


<b>INTERAGENCY AGREEMENT</b>		1. IAA NO. 31310019F0036		PAGE 1 OF 3	
2. ORDER NO.		3. REQUISITION NO. NRR-19-0104		4. SOLICITATION NO.	
5. EFFECTIVE DATE 09/03/2019		6. AWARD DATE 08/20/2019		7. PERIOD OF PERFORMANCE 09/03/2019 TO 06/30/2020	
8. SERVICING AGENCY PACIFIC NORTHWEST NAT LAB ALC: DUNS: 000000000 +4: US DEPARTMENT OF ENERGY PACIFIC NORTHWEST SITE OFFICE PO BOX 350 MS K9-42 RICHLAND WA 99352  POC [REDACTED] TELEPHONE NO. [REDACTED]		9. DELIVER TO BERNARD GRENIER US NUCLEAR REGULATORY COMMISSION OFFICE OF NUCLEAR REACTOR REGULATION 11555 ROCKVILLE PIKE ROCKVILLE MD 20852			
10. REQUESTING AGENCY ACQUISITION MANAGEMENT DIVISION ALC: 31000001 DUNS: 040535809 +4: US NUCLEAR REGULATORY COMMISSION ONE WHITE FLINT NORTH 11555 ROCKVILLE PIKE ROCKVILLE MD 20852-2738  POC Sandra Nesmith TELEPHONE NO. 301-415-6836		11. INVOICE OFFICE US NUCLEAR REGULATORY COMMISSION ONE WHITE FLINT NORTH 11555 ROCKVILLE PIKE MAILSTOP 03-E17A ROCKVILLE MD 20852-2738			
12. ISSUING OFFICE US NRC - HQ ACQUISITION MANAGEMENT DIVISION MAIL STOP TWFN-07B20M WASHINGTON DC 20555-0001		13. LEGISLATIVE AUTHORITY Energy Reorganization Act of 1974			
		14. PROJECT ID			
		15. PROJECT TITLE REVIEW OF THE CALLAWAY PLANT, UNIT 1, SEISMIC PROB			
16. ACCOUNTING DATA 2019-X0200-FEEBASED-20-20D007-1062-11-4-212-253D-11-4-212-1062					
17. ITEM NO.	18. SUPPLIES/SERVICES	19. QUANTITY	20. UNIT	21. UNIT PRICE	22. AMOUNT
	Agreement No. 31310019N0001 Task Order No. 31310019F0036  Title: Review of the Callaway Plant, Unit 1, Seismic Probabilistic Risk Assessment (SPRA) Submittal in Response to the March 12, 2012 50.54(f) Letter (NTTF Recommendation 2.1: Seismic)  The NRC and Pacific Northwest National Laboratory (PNNL) hereby enter into this Agreement for the task order titled "Review of the Callaway Plant, Unit 1, Seismic Probabilistic Risk Assessment Continued ...				
23. PAYMENT PROVISIONS		24. TOTAL AMOUNT \$40,000.00			
25a. SIGNATURE OF GOVERNMENT REPRESENTATIVE (SERVICING)		26a. SIGNATURE OF GOVERNMENT REPRESENTATIVE (REQUESTING) 			
25b. NAME AND TITLE	25c. DATE	26b. CONTRACTING OFFICER SANDRA R. NESMITH		26c. DATE 09/05/2019	

IAA NO 31310019F0036	ORDER NO	PAGE 2	OF 3
<p>(SPRA) Submittal in Response to the March 12, 2012 50.54(f) Letter (NTTF Recommendation 2.1: Seismic."</p> <p>Period of Performance: September 3, 2019 - June 30, 2020</p> <p>Consideration and Obligations:</p> <p>(a) Authorized Cost Ceiling \$143,877.00</p> <p>(b) The amount presently obligated with respect to this DOE Agreement is \$40,000.00. When and if the amount(s) paid and payable to the DOE Laboratory hereunder shall equal the obligated amount, the DOE Laboratory shall not be obligated to continue performance of the work unless and until the NRC Contracting Officer shall increase the amount obligated with respect to this DOE Agreement. Any work undertaken by the DOE Laboratory in excess of the obligated amount specified above is done so at the DOE Laboratory's sole risk.</p> <p>The following documents are hereby made a part of this Agreement:</p> <p>Attachments</p> <ol style="list-style-type: none"> <li>1. Statement of Work</li> <li>2. Letter from Stephanie Banker, VP, Engineering Ameren Missouri dated August 12, 2019</li> </ol> <p>This agreement is entered into pursuant to the authority of the Energy Reorganization Act of 1974, as amended (42 U.S.C 5801 et seq.). This work will be performed in accordance with the NRC/DOE Memorandum of Understanding dated November 24, 1998. To the best of our knowledge, the work requested will not place the DOE and its contractor in direct competition with the domestic private sector.</p> <p>[x] Fee Recoverable Work</p> <p>Docket No.: Unit 1 - 05000483 EPID: L-2019-JLD-0000 Continued ...</p>			

