

ORDER FOR SUPPLIES OR SERVICES

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IMPORTANT: Mark all packages and papers with contract and/or order numbers.

BPA NO. DR-42-07-468

1. DATE OF ORDER SEP 27 2007		2. CONTRACT NO. (If any) GS23F0110M		6. SHIP TO:	
3. ORDER NO. TASK ORDER 1		4. REQUISITION/REFERENCE NO. NRO-07-468		a. NAME OF CONSIGNEE U.S. Nuclear Regulatory Commission	
5. ISSUING OFFICE (Address correspondence to) U.S. Nuclear Regulatory Commission Div. of Contracts Attn: Jeffrey R. Mitchell, 301-415-6465 Mail Stop T-7-I-2 Washington, DC 20555				b. STREET ADDRESS Attn: Karen Chapman Mail Stop: O7-F27 11555 Rockville Pike	
7. TO:		c. CITY Rockville		d. STATE MD	e. ZIP CODE 20852
a. NAME OF CONTRACTOR ENERGY RESEARCH, INC.				f. SHIP VIA	
b. COMPANY NAME ATTN: TRACEY MULLINIX				8. TYPE OF ORDER	
c. STREET ADDRESS 6167 EXECUTIVE BLVD.				<input type="checkbox"/> a. PURCHASE <input checked="" type="checkbox"/> b. DELIVERY	
d. CITY ROCKVILLE		e. STATE MD	f. ZIP CODE 208523901		
9. ACCOUNTING AND APPROPRIATION DATA 725-15-171-103 Q-4131 252A 31X0200725 Obligate \$50,000.00 Contractors DUNS: 621211259				10. REQUISITIONING OFFICE NRO	
11. BUSINESS CLASSIFICATION (Check appropriate box(es))					12. F.O.B. POINT N/A
<input checked="" type="checkbox"/> a. SMALL <input type="checkbox"/> b. OTHER THAN SMALL <input type="checkbox"/> c. DISADVANTAGED <input type="checkbox"/> g. SERVICE-DISABLED VETERAN-OWNED <input type="checkbox"/> d. WOMEN-OWNED <input type="checkbox"/> e. HUBZone <input type="checkbox"/> f. EMERGING SMALLBUSINESS					
13. PLACE OF		14. GOVERNMENT B/L NO.		15. DELIVER TO F.O.B. POINT ON OR BEFORE (Date) As Stated	
a. INSPECTION		b. ACCEPTANCE		16. DISCOUNT TERMS Net 30	

17. SCHEDULE (See reverse for Rejections)

ITEM NO. (a)	SUPPLIES OR SERVICES (b)	QUANTITY ORDERED (c)	UNIT (d)	UNIT PRICE (e)	AMOUNT (f)	QUANTITY ACCEPTED (g)
	In accordance with Section A.12 entitled "Task Order Procedures" of the subject contract, this order definitizes Task Order No. 1. This effort shall be performed in accordance with the enclosed Statement of Work. Task Order No. 1 entitled "Technical Support of Review of Level 2 and 3 PRA, Deterministic Severe Accident Reviews, and SAMDAs for ESBWR" The issuance of this task order does not amend any other terms or conditions of the subject contract.					

18. SHIPPING POINT		19. GROSS SHIPPING WEIGHT		20. INVOICE NO.	
21. MAIL INVOICE TO:					
a. NAME U.S. Nuclear Regulatory Commission Payment Team, Mail Stop T-7-I-2					
b. STREET ADDRESS (or P.O. Box) Attn: (DR-42-07-468 Task Order No. 1) 11555 Rockville Pike					
c. CITY Rockville		d. STATE MD	e. ZIP CODE 20852		

17(h)
TOTAL
(Cont. pages)

17(i).
GRAND
TOTAL

22. UNITED STATES OF AMERICA BY (Signature) 	23. NAME (Typed) Donald A. King Contracting Officer TITLE: CONTRACTING/ORDERING OFFICER
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In accordance with the Terms and Conditions, TASK ORDER PROCEDURES, of the subject contract, Task Order No. 01 is definitized. The effort shall be performed in accordance with the attached Statement of Work.

