"PROPOSED REVISION 2"

ALTERNATIVE - 1

Task A-40
Rev. No. 1
May, 1978

Task A-40

SEISMIC DESIGN CRITERIA

Lead RES **Organizations**:	**Division of Reactor Safety Research (RSR)**
Lead Supervisor:	L. C. Shao, Assistant Director for General Reactor Safety Research, RSR
Task Manager:	G. Bagchi, Chief Structural Engineering Research Branch, RSR
2 Applicability:	All Reactor Types
Projected Completion Date:	July, 1981
NRR Cognizant Director:	R. C. DeYoung, Director Division of Site Safety and Environmental Analysis
NRR Cognizant Engineers:	D. Allison, DOR H. Rood, DPM

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1. PROBLEM DESCRIPTION

The seismic design process required by current NRC criteria includes the following sequence of events.

A. Define the magnitude or intensity of the earthquake which will produce the maximum vibratory ground motion at the site (the safe shutdown earthquake or SSE).

B. Determine the free-field ground motion at the site that would result if the SSE occurred.

C. Determine the motion of site structures by modifying the free-field motion to account for the interaction of the site structures with the underlying foundation soil.

D. Determine the motion of the plant equipment supported by the site structures.

E. Compare the seismic loads, in appropriate combination with other loads, on structures, systems, and components important to safety, with the allowable loads.

While this seismic design sequence includes many conservative factors, certain aspects of the sequence may not be conservative for all plant sites. At present it is believed that the overall sequence is adequately conservative. The objective of this program is to investigate selected areas of the seismic design sequence to determine their conservatism for all types of sites, to investigate alternate approaches to parts of the design sequence, to quantify the overall conservatism of the design sequence, and to modify the NRC criteria in the Standard Review Plan if changes are found to be justified. In this manner this program will provide additional assurance that the health and safety of the public is protected, and if possible, reduce costly design conservatisms by improving (1) current seismic design requirements, (2) NRR's capability to evaluate the adequacy of seismic design of operating reactors and plants under construction, and (3) NRR's capability to quantitatively assess the overall adequacy of seismic design for nuclear plants in general.

2. PLAN FOR PROBLEM RESOLUTION

The overall program for resolution of the seismic design criteria consists of (1) tasks concerning the seismic input, definitions, and (2) tasks concerning the response of structures, systems, and components. Tasks related to the response and behavior of structures, systems and components were initiated in Fiscal Year (FY) 1977, and are nearing completion at the end of FY1978. Tasks related to the seismic input definition were initiated in late FY1978 and early FY1979. These tasks are not expected to be completed until the beginning of FY1981.

2 Phase 2 of this program comprises the tasks related to the seismic input definition. Listed below are the tasks associated with the various phases of this program, also indicated in parentheses are the lead NRR Divisions for the respective tasks.

2 **Phase 1** Response of Structures, Systems, and Components

Task 1.0 Quantification of Seismic Conservatisms (DOR)

1.1 Display of Methodology

1.2 Design Ground Motion

1.3 Seismic Analysis and Design

1.4 Structural and Mechanical Resistance

1.5 Overall Quantification

Task 2.0 Elasto-Plastic Seismic Analysis (DOR)

2.1 Model Development

2.2 Elasto-Plastic Analysis

2.3 Conventional Analysis

2.4 Conclusions and Recommendations

Task 3.0 Site Specific Response Spectra (DOR)

3.1 Define Site Conditon and Assess Relevant Data

3.2 Select Statistically Significant Subjects of Time Histories

3.3 Development of Baysian And Deterministic Approaches

3.4 Develop Data Base for Site Specific Spectra Using Various Approaches

3.5 Initial Assessment of Basic Approaches

3.6 Categorization of sites

3.7 Development of Site Spectra

3.8 Development of Final Report

3.9 Review San Onofre Approval

2 Task 4.0 Seismic Aftershocks (DOR) *

4.1 Assess Data on Aftershocks

4.2 Quantify Probability of Aftershock Before Plant is safely Shut Down

4.3 Recommend Number of Earthquake Cycles

4.4 Recommend Allowable Level of Inelastic Behavior

Task 5.0 Nonlinear Structural Dynamic Analysis Procedures for Category I Structures (DSS)

