

INTERAGENCY AGREEMENT		1. IAA NO. NRC-HQ-20-15-T-0016		PAGE 1 OF 12		
2. ORDER NO.		3. REQUISITION NO. NRR-15-0111		4. SOLICITATION NO.		
5. EFFECTIVE DATE 05/13/2015		6. AWARD DATE 05/13/2015		7. PERIOD OF PERFORMANCE 05/26/2015 TO 05/25/2017		
8. SERVICING AGENCY PACIFIC NORTHWEST NAT LAB ALC: DUNS: +4: US DEPARTMENT OF ENERGY PACIFIC NORTHWEST SITE OFFICE PO BOX 350 MS K9-42 RICHLAND WA 99352 POC April Augustine TELEPHONE NO. 509-372-4010			9. DELIVER TO MATTHEW PANICKER 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 Jerry Purcell Jr. TELEPHONE NO. 301-415-7142			11. INVOICE OFFICE US NUCLEAR REGULATORY COMMISSION ONE WHITE FLINT NORTH 11555 ROCKVILLE PIKE MAILSTOP O3-E17A NRCPAYMENTSNRCGOV ROCKVILLE MD 20852-2738			
12. ISSUING OFFICE US NRC - HQ ACQUISITION MANAGEMENT DIVISION MAIL STOP TWEN-5E03 WASHINGTON DC 20555-0001			13. LEGISLATIVE AUTHORITY Energy Reorganization Act of 1974			
			14. PROJECT ID			
			15. PROJECT TITLE REVIEW OF WCAP-17769-P			
16. ACCOUNTING DATA 2015-X0200-FEEBASED-20-20D008-11-4-151-1065-251D						
17. ITEM NO.	18. SUPPLIES/SERVICES		19. QUANTITY	20. UNIT	21. UNIT PRICE	22. AMOUNT
	TASK ORDERING AGREEMENT: NRC-HQ-25-14-D-0001 TASK ORDER NUMBER: NRC-HQ-20-15-T-0016 The NRC and the DOE Lab (PNNL) hereby enter into this Agreement/Task Order, NRCHQ2514D0001 - NRCHQ2015T0016, for the project entitled, Review of WCAP-17769-P Reference Fuel Design SVEA-96 Optima3. The performance period for this agreement shall commence on May 26, 2015 and will expire on May 25, 2017. Continued ...					
23. PAYMENT PROVISIONS			24. TOTAL AMOUNT \$100,000.00			
25a. SIGNATURE OF GOVERNMENT REPRESENTATIVE (SERVICING)			25b. SIGNATURE OF GOVERNMENT REPRESENTATIVE (REQUESTING)			
25b. NAME AND TITLE		25c. DATE	25b. CONTRACTING OFFICER JEFFREY R. MITCHELL		25c. DATE 5/13/2015	

TEMPLATE - ADM001

SUNSI REVIEW COMPLETE

JUN - 9 2015 ADM002

IAA NO		ORDER NO		PAGE	OF
NRC-HQ-20-15-T-0016				2	12
	<p>Consideration and Obligations:</p> <p>(a) Authorized Cost Ceiling \$192,824.00.</p> <p>(b) The amount presently obligated with respect to this DOE Agreement is \$100,000.00. 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 part of this Agreement:</p> <p>Attachment No. 1: Statement of Work</p> <p>NRC CONTRACTING OFFICERS REPRESENTATIVE (COR): Mathew Panicker and Evan Davidson</p> <p>PNNL PROJECT MANAGER: Walter Lusher and Kenneth Geelhood</p> <p>TAS:31X0200.320 BPN:040535809 Master IAA: NRCHQ2514D0001</p>				
00001	<p>Authorized Cost Ceiling</p> <p>Line Item Ceiling\$192,824.00</p> <p>Incrementally Funded Amount: \$100,000.00</p> <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 TAC CODE: M3367</p> <p>[] Non-fee Recoverable Work</p> <p>Continued ...</p>				192,824.00

Notwithstanding the agreement effective dates and period of performance start dates stated elsewhere in the agreement, the effective date of the agreement and start date of the period of performance are the last date of signature by the parties.

The total amount of award: \$192,824.00. The obligation for this award is shown in box 24.

