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R. P. McDonald
Executive Vice President
Nuclear Operations

the southern electric system

SL-4688
1023U
X7GJ17-H220

June 10, 1988

U. S. Nuclear Regulatory Commission
Attn: Document Control
Washington, D. C. 20555

PLANT HATCH - UNIT 1
NRC DOCKET 50-321
OPERATING LICENSE DPR-57
PLANT HATCH SEISMIC PROGRAM

Gentlemen:

On May 10, 1988, Georgia Power Company (GPC) presented the Plant Hatch Seismic Program to the Nuclear Regulatory Commission (NRC) in Rockville, Maryland. The program includes the proposed resolution of USI A-46 as specified by NRC Generic Letter (GL) 87-02, Verification of the Seismic Adequacy of Electrical and Mechanical Equipment in Operating Reactors; the implementation of the Electric Power Research Institute (EPRI) seismic margins program using the EPRI seismic margins methodology; and the resolution of outstanding NRC seismic topics at Plant Hatch. A complete set of viewgraphs used for the presentation is provided in Enclosure 1.

During the meeting on May 10, personnel from the Office of Nuclear Reactor Regulation (NRR) requested more details concerning the resolution of seismic topics using the Plant Hatch Seismic Program. Enclosure 2 to this letter contains these details.

If you have any questions regarding this letter, please contact this office.

Sincerely,

R. P. McDonald

KWW:ju

Enclosure 1: Viewgraphs of May 10, 1988 GPC presentation to the NRC
Enclosure 2: Description of topics to be resolved through the Plant Hatch Seismic Program

c: (see next page)

Hoad 6/11

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PDR ADOCK 05000321
P PDR

Georgia Power

c: Georgia Power Company
Mr. J. T. Beckham, Jr.
Mr. L. T. Gucwa
Mr. J. P. Kane
GO-NORMS

U. S. Nuclear Regulatory Commission
Mr. Daniel Guzy, Office of Nuclear Regulatory Research
Mr. Larry Crocker, Licensing Project Manager

U. S. Nuclear Regulatory Commission - Region II
Dr. J. Nelson Grace, Regional Administrator

1023U

ENCLOSURE 1

VIEWGRAPHS OF MAY 10, 1988

GPC PRESENTATION TO THE NRC

PRESENTATION TO THE NUCLEAR REGULATORY COMMISSION

PLANT HATCH SEISMIC PROGRAM

GEORGIA POWER COMPANY

MAY 10, 1988

AGENDA

PLANT HATCH SEISMIC PROGRAM OVERVIEW

NRC HEADQUARTERS

ROCKVILLE, MARYLAND

MAY 10, 1988

INTRODUCTION	DON CROWE
• INTRODUCE PEOPLE • PURPOSE OF MEETING	
INTRODUCTION	NRC
PROGRAM OVERVIEW	JEFF BRANUM
PROJECT TEAM SELECTION	JEFF BRANUM
SCHEDULE	JEFF BRANUM
TECHNICAL ACHIEVEMENTS	DON MOORE
COMBINING SEISMIC MARGINS AND USI A-46	DON MOORE
ANTICIPATED RESULTS	DON CROWE
NRC COMMUNICATIONS	DON CROWE
NRC COMMENTS	NRC
SUMMARY	DON CROWE

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LIST OF ATTENDEES REPRESENTING GEORGIA POWER COMPANY

DON CROWE	NUCLEAR SAFETY MANAGER, GPC
JEFF BRANUM	PROJECT MANAGER, GPC
JIM HEIDT	HATCH LICENSING MANAGER, GPC
KERMIT WHITT	NUCLEAR GENERATION ENG, GPC,
DON MOORE	TECHNICAL DIRECTOR, SCS
KEITH WOOTEN	PROJECT ADMINISTRATOR, SCS
BOB KENNEDY	STRUCTURAL MECHANICS CONSULTING
ED 'DRISS	WOODWARD-CLYDE CONSULTING
JIM JOHNSON	EQE

PLANT HATCH SEISMIC PROGRAM

PURPOSE OF MEETING

PLANT HATCH SEISMIC PROGRAM
PURPOSE OF MEETING

- PRESENT AN OVERVIEW OF THE HATCH SEISMIC PROGRAM
- PRESENT GEORGIA POWER's METHODOLOGY FOR COMPLETING THE SEISMIC PROGRAM
- PRESENT PROJECT TEAM AND SCHEDULE
- PRESENT THE RESULTS OF ACTIVITIES ACCOMPLISHED TO DATE
- EXPECTED PROGRAM RESULTS
- ESTABLISH NRC INTERFACES

PLANT HATCH SEISMIC PROGRAM

OVERVIEW OF PROGRAM

PLANT HATCH SEISMIC PROGRAM
INDUSTRY SEISMIC ISSUES

- USI A-46, SEISMIC QUALIFICATION OF EQUIPMENT (GENERIC LETTER 87-02)
- EASTERN SEISMICITY
- EXTERNAL EVENTS SEISMIC
- USI A-40 (SEISMIC DESIGN OF TANKS)
- USI A-17 (SEISMIC SYSTEMS INTERACTION ONLY)

OUTSTANDING SEISMIC TOPICS AT PLANT HATCH

- USI A-46, VERIFICATION OF SEISMIC ADEQUACY OF MECHANICAL AND ELECTRICAL EQUIPMENT IN OPERATING REACTORS (G. L. 87-02)
- FLOOR RESPONSE SPECTRA-PEAK BROADENING
- SOIL DYNAMIC PROPERTIES
- CABLE TRAY SUPPORT LOAD ACCOUNTABILITY
- PVRC DAMPING
- REACTOR BUILDING ROOF STRUCTURE

PLANT HATCH SEISMIC PROGRAM OBJECTIVE

- TO IMPLEMENT THE EPRI SEISMIC MARGINS PROGRAM ALONG WITH THE TECHNICAL RESOLUTION TO GENERIC LETTER 87-02 AND USI A-46

- TO RESOLVE OUTSTANDING SEISMIC TOPICS FOR PLANT HATCH BY:

  1. DEMONSTRATING A SIGNIFICANT SEISMIC MARGIN AT AN EARTHQUAKE LEVEL HIGHER THAN THE DESIGN BASIS EARTHQUAKE (DBE)

  2. IDENTIFYING ANY "WEAKER LINK" COMPONENTS WHICH REDUCE THE HCLPF VALUE OF THE PLANT

- USE RESULTS OF PLANT HATCH SEISMIC PROGRAM TO ADDRESS INDUSTRY ISSUES

PLANT HATCH SEISMIC PROGRAM

PROJECT TEAM

PROJECT TEAM

- GPC CORPORATE
  - HATCH ENGINEERING AND PROJECTS
  - NUCLEAR SAFETY AND LICENSING

- ARCHITECT ENGINEER
  - SOUTHERN COMPANY SERVICES, INC
  - BECHTEL EASTERN POWER COMPANY

- INDUSTRY ORGANIZATIONS
  - ELECTRIC POWER RESEARCH INSTITUTE
  - SEISMIC QUALIFICATION UTILITY GROUP

- CONSULTANTS
  - DR. BOB KENNEDY
    STRUCTURAL MECHANICS CONSULTING
    (GENERAL CONSULTANT)
  - DR. JIM JOHNSON
    EQE, INC
    (SOIL-STRUCTURE INTERACTION)
  - DR. ED IDRISS
    WOODWARD-CLYDE CONSULTANTS
    (SOIL EVALUATIONS)
  - MR. DAVE BUTTERMER AND DR. DENNIS BLEY
    PICKARD, LOWE AND GARRICK, INC
    (SYSTEMS CONSULTANTS)

PLANT HATCH SEISMIC PROGRAM

SCHEDULE

PLANT HATCH SEISMIC PROGRAM SCHEDULE

SELECT SEISMIC MARGIN EARTHQUAKE	COMPLETE
SELECT SEISMIC REVIEW TEAM	COMPLETE
SOIL EVALUATIONS	COMPLETE
SYSTEMS WORK	BEGIN 2/88 COMPLETE 10/88
SOIL-STRUCTURE INTERACTION	BEGIN 4/88 COMPLETE 7/88
PRE-SCREENING ACTIVITIES	BEGIN 2/88
SEISMIC CAPABILITY WALKDOWN	10/88 *
SEISMIC MARGIN ASSESSMENT	BEGIN 11/88 COMPLETE 4/89 *
ISSUE FINAL REPORT TO EPRI	6/89 *
ISSUE FINAL REPORT TO NRC	7/89 *
SER ISSUED BY NRC	10/89 *

* SUBJECT TO PLANT HATCH OUTAGE SCHEDULE

PLANT HATCH SEISMIC PROGRAM

TECHNICAL ACHIEVEMENTS

PLANT HATCH SEISMIC PROGRAM TECHNICAL ACHIEVEMENTS

- SELECTION OF SEISMIC MARGIN EARTHQUAKE
- SELECTION OF SEISMIC REVIEW TEAM
- SOIL PROFILES WITH VARIABILITY
- SEISMIC MARGIN ASSESSMENT OF SOILS
  - SOIL LIQUEFACTION
  - SLOPE STABILITY
- HAVE BEGUN DEVELOPMENT OF THE LIST OF SAFE SHUTDOWN EQUIPMENT AND RELAYS
- PREPARATIONS ARE COMPLETE TO START THE SSI ANALYSIS
- HAVE BEGUN PRE-SCREENING OF CIVIL STRUCTURES, EQUIPMENT, AND SUBSYSTEMS
- SRT MEMBERS HAVE COMPLETED SQUG TRAINING CLASS

PLANT HATCH SEISMIC PROGRAM

COMBINING SEISMIC MARGINS AND GENERIC LETTER 87-02 FOR PLANT HATCH UNIT 1

PLANT HATCH SEISMIC PROGRAM
PURPOSE OF GL 87-02 AND SMA

- GL 87-02: EVALUATE THE SEISMIC ADEQUACY OF EQUIPMENT NEEDED FOR SAFE SHUTDOWN FOLLOWING A SAFE SHUTDOWN EARTHQUAKE (SSE)

- SMA: DETERMINE MARGIN OVER THE SSE WHICH WILL ASSURE PLANT SAFETY AND DETERMINE ANY 'WEAKER LINKS' WHICH MIGHT LIMIT THE PLANT SHUTDOWN CAPACITY TO SAFELY WITHSTAND A SEISMIC EVENT LARGER THAN THE SSE

MAJOR ACTIVITIES FOR RESOLUTION OF GENERIC LETTER 87-02 PLANT HATCH UNIT 1

- SELECTION OF SEISMIC REVIEW TEAM
- SYSTEMS WORK
- SCREENING VERIFICATION AND WALKDOWN
- OUTLIER IDENTIFICATION AND RESOLUTION
- DOCUMENTATION

ALL ACTIVITIES TO FOLLOW THE LATEST REVISION OF SQUG GIP's

MAJOR ACTIVITIES FOR SEISMIC MARGINS ASSESSMENT PLANT HATCH UNIT 1

- SELECTION OF SME LEVEL
- SELECTION OF THE SEISMIC REVIEW TEAM *
- SYSTEMS WORK *
- DEVELOPMENT OF NEW FLOOR RESPONSE SPECTRA
- PRE-WALKDOWN *
- PRE-SCREENING BEFORE WALKDOWN *
- SEISMIC CAPABILITY WALKDOWN *
- SEISMIC MARGINS ASSESSMENT WORK *
- DOCUMENTATION
- REPORT

ALL ACTIVITIES FOLLOW EPRI METHODOLOGY

* ACTIVITIES COMBINED WITH GL 87-02

BASIC DIFFERENCES BETWEEN SEISMIC MARGINS AND G. L. 87-02

87-02	MARGINS
ASSUME NO LOCA, SLBA, OR HELB	ASSUME SMALL LOCA
EVALUATE USING SSE SPECTRA	EVALUATE USING SMA SPECTRA
PERFORM 100% WALKDOWN OF RELAYS, CABLE TRAYS, AND EQUIPMENT ANCHORAGE	PERFORM SAMPLE WALKDOWN OF RELAYS, CABLE TRAYS, AND EQUIPMENT ANCHORAGE
DO NOT CONSIDER FLOODING	CONSIDER FLOODING
CONSIDER EQUIPMENT ONLY	INCLUDES CIVIL STRUCTURES, SUBSTRUCTURES, AND SOIL

PLANT HATCH WILL MEET REQUIREMENTS FOR BOTH PROGRAMS

RESOLUTION OF UNIT 1 GL 87-02 AS PART OF THE SMA PROGRAM

- COMPLETE SAFE SHUTDOWN EQUIPMENT VERIFICATION
- COMPLETE RELAY EVALUATION TO THE EXTENT POSSIBLE BASED ON STATUS OF RELAY GERS
- DEFER CABLE TRAY SUPPORT EVALUATION PENDING RECEPT OF SER ON SQUG PROCEDURE

PLANT HATCH SEISMIC PROGRAM
UNIT 2

- RESOLUTION OF PLANT HATCH UNIT 2 SEISMIC TOPICS WILL BE BASED ON RESULTS OF UNIT 1 ACTIVITIES

PLANT HATCH SEISMIC PROGRAM

RESULTS ANTICIPATED

PLANT HATCH SEISMIC PROGRAM OVERALL RESULTS ANTICIPATED

- RESOLVE SEISMIC TOPICS AT PLANT HATCH
- RECEIVE SER OR OTHER DOCUMENT INDICATING NRC CONCURRENCE THAT PLANT HATCH SEISMIC ISSUES ARE RESOLVED
- SHOW THAT STRUCTURES AND COMPONENTS IN A PREFERRED SHUTDOWN PATH HAVE SEISMIC CAPABILITY MARGINS SUBSTANTIALLY ABOVE THE DESIGN BASIS EARTHQUAKE
- IDENTIFY 'WEAKER LINK' COMPONENTS HAVING LOWEST 'HIGH CONFIDENCE OF LOW PROBABILITY OF FAILURE' (HCLPF)
- DETERMINE DESIRABILITY OF MODIFICATIONS TO IMPROVE HCLPF OF 'WEAKER LINKS'

PLANT HATCH SEISMIC PROGRAM RESULTS ANTICIPATED

- SEISMIC TOPICS AT PLANT HATCH:
  - GENERIC LETTER 87-02 / USI A-46
  - FLOOR RESPONSE SPECTRA PEAK BROADENING ISSUE
  - DYNAMIC SOIL PROPERTIES
  - CABLE TRAY SUPPORTS
  - PVRC DAMPING
  - REACTOR BUILDING ROOF STRUCTURE

PLANT HATCH SEISMIC PROGRAM
RESULTS ANTICIPATED

- INDUSTRY SEISMIC ISSUES:
  - USI A-40 (SEISMIC DESIGN OF TANKS)
  - USI A-17 SEISMIC SYSTEMS INTERACTION ONLY
  - EASTERN SEISMICITY
  - EXTERNAL EVENTS - SEISMIC
- FUTURE SEISMIC ISSURES

PLANT HATCH SEISMIC PROGRAM

NRC COMMUNICATIONS

NRC COMMUNICATIONS

WHAT GROUP WITHIN NRC DOES GPC COMMUNICATE WITH?

- FOR GPC SEISMIC PROGRAM
- FOR SEISMIC MARGINS PROGRAM

PROPOSE MILESTONE MEETINGS FOR USI A-46 AND SMA BE COMBINED

NRC OVERVIEW

- GPC SEISMIC PROGRAM
  - TYPE OF OVERVIEW
  - ORGANIZATION PERFORMING REVIEW
- SEISMIC MARGINS
  - TYPE OF OVERVIEW
  - ORGANIZATION PERFORMING OVERVIEW
- SCHEDULE OR PLAN FOR OVERVIEW ACTIVITIES

PLANT HATCH SEISMIC PROGRAM

SUMMARY

SUMMARY

- PLANT HATCH SEISMIC PROGRAM
  - RESOLVE SEISMIC TOPICS AT PLANT HATCH
  - RESOLVE APPROPRIATE PRESENT AND FUTURE SEISMIC ISSUES

- NRC PARTICIPATION
  - WORK WITH GPC IN IMPLEMENTATION OF PROGRAM
  - PROVIDE SER REFLECTING WORK PERFORMED IN PLANT HATCH SEISMIC PROGRAM

PRESENTATION TO THE NUCLEAR REGULATORY COMMISSION

PLANT HATCH SEISMIC PROGRAM

GEORGIA POWER COMPANY

MAY 10, 1988

AGENDA

EPRI/NRC SEISMIC MARGINS MEETING

NRC HEADQUARTERS
ROCKVILLE, MARYLAND

MAY 10, 1988

OPENING REMARKS	D. M. CROWE
BACKGROUND	R. P. KASSAWARA
PURPOSE AND OBJECTIVES OF MEETING	R. P. KASSAWARA
PROJECT TASK DESCRIPTIONS	D. P. MOORE
PROJECT SCHEDULE	K. D. WOOTEN
DISCUSSION OF PROJECT/NRC INTERFACES	R. P. KASSAWARA
STATUS OF PROJECT EFFORTS TO DATE:	
• SELECTION OF SEISMIC MARGIN EARTHQUAKE	I. M. IDRISS
• SOIL LIQUEFACTION	I. M. IDRISS
• SLOPE STABILITY	I. M. IDRISS
• SOIL PROFILES	I. M. IDRISS
• SOIL STRUCTURE INTERACTION	J. J. JOHNSON
• GENERATION OF IN-STRUCTURE SPECTRA	J. J. JOHNSON
DISCUSSION OF ACTION ITEMS AND NEXT INTERFACE	D. M. CROWE

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EPRI/NRC
SEISMIC MARGIN ASSESSMENT

BACKGROUND

EPRI-NRC Seismic Margins Interactions

Methods

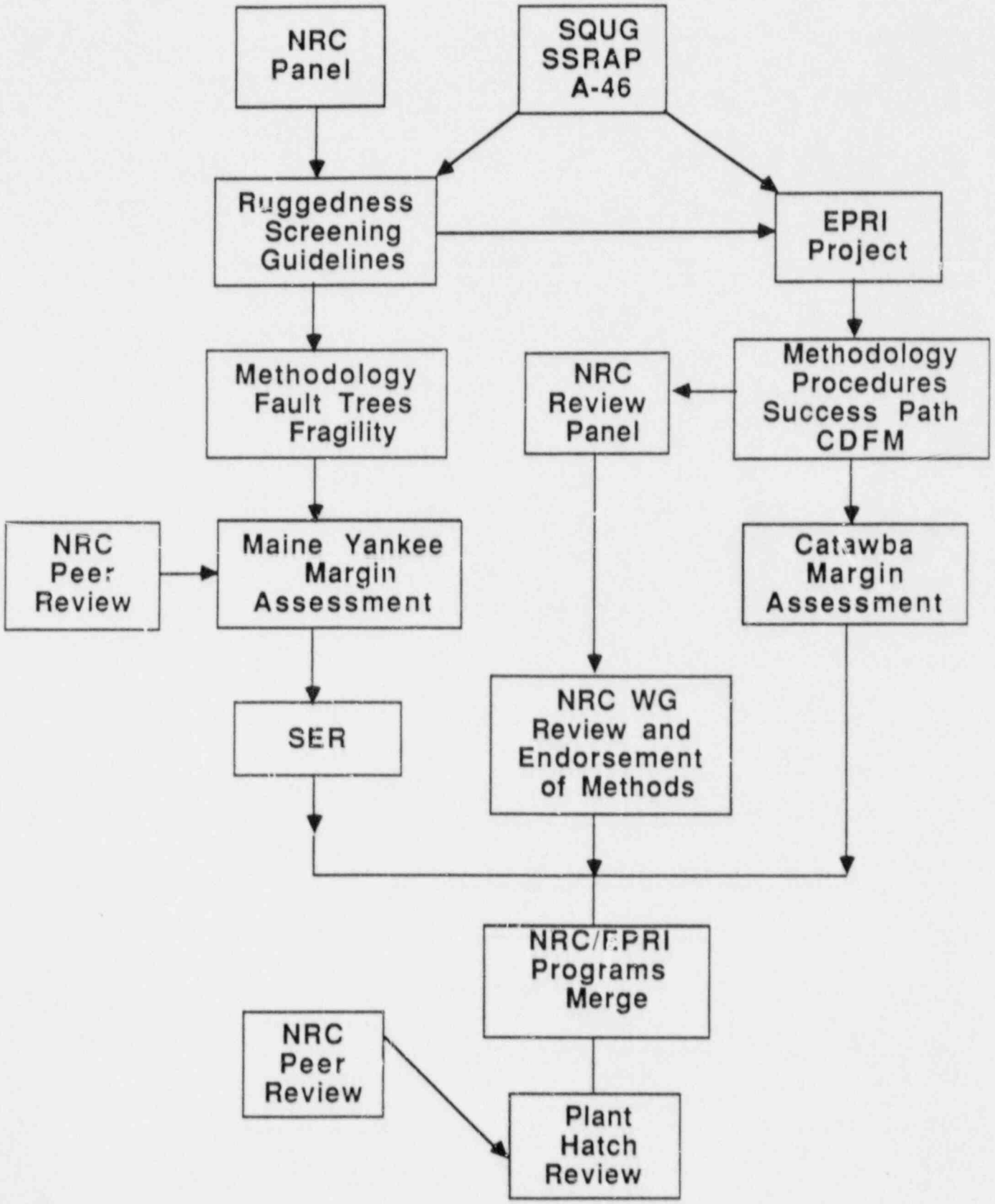
- NRC review of methods
  - Review Panel
  - Merging of different approaches
    - Success path vs. fault tree/cut sets
    - CDFM vs. fragility
  - Basic agreement on success path/CDFM
  - Plant vulnerabilities -- severe accident policy
- NRC Seismic Design Margins Working Group endorsement of methodology

