



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

9-4-84 Thodden

Is this all  
with you

AUG 23 1984

MEMORANDUM FOR:

~~Themis P. Speis~~ Director  
Division of Safety Technology

The schedule is X  
OK. I would be

FROM:

Robert M. Bernero, Director  
Division of Systems Integration

Concerned if they  
have extensive additional

SUBJECT:

REVIEW OF THE SEABROOK STATION PROBABILISTIC  
SAFETY ASSESSMENT

utility financial situation  
is tight and we (Speis to  
DD) requested that questions  
be limited to one round for  
that reason.

REFERENCE:

MEMORANDUM ON ABOVE SUBJECT FROM THEMIS SPEIS  
DATED JUNE 21, 1984

We are processing a contract with Brookhaven National Laboratory (BNL) to provide technical support in response to your request for assistance. This will provide \$50K for work during FY 1984 and \$30K for follow up investigations during FY 1985. Since this is a limited effort in comparison to past PRA studies such as those for Indian Point and Zion, the focus will be somewhat different. Our investigations will be directed toward differences between the back-end behavior of the Seabrook plant and other large dry containment plants such as Zion and Indian Point. In addition, we will spot audit interesting features of the Seabrook PRA as a portion of the contractual program.

Make sure  
that the  
guidelines  
are adhered  
to

We are concerned that the front-end work will be performed under contract with Lawrence Livermore National Laboratory (LLL) while our back-end contract will be with BNL. Experience shows this to be undesirable due to the tendency of contractors to work independently, and the contractor products tend to be disconnected. Consequently, we plan a careful coordination between the RSB Program Manager, Warren Lyon, and your Program Coordinator, Sarah Davis. Further, BNL is to be contractually instructed to work closely with LLL to assure consistency and information cross-flow.

You requested (reference above) a final report by October 15, 1984. We cannot meet this schedule. We plan to have a draft contractor report available on or about October 30, 1984, and a final report in mid-December, 1984.

CONTACT: W. Lyon, RSB X29405

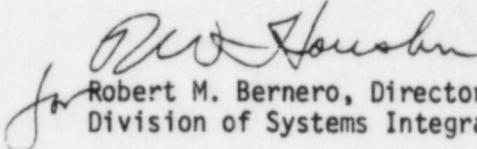
FOIA-87-006

B/19

AUG 23 1984

You also requested questions and comments by August 1, 1984. We cannot meet this schedule, as previously discussed between Mr. Lyon and Ms. Davis, since the BNL work has not yet begun. We are jointly planning a site trip in the vicinity of the end of August or early September, and anticipate most of the preliminary questions and comments will be ready prior to the visit. Of course, additional ones would be generated following the trip.            11

Additional information is provided in the attachment which represents the contractual work we intend that BNL perform.

  
for Robert M. Bernero, Director  
Division of Systems Integration

Enclosure: BNL Statement of Work

## Enclosure

### STATEMENT OF WORK

Title: Review of the Probabilistic Risk Assessment for the Seabrook Nuclear Power Plant

FIN No.: A3778

B&R No.: 20-19-40-41-3

NRC Project Manager: Warren C. Lyon (FTS 492-9405)

#### BACKGROUND

The Reactor Systems Branch (RSB) has the responsibility to assist the Reliability and Risk Assessment Branch (RRAB) within the Office of Nuclear Reactor Regulation (NRR) in review of Probabilistic Risk Assessments (PRAs) submitted to NRC by license Applicants and licensees. A PRA has been submitted to NRC by Public Service Company of New Hampshire, an operating license applicant, pertaining to the Seabrook Nuclear Power Plant.

#### OBJECTIVE

The objective of the present task is to provide a limited review of those aspects of the Seabrook PRA leading to estimates of risk corresponding to various plant damage states to determine the accuracy of the estimates. The investigation will be directed toward differences between phenomenological behavior of the Seabrook plant and other large dry containment plants such as Zion and Indian Point. In addition, unique features of the Seabrook PRA will be audited.

#### WORK REQUIREMENTS

Perform a limited review and evaluation of the risk assessment submitted by the licensee for the Seabrook PWR power plant to determine if estimates of risk reflect appropriate use of risk assessment methods and plant/site information. Compare the Seabrook containment and other severe accident mitigation features to those at Zion and Indian Point. Since the review is to be limited, maximum utilization will be made of results from evaluation of other large dry containment plant PRAs, and emphasis will be placed on differences between those plant PRAs and the Seabrook PRA.

