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

ENCLOSURE II

FEB 25 1983

MEMORANDUM FOR: Themis P. Speis, Director
Division of Safety Technology

FROM: Richard H. Vollmer, Director
Division of Engineering

SUBJECT: COMMENTS ON DRAFT SEISMIC ANALYSIS RESEARCH PLAN

We have reviewed the draft Seismic Analysis Research Plan of January 25, 1983 and have had discussions directly with D. Guzy, RES to communicate general and detailed comments. Our comments are also attached to this memorandum for formal transmittal to RES.

Richard H. Vollmer, Director
Division of Engineering

Enclosure:
As stated

cc w/encl:
J. Knight
G. Lear
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STRUCTURAL AND GEOTECHNICAL ENGINEERING BRANCH

COMMENTS ON DRAFT SEISMIC ANALYSIS RESEARCH PLAN

General Comments

1. In general, the plan should be more explicit in discussing how each of the proposed program elements will contribute to the resolution of specific licensing issues.

2. More specific milestone information such as schedules for providing program end-products, product descriptions and the associated costs should be provided in the plan for each program element.

3. The plan needs improvement in the area of integration of various inter-related program elements in order to present a clear understanding of how the various goals of the plan can be achieved.

4. For programs still under planning stages, more specific focusing of program goals, definition of end-products and identification of methods to be followed in achieving the end products are strongly recommended. This comment may also apply to on-going programs (e.g., Category I Structures and Benchmarking Structural Computer Codes).

5. The extent of coordination of the plan with the RES overall plan on PRA research activities and future SSMRP activities is not clear. For instance, is a timely completion of this plan dependent upon the same on the part of SSMRP? If yes, is the level of performance expected of the SSMRP reasonably achievable?

Specific Comments

1. On page 4, 2nd paragraph, the sentence "Unlike internal event analysis ....", seems to imply that no further verification work is needed for the internal event PRA. We feel that substantial verification work is needed for both internal and external events PRAs. One may want to qualify this sentence.

2. With respect to Item C. 2 of page 11, we recommend future research related to soil-structure interaction effect evaluation should be experimental in order to develop response data for verifications of various analysis codes. Additional analytical effort on this issue without pertinent experiments will, in our opinion, serve no useful purpose from the NRR licensing standpoint.

3. With respect to the Category I structures and structural loads combination programs described on page 12, we suggest that the contents of the program be reexamined and modified, as appropriate, to ensure that the program results will indeed contribute to our understanding of Category I structural fragility urgently needed in the context of PRA technology development. The SGEB staff will be able to offer assistance in such a reexamination effort.

4. With respect to the containment safety margins research program (page 12) covering the containment leaktightness issue, we suggest that the specific program contents should be based on properly scoped test efforts which will produce results integrable into the PRA application to ensure containment functionality. The SGEB staff will again be able to provide specific ideas for defining the program scope.

5. With respect to Item E, Proposed Structural Fragility Research (page 3), we believe that there is a need for defining clearly the objectives, end-product, means for producing the end products, test scopes, accompanying analytical work, milestones and required resources prior to embarking on the program. Such a detail planning work is essential for assuring that the results obtained will be useful from the standpoint of licensing rerview. The SGEB staff will be able to work with the RES staff on this task.

6. With respect to Item G, Proposed Equipment Fragility Data discussed on page 15, we believe that the term "fragility" is often used in a very loose sense. This loose use of the term would, in turn, lead to an ambiguity of what data to collect or develop. A more precise definition of the term "fragility" tied to specific limit states definition is needed for all program elements of this plan dealing with the concept of fragility.

Attachment 2

GEOSCIENCES BRANCH

COMMENTS ON DRAFT SEISMIC ANALYSIS RESEARCH PLAN

We have reviewed the draft plan and have provided directly to D. Guzy, ORES, a marked up copy for his use. It is our understanding that a major rewrite is currently underway.

Our most substantive comment regarding the plan is that the "Seismotectonic Program", as attached needs to be substantially updated to better incorporate our current approach in our new plan for addressing the U.S.G.S. clarification regarding the Charleston earthquake. We also disagree strongly with both A. Thadani (memorandum, A. Thadani to Z. Rosztoczy, February 7, 1983) and the draft NRR comments prepared by P. Williams regarding the need for research effort on seismogenic mechanisms. This research effort, properly implemented, will provide direct usable information in the short term (3-5 years) which will have a strong influence on the development of seismic hazard curves. This information contributes directly to how experts weigh various hypotheses and how credibilities should be assigned in probabilistic analyses. The comment that this work, "cannot be expected to yield results reasonably relevant to regulatory needs during the remaining operating lifetime of most current generation nuclear plants" is unfounded. In fact, such an observation would represent a major reversal in NRR's previous research requests in this area. This work contributes directly to our ability to evaluate whether or not probabilistic conclusions are intuitively reasonable or whether specific further actions are necessary at certain sites.

