PROGRAM PLAN

INDEPENDENT VERIFICATION OF SONGS 2 & 3 SEISMIC DESIGN

PREPARED FOR

SCE *Southern California Edison Company*

DECEMBER 1981

TORREY PINES TECHNOLOGY

A DIVISION OF GENERAL ATOMIC COMPANY

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PROGRAM PLAN

INDEPENDENT VERIFICATION

of

San Onofre Units 2 and 3 Seismic Design

Issue B

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I. SUMMARY

A program plan has been developed to conduct an independent review of the San Onofre Units 2 and 3 seismic design, including an assessment of the effectiveness of the quality assurance program for design. This program will be performed by Torrey Pines Technology division of General Atomic Company for Southern California Edison Company. This program is divided into six tasks as follows:

Task A	Design Procedure Review
Task B	Design Procedure Implementation Review
Task C	Seismic Design Technical Review
Task D	Audit Plan Review
Task E	Processing of Findings
Task F	Reports

General Atomic Company through its Torrey Pines Technology Division is eminently qualified to perform this evaluation for Southern California Edison. We operate under the first NRC approved quality assurance program. We have available the significant expertise in both quality assurance and design required to review in detail the seismic design starting with the approved design basis, through soil-structure interaction, to dynamic structural response to produce the seismic environment applied to specific components, and finally the component structural response to these environments.

We, as a company, have not had significant involvement with Southern California Edison in the immediate past. The individuals assigned to this project will be free from conflict of interest.

The independent review is scheduled to be complete in March 31, 1982. The overall schedule is shown in Figure 1.

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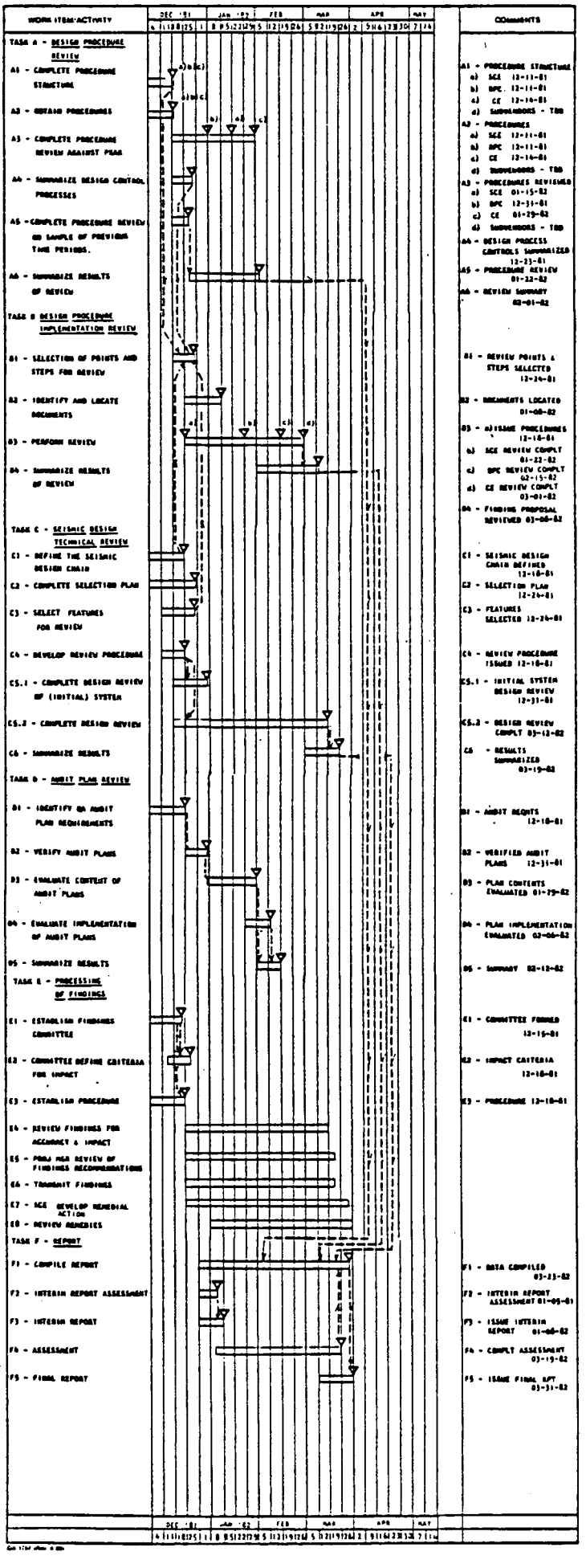

Figure 1

II. TASK DESCRIPTIONS

The purpose of this program is to conduct an independent review of the seismic design of San Onofre Units 2 and 3 from NRC approved design basis to implementation at the constructor or fabricator. This effort shall include review of the effectiveness of the applicable portions of the quality assurance program.

The program will be structured to verify that the design process converted the seismic design basis specified in the FSAR into design documents that are transmitted to the constructor or the fabricator. The program will include a review of the Southern California Edison (SCE) and Bechtel Power Corporation (BPC) audit plans and their implementation at the construction site and the fabricator's shop. The program will not review the design process performed by equipment fabricators other than Combustion Engineering Co. (CE).

The program will be structured to concentrate on Unit 2. It will review Unit 3 insofar as there are significant unique features of Unit 3.

The detailed description of the tasks included in this program are in the following subsections.

TASK A - DESIGN PROCEDURE REVIEW

Objective

To verify compliance of seismic design-related QA procedures and controls to the NRC-approved QA section of the PSAR or to 10CFR-Part 50, Appendix B. The procedures and controls used by SCE, BPC, and CE will be reviewed.

Subtasks

A1. Provide a detailed description of the complete structure of the design control procedures applicable to the seismic design work performed by SCE, BPC and CE. This description will include a comprehensive list of all relevant procedures.

In carrying out this work item, it will be assumed that the major seismic design work was performed by SCE, BPC or CE. If this is not the case, and other organizations also performed significant overall seismic design work, then those organizations will be identified and their design control procedures will be identified and described.

