

PDR P1-37



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

MAR 1 - 1994

Science & Engineering Associates, Inc.
ATTN: Ms. Ilene Colina, Contract Administrator
SEA Plaza, 6100 Uptown Blvd. NE
Albuquerque, NM 87110

Dear Ms. Colina:

Subject: Contract No. NRC-04-91-066, Task Order No. 27 Entitled,
"Individual Plant Examination (IPE) Reviews, Internal Events,
Front End Only" (Shearon Harris Unit 1)

In accordance with Section G.5, Task Order Procedures, of the subject contract, this letter definitizes Task Order No. 27. This effort shall be performed in accordance with the enclosed Statement of Work.

Task Order No. 27 shall be in effect from March 1, 1994 through February 28, 1995 with a total cost ceiling of \$26,681.00. The amount of \$24,705.00 represents the total estimated reimbursable costs and the amount of \$1,976.00 represents the fixed fee.

The obligated amount of this task order is \$26,681.00:

Accounting Data for Task Order No. 27 is as follows:

APPN No.: 31X0200.460
B&R No.: 46019202300
JOB CODE: B5787
BOC No.: 252A
Obligated Amount: \$26,681.00
RES Identifier: RES-C94-048

The following individuals are considered to be essential to the successful performance for work hereunder: John Darby.

The Contractor agrees that such personnel shall not be removed from the effort under the task order without compliance with Contract Clause H.1, Key Personnel.

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

Your contacts during the course of this task order are:

Technical Matters: John Flack, Project Officer
(301) 492-3979

Contractual Matters: Paulette Smith, Contract Administrator
(301) 492-7670

9404080182 940301
PDR CONTR
NRC-04-91-066 PDR

070030

DFG

Please indicate your acceptance of this Task Order No. 27 by having an official, authorized to bind your organization, execute three copies of this document in the space provided and return two copies to the above Contract Administrator. You should retain the third copy for your records.

If you have any questions regarding the task order, please contact Paulette Smith, Contract Administrator, on (301) 492-7670.

Sincerely,

Joyce A. Fields

Joyce A. Fields, Contracting Officer
Contract Administration Branch No. 3
Division of Contracts and
Property Management
Office of Administration

Enclosure:
Statement of Work

ACCEPTED:

Gene B. Calina

NAME

Contract Administrator

TITLE

3/7/94

DATE

Contract NRC-04-91-066
Science & Engineering Associates

STATEMENT OF WORK
Task Order - 27

TITLE: Individual Plant Examination (IPE) Reviews,
Internal Events Front-End Only
(Shearon Harris Unit 1)

DOCKET NUMBER: 50-400

NRC PROJECT MANAGER: John H. Flack, RES (301-492-3979)

NRC TEAM LEADER FOR SHEARON HARRIS UNIT 1: John H. Flack, RES (301-492-3979)

TECHNICAL MONITOR: John H. Flack, RES (301-492-3979)

PERIOD OF PERFORMANCE: one year

BACKGROUND:

On November 23, 1988, the NRC issued Generic Letter 88-20, "Individual Plant Examination," which stated that licensees of existing plants should perform a systematic examination (IPE) to identify any plant-specific vulnerabilities to severe accidents, and to report the results to the Commission. The purpose of the IPE is to have each utility (1) develop an overall appreciation of severe accident behavior; (2) understand the most likely severe accident sequences at its plant; (3) gain a quantitative understanding of the overall probability of core damage and radioactive material releases; and (4) reduce the overall probability of core damage and radioactive releases by modifying procedures and hardware to prevent or mitigate severe accidents. All IPE submittals will be reviewed by the NRC staff to determine if licensees met the intent of Generic Letter 88-20.

