

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

BPA NO.

1. CONTRACT ID CODE

PAGE

OF PAGE

1

6

2. AMENDMENT/MODIFICATION NO.
M002

3. EFFECTIVE DATE
See 16c

4. REQUISITION/PURCHASE REQ. NO.
04-07-107M002

5. PROJECT NO. (If applicable)

6. ISSUED BY
CODE 3100
U.S. Nuclear Regulatory Commission
Div. of Contracts
Attn: Danielle M Emche
Mail Stop TWB-01-B10M
Washington, DC 20555

7. ADMINISTERED BY (If other than Item 6)
CODE 3100
U.S. Nuclear Regulatory Commission
Aladar Csontos
Mail Stop: T10M05
301-415-2015
Washington, DC 20555

8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code)

ENGINEERING MECHANICS CORPORATION OF COLUMBUS
EMC2

3518 RIVERSIDE DR STE 202
COLUMBUS OH 432211735

CODE 014083161

FACILITY CODE

(X)

9A. AMENDMENT OF SOLICITATION NO.

9B. DATED (SEE ITEM 11)

10A. MODIFICATION OF CONTRACT/ORDER NO.
GS10F0145T DR-04-07-107

10B. DATED (SEE ITEM 13)

X 09-14-2007

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers is extended, is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

RES-C08-402 8-60-15-111-127 N6433 252A
DUNS: 014083161 31X0200.860 Obligate: \$100,000.00

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(X) A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

X B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).

C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:

D. OTHER (Specify type of modification and authority)

E. IMPORTANT: Contractor is not, is required to sign this document and return ² copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

****DETAILS OF THIS MODIFICATION ARE STATED ON PAGE 2.****

Total Obligated Amount: \$816,000.00 (changed).
Period of Performance: 09-14-2007 to 09-15-2009 (unchanged).
Total FY08 Ceiling: \$966,397.46 (changed).

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)

CARY HATICKY
DIRECTOR OF OPERATIONS

16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)

Heriberto Colón
Contracting Officer

15B. CONTRACTOR/OFFEROR

15C. DATE SIGNED

16B. UNITED STATES OF AMERICA

16C. DATE SIGNED

(Signature of person authorized to sign)

8/15/08

BY (Signature of Contracting Officer)

8/11/08

The purpose of this modification is to decrease the total ceiling by \$2.15, in accordance with changes herein made to the cost schedule and statement of work, and provide incremental funding in the amount of \$100,000.00. Thereby, this modification revises the delivery order by:

- 1) Decreasing the total ceiling by \$2.15, from \$966,399.61 to \$966,397.46;
- 2) Revising the cost schedule;
- 3) Revising the statement of work by deleting tasks 2a, 2b, 3a, 3b, 3c, and 5, revising tasks 6a and 7 and adding new tasks 8, 9 and 10; and,
- 4) Increasing the total obligated amount by \$100,000.00, from \$716,000.00 to \$816,000.

Accordingly the following changes are made to the terms and conditions of the delivery order:

1. Section B.1 (a) of the terms and conditions is deleted in its entirety and replaced with the following:
 "The total not to exceed estimated amount of this contract is **\$966,397.46.**"
2. The cost schedule on page 3 of the delivery order shall be deleted in its entirety and replaced with the table below in order to incorporate the "Senior Research Leader" labor category and revise the hours estimated per labor category, as follows:

		Labor Category	Hours	Labor Rate	Total
Full Time	1	President			\$148,932.00
	2	Vice-President			\$118,784.50
	3	Senior Research Leader			\$50,375.00
	4	Research Leader			\$254,853.12
	5	Principal Engineer			\$0.00
	6	Research Engineer			\$155,042.16
	7	Engineer			\$84,151.04
	8	Sr. Regulatory Advisor			\$54,586.35
	9	Electronics Specialist			\$44,783.26
	10	Master Technician			\$24,755.85
Task 10e	1	President			\$3,309.60
		Total Labor			\$939,572.88
Other Direct Costs		Travel			\$51,604.00
		Incidentals			\$0.00
		Subtotal			\$991,176.88
		Discount from Original Proposal			-\$24,779.42
		Program Total			\$966,397.46

3. The statement of work is revised, and reflects the adjustments in the cost schedule distribution of labor by:
 - i) Deleting the tasks 2a, 2b, 3a, 3b, 3c, and 5 and their commensurate deliverables in their entirety;
 - ii) Revising tasks 1b by deleting its prior requirements and deliverables in their entirety replacing them with the following:

“Develop and compile the mechanical properties used in typical weld residual stress modeling and flaw evaluation procedures for Alloy 52M in the as-welded condition at room temperature, 300°F, and 600°F and solution-annealed condition at room temperature, 300°F, 600°F, 1000°F, 1400°F, and 1800°F per the ASTM E8 standard.

Deliverable Schedule task 1b): Provide a technical letter report to the NRC program manager within 20 months of project initiation.”