A2. Obtain (or use on-site copies) copies of SCE, BPC, and CE (and, if applicable, subvendor) procedures identified in A1.

The initial collection of procedures from SCE and BPC will include only currently applicable revisions. In the case of CE it will include revisions applicable as of 5/3/76, as well as the current revisions. This is being done under the assumption that all design work can be satisfactorily evaluated against those documents. If this is found not to be the case, then all applicable revisions covering the entire design period will be collected and reviewed.

A3. Review all current procedures (and 5/3/76 CE revisions) affecting the seismic design work, for conformance to the most recent NRC-approved Appendix A of the PSAR.

The first step in this process will be to develop a procedure to accomplish the review described above. The procedure will include a standardized form to be used in the review process. Figure 2 is a typical example of the form to be used.

SCE SEISMIC DESIGN VERIFICATION

Completed by_____

Organization Reviewed _____ Date _____

REQUIREMENT			IMPLEMENTING PROCEDURE(S)				
Document Name	Section	Subject	Procedure Name	#	Rev./Date	Requirements Met Yes No	Comments

Figure 2 - Typical Design Control Procedure Matrix

A4. Summarize the seismic design control process for SCE, BPC, CE (and if applicable, subvendors) used throughout the design period. This summary will be used in Task B, and will consist of a list of the design control requirements and the source procedures.

A5. Review selected design control procedure revisions applicable in time periods other than those covered in A3 for compliance to the applicable PSAR, per A3 above.

A6. Summarize the design procedure review, including any Potential Findings. This information will be included in the reports of Task F.

Milestones

A1- Complete Procedure Structure

a) SCE - 12/11/81
b) BPC - 12/11/81
c) CE - 12/14/81
d) Subvendors - To be defined later if required

A2- Obtain Procedures (or have available on-site at the design location)

a) SCE - 12/11/81
b) BPC - 12/11/81
c) CE - 12/14/81
d) Subvendors - To be defined later if required

A3- Complete Procedure Review Against PSAR or 10CFR50 App. B

a) SCE - 1/15/82
b) BPC - 12/31/81
c) CE - 1/29/82
d) Subvendors - To be defined later if required

A4- Summarize Design Control Processes - 12/23/81

A5- Complete Procedure Review for Selected Revisions in the Interim Time Period - 1/22/82

A6- Summarize Results of Review - 2/1/82

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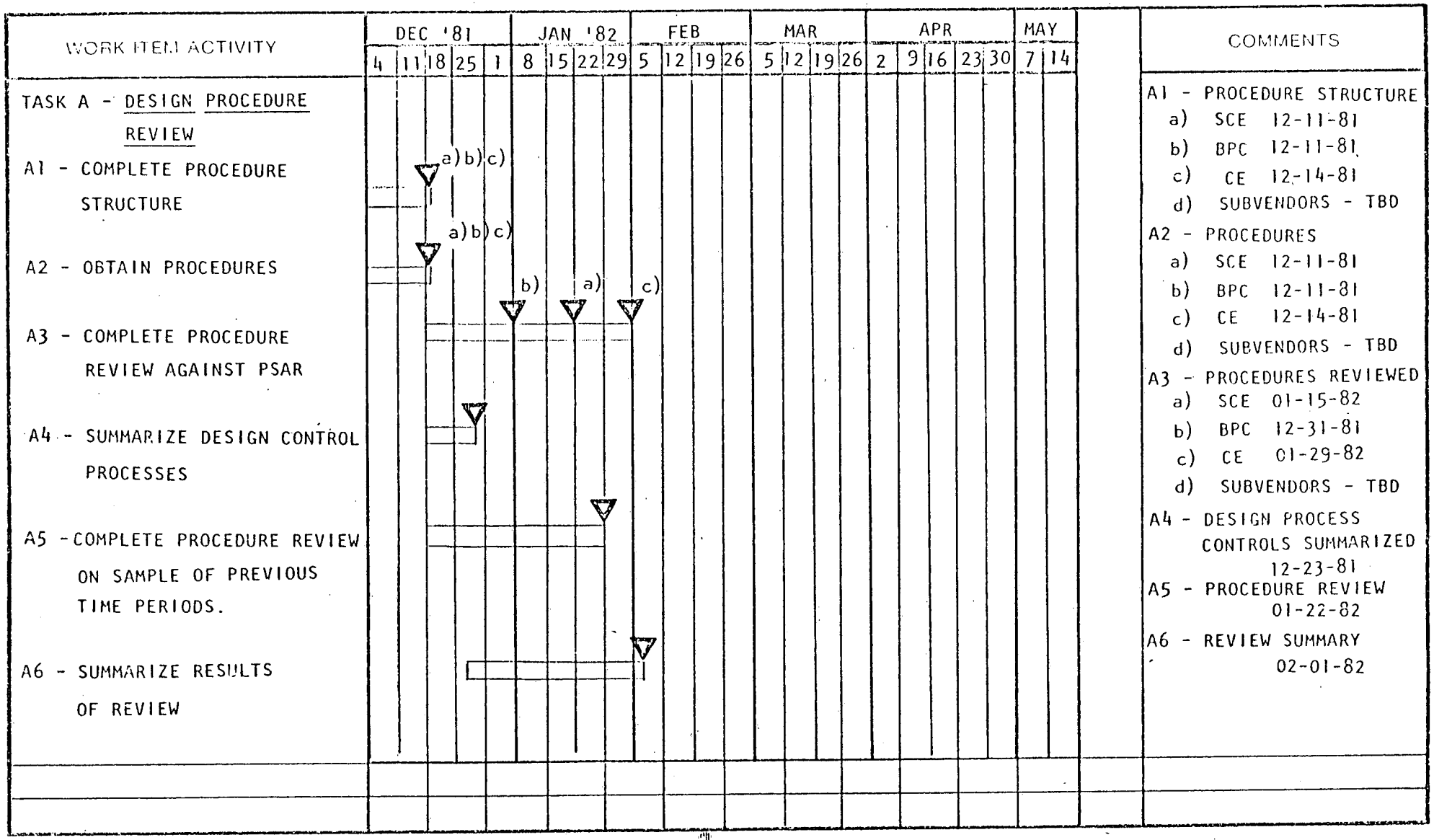

