NRC FORM 173 (2-78) — U.S. NUCLEAR REGULATORY COMMISSION

STANDARD ORDER FOR DOE WORK

ORDER NUMBER: 20-80-210

DATE: May 20, 1980

ISSUED TO: (DOE Office)	ISSUED BY: (NRC Office)
San Francisco Operations Office	Office of Nuclear Reactor Regulation

ACCOUNTING CITATION

APPROPRIATION SYMBOL: 31X0200.200

B&R NUMBER: 20 19 02 01

FIN NUMBER: A0233-0

PERFORMING ORGANIZATION AND LOCATION: Lawrence Livermore Laboratory, Livermore, California

FIN TITLE: Seismic Review of Selected Operating Plants for SEP

WORK PERIOD - THIS ORDER: FIXED ☐ ESTIMATED ☒ — FROM: 10/1/79 TO: 9/30/80

OBLIGATION AVAILABILITY PROVIDED BY:

A. THIS ORDER	$ 80,000
B. TOTAL OF ORDERS PLACED PRIOR TO THIS DATE WITH THE PERFORMING ORGANIZATION UNDER THE SAME "APPROPRIATION SYMBOL" AND THE FIRST FOUR DIGITS OF THE "B&R NUMBER" CITED ABOVE	$ 2,966,000
C. TOTAL ORDERS TO DATE (TOTAL A & B)	$ 3,046,000
D. AMOUNT INCLUDED IN "C" APPLICABLE TO THE "FIN NUMBER" CITED IN THIS ORDER.	$ 715,000

FINANCIAL FLEXIBILITY:

- ☒ FUNDS WILL NOT BE REPROGRAMMED BETWEEN FINS. LINE D CONSTITUTES A LIMITATION ON OBLIGATIONS AUTHORIZED.
- ☐ FUNDS MAY BE REPROGRAMMED NOT TO EXCEED ± 10% OF FIN LEVEL UP TO $50K. LINE C CONSTITUTES A LIMITATION ON OBLIGATIONS AUTHORIZED.

STANDARD TERMS AND CONDITIONS PROVIDED DOE ARE CONSIDERED PART OF THIS ORDER UNLESS OTHERWISE NOTED.

ATTACHMENTS:
THE FOLLOWING ATTACHMENTS ARE HEREBY MADE A PART OF THIS ORDER:

- ☒ STATEMENT OF WORK
- ☐ ADDITIONAL TERMS AND CONDITIONS
- ☐ OTHER

SECURITY:

- ☒ WORK ON THIS ORDER IS NOT CLASSIFIED.
- ☐ WORK ON THIS ORDER INVOLVES CLASSIFIED INFORMATION. NRC FORM 187 IS ATTACHED.

REMARKS:

AFTER SIGNATURE, PLEASE SEND A COPY TO M. PAULETTE TRIPLETT, NRR, P-428.

ISSUING AUTHORITY	ACCEPTING ORGANIZATION
SIGNATURE: B. L. Grenier — 6/20/80	SIGNATURE: [signature]
TITLE: Technical Assistance Program Manager	TITLE: Contracting Officer
	DATE: JUL 18 1980

NRC FORM 173 (2-78)

8007280528

SCOPE OF WORK
LAWRENCE LIVERMORE LABORATORY
FY 1980 TECHNICAL ASSISTANCE

SEISMIC REVIEW OF SELECTED
OPERATING PLANTS FOR THE
SYSTEMATIC EVALUATION PROGRAM
(B&R 20 19 02 01, FIN A0233)

LLL personnel and/or its subcontractors will provide an evaluation of the capability of selected SEP facilities to resist earthquake induced forces. The LLL technical assistance will include an evaluation of the integrity of the reactor coolant pressure boundary and the capability of essential structures, systems and components required to safely shutdown the reactor and maintain it in a safe shutdown condition during and after a seismic disturbance including other systems as specified by the NRC required to mitigate the consequences of such an event.