BWR Review

- Programs merge
  - EPRI does plant evaluation
  - NRC reviews, does substantiating research
- Schedule

- Methods document to NRC	April 87
- Review completed	June 87
- BWR Review Starts	Jan. 88
- NRC Kickoff Meeting	May 88
- Complete	Mid 89

Research Efforts on Seismic Margin



OUTLIERS NEEDING UPGRADE OR JUSTIFICATION

Maine Yankee	Catawba
Lead Antimony Batteries	Several Seismic Interactions
Diesel Generator Day Tanks	Pipe Support Thermal Failures
Station Service Transformers	Valve/Adjacent Pipe Supports
Block Wall	Slack in Armor Cable to Valve
Chillers	Diesel Room Battery Racks

EPRI/NRC
SEISMIC MARGIN ASSESSMENT

PURPOSE AND OBJECTIVES
OF MEETING

Meeting Objectives

- Convey Project Schedules, time constraints
- Discussion of Interfaces
- Summarize Project Efforts to Date
  - Results
  - Status

EPRI/NRC
SEISMIC MARGIN ASSESSMENT

PROJECT TASK DESCRIPTION

MAJOR ACTIVITIES FOR SEISMIC MARGINS ASSESSMENT PLANT HATCH UNIT 1

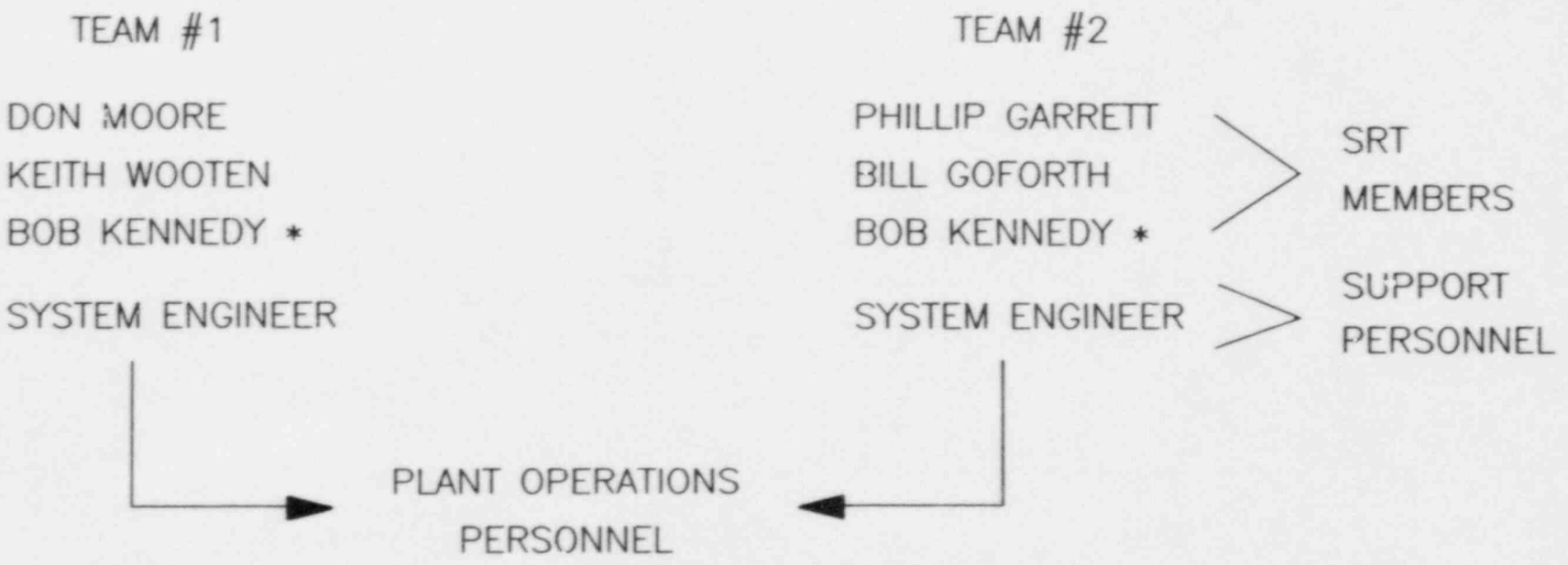
- SELECTION OF SME LEVEL
- SELECTION OF THE SEISMIC REVIEW TEAM
- SYSTEMS WORK
- DEVELOPMENT OF NEW FLOOR RESPONSE SPECTRA
- PRE-WALKDOWN
- PRE-SCREENING BEFORE WALKDOWN
- SEISMIC CAPABILITY WALKDOWN
- SEISMIC MARGINS ASSESSMENT WORK
- DOCUMENTATION
- REPORT

ALL ACTIVITIES FOLLOW EPRI METHODOLOGY

SELECTION OF SME LEVEL

- PGA 0.3g
- FOURTH ALTERNATIVE OF THE SMA METHODOLOGY

SELECTION OF THE SEISMIC REVIEW TEAM



* BOB KENNEDY'S RESPONSIBILITIES:
  - ASSURE THE SCREENING IS FOLLOWING THE EPRI METHODOLOGY
  - ASSIST ON BOTH WALKDOWN TEAMS

SYSTEMS WORK

- IDENTIFY PREFERRED SUCCESS PATH AND ONE ALTERNATE PATH TO BRING THE PLANT TO SAFE SHUTDOWN AND MAINTAIN THAT CONDITION FOR 72 HOURS
- LEAD SYSTEMS ENGINEERS:

FLUID-MECHANICAL	ELECTRICAL
TOM BARR	RON BAILEY

- ROLE OF PICKARD, LOWE AND GARRICK:
  - REVIEW SUCCESS PATH LOGIC DIAGRAMS
  - REVIEW COMPONENT LIST FOR REPRESENTATIVE SYSTEM
  - REVIEW RELAY LIST AND RELAY EVALUATION FOR REPRESENTATIVE SYSTEM
  - PROVIDE ASSURANCE FOR:
    - TECHNICAL ACCURACY
    - ADHERENCE TO EPRI METHODOLOGY
    - CONSISTENCY WITH CATAWBA SMA

DEVELOPMENT OF NEW FLOOR RESPONSE SPECTRA

- ORIGINAL UNIT 1 SEISMIC ANALYSIS IS VERY CONSERVATIVE, THEREFORE, SCALING PROCEDURES ARE NOT APPROPRIATE
- NEW FLOOR RESPONSE SPECTRA WILL BE DEVELOPED REQUIRING NEW SOIL-STRUCTURE INTERACTION ANALYSIS (SSI)
- SSI ANALYSIS WILL INCLUDE:
  - ENHANCED BUILDING MODELS
  - STRAIN-COMPATIBLE SOIL PROFILES
- SSI ANALYSIS TO BE PERFORMED BY EQE, INC.

PRE-WALKDOWN

- PURPOSE IS TO ORGANIZE FOR THE SEISMIC CAPABILITY WALKDOWN
- PRE-WALKDOWN INCLUDES:
  - LOCATING EQUIPMENT IN THE PLANT
  - IDENTIFYING ANY AUXILARY EQUIPMENT MOUNTED SEPARATELY
  - EVALUATING RADIATION LEVELS, LOGISTICS, SPECIAL REQUIRMENTS NEEDED FOR INSPECTIONS, ETC.

PRE-SCREENING PRIOR TO WALKDOWN

- REVIEW OF PLANT HATCH SEISMIC DESIGN DOCUMENTS
- PREPARE SUMMARY REPORT OF PLANT HATCH SEISMIC DESIGN BASIS
- OBTAIN DATA NEEDED TO SCREEN OUT CIVIL STUCTURES, SUBSYSTEMS, AND EQUIPMENT
- PRE-SCREEN CIVIL STRUCTURES, SUBSYSTEMS, AND EQUIPMENT USING TABLES 2-3 AND 2-4 OF THE EPRI METHODOLOGY
- ORGANIZE INFORMATION ON EACH ITEM OF EQUIPMENT FOR THE SEISMIC CAPABILITY WALKDOWN

SEISMIC CAPABILITY WALKDOWN

- TWO SRT's FOR APPROXIMATELY TWO WEEKS
- 100% 'WALK-BY' OF ALL ACCESSIBLE EQUIPMENT
- INSPECTION OF SUBSYSTEMS ON A SAMPLING BASIS
- ANCHORAGE
- SEISMIC SPATIAL SYSTEM INTERACTION:
  - PROXIMITY EFFECTS
  - II/I
  - FLEXIBILITY OF ATTACHED LINES
  - FLOODING FROM RUPTURED TANKS OR PIPING

SEISMIC MARGIN ASSESSMENT

- ALL ITEMS WHICH CAN NOT BE SCREENED OUT DURING THE WALKDOWN WILL BE RESOLVED IN THE SEISMIC MARGIN ASSESSMENT PORTION OF THE PROJECT
- POSSIBLE APPROACHES:
  - GENERIC EQUIPMENT QUALIFICATION
  - CONSERVATIVE DETERMINISTIC FAILURE MARGIN
  - IN-SITU TESTING
  - SHAKE TABLE TESTING
  - EXPAND EARTHQUAKE EXPERIENCE DATA BASE
- DR. ROBERT P. KENNEDY WILL PARTICIPATE

DOCUMENTATION

- SAMPLE OF ITEMS TO BE INCLUDED:
  - BASIS FOR SME
  - LISTING OF EACH ITEM OF THE SUCCESS PATHS
  - NEW FRS
  - LIST OF RELAYS FOR WHICH CHATTER MUST BE PREVENTED
  - SRT DOCUMENTATION OF EACH ITEM REVIEWED
  - COMPLETED WALKDOWN FORMS
  - ALL SMA REVIEWS DOCUMENTED

FINAL REPORT

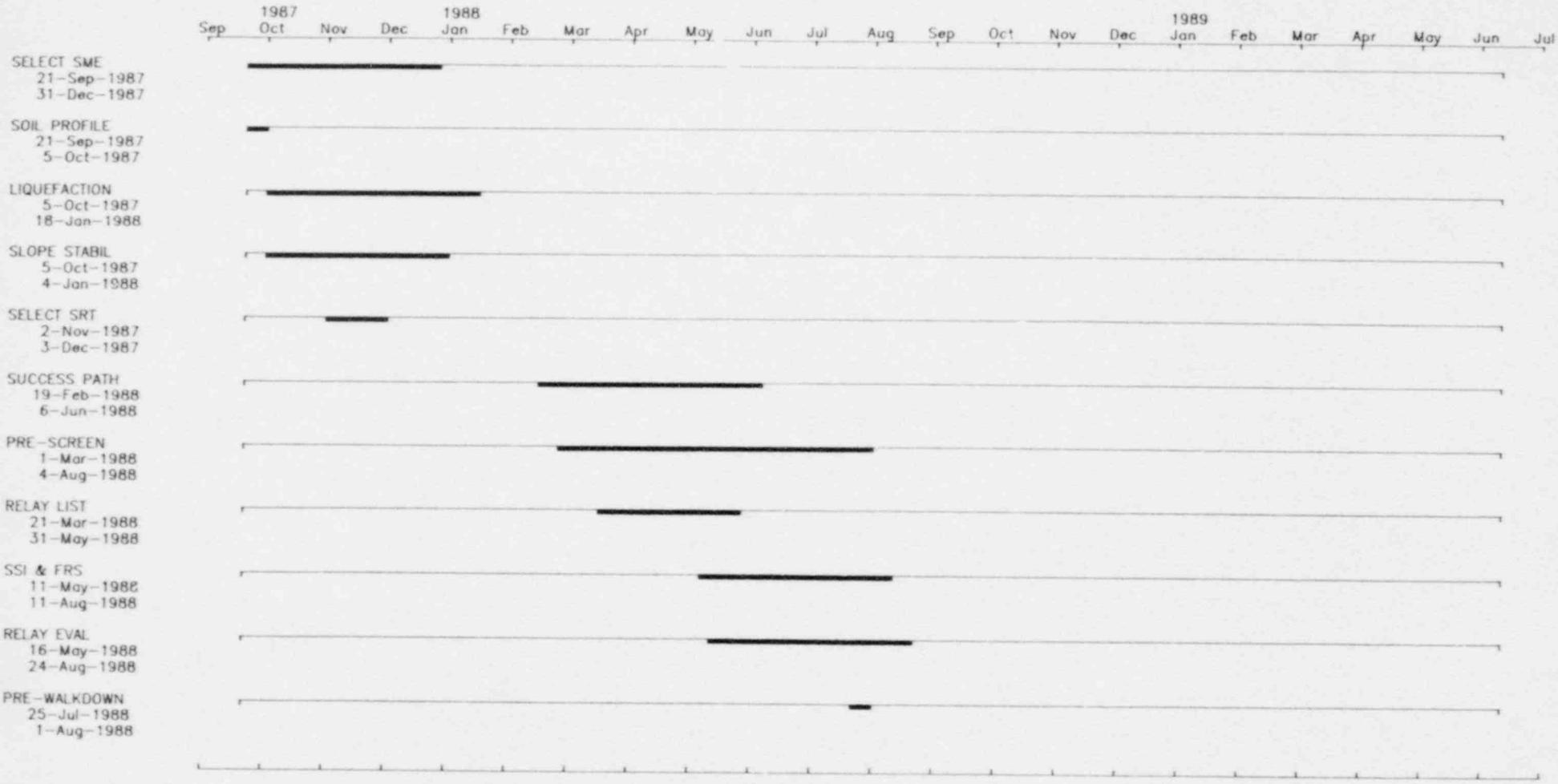
- SAMPLE OF ITEMS TO BE INCLUDED:
  - PLANT DESCRIPTION
  - ORIGINAL PLANT SEISMIC DESIGN BASIS
  - SELECTION OF SME
  - DEVELOPMENT OF FRS
  - WALKDOWN RESULTS
  - ASSESSMENT OF ELEMENTS NOT SCREENED OUT
  - EVALUATION OF RELAYS
  - SUMMARY AND CONCLUSIONS

EPRI/NRC
SEISMIC MARGIN ASSESSMENT

PROJECT SCHEDULE

PLANT HATCH SEISMIC MARGIN ASSESSMENT PROJECT

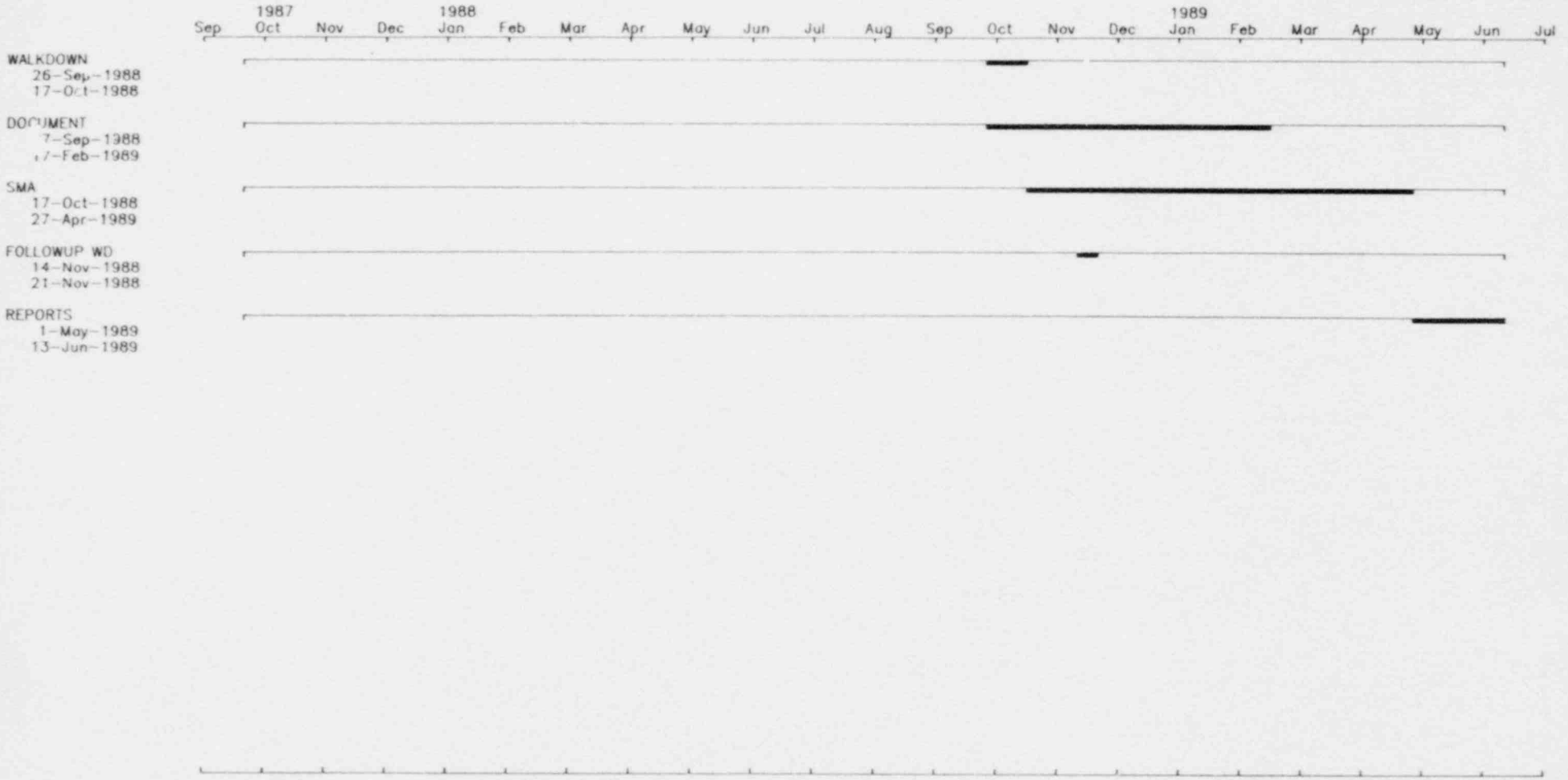
Gantt Chart Project: SMA5



PLANT HATCH SEISMIC ASSESSMENT PROJECT

Gantt Chart

Project: SMA5



EPRI/NRC
SEISMIC MARGIN ASSESSMENT

PROJECT/NRC INTERFACES

Discussion of Interfaces

- Paths of Communication
- Role of the NRC Peer Group
- Project Interface with the Peer Group
  - Mode of Interaction
  - Schedules (times to interface)
- Information Requirements
- Plant Outage Schedules and Requirements
- NRC Studies

Peer Group Interfaces

- Mode of interface
  - Information packages -- by mail
  - Peer Group review
  - Peer Group consensus
  - Peer Group response -- by mail
  - Meetings, if resolution required

- Milestones

- Soil/SSI	May 10, 1988
- Success path decisions	June 6, 1988
- Floor response spectra	Aug 11, 1988
- Relay chatter (systems screen)	Aug 24, 1988
- Walkdown	Oct 1988
- Postwalkdown assessment	April 1989
- Final report	June 1989

SEISMIC MARGIN ASSESSMENT (SMA)

GEORGIA POWER COMPANY'S
E. I. HATCH NUCLEAR POWER PLANT
APPLING COUNTY, GEORGIA

Issues Related to Soils
and
Earthquake Ground Motions

Presentation to NRC
10 May 1988

Woodward-Clyde Consultants

General Philosophy of the SMA Methodology

- The Seismic Margin Earthquake (SME) is conservatively specified.

- The response of earth structures (eg, soil profile, slope ...) to the SME is median centered.

- The capacity (eg, shear stress required to cause liquefaction ...) assessment for a given response is selected conservatively.

General Philosophy of the SMA Methodology
(Cont'd)

- The Trial SME Level should be set sufficiently high so that some plant components in the success path are found to have HCLPF SME capacity levels less than this trial SME level.

- Then both the components which control the HCLPF SME capacity level of the plant and the plant's HCLPF SME capacity level can be established.

- On the other hand, the trial SME level should not be set so high as to result in a substantial increase in the workload for the SMA.

Selection of Earthquake Ground Motions for use in a Seismic Margin Assessment

In accordance of the methodology developed by EPRI and approved by the US NRC, there are four alternate ways by which these ground motions can be specified.

1. A Selected PGA (or ZPA) multiplied by the 84% non-exceedance probability (NEP) response spectral amplification factors (eg,NUREG 0098, RG 1.60).

2. A spectrum is selected to have essentially uniform hazard throughout the frequency range.

(Cont'd)

Selection of Earthquake Ground Motions for use in a Seismic Margin Assessment

(Cont'd)

3. The hazard is specified in terms of a specific magnitude range and a specified distance from the site. Using a sufficient number of appropriately scaled real (and possibly synthetically derived) time histories, the 84% NEP spectrum is obtained.