The defensibility of the licensee's submittal of the risk and associated uncertainty spread with respect to (1) use of state-of-the-art risk assessment methods, (2) thoroughness and comprehensiveness of analysis, (3) availability and appropriate use of data, and (4) realism of modeling assumptions, will be considered.

The review will focus on the calculation of risk given the frequencies of the plant damage states, including methodology, assumptions, data, information sources, models, plant understanding, completeness of the analysis, and any other area which could affect the quantitative or qualitative results. A limited sensitivity analysis will take alternatives identified in the review in appropriate combinations and determine the incremental change in risk resulting from the use of alternatives in the dominant sequence. In general, these alternatives should be evaluated by performing separate effects/phenomenological calculations within the overall analysis.

The work to be performed in accord with this Statement of Work is to be based in part upon the "front-end" work to be performed by the Lawrence Livermore National Laboratory under NRR/DST funding (FIN No. A-3754-4), and is to be fully coordinated with that effort.

The work described herein consists of one task which is divided into several parts to be consistent with the A-3754-4 effort. These are:

1. Evaluation of Risk Due to Internal Events
2. Evaluation of Risk Due to External Events
3. Draft Final Reports
4. Final Reports
5. Questions to Licensee

Each item is discussed below.

Contract Task: Perform "Back-end" evaluation of the Seabrook PRA.

Estimated level of effort FY 84 0.4 staff years FY 85 0.3 staff years

Estimated completion date: Aug. 30, 1985

The following items are to be accomplished to complete the contract task:

- (1) Evaluation of Risk Due to Internal Events
  - (a) Perform a limited review and evaluation of the scope, assumptions, and systems analysis aspects of risk due to internal event plant damage states, and other items identified as a result of the initiating events review and provided to BNL by the NRC Program Manager.
  - (b) Compare such items as risk, methodology, assumptions, data, information sources, models, plant understanding, completeness of the analysis, and other areas which could affect the results. Provide a compilation of significant similarities and differences.
  - (c) Develop a table of assumptions used in the analysis and make a finding on the validity.

- (d) Identify omissions and deficiencies in the phenomenological analysis and estimate the impact where reasonable, considering the scope and depth of the Task effort. Include the technical basis for these estimates.
- (e) Incorporate NRR technical review comments as provided by the NRC Program Manager.
- (f) Perform a limited assessment of the uncertainty analysis. Consider propagation and completeness in treatment of uncertainty, data uncertainty, and modeling sensitivity/uncertainty.
- (g) Maintain close contact with Lawrence Livermore National Laboratory in regard to the front-end analyses which serve as the starting point for the above work.

(2) Evaluation of Risk Due to External Events

- (a) Perform a limited review of each type of external event considered and concur with or modify the risk information for each plant damage state which is significantly affected by the review.
- (b) Review and evaluate assumptions of the external events risk analysis.
- (c) Identify omissions and deficiencies in the external event risk analysis, and estimate the impact where practical with respect to the effort funded under this task. For omissions and deficiencies for which evaluation is believed to be beyond the state-of-the-art, provide a list and the basis for this belief.
- (d) Assess the uncertainty analysis. Examine propagation and completeness in treatment of uncertainty, data uncertainty, and modeling sensitivity/uncertainty.
- (e) Maintain close contact with Lawrence Livermore Laboratories in regard to the front end analyses which serve as the starting point for the Item (2) work.

(3) Draft Reports

A Draft Report is to be provided which covers the effort accomplished in FY84 and a second Draft Report is to be provided which covers the effort accomplished in this program. The reports are to include, at a minimum, the following:

- (a) For each of the PRA areas reviewed, define the basis for acceptability and describe what was considered in the review. The findings will include selected reestimates of risk information corresponding to plant damage states, identification of areas which were not pursued, and identification of grey areas where sensitivity studies might be used to bound a central estimate.