CAC: 000495  
TAC: Callaway Plant, Unit 1

[REDACTED]

NRC COR: Bernard Grenier,  
bernard.grenier@nrc.gov, 301-415-2726

DUNS: 040535809  
TAS: 31X0200.320  
ALC: 31000001  
Master IAA: 31310019N0001

## STATEMENT OF WORK

<b>NRC Agreement Number</b>  313100N190001	<b>NRC Agreement Modification Number</b>  	<b>NRC Task Order Number (If Applicable)</b>  31310019F0036	<b>NRC Task Order Modification Number (If Applicable)</b>  
<b>Project Title</b>  Review of the Callaway Plant, Unit 1, Seismic Probabilistic Risk Assessment (SPRA) Submittal in Response to the March 12, 2012 50.54(f) Letter (NTTF Recommendation 2.1: Seismic)			
<b>Job Code Number</b>  Cost Center 1062	<b>B&amp;R Number</b>  11-4-212		<b>DOE Laboratory</b>  Pacific Northwest National Laboratory
<b>NRC Requisitioning Office</b>  Nuclear Reactor Regulation (NRR), Division of Risk Assessment (DRA)			
<b>NRC Form 187, Contract Security and Classification Requirements</b>  <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> Not Applicable		<input checked="" type="checkbox"/> Involves Proprietary Information <input type="checkbox"/> Involves Sensitive Unclassified	
<input type="checkbox"/> Non-Fee Recoverable		<input checked="" type="checkbox"/> Fee-Recoverable (If checked, complete all applicable sections below)	
<b>Docket Number (If Fee-Recoverable/Applicable)</b>  Unit 1 = 05000483		<b>Inspection Report Number (If Fee Recoverable/Applicable)</b>  N/A	
<b>Technical Assignment Control Number (If Fee-Recoverable/Applicable)</b>  EPID: L-2019-JLD-0006 CAC: 000495		<b>Technical Assignment Control Number Description (If Fee-Recoverable/Applicable)</b>  Callaway Plant, Unit 1	

### 1.0 BACKGROUND

On March 11, 2011, a 9.0-magnitude earthquake struck Japan and was followed by a 45-foot tsunami, resulting in extensive damage to the nuclear power reactors at the Fukushima Daiichi facility. The NRC has taken significant action to enhance the safety of reactors in the United States based on the lessons learned from this accident.

Operating reactor sites are using present-day information to reevaluate the earthquake effects—or hazards—that could impact their site. These newly reevaluated hazards, if worse than what the plant had originally calculated, will be analyzed to determine if plant structures, systems, and/or components need to be updated to protect against the new hazard. The NRC will review each step in the analysis process and take further regulatory action if necessary. Depending on the comparison between the re-evaluated seismic hazard and the current design basis, the result is either no further risk evaluation or the performance of a seismic risk assessment. Risk assessment approaches acceptable to the staff include a seismic probabilistic risk assessment (SPRA), or a seismic margin assessment (SMA).

One acceptable approach for determining the technical adequacy of the SPRA is described in RG 1.200, Revision 2, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities," Agencywide Document Access and Management System (ADAMS) Accession No. ML090410014, ASME/ANS RA-SA-2008 (Reference 1) and ASME/ANS RA-SA-2009 (Reference 2). Consistent with the NRC's probabilistic risk assessment (PRA) policy statement, the technical adequacy of the methods used to develop the requested information must be sufficient to provide confidence in the results, such that the seismic risk information can be used in regulatory decision-making.

About 18 nuclear power plant sites are scheduled to submit a SPRA responses to the 50.54(f) letter (seismic) (ADAMS Accession No. ML12053A340). The Callaway Plant, Unit 1, owned by Ameren Missouri, is one of the nuclear power plants that has submitted a response to the 50.54(f) letter (ADAMS Accession No. ML19225D322). These responses will be reviewed according to the guidance in the EPRI-NEI SPID<sup>1</sup> document (Reference 3) which was endorsed by the staff for this purpose. Peer reviews are to follow the guidance in NEI 12-13 (Reference 4) which was endorsed by the staff's review of NEI 12-13, "External Hazards PRA Peer Review Process Guidance," dated August 2012 (Reference 5). The SPRA responses will be reviewed against specific Review Guidance and a process which has been developed to define the appropriate scope, and allow for more uniform reviews which focus on the most important technical topics. The Review Guidance uses a check-list type of format. This review guidance will be provided by the NRC staff.