4. A standard (non-site specific) trial SME spectrum may be negotiated with the NRC. For example, the median NUREG 0098 spectral shape may be selected and anchored to the desired PGA (or ZPA) .

E. I. HATCH NPP -- SMA
Earthquake Ground Motions - Plant Area

SEISMIC MARGIN EARTHQUAKE (SME) :

. Magnitude of about 6-1/4
. Within Distance of about 25 km of the Site

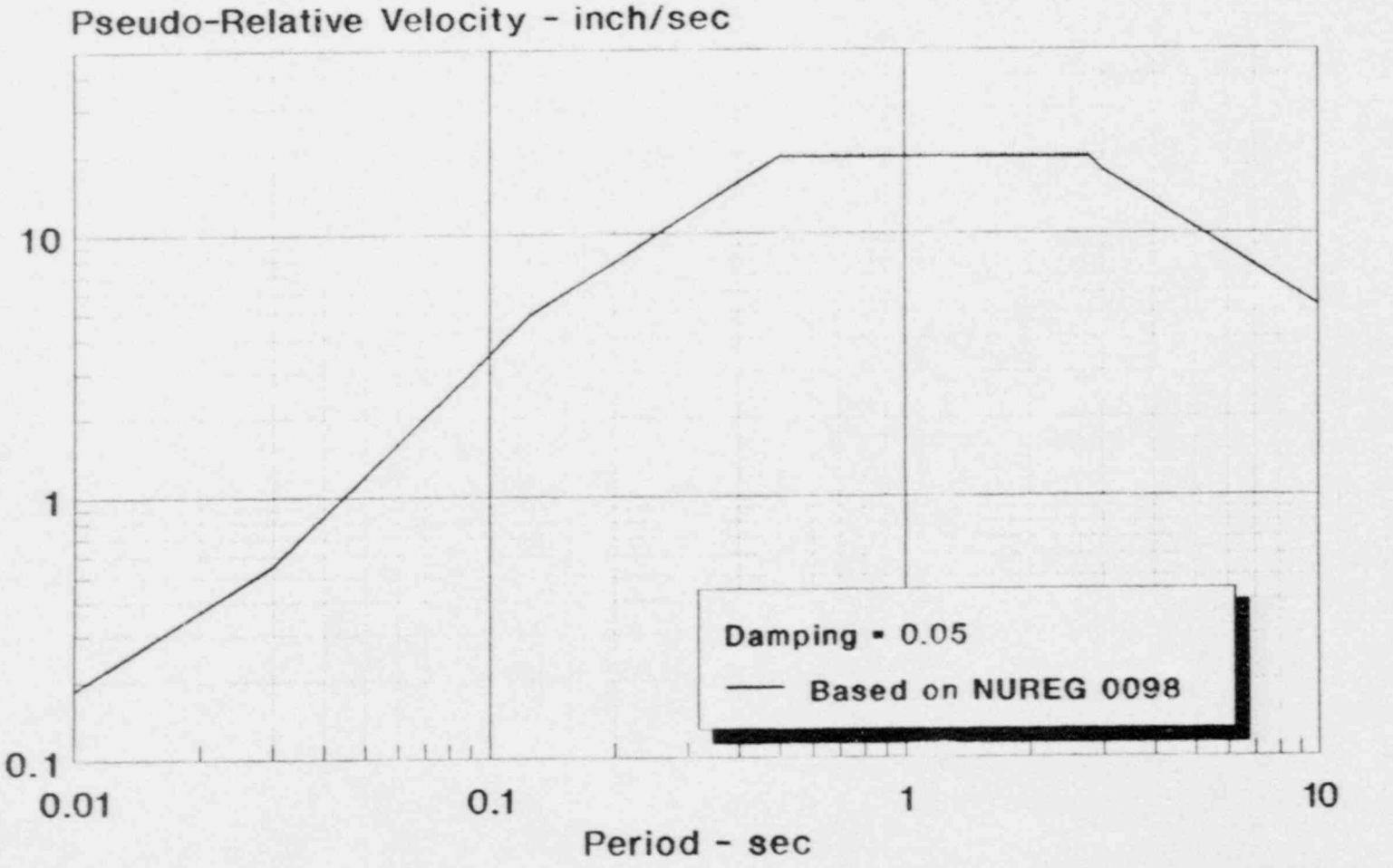
CHARACTERISTICS OF THE SELECTED SME :

. v/a = 100 cm/sec/g (39.4 in/sec/g)
. ad/v2 = 5

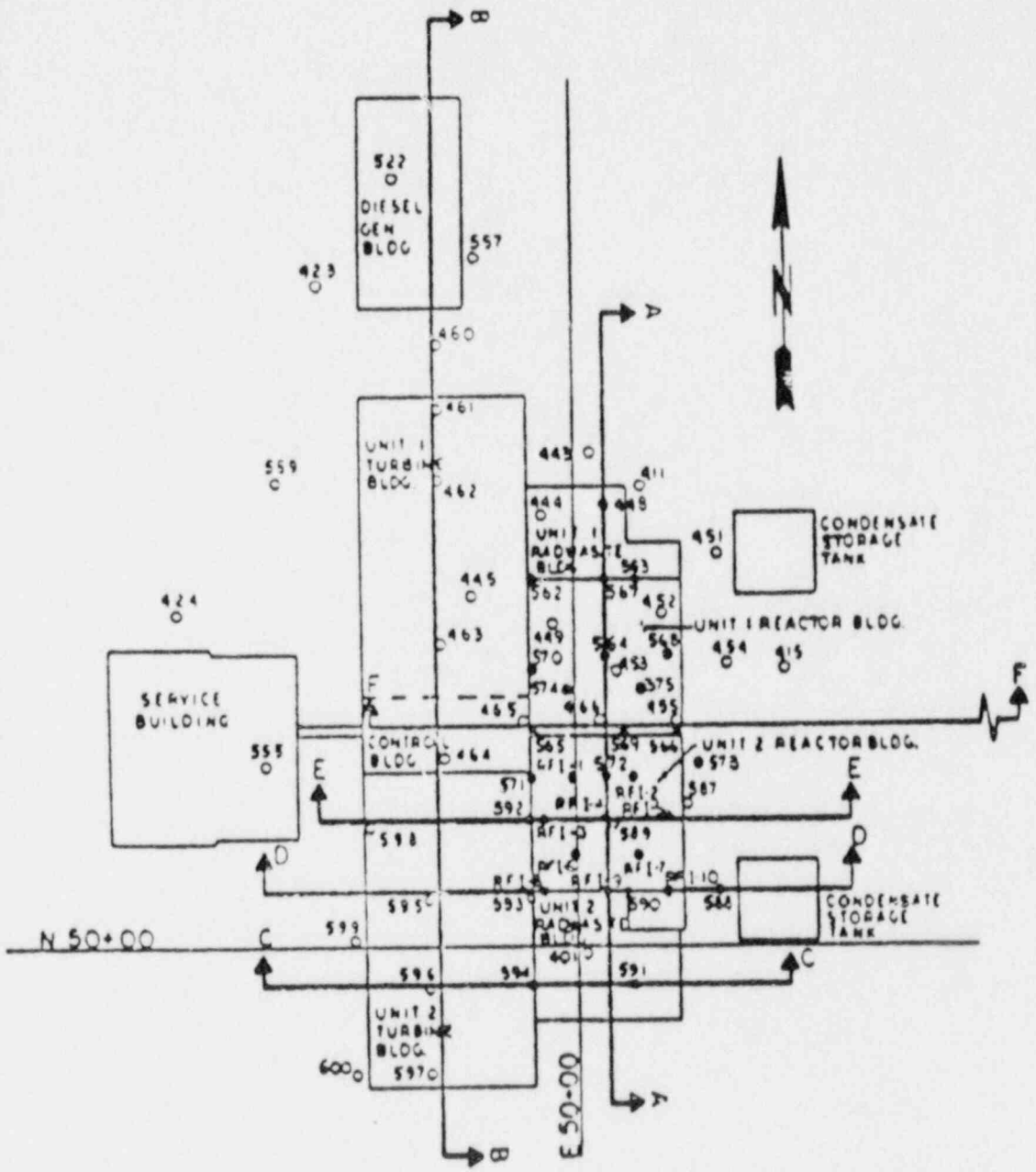
WCC - 05\10\88

HATCH NPP -- SMA

Spectral Ordinates for Target Ground Motion -- ZPA = 0.3 g



WCC - 05\10\88



LEGEND

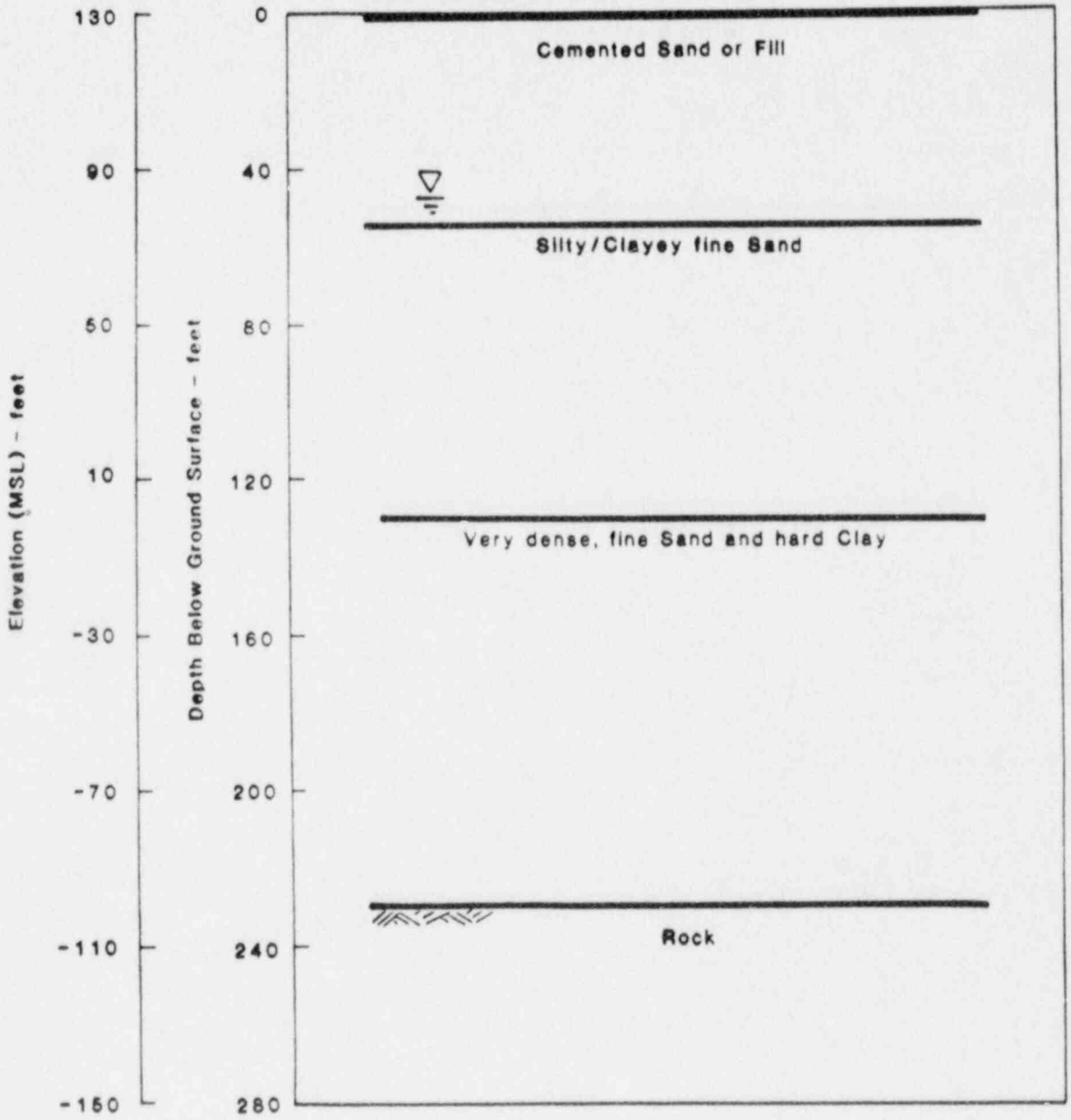
- ○ PRE CONSTRUCTION TEST BORING
- ● CONSTRUCTION INSPECTION BORING

SCALE

50 0 100 200

From: HNP-2-FSAR-2
Supplement 2A

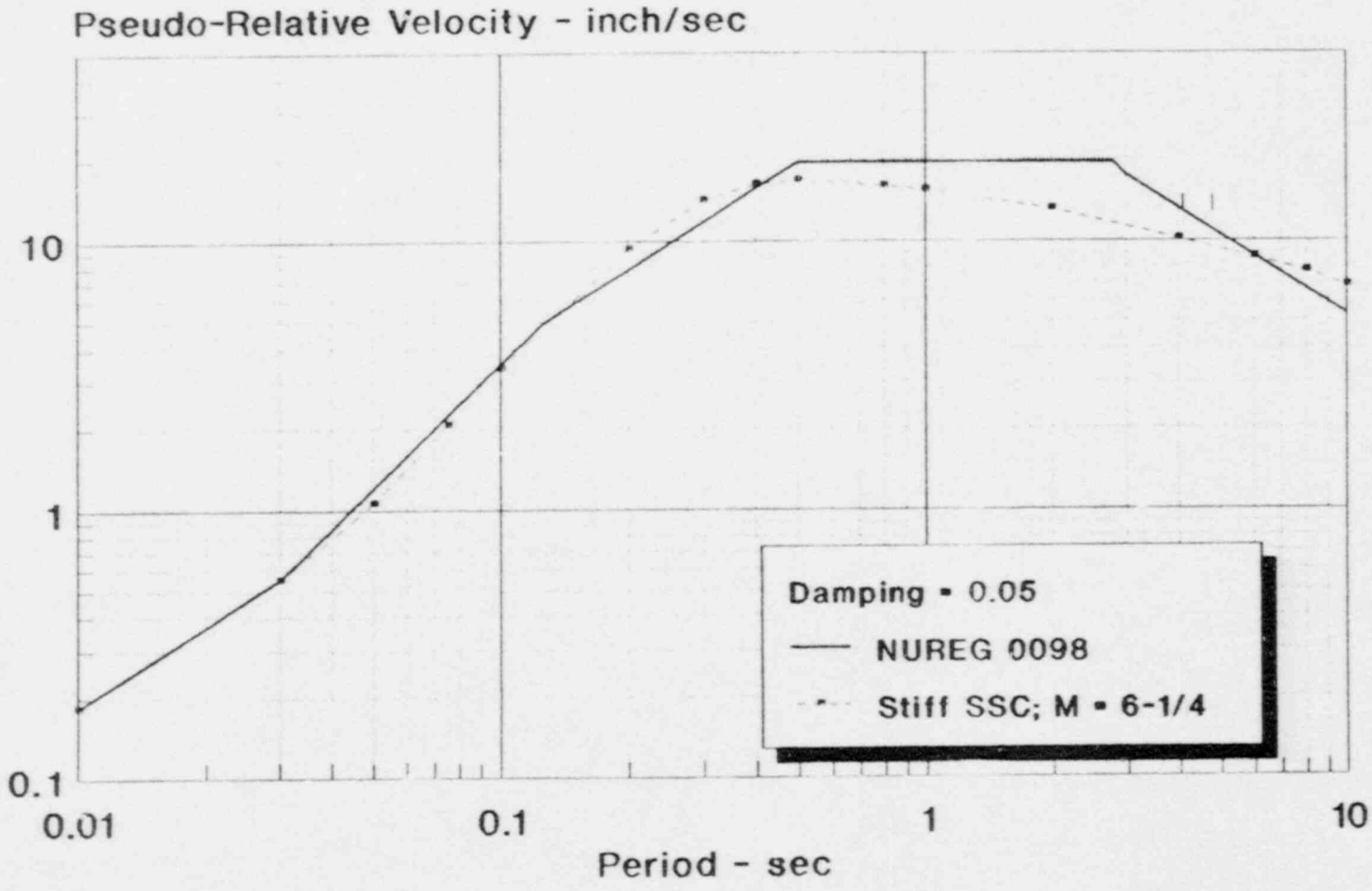
Project	HATCH NP	BORING LOCATIONS - PLANT AREA	Fig 1
Project No	8743076A		



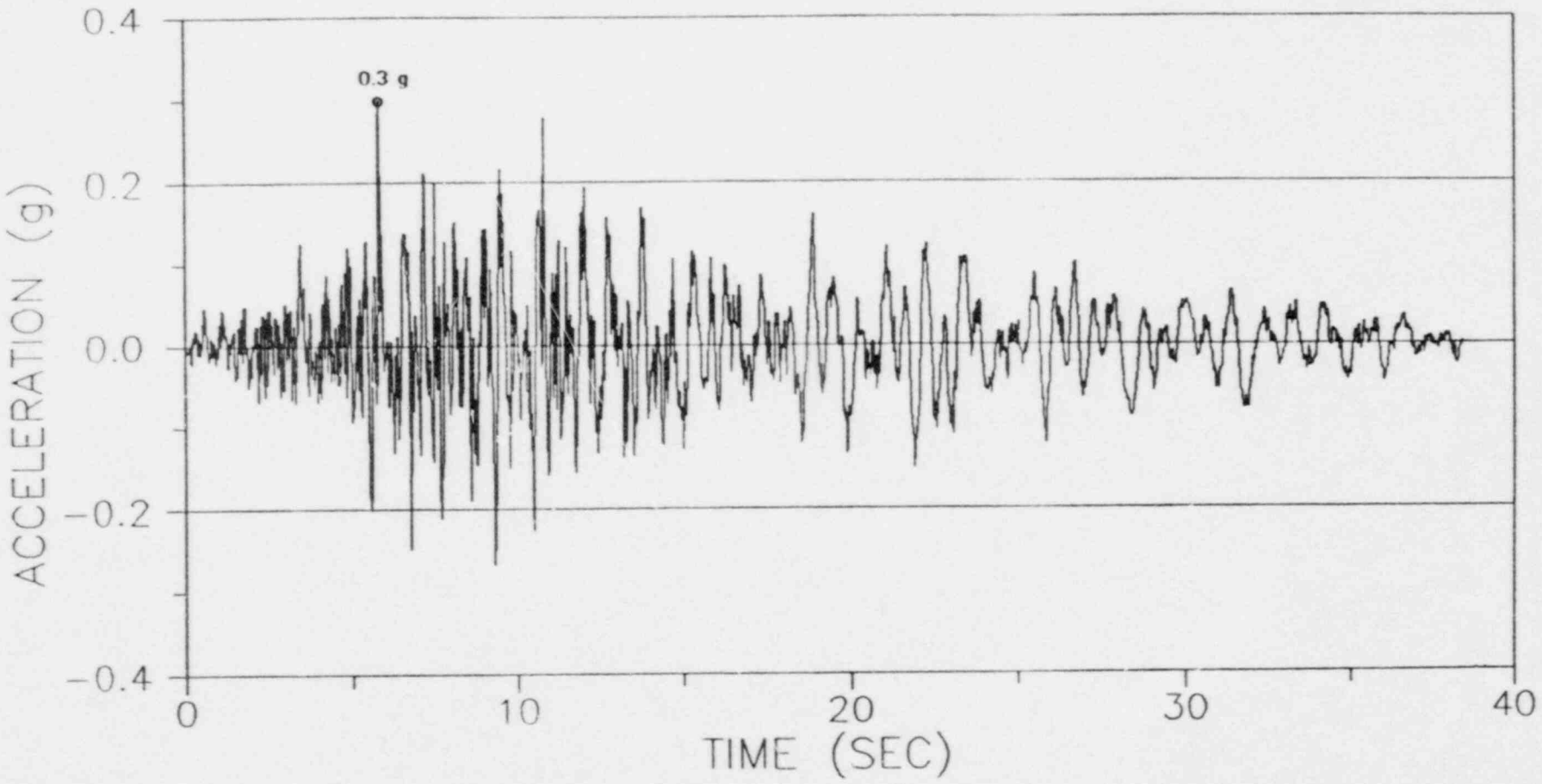
Project Project No	HATCH NP 8743076A	GENERALIZED SOIL PROFILE - PLANT AREA	Fig 2

