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DEC 14 1981

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MEMORANDUM FOR: Elinor G. Adensam, Chief
Licensing Branch #4
Division of Licensing

FROM: Darl Hood, Project Manager
Licensing Branch #4
Division of Licensing

SUBJECT: TELECON OF 12/07/81 REGARDING JANUARY 5, 1982 HEARING ON MIDLAND SOILS

On 12/07/81 at about 9:00 AM, I called Mr. D. Budzik of Consumers Power Company regarding their request for meetings with NRC staff this week on (1) staff review schedules and (2) cracks. My call was prompted by our previous recognition that these meetings could not be scheduled at this time if there is intended to be a hearing the first full week of January 1982 (i.e., the staff would need the available time until 12/11/81 to establish and prepare testimony which, although due 12/21/81, could not be prepared the week of 12/14/81 because of other hearing sessions already scheduled then).

Mr. Budzik stated that Consumers has decided its interest is best served by providing for the meeting with NRC management to layout their review needs in an effort to assure appropriate staff resources are being provided for. It is also Consumer's view that since the crack issue affects all structures on fill, subsequent hearing sessions may be shortened by timely resolutions of the issues of crack criteria and approach. Mr. Budzik stated that if these two meetings can be scheduled this week, Consumers does not plan to request a hearing the first full week in January 1982. The converse was also said to be intended.

Mr. Budzik's position was further confirmed by Messrs. G. Keeley and J. Mooney in a later call this day. This later call established the meeting dates for 12/09/81 and 12/10/81, respectively.

I am advised by Mr. J. Knight that he received a similar call this date from Vice President J. Cook expressing the need for these meetings. Mr. Cook identified Consumer's highest review needs to be:

(1) Auxiliary Building
(2) Crack Resolution
(3) Service Water Pump Structure and Borated Water Storage Tank Foundations

Darl Hood

Darl Hood, Project Manager
Licensing Branch #4
Division of Licensing

8201050063

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DATE						12/11/81	12/13/81

cc: R. Tedesco
R. Vollmer
J. P. Knight
W. Paton

OFFICE ▶							
SURNAME ▶							
DATE ▶							

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

DEC 14 1981

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Licensing Branch #4
Division of Licensing

8201050063

cc: R. Tedesco
R. Vollmer
J. P. Knight
W. Paton
R. Hernan

6/135

JAN 29 1982

Docket Nos: 50-329
and 50-330 OM, OL

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 and 2

SUBJECT: SUMMARY OF JANUARY 12, 1982 MEETING ON QA ORGANIZATIONAL CHANGES AND UNDERPINNING QA

On January 12, 1982 NRC met in Glen Ellyn, Illinois with Consumers Power Company to discuss; (1) changes in the quality assurance organization for Midland Plant, Units 1 and 2 and, (2) the quality program for underpinning of the Auxilairy Building area and the Service Water Pump Structures. Meeting attendees are listed by Enclosure 1.

QA Organizational Change

In November 1981, Consumers implemented certain changes in the Midland Project Quality Assurance Department (MPQAD). The changes were identified in a December 1981 letter to the ASLB and were discussed during the December 1981 session of the OM-OL hearing. The hearing discussions revealed that information provided the NRC on these changes was very limited and the early assessment by the NRC raised concerns regarding the acceptability of these changes. The changes were subsequently discussed in Consumers letter of December 23, 1981. The meeting on January 12, 1982, included a review of the information from the December 23 letter.

Mr. B. Marguglio described the changes in the QA organization using several viewgraph slides (Enclosure 2) during his presentation. Slides 3 and 4 show the previous and new organization for the Midland Project Quality Assurance Department (MPQAD). The principal change is that three QA sections (Fluid Mechanical, Civil and Electrical I&C) no longer report through the superintendent of site project QA to Mr. Walt Bird, the MPQAD manager; rather they directly report to the combined B. Marguglio (MPQAD director) and W. Bird (MPQAD manager) arrangement, along with several other sections.

At the conclusion of the presentation and several questions, Mr. Keppler stated he was concerned about how much Messrs. Marguglio and Bird may be diluted with other work, and that the presentation failed to provide any convincing evidence that the change represents an enhancement of the previous organization. After a brief caucus, Mr. J. Cook returned to announce that the position of superintendent of site project QA would be reinstated after that position can be filled, and the three sections as before would report through this position to

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Mr. Marguglio. Mr. Keppler replied that such an organization would represent a further enhancement to the previous MPQAD which he had found acceptable, and would meet the Staff's criteria for establishing depth in an organization.

Mr. Cook stated that this change would be documented by letter shortly and an implementation date will be provided. The responsibilities of Mr. Bird with respect to HVAC will also be addressed. Mr. Cook also announced that due to reasons of health, Mr. Gil Keeley was being replaced by Mr. Jim Rooney.

QA Plan for Underpinning

Mr. W. Bird reviewed the general Quality Plan and the quality plans for the activities associated with the underpinning of the service water pump structure and auxiliary building. Viewgraph slides used during the presentation are provided by Enclosure 3. The presentation consisted of a review of the information in Consumer's letter of January 7, 1982.

Darl S. Hood, Project Manager
Licensing Branch No. 4
Division of Licensing

Enclosures:
As stated

cc: See next page

OFFICE	DL:LB#4	LA:DL:LB#4	DL:LB#4				
SURNAME	DHood:eb DSH	MDuncan	EAdensam				
DATE	1/29/82	1/ /82	1/29/82				

Docket Nos: 50-329
and 50-330 OM, OL

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1/29/82

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and 50-330 OM, OL

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Darl S. Hood, Project Manager
Licensing Branch No. 4
Division of Licensing

Enclosures:
As stated

cc: See next page

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DHood:eb	MDuncan	EAdensam
1/ /82	1/ /82	1/ /82

MEETING SUMMARY DISTRIBUTION

Docket File
NRC/PDR
Local PDR
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E. Case
D. Eisenhut
R. Purple
B. J. Youngblood
A. Schwencer
F. Miraglia
J. Miller
G. Lainas
R. Vollmer
J. P. Knight
R. Bosrak
F. Schauer
R. E. Jackson
Attorney, OELD
OIE (3)
ACRS (16)
R. Tedesco

NRC Participants:

D. Boyd
R. Cook
W. Paton
D. Hood
M. Wilcove
G. Gallagher
R. Landsman
C. Noseline
L. Spessard
J. Keppler

bcc: Applicant & Service List

G. Lear
S. Pawlicki
V. Benaroya
Z. Rosztoczy
W. Haass
D. Muller
R. Ballard
W. Regan
R. Mattson
P. Check
O. Parr
F. Rosa
W. Butler
W. Kreger
R. Houston
W. Gammill
L. Rubenstein
T. Speis
W. Johnston
S. Hanauer
D. Hood
F. Schroeder
D. Skovholt
M. Ernst
K. Kniel
G. Knighton
A. Thadani
D. Tondi
J. Kramer
D. Vassallo
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D. Ziemann
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M. Srinivasan
R. Baer
C. Berlinger
E. Adensam
Project Manager D. Hood
Licensing Assistant M. Duncan

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

January 29, 1982

Docket Nos: 50-329
and 50-330 OM, OL

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Licensing Branch No. 4
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Energy Technology Engineering Center
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Mr. Neil Gehring
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477 Michigan Avenue
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Charles Bechhoefer, Esq.
Atomic Safety & Licensing Board
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Mr. Ralph S. Decker
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Dr. Frederick P. Cowan
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Jerry Harbour, Esq.
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Geotechnical Engineers, Inc.
ATTN: Dr. Steve J. Poulos
1017 Main Street
Winchester, Massachusetts 01890

ENCLOSURE 1

ATTENDENCE SHEET

CPCo - NRC MEETING

W. R. Bird	CPCo
B. W. Marguglio	CPCo
J. G. Bloom	Isham, Lincoln & Beak
J. Cook	CPCo
D. C. Boyd	NRC
R. J. Cook	NRC
W. D. Paton	NRC
D. Hood	NRC
M. Wilcove	NRC
G. Gallagher	NRC
R. Landsman	NRC
C. Noseline	NRC
L. Spessard	NRC
J. Keppler	NRC
D. E. Horn	CPCo
R. E. Sevo	Bechtel

ENCLOSURE 2

MIDLAND PROJECT QA ORGANIZATIONAL CHANGE

PRESENTATION TO

REGION III AND NRR QA BRANCH

GLEN ELLYN, ILLINOIS

JANUARY 12, 1982

B W MARGUGLIO

CONSUMERS POWER COMPANY

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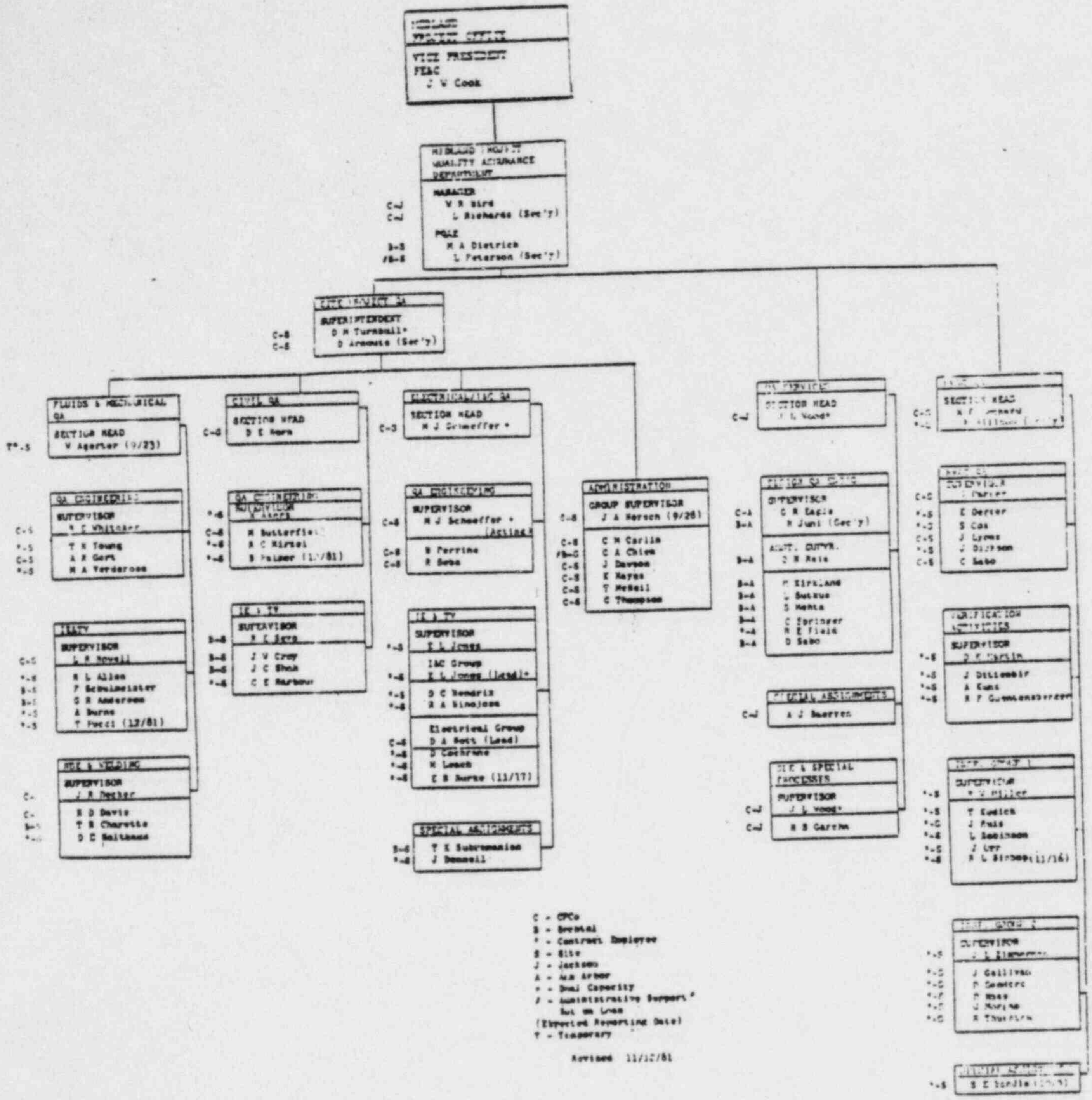
OUTLINE OF PRESENTATION

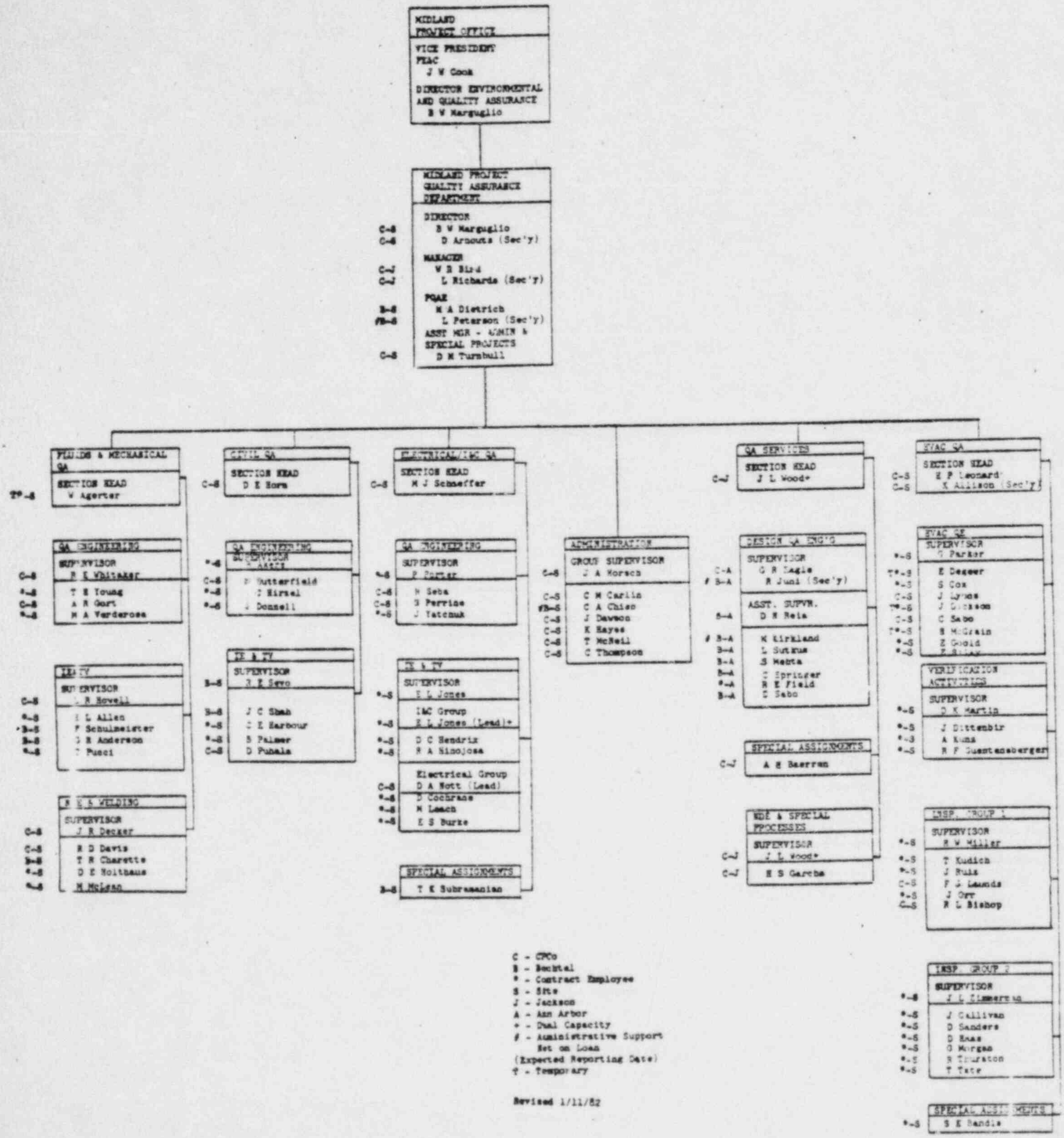
- PURPOSES OF THE CHANGE
- DESCRIPTION OF THE CHANGE
- RESPONSES TO NRC QUESTIONS/CONCERNS
- OTHER BENEFITS FROM THE CHANGE
- DISCUSSION
- NRC POSITION

PURPOSES OF THE CHANGE

* ADD SENIOR EXPERIENCED QA MANAGEMENT
* ACCOMMODATE THE GROWTH IN THE NUMBER OF QA PERSONNEL LOCATED AT THE SITE
* FULLY ADDRESS THE QA NEEDS OF THE JOB IN ITS FINAL STAGES
* UPGRADE LEADERSHIP AT THE SITE



Previous Organization



New Organization

JWC SPECIFICATIONS FOR BWM ASSIGNMENT

- DIRECT LINE RESPONSIBILITY FOR MPQAD
- THREE FULL DAYS AT SITE--MINIMUM
- CONTINUE TO OVERSEE PREVIOUSLY ASSIGNED FUNCTIONS, BUT WITH DELEGATION

DELEGATION

- BWM IS SENIOR QA PERSON
- WRB IS BWM's DEPUTY
- BOTH BWM AND WRB HAVE LINE RESPONSIBILITY AND AUTHORITY
- TO MORE EFFECTIVELY MANAGE QA:
    - ON A DAY-TO-DAY BASIS, THE HVAC SECTION AND THE QUALITY ENGINEERING SERVICES SECTION WILL REPORT TO WRB.
    - ON A DAY-TO-DAY BASIS, THE OTHER SECTION HEADS AND THE ASSISTANT MANAGER-ADMINISTRATION AND SPECIAL PROJECTS WILL REPORT TO BWM.
    - ON A DAY-TO-DAY BASIS, THE PQAE WILL COMMUNICATE AND INTERFACE WITH EITHER WRB OR BWM, DEPENDING UPON THE ABOVE-NOTED DELEGATION OF SUPERVISION.

(CONTINUED)

DELEGATION
(continued)

- IN ADDITION, ON A DAY-TO-DAY BASIS, WRB WILL CONTINUE TO SUPERVISE ALL ACTIVITIES ASSOCIATED WITH 50.55(e) AND PART 21 REPORTS (ie, DETERMINING REPORTABILITY, PREPARING REPORTS AND FOLLOWING-UP FOR PROBLEM RESOLUTION).

- IN ADDITION, ON A DAY-TO-DAY BASIS, WRB WILL CONTINUE TO SUPERVISE THE REMEDIAL SOILS WORK.

- IT IS INCUMBENT UPON EACH SECTION HEAD, THE PQAE AND THE ASSISTANT MANAGER TO NOTIFY EITHER WRB OR BWM OF ANY SIGNIFICANT ITEMS IN ACCORDANCE WITH THE ABOVE-NOTED DELEGATION OF SUPERVISION.

FULL-TIME MANAGEMENT

- SITE TIME SHALL BE WHATEVER IS REQUIRED TO DO THE JOB
- MIDLAND PROJECT BUSINESS AT ANN ARBOR, AND JACKSON
- MANAGING EVEN WHEN AWAY FROM MIDLAND--MANAGING FULL TIME
- DELEGATING OTHER FUNCTIONS--EXCEPT FOR ENVIRONMENTAL, SAME AS ORIGINAL RESPONSIBILITIES

LINES OF COMMUNICATION

- SAME DEGREE OF INVOLVEMENT FOR JWC
- SHORTER LINES OF COMMUNICATION FROM SITE QA SECTION HEADS TO JWC
- EQUAL BWM AND WRB ACCESS TO JWC

ORGANIZATIONAL AUTHORITY

- BWM IS SINGLY ACCOUNTABLE
- BWM HAS FULL-LINE AUTHORITY
- ASSIGNING DAY-TO-DAY SUPERVISION IS NOT DELEGATING AWAY FINAL RESPONSIBILITY AND AUTHORITY

OTHER BENEFITS

- ADDITIONAL SENIOR EXPERIENCED QA MANAGEMENT
- CONCENTRATED/SPECIALIZED EFFORT
- ADDITIONAL MANAGER
- ADDITIONAL SITE PRESENCE--WRB CONTINUES TO SPEND SAME AMOUNT OF TIME AT SITE, EVEN WITH BWM's PRESENCE AT SITE

CONCLUSION

- STRONGER QA ORGANIZATION

QUALITY PROGRAM

FOR

UNDERPINNING

ACTIVITIES

ENCLOSURE 3

QUALITY PLAN FOR UNDERPINNING ACTIVITIES

PURPOSE

PRESENT QUALITY PLANS, FOR THE UNDERPINNING ACTIVITIES TO HIGHLIGHT

- ORGANIZATIONS INVOLVED, SPECIFIC RESPONSIBILITIES AND THEIR INTERFACING
- THOSE UNIQUE ACTIVITIES OR REQUIREMENTS THAT GO BEYOND THE ESTABLISHED QUALITY PROGRAMS
- COMPREHENSIVE TOTAL QUALITY INVOLVEMENT AND CONTROLS ON THE QUALITY RELATED ACTIVITIES

PROVIDE A STATUS ON:

- STAFFING OF THE QUALITY ORGANIZATIONS
- IMPLEMENTATION OF THE QUALITY PLAN

PROVIDE AN OPPORTUNITY FOR FACE TO FACE COMMUNICATION ON THE UNDERPINNING QUALITY PROGRAM

OUTLINE OF THE PRESENTATION

CPCO AND BECHTEL ORGANIZATIONS

SUBCONTRACTOR AND CONSULTANT ORGANIZATIONS

QUALITY PLAN CONTENT

DESIGN CONTROL FOR UNDERPINNING ACTIVITIES

DESIGN DOCUMENT INTERFACE FLOW CHART

PROCEDURE REVIEW APPROVAL/FLOW CHART

QUALITY RELATED ACTIVITIES LIST

SUBCONTRACTOR REQUIRED "Q" PROCEDURES

STAFFING OF QUALITY ORGANIZATIONS

ADDITIONAL QUALITY PROGRAM DOCUMENTS REQUIRED TO SUPPORT THE UNDERPINNING WORK

SUMMARY AND CONCLUSION

CPCO AND BECHTEL ORGANIZATIONAL ELEMENTS

THE EXISTING COMPANY ORGANIZATIONS AS PROVIDED BY ORGANIZATIONAL CHARTS AND DESCRIPTIONS IN THE TOPICAL REPORTS AND LOWER TIER DOCUMENTS REMAIN FULLY APPLICABLE

ORGANIZATIONS INVOLVED IN THE UNDERPINNING

- CPCO PROJECT MANAGEMENT
- CPCO DESIGN PRODUCTION
- CPCO SITE MANAGEMENT
- BECHTEL PROJECT MANAGEMENT
- BECHTEL PROJECT ENGINEERING
- BECHTEL PROJECT GEOTECHNICAL ENGINEER
- BECHTEL CONSTRUCTION (REMEDIAL SOILS GROUP)
- GEOTECH SERVICES
- RESIDENT GEOTECHNICAL ENGINEER
- BECHTEL QUALITY CONTROL (QC)
- MIDLAND PROJECT QUALITY ASSURANCE DEPARTMENT (MPQAD)

THE QUALITY PLAN FOR UNDERPINNING ACTIVITIES PROVIDES A BRIEF SCOPE STATEMENT FOR EACH ORGANIZATION AS RELATED TO THE UNDERPINNING ACTIVITY

ORGANIZATIONS

SUBCONTRACTORS AND CONSULTANTS

SUBCONTRACTORS/CONSULTANTS	SCOPE OF DUTIES
MUESER, RUTLEDGE, JOHNSON AND DESIMONE	DESIGN INPUT FOR THE UNDERPINNING OF THE SERVICE WATER PUMP STRUCTURE UNDER A TECHNICAL SERVICE AGREEMENT ALSO, CONSULTANT FOR THE UNDERPINNING OF THE AUXILIARY BUILDING UNDER A TECHNICAL SERVICE AGREEMENT
SPENCER, WHITE AND PRENTIS, INC (PROPOSED)	SUBCONTRACTOR FOR THE UNDERPINNING OF THE SERVICE WATER PUMP STRUCTURE
MERGENTIME CORP/HANSON ENGINEERS, INC	JOINT VENTURE TO PROVIDE DESIGN INPUT FOR THE UNDERPINNING OF THE AUXILIARY BUILDING UNDER A TECHNICAL SERVICE AGREEMENT
MERGENTIME CONST CORP	SUBCONTRACTOR FOR THE UNDERPINNING OF THE AUXILIARY BUILDING

ORGANIZATIONS

SUBCONTRACTORS AND CONSULTANTS (CONT)

SUBCONTRACTOR/CONSULTANTS	SCOPE OF DUTIES
WISS, JANNEY, ELSTNER AND ASSOCIATES, INC	PROVIDE THE DESIGN FOR THE SETTLEMENT MONITORING EQUIPMENT, PROCURES THE MONITORING EQUIPMENT, INSPECTS THE INSTALLATION OF THE MONITORING EQUIPMENT, AND PROVIDE DATA TO PROJECT ENGINEERING
U S TESTING COMPANY, INC	SUBCONTRACTOR FOR TESTING CONCRETE PRODUCTION MATERIALS (CEMENT, FLYASH, WATER, AGGREGATES), SOILS, CONCRETE, GROUT, FINES MONITORING OF SOIL PARTICLES, TENSILE TESTING OF REINFORCING STEEL AND REINFORCING SPLICES.

