

<b>SOLICITATION/CONTRACT/ORDER FOR COMMERCIAL ITEMS OFFEROR TO COMPLETE BLOCKS 12, 17, 23, 24, &amp; 30</b>				1. REQUISITION NO. RBS-12-263	PAGE 1 OF 8	
2. CONTRACT NO. GS23F0110M	3. AWARD/EFFECTIVE DATE See block 31c.	4. ORDER NO. NRC-DR-04-09-141 NRC-T004	5. SOLICITATION NUMBER	8. SOLICITATION ISSUE DATE		
7. FOR SOLICITATION INFORMATION CALL: a. NAME Adelis M Rodriguez			b. TELEPHONE NO. (No Collect Calls) 301-492-3623	8. OFFER DUE DATE/LOCAL TIME		
9. ISSUED BY U.S. Nuclear Regulatory Commission Div. of Contracts Attn: Adelis M Rodriguez, 301-492-3623 Mail Stop: TWB-01-B10M Washington, DC 20555			10. THIS ACQUISITION IS <input type="checkbox"/> SMALL BUSINESS <input type="checkbox"/> HUBZONE SMALL BUSINESS <input type="checkbox"/> SERVICE-DISABLED VETERAN-OWNED SMALL BUSINESS <input type="checkbox"/> UNRESTRICTED OR <input type="checkbox"/> SET ASIDE: _____ % FOR: <input type="checkbox"/> WOMEN-OWNED SMALL BUSINESS (WOSB) ELIGIBLE UNDER THE WOMEN-OWNED SMALL BUSINESS PROGRAM <input type="checkbox"/> EDWCB8 NAICS: 541330 SIZE STANDARD: \$4.5 Million			
11. DELIVERY FOR FOB DESTINATION UNLESS BLOCK IS MARKED <input checked="" type="checkbox"/> SEE SCHEDULE	12. DISCOUNT TERMS		<input type="checkbox"/> 13a. THIS CONTRACT IS A RATED ORDER UNDER DPAS (16 CFR 700)	13b. RATING N/A	14. METHOD OF SOLICITATION <input type="checkbox"/> RFQ <input type="checkbox"/> IFB <input type="checkbox"/> RFP	
15. DELIVER TO U.S. Nuclear Regulatory Commission  Washington DC 20555			16. ADMINISTERED BY U.S. Nuclear Regulatory Commission Div. of Contracts Mail Stop: TWB-01-B10M Washington, DC 20555			
17a. CONTRACTOR/OFFEROR CODE ENERGY RESEARCH, INC.  6189 EXECUTIVE BLVD ROCKVILLE MD 208523901 TELEPHONE NO. 301-8810866 ext. 206			18a. PAYMENT WILL BE MADE BY Department of Interior / NBC NRCPayments_NBCDenver@NBC.gov Attn: Fiscal Services Branch - D2770 7301 W. Mansfield Avenue Denver CO 80235-2230 PHONE: FAX:			
<input type="checkbox"/> 17b. CHECK IF REMITTANCE IS DIFFERENT AND PUT SUCH ADDRESS IN OFFER			<input type="checkbox"/> 18b. SUBMIT INVOICES TO ADDRESS SHOWN IN BLOCK 18a UNLESS BLOCK BELOW IS CHECKED <input type="checkbox"/> SEE ADDENDUM			
19. ITEM NO.	20. SCHEDULE OF SUPPLIES/SERVICES		21. QUANTITY	22. UNIT	23. UNIT PRICE	24. AMOUNT
	The contractor shall provide the services described in the statement of work attached in accordance with the terms and conditions of the BPA NRC-DR-04-09-141 and contract GS23F0110M.  Period of performance: Award date through December 4, 2012 Contract Type: Labor Hours Order Ceiling: \$74,975.90 Obligated Amount: \$74,975.90  (Use Reverse and/or Attach Additional Sheets as Necessary)					
			SUBTOTAL			
25. ACCOUNTING AND APPROPRIATION DATA Obligate: \$74,975.90 B&R: 2012-60-17-6-100 Job: V6358 BOC: 252A Approp.: 31X0200 FAIMIS: 123010 NAICS: 541330 PSC: R499 DUNS: 621211259			26. TOTAL AWARD AMOUNT (For Govt. Use Only) \$74,975.90			
<input type="checkbox"/> 27a. SOLICITATION INCORPORATES BY REFERENCE FAR 52.212-1, 52.212-4. FAR 52.212-3 AND 52.212-5 ARE ATTACHED. ADDENDA			<input type="checkbox"/> ARE <input checked="" type="checkbox"/> ARE NOT ATTACHED.			
<input type="checkbox"/> 27b. CONTRACT/PURCHASE ORDER INCORPORATES BY REFERENCE FAR 52.212-4. FAR 52.212-5 IS ATTACHED. ADDENDA			<input type="checkbox"/> ARE <input checked="" type="checkbox"/> ARE NOT ATTACHED.			
<input checked="" type="checkbox"/> 28. CONTRACTOR IS REQUIRED TO SIGN THIS DOCUMENT AND RETURN COPIES TO ISSUING OFFICE. CONTRACTOR AGREES TO FURNISH AND DELIVER ALL ITEMS SET FORTH OR OTHERWISE IDENTIFIED ABOVE AND ON ANY ADDITIONAL SHEETS SUBJECT TO THE TERMS AND CONDITIONS SPECIFIED			<input type="checkbox"/> 29. AWARD OF CONTRACT. REF. _____ YOUR OFFER ON SOLICITATION (BLOCK 5), INCLUDING ANY ADDITIONS OR CHANGES WHICH ARE SET FORTH HEREIN IS ACCEPTED AS TO ITEMS:			
30a. SIGNATURE OF OFFEROR/CONTRACTOR <i>Mohsen Khatib-Rahbar</i>			31a. UNITED STATES OF AMERICA SIGNATURE OF CONTRACTING OFFICER <i>Adelis M Rodriguez</i>			
30b. NAME AND TITLE OF SIGNER (TYPE OR PRINT) MOHSEN KHATIB-RAHBAR			30c. DATE SIGNED 8-9-2012		31b. NAME OF CONTRACTING OFFICER (TYPE OR PRINT) Adelis M Rodriguez Contracting Officer	
					31c. DATE SIGNED 8/9/12	