HATCH NPP -- SMA

Ordinates Based on NUREG 0098 Spectral Shape & Those for Stiff SSC & M = 6-1/4



WCC - 05\10\88

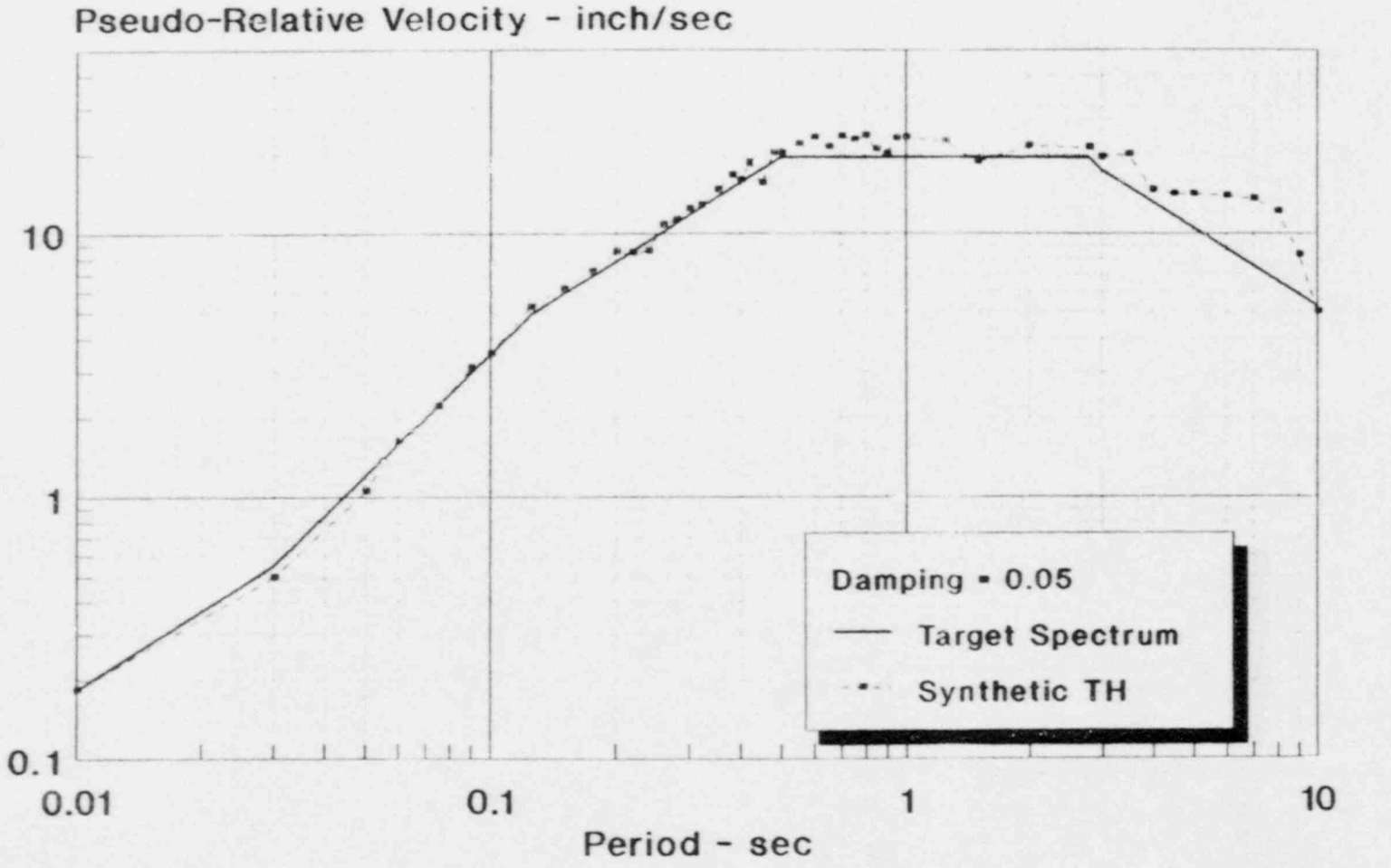


Project:	HATCH NP	SYNTHENIC ACCELEROGRAM FOR SELECTED SME	Fig 9
Project No.	8743076A		

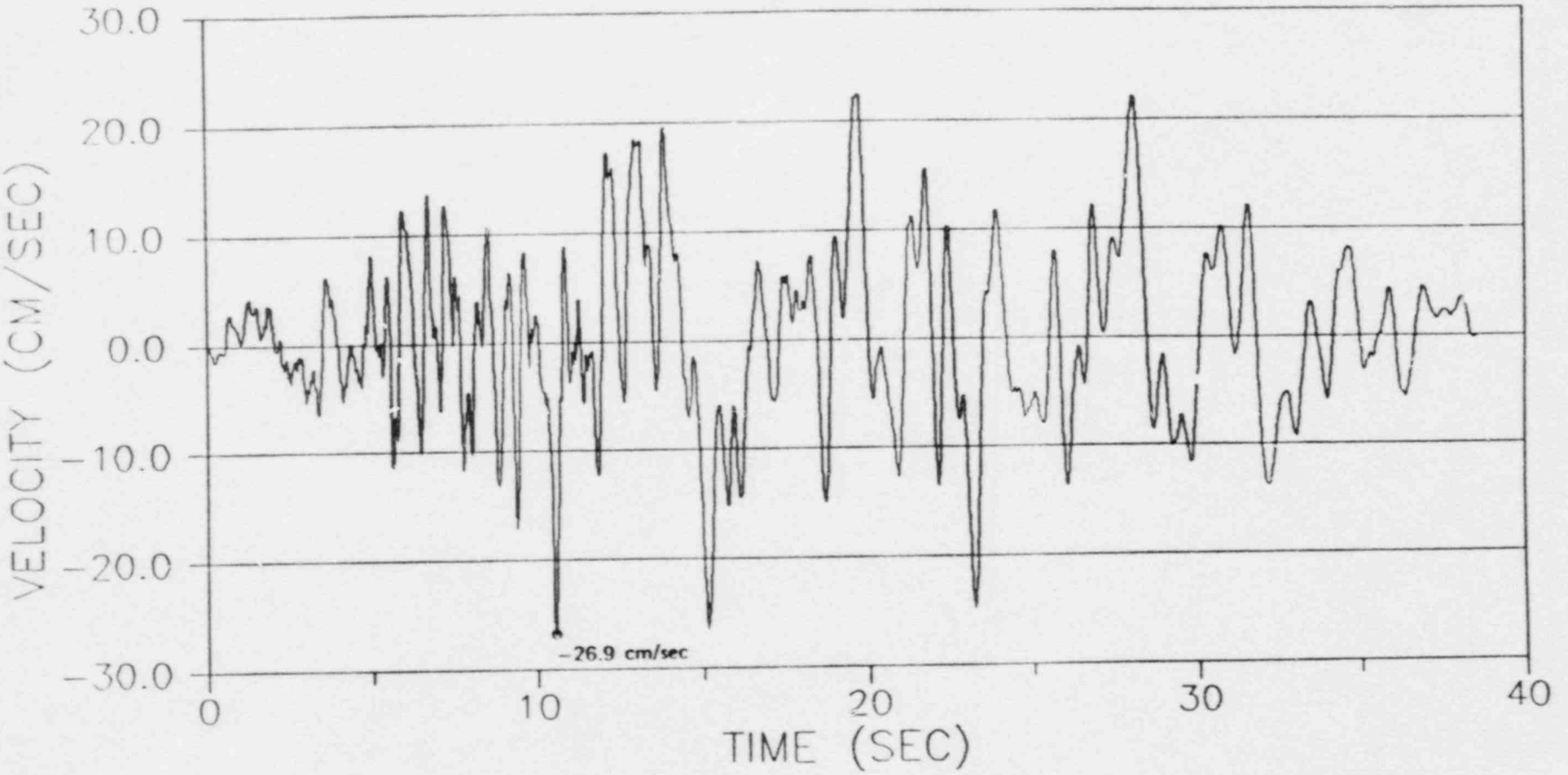
WOODWARD - CLYDE CONSULTANTS

HATCH NPP -- SMA

Spectral Ordinates for Target Ground Motion & for Synthetic Time History

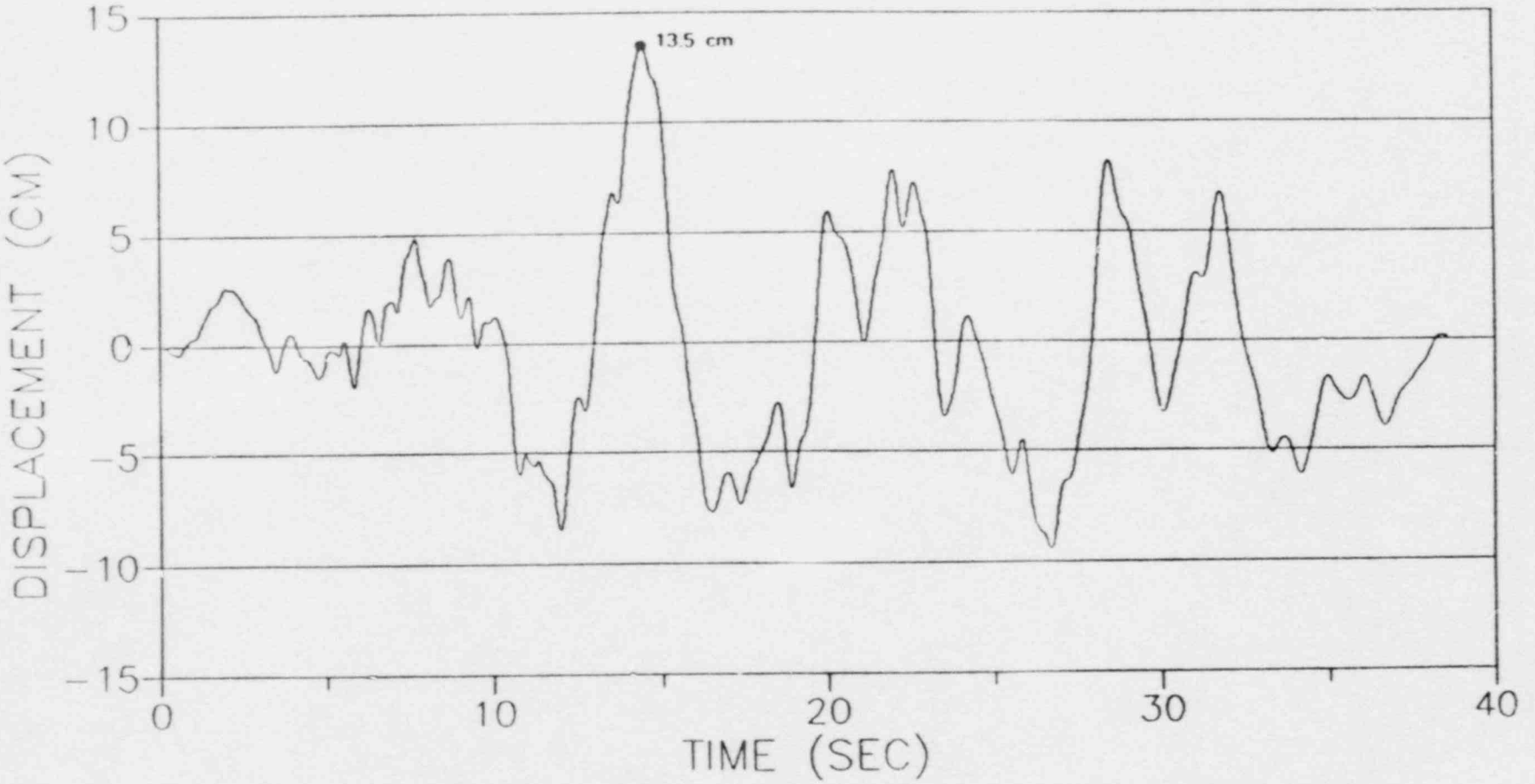


WCC - 05\10\88

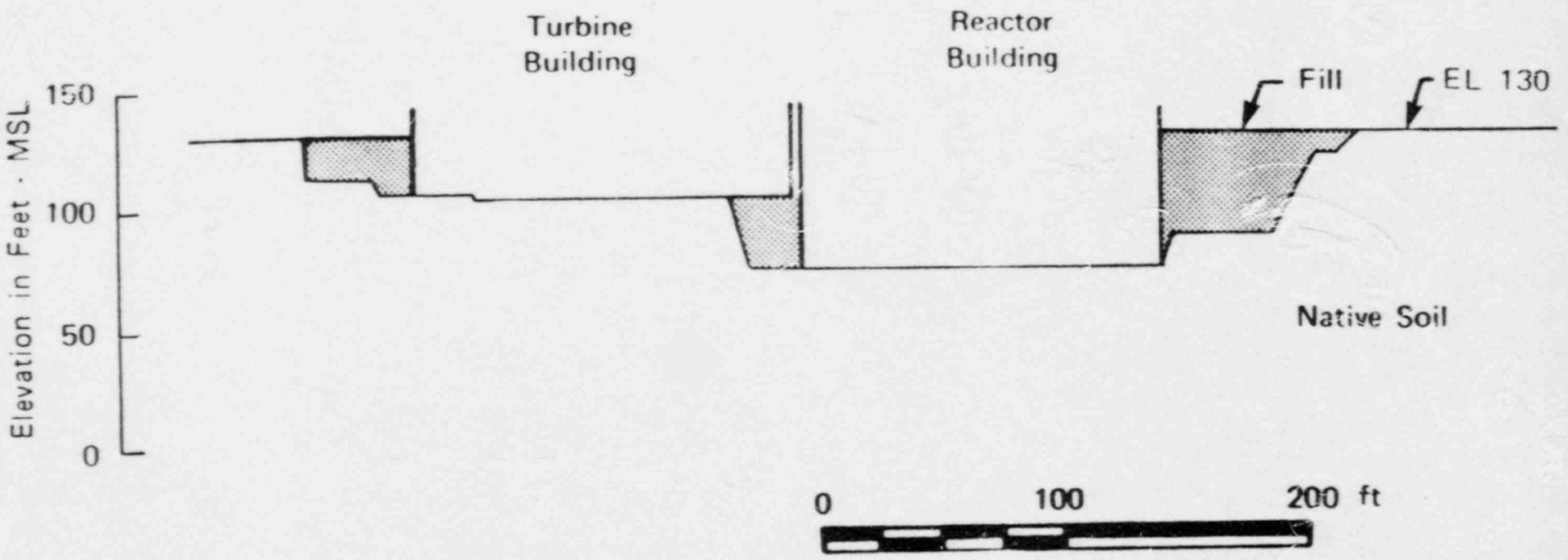


Project	HATCH NP	CALCULATED VELOCITY FOR SYNTHETIC ACCELEROGRAM	Fig 11
Project No	8743076A		

WOODWARD-CLYDE CONSULTANTS



Project:	HATCH NP	CALCULATED DISPLACEMENT FOR SYNTHETIC ACCELEROGRAM	Fig. 12
Project No.	8743076A		



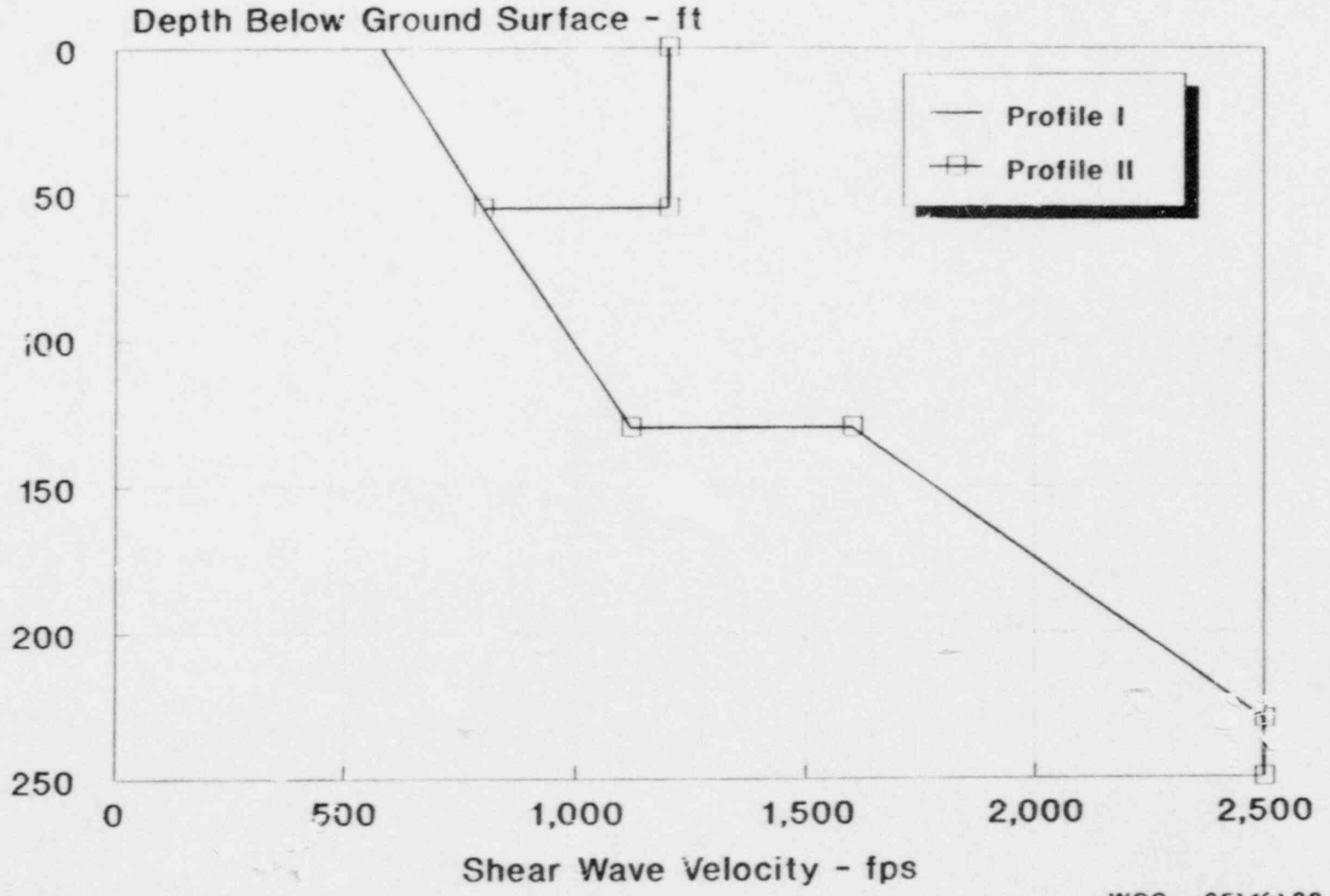
Section corresponds approximately with section E - E' shown in Fig. 1.
Information regarding extent of fill from Hatch Nuclear Plant 2-FSAR-2 Figure 2A-3.

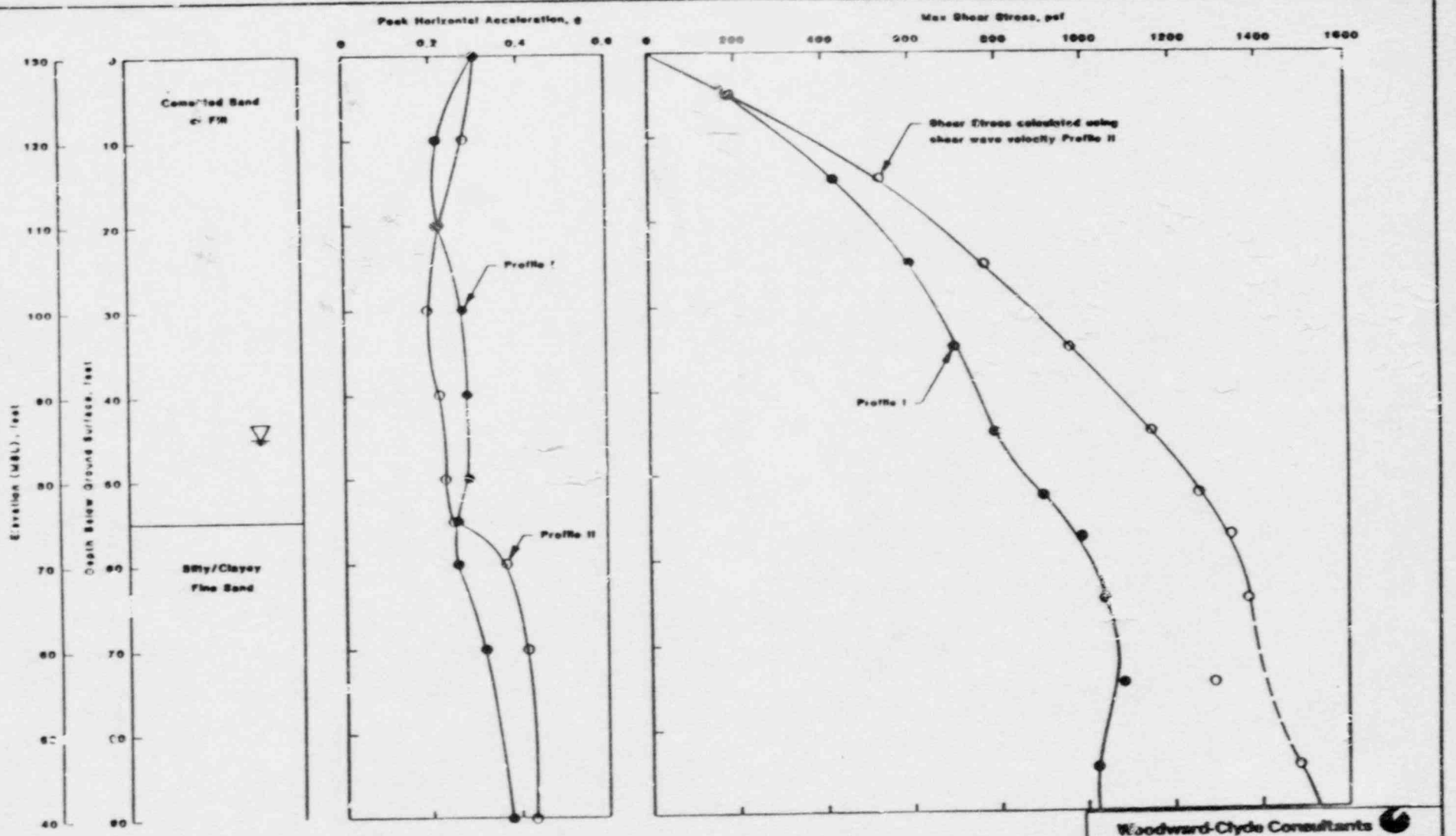
Project:	HATCH NP	APPROXIMATE EXTENT OF FILL IN PLANT AREA	Fig. 3
Project No.	8743-026A		

