UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

NOV 16 1983

Mr. Richard G. Smith, Director
J. F. Kennedy Space Center
National Aeronautics & Space Administration
Kennedy Space Center, FL 32899

Dear Mr. Smith:

Subject: Interagency Agreement No. NRC-04-84-158
Entitled "Developing Guidelines to Perform Safety/Reliability Analyses"

Pursuant to the authority contained in the Economy Act of 1932, as amended, 31 USC 686 and Section 205(e) of the Energy Reorganization Act of 1974, 42 USC 5845, the U.S. Nuclear Regulatory Commission (NRC) and the National Aeronautics & Space Administration (NASA) desire to enter into an interagency agreement whereby NASA will assist the NRC by providing services to the project entitled above.

Accordingly, the parties hereto mutually agree to the following terms of this agreement:

Article I - Period of Performance

The period of performance shall be from the effective date of this agreement through September 30, 1984.

Article II - Scope of Work

See Attachment 1.

Article III - Estimate of Cost

The estimated cost of the effort described in the attached Statement of Work is $125,000.00.

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Article IV - Obligation of Funds

Funds in the amount of $125,000.00 are obligated hereunder and chargeable to the following appropriation data:

B&R Number	Appropriation Symbol	FIN Number
30-19-01-02	31X0200.304	B8230

Article V - Billing Instructions

NASA, to receive reimbursement for costs incurred, shall submit invoices in accordance with Attachment 2, Billing Instructions, which is attached and made a part hereof.

Article VI - Advance Notification

It is estimated that the total cost to the NRC for performance of this contract will not exceed the estimated cost as stated in Article III. NASA agrees to use its best efforts to perform the work specified in the Statement of Work within such estimated costs. If, at any time, NASA has reason to believe that the costs which they expect to incur within the succeeding 60 days will exceed 75 percent of the estimated cost when added to all previously incurred costs, NASA shall notify the Contracting Officer in writing. This notification shall include the revised estimate for the total cost for performance of this interagency agreement.

Article VII - Reporting Requirements

See Attachment 1.

Article VIII - NRC Contacts

A. Technical Contact - The NRC technical contact is Mr. Ernest Brach, Division of Quality Assurance, Safeguards and Inspection Programs, Phone Number FTS 492-4932.

The Project Officer is responsible for: (1) monitoring the technical progress, including the surveillance and assessment of performance and recommending to the Contracting Officer changes in requirements; (2) interpreting the statement of work; (3) performing technical evaluation as required; (4) performing technical inspection and acceptance of work products required by this interagency agreement; and (5) assisting NASA in the resolution of technical problems

encountered during performance. The Contracting Officer is responsible for directing or negotiating any changes in terms, conditions, or amounts cited in the agreement.

For guidance from the Project Officer to NASA to be valid, it must: (1) be consistent with the description of work set forth in this agreement; (2) not constitute new assignment of work or change to the expressed terms, conditions, or specifications incorporated into this agreement; (3) not constitute a basis for an extension to the period of performance or agreement delivery schedule; (4) not constitute a basis for any increase in the estimated cost.

ALL TECHNICAL DIRECTIONS SHALL BE ISSUED IN WRITING BY THE PROJECT OFFICER OR SHALL BE CONFIRMED BY HIM/HER IN WRITING WITHIN TEN (10) WORKING DAYS AFTER VERBAL ISSUANCE. A copy of said written direction shall be provided to the Contracting Officer.

In the event that the Project Officer desires a change to the inter-agency agreement within one or more of the categories as defined in (1) through (4) above, he/she must direct such requests to the Contracting Officer. The Contracting Officer will handle the request in accordance with applicable laws and regulations.

B. Contractual Contact - The NRC Contractual contact is Mr. Paul Edgeworth, Technical Contracts Branch, Division of Contracts, Office of Administration, telephone number FTS 492-4291.

Article IX - NASA Contact

Technical - Donald Page, Chief, Services Systems Section, FTS 823-3402.

Article X - Termination of Agreement

This agreement may be unilaterally terminated by either party upon 30 days written notice to the other party. Any project expenses up to the termination date will be paid by the NRC. Any expenses incurred in terminating the agreement shall be paid by the party terminating the agreement.