The results of this evaluation will enable the NRC staff to determine whether any regulatory action is needed by examining not only the important accident sequences but also assessing the seismic risk for the basic events representing systems, structures and components (SSCs) resulting in the Seismic PRA (SPRA) model.

## **2.0 OBJECTIVE**

The objective of this task order is to obtain technical expertise from Pacific Northwest National Laboratory (PNNL) to assist the NRC staff in determining the technical adequacy of the SPRA submittal such that NRC can have confidence in the results and use of them in regulatory decision making.

## **3.0 SCOPE OF WORK**

PNNL must provide all resources necessary to accomplish the tasks and deliverables described in this statement of work (SOW).

Using the guidance contained in EPRI-SPID, 2012 and review guidance by the NRC staff, PNNL is to review and evaluate the technical adequacy of the response to the 50.54(f) letter, identify and develop, if necessary, a summary of information deficiencies, draft clarification questions and additional information requests and prepare a technical letter report (TLR) of the results of the review and evaluation; and, as part of the TLR, recommend whether any and what type of regulatory action may be needed.

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<sup>1</sup> Screening, Prioritization and Implementation Details (SPID) for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic

The parts of the SPRA submittal to be reviewed by PNNL are limited to the following: 1) plant response associated with the plant seismic accident sequence model and the quantification of results; 2) plant seismic logic model and fragility determination; 3) Submittal appendix A – Seismic PRA Technical Adequacy and Peer Review.

#### 4.0 SPECIFIC TASKS

PNNL must perform the following tasks:

##### Tasks

##### Completion Schedule

1. Based on the staff review guidance checklist found at Attachment 1, review and evaluate the Callaway, Unit 1 Submittal in response to the 50.54(f) letter in the areas of fragilities and system plant response (SPR) and determine if the response is suitable for decision-making.

With respect to the review guidance checklist (Reference 6), the information should be provided based on the following areas:

Fragilities – Topical Sections 4, 5, 6, 8, 9, 10, 12, appropriate parts of 7, 11, 14, 15, 16

Plant Logic Model – Topical Sections 12 and 13 and appropriate parts of 14, 15 and 16.

Identify areas where any clarification and/or any additional information is needed. Prepare a TLR using the checklist as guidance for writing the report.

- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>a. Draft</li> </ol>  | <p>Eight weeks from work authorization.</p>     |
| <ol style="list-style-type: none"> <li>b. Incorporate NRC comments and prepare the final TLR.</li> </ol>  | <p>Two weeks after receipt of NRC comments.</p> |
| <ol style="list-style-type: none"> <li>2. Review and assess any potential substantial safety improvements as may be directed by the staff.</li> </ol>   |   |
| <ol style="list-style-type: none"> <li>a) Based on guidance contained in the document to identify potential substantial safety improvements or the recommendation for no further action (ADAMS Accession No. ML17146A200).</li> </ol>   |   |
| <ol style="list-style-type: none"> <li>b) Review licensee-provided list of safety improvements (if any) to inform plant group recommendation.</li> </ol>  |   |
| <ol style="list-style-type: none"> <li>c) Based on the guidance document, insights from previous reviews, and licensee-identified/ planned modifications, review and assess any potential substantial safety improvements to the extent necessary to support a draft</li> </ol> |   |

recommendation for the TRB that the plant be moved forward as a Group 1, 2, or 3 plant. Identify areas where any clarification and/or any additional information is needed. Prepare a technical letter report.

- |   |   |
|---|---|
| (1) Draft   | Two weeks after completion of Task 1.   |
| (2) Incorporate NRC comments and prepare the final TLR.   | Two weeks after receipt of NRC comments.  |
| 3. Review and evaluate licensee responses and determine if the response(s) adequately address the open issues. If the response(s) is not acceptable, discuss the response(s) with the NRC staff who may determine that a conference call is needed to discuss the response(s) with the licensee in which case the Principal Investigator (PI) will be notified and a mutually acceptable date to participate in the conference call will be set. If the response is deemed inadequate, prepare proposed follow-up requests along with the bases. Incorporate the results in the TLR prepared under Task 1 and submit the updated TLR. | Two weeks after receipt of the response(s).                                       |
| 4. Upon notification by the Contracting Officer Representative (COR) and/or receipt of final comments from the COR, update the TLR.   |   |
| a. Draft.   | Two weeks after notification by the COR.  |
| b. Incorporate NRC comments and prepare the final report.   | Two weeks after receipt of NRC comments.  |
| 5. Assist the staff in resolving comments received from NRC Management and/or the Office of the General Counsel. Prepare a technical letter report or provide a brief summary of the request of the results attained and date in the "Work Performed During the Period" section of the Monthly Letter Status Report.  | As mutually agreed upon; each request will be documented in an E-mail by the COR. |