AUTHORIZED FOR LOCAL REPRODUCTION  
PREVIOUS EDITION IS NOT USABLE

STANDARD FORM 1449 (REV. 2-2012)  
Prescribed by GSA - FAR (48 CFR) 53.212

TEMPLATE - ADM001

SUNSI REVIEW COMPLETE

AUG 10 2012

ADM002

## A.1 PRICE SCHEDULE

Labor category	Labor Rate	Est. hours	Total
Executive			
Executive Engineer Scientist			
Senior Engineer / Scientist			
Engineer / Scientist		0	\$0.00
System Analyst		0	\$0.00
Support Staff		0	\$0.00
Senior Consulting Engineer		0	\$0.00
Executive Consulting Engineer		0	\$0.00
Total Labor			\$74,625.90
Other direct costs			
Travel			\$0.00
TOTAL			\$74,975.90

## A.2 FSS-BPA TERMS AND CONDITIONS

This order is subject to the terms referenced in BPA NRC-DR-04-09-141 and the General Services Administration (GSA) Federal Supply Schedule Contract # GS23F0110M.

## A.3 TASK/DELIVERY ORDER PERIOD OF PERFORMANCE (AUG 2011)

This order shall commence on award date and will expire on 12-04-2012.

## A.4 WHISTLEBLOWER PROTECTION FOR NRC CONTRACTOR AND SUBCONTRACTOR EMPLOYEES (AUG 2011)

(a) The U.S. Nuclear Regulatory Commission (NRC) contractor and its subcontractor are subject to the Whistleblower Employee Protection public law provisions as codified at 42 U.S.C. 5851. NRC contractor(s) and subcontractor(s) shall comply with the requirements of this Whistleblower Employee Protection law, and the implementing regulations of the NRC and the Department of Labor (DOL). See, for example, DOL Procedures on Handling Complaints at 29 C.F.R. Part 24 concerning the employer obligations, prohibited acts, DOL procedures and the requirement for prominent posting of notice of Employee Rights at Appendix A to Part 24 entitled: "Your Rights Under the Energy Reorganization Act".