5.1 Survey of Methods of Nonlinear Analysis

5.2 Selection of Reference Method

5.3 Benchmark Analyses

Task 6.0 Soil-Structure Interaction (DSS)

6.1 Evaluation of Analytical Limitations

6.2 Evaluation of Regulatory Guide 1.60

6.3 Effect of Horizontally Propagating Surface Wave

6.4 Evaluation of Linear Iterative Procedure

6.5 Evaluation of Plane Strain Model

6.6 Determination of Control Motion Location

6.7 Analyze Rotational Inputs

6.8 Conclusions and Recommendations

2 * This task has been deleted due to sparsity of data on strong motion aftershocks. Also, the inelastic behavior of safety related structures and equipment are limited to low ductility levels.

Phase 2, Seismic Input Definition

Task 7 - State-Of-The-Art Study Concerning Near Field Earthquake Ground Motion (DSE)

7.1 **Review and Critique of Methods for Determining Strong Ground Motion**

7.2 **Evaluate Strong Motion in the Near-Field of Earthquake As a Function of Earthquake Size**

2 7.3 **Evaluate the Scaling of Strong Ground Motion with the Source Parameters**

7.4 **Prepare A State-Of-The-Art Report**

Tasks 8 and 9 - Analysis of Near Source Earthquake Ground Motion (DSE)

0.1 **Review Current Work in Near Source Ground Motion**

0.2 **Perform Analysis of Existing Near-Source Data**

0.3 **Review and Analyze Ground Motion Data From Explosions**

0.4 **Develop Scaling Rules**

0.5 **Evaluate High Frequency Attenuation of Near-field Ground Motion**

0.6 **Evaluate Response Spectrum Dependence on Source Parameters**

2 Task 10.0 - Review and Implementation (RES)

10.1 Review and Evaluate Results of Other Tasks

10.2 Modify Standard Review Plan

A description of each of the above tasks and subtasks is given below:

<u>Task 1.0 Quantification of Seismic Conservatisms</u>

The plant seismic design process required by NRC criteria (following identification of the SSE for a site) includes a number of conservative factors and may include some factors which are not conservative. The objective of this task is to identify and quantify each of these factors, and then estimate the overall conservatism of the seismic design process. This task will consist of five subtasks, as described below.

Subtask 1.1: Display of Methodology

Prepare a matrix of the different analytical models showing the different analyses to be performed and the item for which the results will be used.

Subtask 1.2: Design Ground Motion

This subtask will evaluate the conservatism of the use of Regulatory Guide 1.60 response spectra, the use of 1/2 the SSE g value for the OBE, and the simultaneous application of seismic input to all points on the foundation of a structure.

Subtask 1.3: Seismic Analysis and Design

This subtask will evaluate the conservatism inherent in the analysis and design methods recommended by the Standard Review Plan, including inelastic vs elastic analysis, Regulatory Guide 1.61 damping values, soil- structure interaction, three-component analysis, absolute sum combination of loads, peak widening of floor response spectra, the use of maximum response spectra for multiple-supported systems, multiple application of damping values, system redundancy, and qualification of electrical and mechanical equipment.

Subtask 1.4: Structural and Mechanical Resistance

This subtask will evaluate the conservatism due to the use of minimum material properties, the use of static rather than dynamic resistance of structures, the use of 28-day concrete strength, the use of "allowable" ductility rather than ductility to failure, energy absorption by non-load carrying structures, and the stringency of nuclear QA programs.

Subtask 1.5: Overall Quantification

Having determined the conservatism of each aspect of seismic design, quantify the overall conservatism of several typical structures, systems, and components by determining the overall margin to failure, and performing a probabilistic assessment of the overall risk.

Task 2.0 Elasto-Plastic Seismic Analysis

Elasto-Plastic behavior of structures tends to absorb a significant portion of the seismic energy, therby reducing the imposed seismic loads from those predicted using an elastic analysis. This task will investigate the extent to which simplified elasto-plastic design methods are applicable for use in the design of Category I and adjacent non-Category I structures. The purpose of this task is twofold: (1) to compare the degree of conservatism of a typical steel frame for a static, and several vintages of dynamic, analyses to a rigorous elasto-plastic analysis technique; and (2) to recommend a simplified elasto-plastic analysis technique with corresponding inelastic analysis parameters; i.e., damping values, response spectra, etc., for possible use in the analysis of non-Category I structures.

