# AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

| BPA NO. | 1. CONTRACT ID CODE | PAGE | OF PA |
|---|---|---|---|
| | | 1 | 2 |

| 2. AMENDMENT/MODIFICATION NO. | 3. EFFECTIVE DATE | 4. REQUISITION/PURCHASE REQ. NO. | 5. PROJECT NO. (If applicable) |
|---|---|---|---|
| M002 | see block 16c | RES-03-055 | |

6. ISSUED BY CODE 3100

U.S. Nuclear Regulatory Commission
Div. of Contracts
Attn: Neha Dhir
Mail Stop T-7-I-2
Washington, DC 20555

7. ADMINISTERED BY (If other than Item 6) CODE 3100

U.S. Nuclear Regulatory Commission
Div. of Contracts
Mail Stop T-7-I-2

Washington, DC 20555

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

PURDUE UNIVERSITY

SPONSORED PROGRAM SERVICES
302 WOOD ST. (YOUNG HALL)
W LAFAYETTE IN 479072108

CODE 072051394 FACILITY CODE

(X) 9A. AMENDMENT OF SOLICITATION NO.

9B. DATED (SEE ITEM 11)

10A. MODIFICATION OF CONTRACT/ORDER NO.
NRC-04-03-055 T002

X 10B. DATED (SEE ITEM 13)
08-18-2005

## 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)
OBLIGATION: $349,500; B&R 66015113277; JC Y6769; BOC 252A
APPN 31X0200.660

## 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: MUTUAL AGREEMENT OF THE PARTIES |
| | 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.)

THE PURPOSE OF THIS MODIFICATION IS TO:
1. REVISE THE STATEMENT OF WORK TO INCLUDE TASKS 19 THROUGH 28.
2. INCREASE THE TASK ORDER CEILING BY $349,500 FROM $558,134 TO $907,634.
3. INCREASE THE TOTAL OBLIGATED AMOUNT BY $349,500 FROM $558,134 TO $907,634.

PERIOD OF PERFORMANCE: 8/18/2005 - 12/31/2006 (UNCHANGED)

SEE CONTINUATION PAGE

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)
Rick Evans
Assistant Director

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

15B. CONTRACTOR/OFFEROR
(Signature of person authorized to sign)

15C. DATE SIGNED
SEP 2-9-2006

16B. UNITED STATES OF AMERICA
BY
(Signature of Contracting Officer)

16C. DATE SIGNED
9/28/06

STANDARD FORM 30 (REV. 10-83)

SUNSI REVIEW COMPLETE

TEMPLATE - ADM001

ADM002

STATEMENT OF WORK FOR TASK ORDER NO. 2, "PUMA TESTS,"
UNDER CONTRACT NRC-04-03-55 AND JOB CODE Y6769

Modification 2

GENERAL INFORMATION

| | |
|---|---|
| PROJECT TITLE: | PUMA Tests |
| JOB CODE: | Y6769 |
| CONTRACTOR: | Purdue University |
| NRC PROJECT MANAGER/ TECHNICAL MONITOR: | Kent Welter<br>Phone: 301-415-5740<br>E-Mail: kbw@nrc.gov<br>Mail Stop: T-10K08 |
| PRINCIPAL INVESTIGATOR: | Mamoru Ishii<br>Phone: 765-494-4587<br>E-Mail: ishii@ecn.purdue.edu |
| B&R NUMBER: | |
| PERIOD OF PERFORMANCE: | 6 months after contract initiation |
| LEVEL OF EFFORT: | 34.5 staff months |

## I. BACKGROUND

The Purdue University Multi-Dimensional Integral Test Assembly (PUMA) was originally designed and scaled to produce integral test data relevant to the GE-designed, 2000-MWth Simplified Boiling Water Reactor (SBWR). Three kinds of loss-of-coolant accidents (LOCAs) were conducted at PUMA in the late 90's – main steam line break (MSLB), Gravity-Driven Cooling System (GDCS) line break (GDLB), and bottom drain line break (BDLB). Currently, test data have been collected and stored in the NRC databank and are being used to assess the TRACE and MELCOR code.