COMMENTS

A1 - PROCEDURE STRUCTURE
a) SCE 12-11-81
b) BPC 12-11-81
c) CE 12-14-81
d) SUBVENDORS - TBD

A2 - PROCEDURES
a) SCE 12-11-81
b) BPC 12-11-81
c) CE 12-14-81
d) SUBVENDORS - TBD

A3 - PROCEDURES REVIEWED
a) SCE 01-15-82
b) BPC 12-31-81
c) CE 01-29-82
d) SUBVENDORS - TBD

A4 - DESIGN PROCESS CONTROLS SUMMARIZED 12-23-81

A5 - PROCEDURE REVIEW 01-22-82

A6 - REVIEW SUMMARY 02-01-82

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TASK B - DESIGN PROCEDURE IMPLEMENTATION REVIEW

Objective

To verify the implementation of design procedures and controls identified in Task A.

Subtasks

B1. Review the design chain from Task C (Subtask C1) and the summary from Task A (Subtask A1 and A4), and select points and steps for procedure implementation review based on the following selection criteria:

a. All steps and points associated with structures, components and systems selected in Task C (Subtask C3) shall be included.

b. A substantial number of other safety-related points and steps shall be selected for review (currently the total of a and b is estimated at about 200).

c. A significant number of points of interface between SCE, BPC and CE shall be included.

d. The selection shall include work which spans the entire calendar period of the seismic design effort.

e. The selection shall include work which covers all phases of the design process.

f. The selection shall include all types of design documents.

g. The selection shall include work within BPC and CE.

B2. Identify and locate pertinent design documents (from SCE, BPC, or CE) and governing procedures (from Task A).

B3. Review the selected steps and points for compliance to the governing procedures.

The first step in this process will be to develop a detailed procedure to define the review process. The procedure will include steps to establish how source organizations controlled the generation and communication of design requirements and whether these activities complied with the procedural requirements.

B4. Summarize the results of activities in the task including any Potential Findings. This information will be included in the reports under Task F.

Milestones

B1	Selection of points and steps for review	12/24/81
B2	Identify and locate documents	1/08/82
B3	Perform review	
	a) Issue Procedure	12/18/81
	b) Complete SCE review	1/22/82
	c) Complete BPC review	2/15/82
	d) Complete CE review	3/01/82
	e) Subvendor review if required	(later)
B4	Summarize results of review	3/08/82

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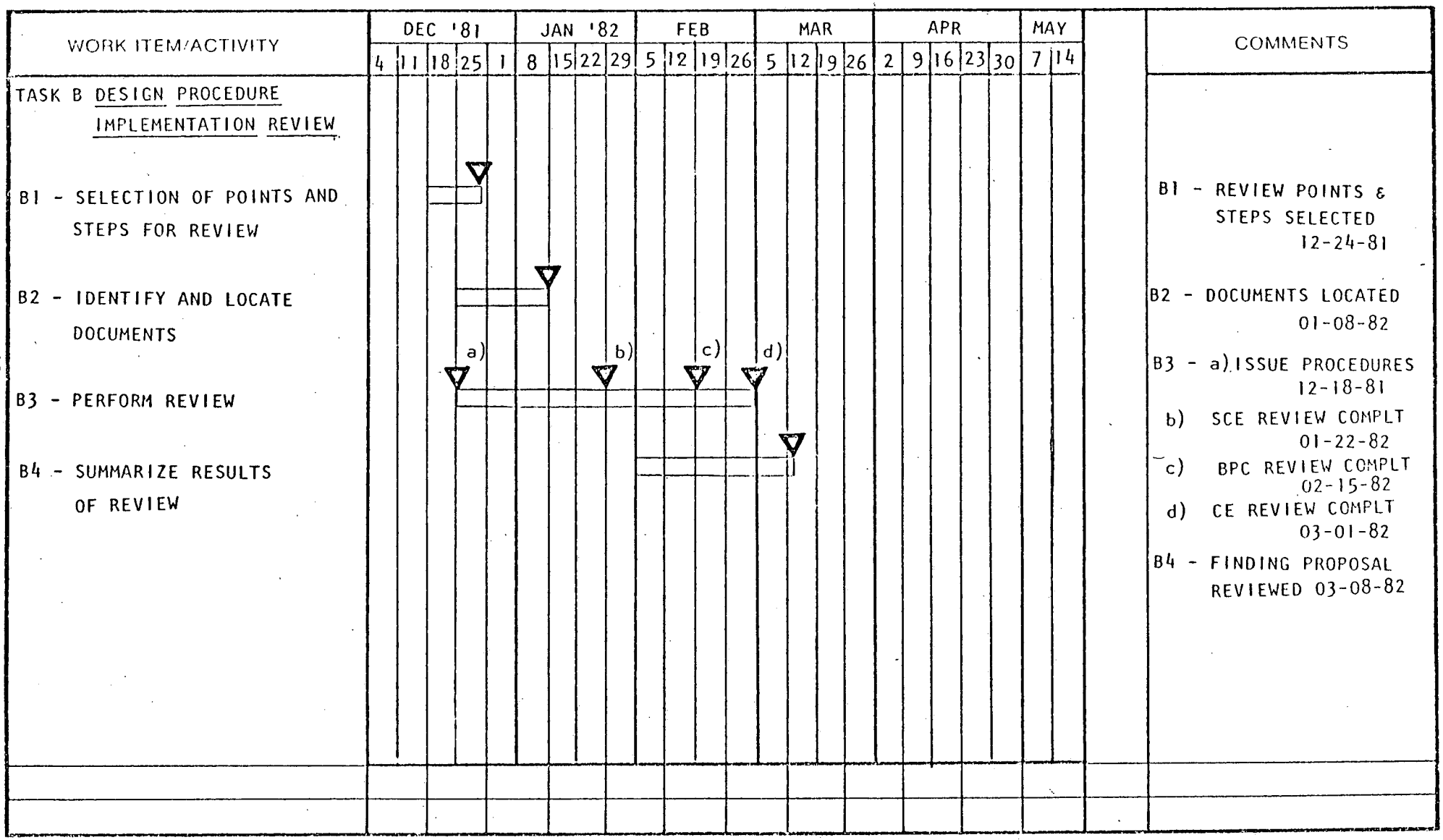