This task is divided into five substasks:

Subtask 2.1: Model Development

Develop the dynamic model of a typical two-bay, three-story steel frame, a typical vertical piping system and a typical horizontal piping system. A typical pump and valve will be assumed to be attached to the piping system to represent equipment and its corresponding supports.

Subtask 2.2: Elasto-Plastic Analysis

Perform rigorous elasto-plastic time history analyses of the models set up in subtask 2.1 by subjecting them to typical recorded seismic accelerograms representing (a) near field effects and (b) far field effects in order to determine the threshold "g" values for the structure, system and component.

Subtask 2.3: Conventional Analysis

Using the same models perform analyses corresponding to the different vintages of design criteria; i.e.:

(a) static application of "g" value - determine the "g" values for the structures, component, and system assuming elastic behavior,

(b) dynamic design with Housner type of spectra, corresponding damping values and floor response spectra - determine the "g" values for the structures, component, and system assuming elastic behavior, and

(c) dynamic design with current criteria in accordance with sections 3.7 and 3.8 of the Standard Review Plan - determine the "g" values for the structures, component, and system assuming elastic behavior.

Obtain relative conservatism of each item in Subtask 2.3 by comparing the results with those of Subtask 2.2.

Subtask 2.4: Conclusions and Recommendations

Make recommendations on a simplified elasto-plastic analysis technique such as the one proposed by N. M. Newmark and the corresponding inelastic analysis parameters such as damping values, response spectra, etc.

Task 3.0 Site-Specific Response Spectra

The current spectral shape as defined by Regulatory Guide 1.60 is based upon a statistical data base which is strongly biased toward shallow California earthquakes. It has been concluded that the guidelines provided in Regulatory Guide 1.60 may be overly conservative for many plant sites. This task is intended to assist in defining site-specific spectral shapes that are realistic and not overly conservative. The objective of this task is to develop procedures for the determination of site-specific response spectra to evaluate the seismic input parameters such as maximum ground acceleration, spectral velocity, and spectral displacement for a variety of nuclear power plant sites. This task will be carried out as follows:

(a) Perform a literature search and make recommendations to the staff regarding the procedures for the determination of site-specific response spectra. For example, (1) the site-specific spectra may be based on a uniform probability of exceedence through the frequency range of interest, (2) site-specific spectra may be based on the envelope of the response spectra of actual strong motion time histories applicable to the selected plant site (similar site condition, same intensity earthquake, etc.)

(b) Identify computer codes and automated routines utilized in this project and document any modifications to same.

(c) Recommend methodologies to be used to determine the site-specific response spectra.

Task 4.0 Seismic Aftershocks

2 This task has been deleted

Task 5.0 Nonlinear Structural Dynamic Analysis Procedures for Category I Structures

This task is designed to provide the staff with a practical method for assessing seismic safety margins and design adequacy of Category I structures beyond their elastic response range.

The Standard Review Plan and regulatory guides currently provide no criteria or acceptable methods for nonlinear seismic analysis. The present licensing need, however, requires the development of acceptance criteria and methods of analysis in this area. This need is principally in existing plants (e.g., Diablo Canyon) where determinations regarding design adequacy of Category I structures requires reevaluation as a result of upward redefinition of SSE "g" values.

This task differs from Task 2.0 above, in that Task 2.0 emphasizes the development of simplified, response spectrum methods of inelastic analysis, whereas Task 5.0 is oriented primarily towards the time-history method of analysis.

This task will consist of three subtasks, as described below:

<u>Subtask 5.1</u>: Survey of Methods of Nonlinear Analysis

Conduct a literature search for both rigorous and simplified methods of dynamic analysis for structures with nonlinear or inelastic behavior for the purpose of identifying specific approaches for implementing the below-defined tasks.