In 2002, GE requested pre-application review of a similar, but larger reactor design – the 4000-MWth Economic Simplified Boiling Water Reactor (ESBWR). Compared to the SBWR design, upon which PUMA was designed, the ESBWR design had a core power increase of 200% and significantly reduced coolant volumes (~30%) of the reactor pressure vessel (RPV), drywell (DW), and wetwell (WW) on a per MW basis. In addition, the 4000-MWth ESBWR design implemented the following piping configuration changes: (1) gas space of the GDCS pools was open to the WW (instead of the DW as in the SBWR design), (2) a loop seal was installed at each GDCS drain line, and (3) condensed water from the Passive Containment Cooling System (PCCS) was collected in drain tanks (instead of the GDCS pools as in the SBWR design) connected to the RPV.

To make PUMA relevant to the 4000-MWth ESBWR design, piping configurations at PUMA were modified accordingly in 2005 under Task Order No. 1. The modified piping configurations were designated as Phase 1 modifications. In addition, a scaling analysis was performed for PUMA with Phase 1 modifications to ensure proper scaling of the 4000-MW ESBWR phenomena (scaling distortions were also identified). Three kinds of LOCA tests were planned at PUMA in 2004 and 2005 with Phase 1 modifications – MSLB, GDLB, and BDLB. Only a portion of these tests were completed, since GE changed their ESBWR design, which created scaling distortions in the PUMA facility. This is discussed more below.

In addition to those integral LOCA tests mentioned above, PUMA was also used to conduct a number of separate-effects tests to obtain data on the performance of the Passive Containment Cooling System (PCCS) and on steam condensation in the suppression pool. Data from the integral LOCA tests and the separate-effects PCCS and suppression pool tests provided a data base for assessing the TRACE code, as well as provide a measure of margin to core uncovery with respect to design-basis accidents.

However in August 2005, the ESBWR design was modified by GE to a power level of 4500-MWth, as referenced in the ESBWR design control document (DCD) submitted for NRC design certification. In addition to a 12.5% power increase from 4000 MWth to 4500 MWth, the new design removed the Phase 1 design modifications that were installed in PUMA. More specifically, in the 4500-MWth ESBWR design, the gas space of GDCS pools is open to the drywell (instead of the wetwell as in the 4000-MWth design) and condensed water from the PCCS drains into the GDCS pools (instead of drain tanks). As a result, Phase 1 modifications were subsequently removed from PUMA under Task Order No. 2 in late 2005 to conform with the 4500-MWth ESBWR design.

Meanwhile, the PUMA facility is more than 10 years old. A number of the original electronic and mechanical components have either failed (e.g., oxygen concentration sensors) or became unreliable (e.g., data acquisition system (DAS)). Funding was provided to Purdue University to refurbish the PUMA facility by replacing those failed or unreliable components.

Under Task Order No. 2, a PUMA scaling analysis for LOCAs was performed by Purdue University using the 4500-MWth ESBWR design as the reference plant. This scaling analysis has been peer reviewed by external consultants and revised accordingly. In order to significantly reduce scaling distortions in the existing PUMA facility, facility modifications have been proposed (described in Task 19 of the SOW). In addition, two new features will be added to the PUMA facility. First, an external circulation loop outside the drywell will be installed to prevent accumulation of noncondensible gas in the lower drywell and promote gas mixing in the drywell. This feature is needed for performing sensitivity tests to investigate the impact of noncondensible gas distribution in the drywell upon containment pressure (e.g., a well-mixed condition vs. non-condensible gas accumulation in the lower drywell). Second, a provision for helium injection (as a hydrogen simulant) into the drywell will be provided so that we can investigate any adverse impact of a lighter-than-steam noncondensible gas upon PCCS performance. However, the NRC Project Manager reserves the right not to carry-out Task 19 based on the results of an independent assessment of existing PUMA facility scaling distortions.