(b) Under this Whistleblower Employee Protection law, as implemented by regulations, NRC contractor and subcontractor employees are protected from discharge, reprisal, threats, intimidation, coercion, blacklisting or other employment discrimination practices with respect to compensation, terms, conditions or privileges of their employment because the contractor or subcontractor employee(s) has provided notice to the employer, refused to engage in unlawful practices, assisted in proceedings or testified on activities concerning alleged violations of the Atomic Energy Act of 1954 (as amended) and the Energy Reorganization Act of 1974 (as amended).

(c) The contractor shall insert this or the substance of this clause in any subcontracts involving work performed under this contract.

#### **A.5 GREEN PURCHASING (JUN 2011)**

(a) In furtherance of the sustainable acquisition goals of Executive Order 13514, "Federal Leadership in Environmental, Energy, and Economic Performance" products and services provided under this contract/order shall be energy- efficient (Energy Star or Federal Energy Management Program (FEMP) designated), water-efficient, biobased, environmentally preferable (e.g., Electronic Product Environmental Assessment Tool (EPEAT) certified), non-ozone depleting, contain recycled content, or are non-toxic or less toxic alternatives, where such products and services meet agency performance requirements. <http://www.fedcenter.gov/programs/eo13514/>

(b) The contractor shall flow down this clause into all subcontracts and other agreements that relate to performance of this contract/order.

#### **A.6 BRANDING (AUG 2011)**

The Contractor is required to use the official NRC branding logo or seal on any publications, presentations, products, or materials funded under this contract, to the extent practical, in order to provide NRC recognition for its involvement in and contribution to the project. If the work performed is funded entirely with NRC funds, then the contractor must acknowledge that information in its documentation/presentation.

Access the following websites for branding information and specifications:  
<http://www.internal.nrc.gov/ADM/branding/> and Management Directive and Handbook 3.13 -

(internal NRC website): <http://www.internal.nrc.gov/policy/directives/toc/md3.13.htm>

(external public website): <http://pbadupws.nrc.gov/docs/ML1122/ML112280190.pdf>

#### **A.7 PACKAGING AND MARKING (AUG 2011)**

(a) The Contractor shall package material for shipment to the NRC in such a manner that will ensure acceptance by common carrier and safe delivery at destination. Containers and closures shall comply with the Surface Transportation Board, Uniform Freight Classification Rules, or regulations of other carriers as applicable to the mode of transportation.

(b) On the front of the package, the Contractor shall clearly identify the contract number under which the product is being provided.

(c) Additional packaging and/or marking requirements are as follows:

#### **A.8 ELECTRONIC PAYMENT (AUG 2011)**

The Debt Collection Improvement Act of 1996 requires that all payments except IRS tax refunds be made by Electronic Funds Transfer. Payment shall be made in accordance with FAR 52.232-33, entitled "Payment by Electronic Funds- Central Contractor Registration".

To receive payment, the contractor shall prepare invoices in accordance with NRC's Billing Instructions. Claims shall be submitted on the payee's letterhead, invoice, or on the Government's Standard Form 1034, "Public Voucher for Purchases and Services Other than Personal," and Standard Form 1035, "Public Voucher for Purchases Other

than Personal - Continuation Sheet." The preferred method of submitting invoices is electronically to the Department of the Interior at [NRCPayments\\_NBCDenver@nbc.gov](mailto:NRCPayments_NBCDenver@nbc.gov). If the contractor submits a hard copy of the invoice, it shall be submitted to the following address:

Department of the Interior  
National Business Center  
Attn: Fiscal Services Branch - D2770  
7301 West Mansfield Avenue  
Denver, CO 80235-2230

**A.9 USE OF AUTOMATED CLEARING HOUSE (ACH) ELECTRONIC PAYMENT/REMITTANCE ADDRESS (AUG 2011)**

The Debt Collection Improvement Act of 1996 requires that all Federal payments except IRS tax refunds be made by Electronic Funds Transfer. It is the policy of the Nuclear Regulatory Commission to pay government vendors by the Automated Clearing House (ACH) electronic funds transfer payment system. Item 15C of the Standard Form 33 may be disregarded.