<u>Subtask 5.2</u>: Selection of Reference Method

Based on the results of the literature search and the review group's expertise in the area, the review group will identify and recommend the most pertinent yet simplified and practical dynamic analysis procedure for Category I structures, systems, and components with reliance on nonlinear or inelastic behavior. The procedure should have the capability of handling nonlinear response of multi-degree-of-freedom systems and structures. Description of the recommended procedure should include all basic assumptions for the analysis, theoretical background, analytical models, mathematical formulation, methods of solution, verification of reliability and correctness of the method and interpretation of results. If computer programs are involved, description of the programs, including flow diagram, complete program listing, program verification date, program applicability and limitations and sources of sub-routines, should be included.

<u>Subtask 5.3</u>: Benchmark Analyses

Develop a set of benchmark problems and perform comparative studies of the benchmark problems using the rigorous and simplified nonlinear analysis methods and the conventional methods of elastic dynamic analysis to establish relative merits of the two approaches (i.e., nonlinear and linear approaches) and recommend cases where the nonlinear dynamic analysis method should be used. Recommend pertinent design criteria and analysis guidelines that should be followed in conducting nonlinear dynamic analyses of Category I structures, systems, and components using the recommended method of analysis.

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Task 6.0 Soil-Structure Interaction

The subject of soil-structure interaction analysis has long been a controversial subject because of the various techniques preferred by different applicants. Recently, it has become a primary issue on several projects being licensed and has been designated an ACRS Generic Item (IIE-1). In order to provide a confirmatory basis for, or otherwise to revise the current Standard Review Plan positions, an indepth study which will evaluate from an analytical point of view the various techniques, including deconvolution analyses, is urgently needed.

The objective of this investigation is to determine limits and conditions of applicability as well as estimates of conservatism in the definition of seismic input and soil-structure interaction procedures currently used in the seismic analysis of nuclear power plants. Specific attention will be given to the conservatism embodied in the application of computer programs such as SHAKE and LUSH employed for deconvolution and soil-structure interaction analysis. Particular attention will be given to requirements concerning variation of soil properties, enveloping the response spectra at the foundation level, and fixing a minimum value of the response spectra at the foundation level.

This task will consist of eight subtasks, as described below:

Subtask 6.1: Evaluation of Analytical Limitations

Analyze the assumptions used in modeling soil-structure interaction as specified in the computer codes SHAKE and LUSH and determine appropriate limits and conditions of applicability. In doing this, specifically consider geological features such as oblique strata and undulating topography and the appropriateness of postulating a horizontally layered soil with uniform properties at a given depth.

Subtask 6.2: Evaluation of Regulatory Guide 1.60

Analyze the suitability of using Regulatory Guide 1.60 (Definition of Seismic Input) with SHAKE. Specifically consider that

SHAKE requires a site dependent input but that R.G. 1.60 provides a relatively broad band frequency input which might result in unrealistic motions predicted at depth.

Subtask 6.3: Effect of Horizontally Propagating Surface Wave

Determine by analysis the effect of a horizontally propagating surface wave on structures, systems, and components and estimate the conservatism of the SHAKE assumption that earthquake motions will arrive at a site via a vertically propagating body wave.

Subtask 6.4: Evaluation of Linear Iterative Procedure

Analyze the significance and consequences on the analytical results of the SHAKE use of an equivalent linear iterative procedure in light of recent studies that have indicated that a more exact nonlinear procedure may give different results, especially for large nonlinearities.

Subtask 6.5: Evaluation of Plan Strain Model

Analyze the significance and the consequences on the analytical results of SHAKE's use of a plane strain model to perform one deconvolution of an earthquake component at a time when, in actuality, three translational components of the earthquake motion will propagate simultaneously.

Subtask 6.6: Determination of Control Motion Location

Determine the appropriate location (e.g., finished grade, foundation level, first competent rock layer) for specifying the seismic control motion.

Subtask 6.7: Analyze Rotational Inputs

Perform analyses to determine the safety significance of rotational seismic inputs (e.g., rocking and torsional inputs).

Subtask 6.8: Conclusions and Recommendations

(a) Recommend appropriate methods of performing seismic deconvolution analyses, including estimates of conservatism and limits of applicability. Recommend analytical procedures for sites having a shallow soil layer over the first competent rock layer.

(b) Recommend appropriate methods of performing soil-structure interaction analysis, including:

(1) when to use the elastic half space method, and

(2) when to use the finite element method.

