

A.1 PRICE SCHEDULE

Summary:

Labor Category	Est. Hrs.	TOTAL
Executive	[REDACTED]	[REDACTED]
Executive Engineer / Scientist	[REDACTED]	[REDACTED]
Senior Engineer / Scientist	[REDACTED]	[REDACTED]
Engineer / Scientist	[REDACTED]	[REDACTED]
System Analyst	0	\$0.00
Support Staff	0	\$0.00
Senior Consulting Engineer	0	\$0.00
Executive Consulting Engineer	0	\$0.00
ODC's	[REDACTED]	[REDACTED]
Travel	[REDACTED]	[REDACTED]
TOTAL	[REDACTED]	\$178,296.88

Award date (Est. September 23, 2009) – December 31, 2009

Labor Category	Est. Hrs.	ERI's	
		Proposed rate	TOTAL
Executive	[REDACTED]	[REDACTED]	[REDACTED]
Executive Engineer / Scientist	[REDACTED]	[REDACTED]	[REDACTED]
Senior Engineer / Scientist	[REDACTED]	[REDACTED]	[REDACTED]
Engineer / Scientist	[REDACTED]	[REDACTED]	[REDACTED]
System Analyst	0	[REDACTED]	\$0.00
Support Staff	0	[REDACTED]	\$0.00
Senior Consulting Engineer	0	[REDACTED]	\$0.00
Executive Consulting Engineer	0	[REDACTED]	\$0.00
ODC's	[REDACTED]	[REDACTED]	[REDACTED]
Travel	[REDACTED]	[REDACTED]	[REDACTED]
TOTAL	[REDACTED]	[REDACTED]	\$76,762.48

January 1, 2010 – May 22, 2010

Labor Category	Est. Hrs.	ERI's	
		Proposed rate	TOTAL
Executive	[REDACTED]	[REDACTED]	[REDACTED]
Executive Engineer / Scientist	[REDACTED]	[REDACTED]	[REDACTED]
Senior Engineer / Scientist	[REDACTED]	[REDACTED]	[REDACTED]
Engineer / Scientist	[REDACTED]	[REDACTED]	[REDACTED]
System Analyst	0	[REDACTED]	\$0.00
Support Staff	0	[REDACTED]	\$0.00
Senior Consulting Engineer	0	[REDACTED]	\$0.00
Executive Consulting Engineer	0	[REDACTED]	\$0.00
ODC's	[REDACTED]	[REDACTED]	[REDACTED]
Travel	[REDACTED]	[REDACTED]	[REDACTED]
TOTAL	[REDACTED]	[REDACTED]	\$101,534.40

A.2 CONSIDERATION AND OBLIGATION – LABOR HOUR

- (a) The total not to exceed cost to the Government for full performance of this contract is \$178,296.88.
- (b) The amount currently obligated by the Government with respect to this contract is \$50,000.00. The contractor shall not exceed this obligated amount at any time.
- (c) It is estimated that the amount currently allotted will cover performance through November 30, 2009.

A.3 DELIVERY SCHEDULE

All reports shall be submitted electronically as a Microsoft Word, WordPerfect, or PDF file to the Project Officer and Contracting Officer. In addition to the MLRSRs/Technical Progress Reports, additional deliverables are listed below:

Task 1: Characterization of Input Data Requirements and PIRT Review

Complete a letter report on data requirements, information gaps and PIRT review
1.5 months*

Task 2: Development of TRACE and SNAP Input Models

- 1. Complete development of preliminary LOCA model 1.5 months*
- 2. Complete development of final LOCA model 4 months*
- 3. Complete development of preliminary AOO models 4.5 months*
- 4. Complete development of final AOO models 6 months*

Task 3: Run TRACE Demonstration Calculations and Prepare Analysis Reports

- 1. Complete preliminary LOCA calculations and analysis report 3 months*
- 2. Complete final LOCA calculations and analysis report 4.5 months*
- 3. Complete preliminary AOO calculations and analysis report 5 months*
- 4. Complete final AOO calculations and analysis report 6.5 months*

*from date of contract award.

Three CDs of all specified deliverables shall be sent to the NRC project manager.

