May 13 1988

Docket No.: 50-321

LICENSEE: Georgia Power Company

FACILITIES: Hatch Unit 1

SUBJECT: SUMMARY OF MEETING HELD MAY 10 1988, TO DISCUSS HATCH 1 SEISMIC MARGIN ANALYSIS

On May 10, 1988, the NRC staff met with representatives of the Georgia Power Company at Rockville, Maryland to discuss the seismic margin analysis for Hatch 1. Attendees are listed in Enclosure 1. Enclosure 2 is a copy of the view-graphs used by D. Crowe, GPC and J. Branum, GPC. Enclosure 3 is a copy of the view-graphs used by I. Idriss, Woodward-Clyde Consultants. Enclosure 4 is a copy of the view-graphs used by J. Johnson, EQE, Inc.

GPC indicated that soil structure interaction is the critical path item on the schedule. The proposed schedule is also subject to change due to the walkdown in containment during the Hatch 1 refueling outage. The NRC staff stressed that they needed to be kept informed regarding which sections of the seismic margin analysis would be used to respond to Generic Letter 87-02, "Verification of Seismic Adequancy of Mechanical and Electrical Equipment in Operating Reactors (USI A-46)."

/S/

Jon B. Hopkins, Project Manager
Project Directorate II-3
Division of Reactor Projects - I/II

Enclosures:
As stated

DISTRIBUTION

Docket File	NRC PDR
Local PDR	PDII-3 Reading
D. Matthews	M. Rood
L. Crocker	OGC-WF
E. Jordan	J. Partlow
J. Hopkins	D. Guzy
G. Bagchi	L. Reiter
N. Anderson	H. Ashar
D. Jeng	L. Phillips
C. Tan	J. Philips
N. Chokshi	A. Murphy
~~P. Davis~~	~~G. Castro~~
~~R. Whitman~~	HATCH PLANT FILE
ACRS (10)	

PDII-3
JHopkins
05/13/88

Enclosure 1

ATTENDEES
MAY 10, 1988
HATCH 1

NRC

J. Hopkins
D. Matthews
D. Guzy
G. Bagchi
L. Reiter
N. Anderson
H. Ashar
D. Jeng
L. Phillips
C. Tan
J. Chen
P. Chen
J. Philip
N. Chokshi
A. Murphy
P. Davis-Consultant, PRD
G. Castro-Consultant, GEI
R. Whitman-Consultant, MIT

GPC

D. Crowe
J. Branum
J. Heidt
K. Whitt
R. Kennedy-Consultant, Structual
Mechanics Consulting
I. Idriss-Consultant, Woodward-Clyde
J. Johnson-Consultant, EQE

Southern Company Services

D. Moore
K. Wooten

EPRI

R. Kassawara

Member of Public

A. Wyche - Serch/Bechtel

ENCLOSURE 2

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

0687N

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 IDRISS	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

0687N

EPRI/NRC
SEISMIC MARGIN ASSESSMENT

BACKGROUND

EPRI-NRC Seismic Margins Interactions

Methods

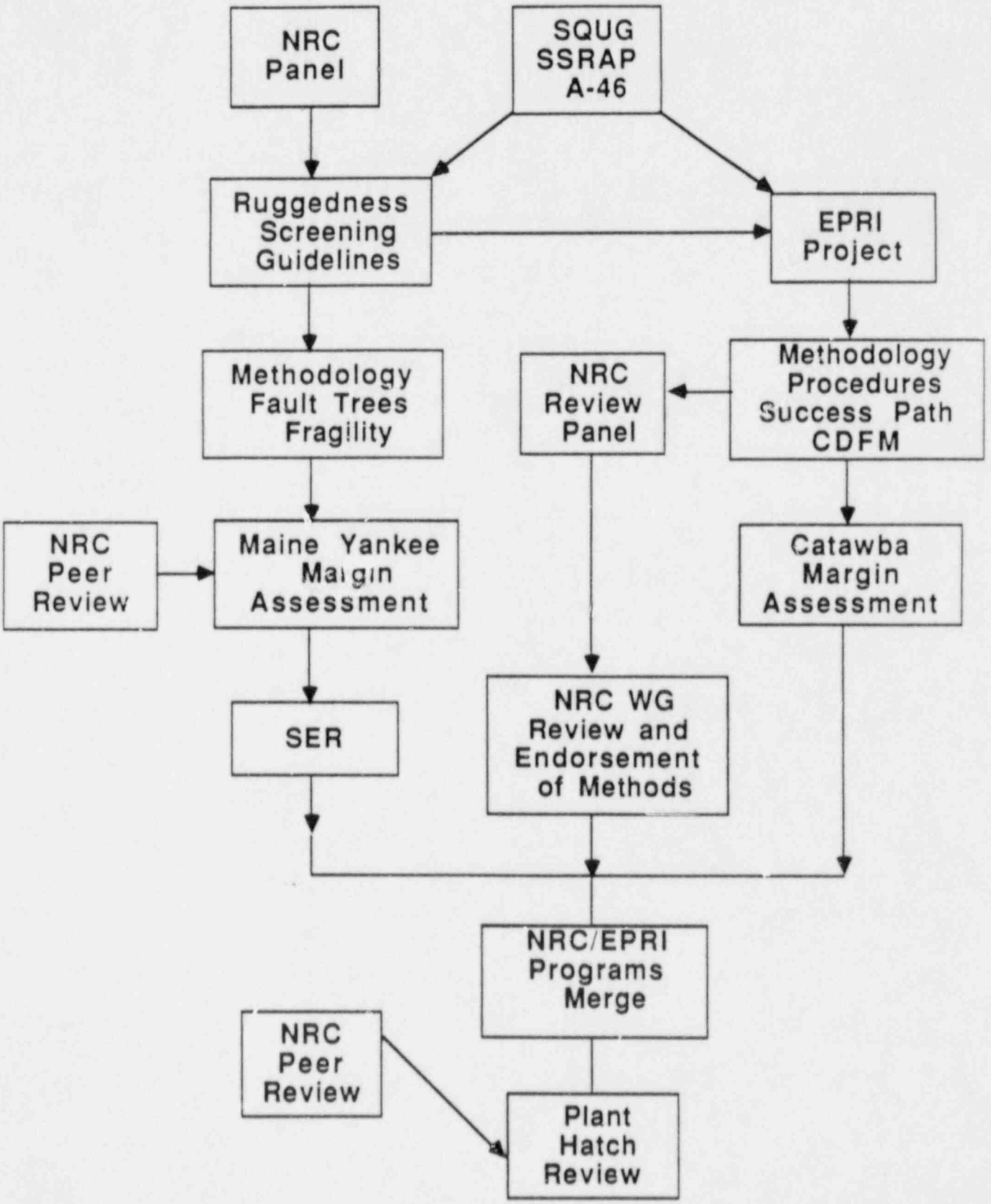
- NRC review of methods
  - Review Panel
  - Merging of different approaches
    - Success path vs. fault tree/cut sets
    - CDFM vs. fragility
  - Basic agreement on success path/CDFM
  - Plant vulnerabilities -- severe accident policy
- NRC Seismic Design Margins Working Group endorsement of methodology

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

TEAM #1

DON MOORE
KEITH WOOTEN
BOB KENNEDY *

SYSTEM ENGINEER

TEAM #2

PHILLIP GARRETT
BILL GOFORTH
BOB KENNEDY *

SRT MEMBERS

SYSTEM ENGINEER

SUPPORT PERSONNEL

PLANT OPERATIONS PERSONNEL

* 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

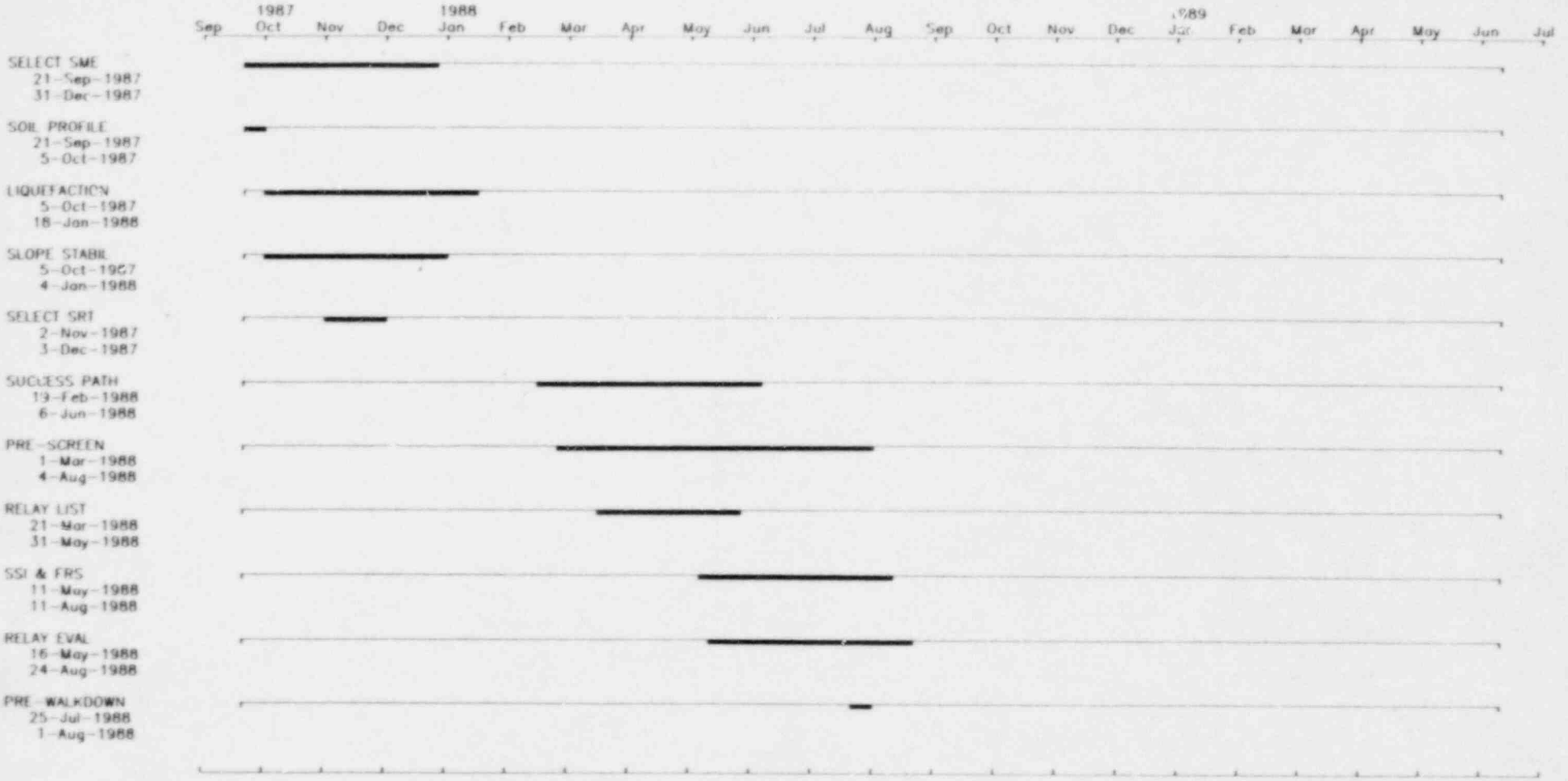
- SAMPLE OF ITEMS TO BE INCLUDED:
  - PLANT DESCRIPTION
  - ORIGINAL PLANT SEISMIC DESIGN BASIS
  - SELECTION OF SME
  - DEVELOPMENT OF FRS
  - WALKDOWN RESULTS
  - ASSESSMENT OF ELEMENTS NOT SCREENED OUT
  - EVALUATION OF RELAYS
  - SUMMARY AND CONCLUSIONS

EPRI/NRC
SEISMIC MARGIN ASSESSMENT

PROJECT SCHEDULE

PLANT HATCH SEISMIC MARGIN ASSESSMENT PROJECT

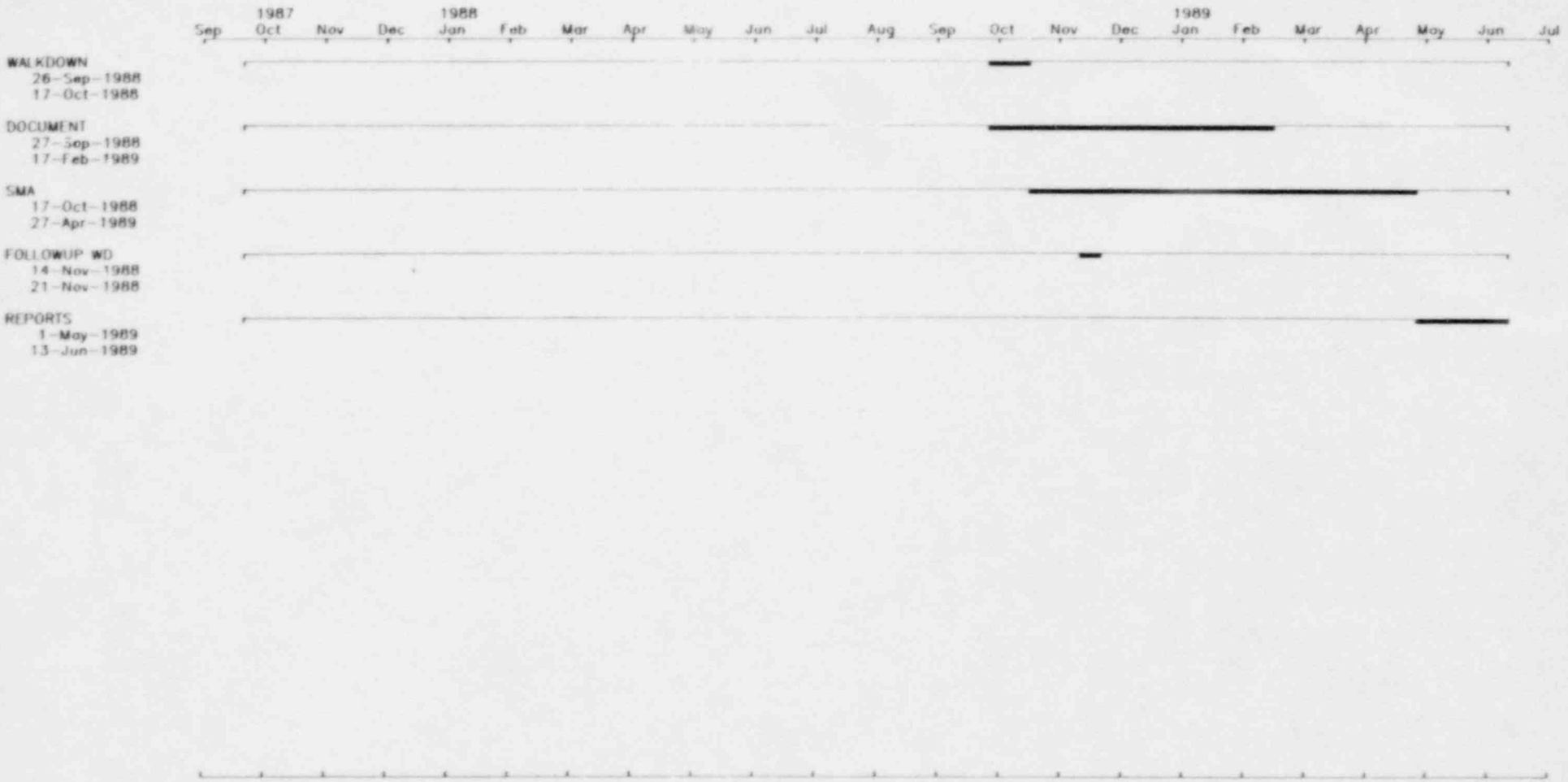
Gantt Chart Project: SMA5



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, 198[illegible]
- Walkdown	Oct [illegible]88
- 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