Task 7.0 Earthquake Source Modeling

The objective of this task is to provide the methodology for determining the adequacy of modeling techniques proposed by applicants to assess ground motion near faults. This task will evaluate the state-of-the-art and provide the staff with the means
2 for making an independent determination of appropriate source parameters to predict site-dependent ground motion from earthquakes on large faults near the site.

Subtask 7.1: Review and Critique Methods for Determining Strong Ground Motion

Perform a unified review which reconciles and explains the different earthquake source theories taking advantage of both dislocation as well as relaxation models.

Subtask 7.2: Evaluate Strong Motion in the Near-Field of Earthquake as a Function of Earthquake Size

Evaluate strong motion in the near-field as a function of
2 earthquake size, for example, moment and magnitude. Strong motion is defined as time histories, response spectra, and peak parameters.

Subtask 7.3: Evaluate the Scaling of Strong Ground Motion with Source Parameters

Variation of other source parameters will be evaluated. These include fault plane dimension and orientation, stress drop, stress conditions and time function of slip.

Subtask 7.4: Prepare a State-of-the-Art Report

Develop and provide a state-of-the-art report incorporating the results of Subtasks 7.1 through 7.3 This document shall combine developed earthquake source theory with the limited observed data to develop alternative scaling procedures for near-field spectra.

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Task 8.0 and 9 Analysis of Near-Source Ground Motion

The objective of this task is to develop methodology for determining strongground motion spectra in the strong motion (region of unattenuated source spectrum) near-field of earthquake sources. Methodology is to incorporate earthquake source parameters.

This task will be conducted as follows:

I. Review current work being done in near-source ground motion and identify parameters which impact ground motion.

2 II. Perform analysis of existing near-source data to determine dependence of peak acceleration on earthquake source parameters as magnitude, moment, source dimension, stress conditions, source propagation speed, and attenuation of the spectral content of the ground motion.

III. Review and analyze ground motion data from explosions and collect applicable data from salvo type experiments.

IV. Develop scaling rules from I, II and III.

V. Evaluate role of attenuation (Q) in high frequency cutoff near-field ground motion from studies of ground motion recorded at several sites from the same earthquake. If possible, worldwide data will be used.

VI. Evaluate response spectrum dependence on source parameters using the above tasks.

VII. Assist NRC staff to make interim assessments. This assistance will consist of the state-of-the-art input, as advanced by this study, to be used by licensing staff for specific sites.

Task 10.0 Review and Implementation

The objective of this task is to provide a technical review of the results of each of the other tasks in this program, and to recommend changes in NRC criteria, regulatory guides, regulations, etc., based on these results.

Subtask 10.1 Review and Evaluate Results of Other Tasks

This subtask involves the establishment of a seismic review group, with representatives from each of the four NRR divisions and from Research and Standards. The function of the group would be to periodically review the results of each of the tasks in this program. When interim or final results are available for a task, the review group would evaluate the results and recommendation to be taken, if warranted, to modify the Standard Review Plan, the Regulatory Guides, or the Regulations.

All the tasks in this program have the potential of resulting in modifications to the standard review plan, depending on the results obtained. In addition, Tasks 1.0 through 4.0 will result in the development of criteria for use in the Systematic Evalution Program for re-review of operating reactors.

Subtask 10.2: Modify Standard Review Plan

Under this subtask, recommended changes to the Standard Review Plan in seismic areas will be implemented by NRR.

3. BASIS FOR CONTINUED PLANT OPERATION AND LICENSING PENDING COMPLETION OF TASK

As discussed in Section 1, the objective of this task is to investigate selected areas of seismic design to determine their conservatism for all types of sites, to investigate alternate approaches to parts of the design sequence, to quantify the overall conservatism of the design sequences, and to modify the licensing criteria if changes are found to be justified. The results of the task will be applicable to all types of nuclear power plants.

We anticipate that the results of this task will provide confirmation that current requirements provide an overall conservative approach to seismic design. The general result that is anticipated from this task is the development of better insight into seismic design considerations that will permit establishment of a set of integrated requirements providing for more realistic and effective designs without a loss of overall margin.