LLL personnel and/or its subcontractors will be assigned to seismic review teams (SRT) organized by the NRC for the review of selected SEP facilities. The assigned members of each review team will be required to participate during site tours of each facility to view selected structures, systems and components.

LLL is responsible for conducting the day to day technical activities of the SRT for each facility and for meeting the schedules provided by the NRC. The NRC will provide overall coordination with the SEP licensees and will assure that logistics are provided to enable LLL to meet its obligations under this technical assistance program. All major allocation of resources to complete the tasks outlined in this program including methods of evaluation, tools utilized or personnel assigned and budget shall be concurred upon by the NRC technical contact or other appropriate NRC representatives.

The bases for evaluation should generally follow the criteria documented in NUREG/CR-0098, "Development of Criteria for Seismic Review of Selected Nuclear Power Plants" by N. M. Newmark and W. J. Hall, dated May, 1978. However, the NRC will provide additional guidance as appropriate in in establishing seismic review procedures and acceptance criteria. LLL personnel and/or its subcontractors will provide studies to support the SEP Site Specific Spectra Project as defined below.

The following tasks shall be completed by LLL.

I. REVIEW OF SELECTED NEWER SEP PLANTS (Dresden 2, Millstone 1, Ginna, Oyster Creek, Palisades)

A. Complete docket review reports.

B. Assist the NRC staff in the development of a basis for evaluation of each SEP plant including the definition of requirements for new seismic analyses and/or verification analyses.

C. Conduct structural analyses to determine the response of plant structures and seismic loadings to equipment and compare to corresponding seismic response and loadings used in the original design.

D. Review seismic evaluation data developed to qualify the mechanical and electrical equipment and fluid and electrical distribution systems and evaluate the performance of selected equipment under newly defined seismic loadings.

E. Conduct structural evaluations of plant structures and structural systems.

F. Write report documenting plant reviews.

G. Evaluate licensee response to unresolved issues.

H. Assist NRC staff with integrated seismic DBE reviews and in writing seismic safety assessments.

II. REVIEW OF SELECTED OLDER SEP PLANTS (Dresden 1, Yankee Rowe, Big Rock Point, LaCrosse, Haddam Neck, San Onofre 1)

A. Assist the NRC staff in defining requirements for structural and mechanical seismic analyses including an identification of the minimum information required to complete such analyses.

B. Assist the NRC staff in the review of licensee structural and mechanical evaluations including verification analyses as required, including:

1. Evaluation of reactor building and RCPB;
2. Evaluation of safe shutdown systems;
3. Structural evaluations;
4. Final licensee report.

C. Assist NRC staff with integrated seismic DBE reviews and in writing seismic safety assessments.

III. SENIOR SEISMIC REVIEW TEAM SUPPORT

A. Support activities of SSRT by providing structural and mechanical analyses as requested.

B. Retain selected consultants with particular expertise in structural mechanics and mechanical equipment qualification.

IV. SEP SITE SPECIFIC SPECTRA PROJECT SUPPORT STUDIES

A. Letter response to review comments of Peer Review Group, U.S.G.S., Owners Group, Newmark/Hall and NRC staff.

B. Sensitivity Studies

1. Assessment of model for background relative to alternative models and the effect of changes in credibilities.

2. Development of refined attenuation model including sensitivity analyses on the effects of this refinement on alternative parameter values addressing the dispersion coefficient, the long period spectral ordinates and the treatment of soil and rock sites.

3. Assessment of the effect of alternative uncertainty models for seismicity.

C. Provide detailed comparison of SSSP results with other Eastern U.S. hazard analyses.

D. Integrate Tasks IV.A - IV.C into existing SSSP reports and finalize the reports.

E. Provide technical support to N. Newmark and NRC staff to develop acceptance criteria for SSS.

F. Organize and conduct a seminar on attenuation and implement recommendations as required.

G. Organize and conduct feedback to SSSP experts. Develop questionnaire covering significant issues from the feedback. Encode and summarize the responses.

