AMENDMENT OF SOLICITATION/MO 'CATION OF CONTRACT	BPA NO.	1. CONTRACT ID CODE	PAGE 1	OF PAGES 6

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. (If applicable)
M010	See Block 15c	RES-02-074	

6. ISSUED BY	CODE	7. ADMINISTERED BY (If other than Item 6)	CODE
U.S. Nuclear Regulatory Commission Div. of Contracts Attn: Rachel Glaros, (301) 415-0115 Mail Stop T-7-I-2 Washington, DC 20555	3100	U.S. Nuclear Regulatory Commission Div. of Contracts Mail Stop T-7-I-2 Attn: Rachel Glaros, (301) 415-0115 Washington, DC 20555	3100

8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code)	(X)	9A. AMENDMENT OF SOLICITATION NO.
BATTELLE MEMORIAL INSTITUTE 505 KING AVE COLUMBUS OH 432012693		9B. DATED (SEE ITEM 11)
		10A. MODIFICATION OF CONTRACT/ORDER NO. NRC-04-02-074
CODE / FACILITY CODE	X	10B. DATED (SEE ITEM 13) 09-09-2002

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)

N/A

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.
	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).
X	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: FAR 43.103(a)(3)
	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.)

See Attached Pages 2 through 6

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)	16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)
ULES P. JACKSON CONTRACTING OFFICER	STEPHEN M. POOL CONTRACTING OFFICER

15B. CONTRACTOR/OFFEROR	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA	16C. DATE SIGNED
(Signature of person authorized to sign)	9/26/05	BY (Signature of Contracting Officer)	9/19/05

STANDARD FORM 30 (REV. 10-83)

TEMPLATE - ADM001

SISP REVIEW COMPLETE

ADM002

The purpose of this modification is (1) to incorporate a within scope change to Section C of the contract, (2) revise deliverable due dates and formats, (3) extend the contract period of performance and (4) adjust the estimated cost and fixed fee. Accordingly, the contract is modified as follows:

A. Delete SECTION B.3 in its entirety and replace with the following:

B.3 CONSIDERATION AND OBLIGATION—COST PLUS FIXED FEE (JUN 1988) ALTERNATE I (JUN 1991)

(a) The total estimated cost to the Government for full performance of this contract is $2,678,621 of which the sum of $2,452,112 represents the estimated reimbursable costs less CAS414, of which the sum of $30,340 represents CASE 414 and of which $196,169 represents fixed fee.

(b) There shall be no adjustment in the amount of Contractor's fixed fee by reason of differences between any estimate of cost of performance of the work under this contract and the actual cost of performance of that work.

©) The amount currently obligated by the Government with respect to this contract is $2,482,254, of which the sum of $2,272,827 represents funds for the estimated reimbursable costs less CAS 414, of which the sum of $26,675 represents funds for CAS 414 and of which $182,752 represents funds for fixed fee.

(d) It is estimated that the amount currently allotted will cover performance through November 30, 2005.

B. Revise SECTION C.3, "SCOPE OF WORK" to add under TASK 4: Technical Assistance for Expert Elicitation Report,: Subtask 4d: Seismic Elicitation Support as follows:

The contractor shall perform linear and nonlinear seismic analyses of a modified version of the Beaver Valley plant containment building/reactor coolant system ANSYS model developed under the Battelle Integrity of Nuclear Piping (BINP) program. The objective is to provide seismic stress data and linear/nonlinear stress margin data for representative primary piping systems in support of the analytical seismic-induced LOCA frequency model. The original ANSYS model shall be modified as set forth below:

I Analysis of Beaver Valley PWR Primary Coolant Loop Piping (Linear Elastic)

Linear elastic seismic analyses shall be performed using the Beaver Valley plant containment building/reactor coolant system ANSYS model and the results shall be used to validate the elastic stress results using the scaling approach provided by another NRC contractor, Brookhaven (BNL). BNL will coordinate and support the analysis effort by defining load cases and appropriate parameters, and by evaluating the results as described below.