Three general types of results are expected from this task. The first of these is the ability to select seismic design ground motion inputs for each site that are more appropriate for the site and thus will result in a more consistent level of seismic design for all plants.

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Second, it is expected that these investigations will demonstrate that the current methods of analysis are conservative in relation to other methods that could be justified and to provide a quantitative idea of how conservative they are. Finally, it is expected that this effort will demonstrate that the overall safety margins attained using current methods are considerable. In the interim, it is believed that continuation of the current licensing requirements will assure an acceptable level of safety in plant seismic design.

If the results of this task action plan are <u>not</u> as anticipated and the current criteria prove <u>not</u> to be adequately conservative in some way for some sites, then corrective action might be indicated for one or more plants that now meet the current criteria. Based on our experience in upgrading the seismic design criteria for some plants, the following considerations apply to this unexpected eventuality:

(1) The corrective action probably would consist of performing detailed plant specific analyses to determine what modifications, if any, are needed.

(2) We expect that such modifications, if required, would be practical and could be implemented in a timely and safe manner.

(3) Since we do not expect any need for upgrading from this task action plan, it is likely that any such need that does arise would not be major. Thus we expect that modifications, if required, would not be major.

Based on the discussion above we conclude that while this task is being performed, continued operation and plant licensing can proceed with reasonable assurance of protection to the health and safety of the public.

4. NRR TECHNICAL ORGANIZATIONS INVOLVED

This section delineates the organizational responsibilities and manpower requirements for each task within NRR before the responsibility of the management of this task was transferred to RES in
2 September, 1979. NRR's participation in FY1979 is limited to review and comment. The cognizant NRR Division and cognizant NRR engineers are also listed in this section.

A. Engineering Branch, Division of Operating Reactors, has lead responsibility for Tasks 1.0, 2.0, 3.0, and 4.0 and secondary responsibility for Tasks 5.0, 6.0 and 10.0.

Manpower Estimate: 1.0 Man-years FY 1978.

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B. Structural Engineering Branch, Division of Systems Safety, has lead responsibility for Tasks 5.0 and 6.0 and secondary responsibility for Tasks 1.0, 2.0, 3.0 and 10.0.

2 Manpower Estimate: 0.5 Man-years FY 1978;

C. Geosciences Branch, Division of Site Safety and Environmental Analysis, has lead responsibility for Tasks 7.0, 8.0, and 9.0 and secondary responsibility for Tasks 1.0, 3.0, 4.0, 6.0 and 10.0.

Manpower Estimate: 0.7 Man-years FY 1978;

D. Light Water Reactors, Branches 1 and 2, Division of Project Management, have overall responsibility, as Task Managers, for coordination and management of all tasks, and have lead responsibility for Task 10.0.

Manpower Estimate: 0.8 Man-years FY 1978;

Cognizant NRR Divisions and Cognizant NRR Engineers:

A. Division of Operating Reactors

T. Cheng
H. Levin
D. Allison

B. Division of Systems Safety

S. Chan
H. Polk

C. Division Site Safety and Environmental Evaluation

L. Reiter

D. Division of Project Management

H. Rood

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5. TECHNICAL ASSISTANCE REQUIREMENTS

2

Task No.	Lead Division	Contractor	Amount FY1978	Amount FY1979	Amount FY1980	Task Objective
1.0	DOR	LLL	304,000	0		Quantify seismic conservatisms
2.0	DOR	LLL	80,000	0		Develop and evaluate elasto-plastic analysis techniques
3.0	DOR	LLL	70,000	130,000		Develop methods to determine site-specific response spectra
4.0*	DOR	LLL	*	*		*
5.0	DSS	URS/John Blume	62,000	0		Develop nonlinear seismic analysis methods
6.0	DSS	D'Appolonia	142,000	29,000		Evaluate soil-structure interaction analysis
7.0	DSE	Systems, Science and Software	0	65,000	101,000	Develop earthquake source modeling methods
8.0 & 9.0	DSE	LLL		57,000	58,000	Develop methods to determine strong-motion near-field spectra
10.0	RES	LLL		60,000		Review results of program, modify SRP
		TOTALS	658,000	341,000	159,000	

*Project was deleted.

