After completion of work, the contractor must either destroy the documents containing both proprietary and ECI information or return them to the NRC. If they are destroyed, please confirm this in an email to the COR with a copy to the CO and include the date and manner in which the documents were destroyed. (Refer to Section H.6 Definition and Handling of Export Controlled Information.)

### **LICENSE FEE RECOVERY**

Work under this contract *may* be license fee recoverable. Determination will be made by the COR for a given project.

### **DATA RIGHTS**

The NRC shall have unlimited rights to and ownership of all deliverables provided under this contract/order, including reports, recommendations, briefings, work plans and all other deliverables. All documents and materials, to include the source codes of any software, produced under this contract/order are the property of the Government with all rights and privileges of ownership/copyright belonging exclusively to the Government. These documents and materials may not be used or sold by the contractor without written authorization from the CO. All materials supplied to the Government shall be the sole property of the Government and may not be used for any other purpose. This right does not abrogate any other Government rights. The definition of "unlimited rights" is contained in Federal Acquisition Regulation (FAR) 27.401, "Definitions." FAR clause at FAR 52.227-14, "Rights in Data-General," is hereby incorporated by reference and made a part of this contract/order.

### **Reporting Requirements**

The contractor is responsible for structuring the deliverables to current agency standards. The contractor shall submit deliverables free of spelling and grammatical errors and that conform to requirements stated in this section.

### **Monthly Letter Status Report (MLSR)**

The contractor shall provide a Monthly Letter Status Report which consists of a technical progress report and financial status report. This report will be used by the NRC to assess the adequacy of the resources utilized by the contractor to accomplish the work contained in this SOW and to provide status of the contractor's progress in achieving tasks and producing deliverables. The report shall include agreement/order summary information, work completed during the specified period, milestone schedule information, problem identification and resolution, travel plans, and staff hour summary. Copies shall be sent to the COR and AMD at [ContractsPOT.Resource@nrc.gov](mailto:ContractsPOT.Resource@nrc.gov).

### **Final Report**

At the COR's discretion, deliverables under tasks 1-3 may be fashioned into a NUREG/CR. NUREG/CR reports require the completion/execution of an NRC form 426A, to be completed by the Contractor and sent to the COR for processing. For further information refer to Management Directive 3.7, "NUREG-Series Publications."

## **D - Packaging and Marking**

### **D.1 PACKAGING AND MARKING**

(a) The Contractor shall package material for shipment to the NRC in such a manner that will ensure acceptance by common carrier and safe delivery at destination. Containers and closures shall comply with the Surface Transportation Board, Uniform Freight Classification Rules, or regulations of other carriers as applicable to the mode of transportation.

(b) On the front of the package, the Contractor shall clearly identify the contract number under which the product is being provided.

(c) Additional packaging and/or marking requirements are as follows: N/A.

### **D.2 BRANDING**

The Contractor is required to use the statement below in any publications, presentations, articles, products, or materials funded under this contract/order, to the extent practical, in order to provide NRC with recognition for its involvement in and contribution to the project. If the work performed is funded entirely with NRC funds, then the contractor must acknowledge that information in its documentation/presentation.

Work Supported by the U.S. Nuclear Regulatory Commission (NRC), Office of Nuclear Regulatory Research, under Contract/order number 31310020D0002\_31310022F0080.



**E - Inspection and Acceptance**

**E.1 INSPECTION AND ACCEPTANCE BY THE NRC (SEP 2013)**

Inspection and acceptance of the deliverable items to be furnished hereunder shall be made by the NRC Contracting Officer's Representative (COR) at the destination, accordance with FAR 52.247-34 - F.o.b. Destination.

Contract Deliverables:

Refer to Statement of Work section labeled deliverables.

**F - Deliveries or Performance**

**F.1 PLACE OF DELIVERY-REPORTS**

The items to be furnished hereunder shall be delivered, with all charges paid by the Contractor, to:

a. Contracting Officer's Representative (COR):

Refer to Section G.2 2052.215-71 CONTRACTING OFFICER REPRESENTATIVE AUTHORITY. (OCT 1999)

b. Contracting Officer (1 electronic copy) - Monthly Letter Status Report (MLSR) Only

**F.2 TASK/DELIVERY ORDER PERIOD OF PERFORMANCE (SEP 2013)**

This order shall commence on 08/18/2022 and will expire on 10/31/2026.