When using a computer outside of a facility that has been approved by the NRC-designated approving authorities (DAAs) for NRC information processing, the user is responsible to ensure that full-disk encryption technology has been used to encrypt the entire disk(s).

For all media containing electronic sensitive information, the user must ensure that the information stored on the media is encrypted when the media is outside of a facility that has been approved by NRC DAAs for NRC information processing. Examples of media include, but are not limited to, compact disks (CDs), digital video disks (DVDs), thumb drives, backups, and external hard drives. All media must be appropriately labeled and controlled according to the sensitivity of information stored on the media.

When encryption of unclassified sensitive information is required, unclassified, sensitive information must be encrypted using FIPS 140-2 validated encryption or encryption approved by the National Security Agency for protection of classified information.

A.4 PLACE OF DELIVERY--REPORTS (JUN 1988)

The items to be furnished hereunder shall be delivered, with all charges paid by the Contractor, to:

- (a) Project Officer (3 electronic copies)
- (b) Contracting Officer (1 copy) – Please send to:

US NRC
Mail Stop: TWB-01-B10M
Attn: Order No. NRC-DR-04-09-168
Washington DC, 20555

A.5 2052.215-71 PROJECT OFFICER AUTHORITY (NOVEMBER 2006)

(a) The contracting officer's authorized representative (hereinafter referred to as the project officer) for this contract is:

Name: Kenneth Armstrong

Mail Stop: C3A7M
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555-0001

Phone: 301-251-7551
Email: kenneth.armstrong@nrc.gov

(b) Performance of the work under this contract is subject to the technical direction of the NRC project officer. The term "technical direction" is defined to include the following:

(1) Technical direction to the contractor which shifts work emphasis between areas of work or tasks, authorizes travel which was unanticipated in the Schedule (i.e., travel not contemplated in the Statement of Work (SOW) or changes to specific travel identified in the SOW), fills in details, or otherwise serves to accomplish the contractual SOW.

(2) Provide advice and guidance to the contractor in the preparation of drawings, specifications, or technical portions of the work description.

(3) Review and, where required by the contract, approval of technical reports, drawings, specifications, and technical information to be delivered by the contractor to the Government under the contract.

(c) Technical direction must be within the general statement of work stated in the contract. The project officer does not have the authority to and may not issue any technical direction which:

(1) Constitutes an assignment of work outside the general scope of the contract.

(2) Constitutes a change as defined in the "Changes" clause of this contract.

(3) In any way causes an increase or decrease in the total estimated contract cost, the fixed fee, if any, or the time required for contract performance.

(4) Changes any of the expressed terms, conditions, or specifications of the contract.

(5) Terminates the contract, settles any claim or dispute arising under the contract, or issues any unilateral directive whatever.

(d) All technical directions must be issued in writing by the project officer or must be confirmed by the project officer in writing within ten (10) working days after verbal issuance. A copy of the written direction must be furnished to the contracting officer. A copy of NRC Form 445, Request for Approval of Official Foreign Travel, which has received final approval from the NRC must be furnished to the contracting officer.

(e) The contractor shall proceed promptly with the performance of technical directions duly issued by the project officer in the manner prescribed by this clause and within the project officer's authority under the provisions of this clause.

(f) If, in the opinion of the contractor, any instruction or direction issued by the project officer is within one of the categories as defined in paragraph (c) of this section, the contractor may not proceed but shall notify the contracting officer in writing within five (5) working days after the receipt of any instruction or direction and shall request the contracting officer to modify the contract accordingly. Upon receiving the notification from the contractor, the contracting officer shall issue an appropriate contract modification or advise the contractor in writing that, in the contracting officer's opinion, the technical direction is within the scope of this article and does not constitute a change under the "Changes" clause.

(g) Any unauthorized commitment or direction issued by the project officer may result in an unnecessary delay in the contractor's performance and may even result in the contractor expending funds for unallowable costs under the contract.

(h) A failure of the parties to agree upon the nature of the instruction or direction or upon the contract action to be taken with respect thereto is subject to 52.233-1 -Disputes.

(i) In addition to providing technical direction as defined in paragraph (b) of the section, the project officer shall:

(1) Monitor the contractor's technical progress, including surveillance and assessment of performance, and recommend to the contracting officer changes in requirements.