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6. INTERACTION WITH OUTSIDE ORGANIZATIONS

A. ACRS

The tasks in this program are of interest to the ACRS; specifically, the ACRS Seismic Subcommittee. Further, Task 6.0 of this program directly addresses the issue raised by ACRS Generic Item IIE-1, Soil-Structure Interaction. Accordingly, this program will be co-ordinated with the Committee as the tasks in the program progress.

B. U.S. Geological Survey

Intermittant interaction with the USGS is expected for the purpose of obtaining seismic data.

7. ASSISTANCE REQUIREMENTS FROM OTHER NRC OFFICES

A. Office of Standards Development, Division of Site Health and Safeguards Standards

Close coordination with OSD is required since this task is closely related to a number of seismic tasks that are planned or are being conducted by OSD. This coordination will be achieved by holding meetings with OSD personnel to exchange information, and by inclusion of one or more OSD members on the seismic review group overseeing A-40 (see Task 10.0).

B. Office of Nuclear Regulatory Research, Division of Reactor Safety Research

Close coordination with RSR is required since this task is closely related to the Seismic Research Program being undertaken by RSR. One of the three major objectives of the Seismic Research Program is the Quantification of Conservatisms in Present Seismic Methodology. It is expected that the work currently underway in Task 1.0 of A-40 will provide input to this aspect of the RES effort. This will be facilitated by the fact that the same contractor (LLL) is undertaking both efforts.

Co-ordination of A-40 with RSR seismic efforts will be achieved by holding meetings with RSR personnel to exchange information, by inclusion of one or more RSR members on the seismic review group overseeing A-40 (see Task 10.0), and by requesting that RSR include the A-40 Task Manager in the Seismic Research Review Group which reviews RSR seismic efforts.

8. POTENTIAL PROBLEMS

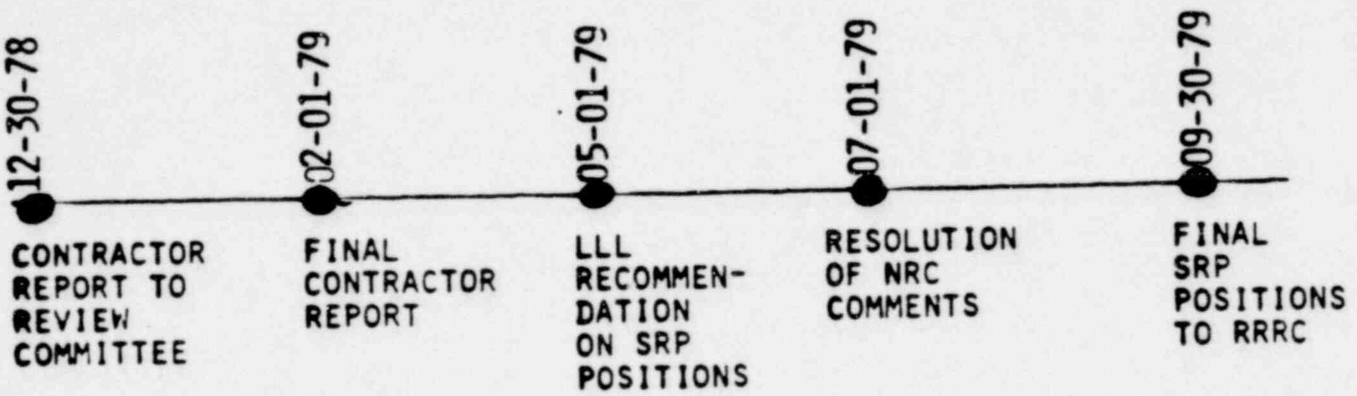
2 Tasks associated with the seismic input definition involve long term effort. The source modeling studies will be useful for the purpose of evaluating the current methods. However, it does not seem likely to yield generic methods and guidelines that can be used solely as the basis for licensing decision. A favorable outcome of these studies for developing Standard Review Plan positions cannot be predicted. Inclusion of such long term efforts in A-40 may lead to expectations of results according to specific schedules that may be hard to keep.

"PROPOSED REVISION 2"

"ALTERNATIVE 1"

TAP A-40 SCHEDULE OF MAJOR MILESTONES

PHASE 1



PHASE 2