## **5.0 DELIVERABLES AND/OR MILESTONES SCHEDULE**

See Section 4.0

## **6.0 TECHNICAL AND OTHER SPECIAL QUALIFICATIONS REQUIRED**

One Principal Investigator (PI)/ Senior Risk Analyst who possesses knowledge and experience in the disciplines and technical area related to the design, construction, operation, maintenance and inspection of nuclear power plants. The knowledge and experience are usually gained by working in a technical systems, design or operations position at a nuclear utility licensee, vendor or architectural/engineering firm, or the equivalent.

The Reliability and Risk Analysts must have a fundamental understanding of risk-informed activities which can be used to achieve NRC's regulatory objectives and overall responsibilities by:

1. Understanding and having experience with general PRA methods and techniques including system and function modelling using fault and event trees, use of NRC SAPHIRE software or industry equivalent software, common cause failures, human failure probabilities and the relative importance of the different inputs on PRA results.
2. Having a thorough understanding of risk and nuclear power plant technology.
3. Understanding and experience in one or more specialized PRA techniques such as success criteria development, containment failure analysis, and/or location dependent hazards analyses (e.g., flooding and fire).
4. Having a working knowledge of the structure, content, and use of the ASME/ANS consensus standard and the associated peer review process.
5. Being familiar with current and pending risk-informed license applications and the role of PRA in adequacy/activities as well as fundamental reactor insights from IPE, IPEEE, NFPA-805, etc.
6. Understanding the risk-informed decision making process and risk-informed performance based regulation and their requirements for implementation.
7. The Reliability and Risk Analysts must have a fundamental knowledge of and demonstrated experience in using or otherwise applying the guidance contained in the following references:
  - Regulatory Guide (RG) 1.174 "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions of Plant-Specific Changes to the Licensing Basis"
  - RG 1.175 "An Approach for Plant-Specific, Risk-Informed Decision making: Inservice Testing"
  - RG 1.177 "An Approach for Plant-Specific, Risk-Informed Decision making: Technical Specifications"
  - RG 1.178 "An Approach for Plant-Specific, Risk-Informed Decision making: Inservice Inspection"
  - Federal Register, 8/21/86, "Safety Goals for the Operations of Nuclear Power Plants: Policy Statement" 51 FR 30028
  - Federal Register, 8/8/85, "Policy Statement on Severe Reactor Accidents regarding Future Designs and Existing Plants" 51 FR 32138
  - Federal Register, 8/16/95 "Use of Probabilistic Risk Assessment Methods in Nuclear Regulatory Activities: Final Policy Statement" 60 FR 42622

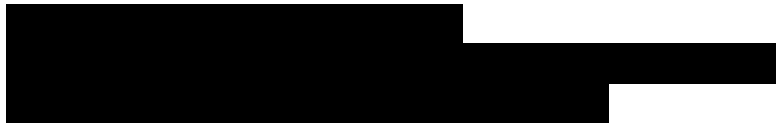


One Structural Engineer on a part-time, intermittent basis who have fundamental understanding and proven experience in structural mechanics as applicable to assessment of nuclear power plant structures and components.

Note: more than one PRA specialist and one structural engineer may be assigned but within the same level of effort.

## 7.0 KEY PERSONNEL

PNNL has assigned the following key personnel to this task order:



## 8.0 MEETINGS AND TRAVEL

None.

## 9.0 REPORTING REQUIREMENTS

PNNL is responsible for structuring the deliverable to follow agency standards. The current agency standard is Microsoft Office Suite 2013. The current agency Portable Document Format (PDF) standard is Adobe Acrobat XI Professional. Deliverables must be submitted free of spelling and grammatical errors and conform to requirements stated in this section.

### Monthly Letter Status Report (MLSR)

PNNL must provide a Monthly Letter Status Report which consists of a technical progress report and financial status report. This report will be used by the sponsoring agency to assess the adequacy of the resources utilized by the servicing agency to accomplish the work contained in this SOW and to provide status of the servicing agency 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 must be sent to the COR and AMD at [ContractsPOT.Resource@nrc.gov](mailto:ContractsPOT.Resource@nrc.gov).