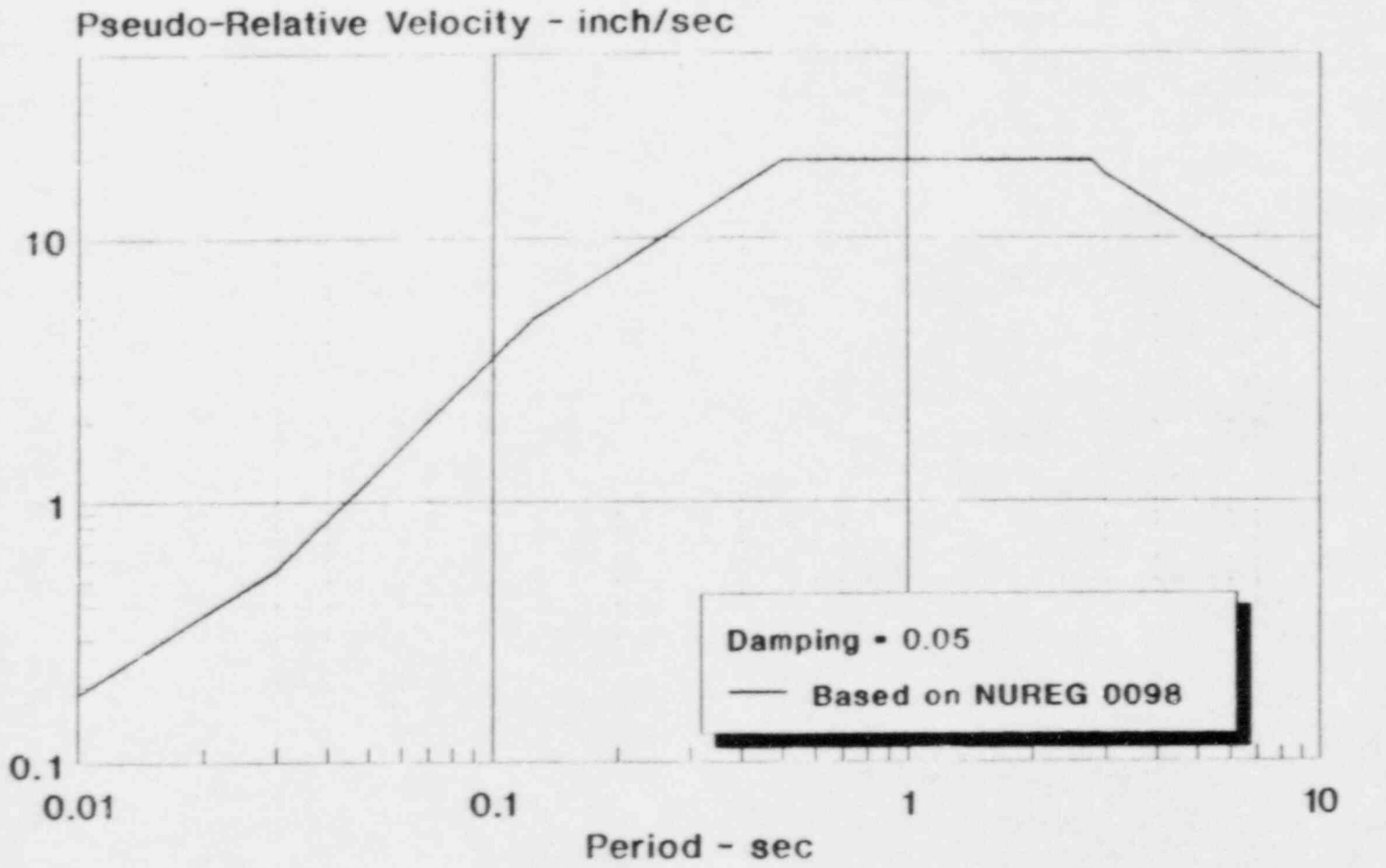
CHARACTERISTICS OF THE SELECTED SME :

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

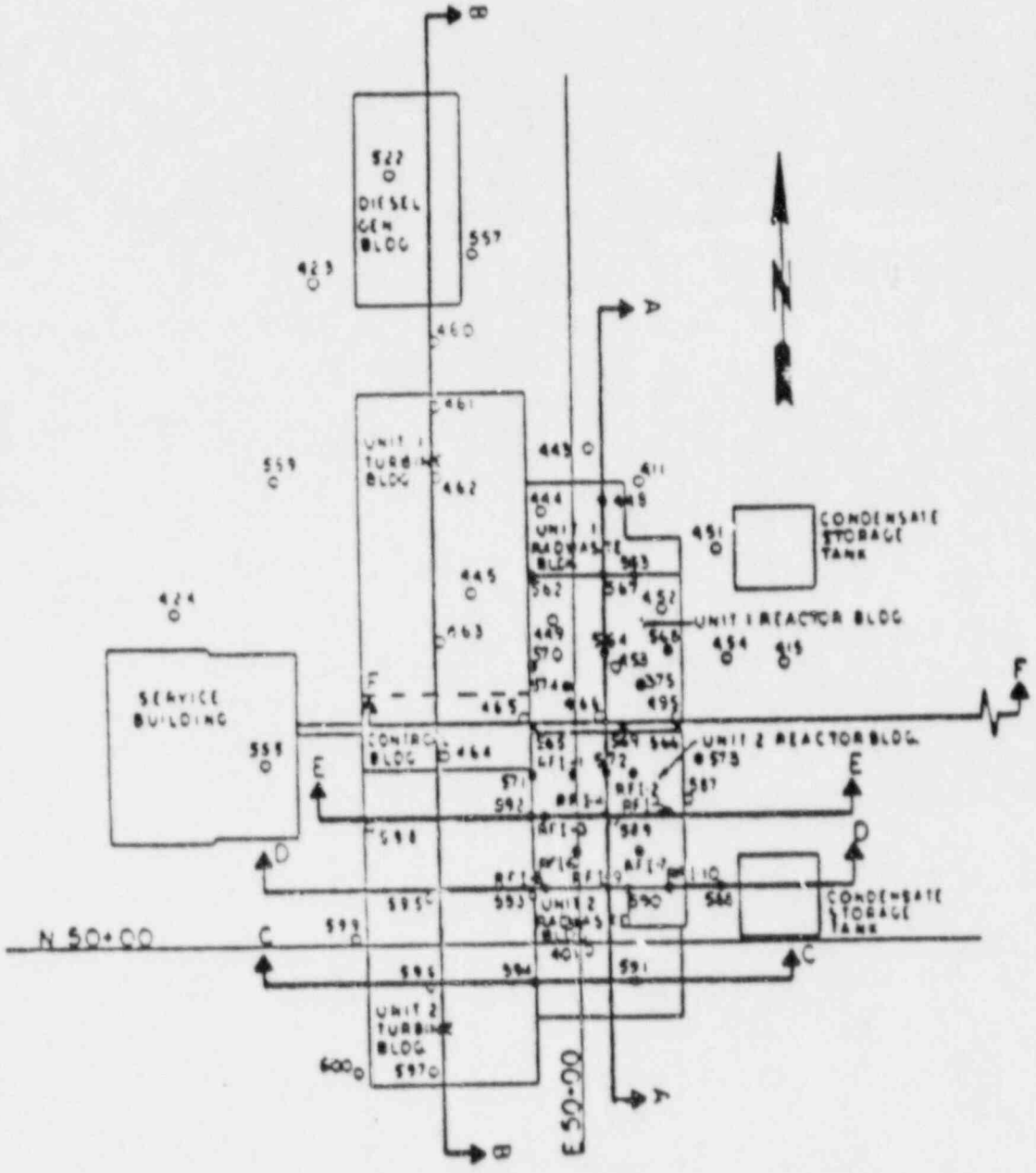
WCC - 05\10\88

HATCH NPP -- SMA

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



WCC - 05\10\88



LEGEND

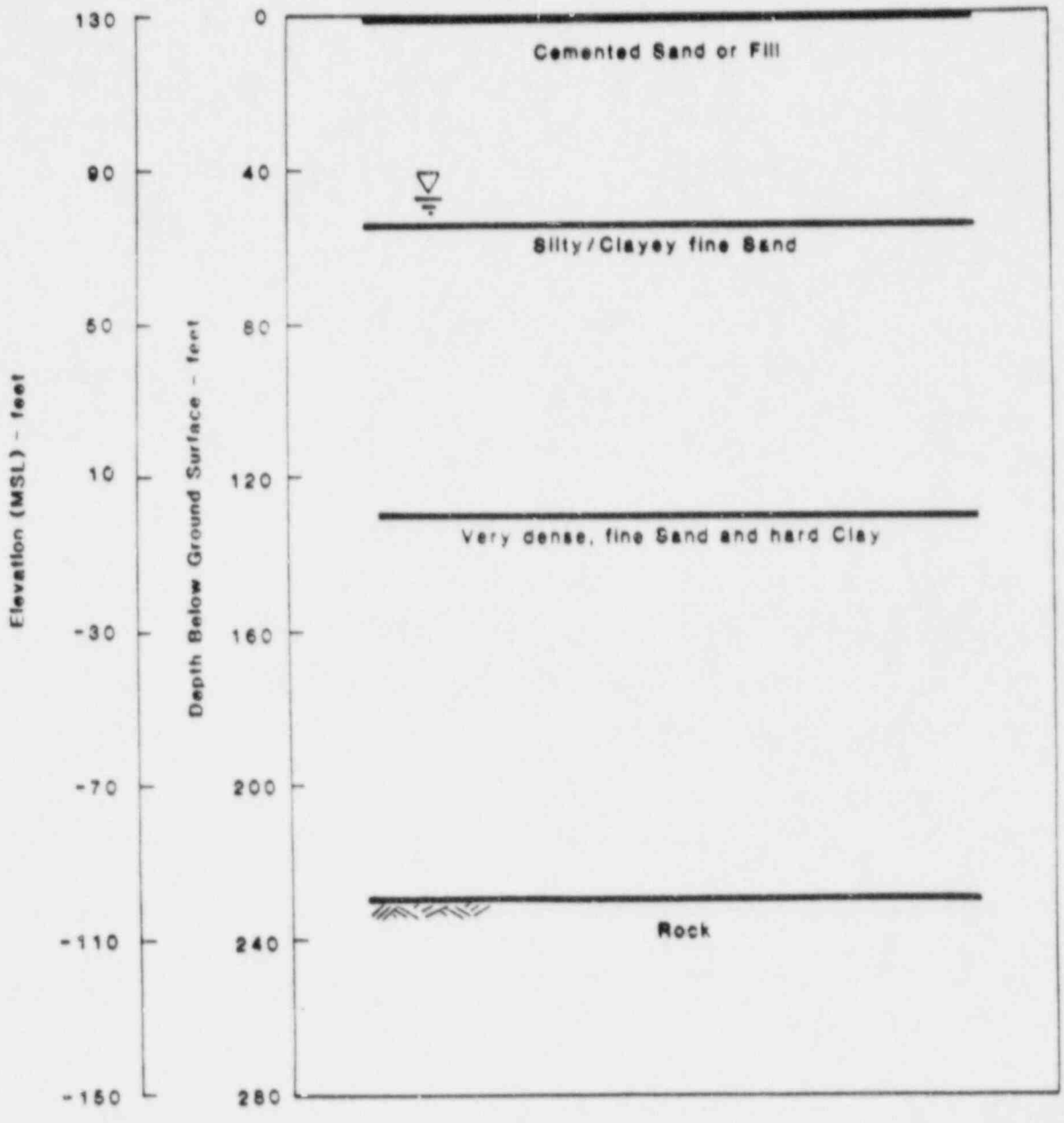
- ○ PRE CONSTRUCTION TEST BORING
- ● CONSTRUCTION INSPECTION BORING

SCALE

50 0 100 200

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

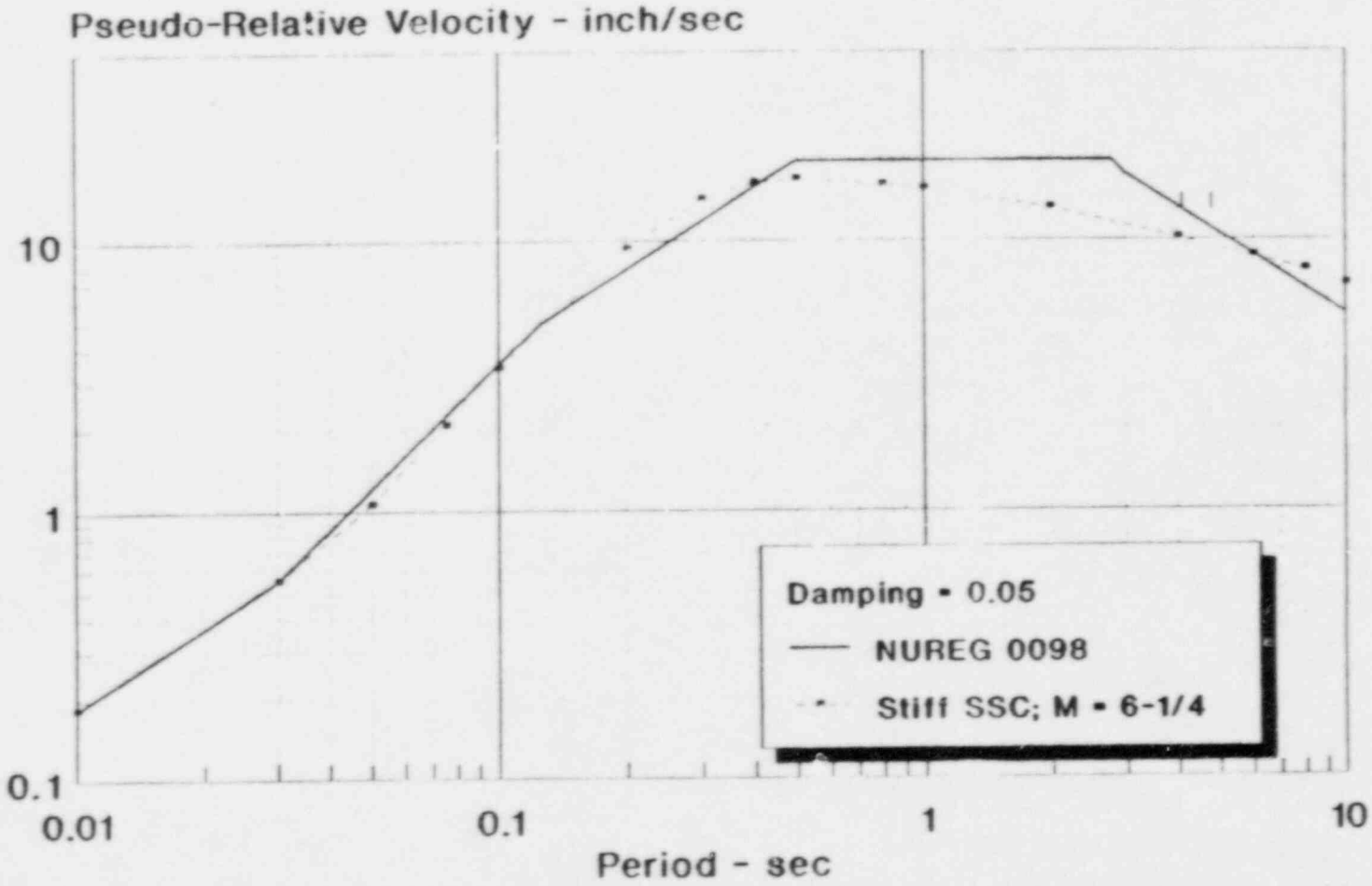
Project	HATCH NP	BORING LOCATIONS - PLANT AREA	FIG 1
Project No.	8743076A		