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TASK C SEISMIC DESIGN TECHNICAL REVIEW

Objective

Review the seismic design of selected safety-related structures, components, and systems of San Onofre Nuclear Generating Station Units 2 and 3 for compliance with the NRC approved design basis and methodology per FSAR Section 3.7 and 3.8. ANSI N45.2.11, Section 6.3.1, criteria will be used for guidance.

Subtasks

C1. Develop the network for the seismic design chain for safety-related structures, components, and systems for San Onofre Units 2 and 3. Include identification of design organizations involved and the interface between organizations (includes design groups within BPC and CE, and subcontractors, if significant).

C2. Establish a selection plan for a detailed seismic design review. The criteria for selection of structures, components, and systems are:

a. The majority of the features selected shall be important to safe shutdown and cooldown of the reactor in the event of a Safe Shutdown Earthquake.

b. Features selected shall be representative of safety-related portions of the plant, including:

(1) at least one safety-related structure
(2) at least one major NSSS component.

c. Components selected shall be at different elevations.

d. The majority of components selected shall be in the selected safety-related structure(s).

e. The complete range of sophistication in design methods shall be covered.

f. Features with design interfaces between SCE, BPC, and CE shall be included. Other subcontractors will be included, if significant.

g. The system(s) selected shall include safety-related mechanical components, controls, electrical, piping and cabling.

C3. Select the features for design review. (Currently 20 features are planned.) Representative candidates for detailed seismic review are shown in Table C-1.

C4. Develop specific procedures and acceptance criteria for this design review. The following questions from ANSI N45.2.11-1974, Section 6.3.1, shall be included as they relate to seismic design: 1, 2, 3, 4, 6, 7, 8, 9, 15, 19.

The review shall be conducted using a "top-down" approach as follows:

a. Understand seismic design criteria for San Onofre Units 2 and 3.

b. Review seismic design of selected structure(s) e.g., reactor containment building, auxiliary building, control building, or diesel generator building. The review shall address:

(1) The mathematical description of the structure and soil.
(2) Computer code used (verified/validated)
(3) Input to computer code.
(4) Output (time histories, response spectra) as being reasonable.

TABLE C-1

Representative Features for Detailed Seismic Review

Structures

- Reactor Containment Building
- Auxiliary Building
- Control Room

Reactor Coolant System

- Reactor Vessel, Steam Generators, Pressurizers, Reactor Coolant Pumps, and Connecting Piping
- Feedwater and Steam Piping
- Pressurizer Pressure Indicator
- Safety Valve

Reactor Internals

- Core Support
- Control Element Assemblies and Drive Mechanisms
- Fuel Assemblies

Safety Injection Systems

- Safety Injection Tanks
- HPSI or LPSI Injection Pump
- LPSI Pump Section Check Valve

Chemical and Volume Control System

- Regenerative Heat Exchanger
- Purification Ion Exchange
- Charging Pump
- Purification Filters

Other

- Containment Isolation Valve (automatic, other than check valve)
- Emergency Feedwater Pump
- Flux Monitor, Neutron
- Refueling Machine
- Containment Spray Nozzles
- Containment Atmosphere Radiation Monitor
- Missile Barriers
- Hydrogen Recombiners
- Fuel Storage Racks

TABLE C-1 (continued)

Reactor Protection System

- Logic Circuit Board, Reactor Trip System
- Pressure Sensor
- Cable Trays
- RPS Initiation Relay

Electric Power Systems

- Battery
- Diesel Generator - Starting and Cooling Systems
- Diesel Generator Breaker
- High Voltage Switchgear and Transformer

Shutdown Cooling System

- Shutdown Cooling Heat Exchangers
- Shutdown Cooling System Motor Operated Isolation Valve
- Heat Exchanger Inlet and Outlet Temperature Monitors

Water Systems

- Component Cooling Water System Piping
- Component Cooling Water System Pump
- Component Cooling Water Signal Transmitters
- Essential Services Chilled Water System Chillers

c. Review the seismic design of selected component(s), system(s). The review shall address the applicability of:

(1) Response spectra specified.

(2) Mathematical model used for dynamic analysis.

(3) Validation of the computer code used.

(4) Input to analysis.

In addition the review shall address:

(1) Output (loads, moments).

(2) Stress calculations (stress reports) developed to meet applicable codes/standards.

(3) Design details.

C5. Obtain design documents and perform the detailed technical design review of selected structures, components, and systems.

C6. Summarize the design review, including any Potential Findings. This information will be included in the reports of Task F.