WOODWARD-CLYDE CONSULTANTS

Low Strain Shear Wave Velocity Profiles

Plant Area -- HATCH NPP





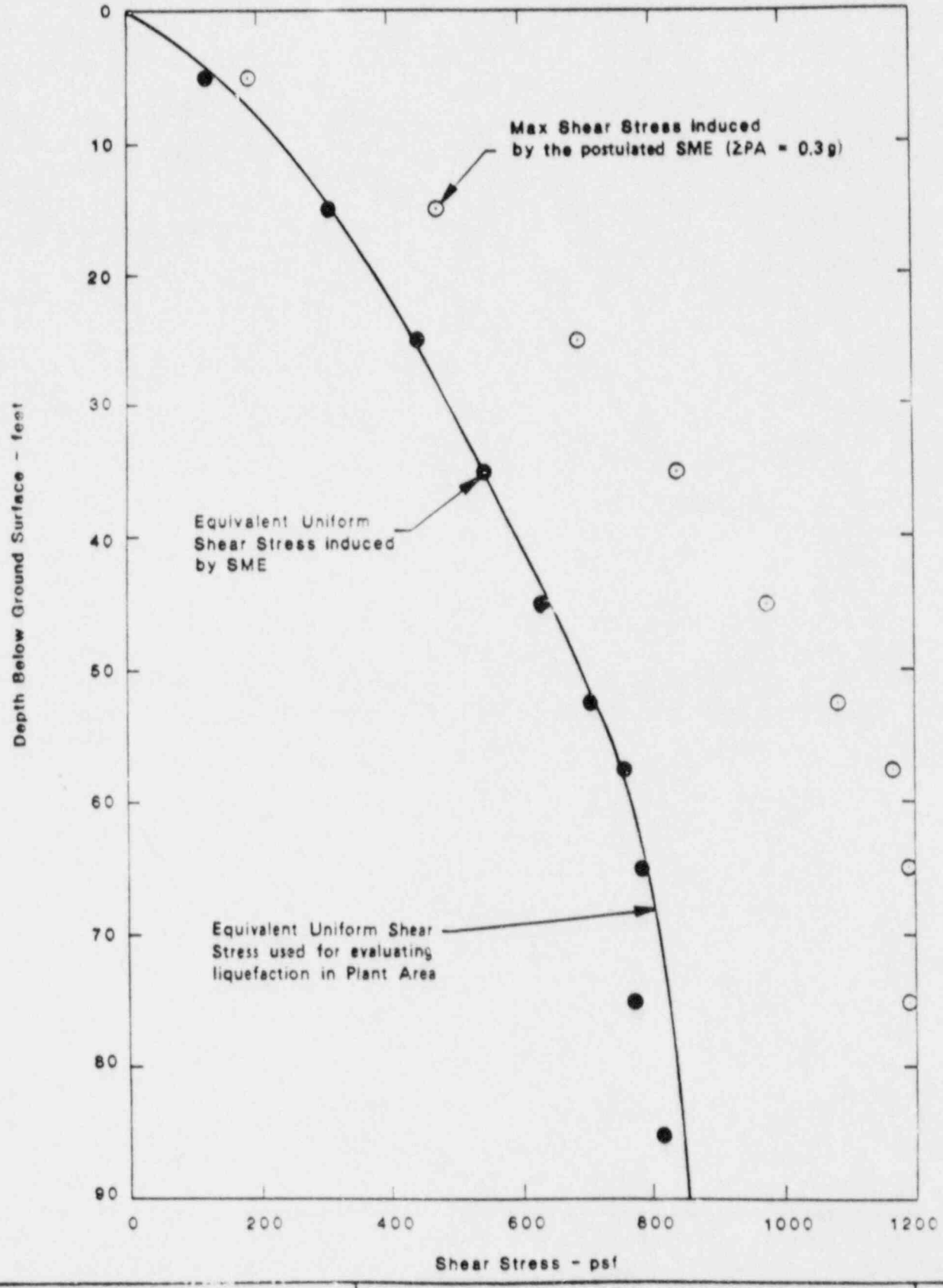
Woodward-Clyde Consultants

RANGE OF CALCULATED ACCELERATIONS AND SHEAR STRESSES - PLANT AREA

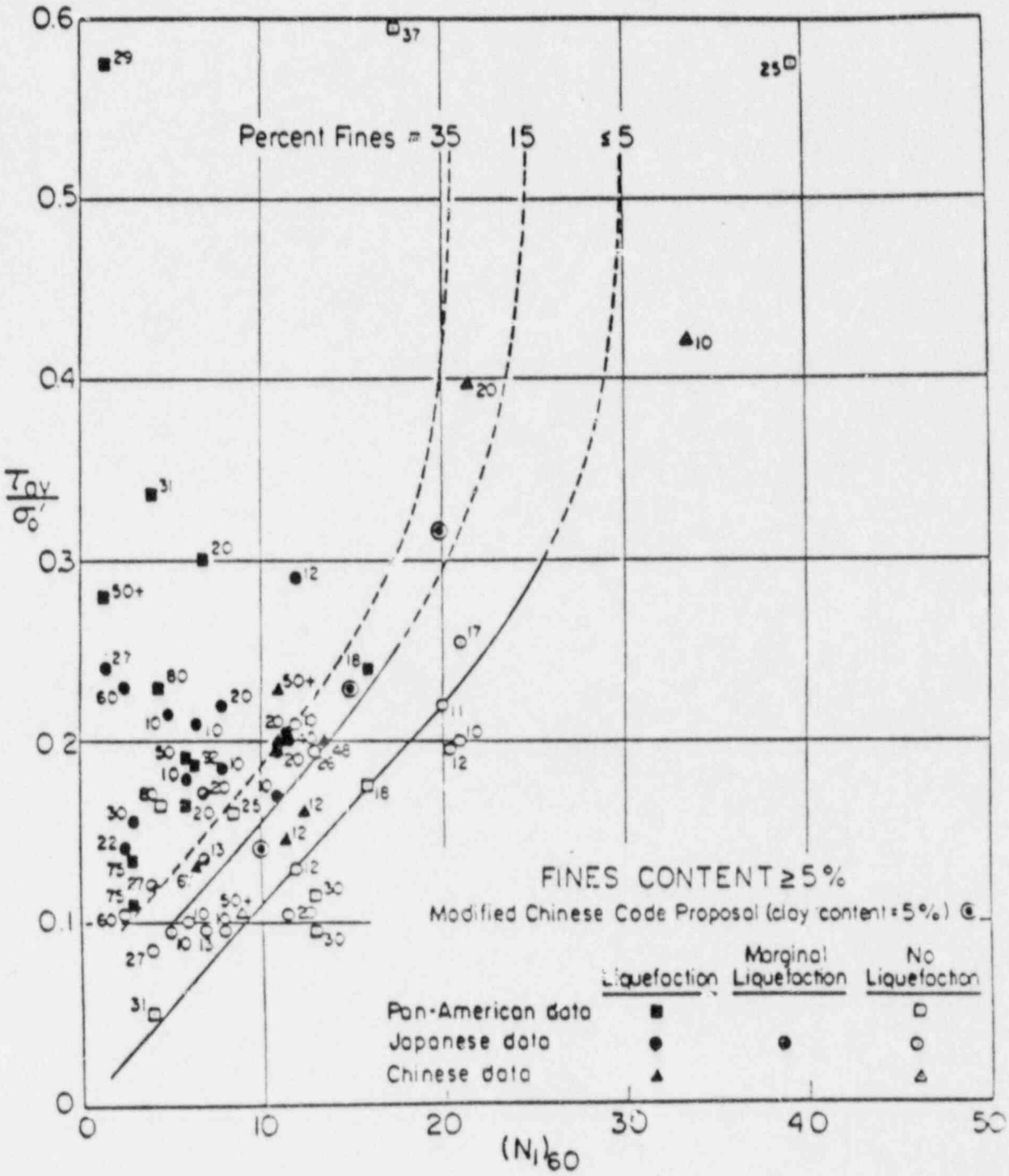
Project No. 8743076A

HATCH NP

Fig. 13

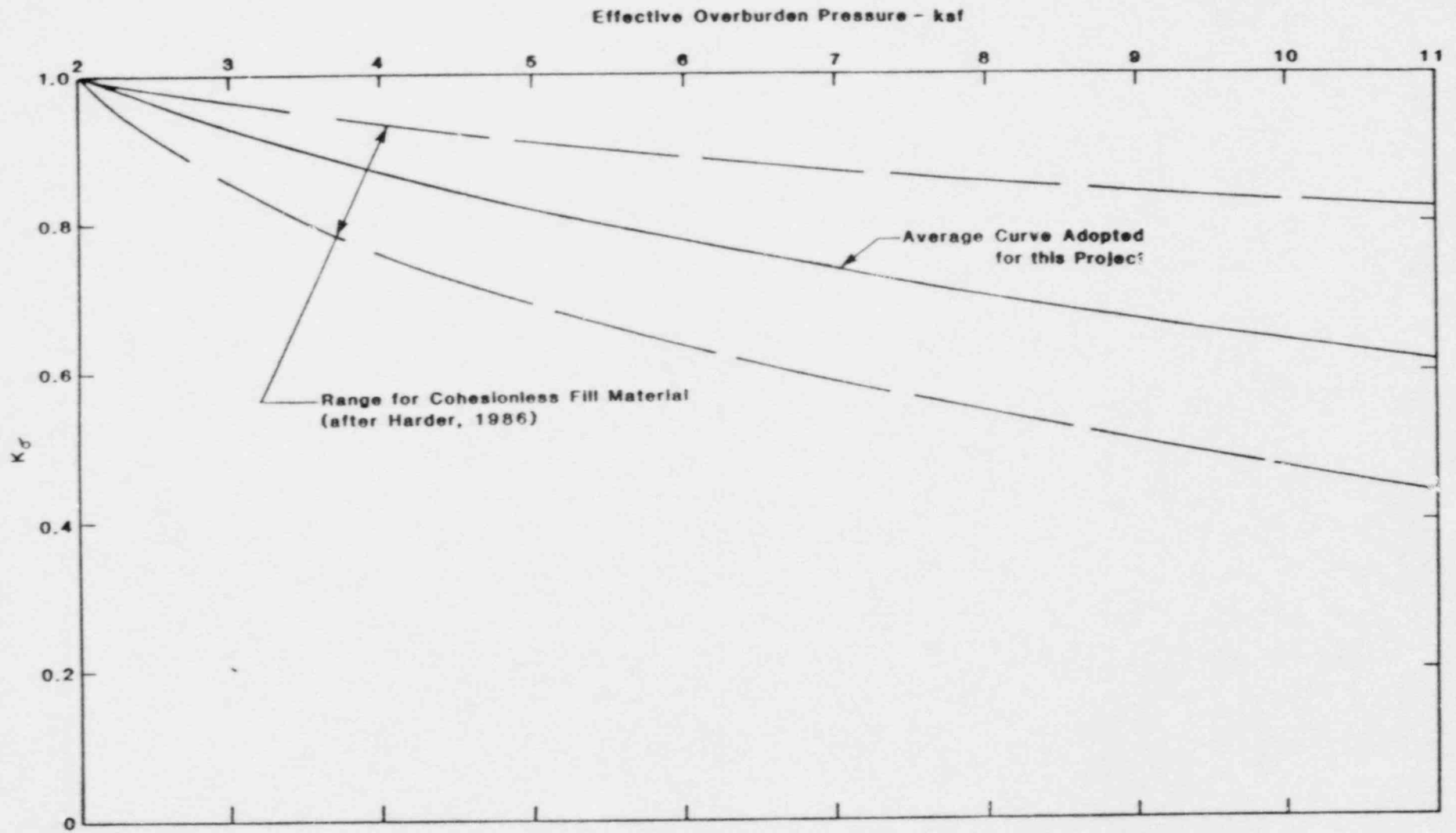


Project	HATCH NP	MAX AND EQUIVALENT UNIFORM STRESSES USED IN LIQUEFACTION EVALUATION- PLANT AREA	Fig 14
Project No	8743076A		



From Seed et al (1984)

Project Project No	HATCH NP 8743076A	CYCLIC STRESS RATIO VERSUS $(N_1)_{60}$ M = 7 1/2	Fig 15

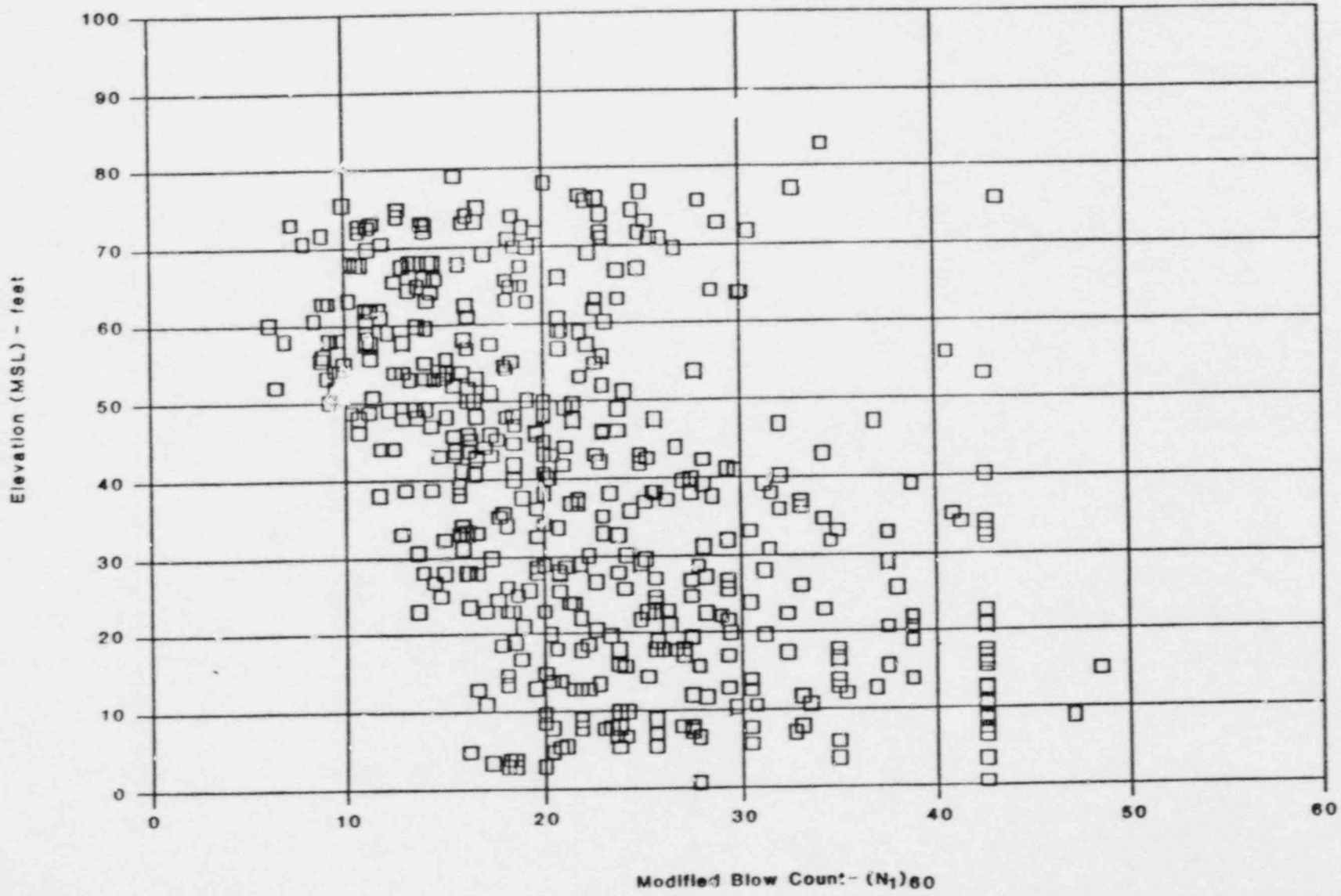


Project:	HATCH NP	EFFECTS OF INITIAL CONFINING PRESSURE ON CYCLIC STRESS RATIO	Fig. 17
Project No.	8743076A		

WOODWARD-CLYDE CONSULTANTS

PLANT AREA

Pre Construction Borings



Project:	HATCH NP	SUMMARY OF SPT BLOW COUNT - PLANT AREA	Fig. 19
Project No.	8743076A		

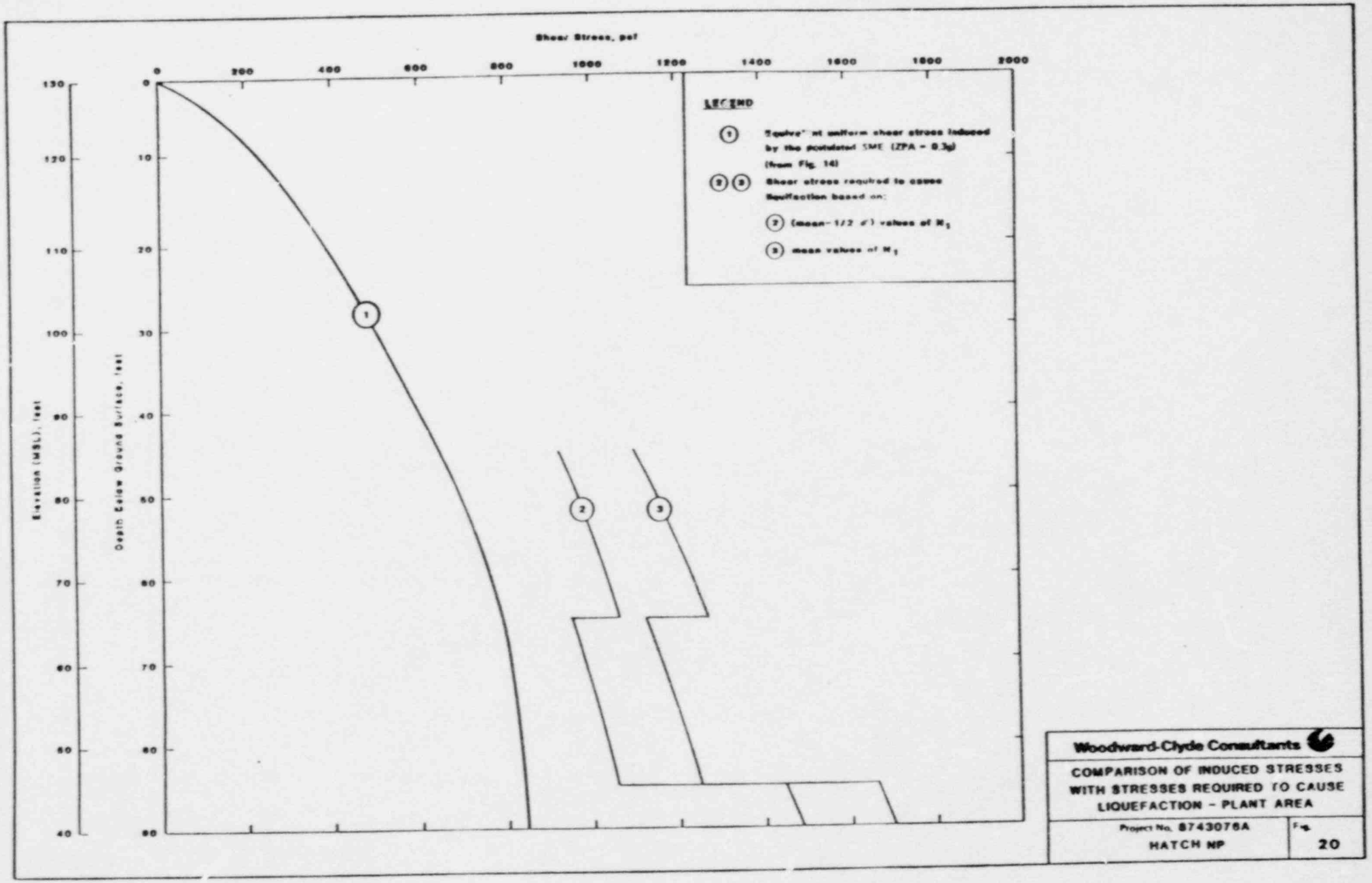
WOODWARD-CLYDE CONSULTANTS

E. I. HATCH NPP -- SMA

SPT Blowcounts -- Plant Area

Elevation	Mean Blowcount	Standard Deviation
65 to 80	17.3	5.6
45 to 65	15.3	4.7
40 to 45	20.3	5.2
30 to 40	23.5	7.0
20 to 30	23.9	6.4
0 to 20	25.5	6.3