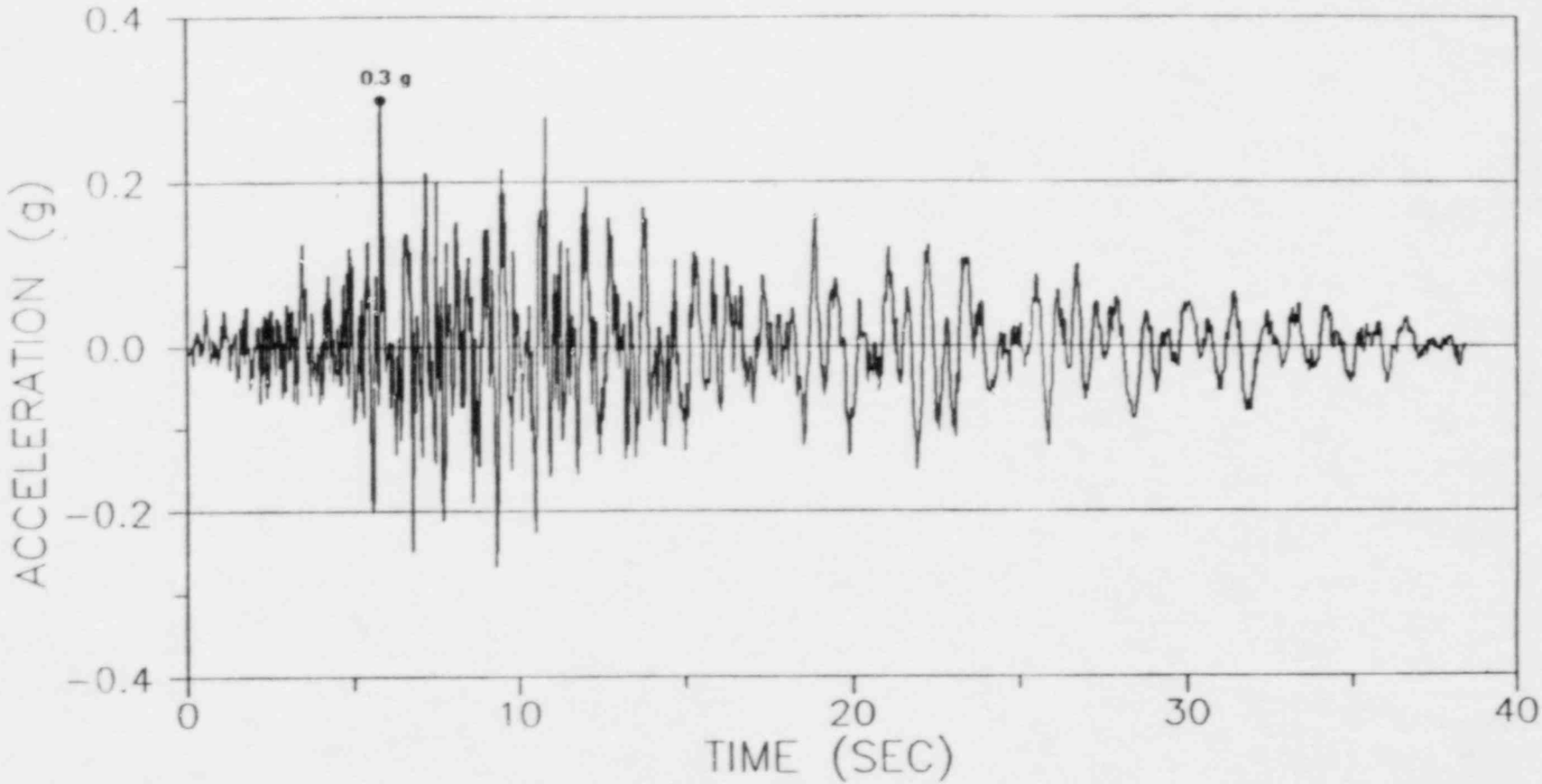
Project Project No	HATCH NP 8743076A	GENERALIZED SOIL PROFILE - PLANT AREA	Fig 2

HATCH NPP -- SMA

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



WCC - 05\10\88

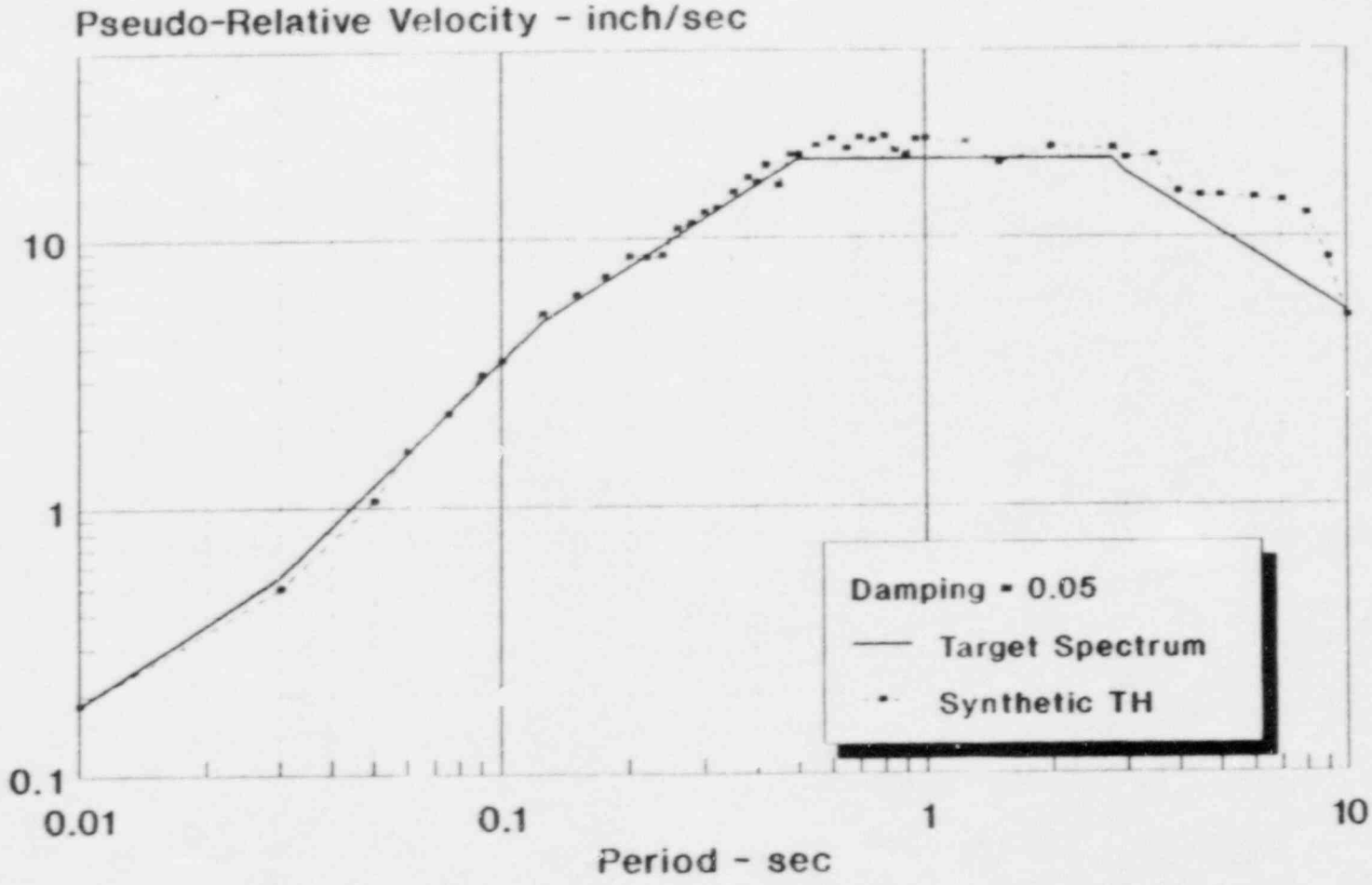


Project	HATCH NP	SYNTHENIC ACCELEROGRAM FOR SELECTED SME	Fig 9
Project No	6743076A		

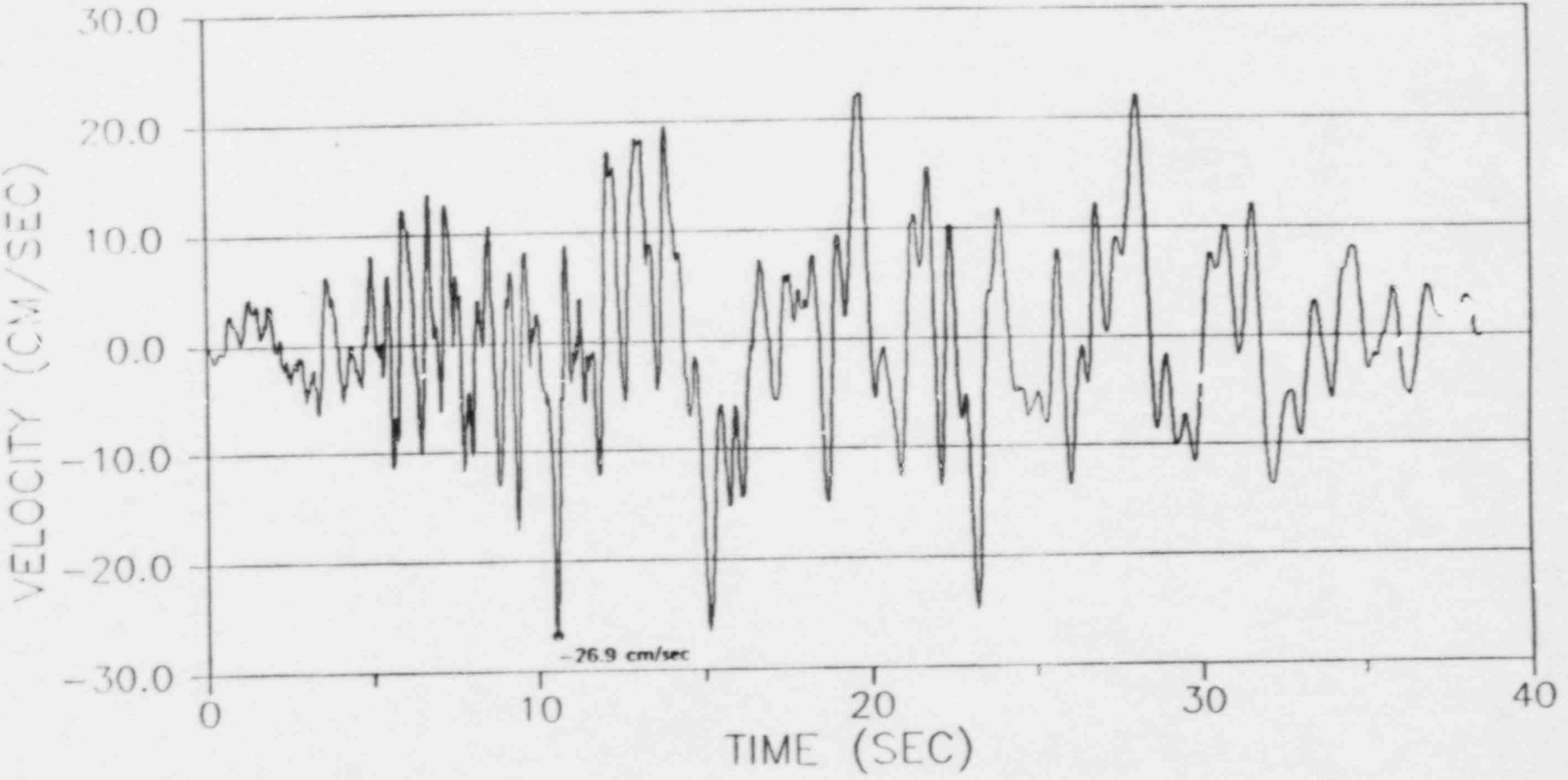
WOODWARD - CLYDE CONSULTANTS

HATCH NPP -- SMA

Spectral Ordinates for Target Ground Motion & for Synthetic Time History

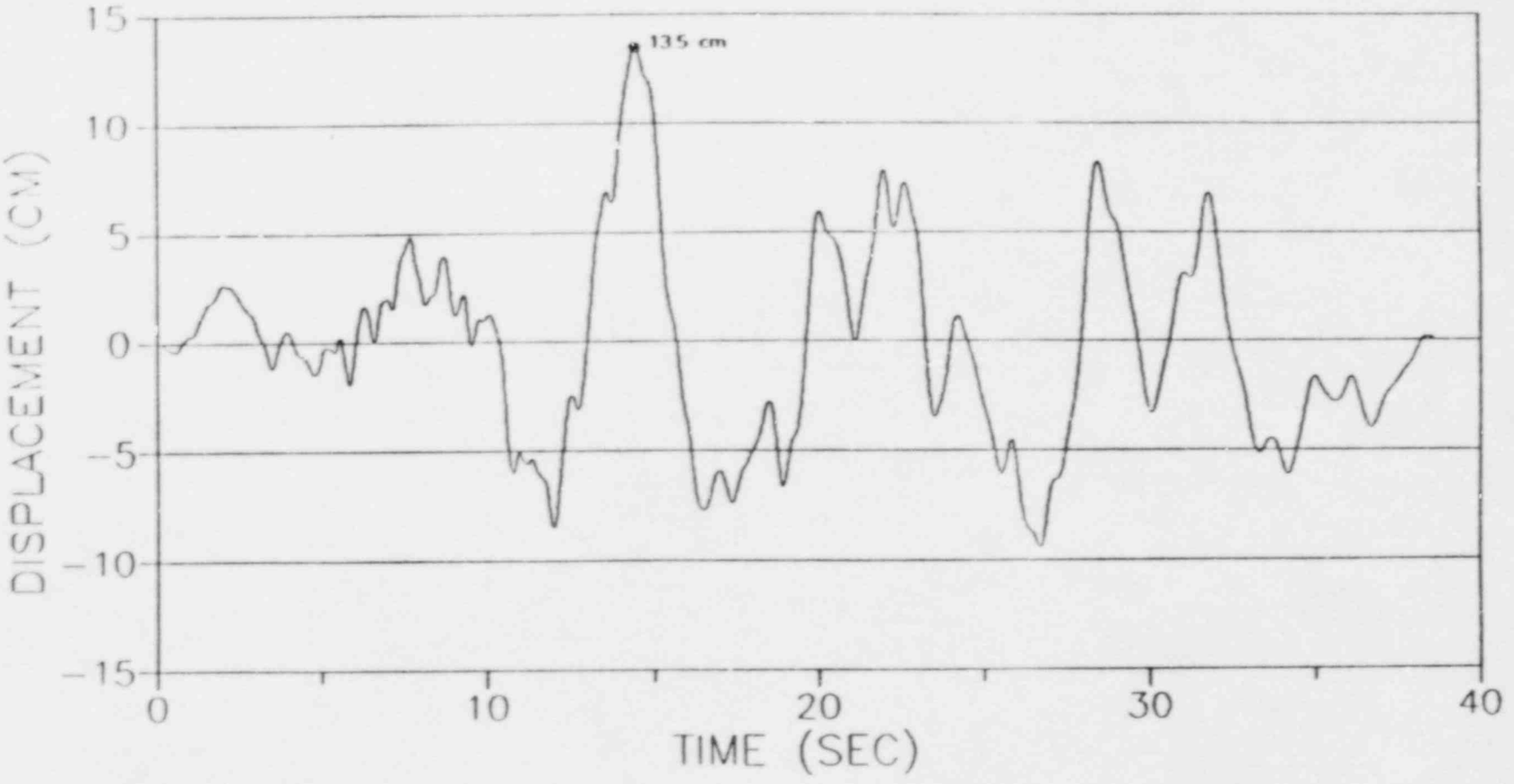


WCC - 05\10\88



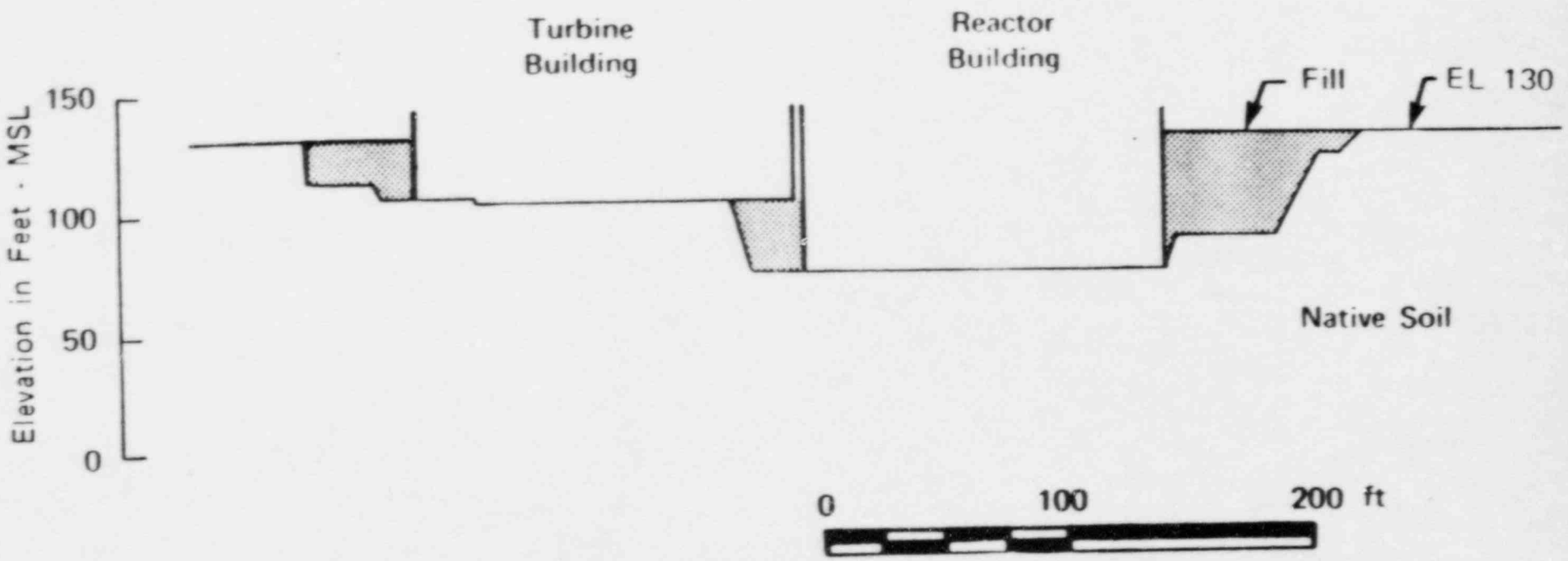
Project	HATCH NP	CALCULATED VELOCITY FOR SYNTHETIC ACCELEROGRAM	Fig 11
Project No	8743076A		