To distinguish from the existing PUMA facility, the upgraded PUMA facility after Phase 2 modifications is designated as **PUMA-E** facility, with letter "E" referring to 4500-MWth ESBWR design submitted by GE for design certification.

## II. OBJECTIVES

1. Modify the existing PUMA facility according to the scaling analysis for the 4500-MWth ESBWR design and add two new features to enhance applications.

2. Maintain PUMA-E facility and documentation.

3. Assess code against data.

## III. SCOPE OF WORK

In the previous SOWs for Task Orders No. 1 and No. 2, Tasks 1 to 18 were defined, and Tasks 1, 2 and 4-12 were completed. Task 3 called for LOCA tests at PUMA facility with Phase 1 modifications that were based on the previous 4000-MWth ESBWR design. When GE revealed that the 4000-MWth design was replaced by the 4500-MWth ESBWR design in August 2005 some tests in Task 3 had been completed and the remaining tests were cancelled. Task 18 was completed, reviewed by the staff, and comments were sent back to the contractor; a revised report will be completed 1 month after the initiation of this modification.

This SOW modifies the existing TO#2 and adds Tasks 19-28, which are basically extensions of Tasks 9-18 in terms of research scope. Note the Principal Investigator (PI) for all the tasks is Prof. Mamoru Ishii at Purdue University.

### GENERAL REQUIREMENTS FOR DEVELOPMENTAL ASSESSMENT

Developmental assessment (also known as validation testing) is a part of code quality assurance procedures outlined in "Software Quality Assurance Procedures for NRC Thermal Hydraulic Codes", NUREG-1737. In the developmental assessment process, code-calculated results are compared either to analytical results, or experimental results, or other acceptable code calculation. In this SOW, TRACE code calculations are compared to experimental data from experimental test facilities and a report describing the results of the developmental assessment is produced. Developmental assessment shall contain the following activities:

1. Identification of the phenomena occurring in the test facility. This requires careful study of the test facility, experimental procedure, and experimental data. The report shall include a description of the facility, experimental procedure, and discussion of the measurement uncertainty, interpretation of the data, and the effect of the uncertainty on the data and their interpretation.
2. Development of the input deck. This requires familiarity with the TRACE User Guide and an understanding of the phenomena (see item above) in order to capture important phenomena governing the process. The report shall include nodalization diagrams, as

needed, a listing of the input deck, and discussion and justification of options used to construct the input deck.

3. Development of the acceptance criteria. Acceptance criteria permit acceptance of results calculated by the code when compared to experimental data. It requires careful study of the experimental data to distinguish measurement uncertainty from random behavior of the data, especially during two-phase flow. As explained in NUREG-1737, the acceptance criteria can be qualitative or quantitative. Appendix C of NUREG-1737 presents a sample acceptance criteria. The report shall include a discussion of the development of the acceptance criteria used for this project.
4. Comparison of Code Calculations with the Test Data. This requires running the code with a selected version of the code and comparing the results with test data. If comparisons indicate that the acceptance criteria are met, then the code results are acceptable. If they do not meet the acceptance criteria, sensitivity calculations may be required. Sensitivity calculations may be needed in order to capture phenomena more accurately. These calculations are performed using different nodalization schemes or choosing more appropriate options. Changes to the input deck to perform sensitivity calculations should be discussed and justified. If sensitivity calculations indicate a better agreement with the test data and that acceptance criteria are met, new user guidelines better capturing the phenomena should be prepared. The report shall include discussions of comparisons of code calculations with the test data, including whether or not acceptance criteria are met. If the criteria are not met, the report shall also include discussion of the need for sensitivity calculations, and if sensitivity calculations are performed, the report shall also include a description of the calculated results and new user guidelines, if applicable.
5. Identification of Code Deficiencies. This requires knowledge of the TRACE code, itself. If the comparison of the results are poor (i.e. results do not meet the acceptance criteria) and sensitivity calculations cannot improve predictions, then there may be a bug in the code or deficiencies in the code physical models, themselves. The report shall identify potential deficiencies to the extent possible and make recommendations for code improvements.