**G - Contract Administration Data**

**NRC Local Clauses Incorporated by Full Text**

**NRCAR Clauses Incorporated By Full Text**

**G.1 2052.215-71 CONTRACTING OFFICER REPRESENTATIVE AUTHORITY. (OCT 1999)**

(a) The contracting officer's authorized representative (hereinafter referred to as the COR) for this contract is:

[REDACTED]

[REDACTED]

(b) Performance of the work under this contract is subject to the technical direction of the NRC COR. The term "technical direction" is defined to include the following:

(1) Technical direction to the contractor which shifts work emphasis between areas of work or tasks, authorizes travel which was unanticipated in the Schedule (i.e., travel not contemplated in the Statement of Work (SOW) or changes to specific travel identified in the SOW), fills in details, or otherwise serves to accomplish the contractual SOW.

(2) Provide advice and guidance to the contractor in the preparation of drawings, specifications, or technical portions of the work description.

(3) Review and, where required by the contract, approval of technical reports, drawings, specifications, and technical information to be delivered by the contractor to the Government under the contract.

(c) Technical direction must be within the general statement of work stated in the contract. The COR does not have the authority to and may not issue any technical direction which:

(1) Constitutes an assignment of work outside the general scope of the contract.

(2) Constitutes a change as defined in the "Changes" clause of this contract.

(3) In any way causes an increase or decrease in the total estimated contract cost, the fixed fee, if any, or the time required for contract performance.

(4) Changes any of the expressed terms, conditions, or specifications of the contract.

(5) Terminates the contract, settles any claim or dispute arising under the contract, or issues any unilateral directive whatever.

(d) All technical directions must be issued in writing by the COR or must be confirmed by the COR in writing within ten (10) working days after verbal issuance. A copy of the written direction must be furnished to the contracting officer. A copy of NRC Form 445, Request for Approval of Official Foreign Travel, which has received final approval from the NRC must be furnished to the contracting officer.

(e) The contractor shall proceed promptly with the performance of technical directions duly issued by the COR in the manner prescribed by this clause and within the COR's authority under the provisions of this clause.

(f) If, in the opinion of the contractor, any instruction or direction issued by the COR is within one of the categories as defined in paragraph (c) of this section, the contractor may not proceed but shall notify the contracting officer in writing within five (5) working days after the receipt of any instruction or direction and shall request the contracting officer to modify the contract accordingly. Upon receiving the notification from the contractor, the contracting officer shall issue an appropriate contract modification or advise the contractor in writing that, in the contracting officer's opinion, the technical direction is within the scope of this article and does not constitute a change under the "Changes" clause.

(g) Any unauthorized commitment or direction issued by the COR may result in an unnecessary delay in the contractor's performance and may even result in the contractor expending funds for unallowable costs under the contract.

(h) A failure of the parties to agree upon the nature of the instruction or direction or upon the contract action to be taken with respect thereto is subject to 52.233-1 - Disputes.

(i) In addition to providing technical direction as defined in paragraph (b) of the section, the COR shall:

(1) Monitor the contractor's technical progress, including surveillance and assessment of performance, and recommend to the contracting officer changes in requirements.

(2) Assist the contractor in the resolution of technical problems encountered during performance.

(3) Review all costs requested for reimbursement by the contractor and submit to the contracting officer recommendations for approval, disapproval, or suspension of payment for supplies and services required under this contract.

(4) Assist the contractor in obtaining the badges for the contractor personnel.

(5) Immediately notify the Security Branch, Division of Facilities and Security (SB/DFS) (via e-mail) when a contractor employee no longer requires access authorization and return of any NRC issued badge to SB/DFS within three days after their termination.