WOODWARD - CLYDE CONSULTANTS



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

WOODWARD-CLYDE CONSULTANTS



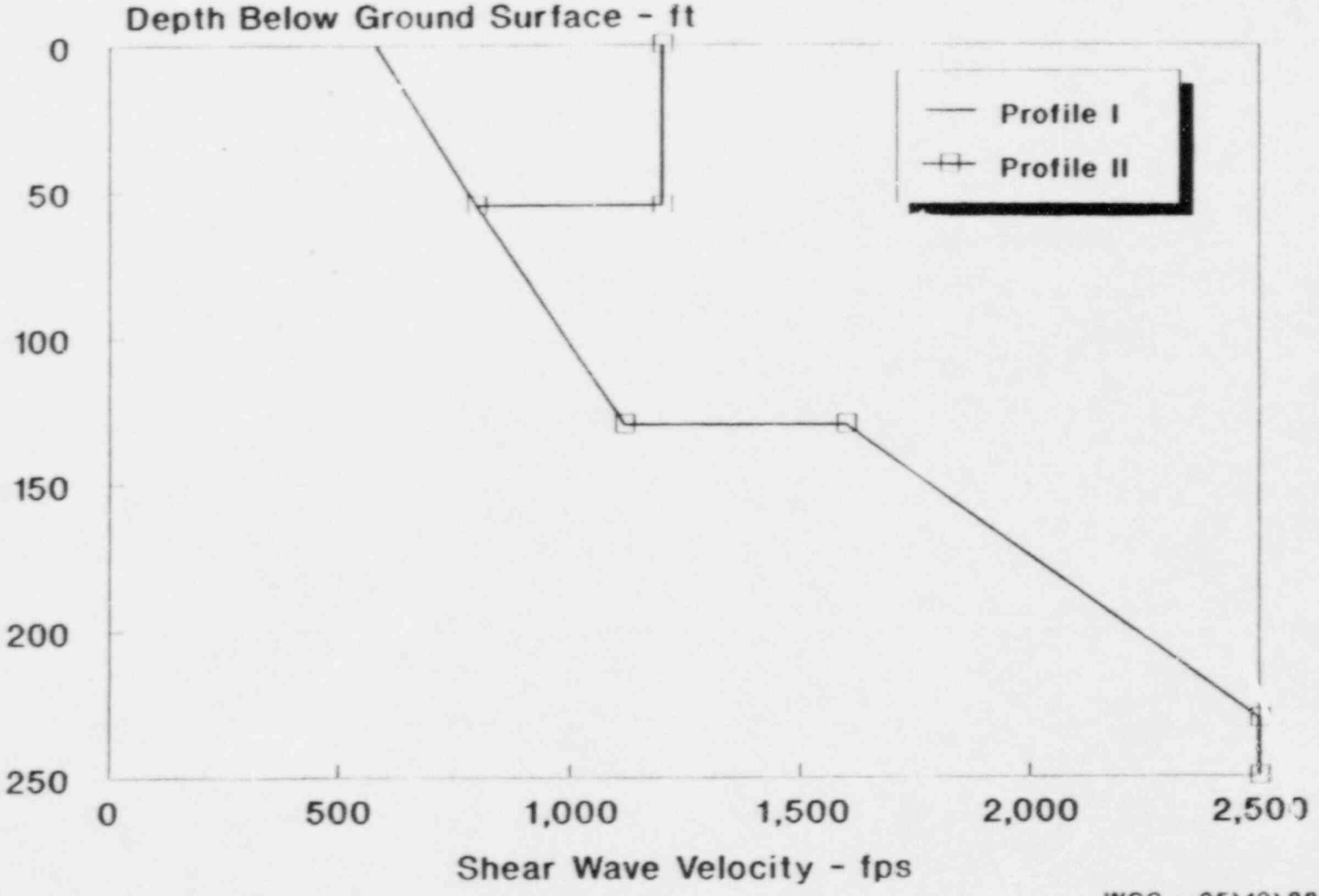
Section corresponds approximately with section E - E' shown in Fig. 1.
Information regarding extent of fill from Hatch Nuclear Plant 2 FSAR 2 Figure 2A-3.

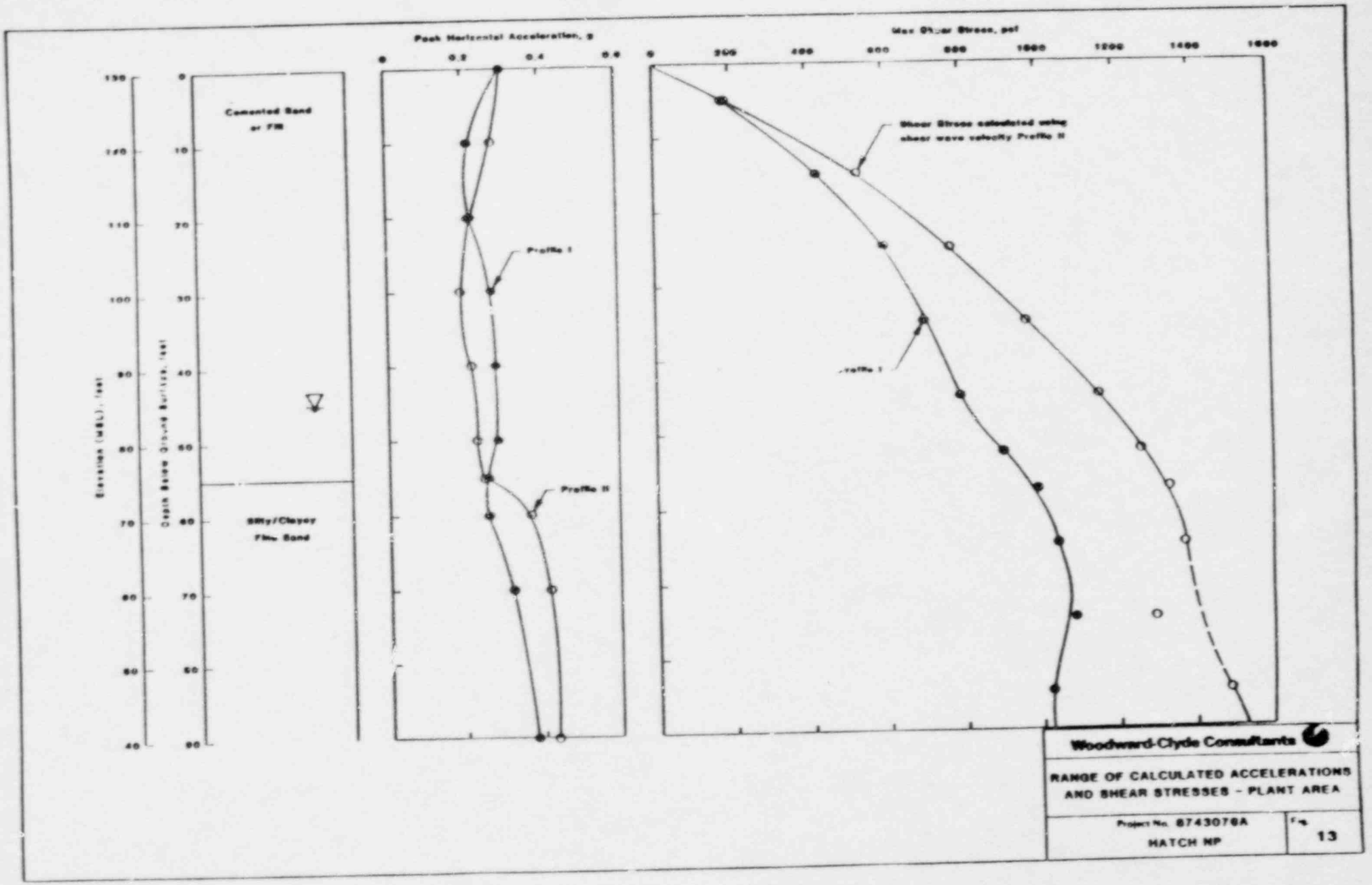
Project:	HATCH NP	APPROXIMATE EXTENT OF FILL IN PLANT AREA	Fig. 3
Project No.	8743076A		

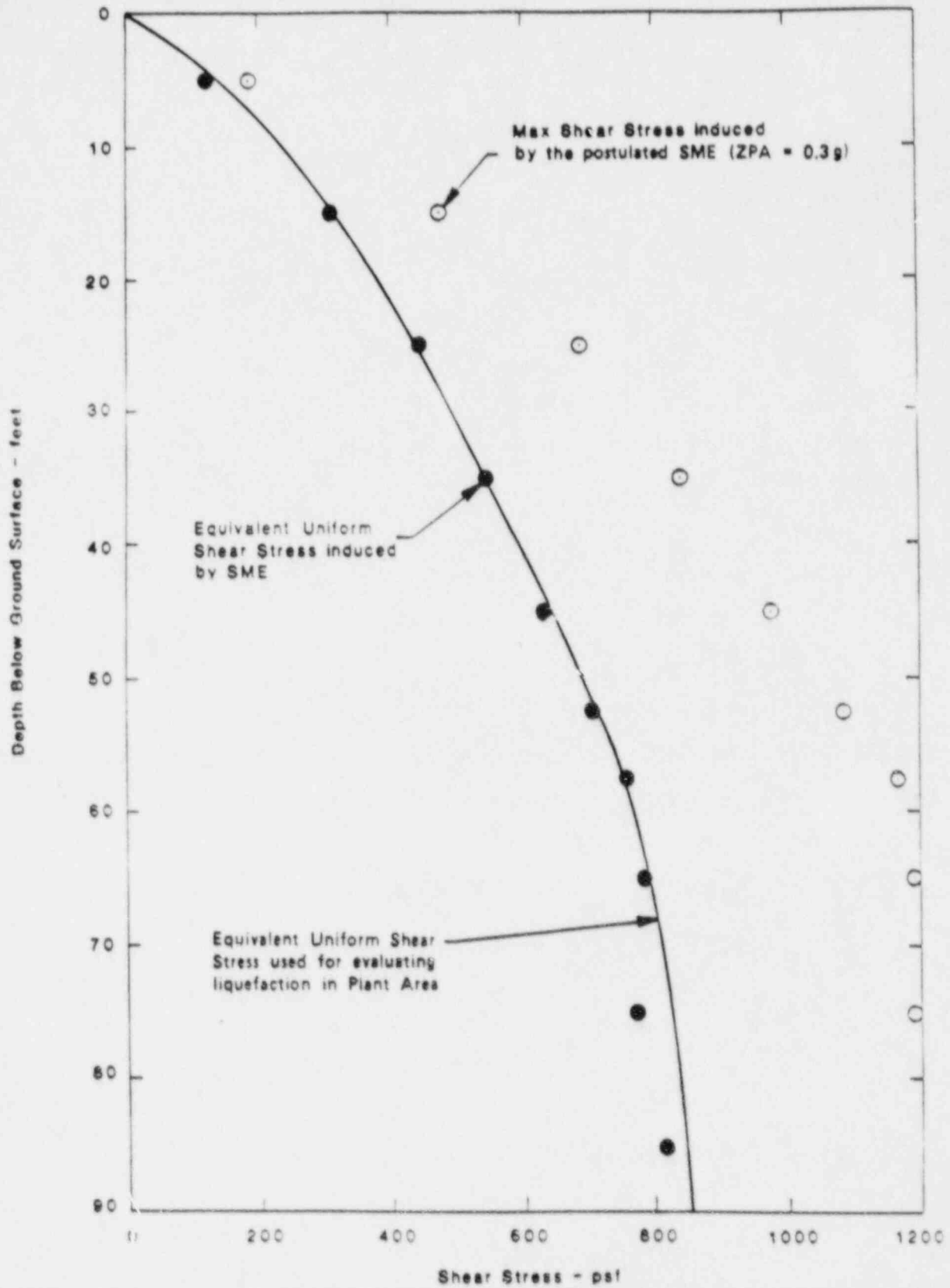
WOODWARD-CLYDE CONSULTANTS

Low Strain Shear Wave Velocity Profiles

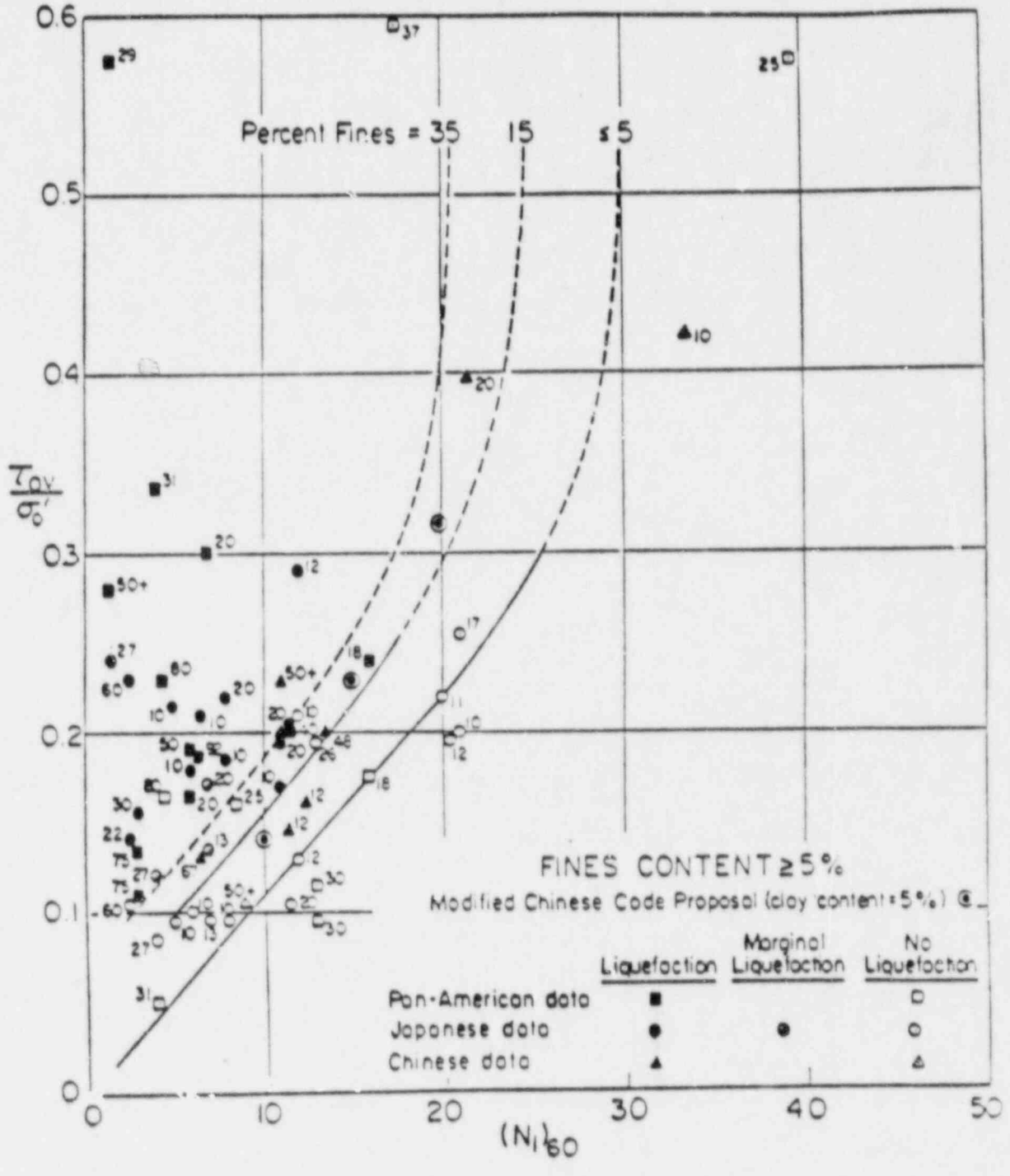
Plant Area -- HATCH NPP




Peak Horizontal Acceleration, g
Max Shear Stress, psf
Cemented Sand or Fill
Silty/Clayey Fine Sand
Profile I
Profile II
Shear Stress calculated using shear wave velocity Profile II
Profile I
Woodward-Clyde Consultants
RANGE OF CALCULATED ACCELERATIONS AND SHEAR STRESSES - PLANT AREA
Project No. 8743078A
HATCH NP
Fig. 13