6A

REMEDIAL SOILS WORK QUALITY PROGRAM

- CPCo QUALITY ASSURANCE PROGRAM MANUAL FOR NUCLEAR POWER PLANTS
  - Volume I - Policies (Topical CPC-1-A)
  - Volume II - Procedures for Design and Construction
- BQ-TOP-1, REVISION 1A
  - Bechtel Nuclear Quality Assurance Manual

QUALITY PLAN CONTENT

PROVIDES ORGANIZATIONAL RESPONSIBILITIES AND RELATIONSHIPS

ESTABLISHES A SPECIFIC Q-LIST OF DESIGNATED QUALITY ACTIVITIES

PROVIDES A NARRATIVE OF THE MAJOR PROGRAM ELEMENTS

PROVIDES UNIQUE QUALITY PROGRAMMATIC CONTROLS WHICH ARE NOT IN THE STANDARD EXISTING PROJECT QUALITY PROGRAMS

PROVIDES ADDITIONAL DEFINITION TO THE QUALITY REQUIREMENTS IN THE TECHNICAL SPECIFICATIONS

PROVIDES A LIST OF THE SPECIFIC SAFETY RELATED (Q) PROCEDURES THE SUBCONTRACTOR MUST PROVIDE FOR PROJECT REVIEW, APPROVAL AND RELEASE

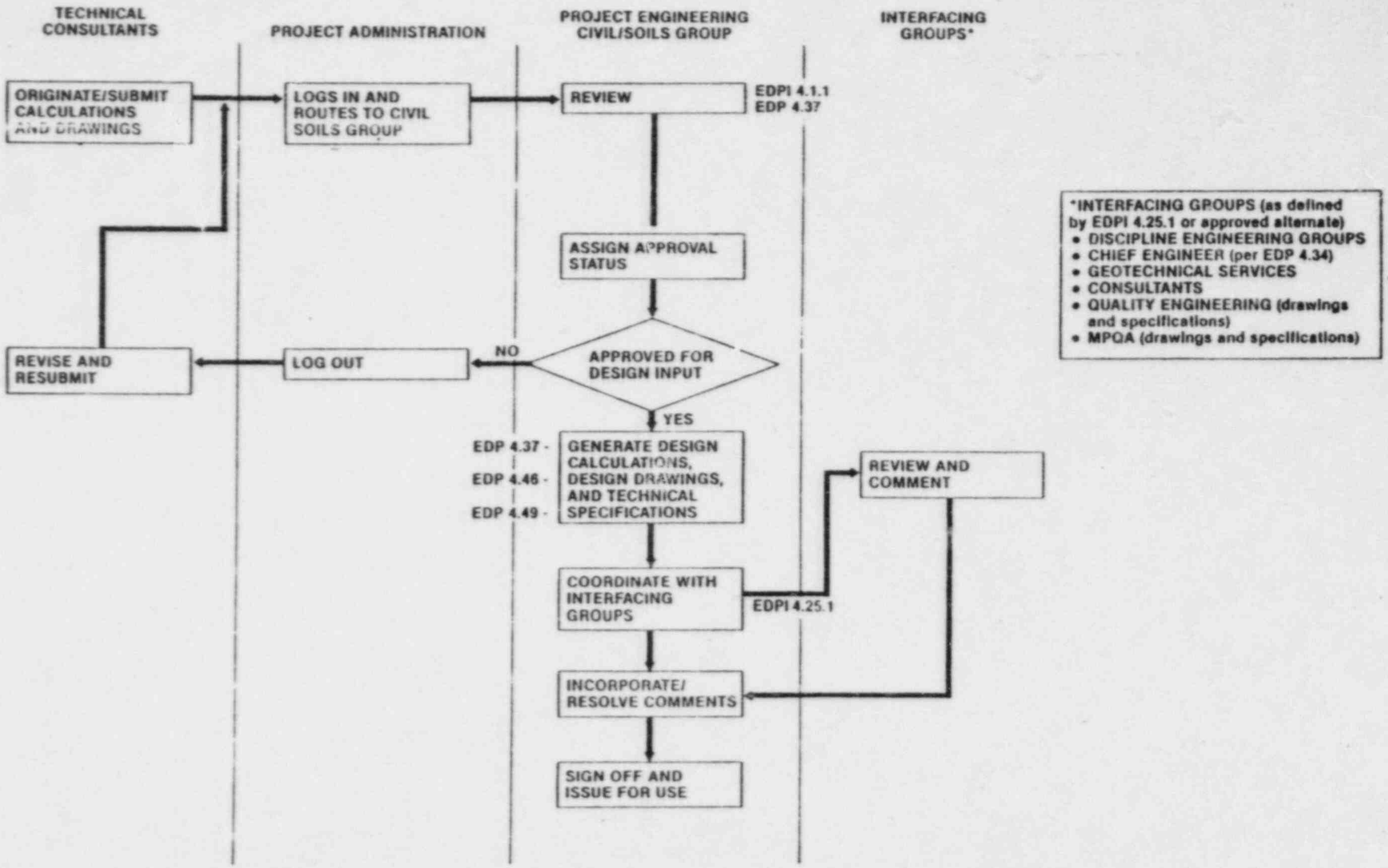
DESIGN CONTROL FOR UNDERPINNING ACTIVITIES

QUALITY PLAN FOR UNDERPINNING ACTIVITIES PROVIDES A DETAILED DESCRIPTION OF THE DESIGN CONTROL PROCESS AND REFERENCES THE DETAIL PROCEDURES CONTROLLING THE BECHTEL AND CPCO DEPARTMENT PROCEDURES

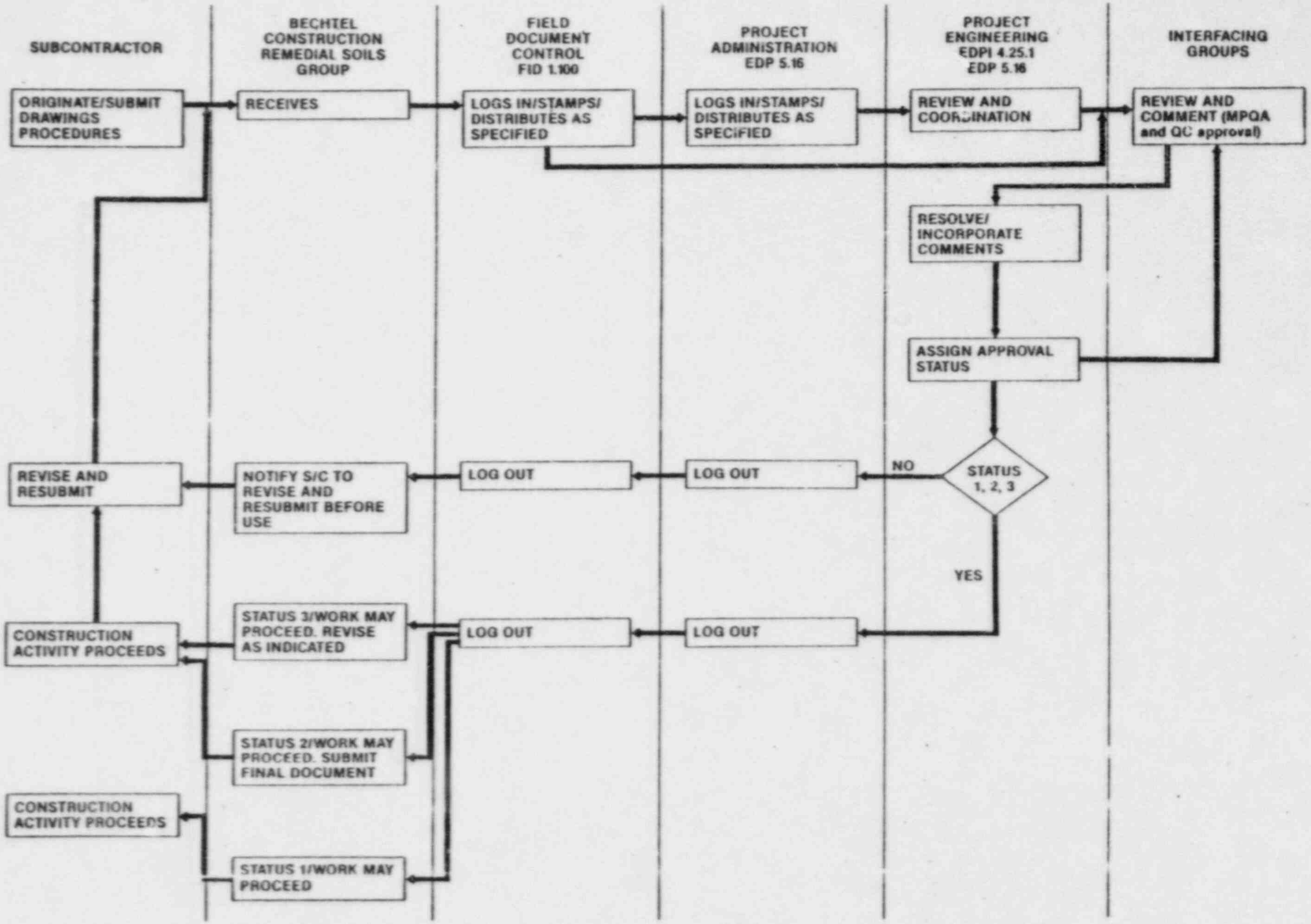
QUALITY PLAN INCORPORATED IN EACH SPECIFICATION PROVIDES THE DETAIL FLOW PROCESS FOR PREPARATION REVIEW AND RELEASE OF DESIGN DOCUMENTS

UNDERPINNING SUBCONTRACTOR(S) WILL BE REQUIRED TO HAVE A PROCEDURE TO CONTROL THE PROJECT ISSUED DESIGN DOCUMENTS AND PROCEDURES

DESIGN DOCUMENT INTERFACE FLOWCHART



PROCEDURE REVIEW/APPROVAL FLOWCHART



9A

Procedures To Be Submitted By The Subcontractor — Organization Responsible For Procedure Review & Approval

Procedures To Be Submitted By The Subcontractor	Proj Eng	Resident Geotech	Bechtel Construction RSG	Bechtel Quality Control	MPQAD	Technical Consultant
Procedure for general underpinning - This procedure shall include the overall concept of the work involved, including the interface of all the operations listed below.	X	0	0	X	X	0
Procedure for load transfer.	X	0	0	X	X	0
Procedure for placement of lean concrete backfill in shafts and tunnel.	X		0	X	X	
Procedure for installation of (including mixing) and pressure grouting.	X		0	X	X	
Procedure for placement of pier concrete.	X		0	X	X	
Procedure for acquiring and maintaining calibration of jacks and gages.	X		0	X	X	
Procedure for mechanical splicing of reinforcement.	X		0	X	X	
Procedure for threading of reinforcing steel.	X		0	X	X	
Procedure for installation of anchor bolts and rock anchors.	X		0	X	X	
Procedure for installation of compressible material.	X		0	X	X	
Procedure for placing reinforcement including bending steel reinforcement (hot and cold).	X		0	X	X	
Procedure for core drilling.	X		0	X	X	

<u>LEGEND</u>

REVIEW & APPROVAL - X

REVIEW & COMMENT - 0
as applicable

9B

Procedures To Be Submitted By The Subcontractor	Organization Responsible For Procedure Review & Approval					
	Proj Eng	Resident Geotech	Bechtel Construction RSG	Bechtel Quality Control	MPQAD	Technical Consultant
Procedure for concrete repairs.	X		0	X	X	
Procedure for excavation "Q" structures and the installation of lagging.	X	0	0	X	X	
Procedure for protection of underground utilities	X		0	X	X	
Procedure for preparing, submitting, and revising Q procedures.	X		0	X	X	
Procedure for handling, storing, and controlling Contractor-furnished materials.	X		0	X	X	
Procedure for design document control.	X		0	0	X	
Procedures for interface and coordination between the Subcontractor and the Contractor for activities covered by the QA Program.	X	0	0	0	X	
Procedure for construction of temporary supports including grillage.	X		0	X	X	0
Procedure for welding.	X		0	X	X	
Procedure for certifying subcontractor personnel specifically for AWS welding and mechanical splices.	X		0	X	X	
Procedure for Training Program of subcontractor personnel for the Q-Procedures covering the subcontractor scope of work.	X		0	X	X	

LEGEND

REVIEW & APPROVAL - X

REVIEW & COMMENT - 0
as applicable

QUALITY RELATED (Q-LISTED ACTIVITIES)

1. DOCUMENT SUBMITTAL, INTERFACE AND CONTROL ①
2. PROCURING Q-LISTED ITEMS AND MATERIALS
3. STORAGE, HANDLING AND CONTROL OF Q-LISTED MATERIALS ①
4. FURNISHING AND INSTALLATION OF LAGGING AND BRACING UNDER "Q" STRUCTURES ①
5. EXCAVATION LIMITS, CONTROL AND SEQUENCE UNDER "Q" STRUCTURES ①
6. CRACK MAPPING AND EVALUATION
7. CALIBRATION, MAINTENANCE, CONTROL AND INSTALLATION OF GAGES AND SETTLEMENT MONITORING INSTRUMENTATION
8. MONITORING OF BUILDING MOVEMENT INSTRUMENTATION AND PIER PRESSURE GAGES
9. FINES MONITORING OF DEWATERING WELLS IN "Q" AREAS
10. LOCATION AND PROTECTION OF "Q" UTILITIES ①
11. GEOTECHNICAL ACCEPTANCE OF SUBGRADE
12. FABRICATION OF STEEL GRILLAGE FOR TEMPORARY SUPPORTS FOR "Q" STRUCTURES ② ①
13. FABRICATIONS AND INSTALLATION OF TEMPORARY SUPPORTS FOR "Q" STRUCTURES ② ①
14. WELDING OF TEMPORARY AND PERMANENT SUPPORTS FOR "Q" STRUCTURES ② ①

① SUBCONTRACTOR HAS TO HAVE PROCEDURES

② APPLY ONLY TO AUXILIARY BUILDING UNDERPINNING

QUALITY RELATED (Q-LISTED ACTIVITIES)
(CONTINUED)

15. FABRICATION AND INSTALLATION OF REINFORCING STEEL (1)
16. CERTIFICATION OF PERSONNEL PERFORMING SPLICES (1)
17. THREADING OF REINFORCING STEEL AND INSTALLATION OF MECHANICAL SPLICES (1)
18. DRILLING IN "Q" STRUCTURES FOR THE INSTALLATION OF ANCHOR BOLTS, ROCK ANCHORS AND DEWATERING WELLS (1)
19. INSTALLATION (1) AND INSPECTION OF ANCHOR BOLTS AND ROCK ANCHORS
20. COMPRESSIBLE MATERIAL CONFIGURATION AND INSTALLATION (1)
21. TESTING OF REINFORCING STEEL AND MECHANICAL SPLICES
22. INSTALLATION (1) INSPECTION AND TESTING OF STRUCTURAL CONCRETE, LEAN CONCRETE, GROUT AND DRYPACK
23. REPAIR OF CONCRETE IN "Q" STRUCTURES (1)
24. CALIBRATING, MAINTAINING, INSTALLING AND CONTROLLING OF HYDRAULIC JACKS AND PRESSURE GAGES (1)
25. LOAD TRANSFER ACTIVITIES (1)
26. BACKFILLING (1) AND ACCEPTANCE TESTING FOR ACCESS SHAFTS AND TUNNELS IN "Q" AREAS

(1) SUBCONTRACTOR HAS TO HAVE PROCEDURES

(2) APPLY ONLY TO AUXILIARY BUILDING UNDERPINNING

SUBCONTRACTOR REQUIRED "Q" PROCEDURES

LIST IS TAKEN DIRECTLY FROM THE QUALITY PLAN FOR SPECIFICATION C-195

PROCEDURE LIST

- PROCEDURE FOR GENERAL UNDERPINNING - THIS PROCEDURE SHALL INCLUDE THE OVERALL CONCEPT OF THE WORK INVOLVED, INCLUDING THE INTERFACE OF ALL THE OPERATIONS LISTED BELOW
- PROCEDURE FOR LOAD TRANSFER
- PROCEDURE FOR PLACEMENT OF LEAN CONCRETE BACKFILL IN SHAFTS AND TUNNELS
- PROCEDURE FOR INSTALLATION OF (INCLUDING MIXING) AND PRESSURE GROUTING
- PROCEDURE FOR PLACEMENT OF PIER CONCRETE
- PROCEDURE FOR ACQUIRING AND MAINTAINING CALIBRATION OF JACKS AND GAGES
- PROCEDURE FOR MECHANICAL SPLICING OF REINFORCEMENT
- PROCEDURE FOR THREADING OF REINFORCING STEEL
- PROCEDURE FOR INSTALLATION OF ANCHOR BOLTS AND ROCK ANCHORS
- PROCEDURE FOR INSTALLATION OF COMPRESSIBLE MATERIAL

SUBCONTRACTOR REQUIRED "Q" PROCEDURES (CONTINUED)

PROCEDURE FOR PLACING REINFORCEMENT INCLUDING BENDING STEEL REINFORCEMENT (HOT AND COLD)

PROCEDURE FOR CORE DRILLING

PROCEDURE FOR CONCRETE REPAIRS

PROCEDURE FOR EXCAVATION "Q" STRUCTURES AND THE INSTALLATION OF LAGGING

PROCEDURE FOR PROTECTION OF UNDERGROUND UTILITIES

PROCEDURE FOR PREPARING, SUBMITTING AND REVISING Q PROCEDURES

PROCEDURE FOR HANDLING, STORING, AND CONTROLLING CONTRACTOR-FURNISHED MATERIALS

PROCEDURE FOR DESIGN DOCUMENT CONTROL

PROCEDURES FOR INTERFACE AND COORDINATION BETWEEN THE SUBCONTRACTOR AND THE CONTRACTOR FOR ACTIVITIES COVERED BY THE QA PROGRAM

PROCEDURE FOR CONSTRUCTION OF TEMPORARY SUPPORTS INCLUDING GRILLAGE

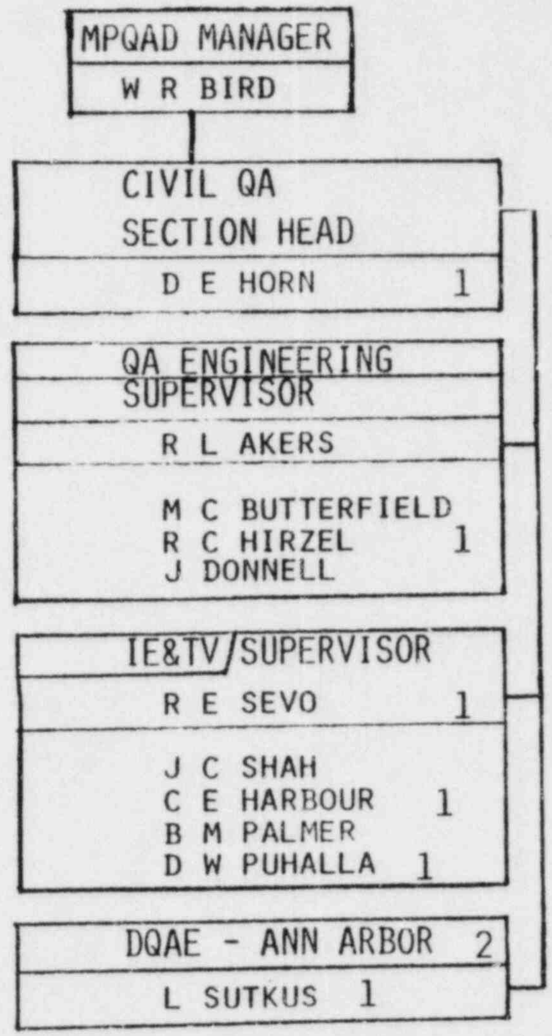
PROCEDURE FOR WELDING

PROCEDURE FOR CERTIFYING SUBCONTRACTOR PERSONNEL SPECIFICALLY FOR AWS WELDING AND MECHANICAL SPLICES

PROCEDURE FOR TRAINING PROGRAM OF SUBCONTRACTOR PERSONNEL FOR THE Q-PROCEDURES COVERING THE SUBCONTRACTORS SCOPE OF WORK

ORGANIZATION CHART OF MPQAD IN SUPPORT OF UNDERPINNING

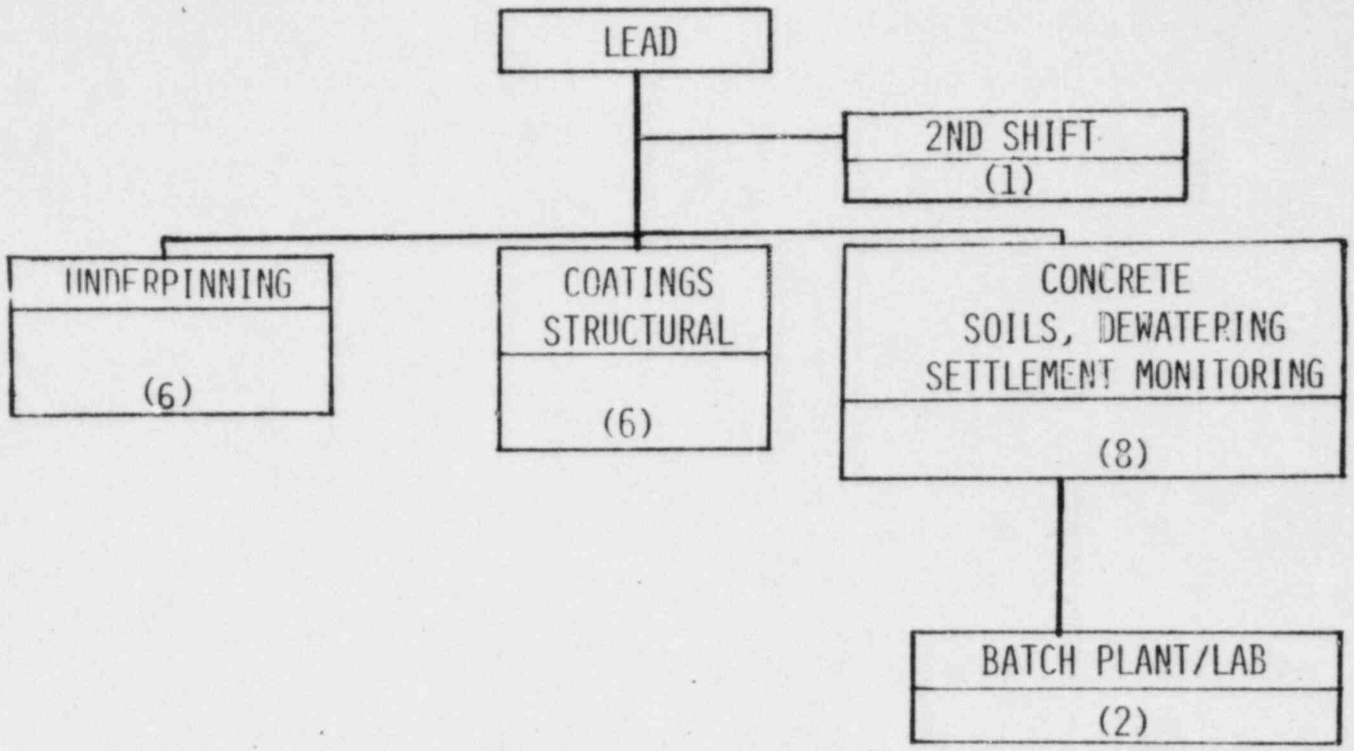
MIDLAND PROJECT OFFICE



1 THOSE INDIVIDUALS WHOSE PRIMARY RESPONSIBILITIES AND TIME ARE FOR SUPPORT OF THE UNDERPINNING WORK

2 ADMINISTRATIVELY UNDER QUALITY ENGINEERING SERVICES SECTION

BECHTEL QUALITY CONTROL CIVIL DISCIPLINE



NUMBERS IN THE BLOCKS SHOW THE NUMBER OF QUALITY CONTROL ENGINEERS ASSIGNED AS OF JANUARY, 1982

PRESENT STAFF AS SHOWN IS ADEQUATE TO COVER NEAR FUTURE SCOPE OF WORK

CERTIFICATION FOR SPECIFIC UNDERPINNING QUALITY CONTROL INSTRUCTIONS IS ACTIVITY PENDING

1/B5

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

JAN 28 1982

Docket Nos: 50-329 OM, OL
and 50-330 OM, OL

Mr. J. W. Cook
Vice President
Consumers Power Company
1945 West Parnall Road
Jackson, Michigan 49201

Dear Mr. Cook:

Subject: Staff Review Schedules for Soils Remedial Actions for Midland Plant, Units 1 and 2

On December 9, 1981, memebers of NRC's licensing staff met in Bethesda, Maryland, with Messrs. D. Budzik and R. Houston of your company to develop a schedule for the NRC's review of remedial actions for soil compaction problems at the Midland Plant site. The objective was to develop a detailed licensing schedule consistent with issuance of the Safety Evaluation Report for the operating licenses by May 6, 1982, which is a key milestone for achieving the fuel load date of July 1983 and operating date of December 1983 for Unit 2. The schedule was developed consistent with Consumers' specified order of importance on issues and consistent with Consumers' targeted construction start dates for the several remedial activities. Enclosure 1 lists the principal action items and target dates developed for lead technical review branches. Enclosure 2 identifies the same schedule identified by major structure or system. Suggested hearing dates for the remaining sessions of the instant OM-OL hearing were also identified (Enclosure 3).

It is readily apparent that this schedule is highly compressed, particularly considering that activities on several fronts are occurring in tandem, that the remedial actions are complex and outside the usual scope of construction activities for nuclear power plants, and considering the complex interactions among the various construction activities. For our part, we have recently completed several reassignments and an additional contract to gain additional resources and are prepared to support this schedule. Despite the efforts of the NRC, however, achievement of such a review schedule will not be possible without your full cooperation and timely submittal of complete and acceptable information. Similarly, the compressed hearing schedules suggested by Enclosure 3 will only be possible if substantial resolution of issues has been achieved prior to start of each hearing session.

~~8202250441~~

14pp.

We request that our licensing project manager be advised promptly if any change to these schedules is identified. Although the flexibility afforded by this schedule is somewhat limited, mutually agreed to changes such as meeting dates would be acceptable if made to enhance resolution of issues, expedite the hearing or otherwise enhance safety.

Sincerely,

Robert L. Tedesco, Assistant Director
for Licensing
Division of Licensing

Enclosures:
As stated

cc:
See next page

MIDLAND

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Geotechnical Engineers, Inc.
ATTN: Dr. Steve J. Poulos
1017 Main Street
Winchester, Massachusetts 01890

ENCLOSURE 1

SEB Action Items

Actual Completion		Item	Date
12/14-17/81	1.	Hearing on Dynamic Models	Dec 14-16, 1981
01/04/82	2.	CPCo Draft Submittal on Cracking	Dec 18
	3.	Holiday	Dec 25
	4.	Holiday	Jan 01, 1982
	5.	Submittal of BWST Tank Stress Report	Jan 08
	6.	Meeting on Cracking	Jan 11
	7.	Meeting on BWST Ring Foundation and Dynamic Model and Hearing Conditions for Resetting BWST	Jan 13
	8.	NRC Generic Resolution on Cracking	Jan 15
	9.	CPCo Submittal on FIVP Cracking	Jan 15
	10.	Audit Prior to Excavation Under FIVP and Turbine Building - Ann Arbor	Jan 18-19
	11.	NRC Resolution on BWST Ring Foundation and Dynamic Model	Jan 25
	12.	NRC Audit prior to Excavation Under Aux Bldg and Aux Bldg Cracking - Ann Arbor	Feb 01-05
	13.	Testimony due of BWST Ring Foundation and Dynamic Model	Feb 01
	14.	NRC Resolution on Excavation Under FIVP and Turbine Bldg	Feb 08
	15.	NRC Resolution on FIVP Cracking	Feb 08
	16.	CPCo submittal on DGB Cracks	Feb 08
	17.	Meeting on SWPS	Feb 11
	18.	Hearing on Underground Piping, BWST, and QA Plan	Feb 16-19
	19.	Holiday	Feb 15
	20.	Meeting on all Aspects of DGB	Feb 23-24
	21.	NRC meeting and Resolution on Hearing Conditions for SWPS	Mar 01
	22.	CPCo Submittal on SWPS Creaking	Mar 01
	23.	NRC Resolution of all Aspects of DGB	Mar 02
	24.	NRC Resolution of Excavation Under Aux Bldg	Mar 08
	25.	NRC Resolution of Aux Bldg Cracking	Mar 15
	26.	NRC Audit on SWPS Design	Mar 15-19
	27.	Testimony due on all Aspects of DGB	Mar 15
	28.	Testimony due on Hearing Conditions for SWPS	Mar 15
	29.	NRC Resolution on SWPS Cracking	Mar 26
	30.	Hearing on DGB. SWPS, & Permanent Dewatering	Mar 29 - Apr 02
	31.	NRC Resolution on SWPS Remedial Work	Apr 09
	32.	Audit of Aux Bldg Underpinning Final Design	After May 17
	33.	Resolution on resetting BWST	May 01

HGEB Action Items

	1.	Hearing - Dynamic Model	Dec 14-16, 1981
	2.	Holiday	Dec 25
	3.	Holiday	Jan 01, 1982
	4.	Submittal on BWST Tank Stresses	Jan 08
	5.	Meeting on Concrete Cracks	Jan 11
	6.	Meeting on BWST Remedial Work	Jan 13
	7.	Submittal of effects of Freeze Wall	Jan 15 (Advanced Jan 07)
	8.	NRC Resolution on BWST Borings	Jan 15
H	9.	NRC Resolution on Permanent Dewatering criterion on Water Table Level	Jan 15
	10.	NRC Resolution on Underground Piping including Seismic Design	Jan 18
	11.	Audit of CPCo prior to Excavating Under FIVP & Turbine Building	Jan 18-19
H	12.	Meeting on Freeze Wall - Ann Arbor	Jan 20
	13.	Meeting on Underground Piping	Jan 21
	14.	NRC Resolution on BWST Foundation Ring	Jan 25
	15.	NRC Resolution on Activation of Freeze Wall	Jan 25
	16.	NRC Audit prior to Excavation Under Aux Bldg and Aux Bldg Cracks	Feb 01-05
	17.	NRC Resolution on Aux Bldg Borings	Feb 01
	18.	Testimony Due on BWST Ring Foundation and seismic model	Feb 01
	19.	Testimony Due on all Aspects of Underground Piping and Fuel Oil Tanks	Feb 02
	20.	Hearing on Undergroung Piping, BWST, and QA Plan	Feb 06-19
	21.	NRC Resolution on Excavation Under FIVP and Turbine Bldg	Feb 08
	22.	CPCo Submittal on DGB Cracks	Feb 08
	23.	Meeting on SWPS	Feb 11
	24.	CPCo Submittal on Partial Recharge Test Results	Feb 15
	25.	NRC Resolution on SWPS Borings	Feb 15
	26.	Holiday	Feb 15
H	27.	Meeting on Partial Recharge Test Results	Feb 18
	28.	Meeting on all Aspects of DGB	Feb 23-24
	29.	Meeting and NRC Resolution on Hearing Conditions for SWPS	Mar 01
	30.	NRC Resolution on all Aspects of DGB	Mar 02
H	31.	NRC Resolution on Partial Results on Recharge Test	Mar 08
	32.	NRC Resolution on Excavation Under Aux Bldg	Mar 08
	33.	NRC Audit on Final SWPS Design	Mar 15-19
	34.	Testimony due on SWPS Borings, SWPS Hearing Conditions, and all Aspects of DGB	Mar 15
H	35.	Testimony due on Permanent Dewatering System	Mar 15
	36.	NRC Resolution on SWPS Cracking	Mar 26
	37.	Hearing on DGB, SWPS, & Permanent Dewatering	Mar 29 - Apr 02
H	38.	NRC Resolution on Start of SWPS Remedial Work	Apr 09
	39.	Resolution on Resetting Tank BWST	May 01

H = Hydraulic Section

MEB Action Items

			Actual
1.	CPCo Submittal on Underground Piping	Dec 21, 1981	12/18/81 (delivered)
2.	Meeting on Underground Piping	Jan 21, 1982	
3.	NRC Resolution on Underground Piping	Jan 25	
4.	Testimony due on Underground Piping	Feb 02	
5.	Hearing on Underground Piping	Feb 16-19	

Region III/QAB Action Items

1.	CPCo QA Plan Submittal	Jan 04	01/08/82
2.	Meeting on QA Organization Chage Region II	Jan 12	
3.	Testimony on QA Organization Change (File)	Jan 19	
4.	NRC Resolution and Meeting on QA Plan	Jan 25	
5.	Testimony due on QA Plan	Feb 01	
6.	Hearing on QA Organization Change	Feb 02-05	
7.	Hearing on QA Plan	Feb 16-19	

Enclosure 2

AUXILIARY BUILDING & FIVP

				Actual
1.	Hearing on dynamic model	December 14-18, 1981	SEB, HGEB*	
2.	CPCo submittal of effects of freeze wall	~~December 15~~ Jan 7, 1982	HGEB	1-7-82
** 3.	CPCo draft generic submittal on cracks	December 18, 1981	SEB	1-4-82
** 4.	Generic meeting on cracks	January 11, 1982	SEB	
5.	NRC generic resolution on cracks	January 15, 1982	SEB	
6.	CPCo submittal on FIVP cracks	January 15, 1982	SEB	
7.	Audit prior to excavation under Turbine Bldg. and FIVP	January 18, 1982	SEB, HGEB	
8.	Meeting on Freeze Wall	January 20, 1982	HGEB	
9.	NRC resolution on activation of Freeze Wall	January 25, 1982	HGEB	
10.	NRC audit ~~of prin~~ prior to excavation under Aux. Bldg. including crack review	February 1-5, 1982	HGEB, SEB	
11.	NRC resolution of Aux. Bldg. borings	February 1, 1982	HBEG	
12.	NRC resoltuion on excavation under FIVP and Turbine Bldg.	February 8, 1982	HGEB, SEB	
13.	NRC resolution on FIVP cracks	February 8, 1982	SEB	
14.	NRC resolution on excavation under Aux. Bldg.	March 8, 1982	HGEB, SEB	
15.	Audit of Aux. Bldg. final underpinning design	After May 17, 1982	SEB	