(6) Ensure that all contractor employees that require access to classified Restricted Data or National Security Information or matter, access to sensitive unclassified information (Safeguards, Official Use Only, and Proprietary

information) access to sensitive IT systems or data, unescorted access to NRC controlled buildings/space, or unescorted access to protected and vital areas of nuclear power plants receive approval of SB/DFS prior to access in accordance with Management Directive and Handbook 12.3.

(7) For contracts for the design, development, maintenance or operation of Privacy Act Systems of Records, obtain from the contractor as part of closeout procedures, written certification that the contractor has returned to NRC, transferred to the successor contractor, or destroyed at the end of the contract in accordance with instructions provided by the NRC Systems Manager for Privacy Act Systems of Records, all records (electronic or paper) which were created, compiled, obtained or maintained under the contract.

(End of Clause)

**G.2 2052.215-78 TRAVEL APPROVALS AND REIMBURSEMENT (OCT 1999) - ALTERNATE I (OCT 1999)**

(a) Total expenditure for travel may not exceed [REDACTED] without the prior approval of the contracting officer.

(b) All foreign travel must be approved in advance by the NRC on NRC Form 445, Request for Approval of Official Foreign Travel, and must be in compliance with FAR 52.247-63 Preference for U.S. Flag Air Carriers. The contractor shall submit NRC Form 445 to the NRC no later than 30 days prior to the commencement of travel.

(c) The contractor will be reimbursed only for travel costs incurred that are directly related to this contract and are allowable subject to the limitations prescribed in FAR 31.205-46.

(d) It is the responsibility of the contractor to notify the contracting officer in accordance with the FAR Limitations of Cost clause of this contract when, at any time, the contractor learns that travel expenses will cause the contractor to exceed the travel ceiling amount identified in paragraph (a) of this clause.

(e) Reasonable travel costs for research and related activities performed at State and nonprofit institutions, in accordance with Section 12 of Pub. L. 100-679, must be charged in accordance with the contractor's institutional policy to the degree that the limitations of Office of Management and Budget (OMB) guidance are not exceeded. Applicable guidance documents include OMB Circular A-87, Cost Principles for State and Local Governments; OMB Circular A-122, Cost Principles for Nonprofit Organizations; and OMB Circular A-21, Cost Principles for Educational Institutions.

\*To be incorporated into any resultant contract

(End of Clause)

## H - Special Contract Requirements

### NRC Local Clauses Incorporated by Full Text

#### H.1 KEY PERSONNEL. (JAN 1993)

(a) The following individuals are considered to be essential to the successful performance of the work hereunder:



\*The contractor agrees that personnel may not be removed from the contract work or replaced without compliance with paragraphs (b) and (c) of this section.

(b) If one or more of the key personnel, for whatever reason, becomes, or is expected to become, unavailable for work under this contract for a continuous period exceeding 30 work days, or is expected to devote substantially less effort to the work than indicated in the proposal or initially anticipated, the contractor shall immediately notify the contracting officer and shall, subject to the concurrence of the contracting officer, promptly replace the personnel with personnel of at least substantially equal ability and qualifications.

(c) Each request for approval of substitutions must be in writing and contain a detailed explanation of the circumstances necessitating the proposed substitutions. The request must also contain a complete resume for the proposed substitute and other information requested or needed by the contracting officer to evaluate the proposed substitution. The contracting officer and the project officer shall evaluate the contractor's request and the contracting officer shall promptly notify the contractor of his or her decision in writing.

(d) If the contracting officer determines that suitable and timely replacement of key personnel who have been reassigned, terminated, or have otherwise become unavailable for the contract work is not reasonably forthcoming, or that the resultant reduction of productive effort would be so substantial as to impair the successful completion of the contract or the service order, the contract may be terminated by the contracting officer for default or for the convenience of the Government, as appropriate. If the contracting officer finds the contractor at fault for the condition, the contract price or fixed fee may be equitably adjusted downward to compensate the Government for any resultant delay, loss, or damage.

**J - List of Documents, Exhibits and Other Attachments**

<b>Attachment Number</b>	<b>Title</b>	<b>Date</b>	<b>Number of Pages</b>
1	Attachment No.1 _ NRC 187 Award	08/16/2022	4