STATEMENT OF WORK

NRC Agreement Number NRC-HQ-25-14-D-0001	NRC Agreement Modification Number 	NRC Task Order Number NRC-HQ-20-15-T-0016	NRC Task Order Modification Number (If Applicable)
Project Title: Review of WCAP-17769-P "Reference Fuel Design SVEA-96 Optima3"			
Job Code Number NA	B&R Number 11-4-151	DOE Laboratory Pacific Northwest National Laboratory (PNNL)	
NRC Requisitioning Office NRR			
NRC Form 187, Contract Security and Classification Requirements <input type="checkbox"/> Applicable <input type="checkbox"/> Not Applicable <input type="checkbox"/> Non Fee-Recoverable		<input checked="" type="checkbox"/> Involves Proprietary Information <input type="checkbox"/> Involves Sensitive Unclassified <input checked="" type="checkbox"/> Fee-Recoverable (If checked, complete all applicable sections below)	
Docket Number (If Fee-Recoverable/Applicable) 00000700		Inspection Report Number (If Fee Recoverable/Applicable) NA	
Technical Assignment Control Number (If Fee-Recoverable/Applicable) MF3367		Technical Assignment Control Number Description (If Fee-Recoverable/Applicable) Submittal of WCAP-17769-P Rev 0, Reference Fuel Design SVEA-96 Optima3	

1.0 BACKGROUND

The Topical Report (TR), WCAP-17769-P describes application of previously approved Westinghouse Electric Company methodology and models to the Westinghouse SVEA-96 Optima3 fuel assembly and it also includes some minor improvements to the previously approved methodology. The previously approved methodologies are (1) WCAP-15942-P-A, "Fuel Assembly Mechanical Design Methodology for Boiling Water Reactors Supplement I to

CENP-287" and WCAP-15942-P Supplement 1, "Material Changes for SVEA-96 Optima2 Fuel Assemblies" that describe the Westinghouse methodology for conducting fuel assembly and fuel rod mechanical evaluations that are identified in Section 4.2 of the Standard Review Plan (SRP), NUREG-0800 and WCAP-15836-P-A, "Fuel Rod Design Methods for Boiling Water Reactors - Supplement 1" that describes the fuel rod design methods. This TR demonstrates that the SVEA-96 Optima3 assembly satisfies the Westinghouse design criteria which assures compliance with Section 4.2 of the Standard Review Plan and, therefore, assures compliance with General Design Criteria 10, 27, and 35 of 10 CFR 50

Scope and contents of the TR are summarized below:

- A description of the Westinghouse SVEA-96 Optima3 boiling water reactor (BWR) fuel assembly design,
- A modified stress analysis using the ANSYS code,
- The sample application of the Westinghouse design evaluation methodology demonstrating compliance of the SVEA-96 Optima3 assembly with the design criteria for normal operations and anticipated operational occurrences (AOOs) to the maximum fuel rod burnup,
- The applicability demonstration of the Westinghouse LOCA methodology for SVEA-96 Optima3,
- The summary of the computer codes used in the Westinghouse methodology described in WCAP-15942-P-A, Revision 0 Supplement to CENP-287 and CENPD-300-P-A,
- The description of the manufacturing inspection measures which assure that the assembly is constructed as required by the design specifications described in WCAP-15942-P-A, Revision 0 Supplement to CENP-287 and CENPD-300-P-A,
- A summary of the operating experience with the SVEA-96 Optima3 design and similar Westinghouse designs,
- A summary of the ex-core prototype test programs relative to the methodology described in WCAP-15942-P-A, Revision 0 Supplement to CENP-287 and CENPD-300-P-A, and
- An updated summary discussion of ongoing testing, inspection, and surveillance plans relative to the methodology described in References 1.0 and 1.1.

The SVEA-96 Optima3 fuel with its 4x(5x5-l) lattice with three part-length rods in each subbundle is an evolution of the SVEA-96 Optima2 fuel and a new generation of Westinghouse 10x10 fuel.