H. Revise results based upon feedback, improved attenuation and sensitivity results. Summarize in a report.

V. GENERAL ELECTRIC TEST REACTOR - SHOW CAUSE PROCEEDING ASSISTANCE

A. Review General Electric Company's probability study relative to initiation of new fractures between existing fractures and/or independent quantification of this likelihood. Prepare an initial letter response with supporting technical review.

B. Provide assistance in preparing responses to ACRS questions by providing analyses to address probability of occurrence of specific offset amounts on existing fractures at the site. This analysis should consider the effect of differences in the origin of fractures as due to both tectonic faulting and landsliding. This analysis should be in the form of a letter report.

C. Provide assistance in evaluating local seismicity in the Livermore Valley area and recurrence calculations for events on the Calaveras fault.

D. Provide assistance in evaluating GE's proposed separation of combined loads caused by fault offset at the surface and peak vibratory motion.

E. Attend approximately 2 meetings with the Advisory Committee and prepare responses to questions as needed. Attend approximately 2 meetings with the staff in Bethesda, Maryland.

F. Prepare formal testimony, interrogatory responses, and participate in public licensing hearings for the GETR site, as required.

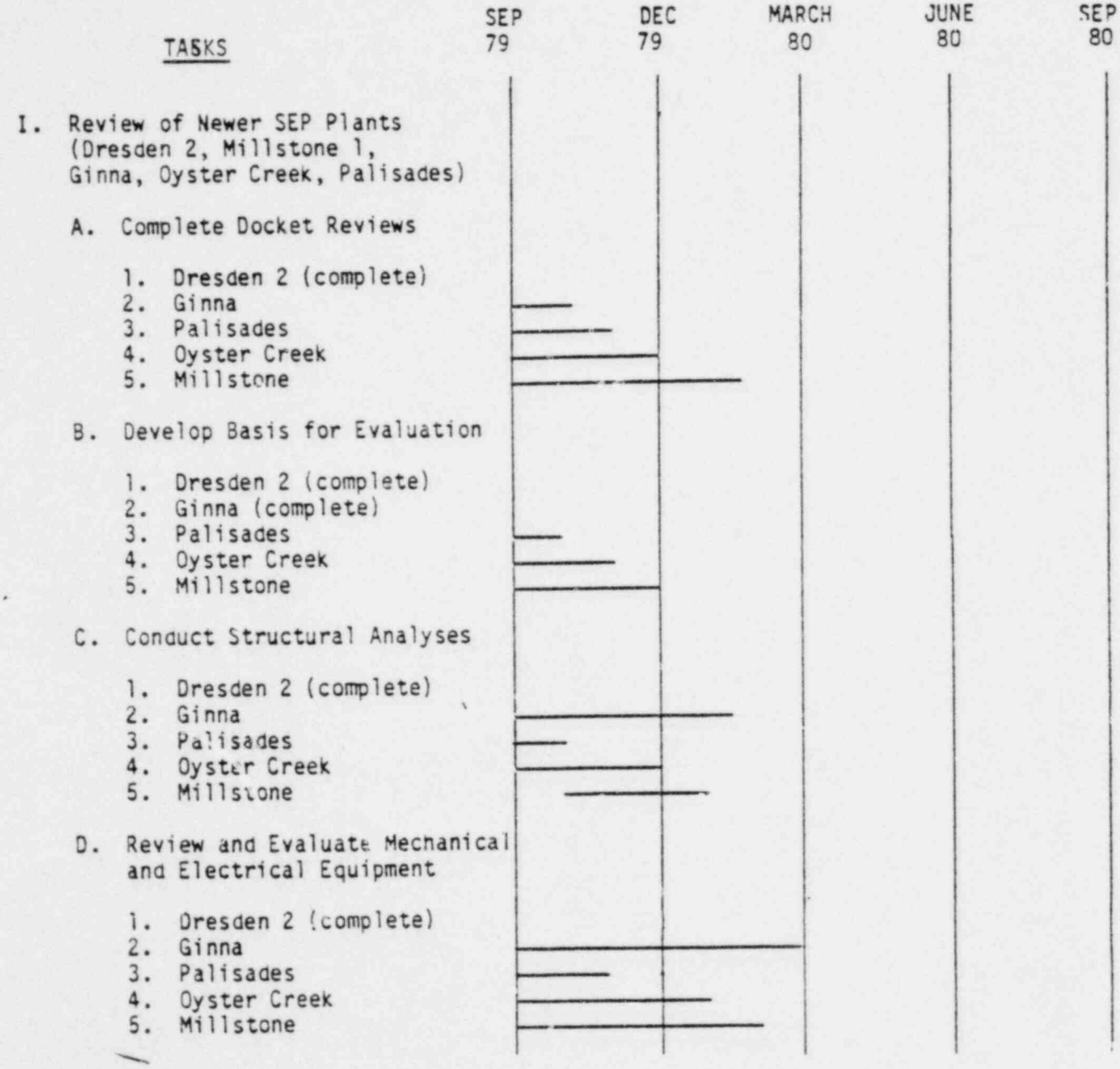
VI. SEP SITE SPECIFIC SPECTRA PROJECT-LICENSING SUPPORT

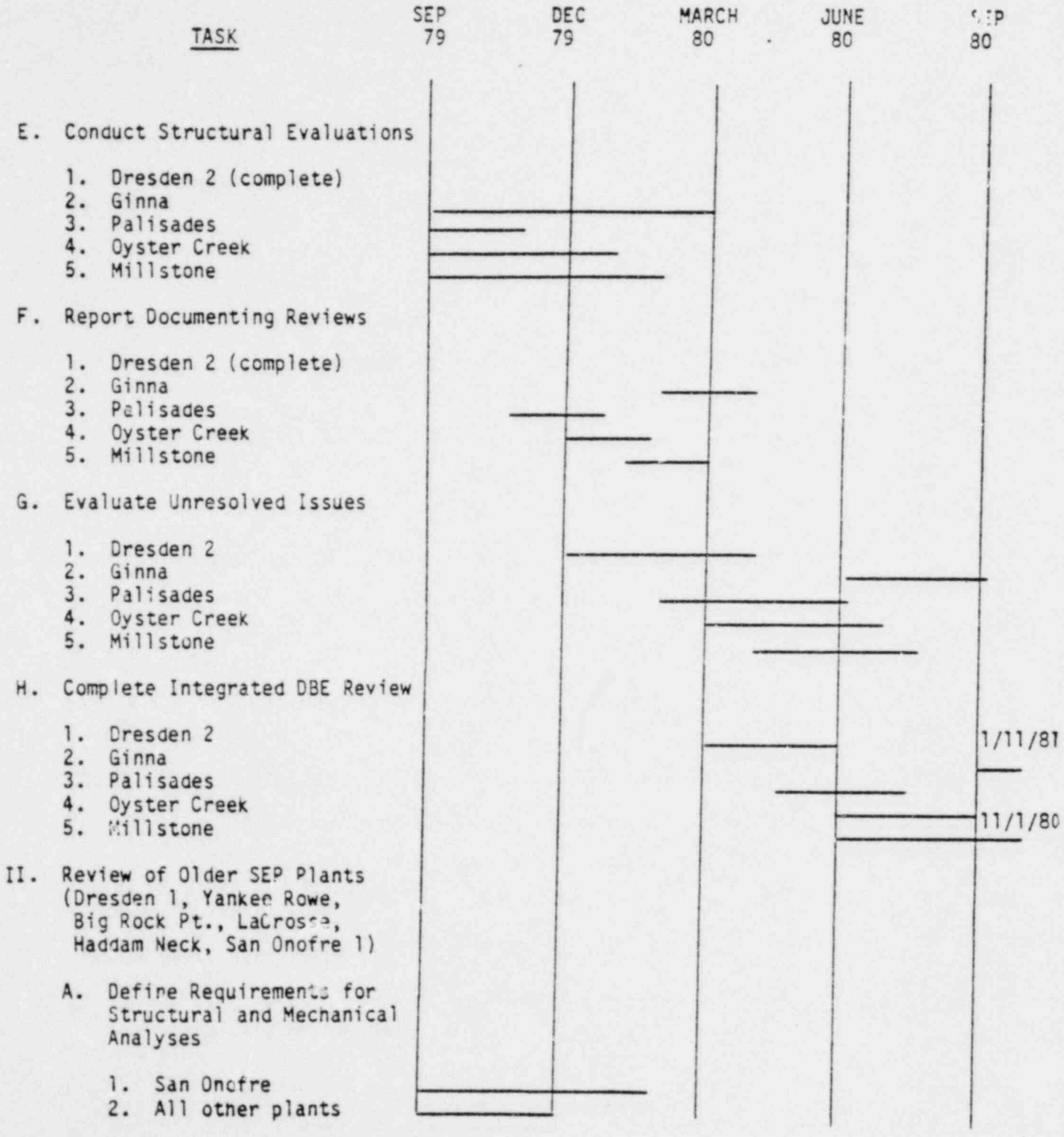
A. Conduct regression analysis for Ossippee earthquake and re-run hazard calculations for selected sites and selected experts.