* HGEB - GES except where otherwise noted

** Common with SWP Structure & DGB

SERVICE WATER PUMP STRUCTURES (SWPS)

				act.
1.	Hearing on Dynamic Model	December 14-18, 1981	SEB,HGEB	
* 2.	CPCo generic draft submittal on cracks	December 18, 1981	SEB	1-4-82
* 3.	Meeting on generic cracks	January 11, 1982	SEB, HGEB	
4.	Meeting on SWPS reports (feedback)	February 11, 1982	SEB, HGEB	
5.	NRC resolution on SWPS borings	February 15, 1982	HGEB	
6.	Meeting & NRC resolution on hearing conditions	March 1, 1982	SEB	
7.	CPCo submittal on SWPS cracks	March 1, 1982	SEB	
8.	NRC audit on final SWPS design	March 15-19, 1982	SEB, HGEB	
9.	Testimony due on hearing conditions	March 15, 1982	SEB, HGEB	
10.	Testimony due on SWPS borings	March 15, 1982	HGEB	
11.	NRC resolution on SWPS cracks	March 26, 1982	SEB, HGEB	
12.	Haring	March 29-April 2, 1982	SEB, HGEB	
13.	Resolution on remedial underpinning (Audit Conclusion)	April 9, 1982	SEB, HGEB	

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* Common with Aux. Bldg., and DGB

UNDERGROUND PIPING AND DIESEL FUEL OIL TANKS

1.	CPCO submittal	December 21, 1981	MEB, HGEB
2.	Meeting on submittal	January 12, 1982	MEB, HGEB
3.	NRC resolution including seismic analysis	January 18, 1982	MEB, HGEB
4.	Testimony due	January 25, 1982	MEB, HGEB
5.	Hearing	February 15-19, 1982	MEB, HGEB

BORATED WATER STORAGE TANKS (BWST)

1.	Hearing on dynamic model	December 14-18, 1982	SEB, HGEB
2.	Meeting on (1) ring foundation, (2) dynamic model, and (3) hearing conditions for resetting tank	January 13, 1982	SEB, HGEB
3.	NRC resolution on borings	January 15, 1982	HGEB
4.	NRC resolution on ring foundation and dynamic model	January 25, 1982	SEB, HGEB
5.	Testimony	February 1, 1982	SEB, HGEB
6.	Hearing	February 15-19, 1982	SEB, HGEB
7.	Resolution on resetting tank	May 1, 1982	SEB, HGEB

DIESEL GENERATOR BUILDING (DGB)

*	1. CPCo draft generic submittal on cracks	December 18, 1981	SEB, HGEB
*	2 Meeting on generic crack submittal	January 11, 1982	SEB, HGEB
	3. CPCo submittal on DGB cracks	February 8, 1982	SEB, HGEB
	4. Meeting on all technical aspects (borings, settlement, structural, cracks)	February 23, 1982	SEB, HGEB
	5. NRC resolution on all technical aspects	March 2, 1982	SEB, HGEB
	6. Testimony due on all aspects of DGB	March 15, 1982	SEB, HGEB
	7. Hearing	March 29-April 2, 1982	SEB, HGEB

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* Common with Aux. Bldg. and SWPS

PERMANENT DEWATERING

1.	NRC approve 5 temporary wells	December 11, 1981	HGEB *
2.	NRC resolution on permanent Dewatering Criteria on Water Table Level/Recharge rate	January 15, 1982	HGEB
3.	CPCo submittal on partial recharge test results	February 15, 1982	HGEB
4.	Meeting on partial recharge test results	February 18, 1982	HGEB
5.	NRC Resolution on Partial Recharge test results	March 8, 1982	HGEB
6.	Testimony due	March 15, 1982	HGEB
7.	Hearing	March 29-April 2, 1982	HGEB

* All actions are principally Hydro

ENCLOSURE 3

HEARINGS AND TESTIMONY

1.	Hearing on Dynamic Models for Aux. Bldg., Service water pump structure, BWST	December 14-16, 1981	SEB, HGEB
2.	Preparation completion of Testimony on Underground Piping and DG Fuel Oil Tanks	February 02, 1982	MEB
3.	Testimony on BWST and seismic model (file) and file item 2 above	February 02, 1982	SEB, HGEB
4.	Testimony on QA plan on remedial fixes (file)	February 02, 1982	RIII
5.	Hearing on Underground Piping, diesel fuel oil tanks, BWST and QA plans on remedial fixes	February 16-19, 1982	SEB, HGEB, MEB, RIII
6.	Testimony on SWPS borings and SWPS hearing, conditions, and all aspects of DG Bldg. (file)	March 15, 1982	HGEB, SEB
7.	Testimony on permanent dewatering system (file)	March 15, 1982	HGEB (HYD)
8.	Hearing on DGB, SWPS and Permanent Dewatering	March 29-April 02, 1982	HGEB, SEB

1/22/82
[initials]

JAN 28 1982

DISTRIBUTION:
Docket Nos. 50-329/330 OM, OL
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bcc: TERA
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NSIC
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Docket Nos: 50-329 OM, OL
and 50-330 OM, OL

Mr. J. W. Cook
Vice President
Consumers Power Company
1945 West Parnall Road
Jackson, Michigan 49201

Dear Mr. Cook:

Subject: Staff Review Schedules for Soils Remedial Actions for Midland Plant, Units 1 and 2

On December 9, 1981, memebers of NRC's licensing staff met in Bethesda, Maryland, with Messrs. D. Budzik and R. Houston of your company to develop a schedule for the NRC's review of remedial actions for soil compaction problems at the Midland Plant site. The objective was to develop a detailed licensing schedule consistent with issuance of the Safety Evaluation Report for the operating licenses by May 6, 1982, which is a key milestone for achieving the fuel load date of July 1983 and operating date of December 1983 for Unit 2. The schedule was developed consistent with Consumers' specified order of importance on issues and consistent with Consumers' targeted construction start dates for the several remedial activities. Enclosure 1 lists the principal action items and target dates developed for lead technical review branches. Enclosure 2 identifies the same schedule identified by major structure or system. Suggested hearing dates for the remaining sessions of the instant OM-OL hearing were also identified (Enclosure 3).

It is readily apparent that this schedule is highly compressed, particularly considering that activities on several fronts are occurring in tandem, that the remedial actions are complex and outside the usual scope of construction activities for nuclear power plants, and considering the complex interactions among the various construction activities. For our part, we have recently completed several reassignments and an additional contract to gain additional resources and are prepared to support this schedule. Despite the efforts of the NRC, however, achievement of such a review schedule will not be possible without your full cooperation and timely submittal of complete and acceptable information. Similarly, the compressed hearing schedules suggested by Enclosure 3 will only be possible if substantial resolution of issues has been achieved prior to start of each hearing session.

~~8202250441~~

We request that our licensing project manager be advised promptly if any changes to these schedules is identified. Although the flexibility afforded by this schedule is somewhat limited, mutually agreed to changes such as meeting dates would be acceptable if made to enhance resolution of issues, expedite the hearing or otherwise enhance safety.

Sincerely,

Robert L. Tedesco, Assistant Director
for Licensing
Division of Licensing

Enclosures:
As stated

cc:
See next page

DL:LB #4	LA:DL:LB4	DL:LB #4	AD:L/DL
DHood/hmc	MDuncan	EAdensam	RTedesco
1/ /82	1/ /82	1/ /82	1/ /82

ENCLOSURE 1

SEB Action Items

Actual Completion			
12/14-17/81	1.	Hearing on Dynamic Models	Dec 14-16, 1981
01/04/82	2.	CPCo Draft Submittal on Cracking	Dec 18
	3.	Holiday	Dec 25
	4.	Holiday	Jan 01, 1982
	5.	Submittal of BWST Tank Stress Report	Jan 08
	6.	Meeting on Cracking	Jan 11
	7.	Meeting on BWST Ring Foundation and Dynamic Model and Hearing Conditions for Resetting BWST	Jan 13
	8.	NRC Generic Resolution on Cracking	Jan 15
	9.	CPCo Submittal on FIVP Cracking	Jan 15
	10.	Audit Prior to Excavation Under FIVP and Turbine Building - Ann Arbor	Jan 18-19
	11.	NRC Resolution on BWST Ring Foundation and Dynamic Model	Jan 25
	12.	NRC Audit prior to Excavation Under Aux Bldg and Aux Bldg Cracking - Ann Arbor	Feb 01-05
	13.	Testimony due of BWST Ring Foundation and Dynamic Model	Feb 01
	14.	NRC Resolution on Excavation Under FIVP and Turbine Bldg	Feb 08
	15.	NRC Resolution on FIVP Cracking	Feb 08
	16.	CPCo submittal on DGB Cracks	Feb 08
	17.	Meeting on SWPS	Feb 11
	18.	Hearing on Underground Piping, BWST, and QA Plan	Feb 16-19
	19.	Holiday	Feb 15
	20.	Meeting on all Aspects of DGB	Feb 23-24
	21.	NRC meeting and Resolution on Hearing Conditions for SWPS	Mar 01
	22.	CPCo Submittal on SWPS Creaking	Mar 01
	23.	NRC Resolution of all Aspects of DGB	Mar 02
	24.	NRC Resolution of Excavation Under Aux Bldg	Mar 08
	25.	NRC Resolution of Aux Bldg Cracking	Mar 15
	26.	NRC Audit on SWPS Design	Mar 15-19.
	27.	Testimony due on all Aspects of DGB	Mar 15
	28.	Testimony due on Hearing Conditions for SWPS	Mar 15
	29.	NRC Resolution on SWPS Cracking	Mar 26
	30.	Hearing on DGB. SWPS, & Permanent Dewatering	Mar 29 - Apr 02
	31.	NRC Resolution on SWPS Remedial Work	Apr 09
	32.	Audit of Aux Bldg Underpinning Final Design	After May 17
	33.	Resolution on resetting BWST	May 01

HGEB Action Items

	1.	Hearing - Dynamic Model	Dec 14-16, 1981
	2.	Holiday	Dec 25
	3.	Holiday	Jan 01, 1982
	4.	Submittal on BWST Tank Stresses	Jan 08
	5.	Meeting on Concrete Cracks	Jan 11
	6.	Meeting on BWST Remedial Work	Jan 13
	7.	Submittal of effects of Freeze Wall	Jan 15 (Advanced Jan 07)
	8.	NRC Resolution on BWST Borings	Jan 15
H	9.	NRC Resolution on Permanent Dewatering criterion on Water Table Level	Jan 15
	10.	NRC Resolution on Underground Piping including Seismic Design	Jan 18
	11.	Audit of CPCo prior to Excavating Under FIVP & Turbine Building	Jan 18-19
H	12.	Meeting on Freeze Wall - Ann Arbor	Jan 20
	13.	Meeting on Underground Piping	Jan 21
	14.	NRC Resolution on BWST Foundation Ring	Jan 25
	15.	NRC Resolution on Activation of Freeze Wall	Jan 25
	16.	NRC Audit prior to Excavation Under Aux Bldg and Aux Bldg Cracks	Feb 01-05
	17.	NRC Resolution on Aux Bldg Borings	Feb 01
	18.	Testimony Due on BWST Ring Foundation and seismic model	Feb 01
	19.	Testimony Due on all Aspects of Underground Piping and Fuel Oil Tanks	Feb 02
	20.	Hearing on Undergroung Piping, BWST, and QA Plan	Feb 06-19
	21.	NRC Resolution on Excavation Under FIVP and Turbine Bldg	Feb 08
	22.	CPCo Submittal on DGB Cracks	Feb 08
	23.	Meeting on SWPS	Feb 11
	24.	CPCo Submittal on Partial Recharge Test Results	Feb 15
	25.	NRC Resolution on SWPS Borings	Feb 15
	26.	Holiday	Feb 15
H	27.	Meeting on Partial Recharge Test Results	Feb 18
	28.	Meeting on all Aspects of DGB	Feb 23-24
	29.	Meeting and NRC Resolution on Hearing Conditions for SWPS	Mar 01
	30.	NRC Resolution on all Aspects of DGB	Mar 02
H	31.	NRC Resolution on Partial Results on Recharge Test	Mar 08
	32.	NRC Resolution on Excavation Under Aux Bldg	Mar 08
	33.	NRC Audit on Final SWPS Design	Mar 15-19
	34.	Testimony due on SWPS Borings, SWPS Hearing Conditions, and all Aspects of DGB	Mar 15
H	35.	Testimony due on Permanent Dewatering System	Mar 15
	36.	NRC Resolution on SWPS Cracking	Mar 26
	37.	Hearing on DGB, SWPS, & Permanent Dewatering	Mar 29 - Apr 02
H	38.	NRC Resolution on Start of SWPS Remedial Work	Apr 09
	39.	Resolution on Resetting Tank BWST	May 01

MEB Action Items

			Actual
1.	CPCo Submittal on Underground Piping	Dec 21, 1981	12/18/81 (delivered)
2.	Meeting on Underground Piping	Jan 21, 1982	
3.	NRC Resolution on Underground Piping	Jan 25	
4.	Testimony due on Underground Piping	Feb 02	
5.	Hearing on Underground Piping	Feb 16-19	

Region III/QAB Action Items

1.	CPCo QA Plan Submittal	Jan 04	01/08/82
2.	Meeting on QA Organization Chage Region II	Jan 12	
3.	Testimony on QA Organization Change (File)	Jan 19	
4.	NRC Resolution and Meeting on QA Plan	Jan 25	
5.	Testimony due on QA Plan	Feb 01	
6.	Hearing on QA Organization Change	Feb 02-05	
7.	Hearing on QA Plan	Feb 16-19	

Enclosure 2

AUXILIARY BUILDING & FIVP

				Actual
	1. Hearing on dynamic model	December 14-18, 1981	SEB, HGEB*	
	2. CPCo submittal of effects of freeze wall	~~December 15~~ Jan 7, 1982	HGEB	1-7-82
**	3. CPCo draft generic submittal on cracks	December 18, 1981	SEB	1-4-82
**	4. Generic meeting on cracks	January 11, 1982	SEB	
	5. NRC generic resolution on cracks	January 15, 1982	SEB	
	6. CPCo submittal on FIVP cracks	January 15, 1982	SEB	
	7. Audit prior to excavation under Turbine Bldg. and FIVP	January 18, 1982	SEB, HGEB	
	8. Meeting on Freeze Wall	January 20, 1982	HGEB	
	9. NRC resolution on activation of Freeze Wall	January 25, 1982	HGEB	
	10. NRC audit ~~of prin~~ prior to excavation under Aux. Bldg. including crack review	February 1-5, 1982	HGEB, SEB	
	11. NRC resolution of Aux. Bldg. borings	February 1, 1982	HBEG	
	12. NRC resoltuion on excavation under FIVP and Turbine Bldg.	February 8, 1982	HGEB, SEB	
	13. NRC resolution on FIVP cracks	February 8, 1982	SEB	
	14. NRC resolution on excavation under Aux. Bldg.	March 8, 1982	HGEB, SEB	
	15. Audit of Aux. Bldg. final underpinning design	After May 17, 1982	SEB	

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* HGEB - GES except where otherwise noted

** Common with SWP Structure & DGB

SERVICE WATER PUMP STRUCTURES (SWPS)

			ccT	
1.	Hearing on Dynamic Model	December 14-18, 1981	SEB,HGEB	
* 2.	CPCo generic draft submittal on cracks	December 18, 1981	SEB	1-4-?
* 3.	Meeting on generic cracks	January 11, 1982	SEB, HGEB	
4.	Meeting on SWPS reports (feedback)	February 11, 1982	SEB, HGEB	
5.	NRC resolution on SWPS borings	February 15, 1982	HGEB	
6.	Meeting & NRC resolution on hearing conditions	March 1, 1982	SEB	
7.	CPCo submittal on SWPS cracks	March 1, 1982	SEB	
8.	NRC audit on final SWPS design	March 15-19, 1982	SEB, HGEB	
9.	Testimony due on hearing conditions	March 15, 1982	SEB, HGEB	
10.	Testimony due on SWPS borings	March 15, 1982	HGEB	
11.	NRC resolution on SWPS cracks	March 26, 1982	SEB, HGEB	
12.	Haring	March 29-April 2, 1982	SEB, HGEB	
13.	Resolution on remedial underpinning (Audit Conclusion)	April 9, 1982	SEB, HGEB	

* Common with Aux. Bldg., and DGB

UNDERGROUND PIPING AND DIESEL FUEL OIL TANKS

1.	CPCO submittal	December 21, 1981	MEB, HGEB
2.	Meeting on submittal	January 12, 1982	MEB, HGEB
3.	NRC resolution including seismic analysis	January 18, 1982	MEB, HGEB
4.	Testimony due	January 25, 1982	MEB, HGEB
5.	Hearing	February 15-19, 1982	MEB, HGEB

BORATED WATER STORAGE TANKS (BWST)

1.	Hearing on dynamic model	December 14-18, 1982	SEB, HGEB
2.	Meeting on (1) ring foundation, (2) dynamic model, and (3) hearing conditions for resetting tank	January 13, 1982	SEB, HGEB
3.	NRC resolution on borings	January 15, 1982	HGEB
4.	NRC resolution on ring foundation and dynamic model	January 25, 1982	SEB, HGEB
5.	Testimony	February 1, 1982	SEB, HGEB
6.	Hearing	February 15-19, 1982	SEB, HGEB
7.	Resolution on resetting tank	May 1, 1982	SEB, HGEB

DIESEL GENERATOR BUILDING (DGB)

*	1.	CPCo draft generic submittal on cracks	December 18, 1981	SEB, HGEB
*	2	Meeting on generic crack submittal	January 11, 1982	SEB, HGEB
	3.	CPCo submittal on DGB cracks	February 8, 1982	SEB, HGEB
	4.	Meeting on all technical aspects (borings, settlement, structural, cracks)	February 23, 1982	SEB, HGEB
	5.	NRC resolution on all technical aspects	March 2, 1982	SEB, HGEB
	6.	Testimony due on all aspects of DGB	March 15, 1982	SEB, HGEB
	7.	Hearing	March 29-April 2, 1982	SEB, HGEB

* Common with Aux. Bldg. and SWPS

PERMANENT DEWATERING

1.	NRC approve 5 temporary wells	December 11, 1981	HGEB *
2.	NRC resolution on permanent Dewatering Criteria on Water Table Level/Recharge rate	January 15, 1982	HGEB
3.	CPCo submittal on partial recharge test results	February 15, 1982	HGEB
4.	Meeting on partial recharge test results	February 18, 1982	HGEB
5.	NRC Resolution on Partial Recharge test results	March 8, 1982	HGEB
6.	Testimony due	March 15, 1982	HGEB
7.	Hearing	March 29-April 2, 1982	HGEB

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* All actions are principally Hydro

ENCLOSURE 3

HEARINGS AND TESTIMONY

1.	Hearing on Dynamic Models for Aux. Bldg., Service water pump structure, BWST	December 14-16, 1981	SEB, HGEB
2.	Preparation completion of Testimony on Underground Piping and DG Fuel Oil Tanks	February 02, 1982	MEB
3.	Testimony on BWST and seismic model (file) and file item 2 above	February 02, 1982	SEB, HGEB
4.	Testimony on QA plan on remedial fixes (file)	February 02, 1982	RIII
5.	Hearing on Underground Piping, diesel fuel oil tanks, BWST and QA plans on remedial fixes	February 16-19, 1982	SEB, HGEB, MEB, RIII
6.	Testimony on SWPS borings and SWPS hearing, conditions, and all aspects of DG Bldg. (file)	March 15, 1982	HGEB, SEB
7.	Testimony on permanent dewatering system (file)	March 15, 1982	HGEB (HYD)
8.	Hearing on DGB, SWPS and Permanent Dewatering	March 29-April 02, 1982	HGEB, SEB

8/135

JAN 25 1982

Docket Nos.: 50-329/330 OM, OL

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 and 2

SUBJECT: SUMMARY OF OCTOBER 2, 1981 MEETING ON SEISMIC MODELS FOR AUXILIARY BUILDING AND SERVICE WATER PUMP STRUCTURES

On October 2, 1981, the NRC staff met in Bethesda, Maryland with Consumers Power Company and Bechtel to discuss seismic models for the Auxiliary Building and Service Water Pump Structure at Midland Plant, Units 1 and 2. Also present were several consultants for the NRC and applicant.

The presentations consisted of a review of information from the applicant's letter to the NRC dated September 30, 1981. Enclosure 1 summarizes the meeting.

/S/

Darl Hood, Project Manager
Licensing Branch #4
Division of Licensing

Enclosure:
As stated

cc: See next page

~~8202120284~~

OFFICE	DL:LB#4	LA:DL#4	DL:LB#4				
SURNAME	DHood:eb	MDuncan	EAdensam				
DATE	1/ /82	1/ /82	1/ /82				

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

JAN 25 1982

Docket Nos.: 50-329/330 OM, OL

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 and 2

SUBJECT: SUMMARY OF OCTOBER 2, 1981 MEETING ON SEISMIC MODELS FOR AUXILIARY BUILDING AND SERVICE WATER PUMP STRUCTURES

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Darl Hood

Darl Hood, Project Manager
Licensing Branch #4
Division of Licensing

Enclosure:
As stated

cc: See next page

8202120284

MIDLAND

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Consumers Power Company
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U.S. Nuclear Regulatory Commission
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Geotechnical Engineers, Inc.
ATTN: Dr. Steve J. Poulos
1017 Main Street
Winchester, Massachusetts 01890

To	File 0485.16	
From	GSKeeley, P-14-113B GSKeeley	CONSUMERS POWER COMPANY
Date	November 4, 1981	
Subject	MIDLAND PROJECT - DISCUSSION WITH STAFF AND PRESENTATION OF SEISMIC MODELS FOR AUX BUILDING AND SERVICE WATER PUMP STRUCTURE ON OCTOBER 2, 1981 - FILE 0485.16, B3.7 SERIAL 14968	Internal Correspondence

CC AJBoos, Bechtel
MIMiller, IL&B-Chicago
NWSwanberg, Bechtel
FWilliams, IL&B-Washington
JWCook, P-26-336B (w/o att)
JEBrunner, M-1079
RWHuston, Washington (4)
TJSullivan/DMBudzik, P-24-517A
TRThiruvengadam, P-14-400

Attendees:

Consumers Power Company	NRC	Bechtel
D Budzik	M Bloom*	C McConnel
B Henley	A Hodgen*	B Shunmugavel
G Keeley	D Hood	N Swanberg
T Thiruvengadam	J Kane	
	R Landsmann*	
	W Paton*	
	F Rinaldi	

Consultants

J Grundstrom, Corps of Engineers
J Matra, Naval Surface Weapons Center
H Singh, Corps of Engineers
D Wesley, Structural Mechanics Associates
F Williams, Isham, Lincoln & Beale

* Part time

PRINCIPAL AGREEMENTS:

Consumers Power Company and Bechtel provided a summary presentation of the seismic models for the Midland Auxiliary Building and Service Water Pump Structure (SWPS) which were transmitted to the NRC by J W Cook to H R Denton memo of September 30, 1981. The viewgraphs used for this presentation are attached.

Consumers Power Company concluded by stating that the results of the new analysis are comparable to the original analysis presented in the FSAR, the present model is more detailed than the model in the FSAR, but the basic criteria and techniques are the same. Production work with the seismic models is starting. It is Consumers' position that the present submittal complies with the Board's requirement in the prehearing conference.

The staff had the following questions regarding the presentation:

ic1181-0902a112

Question 1: What percentage of geometric damping was used?

Answer: Geometric damping is cut off at 10% for horizontal and full damping is used for vertical as discussed in the FSAR and BC-TPO-4A.

Question 2: Is there any vibration in torsional modes for the SWPS?

Answer: The torsional mode is not significant. No torsional excitation is included in the model.

Question 3: Is the SWPS underpinning wall on three sides?

Answer: Yes.

Question 4: How is the Site Specific Response Spectra (SSRS) being factored into the analysis?

Answer: The forces due to the SSE specified in the FSAR generated with the use of the new seismic models are multiplied by 1.5 for design of the underpinning. The use of 1.5 times the FSAR earthquake will permit new structures to meet the SSRS. The remaining structures and equipment will be checked with the new seismic models for the FSAR earthquake.

A seismic margin review will be used for the new SSRS and has been discussed in a letter from J W Cook to H R Denton, September 25, 1981.

Question 5: What is the frequency of the Borated Water Storage Tank (BWST)?

Answer: This will be provided with the BWST model to be presented during the first week of November 1981.

Question 6: Which structures will use the top of fill spectra for the SSRS?

Answer: Diesel Generator Building and Borated Water Storage Tanks.

Question 7: What about the Diesel Fuel Oil Tanks?

Answer Their response is small, and the method of analysis will be similar to buried piping.

Question 8: Will the Board rule on the seismic margin review at the soils hearings?

Answer: It is Consumers Power's position that the issue of seismic margin review for the new SSRS should be reviewed during the OL hearings since the work on this item is yet to be started. However, the issue could be raised during the soils hearings.

Question 9: Has the applicant considered extending the hump of the FSAR earthquake to 7.1 CPS for the SWPS vertical mode?

ic1181-0902a112

Answer: It is not expected that the vertical mode will produce high loads, and most probably the effect of the hump will be picked up in the analysis considering the variation of the soil modulus.

Question 10: Does the ± 50% apply to the soil shear modulus?

Answer: Yes.

Question 11: Are the soil springs and dampers based on an equivalent area of the building footprint?

Answer: For the soil springs, an equivalent rectangle is used. For dampers, an equivalent circle is used. Details are provided in the submittal.

After a caucus with the staff, D Hood stated that the staff believes they have a favorable reaction. The remedial actions proposed are an improvement over previous proposals. Timing on the review is a problem. The staff's ability to meet the schedule was explored, and the staff has placed Midland on a priority review basis.

Ongoing discussions are needed on calculational results of the auxiliary building and the concrete cracking.

Assuming that the presentations reflect the submittal, the staff agreed that they have enough information to complete a construction permit level review of seismic model for Aux. Bldg.

It is difficult for the staff to conduct a review and also take part in hearings. The NRC recognizes that Midland has an ambitious schedule for hearings and the operating license safety evaluation report and that ~~their~~ NRCs review is now on the critical path for the licensing and construction of the underpinning.

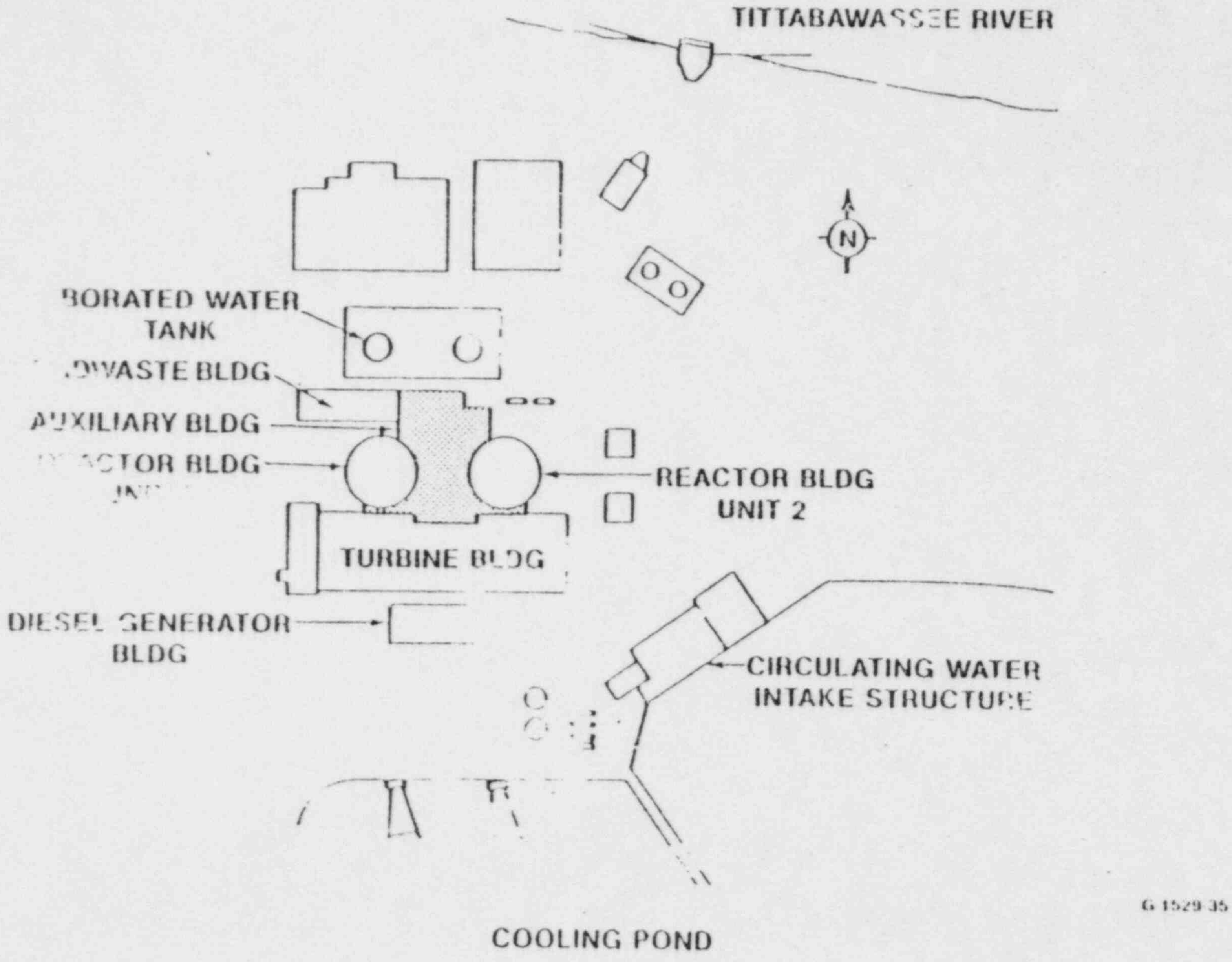
The staff has a large number of reports to review and will provide a schedule for review on October 7, 1981.