CONSIDERATION AND OBLIGATION--COST REIMBURSEMENT (JUN 1988)

(a) The total estimated cost to the Government for full performance under this contract is \$75,927.10.

(b) The amount obligated by the Government with respect to this contract is \$50,000. This obligated amount may be unilaterally increased from time to time by the Contracting Officer by written modification to this contract. The obligated amount shall, at no time, exceed the contract ceiling as specified in paragraph a above. When and if the amount(s) paid and payable to the Contractor hereunder shall equal the obligated amount, the Contractor shall not be obligated to continue performance of the work unless and until the Contracting Officer shall increase the amount obligated with respect to this contract. Any work undertaken by the Contractor in excess of the obligated amount specified above is done so at the Contractor's sole risk.

DURATION OF CONTRACT PERIOD (MAR 1987)

This contract shall commence on September 30, 2007 and will expire December 31, 2007.

PRICE/COST SCHEDULE

The following is a summary of the labor categories, number of hours and hourly labor rates.

TASK ORDER NO. 1; 09/30/2007 – 12/31/2007				
CLIN	LABOR CATEGORY	EST HOURS	RATE 10/01/07 – 12/31/07	ESTIMATE
001	Executive	[REDACTED]		\$28,418.00
002	Executive Engineer/ Scientist	[REDACTED]		\$26,056.00
003	Senior Engineer/ Scientist	[REDACTED]		\$21,203.10
004a	Other Direct Cost (Copies)	[REDACTED] pages		\$200.00
004b**	Other Direct Cost (Phone & Courier)	[REDACTED]		\$50.00
ESTIMATED TOTAL				\$75,927.10

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Your contacts during the course of the work order are:

Technical Matters: Karen Chapman, Project Officer
301-415-8588

Contractual Matters: Jeffrey R. Mitchell, Contract Specialist
301-415-6465

The issuance of this work order does not amend any terms or conditions of the delivery order under the GSA FSS Contract.

Accepted Task Order No. 01:

John Kunit-Robb
NAME

President
Title

9/27/2007
Date

Attachment No. 1

TASK ORDER NO. 1

STATEMENT OF WORK

JCN/Contract No. Q-4131 NRC-42-07-468	Contractor	Task Order No. 1
Applicant	Design/Site	Docket No. <i>(If fee recoverable)</i>
Title/Description Technical Support of Review of Level 2 and 3 PRA, Deterministic Severe Accident Reviews, and SAMDAs for ESBWR		
TAC No. MD1479	B&R Number 725-15-171-103	SRP Section(s) or ESRP 19
NRC Technical Assistance Project Manager (TAPM) Karen Chapman (301) 415-3653 .kgc1@nrc.gov		
NRC Technical Monitor (TM) Edward Fuller (301) 415-1975 elf@nrc.gov		
NRC Safety/Environmental Project Manager (PM)		

1. BACKGROUND

The Economic & Simplified Boiling Water Reactor (ESBWR) is the latest evolution of General Electric (GE) Company's boiling water reactor (BWR) technology. The ESBWR introduces passive safety systems and natural circulation for accident mitigation, but also has active systems for investment protection and defense-in-depth. As part of its application for certification of the ESBWR design, GE submitted a probabilistic risk assessment (PRA) in late August 2005 for NRC review. The ESBWR PRA is a full-scope PRA, including Level 1, Level 2, and a limited scope Level 3 analyses. The Level 2 and 3 portions of the PRA are supported by deterministic analyses of severe accident progression and offsite consequences based on the MAAP and MACCS2 computer codes. Key severe accident phenomena (e.g., direct containment heating, ex-vessel steam explosions, and core-concrete interactions) are further assessed through separate applications of the Risk Oriented Accident Analysis Methodology (ROAAM). An evaluation of severe accident mitigation design alternatives (SAMDAs) is also included in the application.