If this agreement is acceptable to NASA, please so indicate by having an authorized official sign in the space provided below and return three (3) copies to the undersigned. The fourth copy is for your retention. A fully executed copy will be forwarded to you.

Sincerely,

Kellogg V. Morton, Chief
Technical Contracts Branch
Division of Contracts
Office of Administration

Accepted:

National Aeronautics & Space Administration

By: R. G. Smith

Title: Director, Kennedy Space Center

Date: 12/7/83

Accepted:

U.S. Nuclear Regulatory Commission

By:

Title: Chief, Technical Contracts Branch

Date: 12-07-83

Statement of Work

1. BACKGROUND

In May 1982, the NASA Kennedy Space Center (KSC) entered into an agreement with the NRC to conduct a study to determine the feasibility of applying the NASA/KSC System Assurance Analysis methodology to a nuclear power plant system design. North Carolina's Duke Power Company expressed an interest in the study and proposed its nuclear power facility at CATAWBA for the basis of the study. In joint meetings of NASA/KSC and Duke Power personnnel, an agreement was made to select two CATAWBA safety-related systems, the Containment Spray System and the Residual Heat Removal System, for detailed analysis. Duke Power provided NASA/KSC with a full set of Final Safety Analysis Reports as well as schematics for the two systems. Phase I of the study was to conduct a preliminary Failure Mode and Effects Analysis and to determine the feasibility of conducting the hazards portion of the System Assurance Analysis in a follow-on effort in Phase II. The project description contained in this Statement of Work represents the follow-on effort described in the May 1982 NASA/NRC Interagency Agreement Number 82-006.

2. PURPOSE AND OBJECTIVE OF PROPOSED WORK

The purpose of this project is to test the application of the NASA methodology of System Assurance Analyses (SAA) which addresses reliability, safety and quality concerns for selected nuclear plant safety systems. The objective of this test application of the NASA methodology is (1) to assess the feasibility and practicability of implementing aspects of the SAA in the nuclear industry and (2) to develop a handbook with guidelines for conducting an SAA on nuclear power plant safety-related systems.

3. WORK REQUIRED

3.1 General

The work required in this Statement of Work represents a continuation of the work identified in the May 1982 NASA/NRC Interagency Agreement. NASA/KSC will complete the SAA for the two nuclear power plant safety-related systems selected for analysis in Phase I. The two systems on which the NASA test application was applied in Phase I are the Containment Spray System and the Residual Heat Removal System.

The SAA is a NASA-developed method of combining the techniques of a Failure Mode and Effects Analysis and a Hazard Analysis coupled with a stringent management control philosophy to produce a useful reliability, safety, and quality management tool. An SAA consists of the following six basic elements.

a. System Definition
b. Failure Mode and Effects Analysis
c. Cruciality Assessment
d. Crucial Single Failure Point Analysis
e. Hazard Analysis
f. Crucial Items List

During Phase I, NASA provided a report to the NRC on June 1, 1983, which gave preliminary results for elements a. - d. above. In Phase II of this work, NASA/KSC will complete the SAA (elements e. - f. above) for the two safety-related systems analyzed in Phase I. In situations in which NASA/KSC might identify a safety concern during this study, NASA/KSC should notify an appropriate utility representative who will then be responsible for any required notifications to the NRC. In addition NASA/KSC will develop a handbook with guidance for the conduct of future SAAs on nuclear power plant safety-related systems.

In Phase I of this project, NASA/KSC obtained an agreement with Duke Power Company to assist NASA/KSC in their test application of the SAA to nuclear power plant systems. NASA/KSC indicated that they will pursue an extension of this agreement to include the proposed activities in Phase II. NASA/KSC should advise the NRC Project Manager if problems are encountered in this agreement which may affect the work to be performed in Phase II. The NRC Project Manager shall review the agreement before finalization and implementation

3.2 Develop Plan and Schedule

A draft outline of proposed work to be performed in Phase II of this project was provided in Appendix C of the Phase I report to NRC, dated June 1, 1983 and in a memorandum to Dr. Fredrick Forscher, NRC dated March 14, 1983. These documents assumed a start date of Phase II in June 1983. NASA/KSC shall revise and update these proposed work plans for completing the SAA, assuming a start-date of October 1983 for Phase II activities. Also, NASA/KSC shall develop a work plan and schedule for developing a guidance handbook for conducting an SAA on nuclear power plant systems. The revised work plan and accompanying schedule for completion of the SAA and the guidance handbook shall be provided to the NRC Project Manager by December 1, 1983. NASA/KSC shall initiate the proposed work after NRC review and approval of the proposed work plan and schedule.