We also disagree that the major burden for such work remains with the U.S.G.S. The fact is that NRC, even at current funding levels, sponsors a small percent of total geological work in this country. Indeed, NRC has a specific focussed need to undertake research to reduce the number of hypotheses and reduce the large uncertainty in seismic hazard curves especially for long return periods as requested by the ACRS in their January 11, 1983 letter. We do agree that NRC's seismotectonic program should become increasingly focussed towards contributing to hazard analyses.

We also agree with A. Thadani's observation that although seismic risk may be a major risk contributor, there is no current basis for the generalization that it, in fact, is such a major contributor.

The NRR draft comments, item d., infers that NRR's view of the seismotectonic program is that it is not necessary. I am not aware of this ever being NRR's position. Indeed, this would be inconsistent with overall Geosciences Branch planning and our current Charleston plan, which relies heavily on this work in the next three years.

Attachment 3

EQUIPMENT QUALIFICATION BRANCH

COMMENTS ON DRAFT SEISMIC ANALYSIS RESEARCH PLAN

In reviewing the 1/25/83 draft of the RES Seismic Analysis Research Plan we had comments in several areas of the plan. Those comments are as follows:

I. Background

We agree with the statement, "The available evidence indicates that the seismic contribution to risk may be large enough that a careful evaluation of the matter is warranted." The results of our technical assistance contract (FIN No. 3397) on the cost benefit associated with seismic qualification of equipment in operating reactors indicated risk which also support this statement. In particular, the seismic risk associated with BWR's and with structural failures due to seismic events in general, are large enough to warrant careful evaluation.

II. Program Needs

The statement is made that "acceptance criteria for existing plant designs and the incremental risks due to plant backfit must be developed." This is an important point which is also an objective of the cost/benefit study. Since we may not fully meet our objective in this area, additional research support will be needed.

The statement is made that, "There is also a need to provide simplified seismic risk methods that can be applied for generic use, as for example, in IREP/NREP type studies, so that more plants can be analyzed and factors that contribute significantly to risk can be identified and corrected." Perhaps the methodology developed by Brookhaven National Laboratory (BNL) in the cost/benefit program could be applied in analyzing specific plants at a low cost and in a short time frame, and would be one way to fill the need.

III. Major Objectives

We believe there is a need to establish the validity of fragility data being used in current PRA's for both equipment and structures (magnitude and uncertainty) verification of event a limited number of data would be useful.

In the section on simplified methodology (C.1), we feel that the work done in the BNL cost/benefit study should be considered as one possible methodology.

We need criteria for judging the adequacy of the seismic design of operating reactors and what corrective action if any is needed. This was attempted in the BNL cost/benefit study, but should be supported by this larger reserach effort as well.

IV. Assumptions Used in Planning

The plan assumes most currently available fragility data will be compiled through SSMRP and that any additional data can be acquired through cooperative programs or from the Equipment Qualification Research Program (EQRP). Our experience with the BNL cost/benefit study indicates that availability of both structural and equipment fragility data which accurately describes power plants of all vintages is one of the more limiting aspects of any seismic PRA study. The results of any seismic PRA is only as good as the data used to describe the structures and equipment. Therefore, we feel the assumption that SSMRP, EQRP and other cooperative programs as they exist today can supply the fragility data required for future seismic PRA work is not a valid assumption. We believe this fact should be recognized and steps taken to ensure the proper seismic fragility data will be obtained.

V. Major Program Areas

All the proposed structural fragility research seems to deal with piping alone, we have other structural areas where we need better structural fragility data as well. This should be addressed.

We agree with the statement that the scope of the EQRP in the area of equipment fragility data should be expanded. This is an area of weakness that will effect the results of all future seismic PRA work. In light of the increasing concern regarding seismic risk this is an area which needs stronger attention.

In the section under scheduled research products, the area of simplified PWR and BWR methodology should be emphasized. This methodology needs to be developed so that it can be easily applied to existing plants to give us the seismic answers we need in a short time frame.

We do not feel that it is wise to omit the task of comprehensively assessing the seismic margins of current criteria in structures and equipment from the SSMRP Program Plan.

VI. Research Product Table

On page 20 and 21 the dates are missing for Data Base Long Term Objectives, in particular for structural and equipment fragilities.

EQUIPMENT QUALIFICATION BRANCH

ADDITIONAL COMMENTS ON DRAFT SEISMIC ANALYSIS RESEARCH PLAN

Our comments on the subject were transmitted in a memorandum dated February 9, 1983. We have reviewed the draft NRR comments (2-16-83) to ensure that the essence of our previous comments is incorporated in the draft NRR comments. We agree with the draft NRR comments, and offer the following comments mainly for further clarification:

1. With respect to item 3a, it should be noted that the BNL Cost/Benefit Study (sponsored by EQB) indicated the seismic risk to be significant, and it was identified as an item for notification to Licensing Boards. We suggest the following wording; "that seismic risk can be a major contributor to overall plant risk."

2. It appears that the comment #13 did not fully incorporate our comment under "V. Major Program Areas." The Seismic Research Plan should clearly indicate it relationship with the Equipment Qualification Research Plan, and ensure that equipment fragility data are developed in a form that is useful for NRR staff without unnecessary duplication. The fragility data will be needed in the context of estimating available seismic margin and seismic risk analysis of specific plants.