DYNAMIC MODELS

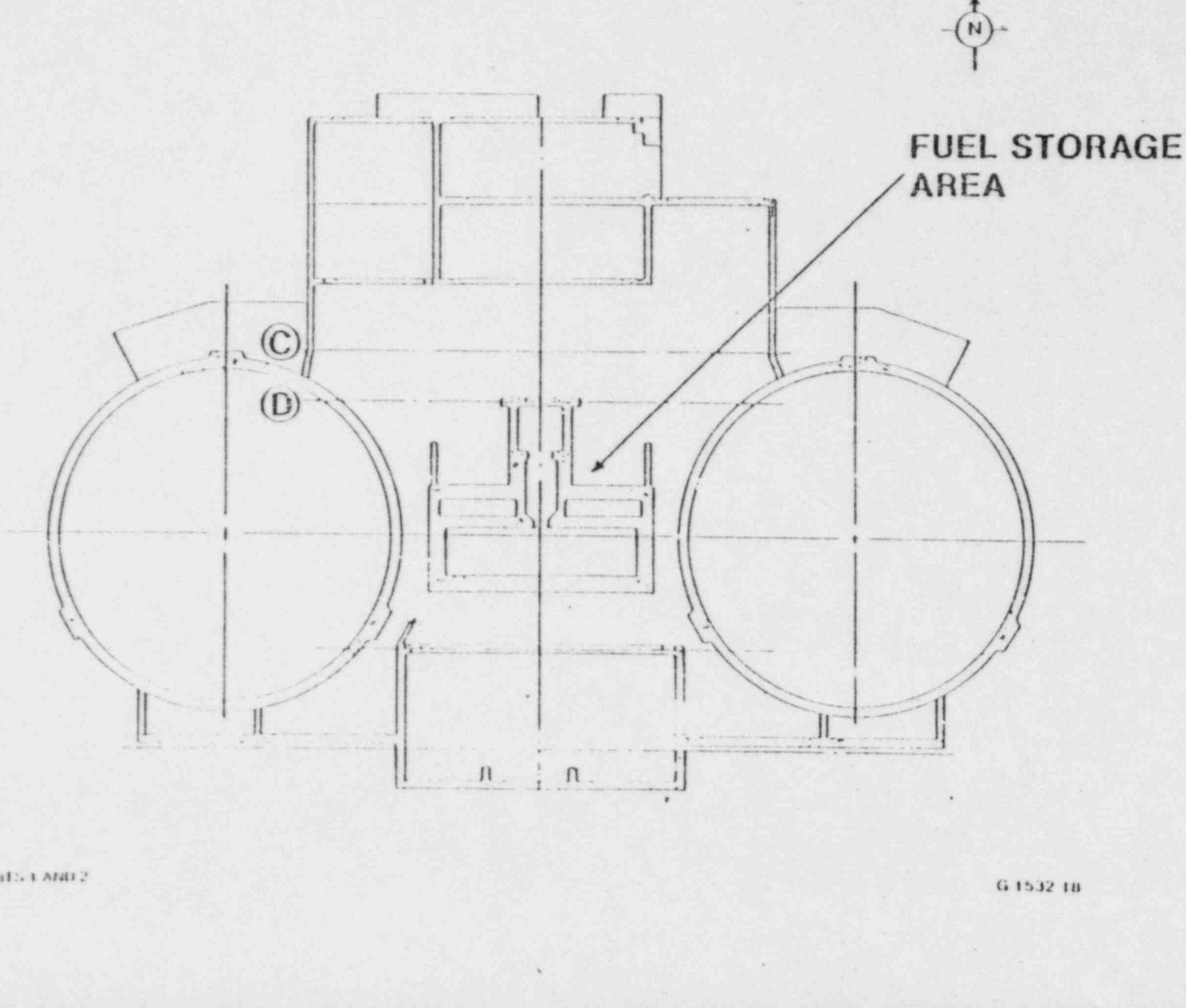
1. INTRODUCTION
   A) NEED FOR ANALYSIS
   B) UNDERPINNING SCHEME
2. METHODOLOGY (3D MODEL AND CRITERIA)
3. MODEL DESCRIPTION
4. SOIL STRUCTURE INTERACTION
5. CONCLUSIONS

SEPTEMBER 29, 1981

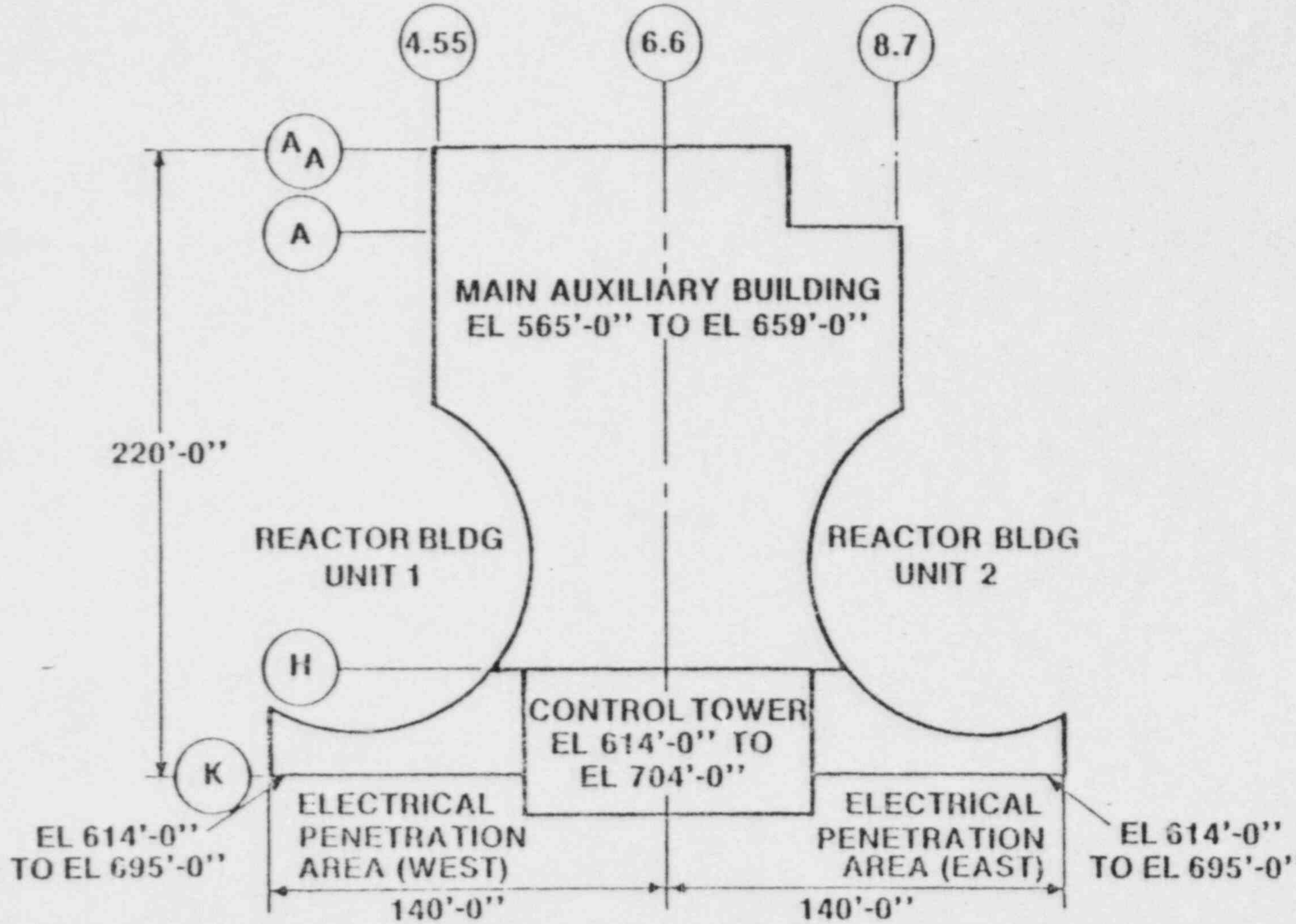
MIDLAND SITE PLAN



AUXILIARY BUILDING
PLAN AT EL 634'-6"



AUXILIARY BUILDING
SCHEMATIC PLAN

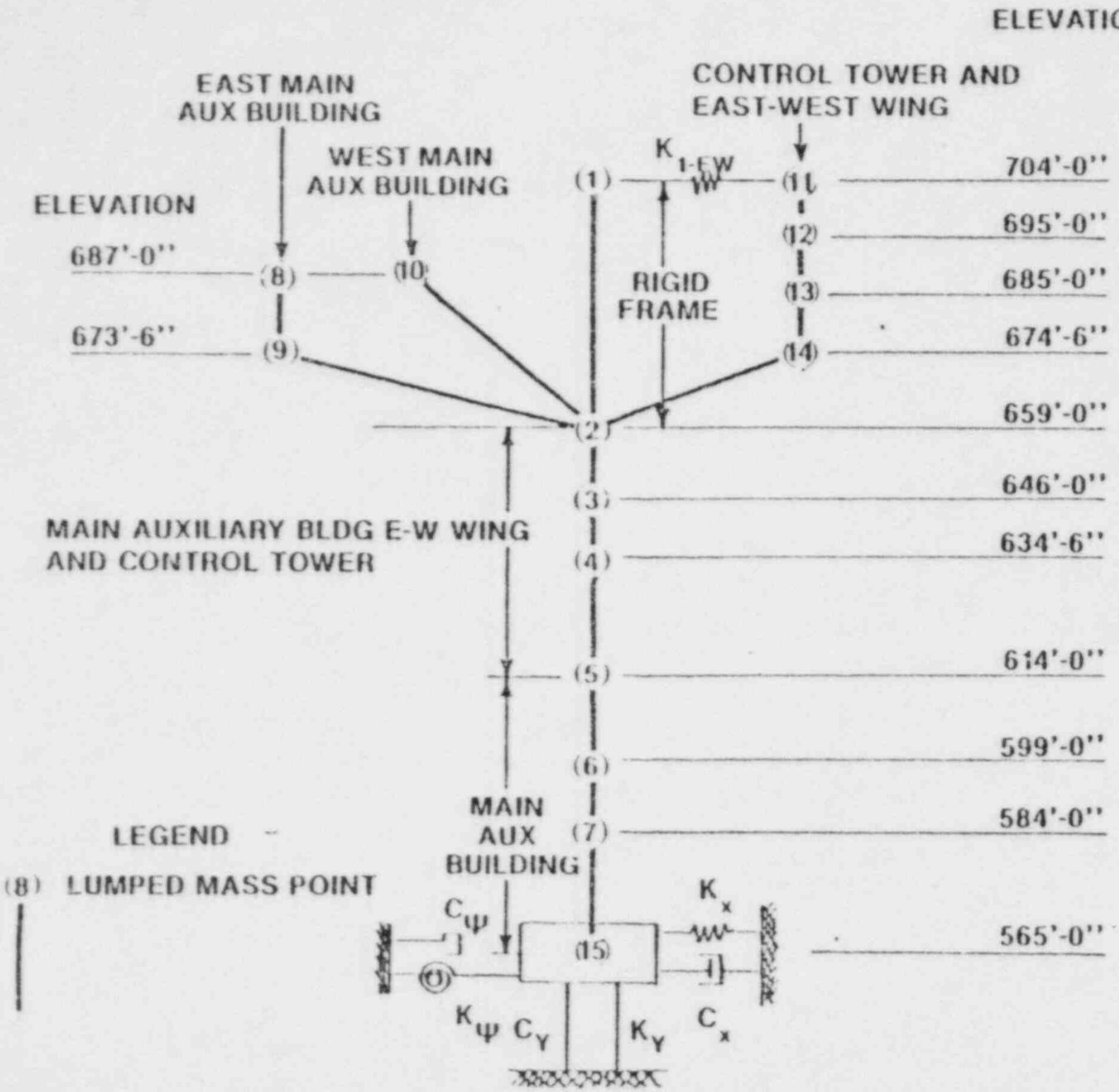


SOIL-STRUCTURE INTERACTION

- LUMPED PARAMETER REPRESENTATION
- BASED ON RIGID MAT ON ELASTIC HALF-SPACE
    - Soil Springs
    - Soil Dampers
- COMPOSITE DAMPING
    - Matching Dynamic Amplification Factor
    - Limited to 10% for All Modes Except Those Associated with Rigid Body Motion

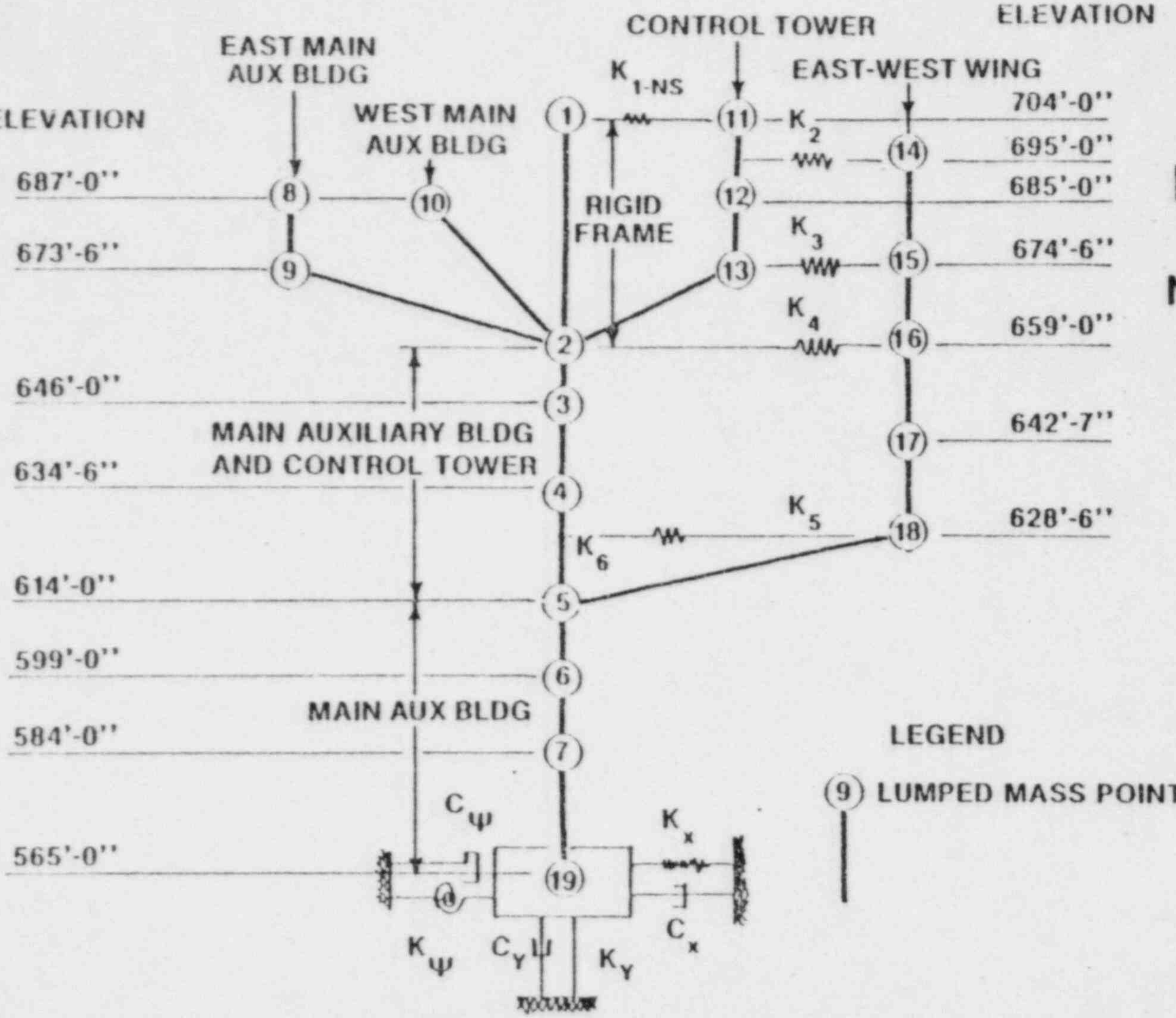
AUXILIARY BUILDING MATHEMATICAL MODEL

EAST-WEST EARTHQUAKE AND VERTICAL



FSAR FIGURE 3.7-11

AUXILIARY BUILDING
MATHEMATICAL MODEL
North-South Earthquake

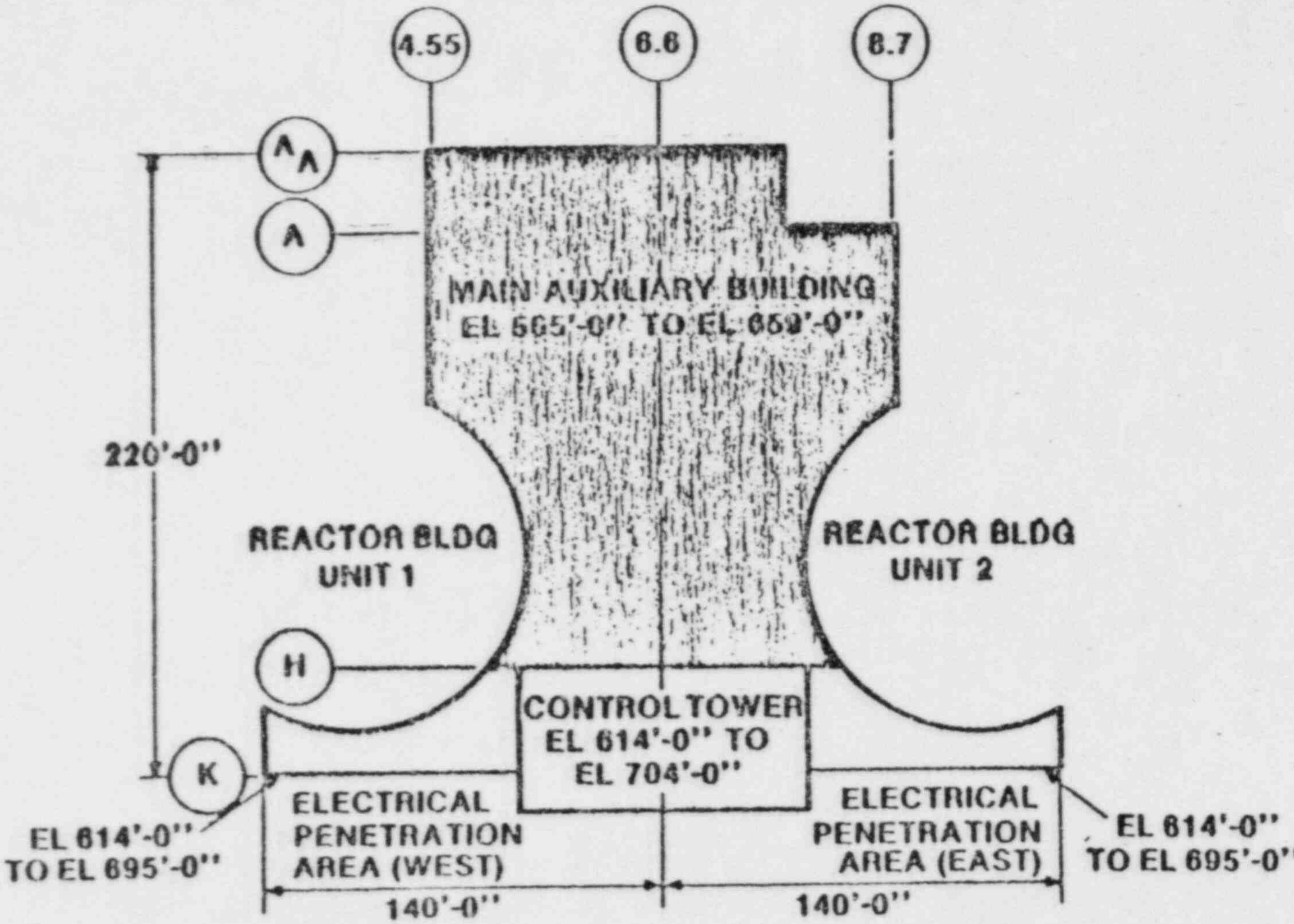


FSAR FIGURE 3.7-10

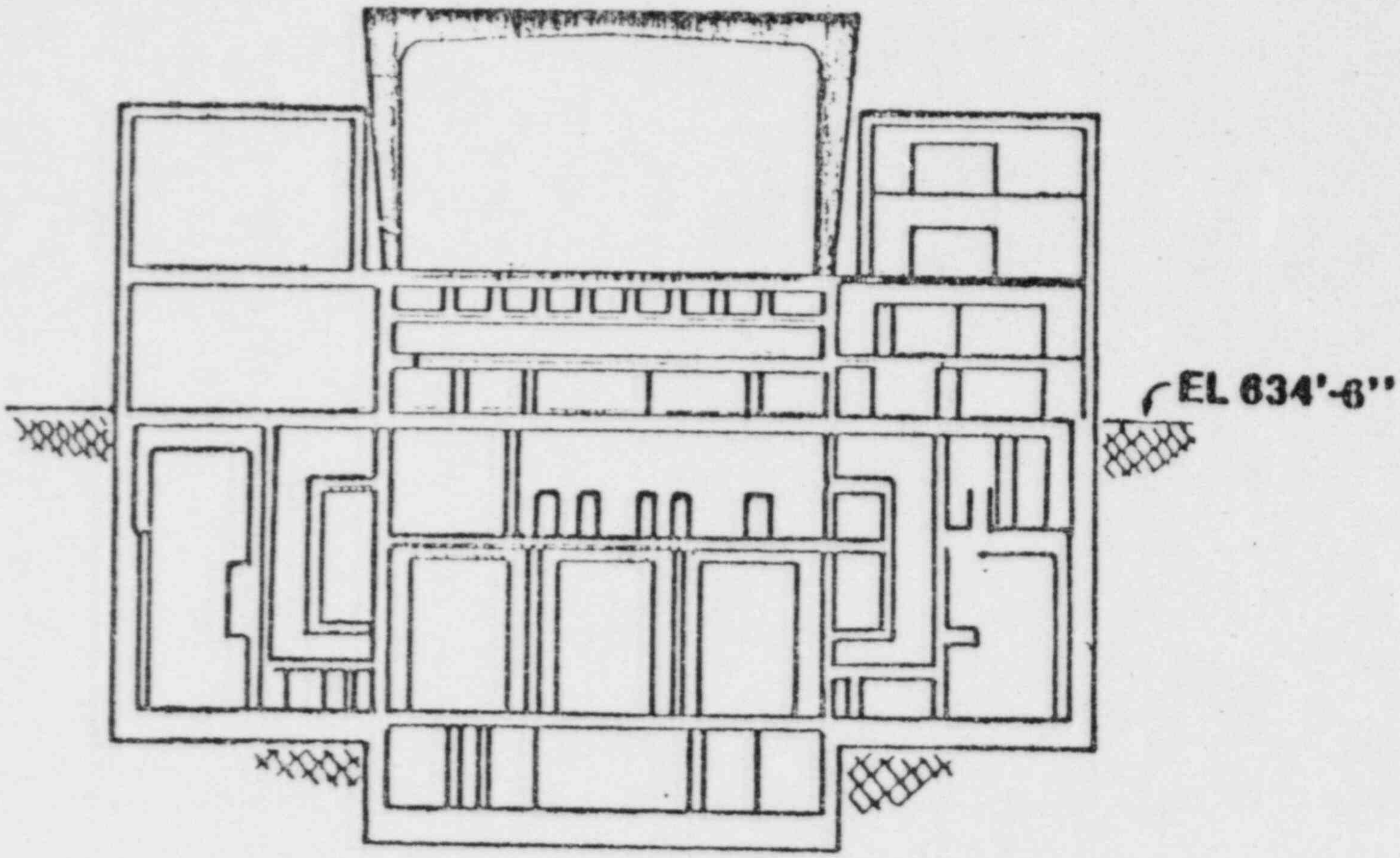
AUXILIARY BUILDING
SEISMIC ANALYSIS

- STRUCTURE GEOMETRY
- SOIL PROPERTIES
- DYNAMIC MODEL
- SOIL/STRUCTURE INTERACTION
- RESULTS

AUXILIARY BUILDING
SCHEMATIC PLAN



AUXILIARY BUILDING
SECTION LOOKING NORTH



SECTION A

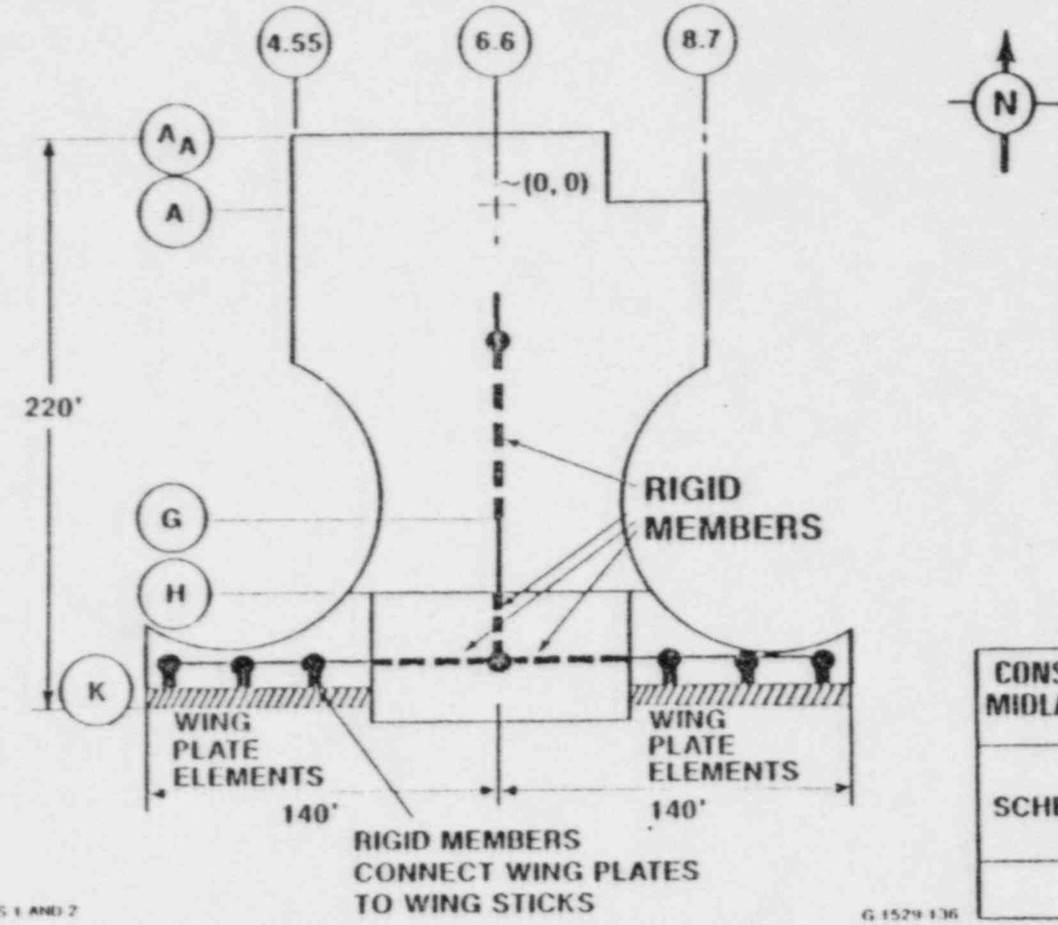
AUXILIARY BUILDING
SEISMIC ANALYSIS
FOUNDATION SOIL PROPERTIES

	Natural	Railroad Bay Area
• Nominal Dynamic Shear Modulus (ksf)	7,746	2,165
• Poisson Ratio	0.42	0.4
• Unit Weight (pcf)	135	120

AUXILIARY BUILDING
SEISMIC ANALYSIS
DYNAMIC MODEL

- THREE-DIMENSIONAL LUMPED MASS STICK MODEL
  - Masses Located at Floor Elevation
  - Beam Elements
  - Plate Elements
  - Rigid Beam Elements

AUXILIARY BUILDING
SCHEMATIC PLAN
(With Conceptual Seismic Model)