**Task 19. Install Phase 2 Modifications to the Facility - Optional**

If the PUMA facility is judged to be technically unacceptable in its current configuration by the NRC for investigating 4500-MWth ESBWR LOCAs, the contractor shall modify the existing PUMA facility according to the scaling analysis for the 4500-MWth ESBWR design and will add new features to enhance applications. Phase 2 modifications include: (1) increasing core power, (2) increasing GDCS pool size, (3) modifying PCCS and ICS, (4) reducing coolant volume in the drywell and wetwell, (5) modifying ADS, (6) adding a drywell external loop equipped with a circulating fan to promote gas mixing in the drywell, and (7) providing a means to inject helium (as a simulant for hydrogen gas) into the drywell.

Under this task, the contractor shall order hardware needed for facility modifications, inspect hardware upon delivery to the PUMA site, install Phase 2 modifications to the facility, and prepare facility design drawings. The upgraded facility is designated as the **PUMA-E** facility

with E referring to the 4500-MWth ESBWR design submitted by GE for design certification. Prepare isometric and engineering drawings to clearly describe the PUMA-E facility design including instrument locations.

Estimated Level of Effort: 13 staff-months + $162 K for hardware
Estimated Completion Date: 5 months after initiation of the contract, as directed by the Project Manager

**Task 20. Conduct PUMA-E Shakedown Tests**

Following completion of Task 19, the contractor shall conduct facility shakedown tests to qualitatively ensure satisfactory operation of the facility in conducting integral LOCA tests. Items to be evaluated include but are not limited to initiation of various breaks, operation of core heater rods, valves, and data acquisition system (DAS), and safe shutdown of the facility. Upon satisfactory completion of the shakedown tests, prepare a letter report to document the results in both electronic format and hardcopy.

Estimated Level of Effort: 2 staff-months
Estimated Completion Date: 1 month after completion of Task 19

**Task 21. Conduct PUMA-E Characterization and Instrument Calibration Tests**

Following completion of Task 19, the contractor shall conduct facility characterization and instrument calibration tests. To be determined are the flow resistance in every flow path of the facility (e.g., from a GDCS pool to the RPV via a GDCS drain line, from a PCCS drain line to a GDCS pool, from a PCCS vent line to the suppression pool, from suppression pool to the RPV via an equalizing line, a depressurization valve connecting the RPV to the drywell, etc.), and calibration results of each of approximately 500 instruments in the facility.

Upon the completion of quality assurance (QA) of all the measured flow resistance and instrument calibration results, prepare a letter report to document the results in both electronic format and hardcopy.

Estimated Level of Effort: 6 staff-months
Estimated Completion Date: 3 months after completion of Task 19

**Task 22. Prepare a Final PUMA-E Design Report**

Following completion of Tasks 19, 20, and 21 the contractor shall prepare a PUMA-E facility design report, including facility description, facility design drawings (from Task 19), and facility characterization and instrument calibration results (from Task 21). The report will be peer reviewed by NRC-designated personnel to ensure its adequacy for preparing a computer code input deck to analyze a LOCA test in PUMA-E facility. Revise the report to address peer reviewers' comments. Conduct a QA of the final report before its publication in both electronic format and hardcopy.

Estimated Level of Effort: 3 staff-months
Estimated Completion Date: 4 months after completion of Task 19

**Task 23. PUMA-E Facility Inspection and Acceptance**

Following completion of Task 19, the contractor shall support an inspection by the NRC staff of the PUMA-E facility including documentation. A demonstration test at PUMA-E shall be conducted as part of the inspection. Deficiencies shall be identified, if any, and fixed under Task 25 of this SOW. Upon completion, the NRC Project Manager will issue a letter of acceptance to Purdue University.