Westinghouse states that the SVEA-96 Optima3 fuel has the following features, compared to SVEA-96 Optima2:

- Simplified mechanical design
- Increased fuel rod plenum volume

- Reduced pressure drop
- Reduced parasitic neutron absorption
- Improved fuel reliability

SVEA-96 Optima3 has the following improvements:

- The subbundle top tie plate is replaced with a top spacer and the bottom tie plate is simplified.
- The modified design in the subbundle ends allows shorter end plugs and correspondingly longer cladding tube, where the starting point of the pellet stack is lowered by several millimeters.
- The new spacer design leads to a reduced amount of parasitic neutron absorption material in the active fuel region,
- The spacer is designed to minimize the risk of debris getting caught in the spacer and thus reduces the risk of debris fretting damage to the fuel, and
- A newly designed debris filter improves debris catching efficiency.

2.0 OBJECTIVE

The objective of this task order is to obtain expertise from PNNL to assist the NRC staff in determining the technical and regulatory compliance and adequacy for the fuel assembly and fuel rod mechanical-thermal design methodology as applied to Boiling Water Reactors (BWRs) fuel design, SVEA-96 Optima3 fuel during normal operation and Anticipated Operational Occurrences (AOOs).

3.0 SCOPE OF WORK

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

The scope of the work involves review of the technical and regulatory basis for the SVEA-96 Optima3 fuel design code and application methodology. Review of the TR must include compliance with general design criteria, design criteria for fuel assembly components, design methodology for SVEA-96 Optima3 evaluation, steady-state initialization of transients and accidents, operating experience, testing, inspection and surveillance plans.

The goal of the NRC Safety Evaluation is to provide the technical, safety, and legal basis for the NRC's decision regarding a TR. In support of this goal, the Contractor will review the methodology and results described in the TR for technical adequacy and agreement with applicable NRC guidance. The Contractor will draft a Technical Evaluation Report (TER) describing their review and conclusions on the technical and regulatory adequacy of TR. If portions of the methodology are not shown to be technically adequate to support the

conclusions expressed in the TR, or if portions of the methodology do not agree with NRC guidance, then the Contractor will identify these "gaps" in writing as a request for additional information (RAI) and provide them to the NRC Contracting Officer Representative (COR) and NRC alternate Contracting Officer. The NRC technical point of contact and COR will coordinate issuing the RAI to the WEC to address the gaps and obtain responses. The Contractor will review responses to the RAI and use those responses to finalize the TER.

The final TER must contain reasoning as determined through the Contractor review to support or refute the following conclusions from the TR:

1. The design bases identified in Reference 1.0 are sufficient to assure that the requirements and guidelines identified in Section 4.2 of NUREG-0800, 10 CFR 50, Appendix A, and Section III of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, "Rules for Construction of Nuclear Facility Components" will be satisfied.
2. The methodology for evaluating fuel assembly and fuel rod mechanical behavior relative to the design basis remains acceptable for design and licensing applications to the maximum rod-average burnup.
3. The evaluation of the SVEA-96 Optima3 fuel assembly applying Westinghouse methodology demonstrates the capability of this fuel assembly to satisfy the fuel performance, mechanical, thermal, and materials design bases under normal operation and AOOs to the maximum peak rod-average burnup.
4. Westinghouse LOCA methodology is applicable for the SVEA-96 Optima3 fuel design.

4.0 APPLICABLE DOCUMENTS AND STANDARDS

1. 10 CFR 50 Appendix A General Design Criteria 10, 27, and 35
2. SRP 4.2, "Fuel System Design"
3. Westinghouse Report WCAP-15942-P-A, Rev. 0, "Fuel Assembly Mechanical Design Methodology for Boiling Water Reactors Supplement 1 to CENP-287," March 2006.
4. Westinghouse Report CENPD-300-P-A, Rev. 0, "Reference Safety Report for Boiling Water Reactor Reload Fuel," July 1996.
5. Westinghouse Report WCAP-15836-P-A, Rev. 0, "Fuel Rod Design Methods for Boiling Water Reactors - Supplement 1," April 2006.
6. Westinghouse Report WCAP-15942-P-A Supplement 1, Rev. 1, "Material Changes for SVEA-96 Optima2 Fuel Assemblies," August 2012.
7. ASME Boiler and Pressure Vessel Code, Section III, "Rules for Construction of Nuclear Facility Components," American Society of Mechanical Engineers.