WCC - 05\10\88



Woodward-Clyde Consultants

COMPARISON OF INDUCED STRESSES WITH STRESSES REQUIRED TO CAUSE LIQUEFACTION - PLANT AREA

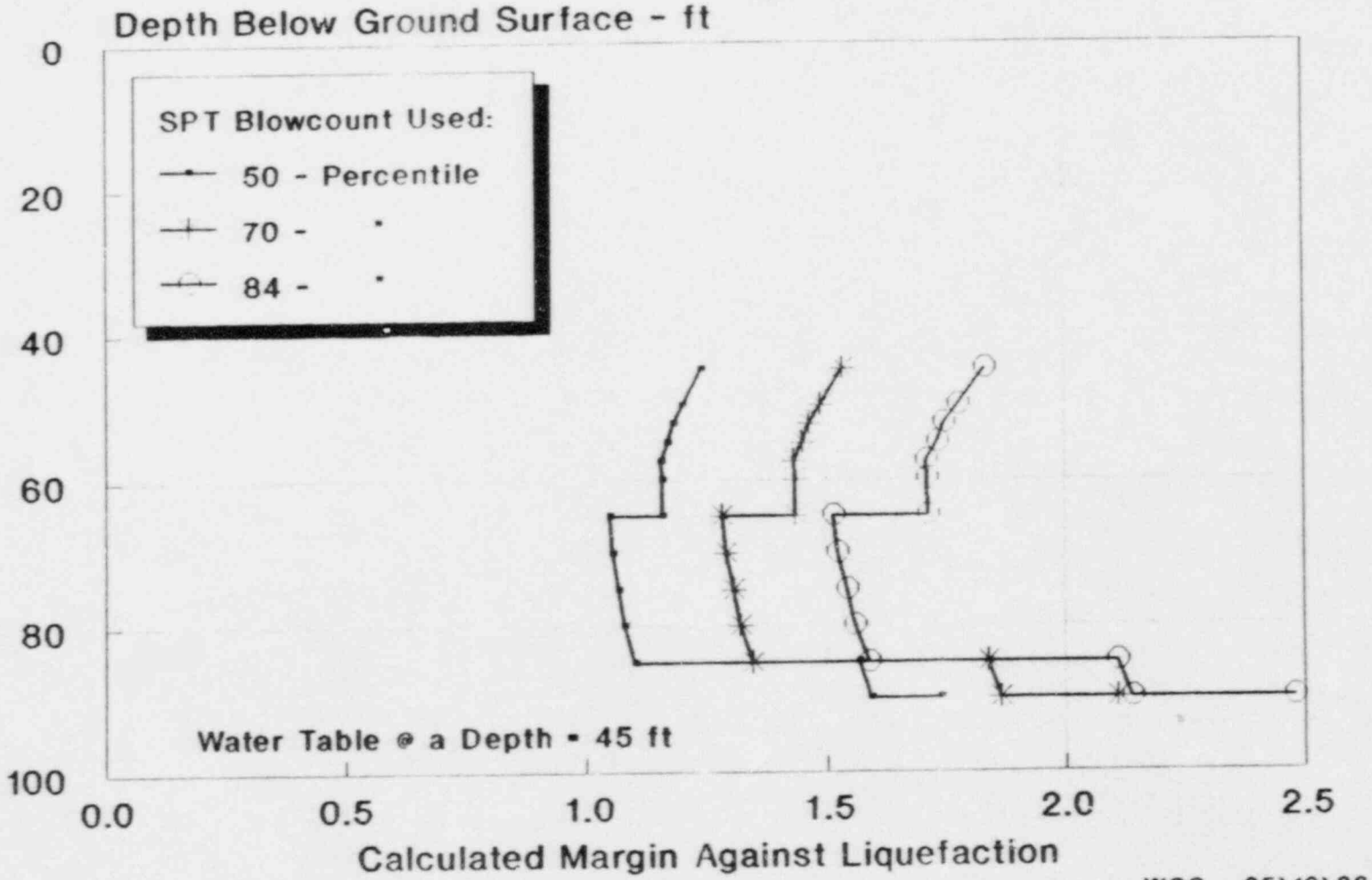
Project No. 8743076A
HATCH NP

Fig. 20

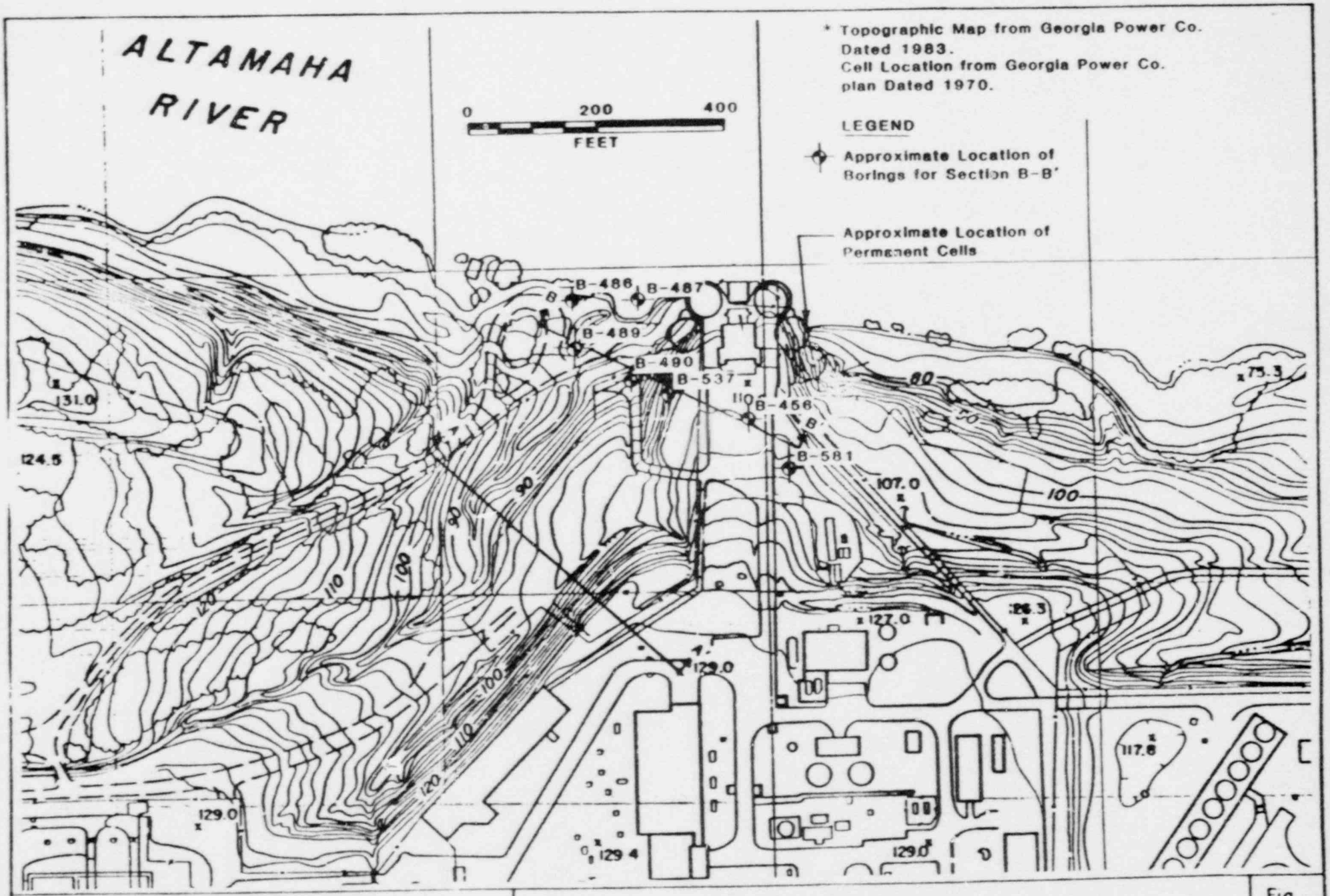
Calculated Margins Against Liquefaction

Plant Area -- Hatch NPP

Based on ZPA = 0.28 g

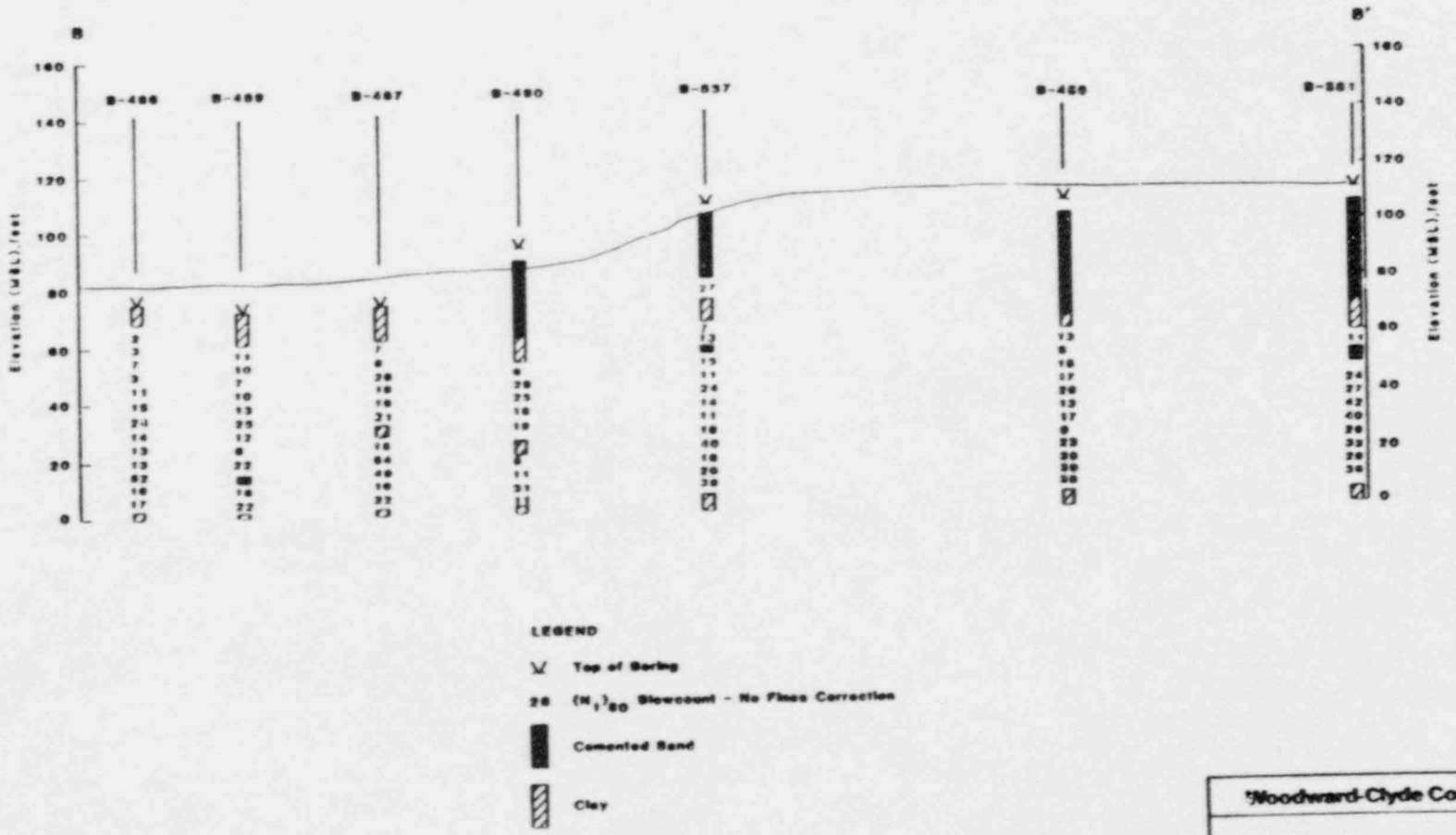


WCC - 05\10\88



Project:	HATCH NP	BORING LOCATIONS - WATER INTAKE AREA	Fig. 5
Project No	8743076A		

WOODWARD-CLYDE CONSULTANTS



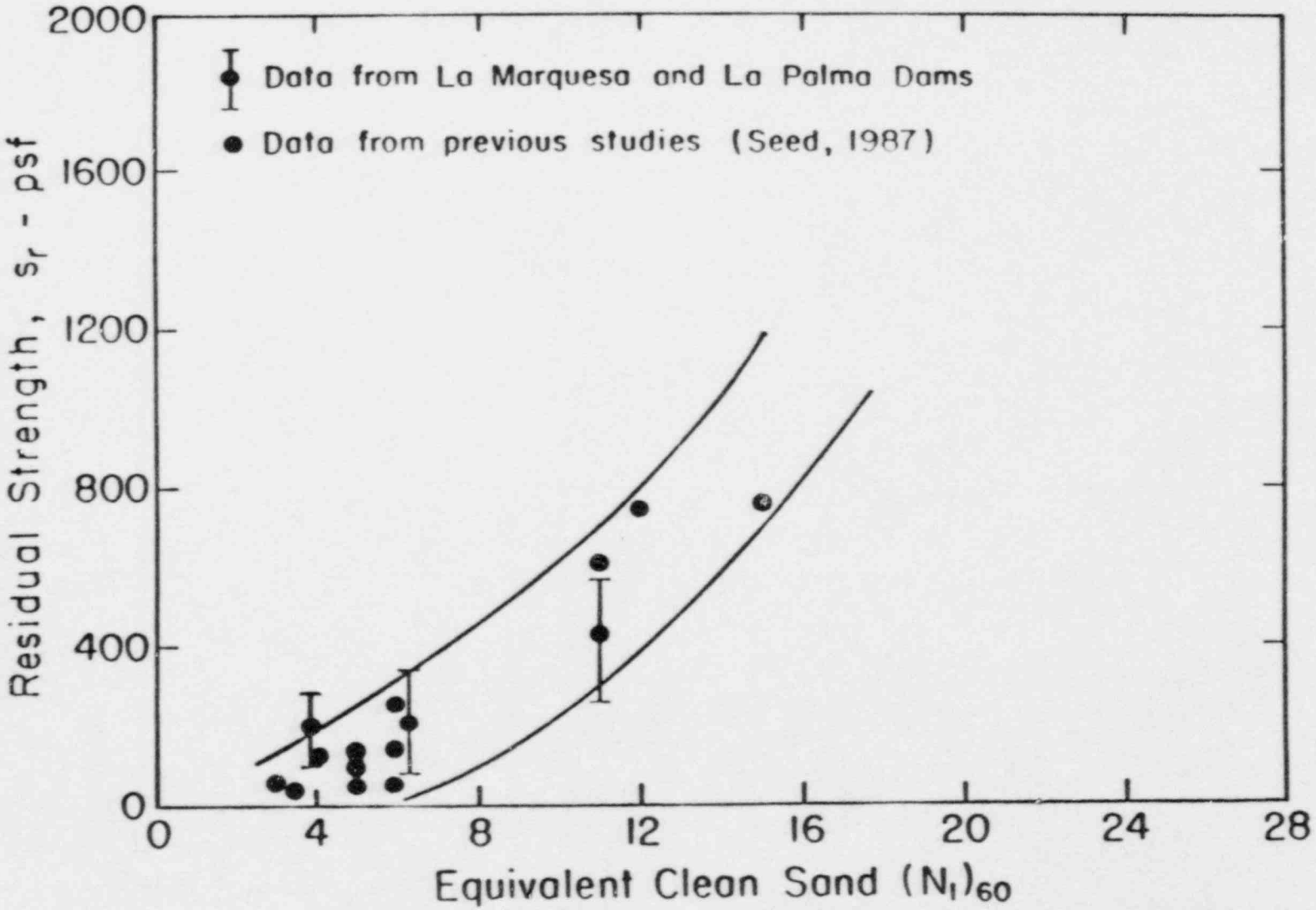
Woodward-Clyde Consultants

SPT BLOW COUNT - SECTION B-B'

Project No. 8743076A

HATCH NP

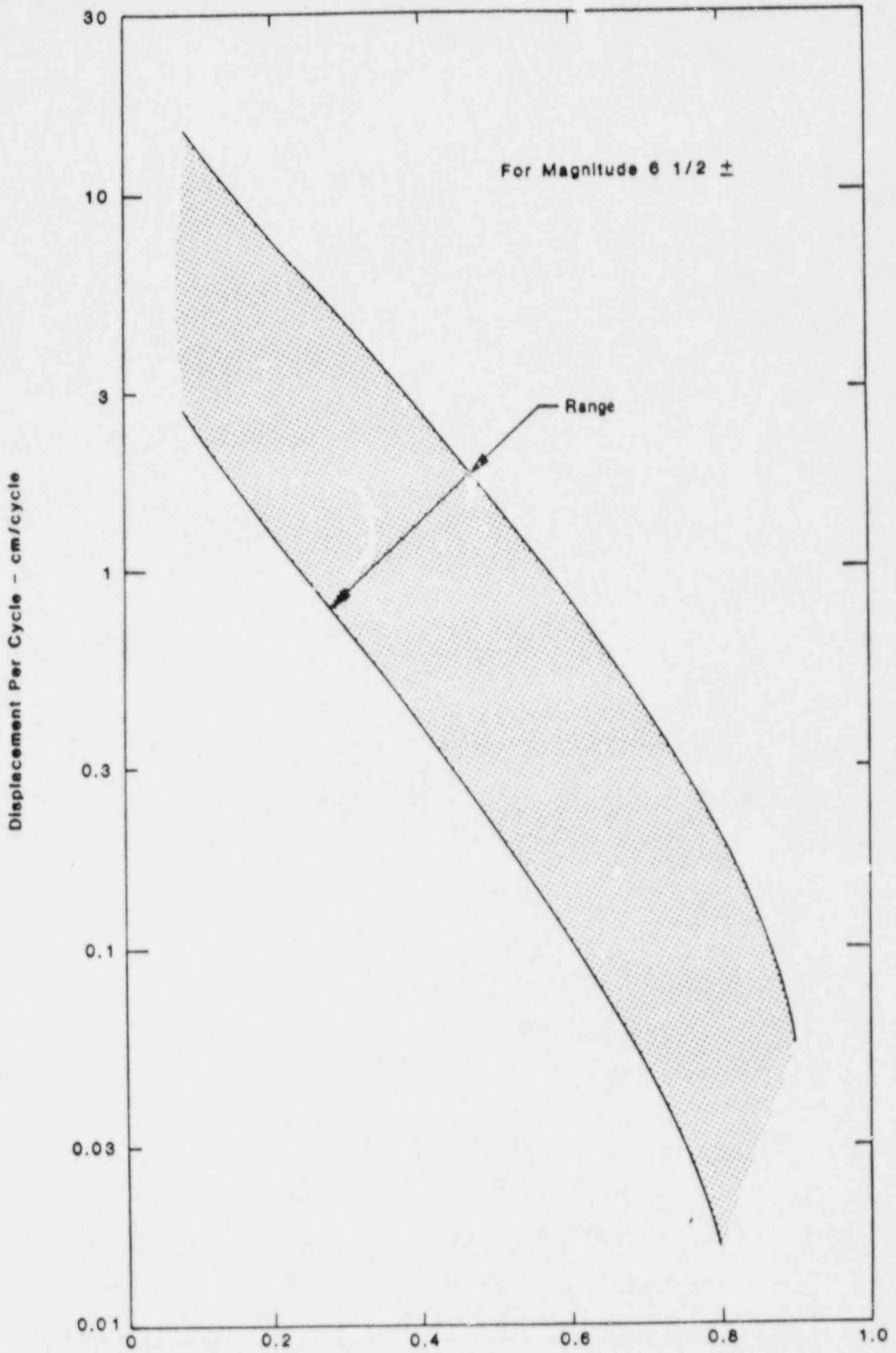
Fig. 21



(From Seed et al, 1987)