- (b) Describe areas of incompleteness determined in the review. Quantify, where consistent with the funded depth of the review, the potential impact of these areas. Discuss the basis for quantification values.
- (c) Based on reviewer audits, discuss the accuracy, uncertainty, and adequacy of the PRA author's risk quantifications.
- (d) An approximate outline of the reports is given below:
  - 1. Summary
  - 2. Introduction
    - 2.1 Background
    - 2.2 Scope
    - 2.3 Assumptions
  - 3. Internal Events Risk
  - 4. External Events Risk
  - 5. Summary and Conclusions
    - 5.1 Dominant Risks Corresponding to Each Plant Damage State
    - 5.2 Important Problems and Omissions
    - 5.3 Treatment of Uncertainties
    - 5.4 Overall Evaluation of Seabrook Risk Assessment
  - 6. Appendices (as required)

This outline is similar to the outline to be followed by Lawrence Livermore in their accomplishment of FIN A-3754-4. Although the BNL and Lawrence Livermore reports are to be "stand alone" reports, the contents are to be coordinated so that complete coverage of the technical topic is provided if one has both the BNL and the Lawrence Livermore reports.

#### (4) Final Reports

The final reports will take into account pertinent comments on the draft final reports by NRC and other interested parties. They will be published as NUREG/CR reports. The first final report is to be provided by November 30, 1984; and the second, which covers the entire program, is to be provided by August 30, 1985.

#### (5) Questions to Licensee

Provide questions for forwarding to the licensee covering all aspects of the analysis on a schedule that is to be mutually agreeable between BNL and the NRC Project Manager.

### LEVEL OF EFFORT AND PERIOD OF PERFORMANCE

The estimated level of effort is 0.7 professional staff years with the effort to be completed by August 30, 1985.

### TECHNICAL REPORTING REQUIREMENTS:

All technical products which are required from this contract have been identified specifically in the above discussion. BNL shall submit six copies of draft NUREG/CR reports to the NRC Project Manager, for staff review and approval. For NUREG/CR reports, within sixty days of receipt of the staff's comments on these reports, the contractor shall submit one (1) reproducible and six (6) reproduced copies of the final reports in accordance with NRC Manual Chapter 3202, "Publication of Unclassified Regulatory and Technical Reports Prepared by NRC Contractors."

### BUSINESS LETTER REPORTS

A monthly business letter report will be submitted by the 20th of the month to the NRC Project Manager with copies provided to the Director, Division of Systems Integration, ATTN: S. Boyd, R. W. Houston, B. Sheron, DSI, and Mr. L. Solander, NRR. These reports will identify the title of the project, the FIN, the Principal Investigator, the period of performance, the reporting period and will contain 3 sections as follows:

#### Project Status Section

For each task under this program, provide the following information:

1. A list of the efforts completed during the period; milestones reached, or if missed, an explanation provided.
2. Any problems or delays encountered or anticipated and recommendation for resolution. 1/
3. A summary of progress to date (this may be expressed in terms of percentage completion for each task).
4. Plans for the next reporting period.

1/ If the recommended resolution involves a contract modification, i.e., changes work requirements, level of effort (costs), or period of performance, a separate letter should be prepared and submitted to the Director, Division of Systems Integration, ATTN: S. Boyd, and a copy provided to the Project Manager and L. Solander, NRR.

Financial Status Section

1. Provide the total cost (value) of the project as reflected in the proposal and the total amount of funds obligated to date.
2. Provide the total amount of funds expended (costed) during the period and total cumulative to date as follows:

	<u>Period</u>	<u>Cumulative</u>
a. Labor-related costs		
b. Computer services		
c. Travel		
d. Subcontracts		
e. Equipment		
Total	_____	_____ ( %) 2/

3. Fee Recovery Cost Status Section

Pursuant to the provisions of NRC Regulations, 10 CFR 170, provide the total amount of funds expended (costed) during the period and cumulative to date for each task in the following format:

FIN: A3778

TITLE: Review of the Probabilistic Risk Assessment for the Seabrook Nuclear Power Plant

PERIOD: \_\_\_\_\_

<u>Facility Name</u>	<u>Docket Number</u>	<u>Costs</u>	
		<u>Period</u>	<u>Cumulative</u>
Seabrook	50-443		

MEETINGS AND TRAVEL

- The contractor may attend a 2-day visit at an unspecified site with the licensee to discuss questions on the analysis and may attend six 1-day meetings at NRC headquarters in Washington, DC.
- Two 3-day visits to the Seabrook site.

NRC FURNISHED MATERIALS

The risk study has been transmitted to the contractor. NRC will provide additional information as needed.

2/ Provide percentage against total funds obligated to date.