OBJECTIVE:

The purpose of this contract is to solicit contractor support in order to enhance the NRC review of licensees' IPE submittals. This contract includes the examination and evaluation of the Shearon Harris Unit 1 IPE submittal, specifically with respect to the "front-end" analysis. The contractor review will be of limited scope and consist of a "submittal only" review and the licensee's response to questions raised by the staff. The "submittal only" review and gathering of associated insights will help the NRC staff determine whether the licensee's IPE process met the intent of Generic Letter 88-20, or whether a more detailed review is warranted.

By identifying the IPE's strengths and weaknesses, extracting important insights and findings, and providing a comparison to staff reviewed and accepted PSAs (e.g. NUREG-1150, PSAs identified in NUREG-1335 Appendix B), it

is expected that the NRC will be in a better position to expeditiously evaluate the licensee's IPE process. To provide support under this contract, the contractor will search for obvious errors, omissions and inconsistencies in the IPE submittal and the licensee's response to a "Request for Additional Information" (RAI) as described in the work requirements listed below.

WORK REQUIREMENTS AND SCHEDULE:

The contractor will perform a "submittal only" review of the Shearon Harris Unit 1 "front-end" IPE analysis. The contractor shall provide the qualified specialists and the necessary facilities, materials, and services to carry out such a review. The contractor will utilize NRC review guidance documents for detail and reference, as well as other interim guidance provided by the NRC Technical Monitor. The contractor is not expected to make a plant/site visit in order to perform this review.

Subtask 1. Review and Identification of IPE Insights

Perform a front-end "submittal only" review of each IPE submittal and identify important IPE insights by completing the NRC IPE Plant Data Summary Sheets. During the review, focus on the areas described below under "Work Requirement." Note any: (1) inconsistencies between methodology employed in the IPE submittals and other PSA studies, and (2) inconsistencies between the submittal's IPE findings and findings stemming from other PSAs (See NUREG-1335, Appendix B). Respond explicitly to each work requirement by evaluating licensee consideration of the area and any associated shortcomings. Appropriately characterize any shortcomings with respect to the impact on IPE conclusions. Identify and provide a justification for a Request for Additional Information (RAI).

Work Requirement 1.1.

Licensee's IPE Process

Check the following:

- 1.1.1 The IPE submittal is essentially complete with respect to the type of information and level of detail requested in the Submittal Guidance Document, NUREG-1335. Identify any obvious omissions.
- 1.1.2 The employed methodology is clearly described and is justified for selection. Methodology is consistent with the methods for examination identified in Generic Letter 88-20.
- 1.1.3 For multi-unit plant analyses, that the IPE explicitly considered events affecting more than one unit, and systems shared between units.
- 1.1.4 The IPE submittal employed a viable process to confirm that the IPE represents the as-built, as-operated plant.
- 1.1.5 Licensee participation in the IPE process.

- 1.1.6 The IPE front-end had been peer-reviewed to ensure the analytic techniques were correctly applied.

Work Requirement 1.2. Review the Accident Sequence Delineation and System Analysis

Check the following:

- 1.2.1 The IPE submittal described the process used to identify generic/plant-specific initiators (including internal flood) and dependencies which could exist between initiating events and the associated mitigation functions. Determine whether the initiating events are consistent and complete with respect to other PSAs.
- 1.2.2 The methodology used to treat internal flood is clearly described and justified. (Use NUREG-1174 for review insights.)
- 1.2.3 The system event trees and treatment of dependencies between event tree top events were appropriately described, and associated success criteria documented. Special events that have been potentially significant at similar plants (e.g., station blackout, ATWS, ISLOCA) were appropriately considered.
- 1.2.4 The IPE identified and analyzed front-line and support-systems important to the prevention of core damage and mitigation of fission product release. Support systems should, as a minimum, include:
- electrical power (AC and DC)
 - ESF actuation system
 - instrument air
 - HVAC
 - service water
 - component cooling water
- 1.2.5 The IPE treated dependencies (including asymmetries) among plant systems, and that dependencies within a system and between systems were identified and documented in a dependency matrix form.
- 1.2.6 The IPE appropriately treated common cause failures employing the beta factor method, MGL method, or sensitivity studies (see NUREG/CR-2815 or plant-specific). Check that common cause failures were carefully examined to reveal possible root causes of such failures and in order to determine likely fixes.