(2) Assist the contractor in the resolution of technical problems encountered during performance.

(3) Review all costs requested for reimbursement by the contractor and submit to the contracting officer recommendations for approval, disapproval, or suspension of payment for supplies and services required under this contract.

(4) Assist the contractor in obtaining the badges for the contractor personnel.

(5) Immediately notify the Security Branch, Division of Facilities and Security (SB/DFS) (via e-mail) when a contractor employee no longer requires access authorization and return of any NRC issued badge to SB/DFS within three days after their termination.

(6) Ensure that all contractor employees that require access to classified Restricted Data or National Security Information or matter, access to sensitive unclassified information (Safeguards, Official Use Only, and Proprietary information) access to sensitive IT systems or data, unescorted access to NRC controlled buildings/space, or unescorted access to protected and vital areas of nuclear power plants receive approval of SB/DFS prior to access in accordance with Management Directive and Handbook 12.3.

(7) For contracts for the design, development, maintenance or operation of Privacy Act Systems of Records, obtain from the contractor as part of closeout procedures, written certification that the contractor has returned to NRC, transferred to the successor contractor, or destroyed at the end of the contract in accordance with instructions provided by the NRC Systems Manager for Privacy Act Systems of Records, all records (electronic or paper) which were created, compiled, obtained or maintained under the contract.

A.6 2052.211-71 TECHNICAL PROGRESS REPORT (JAN 1993)

The contractor shall provide a monthly Technical Progress Report to the following:

Resource Name: RESDSAMLSR.Resource@nrc.gov

The report is due within 15 calendar days after the end of the report period and must identify the title of the project, the contract number, appropriate financial tracking code specified by the NRC Project Officer, project manager and/or principal investigator, the contract period of performance, and the period covered by the report. Each report must include the following for each discrete task/task order:

- (a) A listing of the efforts completed during the period, and milestones reached or, if missed, an explanation provided;
- (b) Any problems or delays encountered or anticipated and recommendations for resolution. If the recommended resolution involves a contract modification, e.g., change in work requirements, level of effort (cost) or schedule delay, the contractor shall submit a separate letter to the contracting officer identifying the required change and estimated cost impact.
- (c) A summary of progress to date; and
- (d) Plans for the next reporting period.

A.7 2052.209-72 CONTRACTOR ORGANIZATIONAL CONFLICTS OF INTEREST (JAN 1993)

(a) Purpose. The primary purpose of this clause is to aid in ensuring that the contractor:

(1) Is not placed in a conflicting role because of current or planned interests (financial, contractual, organizational, or otherwise) which relate to the work under this contract; and

(2) Does not obtain an unfair competitive advantage over other parties by virtue of its performance of this contract.

(b) Scope. The restrictions described apply to performance or participation by the contractor, as defined in 48 CFR 2009.570-2 in the activities covered by this clause.

(c) Work for others.

(1) Notwithstanding any other provision of this contract, during the term of this contract, the contractor agrees to forego entering into consulting or other contractual arrangements with any firm or organization the result of which may give rise to a conflict of interest with respect to the work being performed under this contract. The contractor shall ensure that all employees under this contract abide by the provision of this clause. If the contractor has reason to believe, with respect to itself or any employee, that any proposed consultant or other contractual arrangement with any firm or organization may involve a potential conflict of interest, the contractor shall obtain the written approval of the contracting officer before the execution of such contractual arrangement.

(2) The contractor may not represent, assist, or otherwise support an NRC licensee or applicant undergoing an NRC audit, inspection, or review where the activities that are the subject of the audit, inspection, or review are the same as or substantially similar to the services within the scope of this contract (or task order as appropriate) except where the NRC licensee or applicant requires the contractor's support to explain or defend the contractor's prior work for the utility or other entity which NRC questions.

(3) When the contractor performs work for the NRC under this contract at any NRC licensee or applicant site, the contractor shall neither solicit nor perform work in the same or similar technical area for that licensee or applicant organization for a period commencing with the award of the task order or beginning of work on the site (if not a task order contract) and ending one year after completion of all work under the associated task order, or last time at the site (if not a task order contract).

(4) When the contractor performs work for the NRC under this contract at any NRC licensee or applicant site,

(i) The contractor may not solicit work at that site for that licensee or applicant during the period of performance of the task order or the contract, as appropriate.