Estimated Level of Effort: 1 staff-month
Estimated Completion Date: 4.5 months after completion of Task 19

**Task 24. Revise NUREG/CR-6727 Report**

The contractor shall revise the draft NUREG/CR-6727 report that contains four data reports for PUMA tests conducted in the 1990's. Chapter 2 (PUMA facility description) and Appendixes B and C of each data report shall be revised by fixing the known deficiencies (Ref: E-mails from Dr. James Han of NRC to Profs. Ishii/Revankar/Vierow, "Fixing PUMA Reports - 1st letter," dated 6/1/05, and "Fixing PUMA Reports - 2nd letter," dated 6/22/05. E-mail from Dr. James Han of NRC to Dr. Yoo, dated 5/1/06, "Re: 7/9/98 PUMA GDLB test for TRACE."). All the dimensions, instrument locations, and facility isometric drawings must be quality assured.

Estimated Level of Effort: 0.5 staff-month
Estimated Completion Date: 1 month after initiation of the contract

**Task 25. Maintain Facility and Documents**

The contractor shall maintain the PUMA facility in operational condition as designed and keep the design drawings and other documents (including instrumentation calibration) up-to-date. The contractor shall: (1) test facility instrumentation periodically to ensure operation as calibrated, (2) perform facility repairs and replace broken components in a timely manner after obtaining an approval from the NRC Project Manager, and (3) report to the NRC Project Manager any problems regarding the facility. (This task is a continuation of Task 16 in the previous SOW for original Task Oder No. 2 of the PUMA contract.)

Estimated Level of Effort: 1 staff-month
Estimated Completion Date: throughout the contract

**Task 26. Provide Technical Support to NRC**

The contractor shall provide technical support to NRC, including attending meetings, making presentations, reviewing documents, preparing topical reports (in addition to the reporting requirements listed below), and performing additional PUMA-E tests and code calculations (using TRACE and MELCOR) as requested by the NRC Project Manager. (This task is a

continuation of Task 16 in the previous SOW for original Task Oder No. 2 of the PUMA contract.)

Estimated Level of Effort: 3 staff-months
Estimated Completion Date: throughout the contract

**Task 27. Project Management and Quality Control**

The contractor shall provide planning, administration, and management of this project at its premises. The contractor shall review all deliverables for technical accuracy and quality. The contractor shall provide status reporting as needed by NRC. The contractor shall prepare for and attend meetings such as Advisory Committee for Reactor Safety (ACRS) meetings, Nuclear Safety Research Conference (NSRC), and review meetings as requested by NRC.

Estimated Level of Effort: 2 staff-months
Estimated Completion Date: throughout the contract

**Task 28. Assess TRACE against Data**

The contractor shall conduct code-to-data assessments using TRACE and SNAP software as directed by the NRC Project Manager and prepare a developmental assessment report for each TRACE assessment completed.

The report shall 1) contain short descriptions of the relevant parameters of the test facility and all the test runs, 2) describe the phenomena occurring in each individual test run, 3) discuss why the input deck with selected nodalization and options should capture the phenomena, 4) discuss comparisons of the TRACE calculations with the test data, 5) provide details of the TRACE calculations and discuss the acceptability of these calculations, and 6) identify any code related problems and new user guidelines, if applicable, 7) include an appendix with the calculation notebook in electronic format, 8) describe the quality of the test documentation and data acquisition adequacy, and 9) list and describe the principal and subsidiary figures of merit. If the code does not run or some errors are discovered, these problems shall be communicated to the NRC. The NRC staff will resolve these problems within a period of time which will be negotiated. If the correction of these errors cause some delays in delivery of final products, the NRC project manager will initiate appropriate modifications as necessary. The report shall be prepared first in a draft form for review by NRC. It shall be issued in a final form after the contractor resolves the comments. This combined report shall be compiled and delivered in Framemaker format and use templates provided by NRC sufficient for insertion into the TRACE Development Assessment Manual.

The contractor is permitted to purchase 3 copies of Framemaker 7.0 (or newer) for purposes of this project.