An initial phase of the ESBWR review has already been completed. The results of the initial review are being factored into requests for additional information (RAI) identifying areas where additional information is needed to complete the review. The ESBWR review will be completed under this task order. The primary objectives of the review are: to establish that the technical quality of the Level 2 and 3 PRA is commensurate with the PRA application; to develop insights into severe accident progression/phenomenology, containment performance, and important risk contributors and design features; to identify any structures systems or components (SSCs) that should be subject to additional regulatory controls (i.e., ITAAC, RTNSS, or COL action items); and to evaluate potentially cost-beneficial SAMDAs pursuant to the National Environmental

Policy Act (NEPA). The contractor shall prepare written evaluations for each review topic in a form that can be incorporated into an NRC staff safety evaluation report (SER) with minimal changes. The specific ESBWR review topics to be addressed are identified in Table 1 below. The scope and depth of the reviews in each of these areas are expected to be similar to that for the corresponding reviews performed for ABWR and/or AP1000 design certification.

In support of the ESBWR review, the NRC Office of Research (RES) is sponsoring confirmatory calculations for ESBWR using the MELCOR, CONTAIN, and TEXAS computer codes. The contractor shall closely coordinate with RES and their contractors in this effort, and consider the results of these calculations during both the preparation of RAIs and SER inputs.

2. OBJECTIVE

The objective of this task order is to obtain expert technical assistance from the contractor to support and assist the NRC staff in performing an independent evaluation of the completeness and technical adequacy of GE's Level 2 and 3 PRA, deterministic severe accident evaluations, and SAMDA analysis for the ESBWR design. The scope of work includes: (1) completion of the review of GE's initial PRA and severe accident evaluations; (2) preparation of additional RAIs, with accompanying draft technical evaluation report (TER) sections describing the technical issue and how the requested information supports issue closure; (3) review of supplemental submittals and RAI responses; and (4) preparation of written evaluations for each review topic in a form that can be readily incorporated into an NRC staff safety evaluation report (SER). Although the emphasis of the review is on internal events while at-power, the review scope also includes GE's treatment of containment performance for external events and events during shutdown.

3. TECHNICAL AND OTHER SPECIAL QUALIFICATIONS REQUIRED

The contractor shall provide specialists with expertise and experience in the following areas: (a) development and peer review of Level 2 and 3 PRAs and deterministic severe accident evaluations, including treatment of internal and external events during at-power and shutdown conditions; (b) BWR plant systems, including the design and functional performance of passive systems, containment systems, and severe accident features; (c) thermal-hydraulic, severe accident progression, and offsite consequence analyses, including familiarity with the MAAP, MELCOR, CONTAIN, and MACCS2 computer codes; (d) specialized techniques for treatment and quantification of severe accident phenomena (e.g., ROAAM); (e) PRA quality standards and the use of PRA methodologies and results in commercial nuclear reactor applications; and (f) NRC regulations, technical specifications, and inspections related to commercial nuclear power plant operations.

It is the responsibility of the contractor to assign technical staff, employees, subcontractors, or specialists who have the required educational background, experience, or combination thereof to meet both the technical and regulatory objectives of the work specified in this task order SOW. The NRC will rely on representations made by the contractor concerning the qualifications of the personnel assigned to this task order including assurance that all information contained in the technical and cost proposal, including resumes, is accurate and truthful.

The use of key personnel and any proposed change to key personnel on this task order contract is subject to the NRC Project Manager's approval. This includes proposed use of principal persons (i.e., key contributors) during the life of the contract.

If any work would be subcontracted or performed by consultants, The contractor shall obtain the NRC Project Manager's written approval of the subcontractor or consultant prior to initiation of the subcontract effort. Conflict of interest considerations shall apply to any subcontracted effort.