1. Load cases for input for linear elastic analysis

A series of load cases for performing linear elastic analyses of the Beaver Valley primary coolant system model will be provided. Seismic response spectra and time history input motions with consideration of design spectra and varying levels of seismic hazard spectra will be provided. The load cases will consider different values of damping appropriate for various excitation levels and will include vertical as well as horizontal excitation to be used as input to the ANSYS model. The contractor shall investigate the effect of loop isolation valves on pipe stresses in the ANSYS model. These analyses shall also include pressure and deadweight loads.

2. Benchmark analysis results

The results of the ANSYS seismic analysis shall be provided to BNL for benchmarking against the available design information to validate the model. This may include comparisons of natural frequencies, modes shapes, deflections, forces, moments, and stresses with available design analysis results.

3. Evaluate results

The results of the ANSYS analyses for the defined load cases shall be provided to BNL for evaluation and comparison against the elastic stress results from the scaling approach developed by BNL for the bin of plants representative of Beaver Valley. These results are expected to validate the BNL methodology. Any significant differences in results shall be addressed and reconciled in coordination with BNL.

II Analysis of Beaver Valley PWR Primary Coolant Loop Piping (Nonlinear)

Nonlinear elastic-plastic ANSYS analyses will be carried out using the Beaver Valley model. The results of these analyses shall be provided to BNL to develop the nonlinear correction factors to convert elastic stresses to elastic-plastic stresses for EPFM evaluations. BNL will coordinate and support the analysis effort by defining load cases and appropriate parameters, and by evaluating the results as described below.

1. Load cases for input for nonlinear elastic analysis

A series of load cases will be provided for performing nonlinear elastic-plastic ANSYS analyses of the Beaver Valley primary coolant system model. Time history input motions will be defined by BNL with consideration of varying levels of seismic hazard spectra. The load cases will consider different values of damping appropriate for different excitation levels and will include vertical as well as horizontal excitation to be used as input to the ANSYS model. The ANSYS analyses shall also include pressure and deadweight loads. Available cyclic plasticity models for use in these analyses will be investigated and recommended by BNL.

2. Develop nonlinear correction factors for piping systems of interest

Nonlinear correction factors to convert elastic to elastic-plastic stresses shall be

determined by performing both linear elastic and nonlinear seismic ANSYS analyses. The nonlinear correction factors shall be calculated as the ratios of elastic moments to nonlinear moments. The factors shall be determined at different points in the piping systems of interest (hot leg, cold leg, and crossover leg) for different levels of seismic excitation.

III Analysis of Beaver Valley PWR Primary Coolant Loop Piping with Cracks

Another series of nonlinear elastic-plastic ANSYS analyses shall be carried out using the Beaver Valley model. This series of analyses shall incorporate crack elements in the piping models. These analyses will investigate crack propagation under high level earthquake loads and can serve to validate the BNL EPFM/limit load analyses that define families of flaw geometries that could withstand the stresses associated with the limiting seismic event. BNL will coordinate and support the analysis effort by defining load cases and appropriate parameters, and by evaluating the results as described below.

1. Load cases for input for nonlinear crack propagation analyses

A series of load cases will be provided for performing nonlinear elastic-plastic ANSYS analyses of the Beaver Valley primary coolant system model with flawed piping. The load cases will define appropriate crack configurations, sizes and locations at points of interest. Time history input motions with consideration of the seismic hazard spectra corresponding to the 10-5 earthquake will be provided. The load cases will use damping appropriate for the high earthquake level and will apply vertical as well as horizontal excitation to be used as input to the ANSYS model. The analyses shall also include pressure and deadweight loads. Appropriate cyclic plasticity models for these analyses will be recommended by BNL.

2. Evaluate results

The results of the ANSYS analyses for the defined load cases shall be provided to BNL for evaluation and comparison against the results from the EPFM/limit load analysis performed for the bin of plants representative of Beaver Valley. These results are expected to validate the predicted flaw geometries that could withstand the stresses associated with the limiting seismic event based on the methodology applied in BNL analysis. Any significant differences in results shall be addressed and reconciled in coordination with BNL.