Work Requirement 1.3. Review the IPE's Quantitative Process

Check the following:

- 1.3.1 The analysis used mean values and/or employed sensitivity studies to determine the impact of vital assumptions.

- 1.3.2 The technique used to perform data analysis appears consistent with other PSAs. [Note: plant-specific data is expected to be used for important components and systems as identified in NUREG-1335.]
- 1.3.3 Sources of generic failure data used in the IPE are identified, and a rationale for their use provided. Data source should be reasonably consistent with data reported in NUREG-2815, Appendix C.
- 1.3.4 The licensee quantified contribution from common cause failure data and identified data sources.

Work Requirement 1.4. Review the IPE Approach to Reducing the Probability of Core Damage

Check the following:

- 1.4.1 The IPE identified the most probable core damage sequences and these are consistent with insights from PSAs of similar design. Check that sequences were expanded to identify dominant contributor, i.e., specific components, plant conditions or behavior, common cause failures that contribute to plant vulnerabilities.
- 1.4.2 The IPE analysis supports the licensee's definition of vulnerability with respect to core damage, and that the analysis probed beyond the system level, to train or segment level, to uncover vulnerabilities. The licensee's definition provided a means by which the licensee could identify potential vulnerabilities (as so defined) and plant modifications (or safety enhancements) to eliminate or reduce the affect of vulnerabilities.
- 1.4.3 The identification of plant improvements and proposed modifications are reasonably expected to enhance plant safety.

Work Requirement 1.5. Front-End/Back-End Interface

Check the following:

- 1.5.1 The IPE appropriately treated front-end and back-end dependencies:
- important sequences were not screened out
 - considered containment by-pass
 - considered containment isolation
 - plant damage states considered reactor system/containment system availability
 - source term
 - system mission times
 - inventory depletion
 - dual usage (spray vs. injection)

Work Requirement 1.6.

Review Licensee's Evaluation of the Decay Heat Removal Function

Check the following:

- 1.6.1 In accordance with the resolution of USI A-45, the IPE performed an examination of the DHR system to identify vulnerabilities.
- 1.6.2 IPE explored the benefit of diverse means of decay heat removal, e.g. feed-and-bleed, recovery of main feedwater.
- 1.6.3 Any unique features or other means which contribute to increased DHR reliability were substantiated.

Work Requirement 2.0

Complete data sheets

- A. Summarize data on the Consolidated Data Summary Sheet as described below.

CONSOLIDATED DATA SUMMARY SHEET*
(INTERNAL EVENTS)

- o Total Core Damage frequency:/year
- o Major initiating events and contribution to core melt frequency (internal events):
Contribution
TRANSIENTS (%)
LOCAs (%)
BLACKOUT (%)
SGTR (%)
ISLOCA (%)
- o Major (non-human) contributions to dominant core melt sequences:
- o Significant PRA findings:
- o Enhanced plant hardware (implemented after 1988 PRA):
- o Potential improvements under consideration and not modeled:
- B. Complete NRC IPE data sheets

Complete the NRC IPE data summary sheets and note lack of information as appropriate. However, exclude those data entries marked "BNL Data Entry." These data will be collected by Brookhaven National Laboratory under a separate contract.

Subtask 2. Prepare Preliminary Technical Evaluation Report

Prepare a preliminary Technical Evaluation Report with the outline prescribed below.

I. Executive Summary

Provide a brief overview of the licensee's IPE process, and its basis, e.g., earlier PRA. Indicate whether severe accident vulnerabilities were identified, and whether any safety enhancements were implemented or under commitment. Identify any unresolved safety issues or safety issues proposed for resolution. Discuss any important or unique plant characteristics.

II. Contractor Review Findings

Explicitly address each work requirement element listed under Subtask 1. Discuss any significant limitations and impact on overall IPE conclusions. Comment on the need for additional information, but list questions separately in an appendix. Indicate why the information is important for closure.