5.0 SPECIFIC TASKS

PNNL must perform the following tasks:

1. Attend a one-time kick-off meeting (via conference call) to discuss the scope of work, expectations, task order management, and performance requirements of the task order. The kick-off meeting shall be held within 4 weeks after the Contractor receives the TR materials.
2. Using the criteria and guidelines found in Standard Review Plan (SRP) Chapter 4 and Chapter 15; review the TR. Prepare a draft TER documenting the work performed and the Contractor's conclusions on the technical and regulatory adequacy of the TR, with gaps identified.
3. Prepare a draft RAI with questions that will address the gaps identified in the draft TER. Questions included in the RAI must have a clear and concise regulatory basis, describing why additional information is required to come to a conclusion on the adequacy of the TR. The RAI will be written in a format provided by the NRC technical point of contact or COR. Participation in conference calls with the NRC staff and WEC as necessary to discuss the intent and need for specific questions is included in this task. The final result of this task will be an RAI that incorporates comments from the NRC technical point of contact.
4. Review WEC's response to the RAI and determine whether it adequately resolves the identified gaps. Participate in conference calls with the NRC staff and WEC staff, as necessary, to clarify information provided in the response to the RAI. The COR should be informed promptly if the response to a question does not adequately address the identified gap in the draft TER. Once the RAI response has been reviewed a summary of any responses that do not adequately address gaps in the draft TER will be provided to the COR
5. (OPTIONAL) Perform an audit along with NRC staff to resolve any open items remaining in the review. Contractor staff will support an audit up to five days at NRC Headquarters or vendor facility. The level of effort estimate for the trip is based on a two person five day trip. This task is optional at the direction of the COR. Prior to any trip taken, the contractor will obtain written approval from the COR or CO.
6. Prepare a final TER incorporating the RAI response and filling any gaps identified in the draft TER. Submit the final TER to the COR. Incorporate any comments from the COR and submit a revised final TER.

6.0 DELIVERABLES AND/OR MILESTONES SCHEDULE

TASK	DELIVERABLE	SCHEDULE (business days)
2	Provide draft TER with gaps identified.	No later than 11/26/2015.
2	Provide summary of all gaps identified to date and questions written to address those gaps.	No later than the 20 th day of each month.

3	Provide final list of all questions to be included in the RAI	No later than four weeks after the completion of Task 2.
4	Provide summary report identifying any responses that do not adequately address identified gaps in the draft TER.	No later than four weeks after the receipt of the RAI response.
5	Provide audit trip report that contains a summary of the significant highlights of the audit. The trip report should note the disposition of items reviewed during the audit. In addition, the trip report should provide insights for the possible resolution of any remaining open items.	No later than four weeks after the trip.
6	Provide a preliminary TER that contains a summary of the work performed, the results attained, and conclusions of the evaluation. List any open or unresolved items.	No later than four weeks after the completion of Task 4.
6	Provide a final TER incorporating NRC comments.	No later than two weeks after receipt of NRC comments on draft TER.

For all deliverables, including the monthly letter status report, please include the following on distribution:

Jeremy.Dean@nrc.gov
Mathew.Panicker@nrc.gov
RidsNrrDss.Resource@nrc.gov
Evan.Davidson@nrc.gov

7.0 NRCAR 2052.215-70 KEY PERSONNEL

The following personnel are considered key personnel by the Government:

7.1 Walter Lusher, PhD
Expert Engineer/BWR

7.2 Kenneth Geelhood
Systems/AOOs/ATWs

8.0 MEETINGS AND TRAVEL

Travel for two persons, five-day audit to NRC Headquarters or vendor facility is optional.

It is understood that the Audit is contingent. If it is required, it will be confirmed in writing by the NRC. The level of effort for the trip, 40 hours per person, is based on eight hours for preparation and travel to the meeting, 24 hours for the meeting and eight hours for return travel and report writing.

9.0 REPORTING REQUIREMENTS

9.1 Technical Reporting Requirements

PNNL is responsible for structuring the deliverable to follow agency standards. The current agency standard is Microsoft Office Suite 2010. The current agency Portable Document Format (PDF) standard is Adobe Acrobat 9 Professional. Deliverables must be submitted free of spelling and grammatical errors and conform to requirements stated in this section.