MIDLAND UNITS 1 AND 2
BEC 9/8/81

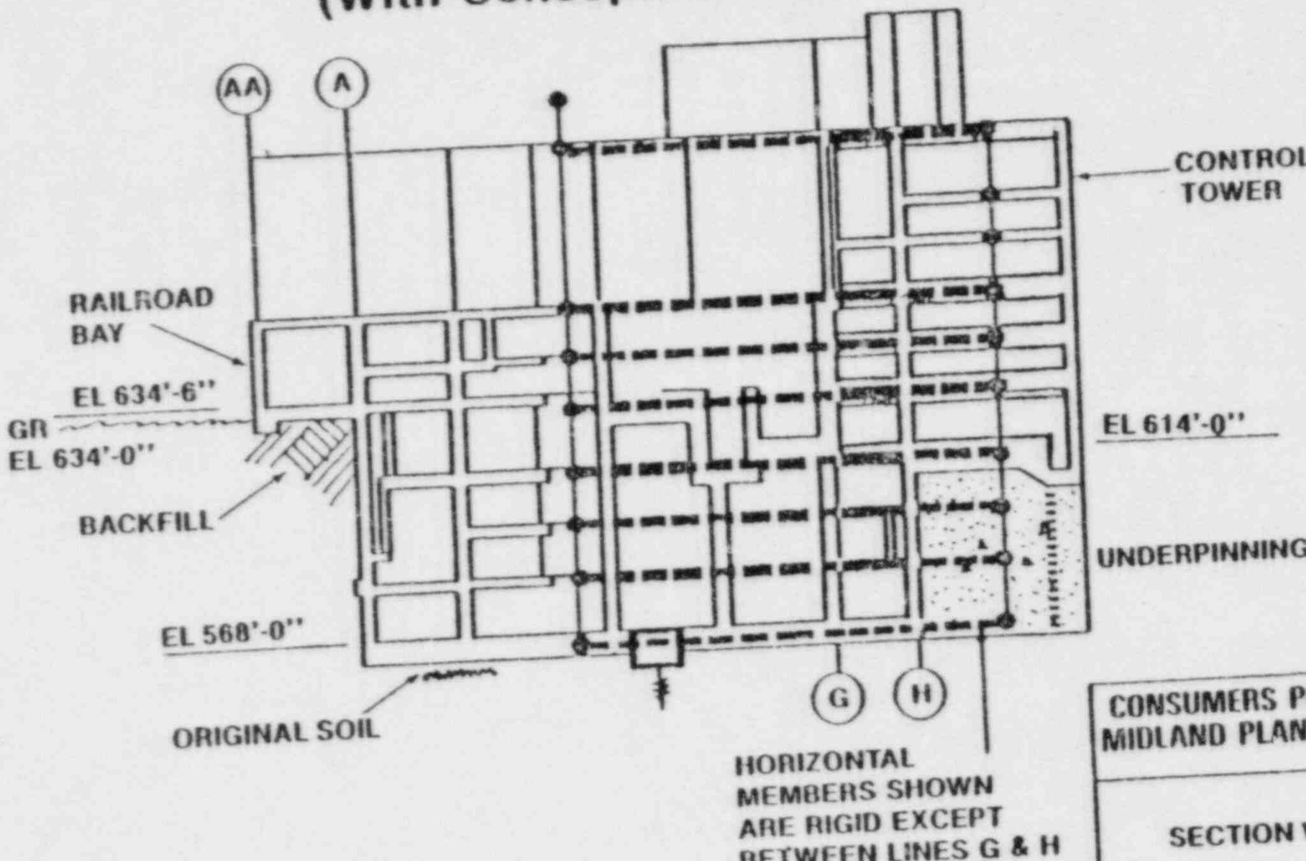
G 1529 136

CONSUMERS POWER COMPANY MIDLAND PLANT UNITS 1 AND 2
SCHEMATIC PLAN WITH MODEL
FIGURE 2

AUXILIARY BUILDING

TYPICAL SECTION LOOKING EAST

(With Conceptual Seismic Model)

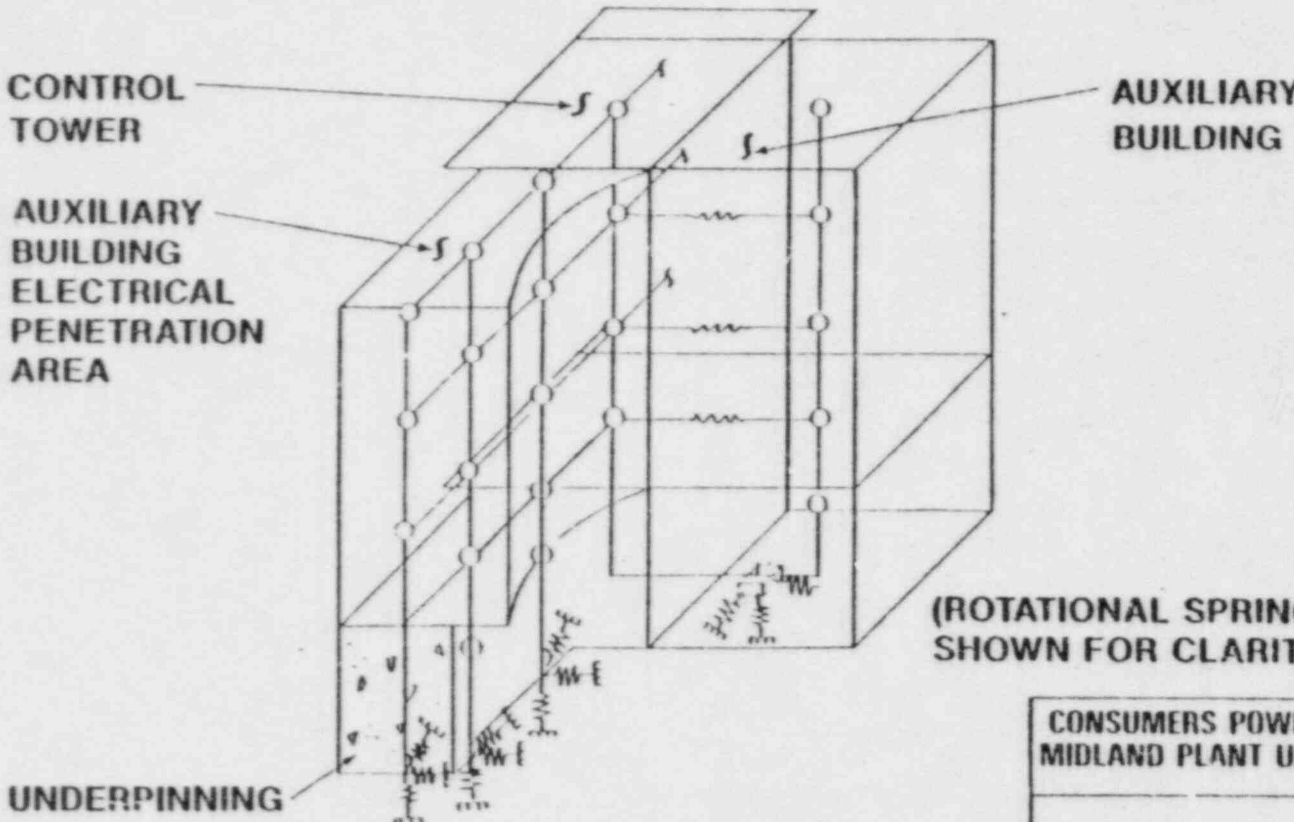


CONSUMERS POWER COMPANY MIDLAND PLANT UNITS 1 AND 2
SECTION WITH MODEL
FIGURE 3

G 1529 134

MIDLAND UNITS 1 AND 2
BEC 9/8/81

AUXILIARY BUILDING
(With Conceptual Seismic Model)



(ROTATIONAL SPRINGS NOT SHOWN FOR CLARITY)

CONSUMERS POWER COMPANY MIDLAND PLANT UNITS 1 AND 2
ROUGH 3-D MODEL
FIGURE 4

MIDLAND UNITS 1 AND 2

G-1529-133

AUXILIARY BUILDING
SEISMIC ANALYSIS
SOIL/STRUCTURE INTERACTION

- ELASTIC HALF-SPACE IMPEDANCE FUNCTIONS (BC-TOP-4, Rev 3)
  - Equivalent Foundation Soil Properties
  - Equivalent Foundation Area
- SOIL MATERIAL DAMPING (3% of critical)
- EMBEDMENT INFLUENCE (Appendix A)
- DISTRIBUTION OF GLOBAL SPRINGS

AUXILIARY BUILDING

EQUIVALENT SOIL PROPERTIES

- ROCKING

  - $$E_{EQUIV} = \frac{I_N E_N + I_F E_F}{I_{TOTAL}}$$

  - I_N - Moments of Inertia of Foundation Surface in Contact with In Situ Material

  - I_F - Moment of Inertia of Foundation Surface in Contact with Fill Material

  - E_N - Nominal Dynamic Elastic Modulus of In Situ Material

  - E_F - Nominal Dynamic Elastic Modulus of Fill Material

AUXILIARY BUILDING

EQUIVALENT SOIL PROPERTIES (cont'd)

- TRANSLATION (horizontal)

  - $$E_{EQUIV} = \frac{A_N E_N + A_F E_F}{A_{TOTAL}}$$

  - A_N - Area of Foundation Surface in Contact with In Situ Material

  - A_F - Area of Foundation Surface in Contact with Fill Material

  - E_N - Dynamic Elastic Modulus of In Situ Material

  - E_F - Dynamic Elastic Modulus of Fill Material

AUXILIARY BUILDING
SEISMIC ANALYSIS
EQUIVALENT FOUNDATION AREA

- RECTANGLE

$$I = \frac{bh^3}{12} \qquad A = bh$$

Since A and I are known

$$h = \left(\frac{12\,I}{A}\right)^{1/2}$$

$$b = \frac{A}{h}$$

- EQUIVALENT RECTANGLE IS h × b

AUXILIARY BUILDING
SEISMIC ANALYSIS
EMBEDMENT INFLUENCE
(Appendix A of Report)

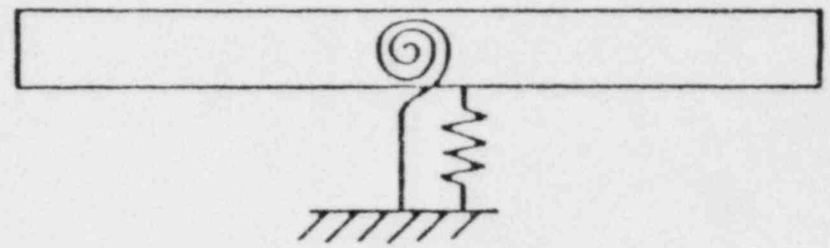
- BASIC EQUATION

$$K'_{ii} = K_{ii}\left[1 + (\alpha_{ii} - 1)\frac{G_1}{G_2} f\right]$$

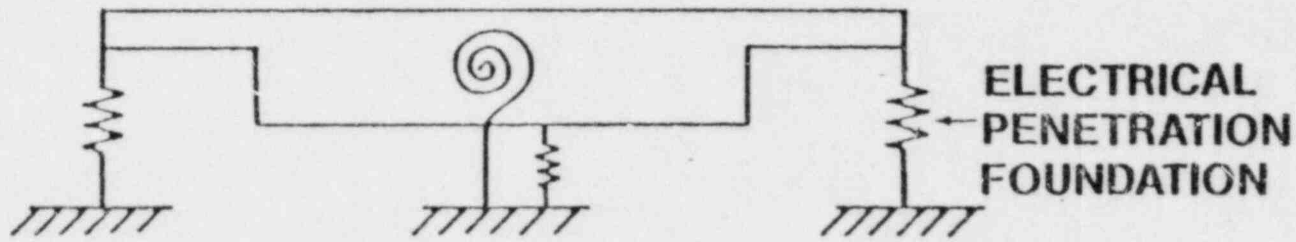
K'_{ii}	=	Elastic Half-Space Spring Adjusted for the Influence of Embedment
K_{ii}	=	Elastic Half-Space Spring
α_{ii}	=	Influence of Full Side Contact
G_1	=	Shear Modulus of Soil Along Building Sides
G_2	=	Shear Modulus of Foundation Soil
f	=	Adjustment for Partial Side Contact

AUXILIARY BUILDING

DISTRIBUTION OF SOIL SPRINGS



ELASTIC HALF-SPACE SPRINGS

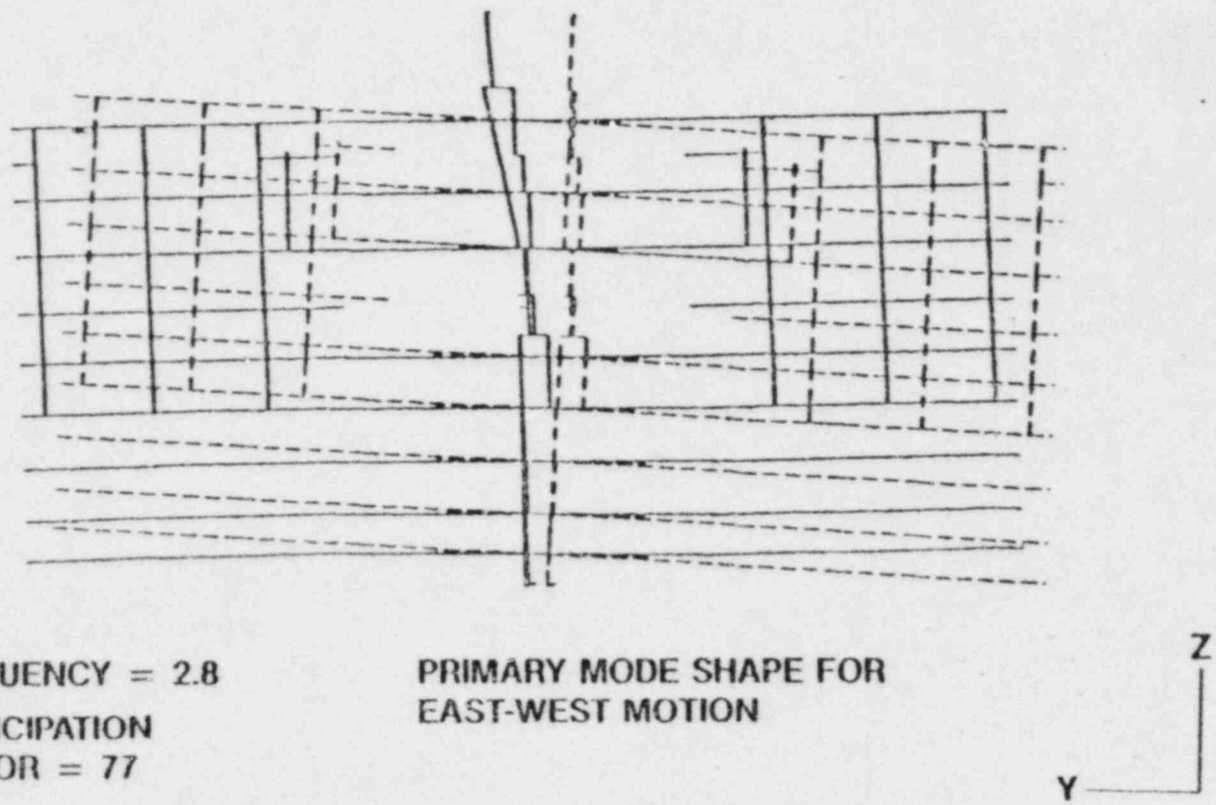


DISTRIBUTED SPRINGS

AUXILIARY BUILDING
SEISMIC ANALYSIS
RESULTS

- STRUCTURAL BEHAVIOR
  - Primary Frequencies
  - Primary Mode Shapes

AUXILIARY BUILDING
RESULTS



FREQUENCY = 2.8

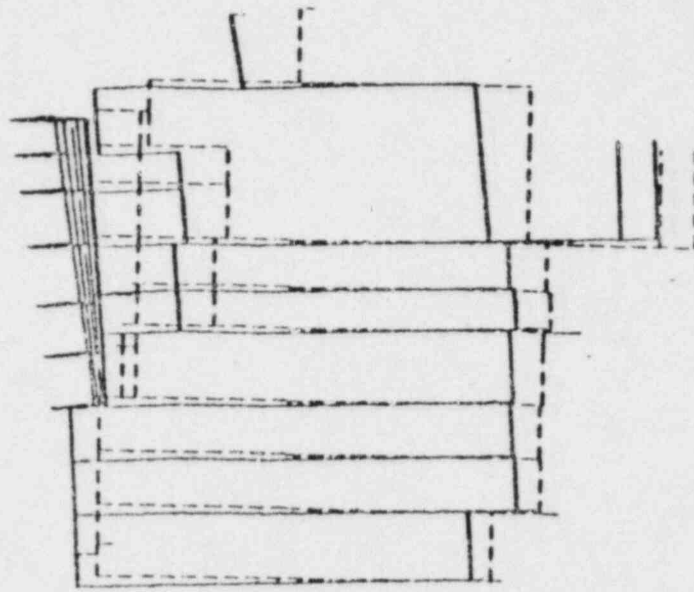
PARTICIPATION FACTOR = 77

PRIMARY MODE SHAPE FOR EAST-WEST MOTION

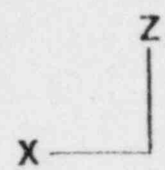
AUXILIARY BUILDING
RESULTS

FREQUENCY = 2.9

PARTICIPATION FACTOR = 78



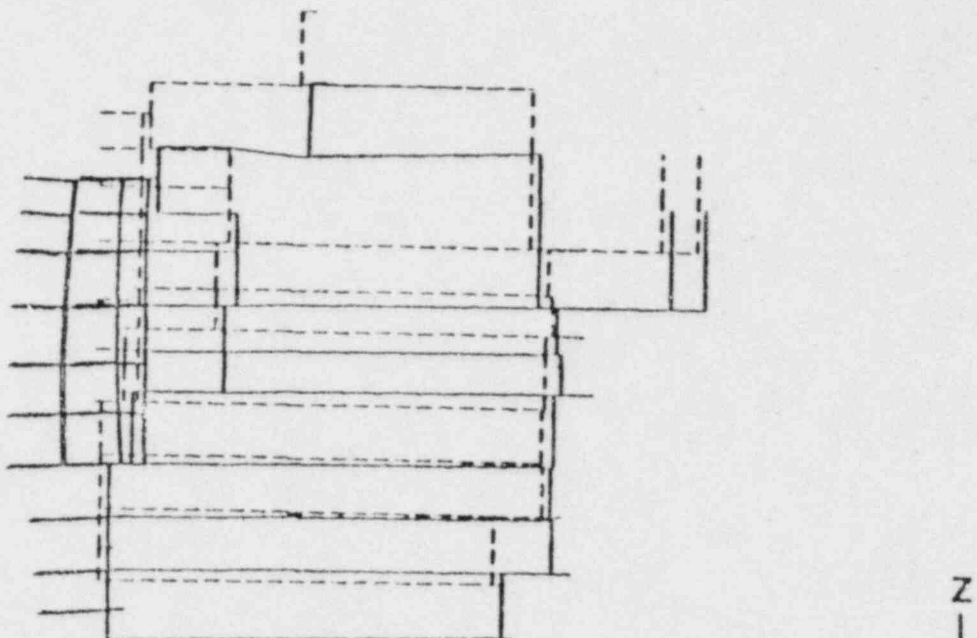
PRIMARY MODE SHAPE FOR NORTH-SOUTH MOTION



AUXILIARY BUILDING
RESULTS

FREQUENCY = 4.2

PARTICIPATION FACTOR = 78



PRIMARY MODE SHAPE FOR VERTICAL MOTION

AUXILIARY BUILDING
RESULTS

- **BUILDING FORCES**
  - Based on Nominal Soil Properties, with Variation of ±50%
  - Mode-byMode Response

    Combined in accordance with NRC Regulatory Guide 1.92

- **IN-STRUCTURE SPECTRA**
  - Based on Nominal Soil Properties
  - Broadening

    At least ±15% in accordance with Regulatory Guide 1.122

PROPOSED REVISION TO FSAR APPENDIX 3C

COMPUTER PROGRAMS USED IN SEISMIC ANALYSIS OF AUXILIARY BUILDING AND SERVICE WATER PUMP STRUCTURE

RESPONSE SPECTRUM METHOD

TITLE	PURPOSES
BECHTEL STRUCTURAL ANALYSIS PROGRAM (BSAP - CE 800)	SOLVES EIGENVALUE PROBLEM AND CALCULATES STRUCTURAL MODAL DAMPING FOR "FIXED" BASE STRUCTURE RESPONSE SPECTRUM ANALYSIS BY MODAL SUPERPOSITION
BECHTEL STRUCTURAL ANALYSIS PROGRAM (BSAP-DYNAM CE207)	COMPUTES COMPOSITE MODAL DAMPING FOR LUMPED PARAMETER SOIL-STRUCTURE INTERACTION PROBLEM

PROPOSED REVISION TO FSAR APPENDIX 3C

COMPUTER PROGRAMS USED IN SEISMIC ANALYSIS OF AUXILIARY BUILDING AND SERVICE WATER PUMP STRUCTURE

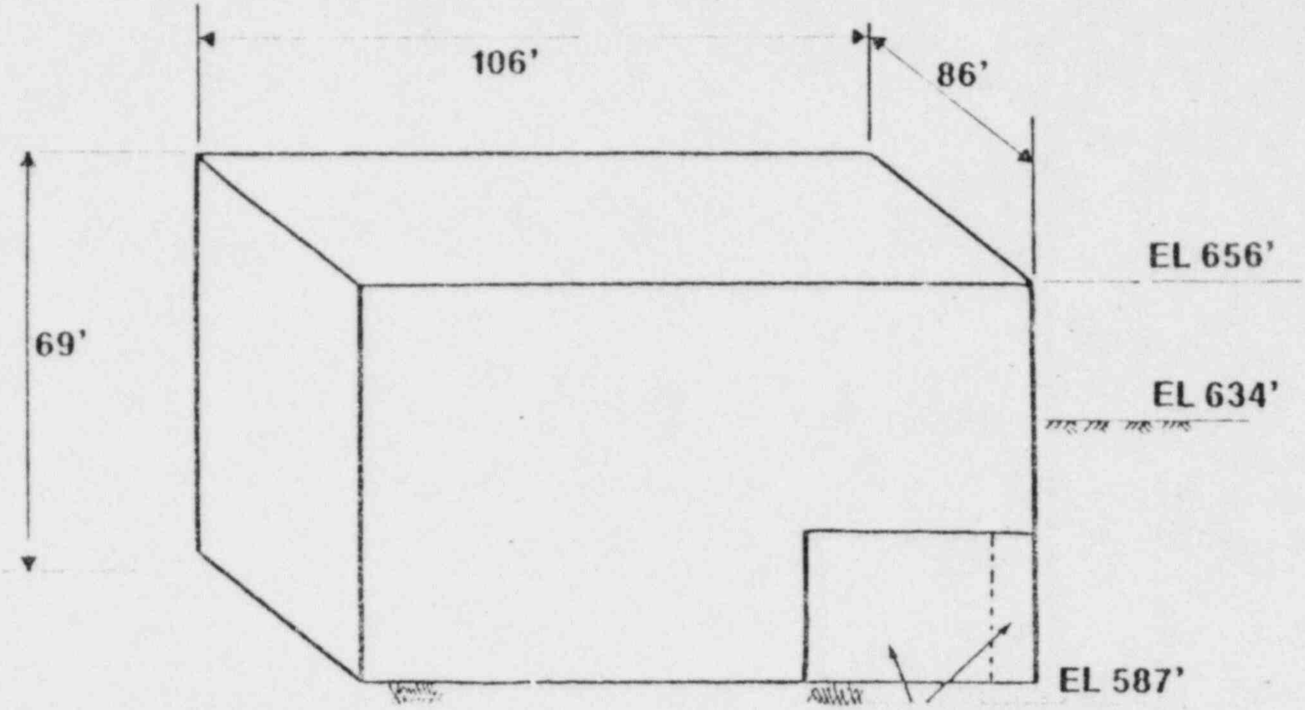
TIME HISTORY ANALYSIS

TITLE	PURPOSES
BECHTEL STRUCTURAL ANALYSIS PROGRAM (BSAP CE800)	SOLVES EIGENVALUE PROBLEM AND CALCULATES STRUCTURAL MODAL DAMPING FOR "FIXED" BASE STRUCTURE TIME HISTORY ANALYSIS BY MODAL SUPERPOSITION
BECHTEL STRUCTURAL ANALYSIS PROGRAM (BSAP-DYNAM CE 207)	COMPUTES COMPOSITE MODAL DAMPING FOR LUMPED PARAMETER SOIL-STRUCTURE INTERACTION PROBLEM
SPECTRA (CE 802)	COMPUTES RESPONSE SPECTRA

SERVICE WATER PUMP STRUCTURE
SEISMIC ANALYSIS

- STRUCTURAL GEOMETRY
- SOIL PROPERTIES
- DYNAMIC MODEL
- SOIL/STRUCTURE INTERACTION
- RESULTS

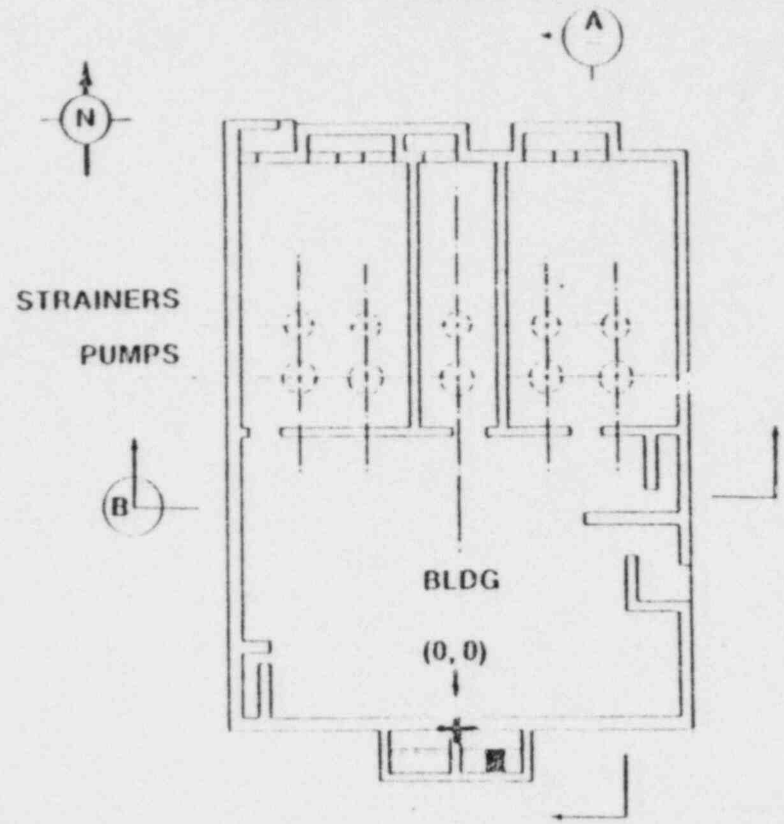
SERVICE WATER PUMP STRUCTURE



CONSUMERS POWER COMPANY MIDLAND PLANT UNITS 1 AND 2
SERVICE WATER PUMP STRUCTURE SCHEMATIC VIEW
FIGURE 1

G-1858-02
(G-1530-15)

SERVICE WATER PUMP STRUCTURE
PLAN AT EL 634'-6"



CONSUMERS POWER COMPANY
MIDLAND PLANT UNITS 1 AND 2

SERVICE WATER
PUMP STRUCTURE
PLAN

FIGURE 2

G 1858 03
(G 1530 19)

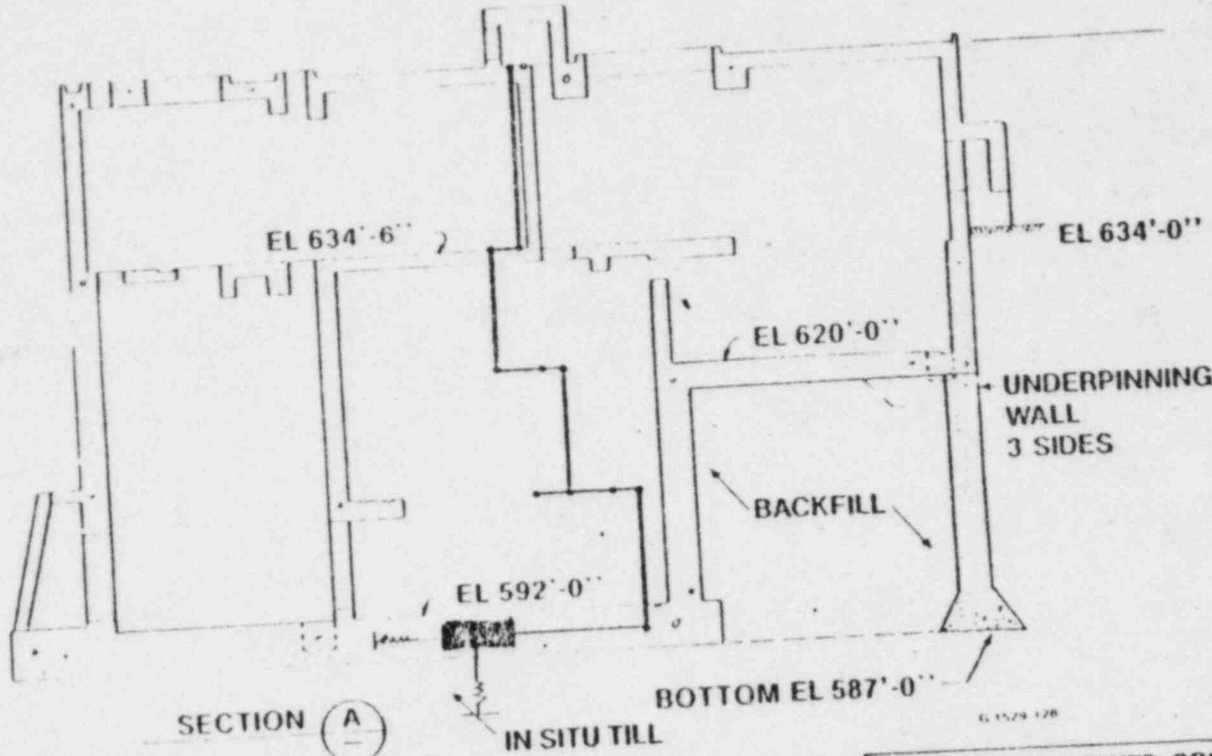
SERVICE WATER PUMP STRUCTURE
SEISMIC ANALYSIS
FOUNDATION SOIL PROPERTIES

	Natural
• Nominal Dynamic Shear Modulus (ksf)	7,746
• Poisson Ratio	0.42
• Unit Weight (pcf)	135