4. WORK REQUIREMENTS

The contractor shall provide personnel with PRA and other required expertise necessary to perform work in the following tasks:

Tasks

1. Review Level 2 and 3 PRA and Deterministic Severe Accident Evaluations and Prepare Draft TER with RAIs

The contractor shall perform a review of GE's Level 2 and 3 PRA and deterministic severe accident evaluations (including the ROAAM applications) for the ESBWR design. The focus of the review will be on: establishing that the technical quality of the Level 2 and 3 PRA is commensurate with the PRA application; developing insights into severe accident progression and phenomenology, containment performance, and important risk contributors and design features; and identifying any structures systems or components (SSCs) that should be subject to additional regulatory controls (i.e., ITAAC, RTNSS, or COL action items). The contractor will consider the results of NRC-sponsored confirmatory calculations during both the preparation of RAIs and TER inputs.

The contractor shall document the results of the evaluation with possible open items in a draft TER. The TER will consist of written evaluations for each review topic in a form that can be incorporated into an NRC staff safety evaluation report (SER) with minimal changes. The specific ESBWR review topics to be addressed are identified in Table 1 below. The scope and depth of the reviews in each of these areas are expected to be similar to that for the corresponding reviews performed for ABWR and/or AP1000 design certification. The reviews for ABWR and/or AP1000 design certification, documented in NUREG-1503 and NUREG-1793 respectively, shall be used as templates for the TER sections. The contractor shall identify any additional information needed to resolve possible open items. This information shall be provided to the NRC in the form of an RAI for transmittal to the applicant.

2. Review SAMDA Analysis and Prepare Draft TER with RAIs

The contractor shall conduct a preliminary review of GE's supplemental SAMDA submittal provided in response to initial RAIs. The emphasis of the review shall be on the completeness of design alternatives considered and the reasonableness of the analyses of risk reduction and costs for each candidate improvement. In assessing completeness, The contractor shall evaluate the rigor of the process used by the applicant to identify potential SAMDAs (e.g., importance analyses or cutset examination), and shall consider the results of the process relative to the leading risk

contributors. The applicant's cost/benefit methodology shall be assessed for consistency with the regulatory analysis guidance provided in NUREG/BR-0058, Rev.4, and NUREG/BR-0184. The contractor shall review the treatment of externally-initiated events and uncertainty in core damage frequency and risk estimates within the applicant's analysis, and address these factors in their assessment of the adequacy of the SAMDA identification and evaluation process.

The contractor shall document the results of the preliminary evaluation with possible open items in a draft TER containing the following: (i) an assessment of the adequacy of the applicant's evaluation of SAMDAs, in terms of completeness, reasonableness of results, and potential for further risk reductions, (ii) identification of any additional SAMDAs which should be considered further, and (iii) independent estimates of risk reduction and costs for selected SAMAs, as appropriate. Recent SAMA evaluations for operating reactor license renewal, documented in the latest available supplements to NUREG-1437, shall be used as a template for the TER. The contractor shall identify any additional information needed to resolve possible open items. This information shall be provided to the NRC in the form of an RAI for transmittal to the applicant.

3. Review Supplemental GE Submittals and RAI Responses for PRA and Severe Accident Analysis

The contractor shall review GE's responses to all issues raised during the review of the Level 2 and 3 PRA and deterministic severe accident evaluations, including new and revised analyses requested in response to RAIs. Any additional information needed to resolve any remaining technical concerns shall be identified by the contractor, and provided to the NRC in the form of an RAI for follow-up discussion with the applicant. The contractor shall support further interactions with the applicant, as appropriate, to ensure that the issues are well understood and to arrive at an acceptable path to resolution.

4. Review Supplemental GE Submittals and RAI Responses for SAMDA

The contractor shall review GE's responses to all issues raised during the review of the PRA that could impact the SAMDA evaluation. Any additional information needed to resolve any remaining technical concerns shall be identified by the contractor, and provided to the NRC in the form of an RAI for follow-up discussion with the applicant. The contractor shall support further interactions with the applicant, as appropriate, to ensure that the issues are well understood and to arrive at an acceptable path to resolution.