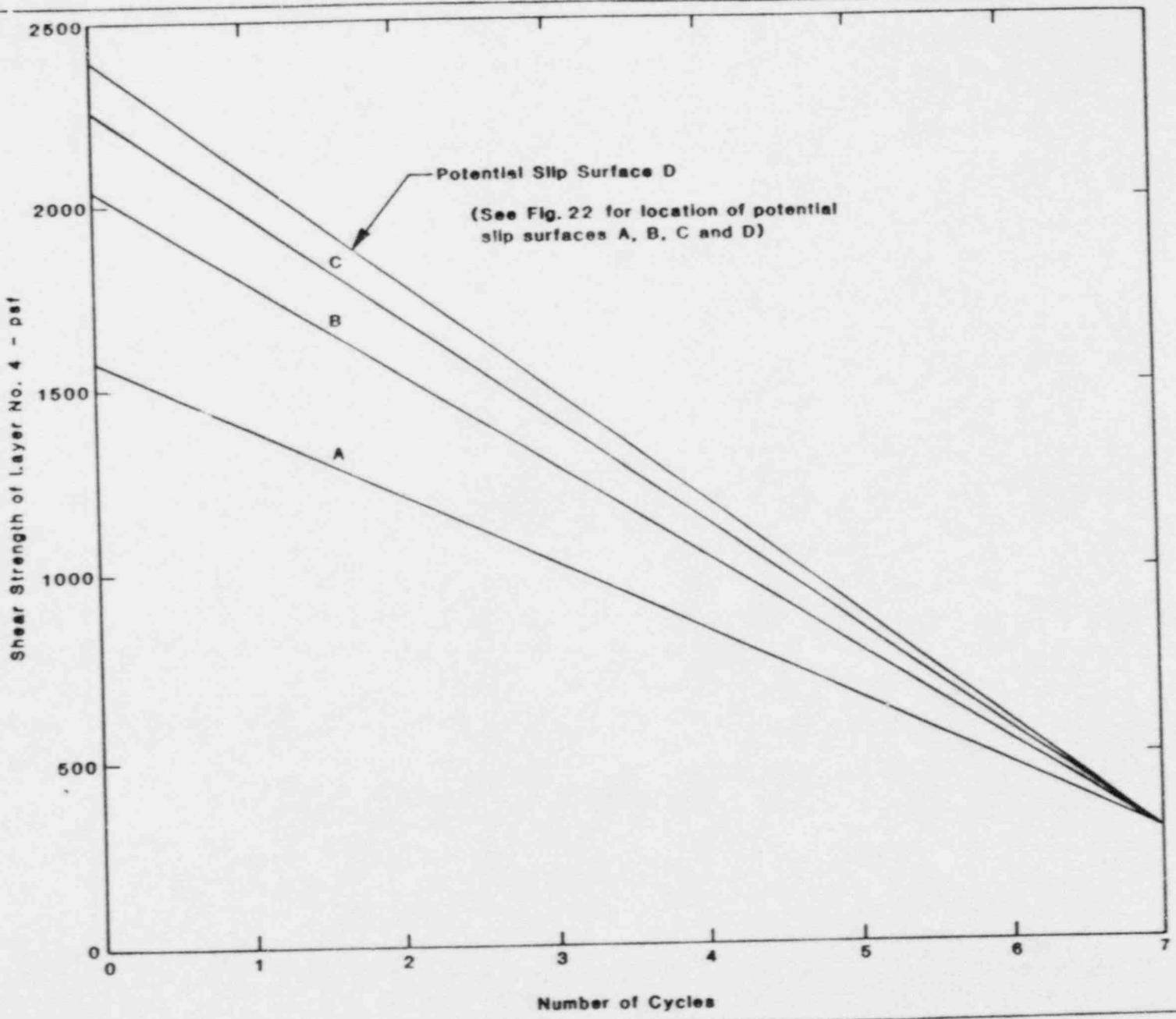
Project	HATCH NP	RELATIONSHIP BETWEEN RESIDUAL STRENGTH AND EQUIVALENT CLEAN SAND VALUE OF $(N_1)_{60}$	Fig 23
Project No	8743076A		

WOODWARD-CLYDE CONSULTANTS



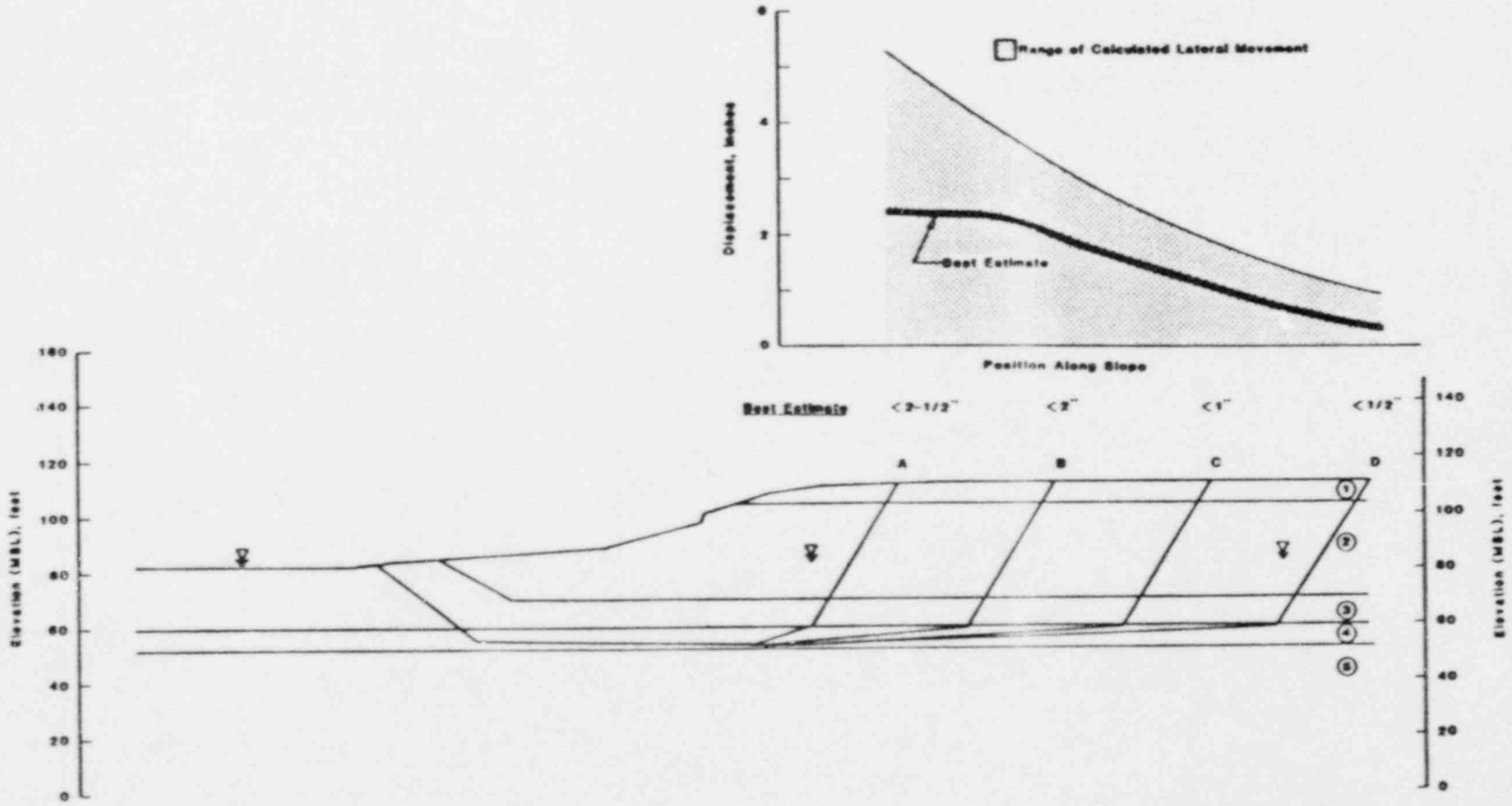
(After Makdisi and Seed, 1978)

Project	HATCH NP	SEISMICALLY-INDUCED DISPLACEMENT PER CYCLE	Fig 24
Project No.	8743076A		



Project	HATCH NP	VARIATION OF SHEAR STRENGTH WITH NUMBER OF CYCLES IN LAYER NO. 4 - SECTION B-B'	Fig. 25
Project No.	8743076A		

WOODWARD-CLYDE CONSULTANTS



Woodward-Clyde Consultants

ESTIMATED LATERAL MOVEMENT
DUE TO SME - SECTION B-B'

Project No. 8743076A
HATCH NP

Fig. 27

STRUCTURAL RESPONSE ANALYSIS FOR THE SEISMIC MARGIN ASSESSMENT OF THE EDWIN I. HATCH NUCLEAR POWER PLANT UNIT 1

Presented to:

US NRC

Presented by:

Dr. James J. Johnson
Mr. Oleg R. Maslenikov

May 10, 1988

EQE

SSI/STRUCTURAL RESPONSE ANALYSES OF THE HATCH UNIT 1 STRUCTURES WILL BE PERFORMED USING THE METHODOLOGY DEVELOPED BY EPRI AND APPROVED BY THE NRC

- Median - Centered Analysis Procedures and Parameter Values

- Uncertainties in System Properties Accounted for by Varying Soil Properties

EQE

THE STRUCTURAL RESPONSE ANALYSIS FOR THE HATCH SMA WILL BE PERFORMED USING THE SUBSTRUCTURE APPROACH

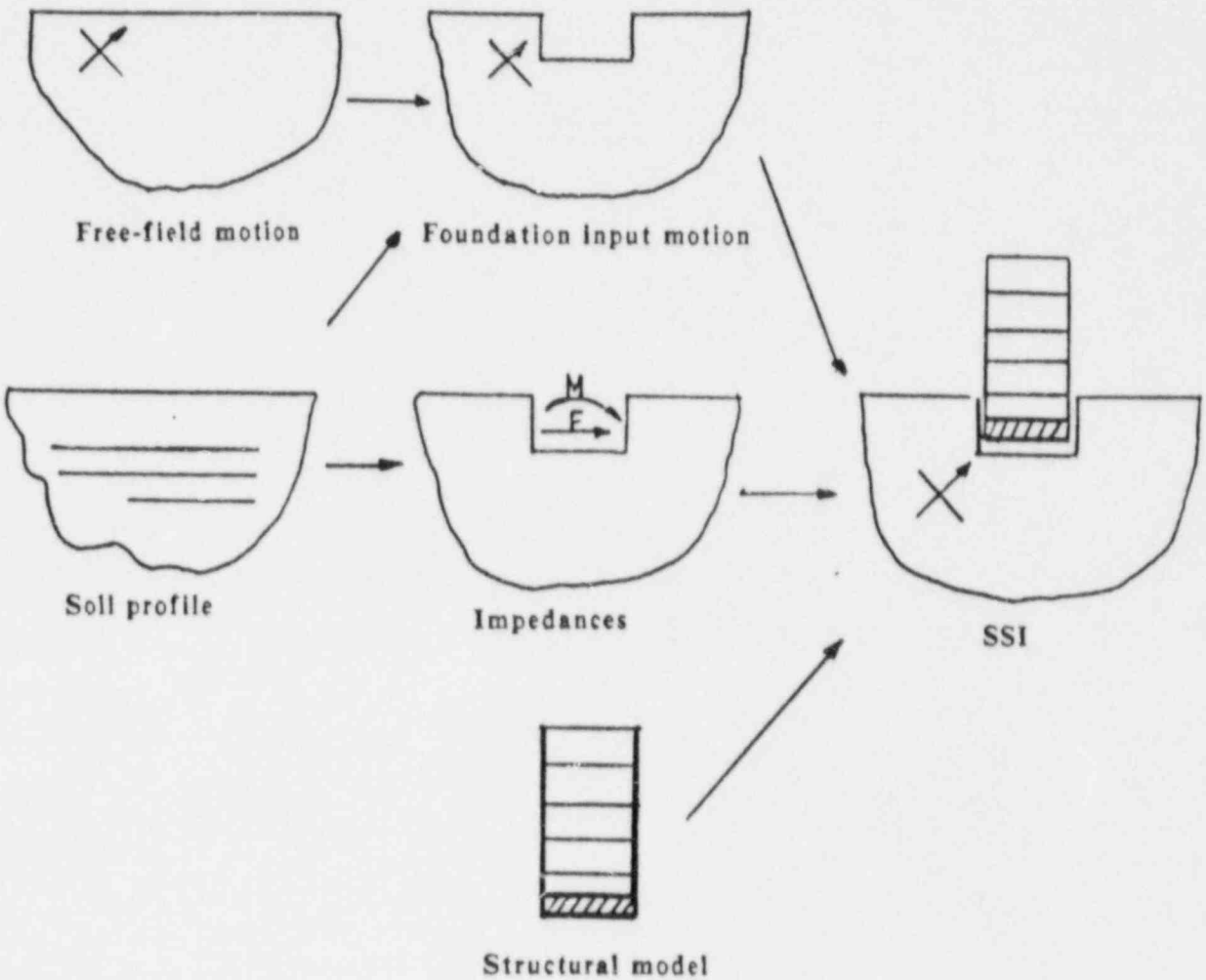
- Free-Field Ground Motion
  - Control motion defined by ground response spectra
  - PGA = about 0.3g horizontal direction, about 0.2g vertical direction
  - Three components of motion
  - Artificial time histories generated to closely match the ground response spectra
  - Control point on the free surface at finished grade
  - Spatial variation of motion defined by vertically propagating waves
  - Provided by WCC

THE STRUCTURAL RESPONSE ANALYSIS FOR THE HATCH SMA WILL BE PERFORMED USING THE SUBSTRUCTURE APPROACH (CONT)

- Soil Profile
  - Strain - dependent equivalent linear soil properties specified for each structure
  - Uncertainties defined by shifting of soil stiffness
- Foundation Input Motion
  - For embedded and partially embedded structures, kinematic interaction effects are included.
- Foundation Impedances
- Structural Models
  - Provided by GPC/SCS

EQE

ELEMENTS OF THE SUBSTRUCTURE SSI ANALYSIS



SSI/STRUCTURAL RESPONSE ANALYSES OF FOUR HATCH UNIT 1 STRUCTURES WILL BE PERFORMED

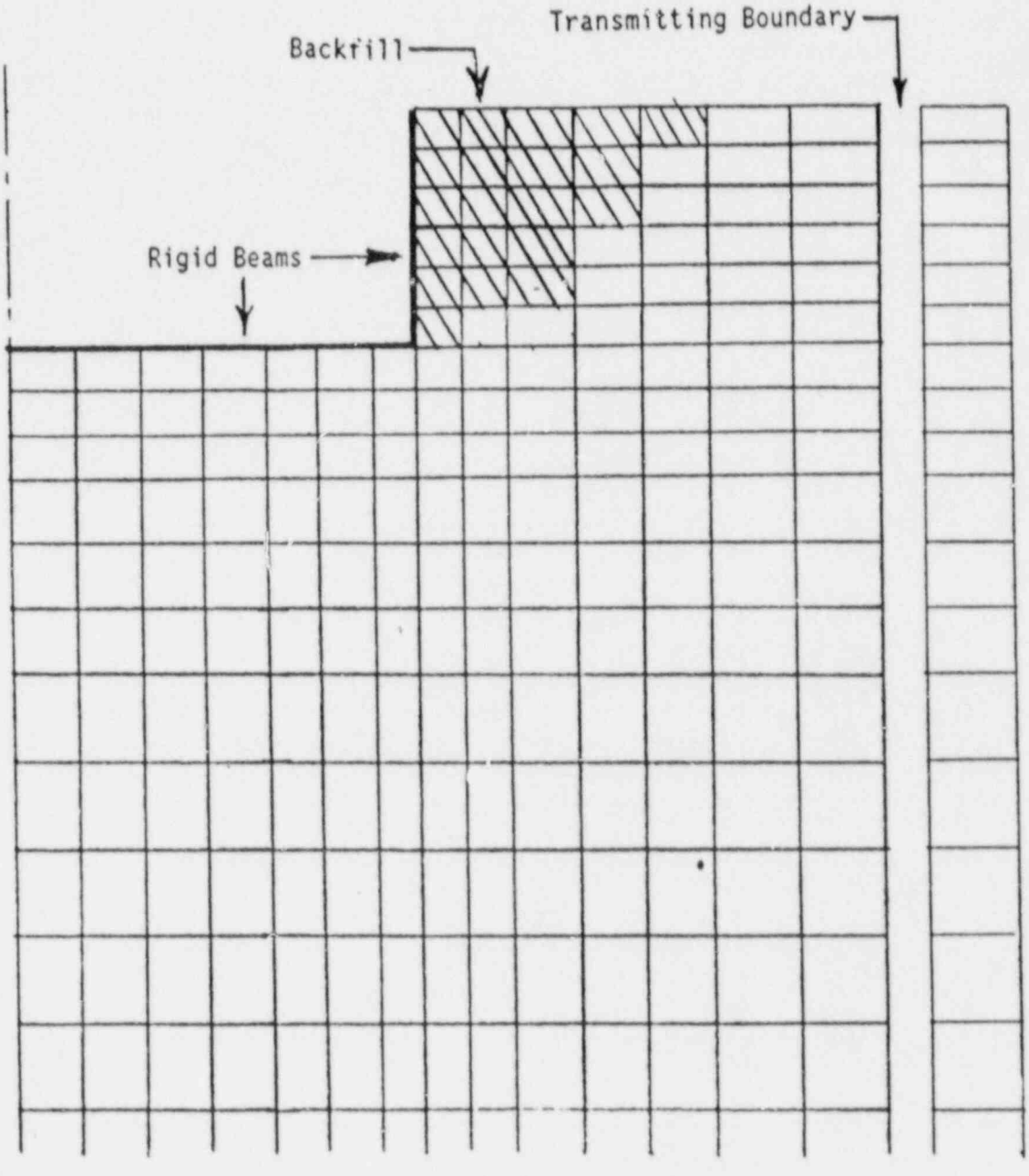
- Reactor Building
- Control Building
- Diesel Generator Building
- Intake Structure

REACTOR BUILDING

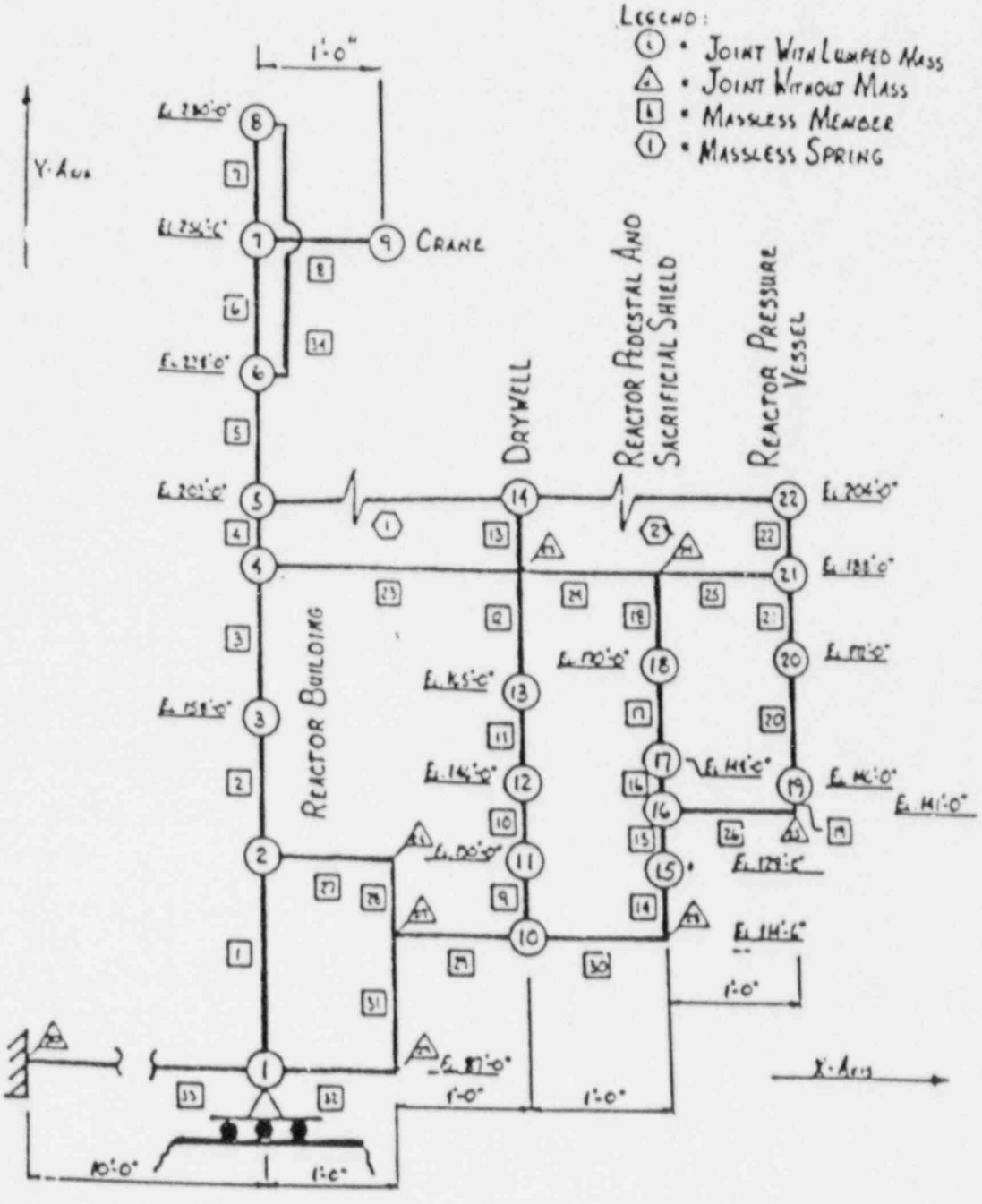
- **Soil Profile**
  - **Combination of Soil Profiles I and II**
  - **Soil property variation (0.75, 1.5)**
- **Soil/Foundation Model**
  - **Sensitivity study for embedment effects**
  - **Foundation input motion and foundation impedances calculated with SUPERALUSH**
  - **Possible additional soil property variation**
- **Structure Model**
  - **N-S, E-W, and vertical models by GPC/SCS**