**STATEMENT OF WORK**  
**Task Order No. 004**  
**Blanket Purchase Agreement NRC-DR-04-09-141**

**TITLE:** Technical Assistance for Thermal-Hydraulics and Severe Accidents for  
Pre-Application and Design Certification of Advanced Reactors  
(TASK 4 - CONFIRMATORY ANALYSES OF PLANT AND CONTAINMENT SYSTEM RESPONSE  
FOR iPWRs)

**I. BACKGROUND**

The U.S. Nuclear Regulatory Commission (NRC) will be receiving design certification applications for integral pressurized water reactors (iPWRs). The NRC had several interactions with Babcock & Wilcox Company and NuScale Power on mPower and NuScale reactor designs, respectively, and is expecting to receive pre-applications for the staff review. The Office of New Reactors (NRO) staff expects Westinghouse Electric Company and Holtec International Company to provide design information on their Small Modular Reactor (SMR) and Holtec Inherently Safe Modular Underground Reactor (HI-SMUR), respectively, in the future. NRO intends to proceed early to identify and examine key technical and policy issues related to these reactors. In support of these efforts, identifying unique and important phenomena, developing phenomena identification and ranking tables (PIRTs), developing computer code input models, and assessing code capabilities are important as they can provide insights into these policy and technical issues.

**II. SCOPE OF WORK**

This task order shall provide technical assistance in the identification of important phenomena and development of methods for analysis of containment design-basis accidents (DBAs) and beyond design-basis accidents (BDBAs) for light-water moderated and cooled integral pressurized reactor (iPWR) designs.

**III. SPECIFIC REQUIREMENTS**

**PIRT Development & MELCOR Code Applicability Assessment for mPower-like Design**

The contractor shall update the phenomena identification and ranking tables (PIRTs) that RES has developed for mPower-like and NuScale-like designs as needed to reflect design information presently available. The focus of PIRTs should be on thermal-fluids phenomena occurring inside the containment following a design-basis loss-of-coolant accident. The PIRTs shall then be used to perform a MELCOR code applicability assessment. The PIRTs and MELCOR code applicability assessment shall be based on any latest design and technical information provided by the applicants as part of pre-application discussions with NRC.

The assessment of the MELCOR computer code is expected to be used by NRC to support the planned reviews of mPower and NuScale licensing applications and other regulatory considerations. The results of this work are expected to provide basis, methods, and computer codes that will likely be used to review mPower and NuScale applications submitted for construction permit or design certification.

**DELIVERABLES/SCHEDULES AND/OR MILESTONES**

<b>Deliverable</b>	<b>Due Date</b>
Draft PIRT & MELCOR Applicability Assessment Report	3 months after award of contract

#### IV. REPORTING REQUIREMENTS

A Monthly Letter Status Report (MLSR) is to be submitted to the NRC Project Manager by the 20<sup>th</sup> of the month following the month to be reported with copies provided to the following:

[RESDSAMLSR.Resource@nrc.gov](mailto:RESDSAMLSR.Resource@nrc.gov)  
[ContractsPOT.Resource@nrc.gov](mailto:ContractsPOT.Resource@nrc.gov)

The MLSR will identify the title of the project, the job code, the Principal Investigator, the period of performance, the reporting period, summarize each month's technical progress, the monthly spending, total spending to date, and the remaining funds and will contain information as directed in NRC Management Directive 11.1. 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.

#### V. RESEARCH QUALITY

The quality of NRC research programs are assessed each year by the Advisory Committee on Reactor Safeguards. Within the context of their reviews of RES programs, the definition of quality research is based upon several major characteristics:

- Results meet the objectives (75% of overall score)
  - Justification of major assumptions (12%)
  - Soundness of technical approach and results (52%)
  - Uncertainties and sensitivities addressed (11%)

- Documentation of research results and methods is adequate (25% of overall score)
  - Clarity of presentation (16%)
  - Identification of major assumptions (9%)

It is the responsibility of the contractor to ensure that these quality criteria are adequately addressed throughout the course of the research that is performed. The NRC project manager and technical monitor will review all research products with these criteria in mind.