9.2 Monthly Letter Status Report

Include the following on distribution:

Jeremy.Dean@nrc.gov
Mathew.Panicker@nrc.gov
RidsNrrDss.Resource@nrc.gov
Evan.Davidson@nrc.gov

In accordance with Management Directive 11.7, NRC Procedures for Placement and Monitoring of Work with the U.S. Department of Energy, the DOE Laboratory must electronically submit a Monthly Letter Status Report (MLSR) by the 20th day of each month to the Contracting Officer Representative (COR) with copies to the Contracting Officer (CO) and the Office Administration/Division of Contracts to ContractsPOT.Resource@nrc.gov. If a project is a task ordering agreement, a separate MLSR must be submitted for each task order with a summary project MLSR, even if no work has been performed during a reporting period. Once NRC has determined that all work on a task order is completed and that final costs are acceptable, a task order may be omitted from the MLSR.

The MLSR must include the following: agreement number; task order number, if applicable; job code number; title of the project; project period of performance; task order period of performance, if applicable; COR's name, telephone number, and e-mail address; full name and address of the performing organization; principal investigator's name, telephone number, and e-mail address; and reporting period. At a minimum, the MLSR must include the information discussed in Attachment 1. The preferred format for a MLSR can also be found in Attachment 1.

10.0 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

contractor (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 the contractor concerning technical aspects of the agreement/task order; issue written interpretations of technical requirements, including technical drawings, designs, specifications; monitor the contractor's performance and notify the contractor of any deficiencies; coordinate availability of NRC-furnished material and/or GFP; and provide site entry for contractor personnel.

10.1 Contracting Officer's Representative

Name: Mathew M. Panicker
Agency: U.S. Nuclear Regulatory Commission
Office: Nuclear Reactor Regulation
Mail Stop: O10A1
Washington, DC 20555-0001
E-Mail: mathew.panicker@nrc.gov
Phone: (301) 415-2987

10.2 Alternate Contracting Officer's Representative

Name: Evan Davidson
Agency: U.S. Nuclear Regulatory Commission
Office: NRR/DSS/SBPB
Mail Stop: O10F4
Washington, DC 20555-0001
E-Mail: Evan.davidson@nrc.gov
Phone: (301) 415-1342

11.0 MATERIALS REQUIRED

N/A

12.0 NRC-FURNISHED PROPERTY/MATERIALS

1. WCAP-17769-P, Revision 0, "Reference Fuel Design SVEA-96 Optima3," Westinghouse Proprietary, November 2013.

13.0 RESEARCH QUALITY

N/A

14.0 STANDARDS FOR CONTRACTORS WHO PREPARE NUREG-SERIES MANUSCRIPTS

N/A

15.0 OTHER CONSIDERATIONS

Assumptions and Understandings

The level of effort hours listed are based primarily upon prior experience. At this rate, also based on staff experience, given the large scope of the review, it is anticipated that it will take approximately 12 months to complete the work. The three major components of the work (tasks 1-3) comprise evaluating the material, reviewing the benchmarking, and reviewing the database and generating RAIs. Again, based on prior experience, these areas comprise ~40%, 20%, and 15% of the work, respectively, with the remainder attributed to polishing the final revision of the TER and the set of RAIs. When examining the Topical Report, the NRC also recognized that the material is almost solely based on Optima3 fuel design that is a result of minor modification from Optima2. Based on where most of the Topical Report's information was focused and on an understanding of the degree to which the component calculational devices described in the Topical were modified, the NRC assessed that all of the hours should be allotted to review of WCAP-17769-P.

As for the level of effort assumption for Task 2, it is understood that the vendor should be providing sufficient information and data to justify their results and conclusion; otherwise, an RAI should be generated; no other empirical data should be considered other than what is provided by the vendor.

It is understood that the trip to NRC Headquarters is contingent. If it is required, it will be confirmed in writing by the NRC. The level of effort for the trip, 24 hours, is based on 16 hours for preparation and travel to the meeting, eight hours for the meeting and eight hours for return travel and report writing.