SERVICE WATER PUMP STRUCTURE
SEISMIC ANALYSIS
DYNAMIC MODEL

- THREE-DIMENSIONAL LUMPED MASS MODEL
  - Mass Located at Floor Elevations
  - Beam Elements
  - Rigid Beam Elements

SERVICE WATER PUMP STRUCTURE
SECTION A



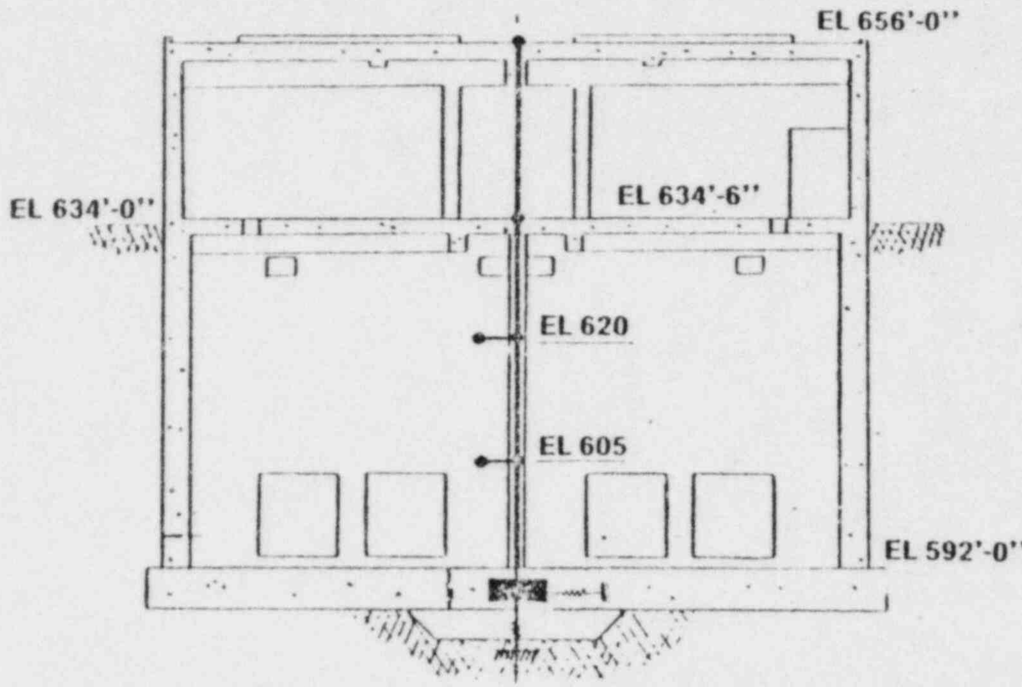
CONSUMERS POWER COMPANY
MIDLAND PLANT UNITS 1 AND 2

SERVICE WATER
PUMP STRUCTURE
NORTH-SOUTH SECTION

FIGURE 3

G 1858 04

SERVICE WATER PUMP STRUCTURE
SECTION B



SECTION B

CONSUMERS POWER COMPANY
MIDLAND PLANT UNITS 1 AND 2

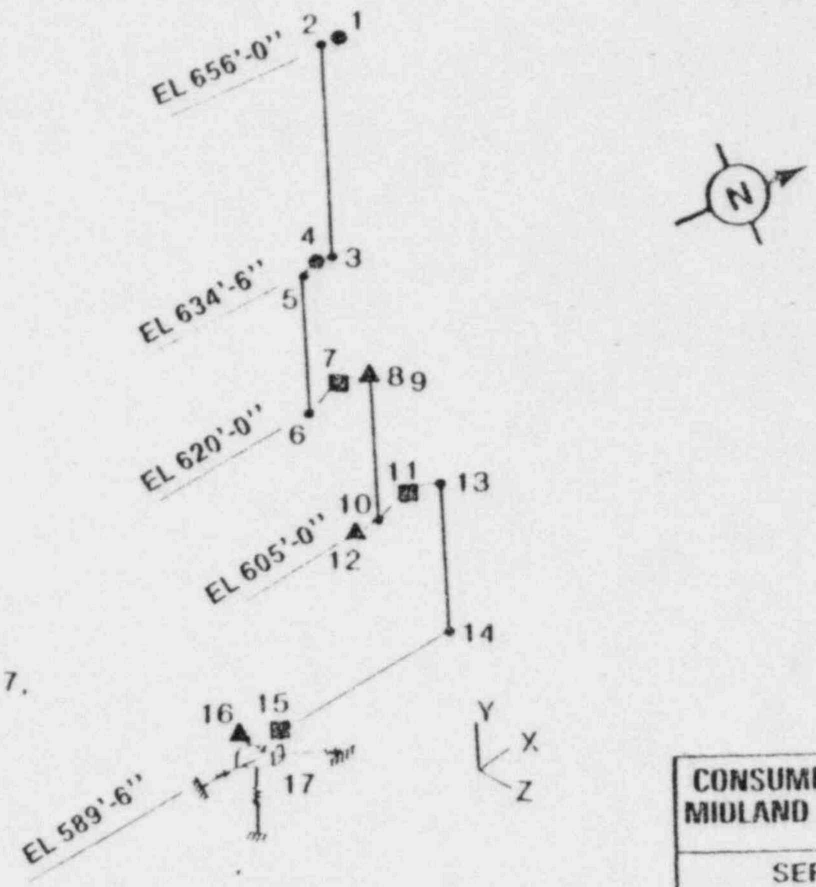
SERVICE WATER
PUMP STURCTURE
EAST-WEST VIEW

FIGURE 4

G-1858-05

LEGEND

- • Node locations
- Mass for all 3 degrees of freedom
- Mass for two horizontal degrees of freedom
- ▲ Mass for vertical degree of freedom
- Base location. Damper rotational springs not shown for clarity



NOTES:

1. The mass of the water is lumped at mass points 7, 11, and 15 horizontally and at mass point 16 vertically.
2. The mass of the fill entrapped within the underpinning walls is lumped at mass points 7, 11, and 15 for the two horizontal degrees of freedom only.

CONSUMERS POWER COMPANY MIDLAND PLANT UNITS 1 AND 2
SERVICE WATER PUMP STRUCTURE NODE LAYOUT
FIGURE 5

G-1858-01

SERVICE WATER PUMP STRUCTURE
SEISMIC ANALYSIS
SOIL/STRUCTURE INTERACTION

- ELASTIC HALF-SPACE IMPEDANCE FUNCTIONS (BC-TOP-4, Rev 3)
  - Equivalent Foundation Area

- SOIL MATERIAL DAMPING (3% of critical)

- EMBEDMENT INFLUENCE (Appendix A)

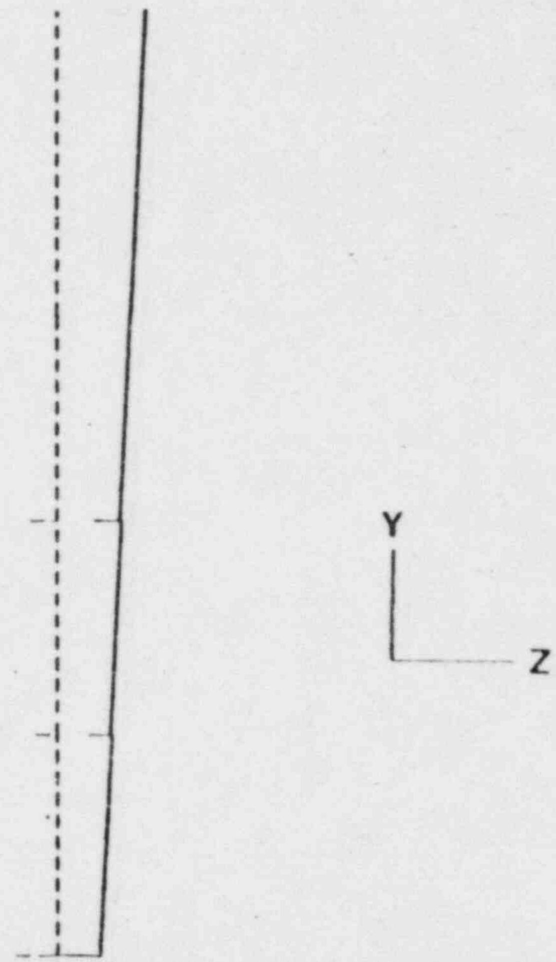
SERVICE WATER PUMP STRUCTURE
RESULTS

- STRUCTURE BEHAVIOR
  - Primary Frequency
  - Primary Modes Shapes

SERVICE WATER PUMP STRUCTURE
RESULTS

FREQUENCY = 4.8

PARTICIPATION
FACTOR = 36

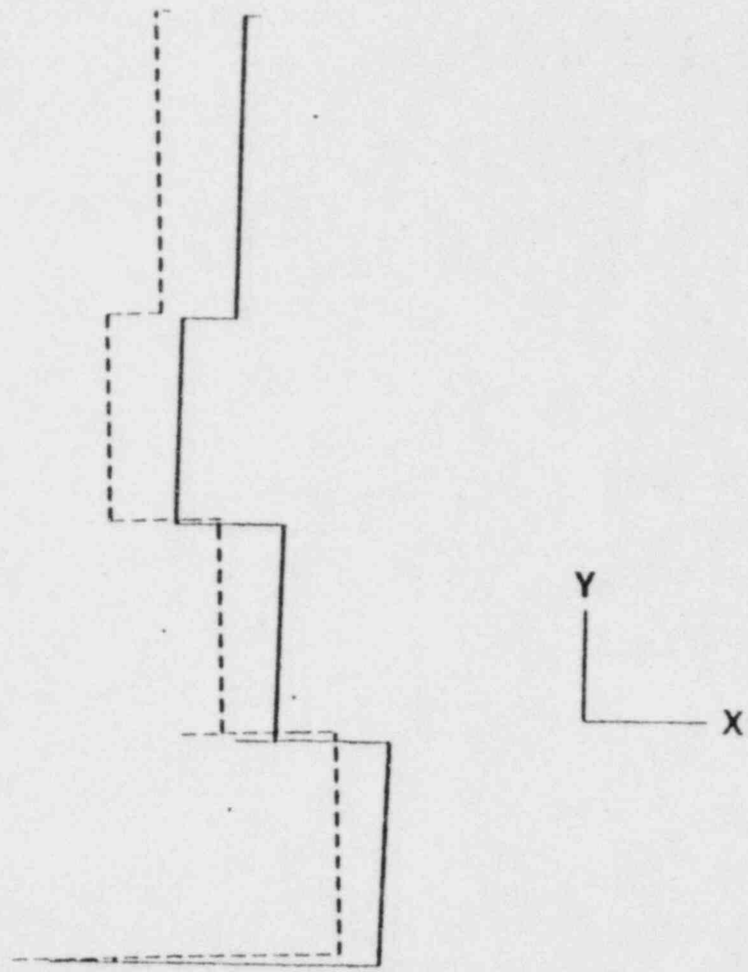


**PRIMARY MODE SHAPE FOR
EAST-WEST MOTION**

SERVICE WATER PUMP STRUCTURE
RESULTS

FREQUENCY = 4.9

PARTICIPATION
FACTOR = 37

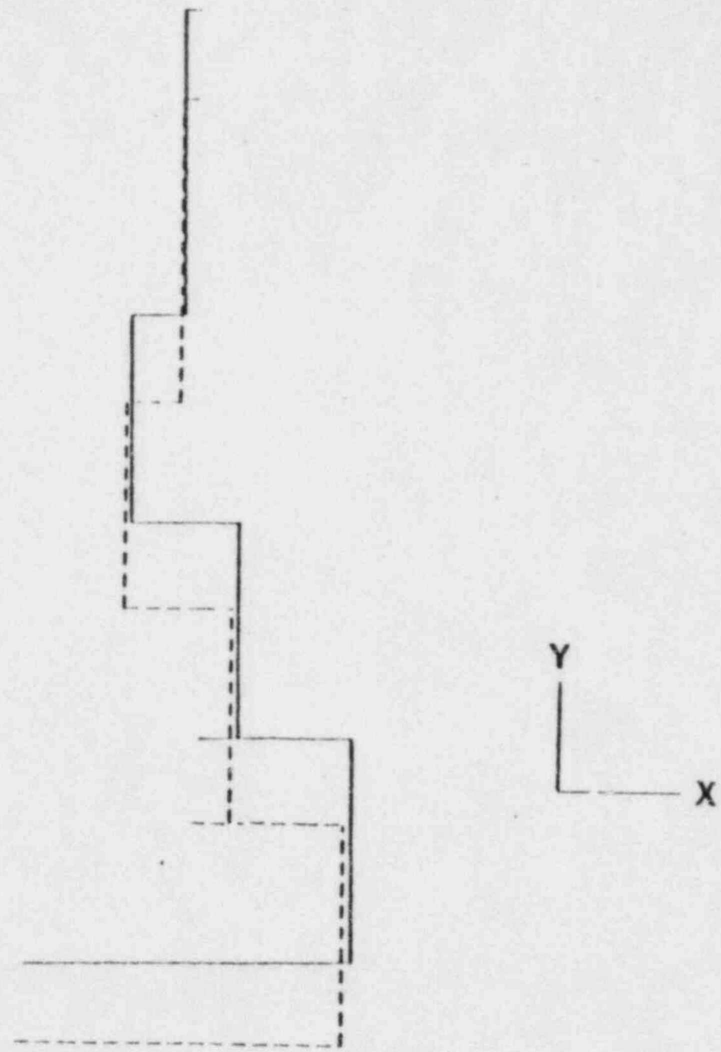


PRIMARY MODE SHAPE FOR
NORTH-SOUTH MOTION

SERVICE WATER PUMP STRUCTURE
RESULTS

FREQUENCY = 7.1

PARTICIPATION
FACTOR = 35



PRIMARY MODE SHAPE FOR
VERTICAL MOTION

SERVICE WATER PUMP STRUCTURE
RESULTS

- BUILDING FORCES
  - Based on Nominal Soil Properties, with Variation of ±50%

- IN-STRUCTURE SPECTRA
  - Based on Nominal Soil Properties
  - Broadening

    At least ±15% in accordance with Regulatory Guide 1.122

1/25/82

JAN 25 1982

Docket Nos.: 50-329/330 OM, OL

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 and 2

SUBJECT: SUMMARY OF OCTOBER 2, 1981 MEETING ON SEISMIC MODELS FOR AUXILIARY BUILDING AND SERVICE WATER PUMP STRUCTURES

On October 2, 1981, the NRC staff met in Bethesda, Maryland with Consumers Power Company and Bechtel to discuss seismic models for the Auxiliary Building and Service Water Pump Structure at Midland Plant, Units 1 and 2. Also present were several consultants for the NRC and applicant.

The presentations consisted of a review of information from the applicant's letter to the NRC dated September 30, 1981. Enclosure 1 summarizes the meeting.

Darl Hood, Project Manager
Licensing Branch #4
Division of Licensing

Enclosure:
As stated

DL:LB#4	LA:DL#4	DL:LB#4
DHood:eb	MDuncan	EAdensam
1/ /82	1/ /82	1/ /82

~~8202120284~~

1/22/82

Docket Nos.: 50-329/330 OM, OL

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 and 2

SUBJECT: SUMMARY OF OCTOBER 2, 1981 MEETING ON SEISMIC MODES FOR AUXILIARY BUILDING AND SERVICE WATER PUMP STRUCTURES

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Darl Hood, Project Manager
Licensing Branch #4
Division of Licensing

Enclosure:
As stated

cc: See next page

DL:LB#4	LA:DL:LB#4	DL:LB#4
DHood:eb	MDuncan	EAdensam
1/ /82	1/ /82	1/ /82

8202120284

7/6
9/185

MEETING SUMMARY DISTRIBUTION

JAN 19 1982

Docket File
NRC/PDR
Local PDR
TIC/NSIC/TERA
LB #4 r/f
H. Denton
E. Case
D. Eisenhut
R. Purple
B. J. Youngblood
A. Schwencer
F. Miraglia
J. Miller
G. Lainas
R. Vollmer
J. P. Knight
R. Bosnak
F. Schauer
R. E. Jackson
Attorney, OELD
OIE (3)
ACRS (16)
R. Tedesco

NRC Participants:

A. Cappucci
H. Brammer
J. Brammer (ETEC)
F. Cherny
C. Sellers
M. Hartzman
R. Bosnak
P. Huo
J. Henderson
R. Hernan

bcc: Applicant & Service List

G. Lear
S. Pawlicki
V. Benaroya
Z. Rosztoczy
W. Haass
D. Muller
R. Ballard
W. Regan
R. Mattson
P. Check
O. Parr
F. Rosa
W. Butler
W. Kreger
R. Houston
W. Gammill
L. Rubenstein
T. Speis
W. Johnston
S. Hanauer
D. Hood
F. Schroeder
D. Skovholt
M. Ernst
K. Kniel
G. Knighton
A. Thadani
D. Tondi
J. Kramer
D. Vassallo
P. Collins
D. Ziemann
F. Congel
J. Stolz
M. Srinivasan
R. Baer
C. Berlinger
E. Adensam
Project Manager R. Hernan
Licensing Assistant ~~M. Duncan~~

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

JAN 19 1982

Docket Nos. 50-329/330

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 and 2

SUBJECT: SUMMARY OF MEETING HELD WITH CONSUMERS POWER ON MIDLAND REACTOR VESSEL ANCHOR BOLTS DECEMBER 2-3, 1981

On December 2 and 3, 1982, the NRC staff met in Bethesda, Maryland with Consumers Power Company, Bechtel and Babcock & Wilcox, to discuss the status of the applicant's action relative to the previously identified problem with the Midland reactor vessel anchor bolts. This subject relates to section 3.9 of the Midland SER. A list of meeting attendees is attached as Enclosure 1.

SUMMARY

Prior to the meeting, Consumers Power submitted Report No. 3 regarding the proposed modifications to the reactor pressure vessel support system. The report had been prepared by Teledyne Engineering Services, the applicant's consultant on the broken reactor vessel anchor bolt problem. The meeting was opened with a brief history of the problem by Consumers Power. This was followed by a detailed discussion of various chapters of the Teledyne report by representatives of Babcock & Wilcox and Bechtel. The report constitutes the finalized design relative to the remedial action on the anchor bolt problem.

Although the staff did not have the opportunity to review the report prior to the meeting, the following issues were raised during the course of the meeting:

1. The multiplier used in section 3.3.7.2 of the report was 0.7. The staff does not consider this to be conservative. Consumers Power agreed to alter the value of the multiplier appropriately.

2. The staff questioned whether calculations had been made to predict buckling of the reactor vessel skirt. Consumers Power agreed to look into this aspect of the report.

3. The staff questioned the absence of derivations and detailed calculations to support the deflection curves and yield curves in Chapter 5 of the report. Consumers Power agreed to provide this information.

4. Consumers Power stated that a factor of 10 in regard to support deflection. The staff does not agree with that position on the basis of the complex shape of the associated supports, particularly the thin sections. A better definition of the associated ductility ratios was requested by the staff.

~~8202240137~~

5. The staff questioned Consumers intention to not performing any inservice inspections of the reactor vessel anchor bolts following the planned inspections in conjunction with the hot functional testing. The applicant was requested to re-evaluate their intentions in this area.

Consumers Power was requested to determine the answers to the NRC's questions in the above areas. Additional meetings may be necessary in conjunction with issuance of the Midland Safety Evaluations Report (SER), scheduled for May 1982.

It is noted that Revision 1 to Report No. 3 was forwarded to the NRC by Consumers Power on December 24, 1981. This revision incorporates requests made by the staff in the December 2-3 meeting.

Ronald W. Hernan

Ronald W. Hernan, Project Manager
Licensing Branch No. 4
Divison of Licensing

Enclosure:
As stated

ENCLOSURE 1

NRC

A. Cappucci
H. Brammer
J. Brammer (ETEC)
F. Cherny
C. Sellers
M. Hartzman
R. Bosnak
P. Kuo
J. Henderson
R. Hernan

Consumers Power

D. Budzik
W. Cloutier
R. Wells
T. Thiruvengadam
B. Henley
H. Slager

Babcock & Wilcox

R. Howard H. Baker
H. Behnke

Bechtel

J. Rutgers
M. Elgaaly
L. Davis

1/18/82

JAN 19 1982

Docket Nos. 50-329/330

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 and 2

SUBJECT: SUMMARY OF MEETING HELD WITH CONSUMERS POWER ON MIDLAND REACTOR VESSEL ANCHOR BOLTS DECEMBER 2-3, 1981

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Ronald W. Hernan, Project Manager
Licensing Branch No. 4
Divison of Licensing

Enclosures:
As stated

DL:LB#4
RHernan:eb
1/ /82

10/B5

Jun 19, 1982

Docket Nos: 50-329/330

MEMORANDUM FOR: Darrell G. Eisenhut, Director
Division of Licensing

THRU: Robert L. Tedesco, Assistant Director
for Licensing,
Division of Licensing

FROM: Elinor G. Adensam, Chief
Licensing Branch #4, DL

SUBJECT: ANTICIPATED EFFECT OF SOILS HEARINGS ON MIDLAND
FINAL SER

Issuance of the final version of the Midland SER is scheduled for May 6, 1982. ACRS meetings are expected to commence the second week in June 1982. On the basis of these two milestones, the first Supplemental SER (SSER) is scheduled for July 5, 1982. Concurrent with the OL licensing effort, as you know, a series of ASLB hearings relating to the soils settlement problems remains to be held. The soils-related hearings are presently expected to continue into early April 1982. Certain confirmatory reviews and audits relating to the soils remedial actions cannot occur before mid-May 1982.

My assessment of the impact of the soils hearings and consequential remedial actions indicates that a number of SER sections affected by the hearings cannot be prepared in time to be included in the Final SER. Input must be supplied to DL by April 6, 1982 in order to support a May 6 SER issuance date. The active involvement on the part of the reviewers in the hearing process precludes those reviewers from spending the time necessary to perform and document the required reviews by that date. In addition to the time constraints, a second problem exists in that the information available to the reviewers in certain areas (e.g. those areas involving remedial construction) at the time of SER issuance will be construction permit level information since the actual work will be far from completion. The most severely affected branch is Structural Engineering Branch (SEB) with HGEB and possibly GSB and MEB also affected. A list of those SER sections most likely to be incomplete or totally missing from the Midland Final SER is attached for your information.

It is my recommendation that we formally notify the applicant (Consumers Power), the ASLB, the ACRS, all parties to the OL process and the affected members of the staff that the Midland Final SER to be issued in May 1982 may not include certain sections affected by the instant soils hearings and that the status of those sections will be addressed in the SSER

OFFICE ▶							
SURNAME ▶							
DATE ▶							

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scheduled for July 1982. Further supplements associated with specific construction schedules will also be needed to close out OL level reviews in these areas. These additional supplements will presumably be issued during the course of the OL hearings.

/s/

Elinor G. Adensam, Chief
Licensing Branch #4
Division of Licensing

Enclosure:
As stated

cc: D. Eisenhut
R. Vollmer
J. P. Knight
L. Heller
H. Schauer
G. Lear
P. Kuo
F. Rinaldi
J. Kane
R. Bosnak
R. Jackson
D. Wood
R. Hernan

*See Previous White

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

JAN 19 1982

Docket Nos: 50-329/330

MEMORANDUM FOR: Darrell G. Eisenhut, Director
Division of Licensing

THRU: Robert L. Tedesco, Assistant Director
for Licensing,
Division of Licensing

FROM: Elinor G. Adensam, Chief
Licensing Branch #4, DL

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Elinor G. Adensam

Elinor G. Adensam, Chief
Licensing Branch #4
Division of Licensing

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R. Jackson
D. Hood
R. Hernan

ENCLOSURE

SECTIONS LIKELY TO BE INCOMPLETE IN OR OMITTED FROM THE

MIDLAND FINAL SER DUE TO SOILS HEARING IMPACT

SER SECTION (SRP Nos.)	TITLE	BRANCH	REVIEWER
2.5.4	Stability of Subsurface Materials and Foundations	HGEB	Kane
2.5.5	Stability of Slopes (and fill)	HGEB	Kane
2.4.2	Analysis Procedures	SEB	Rinaldi
3.7.1	Seismic Design Parameters	SEB	Rinaldi
3.7.2	Seismic Design Analysis	SEB	Rinaldi
3.8.3	Concrete and Steel Internal Structures of Containment	SEB	Rinaldi
3.8.4	Other Seismic Category I Structures	SEB	Rinaldi
3.8.5	Foundations	SEB	Rinaldi

1/18/82

JAN 19 1982

Docket Nos: 50-329/330

MEMORANDUM FOR: Darrell G. Eisenhut, Director
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THRU: Robert L. Tedesco, Assistant Director
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Division of Licensing

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J. Kane
B. Bosnak
R. Jackson
D. Hood
R. Hernan

11/135

FEB 5 1982

Docket Nos.: 50-329
and 50-330 OM, OL

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 and 2

SUBJECT: SUMMARY OF DECEMBER 10, 1981 MEETING ON CRACKS IN MIDLAND BUILDINGS ON PLANT FILL

On December 10, 1981, the NRC staff met in Bethesda, Maryland with Consumers Power Company, Bechtel, and consultants to discuss concrete cracks in the Auxiliary Building, Service Water Pump Structure and Diesel Generator Building at Midland Plant, Units 1 and 2. Enclosure 1 is a summary of the meeting and includes a list of meeting attendees.

Darl S. Hood, Project Manager
Licensing Branch No. 4
Division of Licensing

Enclosure:
As stated

cc: See next page

8202170348

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ATTENDEES

December 10, 1981

Name	Organization
Darl S. Hood	LB#4/ NRR
F. Rinaldi	SEB/NRR
F. Schaver	SEB/NRR
J. Haarstad	NRC/Consultant
Pao Huang	NRC/Consultant
John P. Matra, Jr.	NRC/Consultant
Joseph D. Kane	NRC/DOE/HGEB
H. Kuo	NRC
T. E. Johnson	Bechtel
N. Swanberg	Bechtel
Dennis Budzik	Consumers Power Company
Fernando Villalta	Consumers Power Company
W. Corley	PCA (CPCo Consultant)
M. Sozen	Bechtel (Consultant)

DALL -
THESE GOT TIED UP IN THE MAIL.
COPIES ARE FOR YOU, JOE + FRANK.
Roger

To	File 0485.21	CONSUMERS POWER COMPANY
From	FVillalta, P-14-421 F.V	
Date	December 28, 1981	
Subject	MIDLAND PROJECT - MEETING W/NRC STAFF TO DISCUSS EXISTING CONCRETE CRACKS IN AUX BUILDING, SWPH AND DG BUILDINGS ON DECEMBER 10, 1981 - FILE 0485.21 SERIAL 15416	Internal Correspondence

CC JWCook, P-26-336B (w/o) MIMiller, IL&B-Chicago
RCBauman, P-14-314B (w/o)PSteptoe, IL&B-Chicago
JEBrunner, M-1079 TRThiruvengadam, P-14-400
DMBudzik, P-24-517A FWilliams, IL&B-Washington
DBMiller, Midland RWHuston, Washington (4).

1.0 Dr William G Corley - Presentation. Dr Corley showed slides of a water tank structure, 2 feet thick wall resting on a rock till foundation. Concrete was placed on 60 feet long pours resulting in through cracks due to volumetric changes by temperature and shrinkage. Cracks were mapped from 2 to 20 mills (0.002"-0.020") to check water leakage in the tank.

2.0 Dr Mete Sozen - Presentation. Professor Sozen showed slides of an experimental cyclic loading behavior of a reinforced concrete box structure that was observed and reported by Umemura of the University of Tokyo. Lateral load developed flexural and shear cracks in both directions in the walls.

The test results demonstrate that cracks in concrete structures with adequate amount of anchored reinforcement crossing the cracks do not affect the strength of the system.

3.0 Significance of Existing Concrete Cracks:

3.1 Auxiliary Building

Dr Corley stated that the cracks observed in this building are due to volumetric changes in the concrete by temperature and shrinkage. Some flexural cracks were observed on floor slabs. The crack pattern does not indicate they are due to settlement.

3.2 Service Water Pump Building

Dr Corley and Dr Sozen stated that the cracks in this building are a combination of settlement and volumetric changes in the concrete as the case in the Auxiliary Building.

3.3 Diesel Generator Building

Dr Corley and Dr Sozen stated that the crack pattern can be associated with settlement due to the cracks fanning out in the wall near the top of the duct banks, before their isolation from the walls. The construction of the walls at different time pours of concrete also contributes to the cracking of the wall.

4.0 NRC Concerns

4.1 Darl Hood stated the purpose of this meeting is to establish an acceptance criteria for existing cracks in the buildings.

4.2 Frank Rinaldi is concerned on how to evaluate a crack and the behavior of reversible stresses on cracks going from tension into compression.