3.3 Products to be Delivered

3.3.1 Completion of SAA. Upon completion of the SAA, NASA/KSC shall provide a report which documents the work performed and results obtained in testing the application of the NASA/KSC methodology (SAA) to selected nuclear power plant systems. The report should also contain the NASA/KSC conclusions and recommendations on the feasibility and practicality of applying the SAA to nuclear power plant systems. A draft of this report is due to the NRC Project Manager by July 1, 1984.

By January 1, 1984, the NASA/KSC shall provide the NRC Project Manager with an interim report which documents the work performed and results to date as well as preliminary conclusions and recommendations on the feasibility and practicality of applying the SAA to nuclear power plant systems.

3.3.2 Guidance Handbook. Following NRC review and comment on the report required in 3.3.1 above, NASA/KSC shall prepare a handbook for guidance in conducting a SAA for nuclear power plant safety-related systems.

4. QUARTERLY LETTER STATUS REPORT

Each calendar quarter, beginning with the quarter ending December 31, 1983, NASA/KSC shall submit a brief letter status report which summarizes the work performed during the previous quarter. The report should identify the project status with regard to the scheduled milestones. The report should identify any problems encountered or anticipated in the planned scope of work.

Copies of the quarterly letter status reports shall be sent to the following persons:

a. NRC Project Manager: E. William Brach, Quality Assurance Branch Office of Inspection and Enforcement, U.S. Nuclear Regulatory Commission Washington, DC 20555.
b. IE Contractor Coordinator: Alan P. Muir, Program Support Branch, Office of Inspection and Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555.

5. STAFFING REQUIREMENTS

NASA/KSC shall ensure that persons experienced and knowledgeable in the application of the NASA/KSC methodology for performing an SAA are employed on this project. The services of contractors to NASA/KSC may be employed to assist in the successful completion of this project.

6. TRAVEL

NRC will fund only those trips which are identified in the work plan and schedule and are directly applicable to the contract. Other travel will require the approval of the NRC Project Manager.

7. NRC-FURNISHED MATERIAL

NRC will provide copies of NRC regulations, regulatory guides, and standards which may be requested by NASA/KSC and are pertinent to the successful completion of the contract.

8. PERIOD OF PERFORMANCE

All work under this contract shall be completed by September 30, 1984.

9. TECHNICAL DIRECTION

E. William (Bill) Brach, IE (FTS 492-4932) will be the NRC Project Manager for this project.

BILLING INSTRUCTIONS FOR INTERAGENCY AGREEMENT NO. NRC-04-84-158

NASA shall submit vouchers for cost-reimbursement on either Form 1081 "Voucher and Schedule of Withdrawals and Credits" or Form 1080 "Voucher for Transfers between Appropriations and/or Funds," following the instructions for preparation shown on the form. The following information must be included with each voucher:

1. Billing Period. Include the beginning and ending dates (day, month, and year) of the period in which costs were incurred and for which reimbursement is claimed.

2. Breakdown of Costs as follows:

   a. Direct Labor. This consists of salaries and wages paid (or accrued) for direct performance of the contract.

   b. Overhead. Show that amount of the billing which is overhead.

   c. Subcontracts. Include all costs paid to approved subcontractors during billing period.

   d. Materials and Supplies. This is consumable materials and supplies and equipment.

   e. Travel and Per Diem. This consists of all travel required and authorized pursuant to this agreement.

   f. Other. List all other direct costs by cost elements and dollar amount.

3. The original voucher (with four copies) should be addressed and mailed to:

   U.S. Nuclear Regulatory Commission
   Division of Accounting and Finance
   Office of Resource Management
   ATTN: GOV/COM, Accounts Section
   Washington, DC 20555

4. Payees Name and Address. Show the name and address of NASA and include name of voucher preparer and telephone number.