(ii) The contractor may not perform work at that site for that licensee or applicant during the period of performance of the task order or the contract, as appropriate, and for one year thereafter.

(iii) Notwithstanding the foregoing, the contracting officer may authorize the contractor to solicit or perform this type of work (except work in the same or similar technical area) if the contracting officer determines that the situation will not pose a potential for technical bias or unfair competitive advantage.

(d) Disclosure after award.

(1) The contractor warrants that to the best of its knowledge and belief, and except as otherwise set forth in this contract, that it does not have any organizational conflicts of interest as defined in 48 CFR 2009.570-2.

(2) The contractor agrees that if, after award, it discovers organizational conflicts of interest with respect to this contract, it shall make an immediate and full disclosure in writing to the contracting officer. This statement must include a description of the action which the contractor has taken or proposes to take to avoid or mitigate such conflicts. The NRC may, however, terminate the contract if termination is in the best interest of the Government.

(3) It is recognized that the scope of work of a task-order-type contract necessarily encompasses a broad spectrum of activities. Consequently, if this is a task-order-type contract, the contractor agrees that it will disclose all proposed new work involving NRC licensees or applicants which comes within the scope of work of the underlying contract. Further, if this contract involves work at a licensee or applicant site, the contractor agrees to exercise diligence to discover and disclose any new work at that licensee or applicant site. This disclosure must be made before the submission of a bid or proposal to the utility or other regulated entity and must be received by the NRC at least 15 days before the proposed award date in any event, unless a written justification demonstrating urgency and due diligence to discover and disclose is provided by the contractor and approved by the contracting officer. The disclosure must include the statement of work, the dollar value of the proposed contract, and any other documents that are needed to fully describe the proposed work for the regulated utility or other regulated entity. NRC may deny approval of the disclosed work only when the NRC has issued a task order which includes the technical area and, if site-specific, the site, or has plans to issue a task order which includes the technical area and, if site-specific, the site, or when the work violates paragraphs (c)(2), (c)(3) or (c)(4) of this section.

(e) Access to and use of information.

(1) If in the performance of this contract, the contractor obtains access to information, such as NRC plans, policies, reports, studies, financial plans, internal data protected by the Privacy Act of 1974 (5 U.S.C. Section 552a (1988)), or the Freedom of Information Act (5 U.S.C. Section 552 (1986)), the contractor agrees not to:

(i) Use this information for any private purpose until the information has been released to the public;

(ii) Compete for work for the Commission based on the information for a period of six months after either the completion of this contract or the release of the information to the public, whichever is first;

(iii) Submit an unsolicited proposal to the Government based on the information until one year after the release of the information to the public; or

(iv) Release the information without prior written approval by the contracting officer unless the information has previously been released to the public by the NRC.

(2) In addition, the contractor agrees that, to the extent it receives or is given access to proprietary data, data protected by the Privacy Act of 1974 (5 U.S.C. Section 552a (1988)), or the Freedom of Information Act (5 U.S.C. Section 552 (1986)), or other confidential or privileged technical, business, or financial information under this contract, the contractor shall treat the information in accordance with restrictions placed on use of the information.

(3) Subject to patent and security provisions of this contract, the contractor shall have the right to use technical data it produces under this contract for private purposes provided that all requirements of this contract have been met.

(f) Subcontracts. Except as provided in 48 CFR 2009.570-2, the contractor shall include this clause, including this paragraph, in subcontracts of any tier. The terms contract, contractor, and contracting officer, must be appropriately modified to preserve the Government's rights.

(g) Remedies. For breach of any of the above restrictions, or for intentional nondisclosure or misrepresentation of any relevant interest required to be disclosed concerning this contract or for such erroneous representations that necessarily imply bad faith, the Government may terminate the contract for default, disqualify the contractor from subsequent contractual efforts, and pursue other remedies permitted by law or this contract.

(h) Waiver. A request for waiver under this clause must be directed in writing to the contracting officer in accordance with the procedures outlined in 48 CFR 2009.570-9.