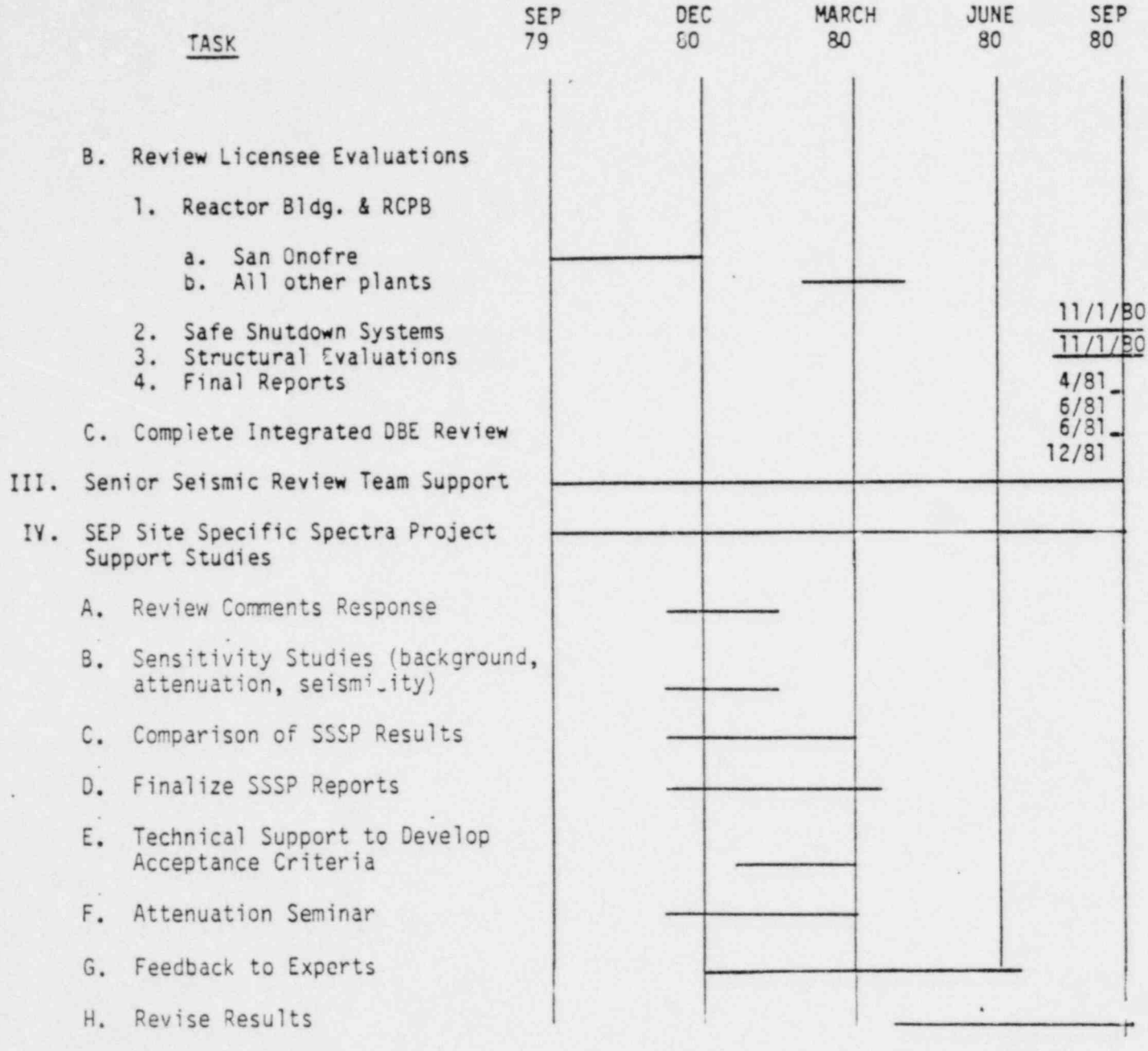
B. Develop scaling relationship for additional damping values using revised ground motion models.