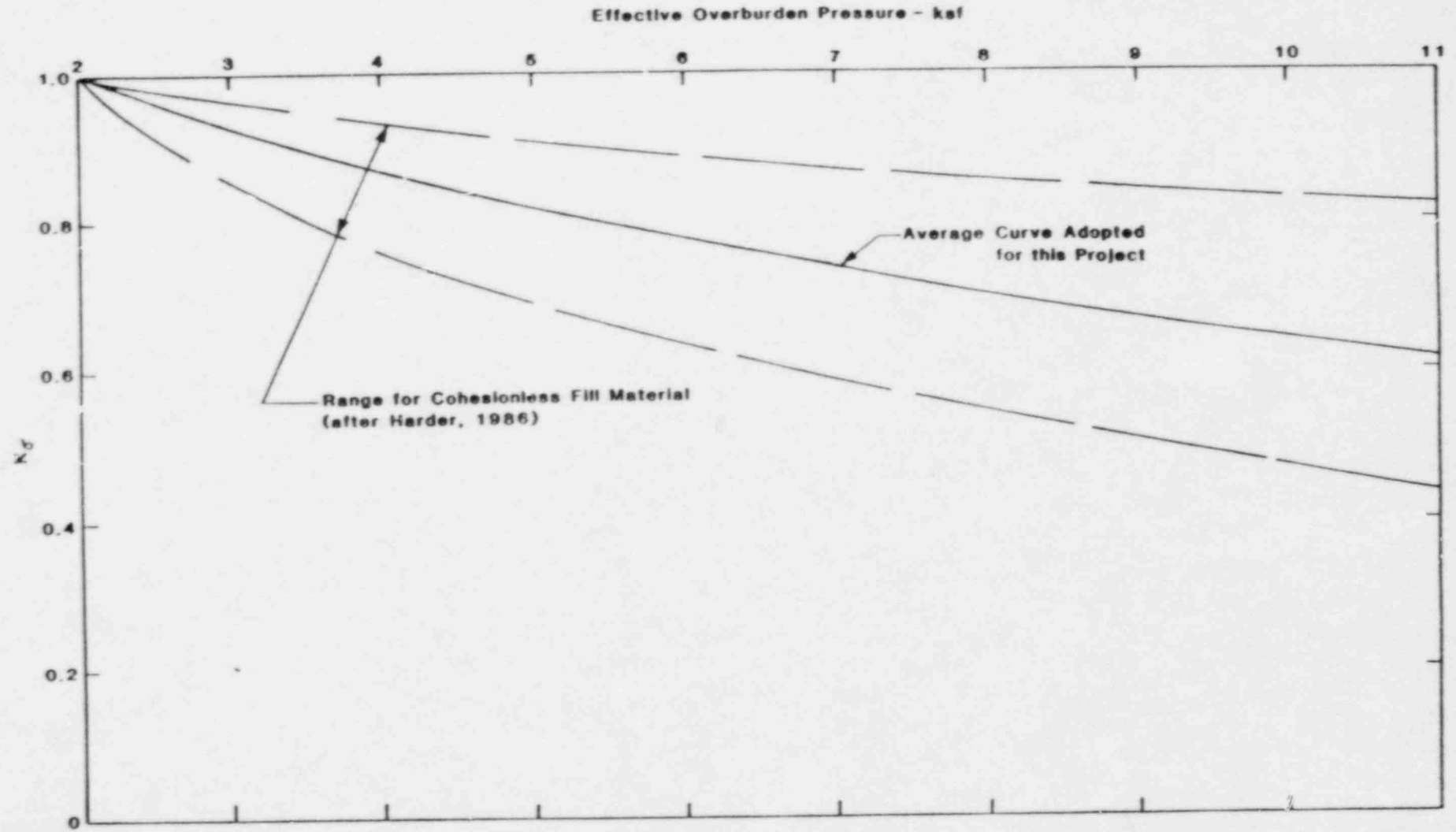


Project	HATCH NP	MAX AND EQUIVALENT UNIFORM STRESSES USED IN LIQUEFACTION EVALUATION- PLANT AREA	Fig. 14
Project No.	8743076A		



From Seed et al (1984)

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

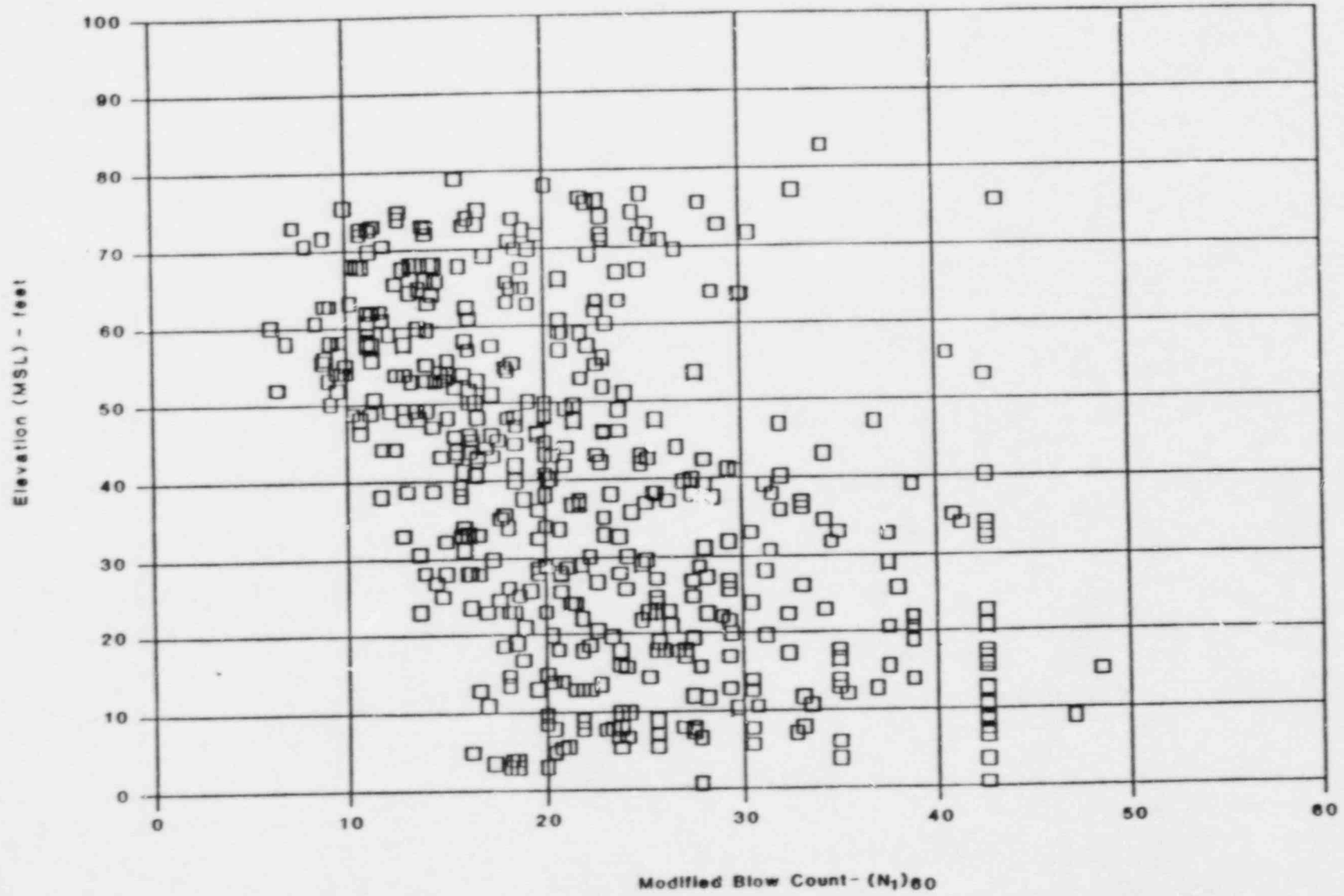


Project	HATCH NP	EFFECTS OF INITIAL CONFINING PRESSURE ON CYCLIC STRESS RATIO	Fig 17
Project No	8743076A		

WOODWARD - CLYDE CONSULTANTS

PLANT AREA

Pre Construction Borings



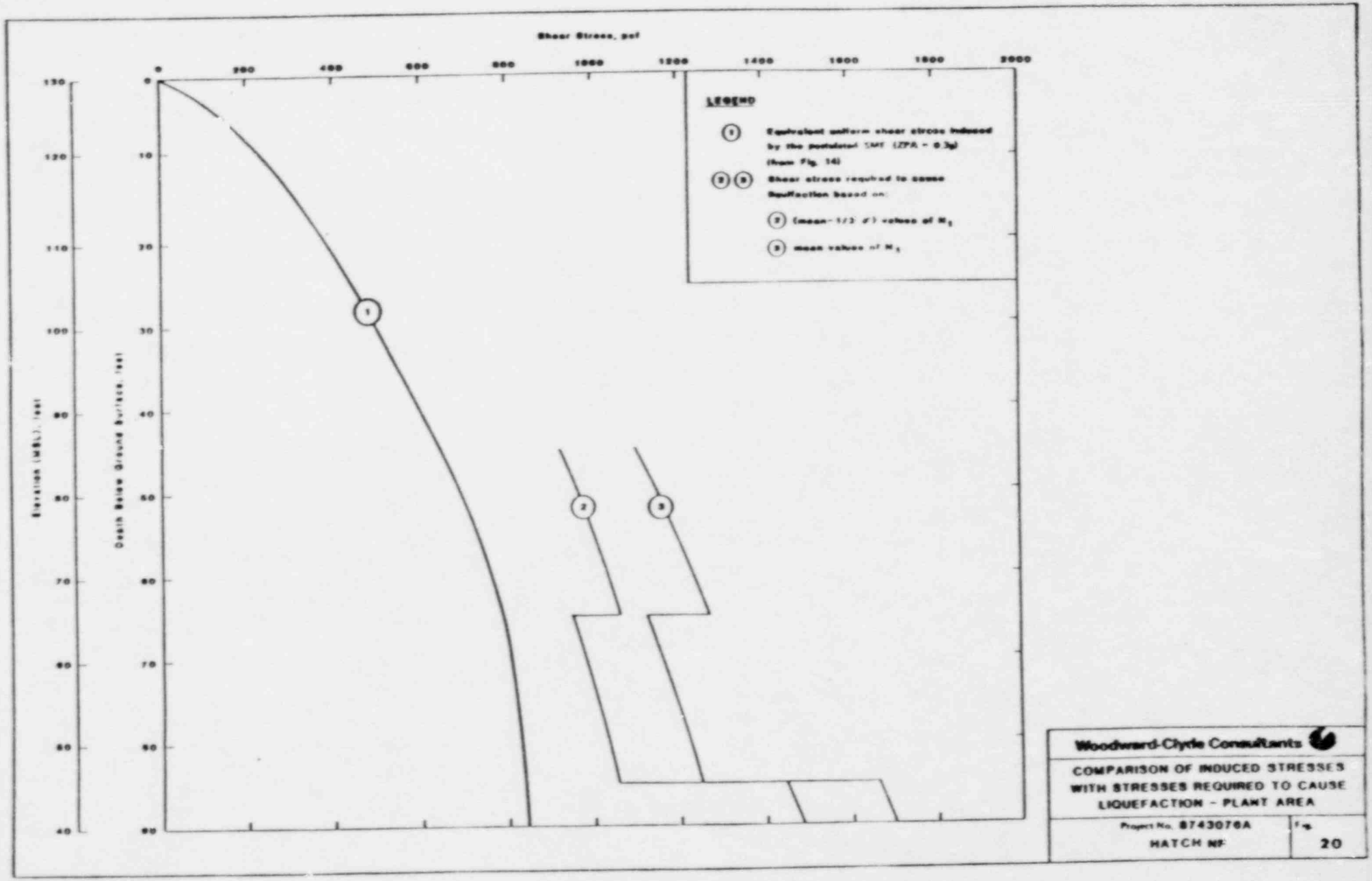
Project	HATCH NP	SUMMARY OF SPT BLOW COUNT - PLANT AREA	Fig 19
Project No	8743076A		