(i) Follow-on effort. The contractor shall be ineligible to participate in NRC contracts, subcontracts, or proposals therefore (solicited or unsolicited), which stem directly from the contractor's performance of work under this contract. Furthermore, unless so directed in writing by the contracting officer, the contractor may not perform any technical consulting or management support services work or evaluation activities under this contract on any of its products or services or the products or services of another firm if the contractor has been substantially involved in the development or marketing of the products or services.

(1) If the contractor, under this contract, prepares a complete or essentially complete statement of work or specifications, the contractor is not eligible to perform or participate in the initial contractual effort which is based on the statement of work or specifications. The contractor may not incorporate its products or services in the statement of work or specifications unless so directed in writing by the contracting officer, in which case the restrictions in this paragraph do not apply.

(2) Nothing in this paragraph precludes the contractor from offering or selling its standard commercial items to the Government.

A.8 2052.215-70 KEY PERSONNEL (JAN 1993)

(a) The following individuals are considered to be essential to the successful performance of the work hereunder:



The contractor agrees that personnel may not be removed from the contract work or replaced without compliance with paragraphs (b) and (c) of this section.

(b) If one or more of the key personnel, for whatever reason, becomes, or is expected to become, unavailable for work under this contract for a continuous period exceeding 30 work days, or is expected to devote substantially less effort to the work than indicated in the proposal or initially anticipated, the contractor shall immediately notify the contracting officer and shall, subject to the concurrence of the contracting officer, promptly replace the personnel with personnel of at least substantially equal ability and qualifications.

(c) Each request for approval of substitutions must be in writing and contain a detailed explanation of the circumstances necessitating the proposed substitutions. The request must also contain a complete resume for the proposed substitute and other information requested or needed by the contracting officer to evaluate the proposed substitution. The contracting officer and the project officer shall evaluate the contractor's request and the contracting officer shall promptly notify the contractor of his or her decision in writing.

(d) If the contracting officer determines that suitable and timely replacement of key personnel who have been reassigned, terminated, or have otherwise become unavailable for the contract work is not reasonably forthcoming, or that the resultant reduction of productive effort would be so substantial as to impair the successful completion of the contract or the service order, the contract may be terminated by the contracting officer for default or for the convenience of the Government, as appropriate. If the contracting officer finds the contractor at fault for the condition, the contract price or fixed fee may be equitably adjusted downward to compensate the Government for any resultant delay, loss, or damage.

A.9 DISSEMINATION OF INFORMATION

There shall be no dissemination or publication, except within and between the Contractor and any subcontractors, of information developed under this contract or contained in the reports to be furnished pursuant to this contract without prior written approval from the Contracting Officer.

A.10 RELEASE OF REPORTS

The Contractor is prohibited from releasing to any source, other than the sponsoring activity, any interim, draft and final reports or information pertaining to services performed under this contract until report approval or official review has been obtained. Furthermore, the contractor shall insure that the cover of all interim, draft and final reports contain the following statement: "The view, opinions, and/or findings contained in this report are those of the author(s) and should not be construed as an official Government position, policy or decision, unless so designated by other documentation."

A.11 RELEASE OF NEWS INFORMATION

No news release (including photographs and films, public announcements, denial or confirmation of same) on any part of the subject matter of this contract or any phase of any program hereunder shall be made without the prior written approval of the Contracting Officer.

A.12 GOVERNMENT FURNISHED EQUIPMENT/PROPERTY (JANUARY 2001)

(a) NRC will supply necessary reactor, fuel, and core design information including the lattice parameters, fuel type, core design, and exposure to support the TRACEW/PARCS model developments. The staff will also provide all listed references in the SOW. This information will be provided within 2 weeks of the award of contract.

(b) The above listed equipment/property is hereby transferred from contract/agreement: N/A.

(c) Only the equipment/property listed above in the quantities shown will be provided by the Government. The contractor shall be responsible and accountable for all Government property provided under this contract and shall comply with the provisions of the FAR Government Property Clause under this contract and FAR Subpart 45.5, as in effect on the date of this contract. The contractor shall investigate and provide written notification to the NRC Contracting Officer (CO) and the NRC Division of Facilities and Security, Physical Security Branch of all cases of loss, damage, or destruction of Government property in its possession or control not later than 24 hours after discovery. The contractor must report stolen Government property to the local police and a copy of the police report must be provided to the CO and to the Division of Facilities and Security, Physical Security Branch.