#### VI. TECHNICAL AND OTHER SPECIAL QUALIFICATIONS REQUIRED

The contractor shall provide personnel that are experienced in thermal hydraulics, severe accidents, containment analysis, and MELCOR models and correlations, code assessment, and iPWR designs.

#### VII. PLACE OF PERFORMANCE

All work performed under this contract shall be performed primarily at the contractor's site, except when the contractor needs to be on-site at NRC Headquarters in Rockville, MD, for meetings and discussions, and off-site locations designated by NRC Project Officer.

#### VIII. PUBLICATIONS NOTE

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, approval of the proposed article or

presentation should be obtained from the NRC Project Manager. 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 3.7, "NUREG Series Publications," 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.

### NEW STANDARDS FOR CONTRACTORS WHO PREPARE NUREG-SERIES MANUSCRIPTS

The U.S. Nuclear Regulatory Commission (NRC) began to capture most of its official records electronically on January 1, 2000. The NRC will capture each final NUREG-series publication in its native application. Therefore, please submit your final manuscript that has been approved by your NRC Project Manager in both electronic and camera-ready copy.

All format guidance, as specified in NUREG-0650, Revision 2, will remain the same with one exception. You will no longer be required to include the NUREG-series designator on the bottom of each page of the manuscript. The NRC will assign this designator when we send the camera-ready copy to the printer and will place the designator on the cover, title page, and spine. The designator for each report will no longer be assigned when the decision to prepare a publication is made. The NRC's Publishing Services Branch will inform the NRC Project Manager for the publication of the assigned designator when the final manuscript is sent to the printer.

For the electronic manuscript, the Contractor shall prepare the text in Microsoft Word, and use any of the following file types for charts, spreadsheets, and the like.

File Types to be Used for NUREG-Series Publications	
File Type	File Extension
Microsoft®Word®	.doc
Microsoft® PowerPoint®	.ppt
Microsoft®Excel	.xls
Microsoft®Access	.mdb
Portable Document Format	.pdf

This list is subject to change if new software packages come into common use at NRC or by our licensees or other stakeholders that participate in the electronic submission process. If a portion of your manuscript is from another source and you cannot obtain an acceptable electronic file type for this portion (e.g., an appendix from an old publication), the NRC can, if necessary, create a tagged image file format (file extension.tif) for that portion of your report. Note that you should continue to submit original photographs, which will be scanned, since digitized photographs do not print well.

If you choose to publish a compact disk (CD) of your publication, place on the CD copies of the manuscript in both (1) a portable document format (PDF); (2) a Microsoft Word file format, and (3) an Adobe Acrobat Reader, or, alternatively, print instructions for obtaining a free copy of Adobe Acrobat Reader on the back cover insert of the jewel box.

**IX. MEETINGS AND TRAVEL**

None planned

**X. NRC-FURNISHED MATERIAL**

The NRC will provide to the contractor information and design data for mPower and any available input data that is provided by the applicant. Proprietary submitted documentation will be provided by the NRC in the form of CD-ROMs.

The contractor shall be responsible for the protection of all NRC documentation in its possession during the course of contract performance in accordance with the procedures as set forth in NRC's policy entitled, Sensitive Unclassified Non-Safeguards Information (SUNSI), Handling Requirements for Proprietary Information.

**XI. TECHNICAL DIRECTION**

Technical direction will be provided by the Project Manager, Imtiaz Madni, who can be reached at:

U. S. Nuclear Regulatory Commission  
Mail Stop: CSB – 3A07M  
Washington, D. C. 20555-0001

Phone: (301) 251-7493  
Fax: (301) 251-7423  
Email: [Imtiaz.Madni@nrc.gov](mailto:Imtiaz.Madni@nrc.gov)

Express mail should be sent to:  
U. S. Nuclear Regulatory Commission  
Mail Stop: CSB – 3A07M  
11545 Rockville Pike  
Rockville, MD 20852-2738