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**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
WASHINGTON, D.C. 20555-0001

February 4, 2000

Science Applications International Corporation
Energy Systems Group
ATTN.: Ms. Helena L. Yowell
Senior Contract Representative
20201 Century Boulevard
Germantown, Maryland 20874

**SUBJECT: TASK ORDER NO. 40 ENTITLED "TECHNICAL ASSISTANCE FOR THE
SABOTAGE EVALUATION OF SPENT FUEL STORAGE CASKS" UNDER
CONTRACT NO. NRC-02-95-003**

Dear Ms. Yowell:

In accordance with Section G.4(c) of the subject contract entitled "Task Order Award," of the subject contract, this letter definitizes the subject task order. This effort shall be performed in accordance with the enclosed Statement of Work .

Task Order No. 40 shall be in effect from January 28, 2000 through May 15, 2000. As indicated in Section 9.0 of the attached Statement of Work, if the NRC authorizes the contractor to proceed with Subtask D, then the period of performance shall be extended until July 28, 2000.

The total cost ceiling is \$346,415.00, of which the sum of \$319,277.00 represents the reimbursable costs and the sum of \$27,139.00 represents the fixed fee. The cost ceiling of \$346,415.00 includes costs for performance of Optional Subtask D. The total cost for Optional Subtask D is \$134,456.00, of which the sum of \$123,923.00 represents the reimbursable costs and the sum of \$10,533.00 represents the fixed fee.

This task order obligates funds in the amount of \$180,000.00.

The obligated amount shall, at no time, exceed the task order ceiling. 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 task order. Any work undertaken by the Contractor in excess of the obligated amount specified above is done so at the Contractor's sole risk.

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NRC-02-95-003 - Task Order No. 40

Accounting data for this task order is as follows:

B&R No.:	05015201110
FFS No.:	5000R048
Job Code No.:	J5074
BOC:	252A
APPN No.:	31X0200
OBLIGATED AMOUNT:	\$180,000.00

The following individuals are considered essential to the successful performance of the work hereunder: Mr. John Stokley, Mr. Robert Britt, Dr. Gerald Kent, Mr. Dale Ranta, Mr. Jofu Mishima, Dr. Joseph Price, Mr. Greg Martin, Mr. Steven Mirsky, Dr. Reginald Gotchy, Dr. Geoffrey Kaiser, Dr. Frank Wimpey.

The Contractor agrees that such personnel shall not be removed from the effort under the task order without compliance with Contract Clause H.5, Key Personnel.

Your contacts during the course of this task are:

Technical Matters:	Donald Stout, Technical Monitor (301) 415-7218
	Edwin Flack, Technical Monitor (301) 415-8115
	Penelope Kinney, Project Officer (301) 415-7805
Contractual Matters:	Joyce Fields, Contracting Officer (301) 415-6564

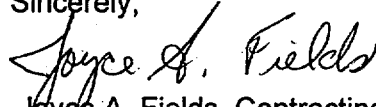
The issuance of this task order does not amend any terms or conditions of the subject contract.

Please indicate your acceptance of this task order by having an official, authorized to bind your organization, execute three (3) copies of this document in the space provided below and return two (2) copies to the U.S. Nuclear Regulatory Commission, ATTN.: Ms. Joyce Fields, Division

NRC-02-95-003 - Task Order No. 40

of Contracts and Property Management, T-712, ADM/DCPM/CMB2, Washington, D.C. 20555.
You should retain the third copy for your records.

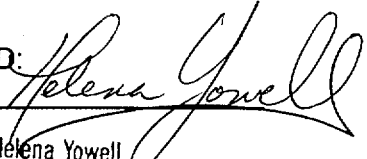
Sincerely,



Joyce A. Fields, Contracting Officer
Contract Management Branch No. 2
Division of Contracts and
Property
Office of Administration

Enclosure:
As stated

ACCEPTED:



NAME

Helena Yowell

TITLE

Senior Contract Representative

DATE

2/7/00

Contract/Task Title:	StorageCasks	Sabotage Evaluation of Spent Fuel
Contractor:		SAIC
Contract No.:		NRC-02-95-003
Task Order Number:		40
Task/Job Control Number:		J5074
B&R Number:		5015201110
Technical Project Manager (TPM):		DStout/EFlack
Technical Assistance Project Manager (TAPM):		Penelope Kinney
Fee Recoverable:		No

STATEMENT OF WORK

1.0 Background

In 1995 Science Applications International Corporation (SAIC) analyzed the potential impact of a vehicle bomb attack on three spent fuel storage casks. This work was done for the NRC as Task Order 31 under contract NRC-02-90-009. Under this task order, SAIC delivered several Safeguards Information reports to the NRC, including the following:

- J. R. Stokley, G. I. Kent, P. C Owczarski, *et al*, "Effect of Spent Fuel Cask Design on Mitigation of Radiological Impacts From Vehicle Bomb Attack," Oct. 27, 1995
- J. R. Stokley, G. I. Kent, D. E. Ranta, "Sensitivity Study of Models for Characterizing the Structural Response of Nodular Cast Iron Casks at ISFSIs to Vehicle Bomb Attack," Dec. 1995
- J. R. Stokley, G. I. Kent, D. E. Ranta, R. J. Britt, "Structural Response of Two Representative Casks at ISFSIs to Vehicle Bomb Attack," Dec. 1995

The analysis of another spent nuclear fuel storage system is now needed by the NRC and contractor assistance is required to complete this task.