5. Prepare Final TERs

The contractor shall update the draft TERs for PRA and severe accidents and for SAMDA to reflect the resolution of any previously identified open items, and overall conclusions of the review. The updating of the draft TERs will be performed after completion of Tasks 3 and 4. The contractor shall incorporate NRC comments on the updated TERs and issue the documents as final TERs.

It is expected that during the course of the review (on an as-needed basis by request of the NRC technical monitor), the contractor will participate in technical meetings with the NRC staff concerning severe accident evaluations and analyses, and in technical meetings and

conference calls between NRC and GE staff. As necessary, the contractor will also provide presentations to the Advisory Committee for Reactor Safeguards (ACRS), Commission, and industry groups, and/or support to the NRC staff in preparing such presentations.

5. SCHEDULE AND DELIVERABLES

The work shall be performed on the following schedule.

<u>Task</u>	<u>Completion Date</u>
1. Draft TER and RAIs on Level 2/3 and severe accidents	10/15/2007
2. Draft TER and RAIs on SAMDA	10/15/2007
3. Review Level 2/3 responses; prepare follow-up RAIs, if needed	10/31/2007
4. Review SAMDA responses; prepare follow-up RAIs, if needed	10/31/2007
5. Prepare Final TERs	
Level 2/3 PRA and severe accidents	
- Draft	11/30/2007
- Final	12/28/2007
SAMDA	
- Draft	11/30/2007
- Final	12/28/2007

Technical Reporting Requirements

1. At the completion of Task 1, submit a draft TER with open items, and a description of any additional information needed to resolve the open items. The TER will consist of written evaluations for each review topic in a form that can be incorporated into an NRC SER with minimal changes. The additional information needed should be in the form of an RAI for transmittal to the applicant.
2. At the completion of Task 2, submit a draft TER with open items, and a description of any additional information needed to resolve the open items. The TER will be similar in format and content to recent SAMA evaluations for operating reactor license renewal. The additional information needed should be in the form of an RAI for transmittal to the applicant.
3. Following the completion of the PRA and severe accident review under Task 3, submit a description of any additional information needed to resolve any remaining technical concerns regarding Level 2/3 PRA or severe accidents in the form of an RAI for follow-up discussion with the applicant.

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4. Following the completion of the SAMDA review under Task 4, submit a description of any additional information needed to resolve any remaining technical concerns regarding SAMDA in the form of an RAI for follow-up discussion with the applicant.
 5. At the completion of Task 5, submit updated TERs for use in developing Chapter 19 of the NRC staff SER for the ESBWR. Incorporate NRC comments on the updated TERs and issue the documents as final TERs.

The TERs should be submitted to the NRC Technical Monitor with a copy of the cover or transmittal letter to the Project Officer. All technical letter reports submitted for acceptance by NRC staff must meet NRC expected quality standards.

6. PERIOD OF PERFORMANCE

The period of performance for this task is projected to be from September 30, 2007 through December 31, 2007.

7. MEETINGS AND TRAVEL

The following meeting and travel requirements are anticipated for planning purposes:

Three, two-person, one-day trips to NRC Headquarters in Rockville, Maryland to meet with the NRC and/or GE staff to discuss the results of the evaluations, and to prepare or provide presentations to the ACRS, Commission and industry groups.

Additional travel will be coordinated with the NRC Project Manager and Technical Monitor as the need for such travel is identified to ensure it supports the timely completion of work.

8. NRC FURNISHED MATERIALS

Upon acceptance of this task order, the NRC Technical Monitor will provide to the contractor any supplemental ESBWR PRA and severe accident submittals necessary to facilitate successful completion of this project.

9. OTHER APPLICABLE INFORMATION

License Fee Recovery

The work specified in this SOW is licensee fee recoverable under 10 CFR Part 52.