Milestones

C1	Define the Seismic Design Chain	12/18/81
C2	Complete Selection Plan	12/24/81
C3	Select Features for Review	12/24/81
C4	Develop Review Procedure	12/18/81
C5.1	Complete Design Review of (Initial) System	12/31/81
C5.2	Complete Design Review	3/12/82
C6	Summarize Results	3/19/82

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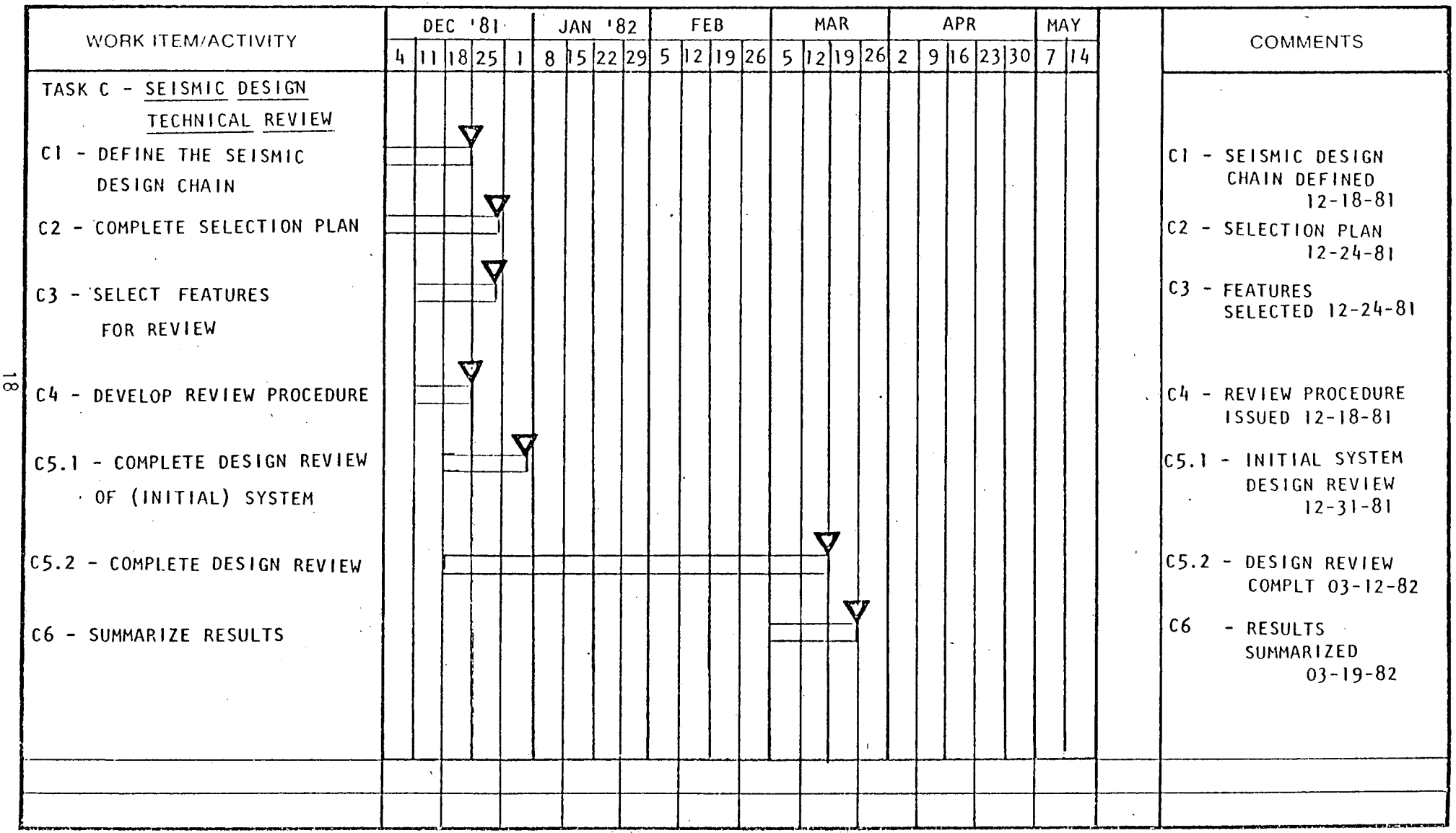

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TASK D - AUDIT PLAN REVIEW

Objective

To review and evaluate the QA audit plan(s) of SCE and BPC, and verify implementation of those plans. The review and evaluation will be restricted to audit plans and audits covering implementation of seismic design output at the construction site or the fabricators' shops.

Subtasks

D1. Identify SCE requirements for the QA audit plan(s) from 1971 to the present. Evaluate those requirements against the then-existing regulatory requirements.

D2. Review the SCE and BPC records to verify that audit plan(s) were prepared in accordance with the SCE requirements identified in D1.

D3. Evaluate the audit plans to determine that they included audits of the construction site or fabricators' shops to verify proper implementation of seismic design output.

The first step in the process will be to prepare a detailed procedure and checklist for carrying out this evaluation and the review in D4.

D4. Review the SCE and BPC records for evidence that the audit plan(s) were implemented as required by their respective procedures.

D5. Summarize the work performed on this task, including a complete description of any Potential Findings. This information will be included in the reports under Task F.

Milestones

D1	Identify QA audit plan requirements	12/18/81
D2	Verify audit plans	12/31/81
D3	Evaluate content of audit plans	1/29/82
D4	Evaluate implementation of audit plans	2/06/82
D5	Summarize Results	2/12/82