(d) All other equipment/property required in performance of the contract shall be furnished by the Contractor.

A. 13 APPROPRIATE USE OF GOVERNMENT FURNISHED INFORMATION TECHNOLOGY (IT) EQUIPMENT AND/ OR IT SERVICES/ ACCESS (APRIL 2003)

As part of contract performance the NRC may provide the contractor with information technology (IT) equipment and IT services or IT access as identified in the statement of work or subsequently as identified in the project. Government furnished IT equipment, or IT services, or IT access may include but is not limited to computers, copiers, facsimile machines, printers, pagers, software, phones, Internet access and use, and email access and use. The contractor (including the contractor's employees, consultants and subcontractors) shall use the NRC furnished IT equipment, and/or IT provided services, and/or IT access solely to perform the necessary efforts required under the contract. The contractor (including the contractor's employees, consultants and subcontractors) are prohibited from engaging or using the NRC IT equipment and government provided IT services or IT access for any personal use, misuse, abuses or any other unauthorized usage.

The contractor is responsible for monitoring its employees, consultants and subcontractors to ensure that NRC furnished IT equipment and/or IT services, and/or IT access are not being used for personal use, misused or abused. The NRC reserves the right to withdraw or suspend the use of its government furnished IT equipment, IT services and/ or IT access arising from contractor personal usage, or misuse or abuse; and/or to disallow any payments associated with contractor (including the contractor's employees, consultants and subcontractors) personal usage, misuses or abuses of IT equipment, IT services and/or IT access; and/or to terminate the project arising from violation of this provision.

A.14 COMPLIANCE WITH U.S. IMMIGRATION LAWS AND REGULATIONS

NRC contractors are responsible to ensure that their alien personnel are not in violation of United States Immigration and Naturalization (INS) laws and regulations, including employment authorization documents and visa requirements. Each alien employee of the Contractor must be lawfully admitted for permanent residence

as evidenced by Alien Registration Receipt Card Form 1-151 or must present other evidence from the Immigration and Naturalization Services that employment will not affect his/her immigration status. The INS Office of Business Liaison (OBL) provides information to contractors to help them understand the employment eligibility verification process for non-US citizens. This information can be found on the INS website, <http://www.ins.usdoj.gov/graphics/services/employerinfo/index.htm#obl>.

A.15 OPTION PERIODS - TASK ORDER/DELIVERY ORDER UNDER A GSA FEDERAL SUPPLY SCHEDULE CONTRACT (MARCH 2007)

The Period of Performance (PoP) for this requirement may extend beyond the Offeror's current PoP on their GSA Schedule. Offerors may submit proposals for the entire PoP as long as their current GSA Schedule covers the requested PoP, or their GSA Schedule contains GSA's "Evergreen Clause" (Option to Extend the Term of the Contract), which covers the requested PoP if/when the option(s) are exercised. Offerors are encouraged to submit accurate/realistic pricing for the requirement's entire PoP, even if the proposed GSA Schedule does not include pricing for the applicable option years, etc.

For proposal evaluation purposes, the NRC assumes that applicable Evergreen Clause Option(s) will be exercised and the NRC will apply price analysis, as applicable. It is in the best interest of the Offeror to explain major deviations in escalation, proposed in any Evergreen Clause option years. Resulting GSA task/delivery order option years subject to the Evergreen

Clause will be initially priced utilizing the same rates proposed under the last GSA-priced year of the subject GSA Schedule. Upon GSA's exercise of the GSA Schedule option year(s) applicable to the Evergreen Clause, the NRC will modify the awarded task/delivery order to incorporate either the proposed pricing for the option years or the GSA-approved pricing (whichever is lower).

It is incumbent upon the Offeror to provide sufficient documentation (GSA-signed schedule, schedule modifications, etc.) that shows both the effective dates, pricing and terms/conditions of the current GSA Schedule, as well as Evergreen Clause terms/conditions (as applicable). Failure to provide this documentation may result in the Offeror's proposal being found unacceptable.