### Technical Reporting Requirements

1. At the completion of Task 1, submit a TLR that consists of the completed review guidance checklist along with a determination of technical adequacy of SPRA submittal and suitability for regulatory decision-making. Include a list of technical deficiencies along with their bases.
2. At the completion of Task 2, submit a TLR that contains the recommendation on whether any potential backfit may be warranted along with the bases for such a proposal.
3. At the completion of review of each request to evaluate the responses under Task 3, submit the updated TLR along with any outstanding/new requests which clearly articulates the bases for the need for further information or discussion.

4. At the completion of Task 4, submit the final TLR, draft and final as appropriate, that contains the completed review guidance checklist along with a summary of the results of the evaluation findings.
5. At the completion of Task 5, submit a technical letter report that contains the results of the evaluation of the NRC management and/or OGC comments needed to be addressed.

## **10.0 PERIOD OF PERFORMANCE**

The period of performance is September 3, 2019 – June 30, 2020.

## **11.0 CONTRACTING OFFICER'S REPRESENTATIVE**

The COR monitors all technical aspects of the agreement/task order and assists in its administration. The COR is authorized to perform the following functions: assure that the PNNL performs the technical requirements of the agreement/task order; perform inspections necessary in connection with agreement/task order performance; maintain written and oral communications with PNNL concerning technical aspects of the agreement/task order; issue written interpretations of technical requirements, including Government drawings, designs, specifications; monitor PNNL's performance and notify PNNL of any deficiencies; coordinate availability of NRC-furnished material and provide site entry of PNNL personnel.

COR: Bernard L. Grenier, [Bernard.Grenier@nrc.gov](mailto:Bernard.Grenier@nrc.gov), 301-415-2726

Alternate COR: [Jay.Robinson@nrc.gov](mailto:Jay.Robinson@nrc.gov) , 301-415-2878

Technical Reviewers: [Keith.Tetter@nrc.gov](mailto:Keith.Tetter@nrc.gov) and [Shilp.Vasavada@nrc.gov](mailto:Shilp.Vasavada@nrc.gov)  
 Project Manager: [TBD@nrc.gov](mailto:TBD@nrc.gov)

## **12.0 MATERIALS REQUIRED**

N/A

## **13.0 NRC-FURNISHED PROPERTY/MATERIALS**

A copy of the Review Project Plan, to include the Review Guidance Checklist which define the scope of the review was provided to the PI under separate cover.

The ADAMS Accession No. for the Callaway SPRA Submittal is ML19225D321.

NOTE: Some of these documents contain proprietary information and must be safeguarded against unauthorized disclosure. After completion of work, the documents should either be destroyed or returned to NRC. If they are destroyed, please confirm this in an E-mail to the COR and include the date and manner in which the documents were destroyed.

PNNL shall identify any additional NRC documentation that is needed and the COR will determine whether these will be provided by the NRC or obtained directly by PNNL from ADAMS, NRC public document room or the NRC website at [www.nrc.gov](http://www.nrc.gov).

## 14.0 RESEARCH QUALITY

N/A

## 15.0 STANDARDS FOR CONTRACTORS WHO PREPARE NUREG-SERIES MANUSCRIPTS

N/A

## 16.0 OTHER CONSIDERATIONS

### Assumptions and Understandings

It is understood that the preferable approach to conducting the review is to begin with Review Guidance Checklist Item number 14.

It is understood that Task 3 can be initiated in parallel to Tasks 1 and 2.

It is understood that the level of effort for each Task includes sufficient effort to participate in telephone conference calls with the NRC staff for the purpose of addressing comments by the staff and responses from the licensee.

It is understood that Tasks 1 and 3 contain sufficient effort to actively participate in a remote audit conducted during the performance of Tasks 1 and 3 via electronic reading room set up by the licensee.

### References

1. ASME/ANS RA-S-2008, "Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications", American Society of Mechanical Engineers and American Nuclear Society, 2008
2. ASME/ANS 2009: "Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications", American Society of Mechanical Engineers and American Nuclear Society, 2009
3. EPRI-SPID, 2012: "Screening, Prioritization and Implementation Details (SPID) for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic", Electric Power Research Institute, EPRI report 1025287, November 2012
4. NEI, 2012: NEI 12-13 "External Hazards PRA Peer Review Process Guidelines" Nuclear Energy Institute, August 2012
5. NRC, 2012: "U.S. Nuclear Regulatory Commission Comments on NEI 12-13, 'External Hazards PRA Peer Review Process Guidelines' Dated August 2012", NRC letter to Nuclear Energy Institute, November 16, 2012

NRC Staff Review Guidance for Seismic PRA Submittals and Technical Review Checklist, Bob Budnitz, revised version, dated 3 August, 2016