4.3 F Schaver is concerned of a wall designed for a vertical "P" tension load. The wall was cracked for an additional "P" horizontal load. Will the wall take the vertical "P" load?

4.4 F Schaver asked what is the criteria for mapping cracks.

4.5 J D Kane would like to make sure that settlement is not a concern for cracks.

4.6 P Huang is concerned on multiple cracking for reversible loads or change of load application as mentioned in Question 4.3.

5.0 Answers to NRC Concerns

Answer to 4.1 is addressed in Item 6.

Answer to 4.2 - Dr Corley outlined the following nine steps to evaluate a crack:

1. Type of member (structural or nonstructural)
2. Type of loads and direction
3. Type of reinforcing
4. Type of construction and sequence of construction
5. Location of the crack
6. Length of the crack
7. Ratio width/length of the crack
8. Direction of the crack
9. Multiple crack pattern

Dr Sozen addressed reversible stresses in his presentation in Item 2.0 for cyclic loading behavior.

Answer to 4.3 - Dr Sozen stated that if horizontal reinforcement is adequate to cross the cracks then the wall can take the vertical load "P" in tension or compression.

Answer to 4.4 - Dr Corley stated that a skilled technician from the PCA laboratory would be able to map a two or three mills crack. A 5 mills (0.005") crack is hard to read with a magnifying instrument.

Answer to 4.5 - Dr Sozen and Dr Corley stated that settlement is not a concern because of the crack pattern existing on the walls.

Answer to 4.6 - Consultants Dr Sozen and Dr Corley will provide engineering information in regards to change of load application.

6.0 Future Crack Monitoring and Acceptance Criteria

Consultants Dr Sozen and Dr Corley will review each structure to evaluate the present strength for the existing cracks.

Dr Sozen proposed to use the following criteria: The ratio of reinforcement times its yield strength should be larger or equal than four times the square root of the strength of concrete ($\rho fy \geq 4\sqrt{f'c}$). If this requirement is not met, a limit analysis for a subsection of the structure with its membrane forces should be done.

Underpinning of the Auxiliary Building will take care of the concern of cracking caused by differential settlement.

T E Johnson stated that Bechtel Power Corporation is working on the structural analysis to simulate the jacking loads due to the construction sequence during the underpinning operation.

The consultants will reevaluate the crack width limits for acceptance as proposed by Bechtel Power Corporation as follows:

a. Evaluate any new or existing crack width larger than 10 mills (0.010").

b. Stop construction for crack widths larger than 30 mills (0.030").

An "on call" evaluation and monitoring of cracks by the consultants was suggested for the future serviceability and durabilility of the buildings.

Dr Sozen stated is not a need to seal cracks for water leakage when the water is not corrosive.

T E Johnson stated that Bechtel will seal cracks larger than 0.013".

FV/mo

ATTENDEES

December 10, 1981

Name	Organization
Darl S Hood	LBA4/NRR
F Rinaldi	SEB/NRR
F Schaver	SEB/NRR
J Haarstad	NRC/Consultant
Pao Huang	NRC/Consultant
John P Matra, Jr	NRC/Consultant
Joseph D Kane	NRC, DOE, HGEB
H Kuo	NRC
T E Johnson	Bechtel
N Swanberg	Bechtel
Dennis Budzik	Consumers Power Co
Fernando Villalta	Consumers Power Co
W. Corley	PCA (CPCo Consultant)
M. Sozen	Bechtel Consultant

MEETING SUMMARY DISTRIBUTION

Docket File
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R. Bosnak
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ACRS (16)
R. Tedesco

NRC Participants:

D. Hood
F. Rinaldi
F. Schaver
J. Haarstad
P. Huang
J. Matra
H. Kuo

bcc: Applicant & Service List

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S. Pawlicki
V. Benaroya
Z. Rosztoczy
W. Haass
D. Muller
R. Ballard
W. Regan
R. Mattson
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E. Adensam
Project Manager D. Hood
Licensing Assistant M. Duncan

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

FEB 5 1982

Docket Nos.: 50-329
and 50-330 OM, OL

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 and 2

SUBJECT: SUMMARY OF DECEMBER 10, 1981 MEETING ON CRACKS IN MIDLAND BUILDINGS ON PLANT FILL

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Darl S. Hood, Project Manager
Licensing Branch No. 4
Division of Licensing

Enclosure:
As stated

cc: See next page

~~8202170348~~

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M. Sozen	Bechtel (Consultant)

DALL -
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Roger

To File 0485.21

From FVillalta, P-14-421 F.V

Date December 28, 1981

CONSUMERS
POWER
COMPANY

Subject MIDLAND PROJECT -
MEETING W/NRC STAFF TO DISCUSS EXISTING
CONCRETE CRACKS IN AUX BUILDING, SWPH AND
DG BUILDINGS ON DECEMBER 10, 1981 -
FILE 0485.21 SERIAL 15416

Internal
Correspondence

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DBMiller, Midland RWHuston, Washington (4)

1.0 Dr William G Corley - Presentation. Dr Corley showed slides of a water tank structure, 2 feet thick wall resting on a rock till foundation. Concrete was placed on 60 feet long pours resulting in through cracks due to volumetric changes by temperature and shrinkage. Cracks were mapped from 2 to 20 mills (0.002"-0.020") to check water leakage in the tank.

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4.3 F Schaver is concerned of a wall designed for a vertical "P" tension load. The wall was cracked for an additional "P" horizontal load. Will the wall take the vertical "P" load?

4.4 F Schaver asked what is the criteria for mapping cracks.

4.5 J D Kane would like to make sure that settlement is not a concern for cracks.

4.6 P Huang is concerned on multiple cracking for reversible loads or change of load application as mentioned in Question 4.3.

5.0 Answers to NRC Concerns

Answer to 4.1 is addressed in Item 6.

Answer to 4.2 - Dr Corley outlined the following nine steps to evaluate a crack:

1. Type of member (structural or nonstructural)
2. Type of loads and direction
3. Type of reinforcing
4. Type of construction and sequence of construction
5. Location of the crack
6. Length of the crack
7. Ratio width/length of the crack
8. Direction of the crack
9. Multiple crack pattern

Dr Sozen addressed reversible stresses in his presentation in Item 2.0 for cyclic loading behavior.

Answer to 4.3 - Dr Sozen stated that if horizontal reinforcement is adequate to cross the cracks then the wall can take the vertical load "P" in tension or compression.

Answer to 4.4 - Dr Corley stated that a skilled technician from the PCA laboratory would be able to map a two or three mills crack. A 5 mills (0.005") crack is hard to read with a magnifying instrument.

Answer to 4.5 - Dr Sozen and Dr Corley stated that settlement is not a concern because of the crack pattern existing on the walls.

Answer to 4.6 - Consultants Dr Sozen and Dr Corley will provide engineering information in regards to change of load application.

6.0 Future Crack Monitoring and Acceptance Criteria

Consultants Dr Sozen and Dr Corley will review each structure to evaluate the present strength for the existing cracks.

Dr Sozen proposed to use the following criteria: The ratio of reinforcement times its yield strength should be larger or equal than four times the square root of the strength of concrete ($\rho fy \geq 4\sqrt{f'c}$). If this requirement is not met, a limit analysis for a subsection of the structure with its membrane forces should be done.

Underpinning of the Auxiliary Building will take care of the concern of cracking caused by differential settlement.

T E Johnson stated that Bechtel Power Corporation is working on the structural analysis to simulate the jacking loads due to the construction sequence during the underpinning operation.

The consultants will reevaluate the crack width limits for acceptance as proposed by Bechtel Power Corporation as follows:

a. Evaluate any new or existing crack width larger than 10 mills (0.010").

b. Stop construction for crack widths larger than 30 mills (0.030").

An "on call" evaluation and monitoring of cracks by the consultants was suggested for the future serviceability and durabilility of the buildings.

Dr Sozen stated is not a need to seal cracks for water leakage when the water is not corrosive.

T E Johnson stated that Bechtel will seal cracks larger than 0.013".

FV/mo

ic1281-1202a102

ATTENDEES
December 10, 1981

Name	Organization
Darl S Hood	LBA4/NRR
F Rinaldi	SEB/NRR
F Schaver	SEB/NRR
J Haarstad	NRC/Consultant
Pao Huang	NRC/Consultant
John P Matra, Jr	NRC/Consultant
Joseph D Kane	NRC, DOE, HGEB
H Kuo	NRC
T E Johnson	Bechtel
N Swanberg	Bechtel
Dennis Budzik	Consumers Power Co
Fernando Villalta	Consumers Power Co
W. Cordley	PCA (CPCo Consultant)
M. Dozen	Bechtel Consultant

ic1281-1202a102

2/4/82

FEB 4 1982

Docket Nos.: 50-329
and 50-330 OM, OL

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 and 2

SUBJECT: SUMMARY OF DECEMBER 10, 1981 MEETING ON CRACKS IN MIDLAND BUILDINGS ON PLANT FILL

On December 10, 1981, the NRC staff met in Bethesda, Maryland with Consumers Power Company, Bechtel, and consultants to discuss concrete cracks in the Auxiliary Building, Service Water Pump Structure and Diesel Generator Building at Midland Plant, Units 1 and 2. Enclosure 1 is a summary of the meeting and includes a list of meeting attendees.

Darl S. Hood, Project Manager
Licensing Branch No. 4
Division of Licensing

Enclosure:
As stated

cc: See next page

DL:LB#4	LA:DL:LB#4	DL:LB#4
DHood:eb	MDuncan	EAdensam
8/ /82	2/ /82	2/ /82

8202170348

12/135

FEB 5 1982

Docket Nos: 50-329/330 OM, OL

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 and 2

SUBJECT: SUMMARY OF JANUARY 26, 1982 TELEPHONE DISCUSSION REGARDING SURCHARGE RESULTS FOR THE BWST FOUNDATIONS

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Consumer's discussion of the enclosures included the following points:

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~~8202240292~~

Darl S. Hood, Project Manager
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Division of Licensing

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ENCLOSURE 1

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J. Anderson

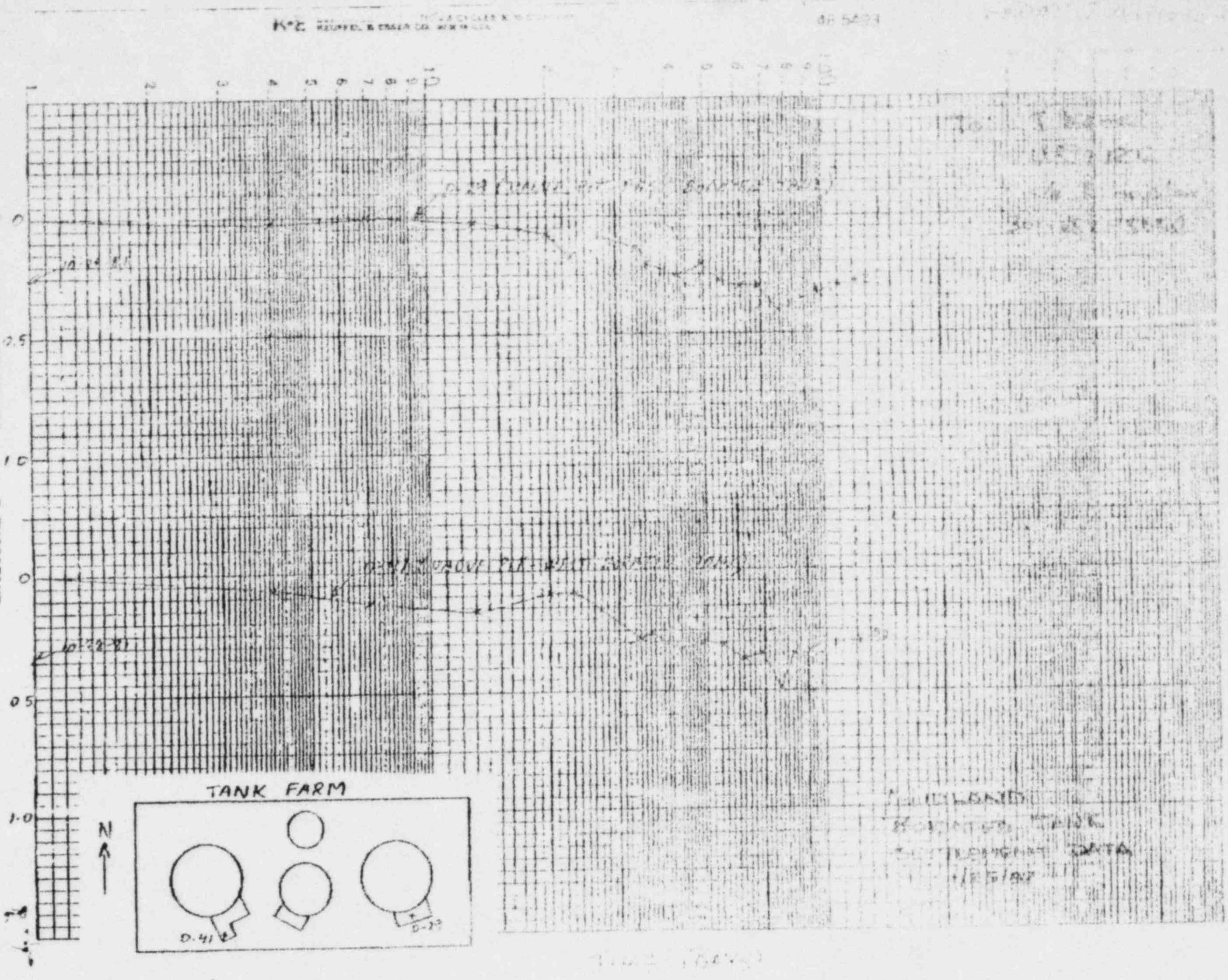
Bechtel

N., Swanberg
S. Lo
A. Boos

NRC

J. Kane
D. Hood

ENCLOSURE 2



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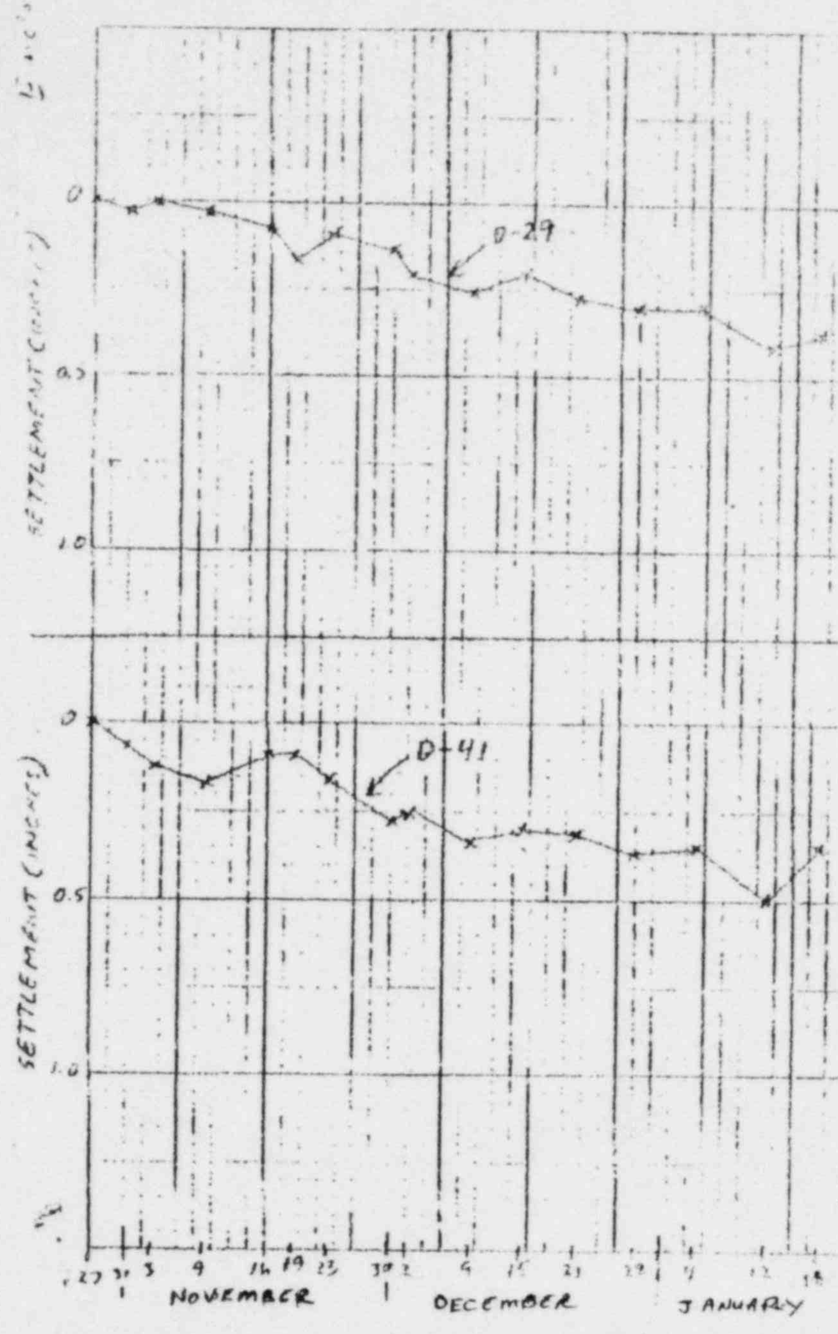

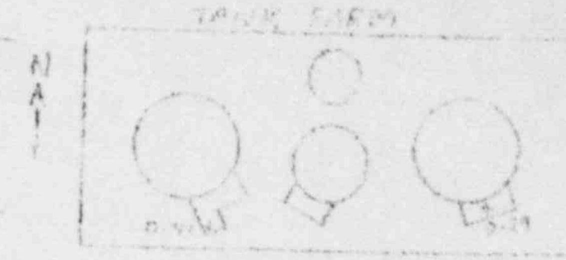

To J Kane
U.S. NRC
c/o R. Houston
301-492-8014

MIDLAND
BORATED TANK
SETTLEMENT DATA
1/25/82

FROM: J. ANDERSON

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Bechtel Power Corporation
Ann Arbor Power Division
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AUTHORIZED BY: Angie Trotter	DATE: 1/25/82	

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To: U.S. NRC c/o R Houston

Attn: J Kane

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Licensing Assistant M. Duncan

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

FEB 5 1982

Docket Nos: 50-329/330 OM, OL

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 and 2

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Darl S. Hood, Project Manager
Licensing Branch No. 4
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Enclosures:
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ENCLOSURE 1

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January 26, 1982

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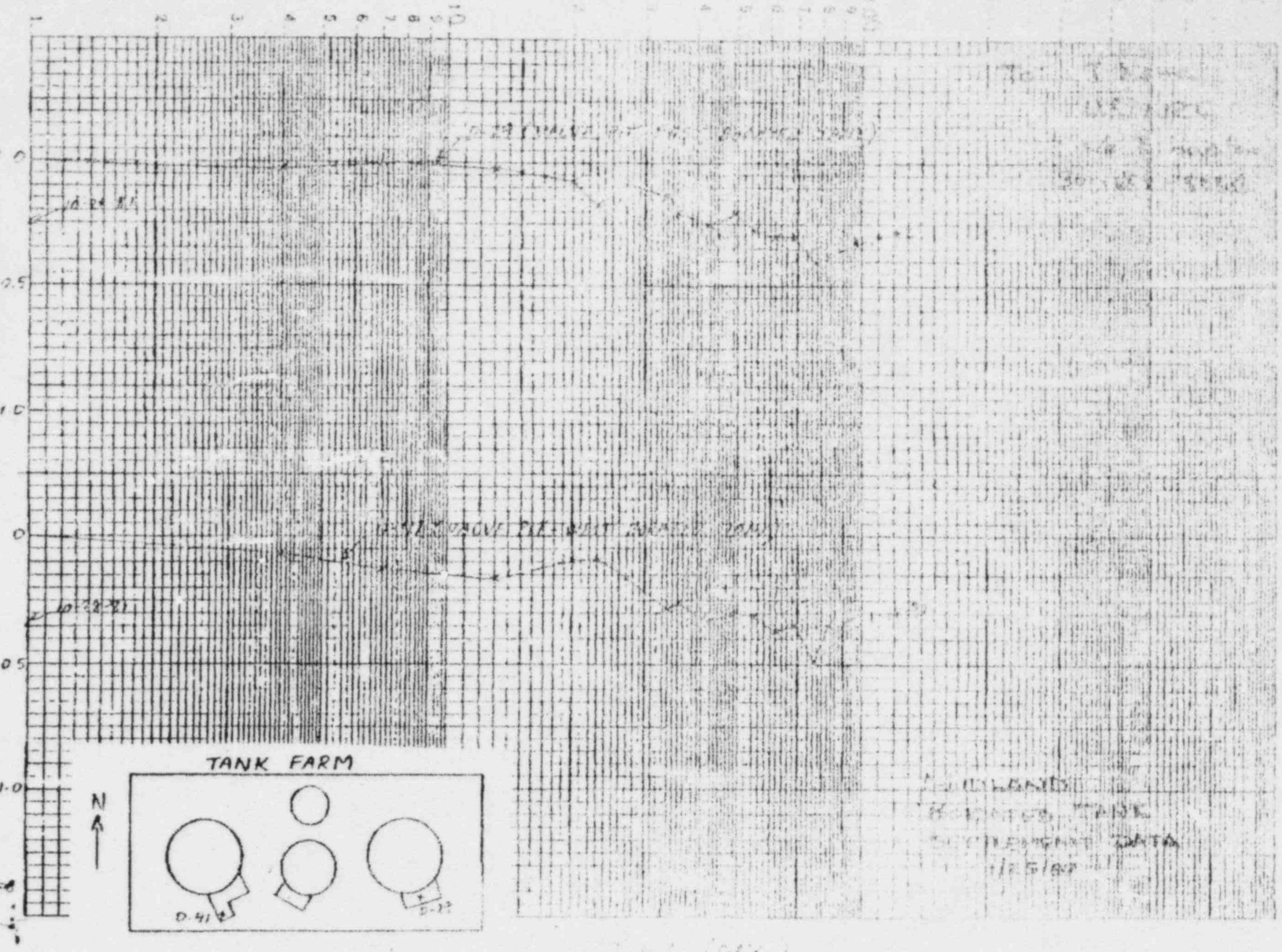
D. Hood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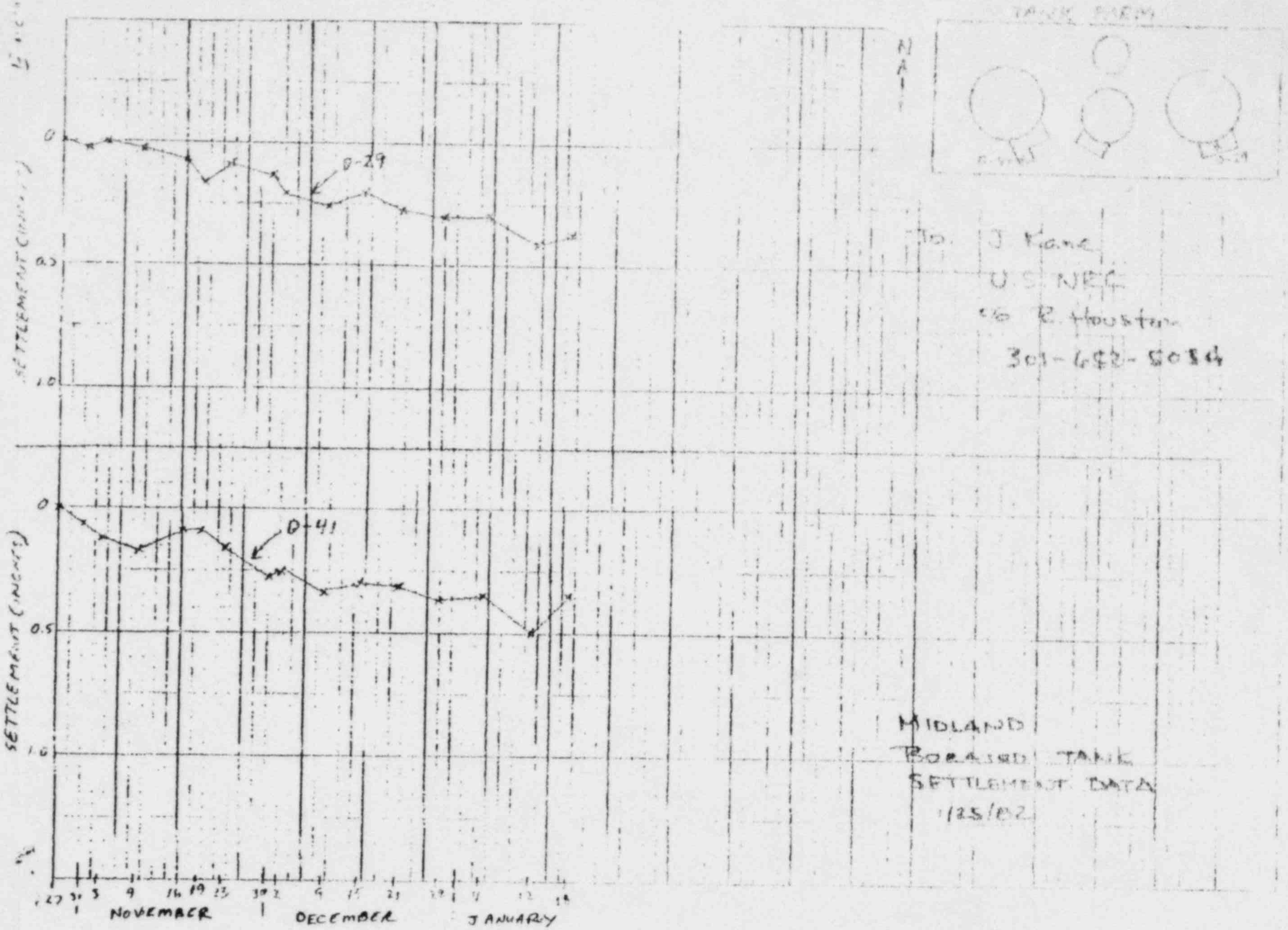
BORATED TANK
SETTLEMENT DATA

ENCLOSURE 2



To: J Kane
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c/o R. Houston
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BORATED TANK
SETTLEMENT DATA
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Bechtel Power Corporation
Ann Arbor Power Division

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2/4/82

FEB 5 1982

Docket Nos: 50-329/330 OM, OL

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 and 2

SUBJECT: SUMMARY OF JANUARY 26, 1982 TELEPHONE DISCUSSION REGARDING SURCHARGE RESULTS FOR THE BWST FOUNDATIONS

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Enclosures:
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8202240292

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Docket Nos.: 50-329
and 50-330 OM, OL

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 and 2

SUBJECT: SUMMARY OF OCTOBER 1, 1981 MEETING ON REMEDIAL MEASURES FOR THE MIDLAND AUXILIARY BUILDING

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Darl S. Hood, Project Manager
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Docket Nos.: 50-329
and 50-330 OM, OL

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 and 2

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UNITED STATES
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FEB 5 1982

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and 50-330 OM, OL

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To File

From GSKeeley, P-14-113B GSKeeley

Date October 27, 1981

Subject MIDLAND PROJECT
DISCUSSION WITH STAFF ON -
REMEDIAL FIXES FOR AUXILIARY BUILDING -
ON OCTOBER 1, 1981
FILE 0485.16 SERIAL 14705

CONSUMERS
POWER
COMPANY

Internal
Correspondence

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TRThiruvengadam, P-14-400 3 att
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A. Purpose - To explain the design and construction aspects of the underpinning scheme for the Auxiliary Building including methods to be used to assure minimal effects on structures in place. The proposed schedule for preparatory work and starting of underpinning will also be discussed.

Also make staff aware of the interfacing of the various groups involved in performing the work.

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B. Parties Involved -

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Bechtel - design of structures

Mueser - Rutledge - advisor on construction methods including instrumentation, review of tech spec, and geo tech advice during design and construction.

Mergentime - Construction

ic1081-0882a102

2. Design and Construction Schedule (See attachment)

   44 Permanent Wells - Complete before underpinning starts January 1, 1982. Can't develop wells during underpinning since have to dewater. Can be used to support underpinning.

3. (a) Presented and explained slides. Mentioned that prestressed tendons for temporary support of wing walls during dewatering and FW Valve Pit is being supported by beams. Will analyze structure to account for underpinning activities at critical points during construction. New structure analyzed for 50% additional seismic load. Will monitor cracks in area effected by jacking and construction.

   (b) Gould discussed their experience including that in Washington area. Freeze wall practically eliminates problem of water in pits to improve working conditions and therefore gets rid of fines removal during work activities.

   Use rotary drill for casing installation. Use brine for cooling. Ethelyne Glycol has been used. Freeze wall layout may not be exactly as shown along admin building side.

   (c) Gould discussed construction details as provided in technical report.

   (d) Gould discussed instrumentation. Closing loop of relative measurements has temperature correction to it.

   On jacking, acceptance criterion are 0.01"/1 hr to reach 90 day settlement point. This is monitored on a continuous basis. Carlson stress meters show load gain or decrease, but have at least a day to arrest movement.

   Monitoring - discussed what's in tech write up.

   (e) Jim Gould - Discussed sample pictures of borings taken by WCC and that it is very uniform fill (COE 17 & 18) and some samples. Feels it's a black and white case of knowing you're in good fill and it's a common sense decision. It's not a sensitive material to being disturbed. Application of load by jacking will be basic proof test. Consolidation tests for fill shows 30-80 kips/ft^2. Feels 80 is more applicable. 6 - 7 UU kips/ft^2 (shear strength). Feels its insensitive plastic material. Not as firm as at SWPS but are using low bearing pressure. To monitor - penetrometer is only a device to help make a judgement evaluation. Will also use torvane device.