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

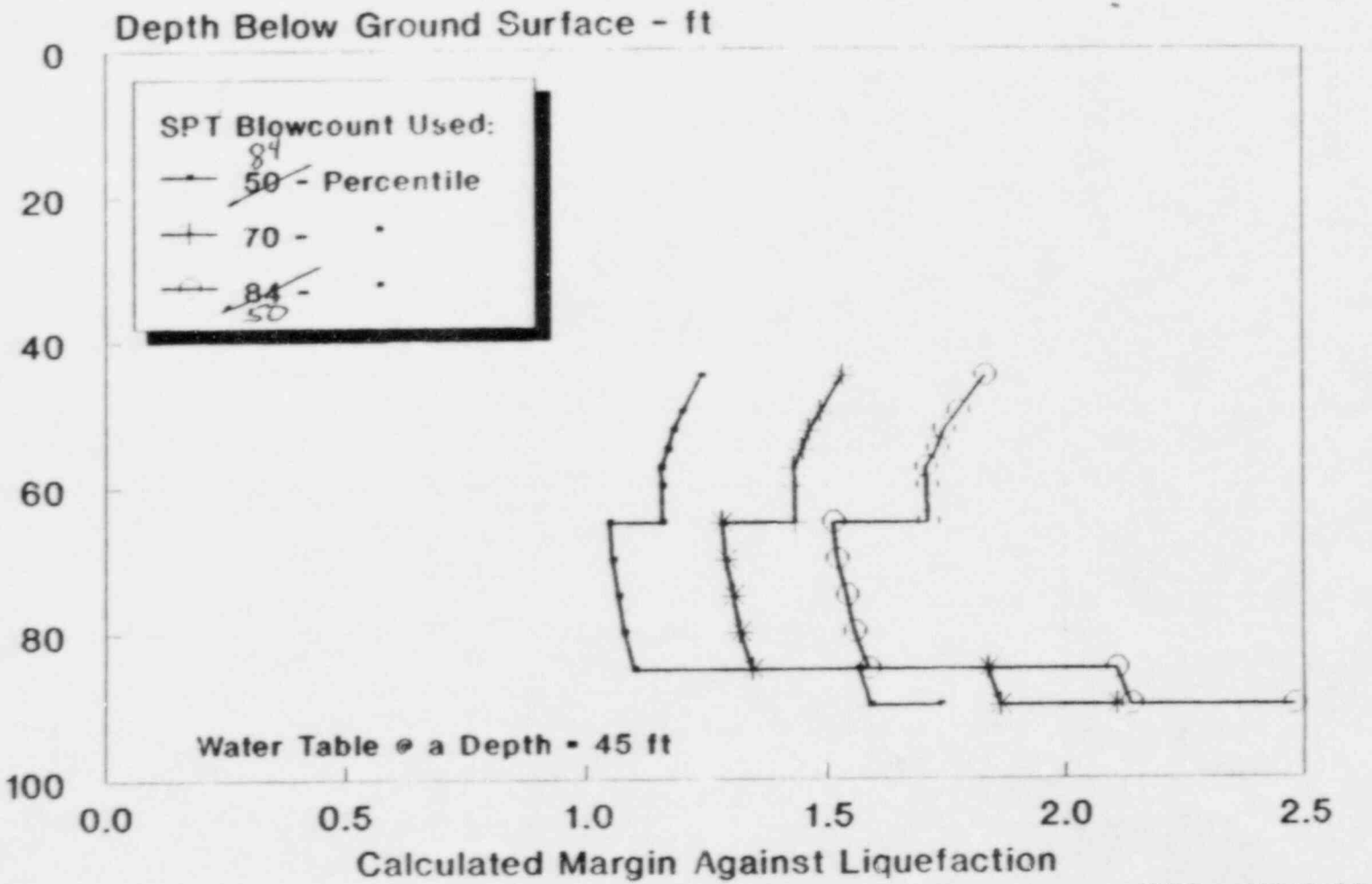
Project No. 8743076A
HATCH NP

Fig. 20

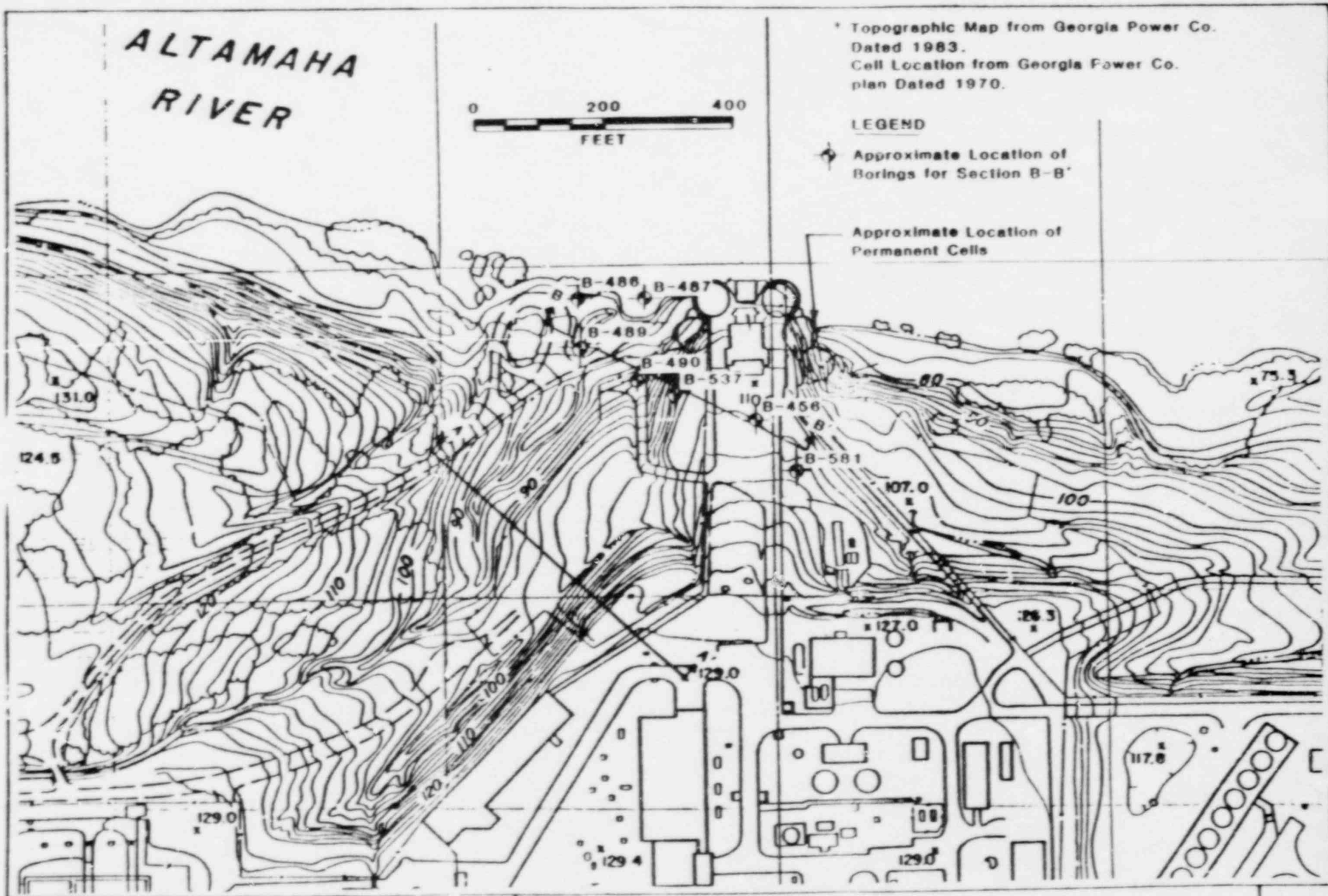
Calculated Margins Against Liquefaction

Plant Area -- Hatch NPP

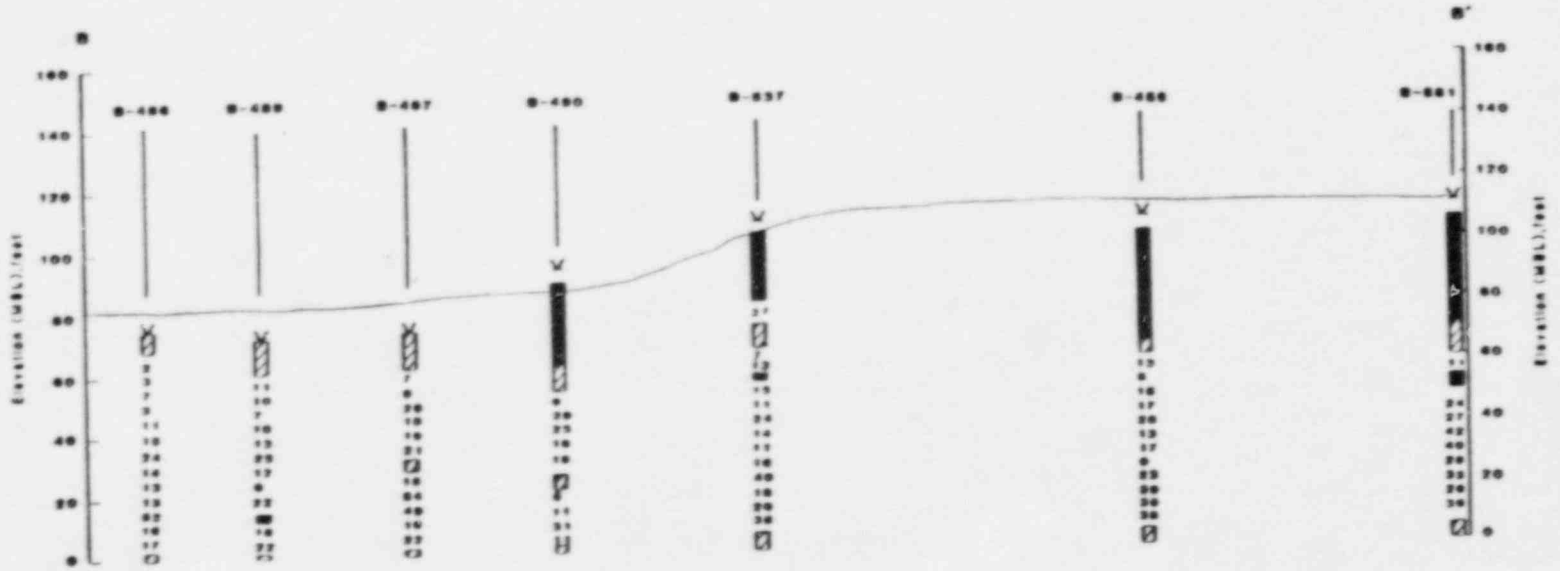
Based on ZPA = 0.28 g



WCC - 05\10\88



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

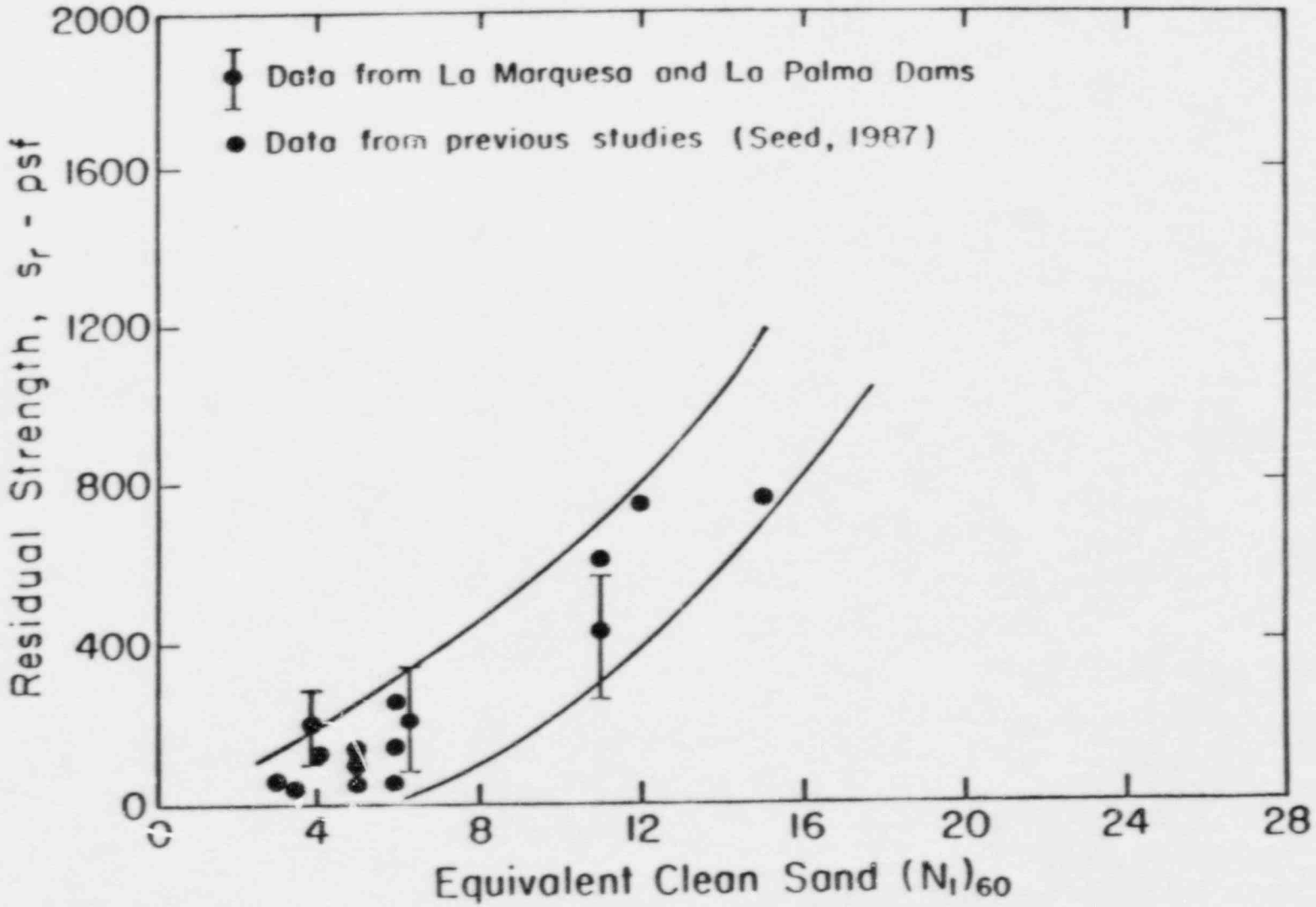


Woodward-Clyde Consultants

SPT BLOW COUNT - SECTION B-B'