- iii) Revising task 6a by deleting its prior requirements and deliverables in their entirety replacing them with the following:

“The contractor shall construct a finite element model to predict the throughwall residual stress profiles of dissimilar metal butt-weld mockup(s). For this modeling effort, the NRC will provide the detailed fabrication specifications and welding parameters for each butt-weld mockup with and without weld repairs. The fabrication specifications and welding parameters for the representative butt-weld will be provided to the contractor by the NRC within **18 months** after the contract award date.

Deliverable: Provide a technical letter report detailing the finite element model results for the butt-weld mockup(s) **18 months** after contract award date.”

- iv) Revising task 7 by deleting its prior requirements and deliverables in their entirety and replacing them with the tasks 7a, 7b and 7c, as follows:

“Task 7a): Material to be tested initially shall be HDPE 4710. This task shall include designing the testing approach and performing the testing necessary to obtain pertinent and relevant SCG data including crack growth rate, time to failure initiation, and time to final failure at multiple applied stresses and temperatures. The test most likely to meet these objectives is the PENT test per ASTM F1473 modified appropriately to obtain crack growth rate. Other test methods may be proposed by the contractor and submitted for NRC approval. The data shall be analyzed with respect to the performance of the candidate HDPE material compared to other HDPE materials of similar molecular weight (i.e. ASTM D 3350 cell classification). In addition, the SCG rate data obtained from the PENT test shall be used to predict the long term service life of flawed piping using finite element (FE) modeling. The effect of the notch depth and radius shall be considered in the analysis.

Task 7b): Review and assess industry submittals and butt joint research and modify the test matrix and experimental designs to obtain additional datapoints.

Task 7c): Provide technical assistance to the NRC review of American Society of Mechanical Engineers (ASME) Code Case N-755 and licensee relief requests from Catawba and Callaway through participation in the ASME code meetings and associated technical conferences.

Deliverables: 7a) Provide a technical report that includes a description of the material(s) tested, the experimental approach, the results, the analysis of the results and the conclusions due to the NRC program manager within 18 months of the project initiation.”

- v) Adding task 8 to the statement of work, as follows:

“Update Leak-Before Break (LBB) Database: The contractor shall update the existing RES LBB database with the most recent available information. The LBB database

provides key information to many recent NRC component integrity evaluations, but, was last updated in 2005 and for only the last half of plant submittals and large diameter piping. The contractor shall update the LBB database to include:

- Small diameter pipes and ancillary lines
- Extracted data from LBB submittals and resolve conflicts in LBB submittals

Deliverables: Updated NRC LBB database to include the above information 20 months after contract award date.

vi) Adding task 9 to the statement of work, as follows:

"Inlay/Onlay Analyses: The contractor shall conduct a limited component integrity analysis involving inlays/onlays of representative dissimilar metal weld configurations to include the following:

- Weld residual stress analyses of the inlay/onlay mitigation step to the throughwall residual stress of the dissimilar metal weld
- Using the weld residual stress analyses in (a), conduct a flaw evaluation as a function of Chromium content to determine the time interval for surface breaking hot cracks to grow into the more susceptible A182 weld metal
- Support NRC review of the inlay/onlay code cases

Deliverable: Technical letter report with the residual stress and flaw growth analysis 20 months after contract award date.

vii) Adding task 10, 10a, 10b, 10c, 10d, 10e and the commensurate deliverables, to the statement of work, as follows:

"Task 10: Technical Assistance to Develop the Technical Basis Document (TBD) and NRC Regulatory Guide: The contractor shall develop a TBD and aid NRC development of a regulatory guide to demonstrate that the generic component integrity and LOCA analyses and results contained in NUREG-1829 and NUREG-1903 are applicable to individual licensees. The TBD and regulatory guide will describe an acceptable method to conduct a plant-specific seismic component integrity analyses if the generic applicability of NUREG-1903 cannot be demonstrated. It is not currently anticipated that regulatory guidance will be provided to describe an alternative process to develop plant-specific LOCA frequencies if generic applicability of NUREG-1829 cannot be demonstrated. To accomplish this task, the following subtasks need addressing:

Task 10a): Develop Requirements and Scope for TBD and Regulatory Guide: The contractor shall engage with NRC staff members to determine the scope of permissible plant changes for the proposed risk-informed revision to 10 CFR 50.46 and the associated change control process that will be used. Based on this input, the contractor shall define the scope and requirements of the licensee assessment to demonstrate plant-specific applicability of both NUREG-1829 and NUREG-1903. The scope and requirements of this assessment should be consistent with the revised rule scope, requirements, and processes.

Task 10b): Develop Technical Basis for Demonstrating Plant-Specific Applicability: Based on the Subtask 10a deliverable, develop the part of the TBD which describes the approach and requirements for licensee's to demonstrate plant-specific applicability of the NUREG-1829 and NUREG-1903 results. This will require, in part, a consideration

of the assumptions, approach, bounds, and limitations associated with the NUREG-1829 and NUREG-1903 analyses so that the appropriate parameters or plant attributes that a licensee must address to demonstrate that their plant falls within the purview of these studies.