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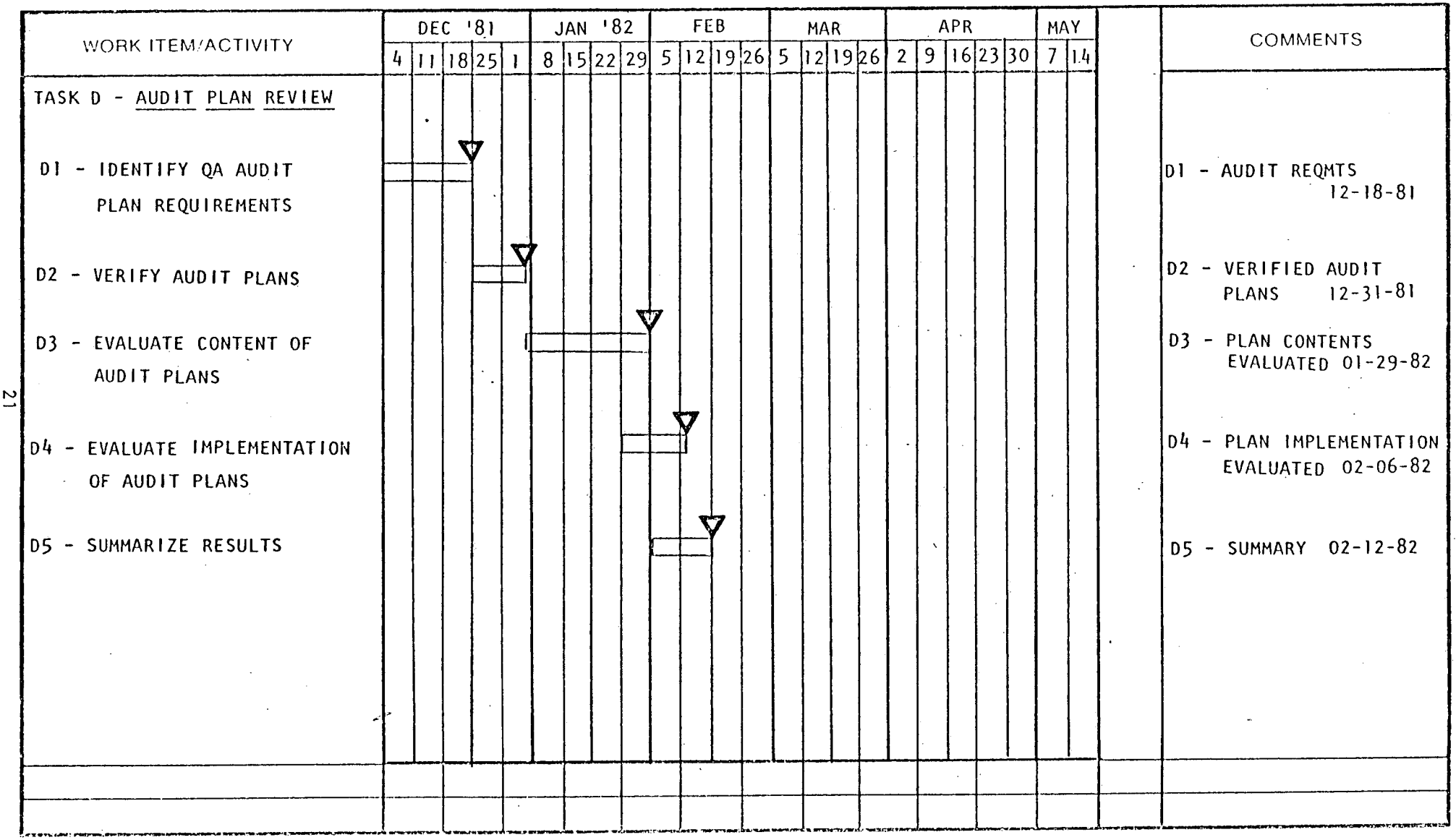


TASK E - PROCESSING OF FINDINGS

Objectives

To review Potential Findings and transmit any Findings to Southern California Edison, Bechtel Power Corp. and Combustion Engineering.

Subtasks

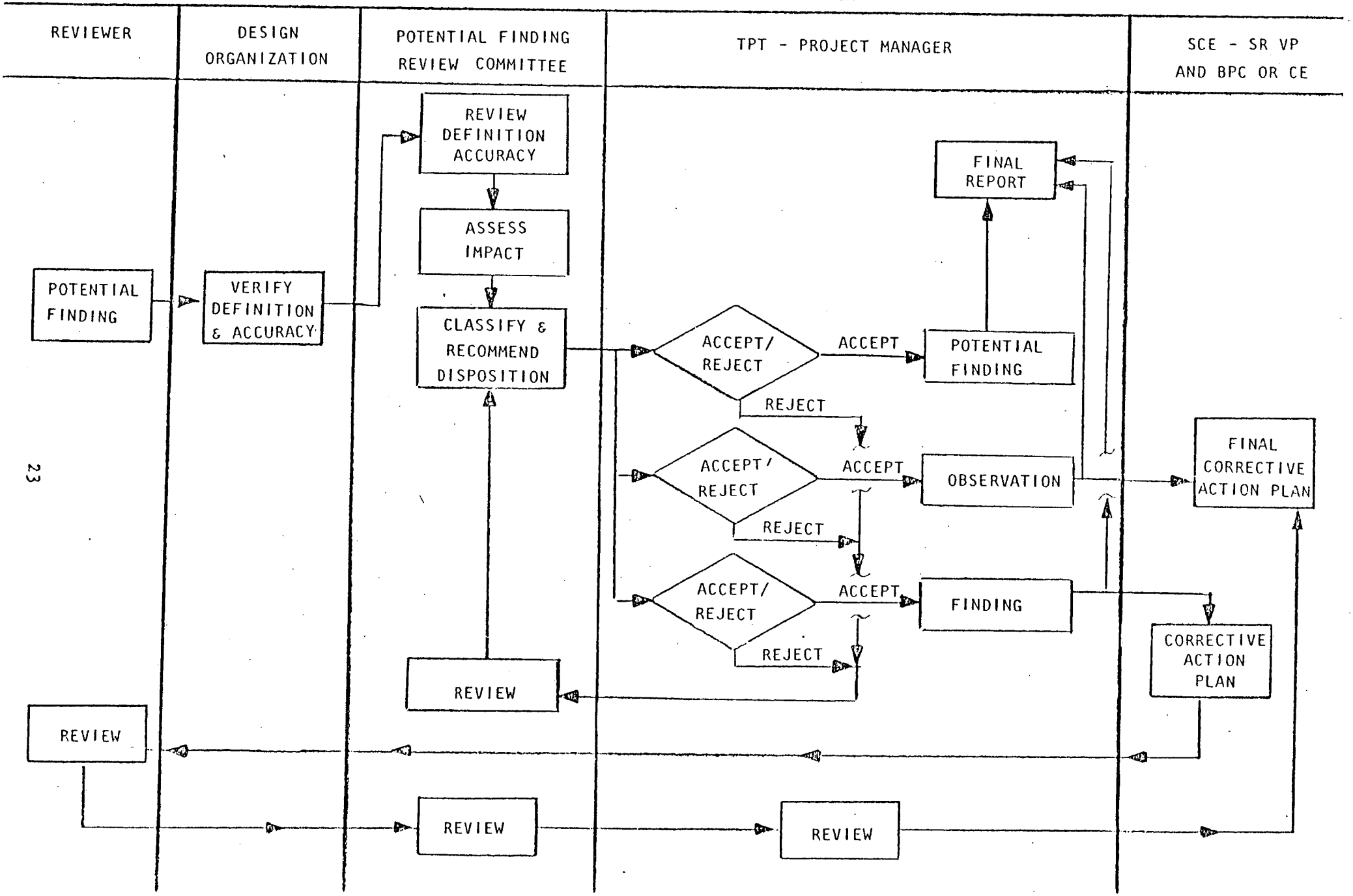
E1. Establish a Findings Review Committee. This committee shall be composed of senior technical personnel with broad experience in technical management.