A.16 2052.211-70 PREPARATION OF TECHNICAL REPORTS (JAN 1993)

The final report is to be prepared in accordance with NRC Management Directive 3.7, "NUREG Series Publications." Management Directive 3.7 is not applicable to any Contractor Spending Plan (CSP) and any Financial Status Report that may be included in this contract. Management Directive 3.7 may be accessed electronically at the following address: <http://www.nrc.gov/reading-rm/doc-collections/nuregs/>

A.17 FEDERAL ACQUISITION REGULATION CLAUSES INCORPORATED BY REFERENCE:

52.227-17 RIGHTS IN DATA – SPECIAL WORKS (DEC 2007)

52.245-1 GOVERNMENT PROPERTY (JUN 2007)

52.243-3 CHANGES – TIME-AND-MATERIALS OR LABOR-HOURS (SEP 2000)

A.18 SEAT BELTS

Contractors, subcontractors, and grantees, are encouraged to adopt and enforce on-the-job seat belt policies and programs for their employees when operating company-owned, rented, or personally owned vehicles.

A.19 WHISTLEBLOWER PROTECTION FOR NRC CONTRACTOR AND SUBCONTRACTOR EMPLOYEES (JULY 2006)

(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.

(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.

STATEMENT OF WORK

TITLE: TRACE Input Models for NuScale

I. BACKGROUND

TRACE input models for the NuScale reactor have been requested by the Office of New Reactors (NRO) to support the confirmatory analyses of the limiting loss-of-coolant accident (LOCA) and anticipated operational occurrence (AOO) transient. In addition, NRO has also requested PARCS input models to support the TRACE AOO calculations. Since this passively safe small reactor has not yet been modeled with TRACE, the applicability of the code to the analysis of these events will be investigated.

II. OBJECTIVE

Develop TRACE/ PARCS plant models based on the preliminary NuScale design to support the confirmatory analyses of the limiting LOCA and AOO events. Investigate the applicability of TRACE to the analyses of these events.

III. SCOPE OF WORK

Task 1: Characterization of Input Data Requirements and PIRT Review

The contractor shall:

1. Gather available information to understand the design principles of NuScale. Characterize and rank design differences between NuScale and a passively safe new reactor in terms of LOCA and AOOs.
2. Determine data needs for LOCA and AOOs, including PARCS. Reports such as the draft Design Control Document (DCD), Draft Licensing Topical Reports (LTRs), and available plant model calculation notebooks, shall be used to locate this information. Data not located in these documents shall be noted. Review the fuel and core design specification documents to be provided by the staff and identify any additional information that is needed to develop the input models.
3. Examine NuScale relative to existing event specific phenomena identification and ranking tables (PIRTs) for passively safe new PWRs, and in particular the AP1000. The contractor shall determine applicability of the previous LOCA and AOO PIRTs to NuScale and recommend NuScale input parameters for event specific sensitivity calculations.
4. Summarize the review findings and shall identify additional data requirements in a letter report.

The project manager will fill in data gaps or recommend suitable approximation.

Task 2: Development of TRACE Input Models

The contractor shall:

Develop preliminary as well as final input decks for TRACE and Symbolic Nuclear Analysis Package (SNAP) to model the limiting LOCA and select AOO events. The models shall be based on the NuScale draft DCD Codes and Methods Report [1] and other NuScale specific design documents to be provided by the staff. The contractor shall start either with preliminary TRACE or RELAP5 decks or a NuScale calculation notebook to be provided by the staff. The project manager will provide guidance on modeling

assumptions to be used for unique design features. Project manager written approval shall be required for deviating from documented technical direction.

The TRACE input files shall be restarts from steady state. The SNAP files shall be created by importing the TRACE restart decks into the steady state SNAP model. The lattice parameters to be used with AOO models will be provided by the NRC staff.

(a) *Limiting LOCA Model*

The contractor shall develop the limiting LOCA model with corresponding steady state inputs.

(b) *AOO Models*

The contractor shall develop NuScale models with corresponding steady state inputs for the following AOOs:

- Loss of External Load
- Uncontrolled Control Rod Assembly Withdrawal

The AOO decks shall have the following modeling features:

- A three-dimensional PARCS model using PMAXS files to be developed with Task 2 and core geometry to be supplied by the NRC.
- Sufficient core modeling detail to capture the response of the three-dimensional core during the limiting AOO event.
- NuScale specific containment and passive safety system models.
- A control system model capable of simulating the response of the safety system.