2.0 Objective

The objective of this task order is to obtain technical assistance with the analysis of a Holtec International HI-STORM 100 spent nuclear fuel storage system and to obtain a final report which documents all findings.

3.0 Work Required

The contractor shall conduct an analysis of a Holtec International HI-STORM 100 spent nuclear fuel storage system in lieu of the casks previously studied under task order no. 31 of contract no. NRC-02-90-009. The evaluation will be conducted for an explosive charge size to be determined in advance of the analyses by the NRC TPM and the contractor. The contractor shall conduct and report on an engineering analysis to estimate the potential radiological impacts from the detonation of a bulk explosive charge, such as that from a vehicle bomb in the immediate vicinity of the HI-STORM 100 spent nuclear fuel storage cask. The contractor may

assume the worst case scenario in which the explosives are placed adjacent to the spent fuel cask.

The HI-STORM 100 is a vented modular design, consisting of a sealed metal canister, referred to as the MPC, within an overpack that has an air vent for heat removal. There are 3 MPC designs. Each has a different internal basket design to accommodate different fuel types. (The external dimensions of the MPC are identical.) MPC-24 and MPC-32 will contain up to 24 and 32 pressurized water reactor (PWR) assemblies, respectively. MPC-68 will contain up to 68 boiling water reactor (BWR) assemblies.

The contractor shall perform all work for this task in accordance with the subtasks delineated below. The contractor shall provide the personnel, standardized computer codes, and equipment necessary to perform this work. All or portions of the work conducted under this task may be either classified Confidential NSI or unclassified sensitive information that must be protected from unauthorized disclosure as Safeguards Information.

The four areas of expertise which are essential for performing this study are:

1. Structural engineering as applied to specific cask storage.
2. Calculation and modeling of explosive effects on structural materials, such as reinforced concrete and steel used for storage of spent fuel.
3. Calculation and evaluation or modeling of the effects of shock waves on spent fuel, i.e., determining the quantity of respirable contamination resulting from the interaction of a blast wave on irradiated fuel elements.
4. Calculation and evaluation or modeling the potential radionuclide release source terms, meteorologic dispersion of the release radionuclides, direct radiation and contamination exposure pathways to workers and members of the public and the environment, radiation dose assessment and risk/consequence analysis.

Results for each HI-STORM cask design evaluated shall yield calculated radiation doses (rem) to an individual 100 meters away from the spent fuel storage cask. If the assumed detonation of an explosive charge adjacent to any of the HI-STORM 100 spent fuel casks results in a calculated radiation dose of greater than 5 rem total dose effective equivalent (TEDE) of any exposed individual at a distance of 100 meters from the cask, then the contractor shall determine stand-off distances needed between the cask and the explosive charge to yield radiation doses of 5 rem or less TEDE.

Subtask A: The contractor shall perform an evaluation of the MPC-68 design and document the results in a letter report in accordance with item A under Section 6.0 below.

Subtask B: The contractor shall perform a blast analysis and dose assessment for the MPC-68 design of the HI-STORM 100 cask. All results shall be documented in a letter report in accordance with item B under Section 6.0.

Subtask C: If the contractor determines that the calculated radiation dose is greater than 5 rem

TEDE for any exposed individual at a distance of 100 meters from the cask, then the contractor shall determine stand-off distances needed between the cask and the explosive charge to yield radiation doses of 5 rem or less TEDE and document the results in a letter report in accordance with item C under Section 6.0 below.

The NRC will review all of the findings submitted for subtasks A, B, and C and will determine if the work required under the following optional subtask should be performed. If the NRC decides to proceed, a modification to this task order will be executed authorizing the contractor to perform the evaluations of the MPC-24 and MPC-32 designs as delineated below and in accordance with the proposal submitted for these optional services. No work on subtask D shall begin prior to a formal modification to this task order. The NRC TPM will notify the contractor of the NRC's intent to proceed with Subtask D no later than 3 weeks after the completion of Subtask C.

Optional Subtask D: Repeat Tasks B and C above for the MPC-24 and MPC-32 designs of the HI-STORM 100 cask.