Estimated Level of Effort: 3 staff-months
Estimated Completion Date: throughout the contract

## IV. REPORTING REQUIREMENTS

In addition to the letter reports required for the above tasks, the contractor shall provide the monthly letter status reports described below.

Monthly Letter Status Report

An MLSR is to be submitted to the NRC Project Manager by the 20th of the month following the month to be reported with copies provided to the following:

Division Management Analyst, (Janine Dehn, Mail Stop T-10E32)

Division of Contracts, Office of Administration (Mail Stop T-7I2) - **an electronic copy only to Mary Lynn Scott, email address mls2@nrc.gov and to Debra Robinson, email address djr1@nrc.gov. If the contractor cannot comply with the request for electronic transfer to the Division of Contracts, please provide a hard copy addressed to Ms. Scott, Mail Stop T-7 I2.**

The MLSR will identify the title of the project, the job code, the Principal Investigator, and the period of performance, summarize each month's technical progress, and list monthly spending, total spending to date, and the remaining funds. Any administrative or technical difficulties which may affect the schedule or costs of the project shall be immediately brought to the attention of the NRC project manager.

ORGANIZATIONAL CONFLICT OF INTEREST DISCLOSURE

A. Provide descriptions of present/planned/past work for other organizations, in the same/similar technical area as the NRC project scope of work, e.g., (included but not limited to), NRC licensees, vendors, industry groups or research institutes that represent or are substantially comprised of nuclear utilities.

B. Provide name of organization, dollar value, and period of performance of the work identified in A.

## V. DELIVERABLES AND DELIVERY SCHEDULE

Task 19: facility design drawings within 5 months after contract initiation

Task 20: a letter report within 6 months after contract initiation

Task 21: a letter report within 8 months after contract initiation

Task 22: a letter report within 9 months after contract initiation

Task 23: a letter report within 9.5 months after contract initiation

Task 24: a letter report by 1 month after contract initiation

Task 28: a draft developmental assessment report 1 month after completion of each TRACE assessment, followed by a final report 1 month after receiving comments from the NRC Project Manager

## VI. MEETINGS AND TRAVEL REQUIREMENTS

The contractor should plan to attend three NRC meetings in Rockville, Maryland. In addition, the contractor will also attend three technical meetings including ANS/ASME meetings and TRACE code workshops. For planning purpose, each meeting may be attended by up to two people. Prior approval from the NRC Project Manger is required for any travel.

## VII. TECHNICAL DIRECTION

Technical direction is provided by Dr. Kent B. Welter, who is the Project Manager and Technical Monitor of this contract. He can be reached at:

Phone: (301) 415-5740
Fax: (301) 415-5160
Email: kbw@nrc.gov

## VIII. PUBLICATIONS

RES encourages the publication of the scientific results from RES sponsored programs in refereed scientific and engineering journals as appropriate. If the laboratory proposes to publish in the open literature or present the information at meeting in addition to submitting the required technical reports, review and approval of the proposed article or presentation shall be obtained from the NRC Project Manager 6 weeks in advanced of submittal to publishers or conference. The RES Project Manager shall either approve the material as submitted, approve it subject to NRC suggested revisions, or disapprove it. In any event, the RES Project Manager may disapprove or delay presentation or publication of papers on information that is subject to Commission approval that has not been ruled upon or which has been disapproved. Additional information regarding the publication of NRC sponsored research is contained in NRC Management Directives 3.8, "Unclassified Contractor and Grantee Publications in the NUREG Series," and 3.9, "NRC Staff and Contractor Speeches, Papers, and Journal Articles on Regulatory and Technical Subjects."

If the presentation or paper is in addition to the required technical reports and the RES Project Manager determines that it will benefit the RES project, the Project Manager may authorize payment of travel and publishing costs, if any, from the project funds. If the Project Manager determines that the article or presentation would not benefit the RES project, the costs associated with the preparation, presentation, or publication will be borne by the contractor. For any publication or presentations falling into this category, the NRC reserves the right to require that such presentation or publication will not identify the NRC's sponsorship of the work.