E2. The Committee shall define criteria for determining the degree of impact that Potential Findings have on the seismic design adequacy of San Onofre Units 2 and 3.

E3. The Committee shall establish a procedure to process Potential Findings. This procedure shall assure that SCE and BPC or CE has verified the definition and accuracy of the Potential Finding. The basic process is shown in Figure 7.

E4. The Committee shall review each Potential Finding identified in Tasks A, B, C, and D. This review will include the definition and the accuracy of the Potential Finding. The review will also include an assessment of the impact of the Potential Finding on the overall seismic design process for the plant. If the Committee determines the Potential Finding is accurate and has the potential for significant impact on the design adequacy of San Onofre Units 2 and 3, it shall recommend to the TPT Project Manager that these Potential Findings be identified as Findings. If the Committee determines the Potential Finding is accurate, but does not have the potential for significant impact on the design adequacy of San Onofre Units 2 and 3, it shall recommend to the TPT Project Manager that these Potential Findings be identified as Observations. If a

REVIEW OF [redacted]TIAL FINDING
FOR THE INDEPENDENT VERIFICATION OF SAN ONOFRE 2 & 3 SEISMIC DESIGN



Potential Finding is not accurate and therefore does not become a Finding or an Observation its record shall be retained and included in the Final Report.

E5. The TPT Project Manager shall review the recommendations of the Findings Review Committee for compliance with established criteria. If criteria have been properly applied and documented he shall declare the Potential Finding as a Finding or an Observation, and so report it in the interim and final reports. If the recommendation is not accepted, the Potential Finding shall be reprocessed by the Findings Review Committee.

E6. The TPT Project Manager shall transmit both Findings and Observations to SCE and BPC or CE.

E7. SCE and BPC or CE shall evaluate the Findings in accordance with established SCE procedures and propose a remedial action.

E8. The individual reviewer and the Finding Review Committee shall review the remedial action plans and evaluate their adequacy.

Milestones

E1	Establish Committee	12/15/81
E2	Design Impact Criteria	12/18/81
E3	Establish Procedure	12/18/81

The remaining subtasks shall be performed as Potential Findings are developed by the individual reviewers.

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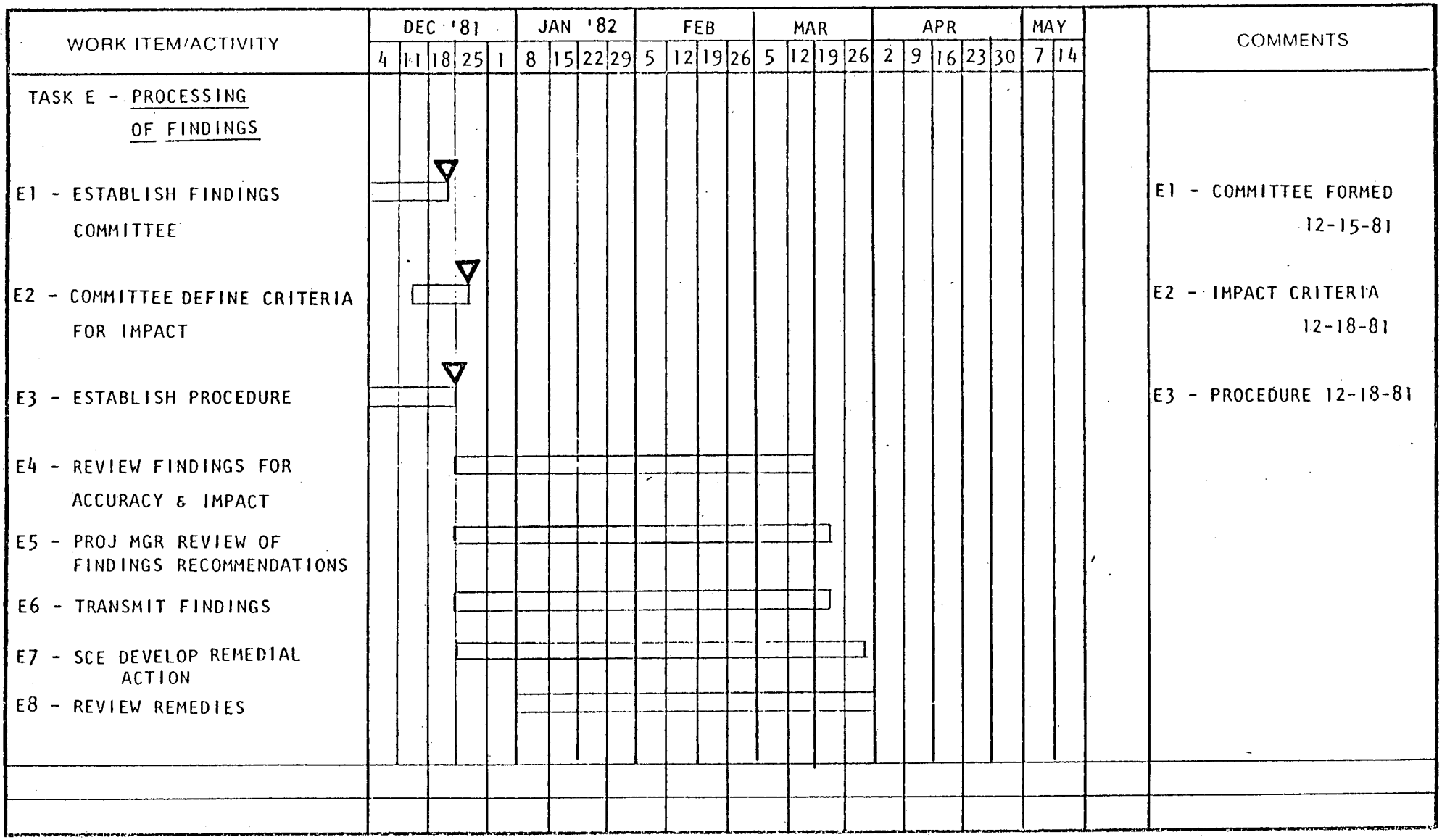