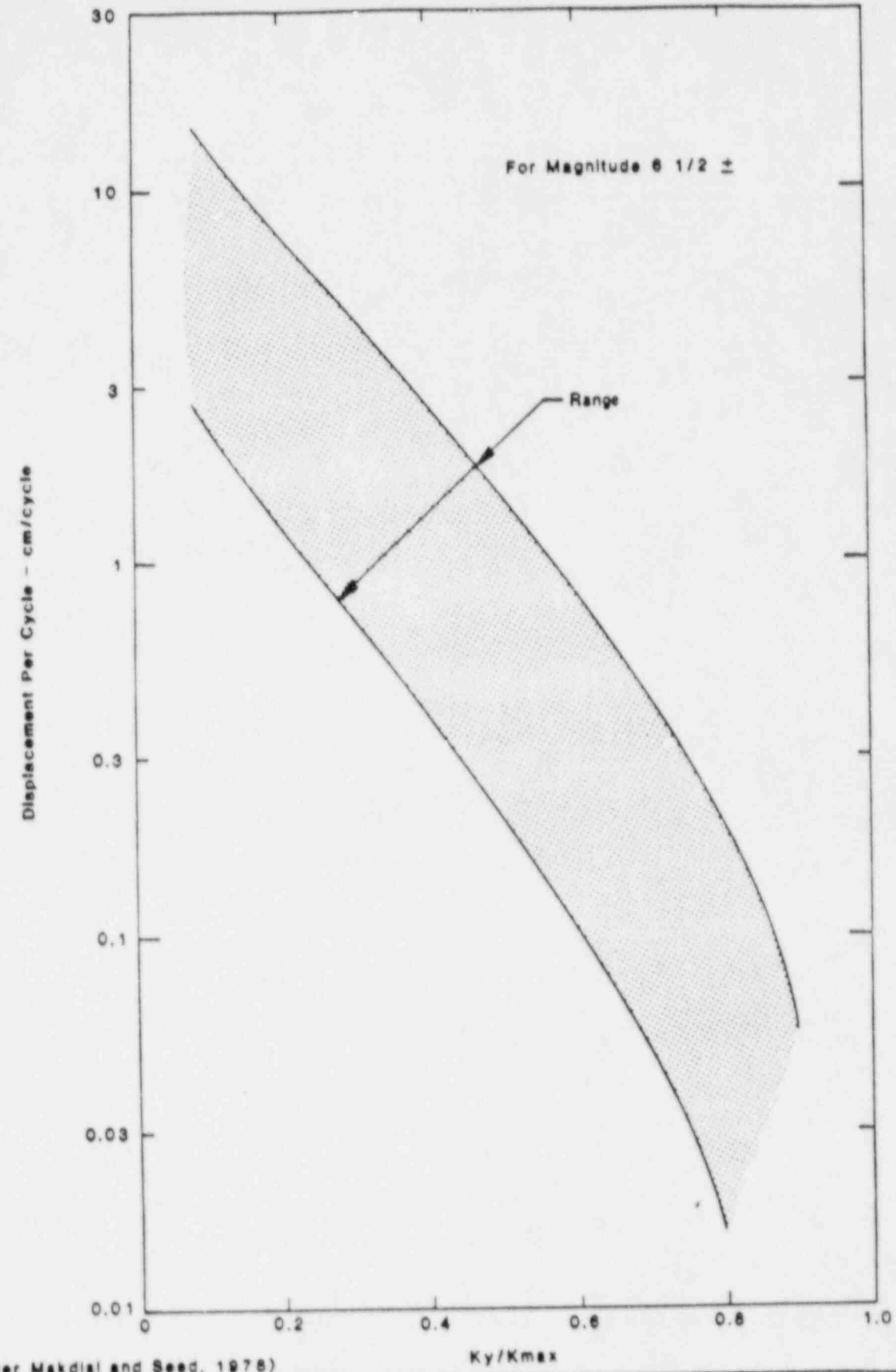
Project No. 8743078A
HATCH NP

Fig. 21



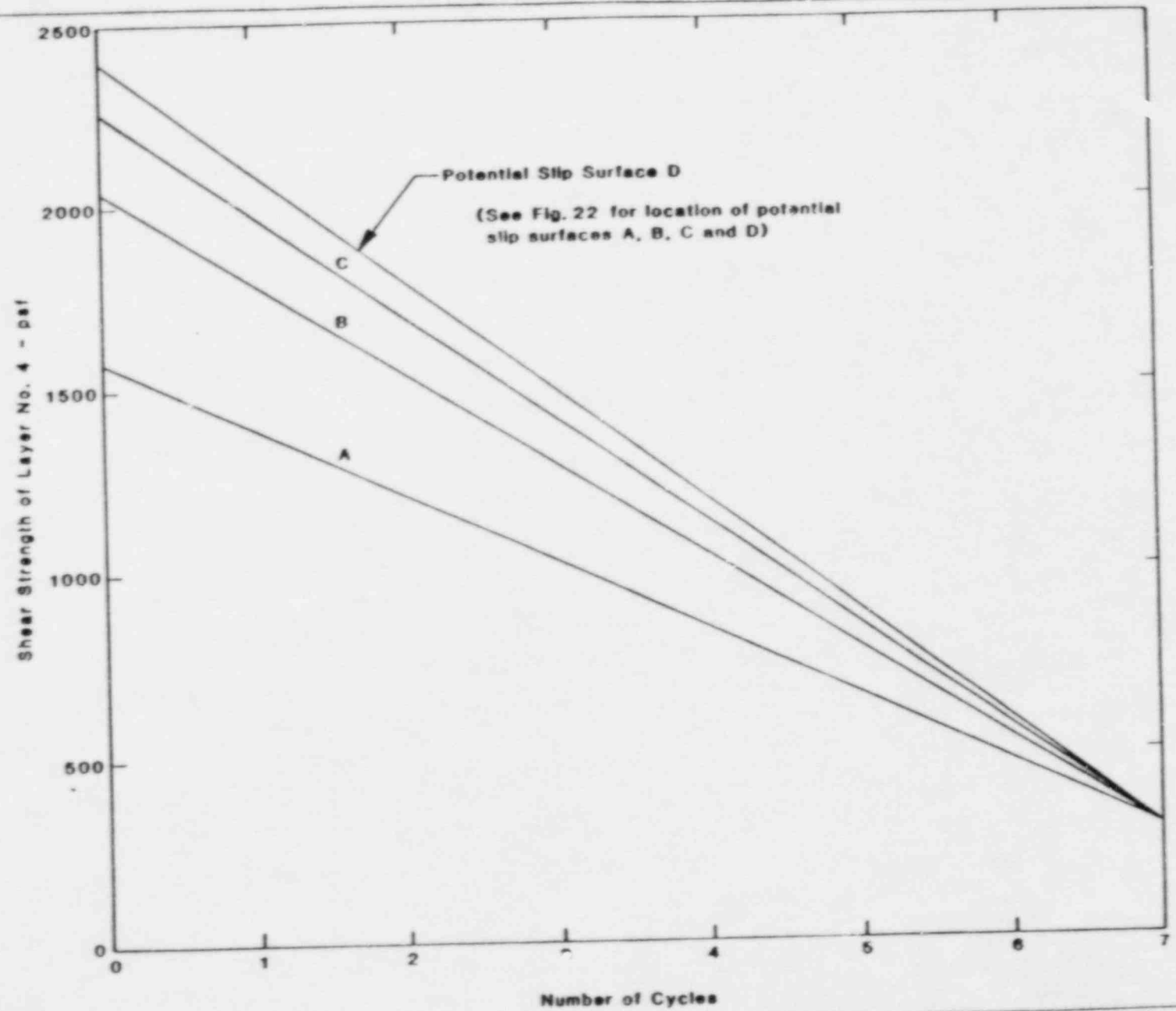
(From Seed et al, 1987)

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



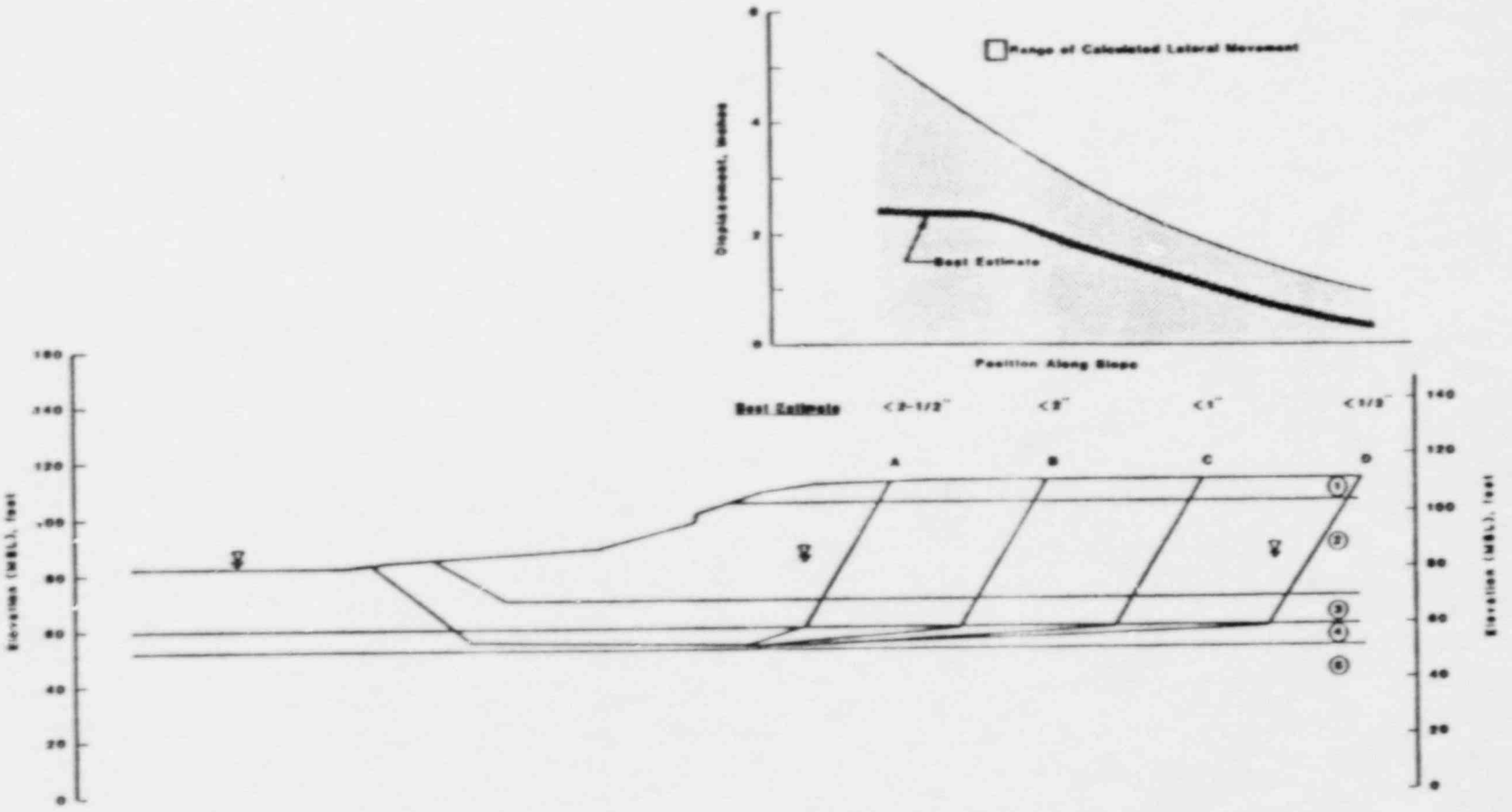
(After Makdisi and Seed, 1978)

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

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

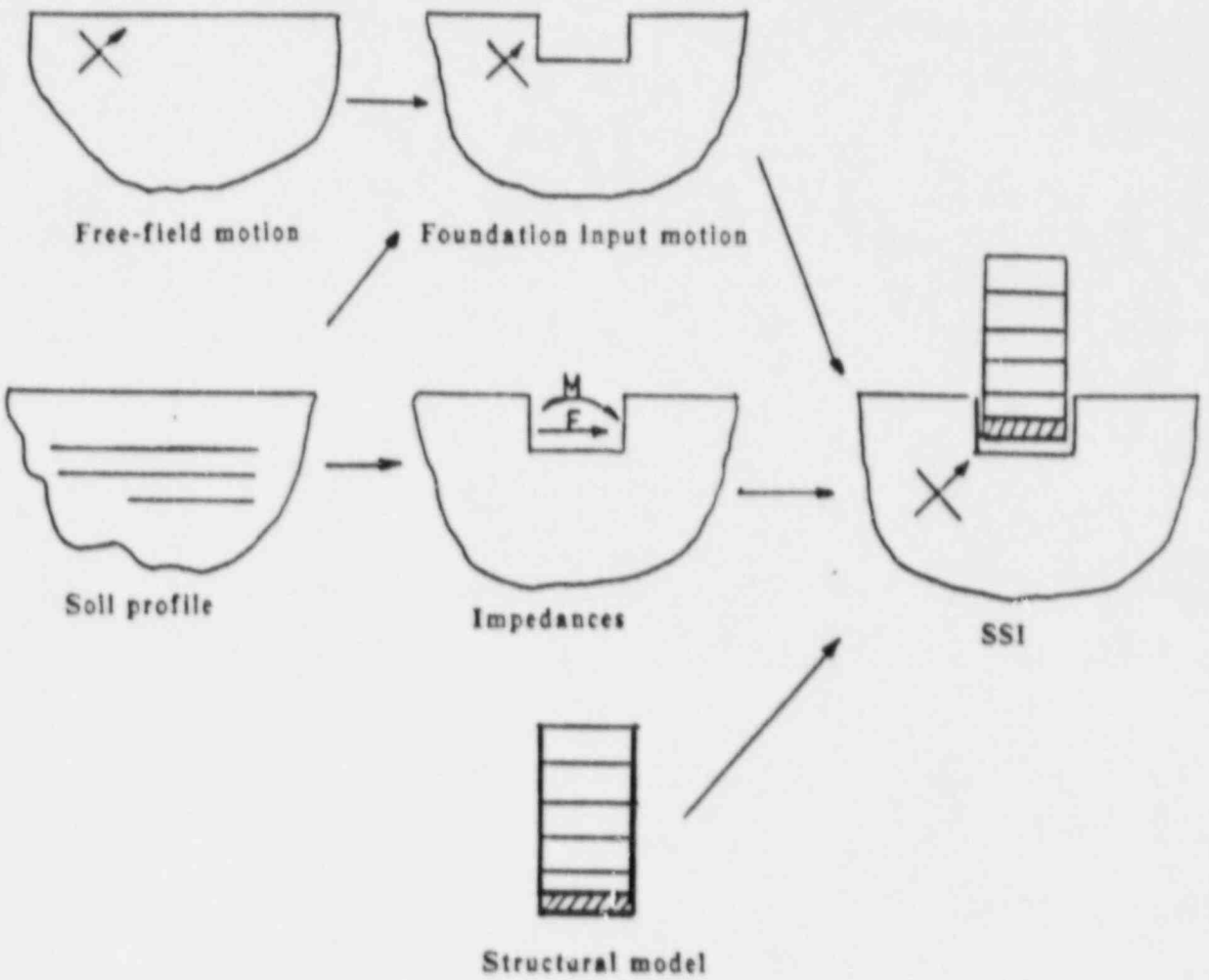
THE STRUCTURAL RESPONSE ANALYSIS FOR THE HATCH SMA WILL BE PERFORMED USING THE SUBSTRUCTURE APPROACH

- 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

ELEMENTS OF THE SUBSTRUCTURE SSI ANALYSIS



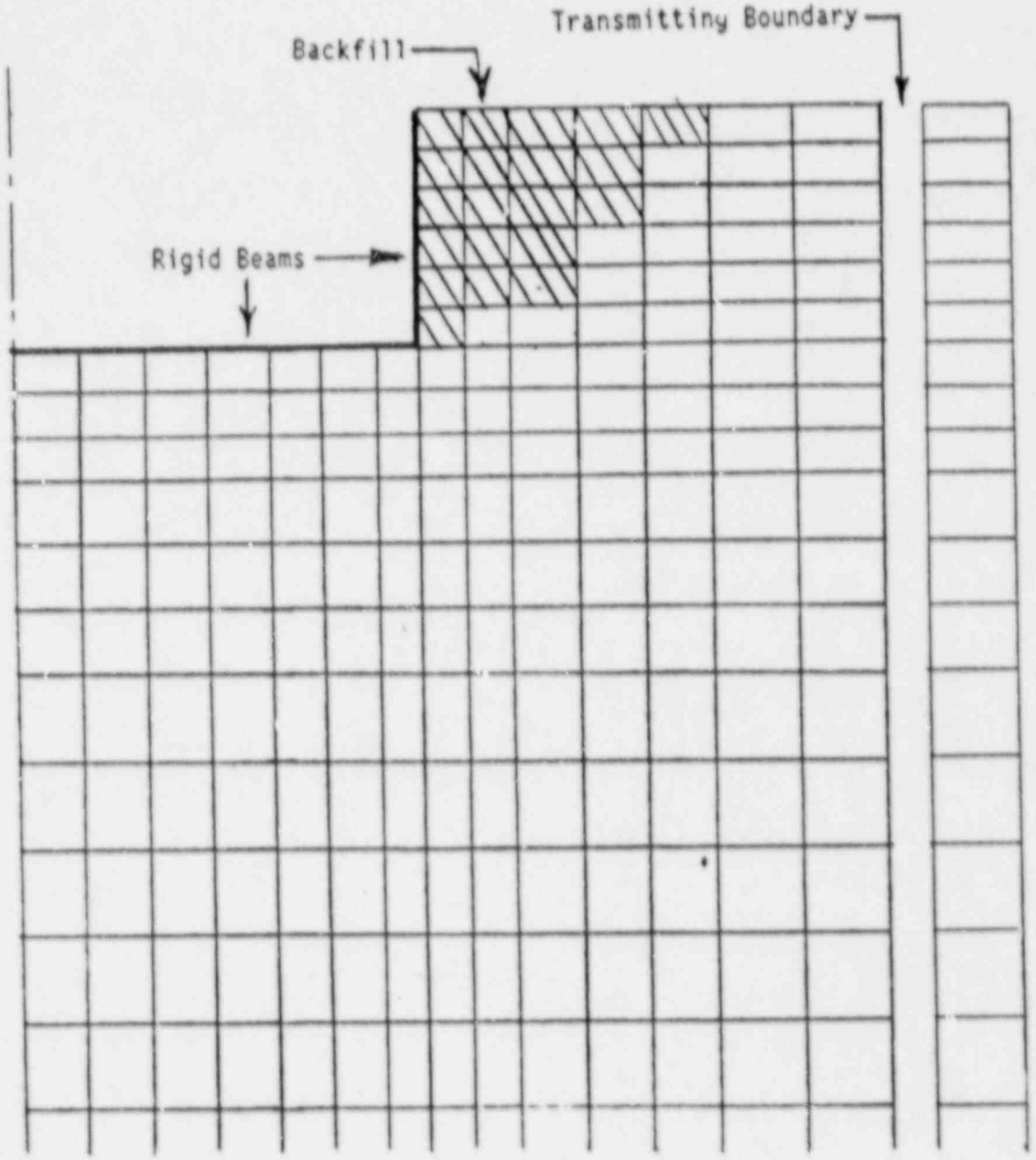
SSI/STRUCTURAL RESPONSE ANALYSES OF FOUR HATCH UNIT 1 STRUCTURES WILL BE PERFORMED