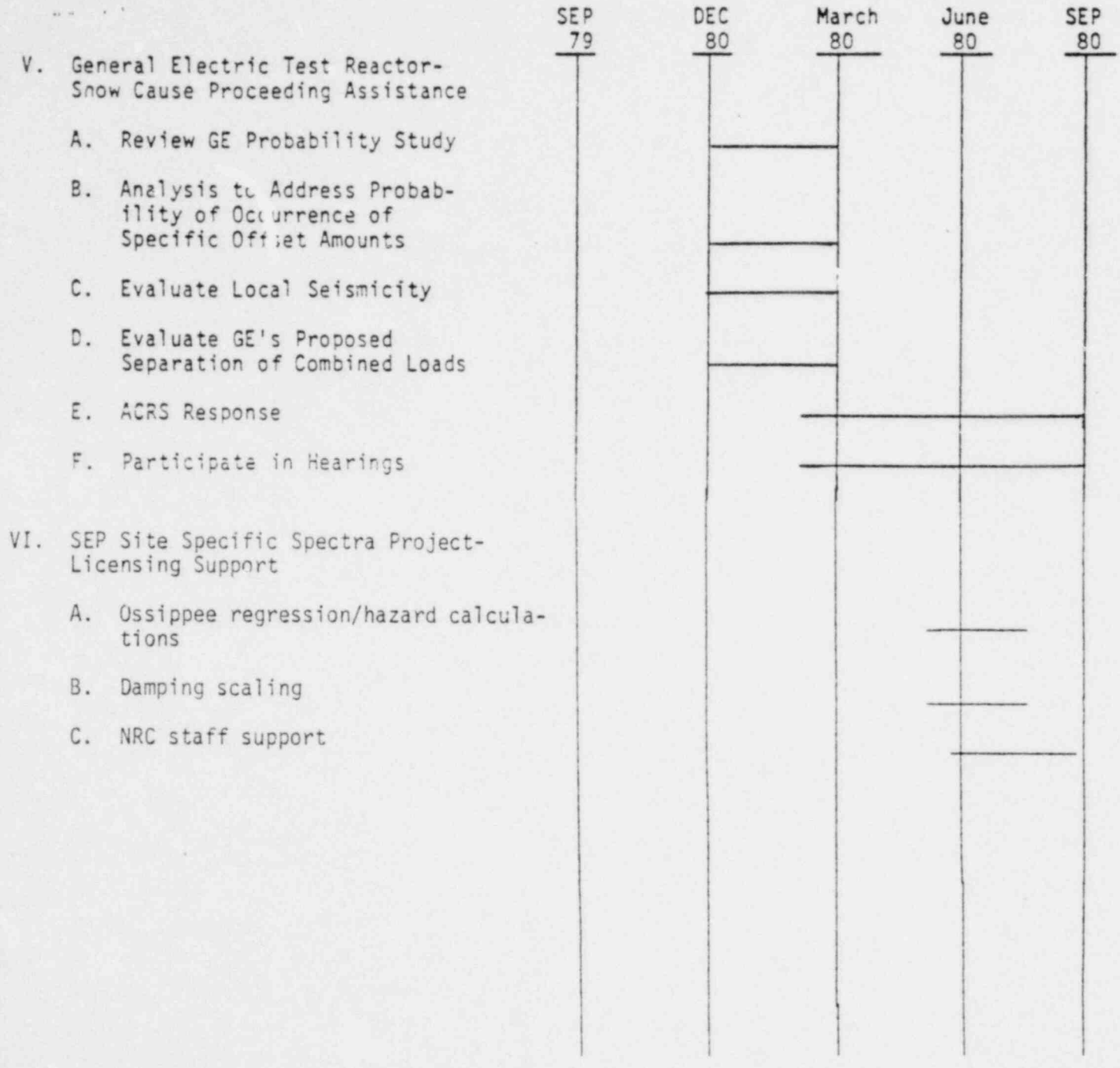
C. Support NRC staff at five meetings. (2 NRC management briefings, 2 program meetings, ACRS meeting).