III. Overall Evaluation and Conclusion

Summarize the "submittal only" review conclusions based on the information submitted and significance of IPE strengths and weaknesses.

IV. IPE Insights, Improvements, and Commitments

Characterize important IPE findings and insights, including any unique plant features or analytic assumptions. Describe and characterize plant improvements or safety enhancements implemented by the licensee, specifically in response to important insights which stem from the process. Identify any licensee commitments, and characterize the need to track commitments based on the impact on IPE conclusions. Also identify and characterize any improvements not forthcoming but perceived to be significant.

V. IPE Evaluation and Data Summary Sheets

Attach: (a) Consolidated Data Summary Sheets using the above outline, and (b) the NRC IPE data sheets.

Appendix: Questions and Comments

Provide all questions and comments which are to be discussed with the licensee. Provide rationale for comments, especially when seeking additional information.

Subtask 3. Prepare Final Technical Evaluation Report

Review the licensee's response to staff questions and comments. Update the preliminary TER developed under Subtask 2, as appropriate, based on the additional information received from the licensee. Emphasis should be placed on review areas identified under Subtask 2. Provide rationale as appropriate to support the need for any additional follow-on studies or recommendations.

Note: The contractor should be prepared to participate in telephone communication with the licensee and/or discussions with NRC review team members regarding the licensee's response to questions and issues stemming from the preliminary TER.

REPORT REQUIREMENTS:

Technical Reports

The contractor will submit to the NRC Technical Monitor four copies of the Preliminary Technical Evaluation Report (TER) on June 30, 1994. Copies will include three hard copies and one 3.5" computer diskette version (Wordperfect 5.1 or other IBM PC compatible software acceptable to the NRC IPE Team Leader). The Preliminary TER shall summarize all findings, results, and conclusions in the areas examined in the format described under Subtask 2. If the contractor finds that the licensee's IPE is obviously deficient in any of the areas examined, the Technical Monitor should be notified in advance. Deficient or weak areas should be clearly documented in the Technical Evaluation Report. In addition, if the contractor finds that there are specific areas that need additional in-depth review, the Team Leader should be notified of the areas, and provided with the rationale for subsequent review.

The contractor will submit to the NRC Technical Monitor three copies of the Final Technical Evaluation Report (TER) two weeks after the receipt of the licensee's response to staff questions and comments. Copies will include two hard copies and one 3.5" computer diskette version (Wordperfect 5.1 or other IBM PC compatible software acceptable to the NRC IPE Team Leader). The Final TER shall update all findings, results, and conclusions in the areas examined in the format described under Subtask 2 as appropriate.

BUSINESS LETTER REPORT:

The contractor shall provide monthly progress reports in accordance with the requirements of the basic contract.

MEETINGS AND TRAVEL:

One, one person trip to NRC Headquarters to present and discuss review findings and conclusions.

ESTIMATED LEVEL OF EFFORT:

For each IPE reviewed:

Subtask 1 80 contractor hours
Subtask 2 132 contractor hours.
Subtask 3 16 contractor hours

It shall be the responsibility of the contractor to assign technical staff, employees, and subcontractors who have the required educational background, experience, or combination thereof, to meet both the technical and regulatory objectives of the work specified in this SOW. The NRC will rely on representation made by the contractor concerning the qualifications of the personnel proposed for assignment to this task order including assurance that all information contained in the technical and cost proposals, including resumes and conflict of interest disclosures, is accurate and truthful.

NRC FURNISHED MATERIAL:

1. Licensee's IPE submittal.
2. Licensee's response to staff generated questions and associated information.

TECHNICAL DIRECTION:

The NRC Project Manager is:

John H. Flack
Severe Accident Issues Branch
Division of Safety Issue Resolution
U.S. NRC, Mail Stop NL/S 324
Washington, D.C. 20555
Telephone No. (301) FTS-492-3979