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

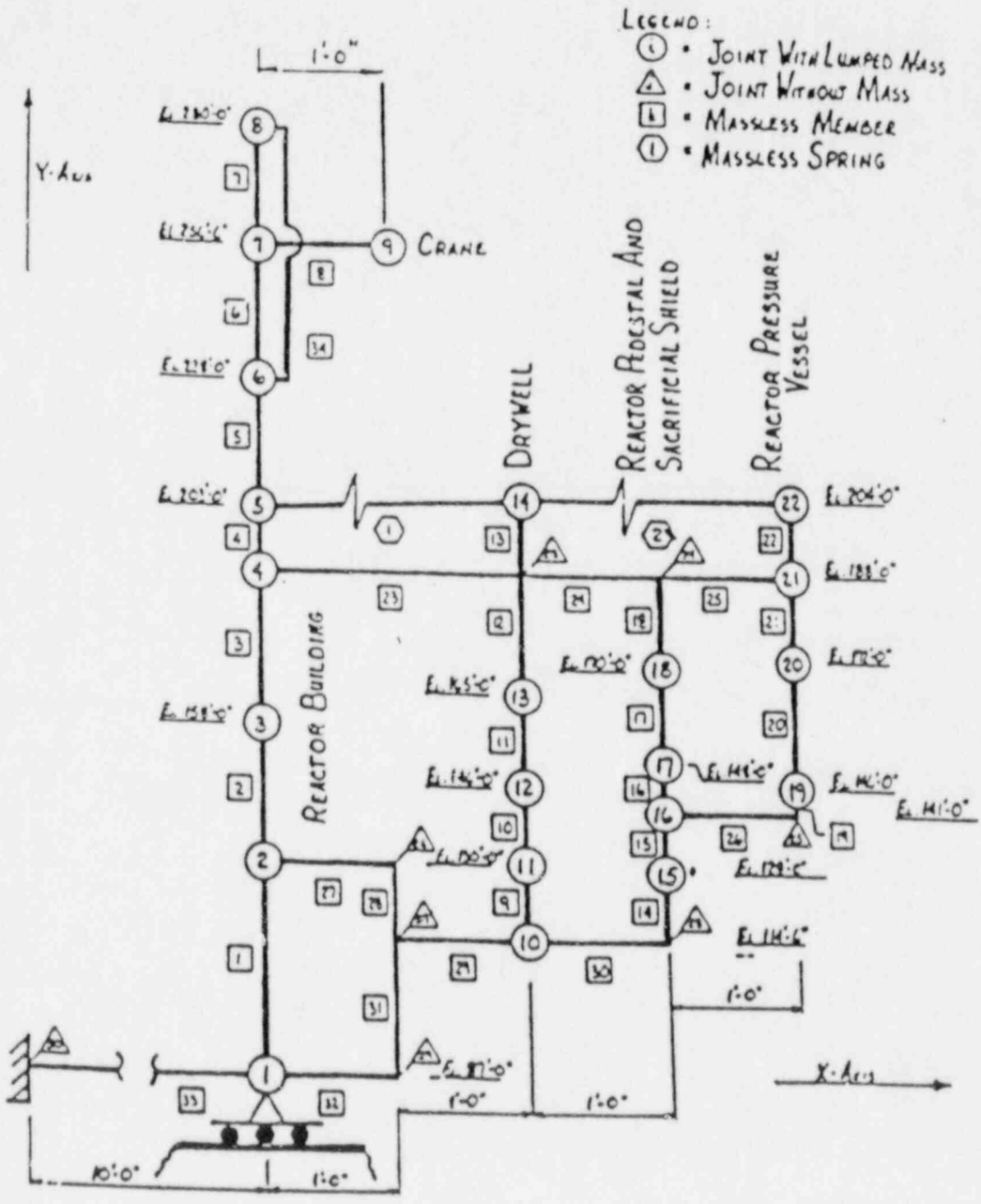
REACTOR BUILDING

- 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

TYPICAL SUPERALUSH FOUNDATION MODEL OF REACTOR BUILDING



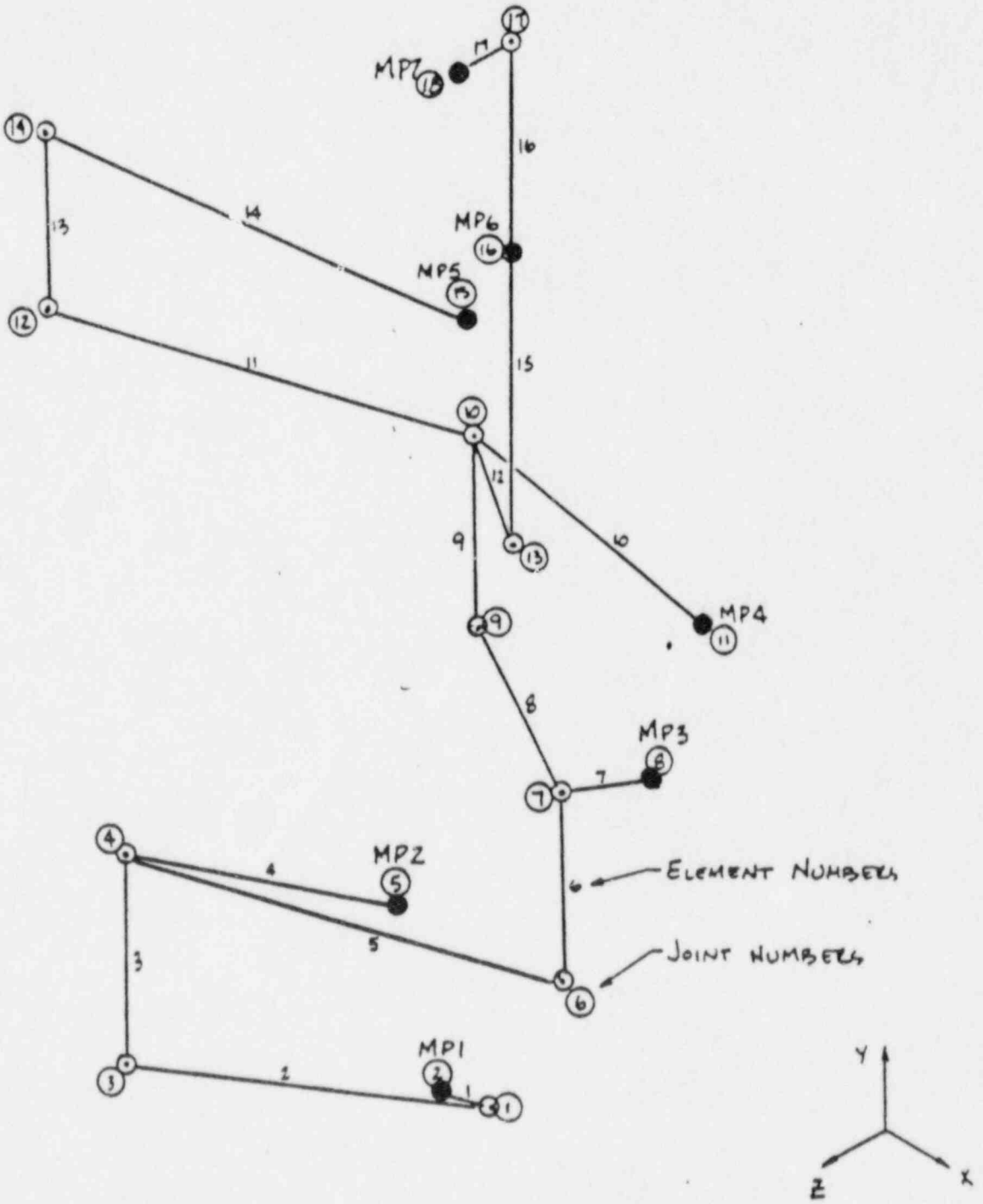
REACTOR BUILDING SEISMIC MODEL



CONTROL BUILDING

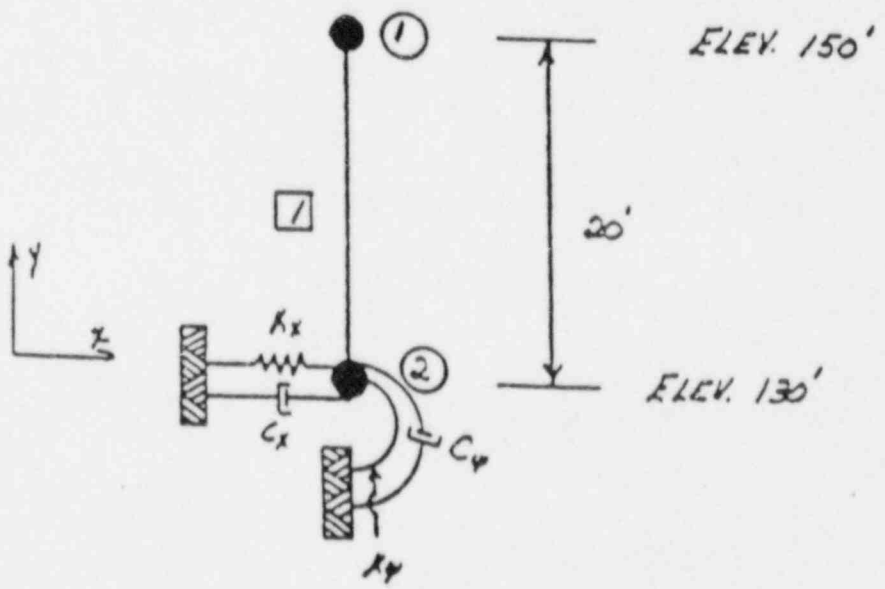
- Soil Profile
  - Soil Profile II
  - Soil property variations (0.60, 1.5)
- Soil/Foundation Model
  - Embedded, no sidewall contact with soil
  - Foundation input motion calculated with SUPERFLUSH or SHAKE
  - Foundation impedances calculated with CLASSI
- Structure Model
  - Three-dimensional model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

CONTROL BUILDING 3-D SEISMIC MODEL



DIESEL GENERATOR BUILDING

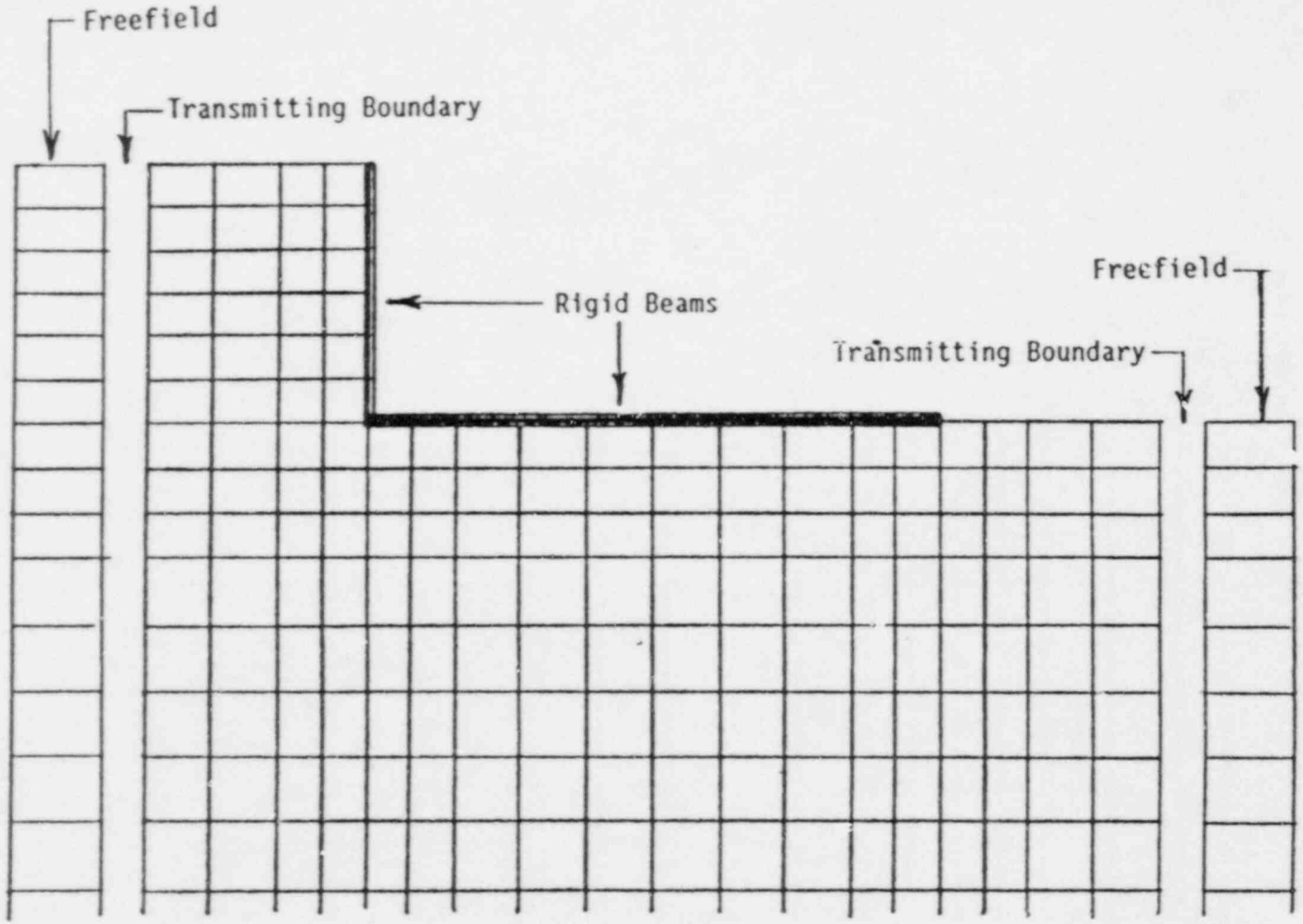
- Soil Profile
  - Soil Profile I
  - Soil property variations (0.8, 2.5)
- Soil/Foundation Model
  - Surfaced - founded
  - Foundation input motion equals free-field ground moti
  - Foundation impedances calculated with CLASSI
- Structure Model
  - N-S, E-W, and vertical models by GPC/SCS



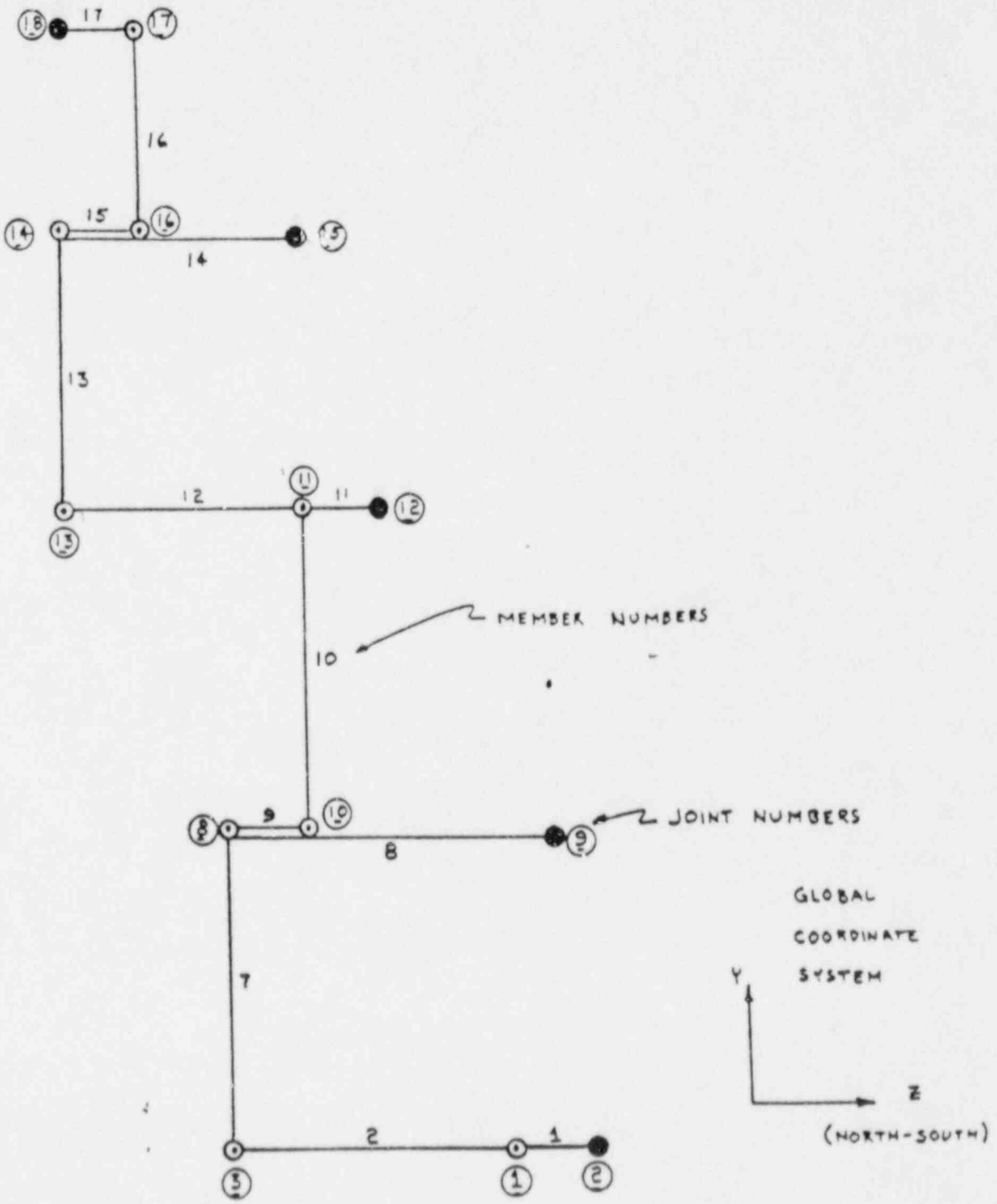
INTAKE STRUCTURE

- 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

TYPICAL SUPERFLUSH FOUNDATION MODEL OF INTAKE STRUCTURE



INTAKE STRUCTURE 3-D SEISMIC MODEL



RESPONSE WILL BE OBTAINED AT ALL MASS POINTS OF EACH STRUCTURAL MODEL

- Response spectra for 3%, 5%, and 10% damping
- Maximum accelerations
- Maximum relative displacements