4.0 Key Personnel

The contractor shall ensure that the project team has the right mix of recognized technical experts, i.e. scientists and/or engineers with training and experience in modeling effects of high explosives on spent fuel and structural materials. Structural engineers and environmental health physicists or scientists and engineers with training and experience in modeling abnormal radionuclide release scenarios, source terms (specifically aerosol physics and chemistry), meteorologic dispersion of the released radioactive materials, radiation exposure pathways to workers and members of the public, dose assessment, and consequence/risks analysis are also required.

5.0 Technical Reporting Requirements

The contractor shall provide letter reports that detail the results of the evaluation conducted (For detailed milestones, see Section 6.0 below). The letter reports must detail analyses performed under the task, a description of computer codes used in the analysis, assumptions, limitations and results of the analysis. At the end of Task C, data must be provided to the NRC TPM so that the NRC can determine whether to proceed with optional Subtask D. In addition, the contractor shall provide a draft final report at the conclusion of Subtask C if the NRC decides not to proceed with Subtask D. If the NRC decides to proceed with Subtask D, the draft final report is due at the end of the study. The draft final report shall include all information provided by the letter reports required by this section and conclusions and recommendations reached by the contractor. The draft final report shall be reviewed by NRC and NRC comments incorporated into a final report.

All reports are to be prepared in accordance with Section F.2 - Preparation of Technical Reports in the basic contract.

6.0 Deliverables/Milestones

The contractor shall submit the following deliverables to the NRC TPM in accordance with the

following time frames.

- A. Initial letter report including the status of data needed, computer codes to be utilized, and the methodology to be used. (2 weeks after study initiation)
- B. Letter report (7 weeks after study initiation)
- C. Letter report (10 weeks after study initiation)
- D. Draft Final Report (Required if optional Subtask D is not requested. Due 2 weeks after submission of letter report for Subtask C).
- E. Final Report (Required if optional Subtask D is not requested. Due 2 weeks after receipt of NRC comments on the Draft Final Report).
- F. Letter report (10 weeks after NRC makes a determination to do optional Subtask D).
- G. Draft Final Report (2 weeks after submission of letter report for optional Subtask D).
- H. Final Report (2 weeks after receipt of NRC comments on the Draft Final Report).

7.0 Meetings and Travel

Meetings shall be held between participating contractor personnel and NRC personnel as required to coordinate project efforts. Three meetings will be held at NRC Headquarters in Rockville, Maryland as follows: first meeting upon task initiation; second meeting between Milestones B and C; third meeting to brief NRC on the study results. No foreign travel will be required or authorized. All meetings will be scheduled by the NRC TPM.

8.0 NRC Furnished Material

The NMSS TPM will provide the contractor with guidance on the work to be performed and with copies of NRC studies or other background information pertinent to this effort.

9.0 Period of Performance

The period of performance for this task shall begin on the effective date of the task order and will continue for a period of 3.5 months. If NRC authorizes the contractor to proceed with Subtask D, then the period of performance shall be extended until July 28, 2000.

10.0 Quality Assurance

All deliverables must be reviewed by the contractor's management and approved with two signatures. One signature is required from contractor management at a level above the program manager.

For all draft and final reports delivered under this task order, the contractor shall assure that an independent review and verification of all numerical computations, mathematical equations, and

derivations are performed by qualified personnel other than the original authors(s) of the reports. If the contractor proposes to verify/check less than 100 percent of all computations and mathematical equations and derivations in the report(s) (such as might be the case when there are a large number of routine, repetitive calculations), the contractor must first obtain written approval from the NMSS TPM. Computer-generated calculations will not require verification where the computer program has already been verified. The NMSS TPM has the option of auditing all documentation including project correspondence, drafts, calculations, and unrefined data.

11.0 Level of Effort

The estimated level of effort to complete all the tasks is 1.5 staff years. The estimated level of effort to complete all the tasks except optional Subtask D is 0.75 staff years.

12.0 Financial and Technical Progress Status Reports

The contractor shall submit a monthly Technical Progress Report in accordance with Section F.3 - Technical Progress Reports and a Financial Status Report in accordance with Section F.4 - Financial Status Reports of the basic contract. The reports are due within 15 calendar days after the end of the report period.

13.0 Technical/Project Direction

The NMSS TPM is responsible for providing technical guidance to the contractor regarding staff interpretations of the technical aspects of regulatory requirements, along with copies of relevant documents when requested. Technical instructions may be issued from time to time during the duration of this work. Technical instructions shall not constitute new assignments of work or changes of such nature as to justify an adjustment in cost or period of performance. The NMSS TPM is not authorized to unilaterally make changes to the approved work scope or schedule or give the contractor any direction that would increase costs over approved levels. The Contracting Officer is the only individual authorized to make changes to this task.

The NMSS TAPM is the focal point for all contract related activities. All work assignments and program funding actions are initiated by the NMSS TAPM who submits all requests to the Division of Contracts and Property Management (DCPM) for processing. All proposed work scope or schedule changes must be submitted through the NMSS TAPM for DCPM.