Using the core design specific cross-sections and kinetics parameters developed with Task 2.

Task 3: Run TRACE Demonstration Calculations and Prepare Analysis Reports

The contractor shall:

Run demonstration calculations and prepare analysis reports for each of the NuScale decks developed in Task 2. The work shall closely follow the development of the specific input model. The demonstration calculations for each deck shall commence as soon as the model for the specific event is completed.

All model development and changes shall be documented in calculation notebooks. The TRACE calculation notebook and input model development shall follow the TRACE PWR Input Model Calculation Notebook Development [2] outline and guidance documents referenced in this SOW. If in the course of developing plant models the contractor identifies deficiencies in TRACE user guidance, the contractor shall document these and recommend changes. Input model development shall also adhere to the guidance provided in the User's Manual for the TRACE 5.0 code. The table of contents for the calculation notebooks shall be similar to the one used in reference [3] entitled "The CE System 80 Calculation Notebook" [INEL-94/0247 Volume 1 (ML071770210) and Volume 2 (ML071770349)]. Plant specific reports shall be fully completed during the contract period.

The cases associated with these TRACE code runs shall use the SNAP AVScript plug-in AVF and code input files prepared for each case. All calculations shall be documented in a TRACE Model User Description and Analysis Report written in Framemaker which shall follow the TRACE User Description and Analysis Report Outline document [4]. All figures present in the Framemaker assessment report

documents shall exist as separate files on disk and linked to the files using the "import by reference feature" of Framemaker. All plant reports shall also be made available in Adobe PDF and Rich Text Format (RTF). Exceptions to this requirement shall be approved by the project manager.

Where applicable, results for each model shall be compared to previous analyses (results of steady state, limiting LOCA and AOO analyses published in the draft NuScale DCD, LTRs, etc.). Results shall be summarized in an analysis report.

All models shall run to completion on Microsoft Windows platforms, with SNAP and TRACE executables provided by the staff, within acceptable CPU times and without user intervention.

- (a) Any sustained timestep reductions below 10^{-4} seconds lasting more than a few seconds of modeling time shall be an indication of either modeling or code error and shall be reportable after the contractor makes every effort to identify and correct input deficiencies in the model.
- (b) For the steady state, real-time execution is preferred (CPU time = modeled time). No steady state run shall take longer than three times the modeled time to converge.
- (c) For large break LOCAs the CPU time shall not exceed ten times the modeled time.
- (d) For small break LOCAs the CPU time shall not exceed five times the modeled time. In addition, the code should be able to sustain a timestep range of 0.025 - 0.1 seconds through the entire event.
- (e) For AOOs the CPU time shall not exceed fifty times the modeled time. In addition, the code should be able to sustain a timestep range of 0.01 - 0.02 seconds through the entire event

The above criteria assume that all TRACE modeling guidelines are followed. The contractor should immediately notify the project manager if the above criteria can not be met.

Task 4: Program Management and Assistance

The contractor shall:

Prepare monthly letter status reports, interface with NRC staff and perform the necessary administrative functions in support of this work.

IV. 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.

V. TECHNICAL AND OTHER SPECIAL QUALIFICATIONS REQUIRED

- A senior engineer with experience developing and running TRACE/PARCS shall perform the work.
- A principal investigator shall ensure that high quality TRACE/PARCS decks are delivered to the NRC and that only staff with a proven record of producing quality products will be assigned to any identified task.

VI. PERIOD OF PERFORMANCE

8 months from award of contract

VII. 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.

VIII. MEETINGS AND TRAVEL

For domestic travel, the contractor is expected to attend two meetings at the NRC in Rockville, MD, for reviews. The trips will be of approximately two days duration. All trips have to obtain approval from the NRC project manager in advance.

REFERENCES

1. Codes and Methods Report for the NuScale Power Module, NuScale Power Inc., November 2008 (ML083390538)
2. TRACE PWR Input Model Calculation Notebook Development
3. CE System 80 Calculation Notebook [INEL-94/0247 Vol.1 (ML071770210) and Vol. 2 (ML071770349)]
4. TRACE Model User Description and Analysis Report Outline