TASK F - REPORT PROCEDURE

Objective

Prepare reports on Findings, and conclusions with respect to adequacy of the seismic design .

Subtasks

F1. Compile all Potential Findings, results of Findings Review Committee, Observations and Findings.

F2. Assess on an interim basis the adequacy of the overall seismic design for San Onofre Units 2 and 3 based on the part of the program completed by December 31, 1981.

F3. Prepare an interim report including a description of the work completed to date and the interim conclusions drawn from that work. This report will be issued on January 8, 1982.

F4. Assess the adequacy of the overall seismic design for San Onofre Units 2 and 3.

F5. Prepare a final report compiling all Potential Findings, Observations, and Findings, including their description, comments assessment of impact, the results of the Findings Review Committee, the results of the review of SCE remedial actions plans and the final assessment of the adequacy of the seismic design of San Onofre Units 2 and 3.

Milestones

F1	Complete Compilation	3/24/82
F2	Complete Interim Assessment	1/05/82
F3	Complete Interim Report	1/08/82
F4	Complete Assessment	3/19/82
F5	Complete Final Report	4/02/82

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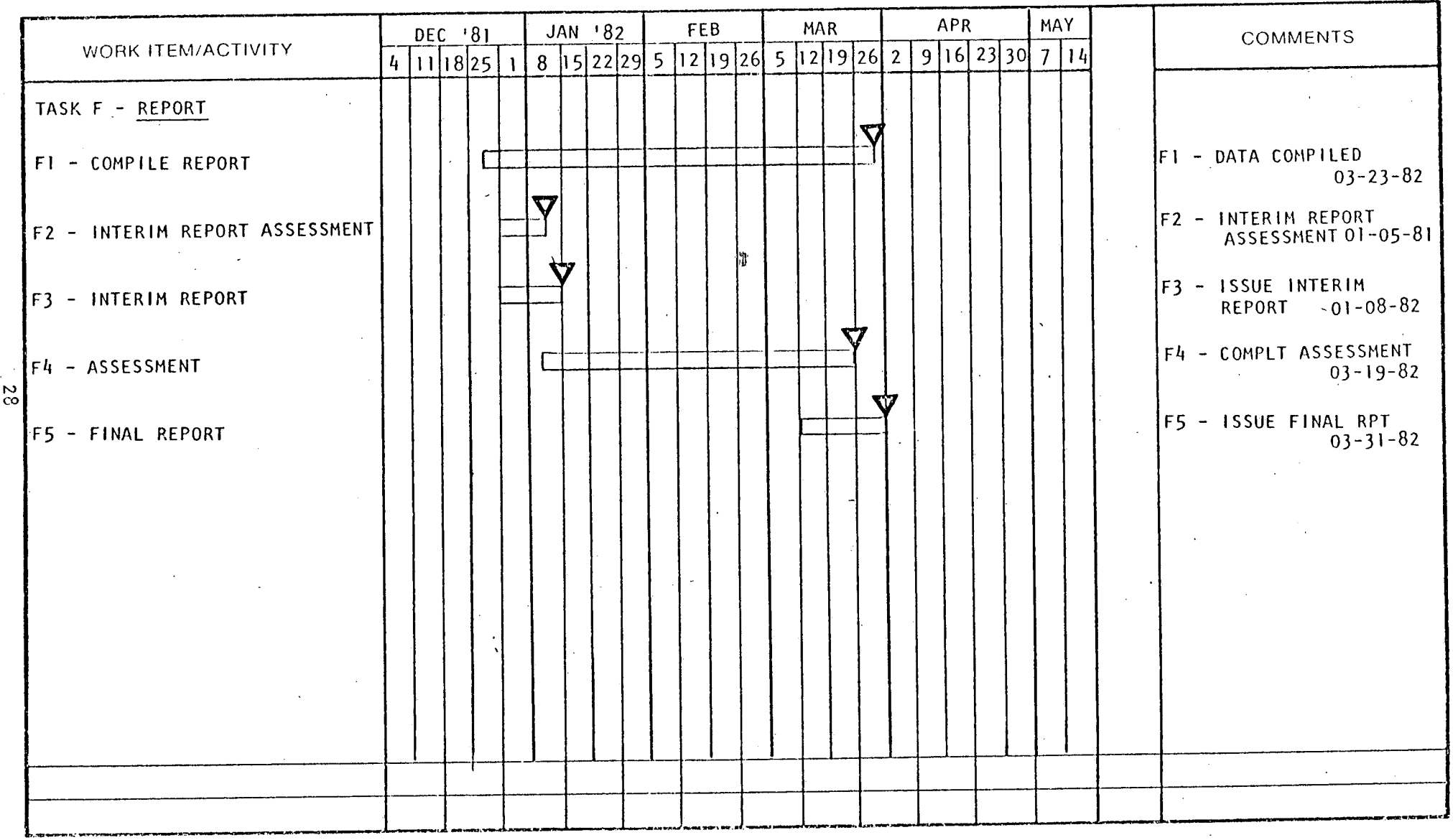

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