MILESTONES
TECHNICAL ASSISTANCE FOR SEISMIC REVIEW OF
SELECTED OPERATING PLANTS FOR THE SYSTEMATIC
EVALUATION PROGRAM




TASK
SEP 79
DEC 79
MARCH 80
JUNE 80
SEP 80
E. Conduct Structural Evaluations
1. Dresden 2 (complete)
2. Ginna
3. Palisades
4. Oyster Creek
5. Millstone
F. Report Documenting Reviews
1. Dresden 2 (complete)
2. Ginna
3. Palisades
4. Oyster Creek
5. Millstone
G. Evaluate Unresolved Issues
1. Dresden 2
2. Ginna
3. Palisades
4. Oyster Creek
5. Millstone
H. Complete Integrated DBE Review
1. Dresden 2
2. Ginna
3. Palisades
4. Oyster Creek
5. Millstone
1/11/81
11/1/80
II. Review of Older SEP Plants (Dresden 1, Yankee Rowe, Big Rock Pt., LaCrosse, Haddam Neck, San Onofre 1)
A. Define Requirements for Structural and Mechanical Analyses
1. San Onofre
2. All other plants


TASK
SEP 79
DEC 80
MARCH 80
JUNE 80
SEP 80
B. Review Licensee Evaluations
1. Reactor Bldg. & RCPB
a. San Onofre
b. All other plants
2. Safe Shutdown Systems
3. Structural Evaluations
4. Final Reports
11/1/80
11/1/80
4/81
6/81
6/81
12/81
C. Complete Integrated DBE Review
III. Senior Seismic Review Team Support
IV. SEP Site Specific Spectra Project Support Studies
A. Review Comments Response
B. Sensitivity Studies (background, attenuation, seismicity)
C. Comparison of SSSP Results
D. Finalize SSSP Reports
E. Technical Support to Develop Acceptance Criteria
F. Attenuation Seminar
G. Feedback to Experts
H. Revise Results


SEP 79
DEC 80
March 80
June 80
SEP 80
V. General Electric Test Reactor-Snow Cause Proceeding Assistance
A. Review GE Probability Study
B. Analysis to Address Probability of Occurrence of Specific Offset Amounts
C. Evaluate Local Seismicity
D. Evaluate GE's Proposed Separation of Combined Loads
E. ACRS Response
F. Participate in Hearings
VI. SEP Site Specific Spectra Project-Licensing Support
A. Ossippee regression/hazard calculations
B. Damping scaling
C. NRC staff support