IV Analysis of Zion PWR Primary Coolant Loop Piping System

The ANSYS analyses described above utilize a finite element model of the Beaver Valley plant which is a Westinghouse 3-loop PWR. The results of these analyses will be applicable to the bin of plants representative of Beaver Valley. Additional ANSYS analyses shall be performed using a finite model of the Zion plant (a Westinghouse 4-loop PWR) available from another NRC-sponsored study (LLNL analysis of Zion, NUREG/CR-2189, Vol. 2). The analyses shall include the same types of linear, nonlinear and crack propagation analyses as described above. BNL will coordinate and support the analysis effort by defining load cases and

appropriate parameters, and by evaluating the results.

C. Revise SECTION F.6, " DELIVERABLES" as follows:

1. Change due date for Subtask 1e., "Submit final piping fracture mechanics code with accompanying manual, from 6/30/2005 to 2/28/2006.

2. Delete Subtask 3a, "Submit technical letter report detailing process and results of estimated LOCA frequency distributions" per Battelle's February 28, 2003 proposal.

3. Delete Subtask 3b, "Submit draft technical letter report detailing break frequency sensitivity analysis and plant specific analysis," due 4/30/2005 and replace with:

Submit draft NUREG report detailing break frequency sensitivity analysis and plant specific analysis due 12/31/2005.

4. Add a final NUREG report, incorporating NRC comments , for Subtask 3b, "detailing break frequency sensitivity analysis and plant specific analysis," due on 3/31/2006.

5. Add deliverables for Subtask No. 4d as follows:

Submit draft preliminary report due on 2/15/2006 or the date established by the NRC Project Officer

Submit final report incorporating NRC comments due on 3/15/2006 or the date established by the NRC Project Officer.

6. Delete the last two paragraphs and replace with the following:

6. Program Management/Reporting

Subtask 6a Monthly Reports

As specified in Section F.4 Technical Progress Report and F.5 Financial Status Report

Subtask 6b Final Program NUREG Report due 5/31/2006

The report shall summarize the technical work completed, list and summarize NUREGs published and detail any remaining or unfinished technical work

Subtask 6c: Encyclopedia CD ROM Set due 5/31/2006

Append the NRC's pipe fracture encyclopedia to include all NUREGs and computer codes developed as part of this effort. Supply 10 copies of the updated CD-ROM.

D. Delete SECTION F.8, " DURATION OF CONTRACT PERIOD (MAR 1987)" in its entirety and replace with:

The contract shall commence on September 9, 2002 and will expire on May 31, 2006.

E. As a result of the above, the contract estimated cost and fee are increased as follows:

	FROM	BY	TO
Est. Cost	$2,317,749	$134,363	$2,452,112
FCCM	$ 27,192	$ 3,148	$ 30,340
Fixed Fee	$ 185,420	$ 10,749	$ 196,169
CPFF	$2,530,361	$148,260	$2,678,621

F. As a result of the above, there is no change to the obligated amount of $2,482,254.

G. All other terms and conditions of the contract remain unchanged as well.

From: "Jackson, Ules P" <jacksonu@BATTELLE.ORG>
To: Rachel Glaros <RNG1@nrc.gov>
Date: 9/26/05 7:10PM
Subject: RE: Revised Modification 10

Rachel,

Attached is fully executed copy of Modification No. 10.

Thank you.

Ules
Ules P. Jackson
Contracting Officer
614/424-5447 (Telephone)
614/458-5447 (Facsimile)
jacksonu@battelle.org

-----Original Message-----
From: Rachel Glaros [mailto:RNG1@nrc.gov]
Sent: Monday, September 26, 2005 4:57 PM
To: Jackson, Ules P
Cc: Scott, Paul Michael; Charles Greene
Subject: Revised Modification 10

Ules,

Please see enclosed revised Modification 10 that changes the due dates under Paragraph C. No. 5. Subtask 4d.

Let me know if there are still concerns with the modification please let me know right away. Otherwise please fax back the signed modification or provide an electronic copy of the signed modification.

Thanks,
Rachel Glaros
(301) 415-0115 (Phone)
(301) 415-5761 (Fax)

CC: "Scott, Paul Michael" <scottp@BATTELLE.ORG>, Charles Greene <CAG2@nrc.gov>, "Jackson, Ules P" <jacksonu@BATTELLE.ORG>