EQE

TYPICAL SUPERALUSH FOUNDATION MODEL OF REACTOR BUILDING



REACTOR BUILDING SEISMIC MODEL

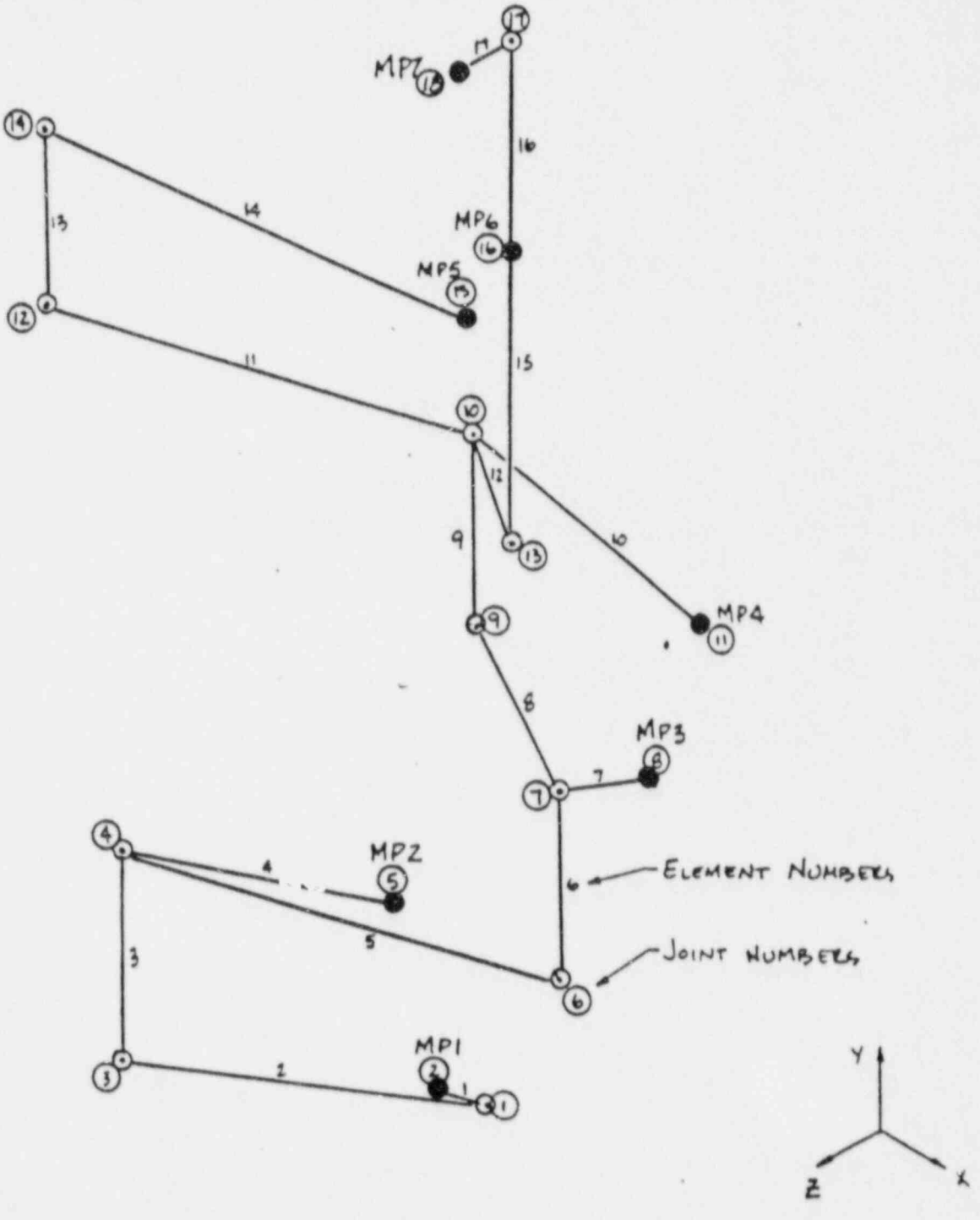


CONTROL BUILDING

- Soil Profile
  - Soil Profile II
  - Soil property variations (0.60, 1.5)
- Soil/Foundation Model
  - Embedded, no sidewall contact with soil
  - Foundation input motion calculated with SUPERFLUSH or SHAKE
  - Foundation impedances calculated with CLASSI
- Structure Model
  - Three-dimensional model by GPC/SCS

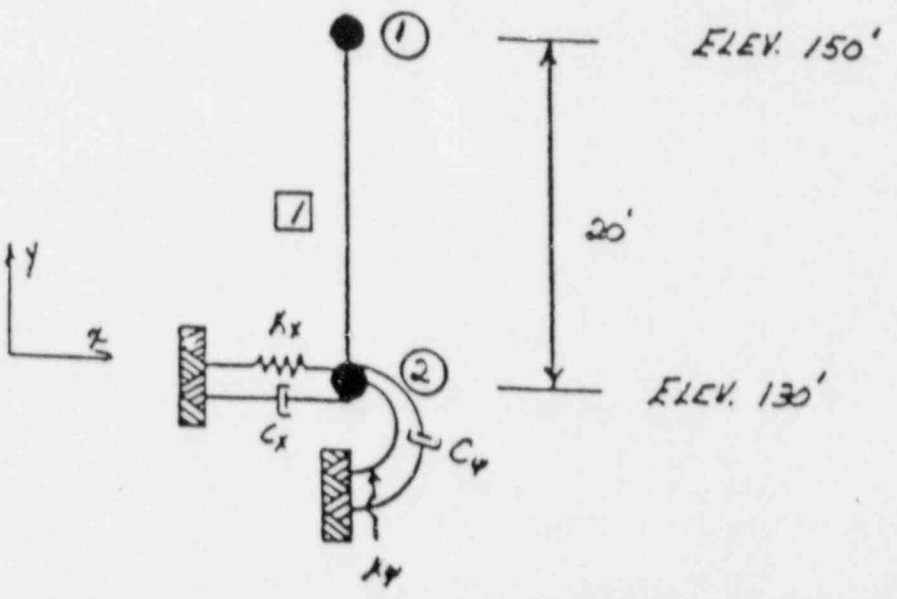
EQE

CONTROL BUILDING 3-D SEISMIC MODEL



DIESEL GENERATOR BUILDING

- Soil Profile
  - Soil Profile I
  - Soil property variations (0.8, 2.5)
- Soil/Foundation Model
  - Surfaced - founded
  - Foundation input motion equals free-field ground moti
  - Foundation impedances calculated with CLASSI
- Structure Model
  - N-S, E-W, and vertical models by GPC/SCS



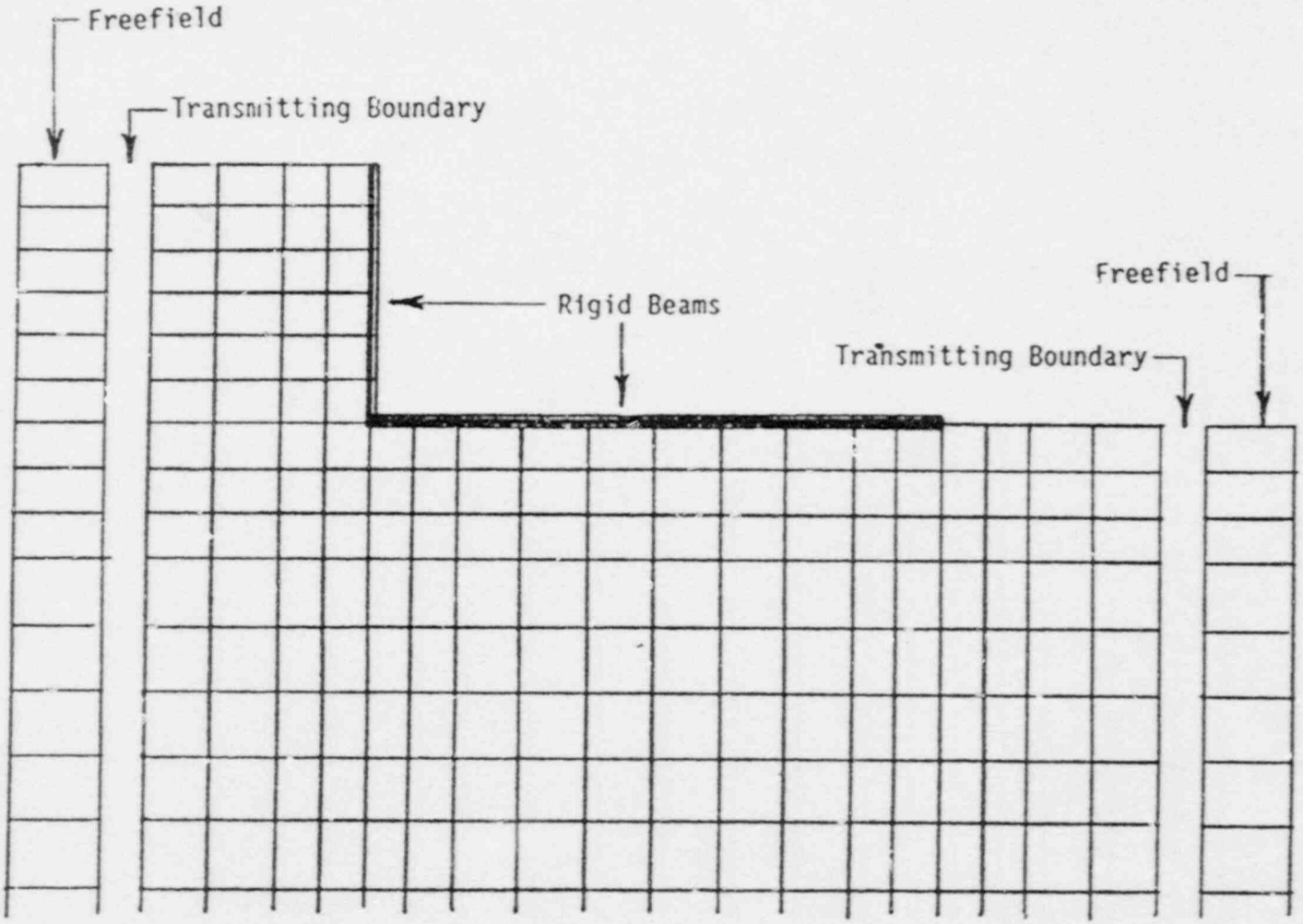
EQE

INTAKE STRUCTURE

- Soil Profile
  - Profile accounting for excavation and K - Krete
  - Soil property variations (0.75, 1.5)
- Soil/Foundation Model
  - Partially embedded
  - Foundation input motion calculated with SUPERFLUSH
  - Foundation impedances calculated with CLASSI and corrected for partial embedment
- Structure Model
  - Three-dimensional model by GPC/SCS

FSE

TYPICAL SUPERFLUSH FOUNDATION MODEL OF INTAKE STRUCTURE



ENCLOSURE 2

DESCRIPTION OF TOPICS TO BE RESOLVED THROUGH THE PLANT HATCH SEISMIC PROGRAM

ENCLOSURE 2

PLANT HATCH SEISMIC PROGRAM
PROPOSED RESOLUTIONS TO THE SEISMIC TOPICS

I. Generic Letter (GL) 87-02 for Plant Hatch Unit 1 (1)

Georgia Power Company (GPC) will be implementing portions of the Seismic Qualification Utility Group (SQUG) Generic Implementation Procedures that are similar to Electric Power Research Institute (EPRI) Seismic Margin Assessment (SMA) program with the Plant Hatch Seismic Program activities for Plant Hatch Unit 1. These combined activities will meet the appropriate requirements of both programs. These combined activities include the following:

a) Selection of the Seismic Review Team.
b) Selection of the safe shutdown paths and the development of the Safe Shutdown Equipment List.
c) Preparation for walkdown.
d) Screening verification and walkdown of equipment.
e) Resolution of outliers.

At the completion of the Plant Hatch Unit 1 SMA, which includes the above mentioned combined activities, the seismic verification of the safe shutdown equipment for GL 87-02 will be complete except for the relay evaluation. The relay evaluation for GL 87-02 will be completed to the extent possible pending the resolution of outstanding generic relay issues and completion of the relay generic equipment ruggedness spectra.

Upon completion of the Plant Hatch Unit 1 seismic program, GPC will evaluate the results to determine if any are directly applicable to Plant Hatch Unit 2. If it is determined to be appropriate, GPC will use the results from Unit 1 to address applicable portions of the Plant Hatch, Unit 2 GL 87-02 program.

II. Floor Response Spectra - Peak Broadening (2)

A discrepancy in the Plant Hatch Final Safety Analysis Report (FSAR) commitments for peak broadening of the seismic floor response spectra curves was identified in December, 1983. A 10 CFR Part 21 evaluation was completed in 1984 in which new Floor Response Spectra (FRS) were generated. The regeneration of the FRS reflected improvements to the original seismic models and removal of excessive conservatism beyond the FSAR commitments. The new spectra were broadened to the intended $\pm$ 10%.

The differences between the original and new FRS were compared and the effects of the major exceedances were evaluated. The conclusion was that no reportable condition per 10 CFR Part 21

existed. The NRC was presented the results of the safety evaluation in November, 1984. In 1986 these new FRS were made the formal FRS for Plant Hatch for future qualification of subsystems.

The NRC sent a set of questions to GPC in April, 1985 concerning the evaluation, GPC responded to these questions in May, 1985. The NRC contracted with EQE in the Fall of 1986 to review the seismic design of Plant Hatch and in particular the 1984 10 CFR Part 21 evaluation. EQE completed the evaluation in November, 1987. The NRC has not transmitted any additional questions. Verbally, the NRC has indicated that they are awaiting the results of the Plant Hatch Seismic Program. The NRC, however, did state that the results of the EQE analysis are acceptable as a short term resolution.

It is expected that the results of the Plant Hatch Seismic Program will show a significant margin over the seismic design bases for the plant. Based on the Plant Hatch Seismic Program results for Unit 1 and the 10 CFR Part 21 evaluation performed in 1984 for both Unit 1 and Unit 2, it is expected that the NRC will issue a Safety Evaluation Report (SER) that accepts the resolution of the Plant Hatch floor response spectra peak broadening topic for both units. This SER would address the acceptability of the newly generated (1984) FRS as the formal FRS.

III. Soil Dynamic Properties (2)

The NRC contracted with EQE in the fall of 1986 to review the seismic design of Plant Hatch. As part of this review the soil profiles used in the soil-structure interaction (SSI) analysis were evaluated. The shear wave velocity used in the original analysis of Plant Hatch was based on a refraction survey of the general site area. The results of this testing was an average composite shear wave velocity of 2450 ft/sec, which is representative of relatively stiff soil. EQE reviewed soil boring data which provided standard penetration test results (blow counts) and soil type information. This information indicated a softer profile. EQE, therefore, independently developed a new soil profile using the boring data.

GPC has contracted with Woodward-Clyde Consultants (WCC) to be the soils consultant for the Plant Hatch Seismic Program for Unit 1. One of WCC's tasks is to review the existing soil information and develop soil profiles for the SSI analysis with appropriate variation to account for uncertainty.

PLANT HATCH SEISMIC PROGRAM
PROPOSED RESOLUTIONS TO THE SEISMIC TOPICS

It is anticipated that the NRC will agree that the current soil modeling methodology is correct and adequately conservative. Additionally, it is expected that the Plant Hatch Seismic Program results will show significant margin over the seismic design bases for Plant Hatch utilizing the new models. Therefore, it is expected that the NRC's SER on the Plant Hatch Seismic Program will state that the soil dynamic properties topic has been adequately resolved.

IV. Cable Tray Support Load Accountability

As part of the 1984 Part 21 evaluation concerning floor response spectra peak broadening a review was made of the seismic design commitments in the Plant Hatch Unit 1 and Unit 2 FSAR's. It was discovered that actual loads, in some cases, exceeded the design loads of the cable tray supports. A walkdown was performed of all Plant Hatch safety related cable tray supports. In a meeting with the NRC in June, 1986 it was reported that Plant Hatch cable tray supports are operable. Based on the GPC walkdown, operability evaluation and SQUG's documentation of earthquake experience data that shows the seismic ruggedness of cable tray supports, the NRC agreed with GPC to defer final resolution pending acceptance of the SQUG cable tray support evaluation procedures. GPC plans to resolve this topic as part of the Plant Hatch Seismic Program which will use, where judged appropriate, the approved SQUG cable tray support evaluation procedures. It is anticipated that the NRC SER will indicate this topic is closed.

V. PVRC Damping (2)

As part of the 1984 10 CFR Part 21 evaluation of the floor response spectra peak broadening, new FRS at PVRC damping (Code Case N-411) were compared to the original one percent damped FRS used to design piping for the Design Bases Earthquake (DBE). The result of this comparison was that no significant exceedances existed and thus the new FRS were judged not to affect safety in regards to piping.

In order to demonstrate compliance with the FSAR, GPC performed a 10 CFR 50.59 evaluation which justified the use of the PVRC damping. This evaluation was sent to the NRC on January 16, 1985 (NED-85-031). The NRC issued a list of questions to GPC on April 2, 1985. Enclosure 3 of that list addressed use of PVRC damping as stated in Code Case N-411.

PLANT HATCH SEISMIC PROGRAM
PROPOSED RESOLUTIONS TO THE SEISMIC TOPICS

The NRC stated in Enclosure 3 that "the licensee's use of code case N-411 damping values in piping seismic analysis as an alternative to Reg. Guide 1.61 damping values is acceptable to the staff." The NRC further stated that the licensee should evaluate increased piping displacements if piping supports were removed and that the use of Code Case N-411 damping was not appropriate with a time history analysis. The GPC response indicated the intent to meet those conditions and to use Code Case N-411 only on new or replacement piping systems and load reconciliation work. Based on this NRC position, the Hatch FSAR was revised to allow the use of the alternative damping values.

Later, the NRC revised their position through Regulatory Guide 1.84, to restrict the use of the alternative damping values only to: 1) analyses using NRC currently accepted seismic spectra and procedures, 2) piping systems not using supports designed to dissipate energy by yielding and 3) piping systems not having stress corrosion cracking. Therefore, based on the NRC revised position, Plant Hatch discontinued the use of the PVRC damping values.

GPC plans to evaluate the results of the Plant Hatch Seismic Program to determine the margin of the Seismic Margin Earthquake Floor Response Spectra at PVRC damping as compared to that of the original FRS. GPC may increase their walkdown of piping systems to better support this evaluation. These efforts are expected to show that the use of the original FRS at PVRC damping meets the intent of the NRC limitation that states the piping analysis must be based on the NRC current accepted seismic spectra and procedures. Based on a successful evaluation, the SER on the Plant Hatch Seismic program would then allow the use of PVRC damping.

VI. Reactor Building Roof Structure

Modeling discrepancies have been identified in the roof structure portion of the Plant Hatch Unit 1 and Unit 2 reactor building seismic models. These models have been revised and the seismic loads recalculated. The roof structure seismic forces are greater than indicated by the original analysis. The results of an operability evaluation show no detrimental affect on plant safety.

PLANT HATCH SEISMIC PROGRAM
PROPOSED RESOLUTIONS TO THE SEISMIC TOPICS

GPC plans to determine the high confidence of a low probability of failure (HCLPF) of the Unit 1 reactor building roof structure as part of the Plant Hatch Seismic Program for Unit 1. No modifications will be done if a sufficiently high HCLPF is determined for the roof structure.

The Unit 2 roof structure is similar to Unit 1, and the increases in seismic forces for Unit 2 are less than the maximum increase for Unit 1; therefore, the results of the Plant Hatch Seismic Program will be used to address the need for any Unit 2 roof structure modification.

If a sufficiently high HCLPF value results as expected, the SER concerning the Plant Hatch Seismic Program should state that the existing roof structures have sufficient seismic capacity.

VII. Eastern Seismicity (2)

GPC plans to use the Plant Hatch Seismic Program with the estimation of the seismic hazard of the Plant Hatch site now being developed as part of the Eastern Seismicity program to resolve appropriate concerns about seismic design basis for Plant Hatch due to the Eastern Seismicity issue.

VIII. External Events - Seismic (2)

GPC plans to use the SMA of Plant Hatch Seismic Program for Unit 1 where appropriate to address the seismic portion of the external events program now under development by the NRC.

IX. USI A-40 (Seismic Design of Tanks Only)(2)

GPC plans to address the design of above ground tanks and their anchorage using Appendix H of the EPRI technical report No. 1551.05 as part of the Plant Hatch Seismic Program for Unit 1. In addition for Plant Hatch Units 1 and 2, GPC will use, where appropriate, the procedures being developed for SQUG on the design of above ground tanks, and anchorage of tanks and heat exchangers.

PLANT HATCH SEISMIC PROGRAM
PROPOSED RESOLUTIONS TO THE SEISMIC TOPICS

X. USI A-17 (Seismic System Interaction Only)

Spatial seismic system interaction will be addressed for Plant Hatch Unit 1 as part of the Plant Hatch Seismic Program. Response to GL 87-02 for Plant Hatch Unit 2 will address seismic system interaction for that Unit, if required.

Notes: 1) Resolution addresses Plant Hatch Unit 1 and partially addresses Plant Hatch Unit 2.

2) Resolution addresses both Plant Hatch Unit 1 and 2. Plant Hatch Unit 1 and Unit 2 are mirror image units and as such are very similar. The Control building, Diesel Generator Building, and the River Intake Structure are shared structures. Equipment, subsystems, and piping are in most cases very similar. There are differences in the seismic design basis for each unit but comparisons of the floor response spectra show that they too are very similar. Based on the fact that both units are similar and Plant Hatch Unit 1 is the older unit, the margin determined from the Plant Hatch Seismic Program for Unit 1 is judged to be a reasonable lower bound for Plant Hatch Unit 2.