Subtask 10c): Develop Technical Basis for Plant-Specific Seismic Assessment: If it is determined that a plant-specific assessment will be required to demonstrate acceptable seismic risk so that a licensee can utilize the risk-informed revision to 10 CFR 50.46, a technical basis will be developed to provide guidance for conducting such an assessment. The assessment may need to consider risks associated with direct failure of flawed piping systems to seismic loading and/or indirect failure of a non-piping system which, in turn, leads to a piping failure. For indirect failure, the following three potential failure modes are applicable:

- Failure of a major component support which is attached to the piping system under consideration,
- Secondary failure resulting from a component failure that impacts the piping system, and
- Failure of a piping support or multiple supports.

It is anticipated that one acceptable method for conducting a plant-specific component integrity assessment of direct failure of flawed piping systems will be according to the procedure followed in NUREG-1903. Therefore, the TBD should describe this approach including the scope, selection of analysis locations, allowable flaw size determination, seismic response analysis, seismic stress analysis, critical flaw size evaluations for higher seismic stress, and possible implementation of an ISI program or additional analysis based on these results.

Task 10d): Technical assistance for Regulatory Guide Development: NUREG-1829, NUREG-1903, and the TBD deliverable from Tasks 3b-d should form the technical basis for developing a regulatory guide which can be used by a licensee to demonstrate the plant-specific applicability of the generic component integrity evaluations described in NUREG-1829 and NUREG-1903. In this task, the contractor shall assist the NRC staff in preparing a regulatory guide based on the TBD from Tasks 3b-d. This task will include drafting the introduction, discussion, regulatory position, and implementation sections of the regulatory guide. The NRC staff will then review and modify this draft guidance prior to submitting the draft for public comment. After public comments are received, the contractor shall assist NRC staff in addressing public comments and, as required, modifying the draft regulatory guidance based on these comments.

Task 10e): Will not begin until guidance is received from the project officer to perform Additional Seismic Analyses: The analysis documented in NUREG-1903 contained only operating and earthquake stresses for plants that submitted information as part of a LBB submittal, i.e. PWR plants only. It may be desired to conduct additional analyses to evaluate operating and earthquake stresses that are representative of a BWR plant to evaluate the generic applicability of NUREG-1903 to these plants. Alternatively, it may be sufficient to utilize bounding operating and earthquake stresses for this evaluation. At the direction of the contract officer and program manager, the contractor shall obtain operating, transient, and/or seismic stresses that are representative of BWR plants (potentially from the updated LBB database from Task 1 above). The contractor shall also identify the likely range of operational and transient/seismic stresses existing at BWR plants to identify reasonably conservative estimates. The contractor shall then compare these stresses in combination with the

BWR large diameter (D > 15") primary-system piping materials to determine if the critical flow sizes in the component integrity analyses are appropriately bounded by the existing NUREG-1903 analysis. If further analyses are required, the contractor should accumulate earthquake stresses associated with large, primary-system piping components for plants west of the Rocky Mountains. If these stresses are not appropriately bounded by either of the existing PWR and/or BWR analyses, the project manager may determine that the contractor should conduct additional analysis to determine critical seismic flaw sizes for plants west of the Rocky Mountains.

Deliverables:

Task 10a): A short white paper within 18 months after contract award date describing the scope of the TBD and listing the requirements for the assessment that licensee will perform to demonstrate plant-specific applicability of both NUREG-1829 and NUREG-1903.

Task 10b): TBD which describes the approach and requirements for licensee's to demonstrate plant-specific applicability of NUREG-1829 and NUREG-1903 within 18 months after contract award date.

Task 10c): Same TBD as identified in Subtask 10b above which describes the acceptable methods for performing a plant-specific analysis of direct and indirect piping failures due to seismic loading within 18 months after contract award date.

Task 10d): Prepare portions of the draft regulatory guide which can be used by a licensee to demonstrate the plant-specific applicability of the generic component integrity results described in NUREG-1829 and NUREG-1903 and assist NRC staff in revising the regulatory guide to address public comments within 18 months after contract award date.

Task 10e): Will not begin until guidance is received from the project officer, at which time the contractor shall provide the following information in the same way as identified in Tasks 10b and 10c:

- Representative operating and earthquake stresses for large diameter (D > 15") BWR primary piping for an appropriate range of BWR plants
- Range of representative strength and toughness properties for large diameter (D > 15") BWR primary piping components
- Representative earthquake stresses for an appropriate range of plants located west of the Rocky Mountains
- Potential follow-on critical flaw component integrity calculations as per the procedure described in NUREG-1903

4. Section B.1 (b) of the terms and conditions is deleted in its entirety and replaced with the following:

"The amount presently obligated with respect to this contract is **\$816,000.00**. The contractor shall not exceed the obligated amount."

Summary of Obligations to date:

Total FY07 Obligations: \$250,000.00
Total FY08 Obligations: +\$566,000.00
Total Obligations to date: **\$816,000.00**

*****ALL OTHER TERMS AND CONDITIONS REMAIN THE SAME.*****