   Is pleased that site is being ringed to prevent water from going to fill. Load of 6.8 and 8.8 kips/ft^2 for elec pen and control tower. 5 to 8 factor of safety and 4 to 4.5 on elec pen and control tower. They estimate settlement values of 0.6" with 0.4" on jacking to 0.9" with 0.6" jacking so 0.2" and 0.3" for penetration area and control tower.

Showed estimate of Aux Bldg settlement versus time. Most settlement in 10 days (0.5) with concrete shrinkage from 10 to 90 days of (0.1). T/G Building piers more heavily loaded and estimate 1" settlement.

Landsman wanted data that was taken every 8 hours to be reviewed instead of waiting until 24 hours. Told him we'd evaluate.

(f) Bob Sevo presented QA program. (See attachments) QA will be obtaining a person with underpinning experience.

BQAM controls procurement, design and construction. CP Co Topical controls MPQAD QA Activities.

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Attendees
12/1/81

Name	Organization
Darl Hood	LB #4 / NRR
Lyman Heller	NRC - HGEB (Part time attendance)
JOHN GRUNDSTROM	CORPS OF ENGINEERS, DETROIT
Joseph Kane	NRC, HGEB, GES
Hari N. Singh	U.S. Army Engineers Division (NCD) Chicago
ROSS B. LANDSMAN	NRC - RIII - IE
Wm D PATON	NRC - Midland Counsel
Edmund Burke	Mueser, Rutledge, Johnston & DeSimone
ROBERT SEVO	CPCO - MPQAD
MALAY DASGUPTA	BECHTEL - ANN ARBOR
FREDERICK WILLIAMS	ISHAM LINCOLN + BEALE, WASHINGTON
Alan Farnell	Isham, Lincoln + Beale, Chicago
Don Bartlett	Hanson Engineers, Springfield, ILL
ANDREW GOULD	MORGENTHALER WFF, FLEMINGTON NJ
AL BOOS	BECHTEL - ANN ARBOR
T.E. JOHNSON	" " "
G.S. Keeley	Consumers Power Co.
Keith Razban	"
Bimal Dhar	Bechtel
FRANK RINALDI	NRC / SEB
THIRU THIRUVENGADAM	CONSUMERS POWER
Ann Hodgdon	OELD, NRC
JOHN P MATRA Jr	NRC - CONSULTANT
W. Haass	QAB / NRR
J. Gilray	QAB / NRR

AUX BLDG REMEDIAL ACTIVITIES

1. Introduction
   a) Purpose of meeting
   b) Parties envolved in Remedial Activities
2. Design and Construction Schedule
3. Presentation of Technical Report
   a) Structural considerations (Post tensioning and Temporary Supports)
   b) Dewatering (effects to date on structure)
   c) U/P Method
   d) Instrumentation
   e) Geo Technical Discussion
   f) Quality Program
4. General Discussion

September 29, 1981

SCHEDULE FOR AUX BUILDING
UNDERPINNING & SUPPORT ACTIVITIES

10/15/81	Drill & Develop Additional 44 Permanent Plant Dewatering Wells. (Memo to Denton 9/16/81)
11/ 1/81	Start Recharge Test (2 Months Duration)
11/ 1/81	Start Holes & Installation of Freeze Piping (5 Weeks)
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12/ 7/81	Start Freezing Ground (3 Weeks)
1/ 1/82	Start Excavation Work, Construct Underpinning, Transfer Load, Etc. (61 Weeks)

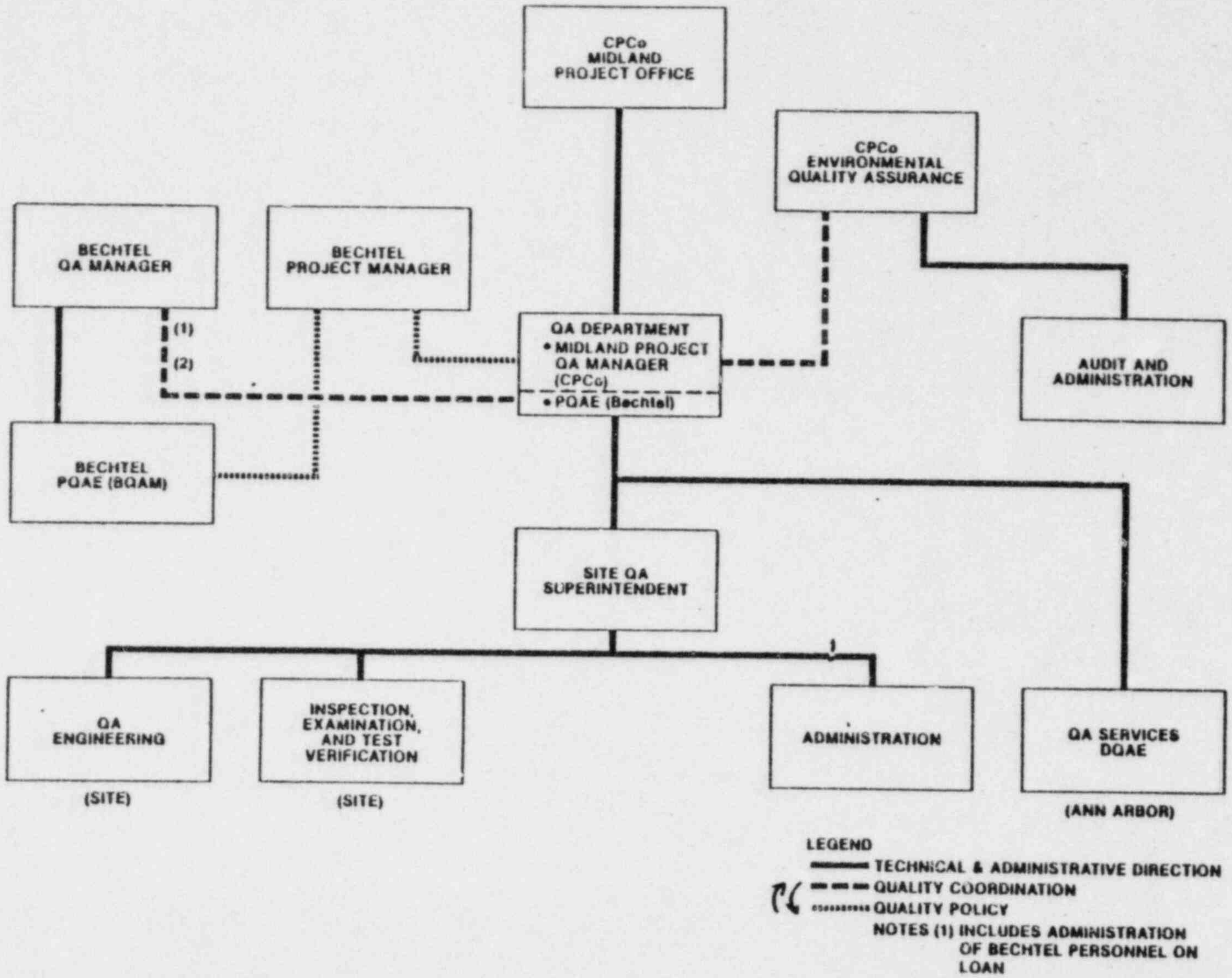
September 29, 1981

REMEDIAL SOILS WORK QUALITY PROGRAM

- CPCo QUALITY ASSURANCE PROGRAM MANUAL FOR NUCLEAR POWER PLANTS
  - Volume I - Policies (Topical CPC-1-A)
  - Volume II - Procedures for Design and Construction
- BQ-TOP-1, REVISION 1A
  - Bechtel Nuclear Quality Assurance Manual

MIDLAND PROJECT

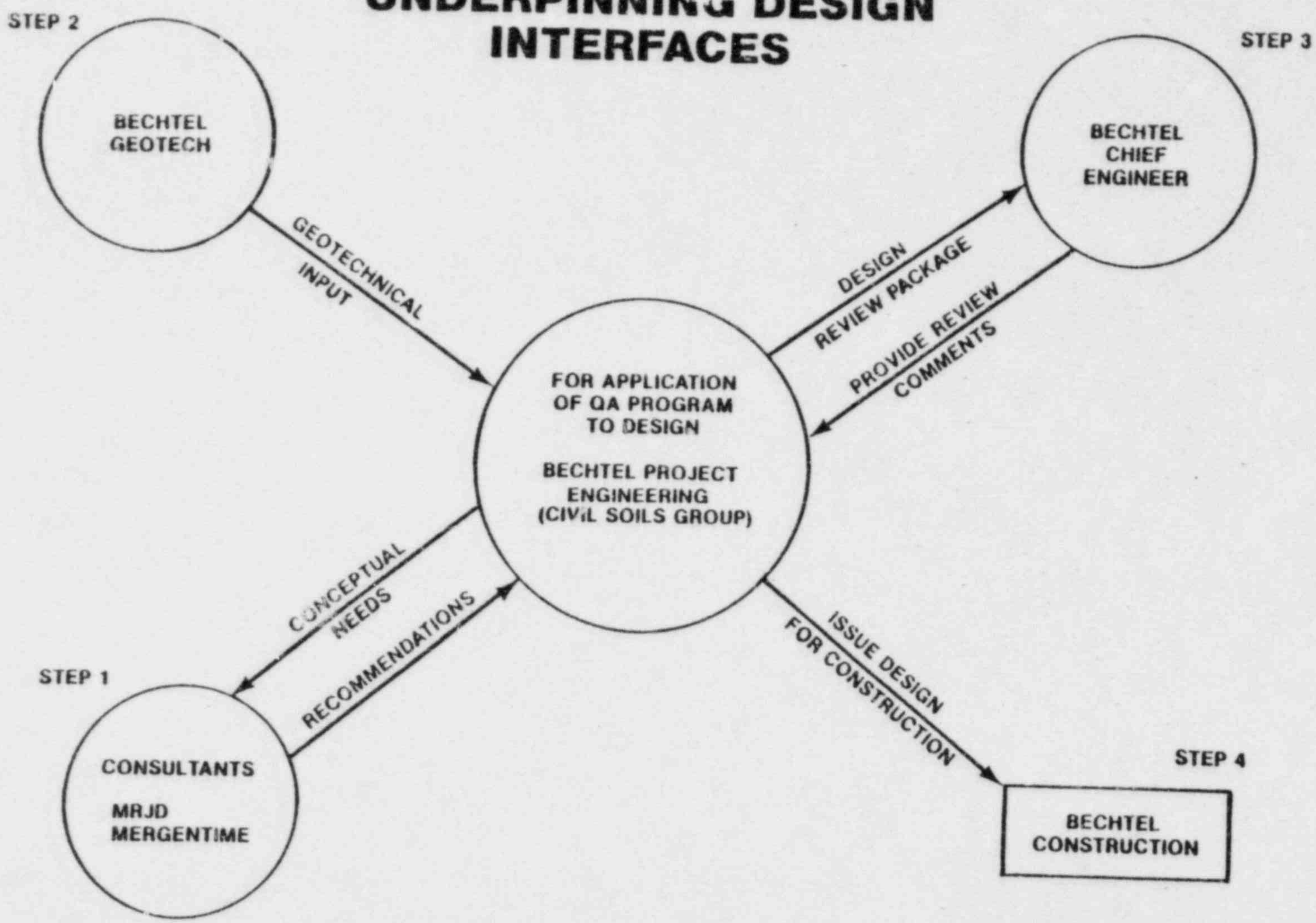
QUALITY ASSURANCE ORGANIZATION



MIDLAND UNITS 1 AND 2
REMEDIAL SOILS WORK 9-25-81

G 1064 03

UNDERPINNING DESIGN INTERFACES



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MIDLAND UNITS 1 AND 2
REMEDIAL SOILS WORK 9/25/81

4-A

QUALITY RELATED ACTIVITIES

- DESIGN CONTROL
  - Temporary Underpinning Supports and Load Transfer
  - Permanent Underpinning Supports and Load Transfer
- DETECTION OF MOVEMENT OF STRUCTURES AND LOAD MEASUREMENTS
  - Instrument Calibration
  - Procedures
- CONSTRUCTION PRE-DRAINAGE
  - Fines Monitoring
- EXCAVATION
  - Location, Size, Sequence, Protection of Utilities

QUALITY RELATED ACTIVITIES
(cont'd)

- SUBGRADE INSPECTION

- PROCUREMENT (Q list items)
  - Structural Concrete and Grout
  - Rebar/Connectors
  - Miscellaneous Steel
  - Dowels
  - Weld Rod

QUALITY RELATED ACTIVITIES
(cont'd)

- INSTALLATION OF TEMPORARY AND PERMANENT UNDERPINNING SUPPORTS
  - Forming (location, size, sequence)
  - Structural Concrete (production, placement)
  - Rebar/Connectors
  - Welding
  - Miscellaneous Steel
  - Joint Preparation
  - Drypack
  - Dowels

QUALITY RELATED ACTIVITIES
(cont'd)

- LOAD TRANSFER
  - Calibration of Jacking System
  - Procedures
- QA INDOCTRINATION

PROJECT FUNCTIONAL MATRIX

	POLICY: ENGRG POLICY ESTABLISHMENT	POLICY: ESTABLISHMENT AND IMPLEMENTATION OF DESIGN CRITERIA (PERMANENT STRUCTURE)	POLICY: ESTABL. AND IMPLEMENTATION OF DESIGN CRITERIA (TEMPORARY STRUCTURE)	POLICY: DESIGN CONTROL INTERFACE ESTABLISHMENT	DESIGN: PREPARATION OF ENGINEERING DOCUMENTS	DESIGN: DESIGN REVIEW AND VERIFICATION	DESIGN: PREPARATION AND CONTROL OF DESIGN CHANGES (INCLUDING FIELD)	PROCUREMENT: SUPPLIER EVALUATION AND SELECTION *	PROCUREMENT: PROCUREMENT (PURCHASE ORDERS)	PROCUREMENT: INSPECTION AND AUDIT OF SUPPLIER	PROCUREMENT: RECEIVING INSPECTION	INSTALLATION: PREPARATION AND IMPLEMENTATION OF INSTRUCTIONS PRODECURES DRAWINGS/TEST CONTROL	INSTALLATION: QUALITY VERIFICATION INSPECTION AND TESTING TESTING INDICATORS	INSTALLATION: NONCONFORMANCE CONTROL	INSTALLATION: CORRECTIVE ACTION	INSTALLATION: QUALITY RECORDS	INSTALLATION: AUDITS
CPCo PROJ MGMT				○								○			●		●
BECHTEL PROJ MGMT				○								○			●		●
CPCo PRODUCTION ENGRG		○	○	○	○	○	○					○					
BECHTEL MGMT ENGRG	●			●	●	●						○					
BECHTEL PROJ ENGRG		●	●	●	●	●	●	●	●	●		●	●	●	●	●	
BECHTEL QUALITY ENGRG		●	●		●	●	●	●							●		
MRJD		○	○		○		○					○					
BECHTEL PROJ GEOTECH		●	●		●	●						●	●	●			
BECHTEL RESIDENT GEOTECH												○	●	●			
MERGENTIME CORP																	
• ENGRG		○	○		○		○					○		○	○		
• CONSTR												○					
BECHTEL RESIDENT ENGR							●							●			
BECHTEL CONSTRUCTION															● 1		
• FIELD ENGR							●		●			○		●			
• SURVEY												●		●			
• SUBCONTRACTS							●					●					
BECHTEL QUALITY CONTROL																	
• RECEIVING QCE											●	●		●	●	●	
• CIVIL QCE							●		●			●	●	●	●	●	
BECHTEL PROCUREMENT																	
• PSQD					●			●		●				●	●		
• OFFICE/FIELD									●		●					●	
MPQAD																	
• JACKSON										●				●	●	●	●
• DQAE		●	●		●	●	●	●	●	●		●		●	●	●	●
• QAE									●			●	●	●	●	●	●
• IE & TV												●	●	●	●	●	●
• PQAE															●	●	●

● DIRECT INVOLVEMENT
○ INPUT ONLY
1 SITE MANAGER

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

FEB 5 1982

Docket Nos.: 50-329
and 50-330 OM, OL

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 and 2

SUBJECT: SUMMARY OF OCTOBER 1, 1981 MEETING ON REMEDIAL MEASURES FOR THE MIDLAND AUXILIARY BUILDING

On October 1, 1981 the NRC staff met in Bethesda, Maryland with Consumers Power Company, Bechtel, and consultants, to discuss the design and construction aspects of the underpinning planned beneath the Auxiliary Building at Midland Plant, Units 1 and 2. Because the underpinning scheme presented was a significant change from the previously proposed remedial measure, a briefing was also provided to NRC management. Enclosure 1 is a summary of the meeting and includes a compilation of the handouts and visual aids used in the course of the meeting.

Darl Hood/md

Darl S. Hood, Project Manager
Licensing Branch No. 4
Division of Licensing

Enclosure:
As stated

cc: See next page

8203040338

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2. Design and Construction Schedule (See attachment)

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Joseph Kane	NRC . HGEB . GES
Hari N. Singh	U.S. Army Engineers Division (NCD) Chicago
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Wm D. PATON	NRC - Midland Counsel
Edmund Burke	Mueser, Rutledge, Johnston & DeSimone
ROBERT SEVO	CPCO - MPQAD
MALAY DASGUPTA	BECHTEL - ANN ARBOR
FREDERICK WILLIAMS	ISHAM, LINCOLN + BEALE, WASHINGTON
Alan Farnell	Isham, Lincoln + Beale, Chicago
Don Bartlett	Hanson Engineers, Springfield, ILL
ANDREW GOULD	WOODWARD-CLYDE, FLEMINGTON NJ
AL BOOS	BECHTEL - ANN ARBOR
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Ann Hodgdon	OELD, NRC
JOHN P. MATRA Jr	NRC - CONSULTANT
W. Horn	QAB / NRR
J. Gilray	QAB / NRR

AUX BLDG REMEDIAL ACTIVITIES

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   a) Purpose of meeting
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September 29, 1981

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September 29, 1981

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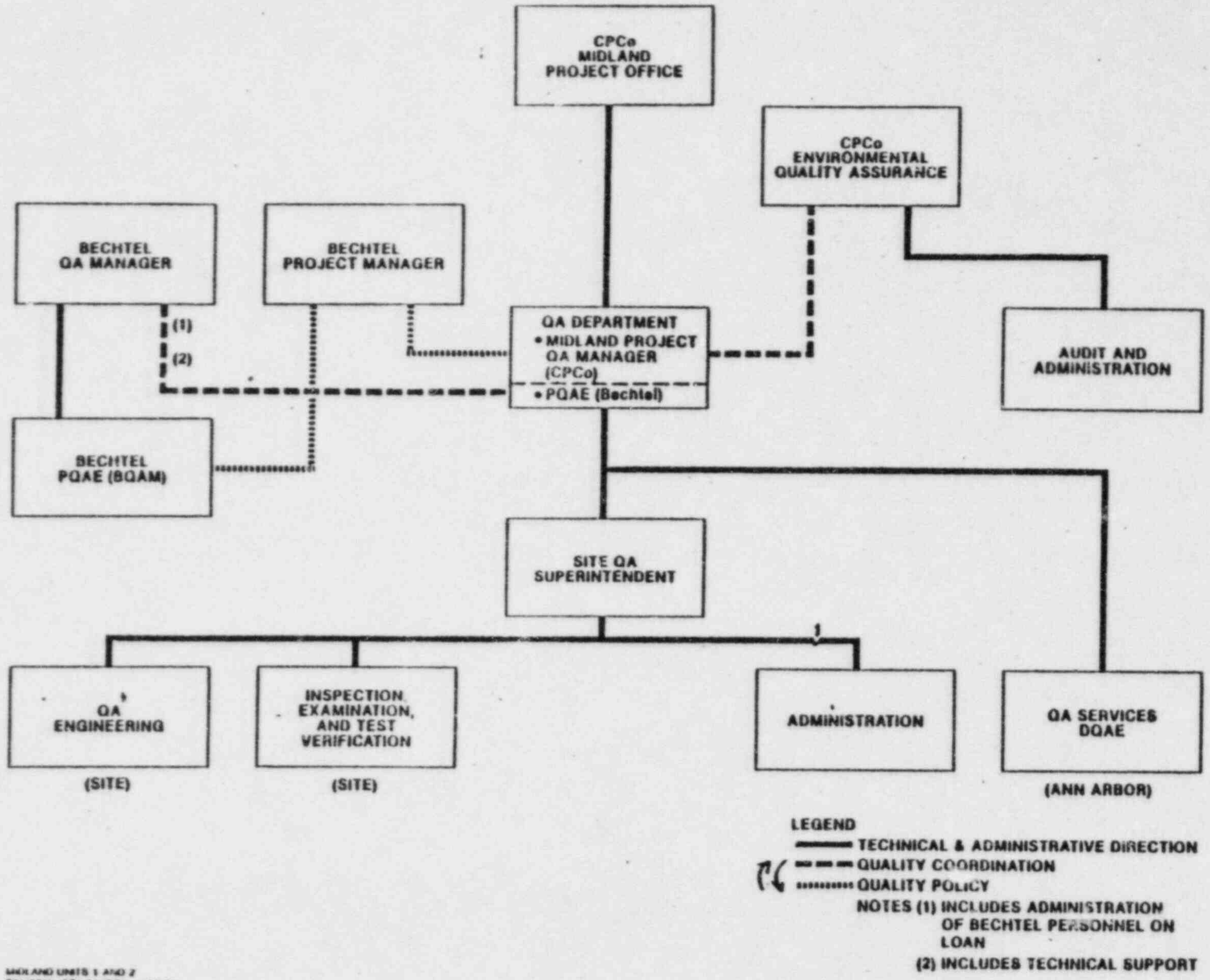
2

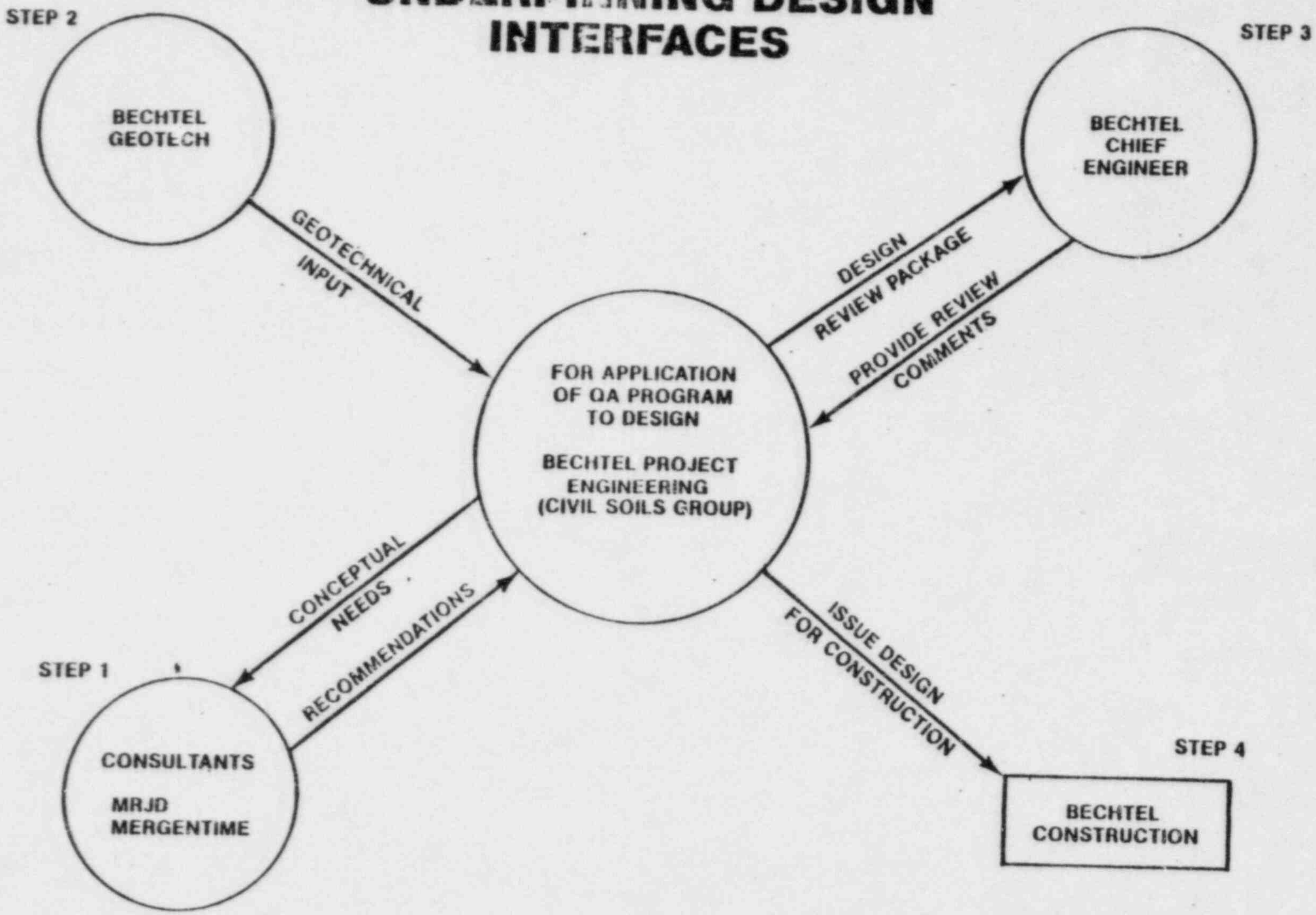
MIDLAND PROJECT
QUALITY ASSURANCE ORGANIZATION



MIDLAND UNITS 1 AND 2
REMEDIAL SOILS WORK 9-25-81

G-1884-03

UNDERPINNING DESIGN INTERFACES



G-1664 21

MIDLAND UNITS 1 AND 2
REMEDIAL SOILS WORK 9/25/81

4-A

QUALITY RELATED ACTIVITIES

- DESIGN CONTROL
  - Temporary Underpinning Supports and Load Transfer
  - Permanent Underpinning Supports and Load Transfer
- DETECTION OF MOVEMENT OF STRUCTURES AND LOAD MEASUREMENTS
  - Instrument Calibration
  - Procedures
- CONSTRUCTION PRE-DRAINAGE
  - Fines Monitoring
- EXCAVATION
  - Location, Size, Sequence, Protection of Utilities

QUALITY RELATED ACTIVITIES
(cont'd)

- SUBGRADE INSPECTION

- PROCUREMENT (Q list items)
  - Structural Concrete and Grout
  - Rebar/Connectors
  - Miscellaneous Steel
  - Dowels
  - Weld Rod

QUALITY RELATED ACTIVITIES
(cont'd)

- INSTALLATION OF TEMPORARY AND PERMANENT UNDERPINNING SUPPORTS
  - Forming (location, size, sequence)
  - Structural Concrete (production, placement)
  - Rebar/Connectors
  - Welding
  - Miscellaneous Steel
  - Joint Preparation
  - Drypack
  - Dowels

QUALITY RELATED ACTIVITIES
(cont'd)

- LOAD TRANSFER
  - Calibration of Jacking System
  - Procedures
- QA INDOCTRINATION

PROJECT FUNCTIONAL MATRIX

	POLICY				DESIGN			PROCUREMENT				INSTALLATION					
	ENGRG POLICY ESTABLISHMENT	ESTABLISHMENT AND IMPLEMENTATION OF DESIGN CRITERIA (PERMANENT STRUCTURE)	ESTABL AND IMPLEMENTATION OF DESIGN CRITERIA (TEMPORARY STRUCTURE)	DESIGN CONTROL INTERFACE ESTABLISHMENT	PREPARATION OF ENGINEERING DOCUMENTS	DESIGN REVIEW AND VERIFICATION	PREPARATION AND CONTROL OF DESIGN CHANGES (INCLUDING FIELD)	SUPPLIER EVALUATION AND SELECTION †	PROCUREMENT (PURCHASE ORDERS)	INSPECTION AND AUDIT OF SUPPLIER	RECEIVING INSPECTION	PREPARATION AND IMPLEMENTATION OF INSTRUCTIONS, PROCEDURES DRAWINGS/TEST CONTROL	QUALITY VERIFICATION INSPECTION AND TESTING/ TESTING INDICATORS	NONCONFORMANCE CONTROL	CORRECTIVE ACTION	QUALITY RECORDS	AUDITS
CPCo PROJ MGMT				○								○			●		●
BECHTEL PROJ MGMT				○								○			●		●
CPCo PRODUCTION ENGRG		○	○	○	○	○	○					○					
BECHTEL MGMT ENGRG	●			●	●	●						○					
BECHTEL PROJ ENGRG		●	●	●	●	●	●	●	●	●		●	●	●	●	●	
BECHTEL QUALITY ENGRG		●	●		●	●	●	●							●		
MRJD		○	○		○		○					○					
BECHTEL PROJ GEOTECH		●	●		●	●						●	●	●			
BECHTEL RESIDENT GEOTECH												○	●	●			
MERGENTIME CORP																	
• ENGRG		○	○		○		○					○		○	○		
• CONSTR												○					
BECHTEL RESIDENT ENGR							●							●			
BECHTEL CONSTRUCTION															●1		
• FIELD ENGR							●		●			○		●			
• SURVEY												●		●			
• SUBCONTRACTS							●					●					
BECHTEL QUALITY CONTROL																	
• RECEIVING QCE											●	●		●	●	●	
• CIVIL QCE							●		●			●	●	●	●	●	
BECHTEL PROCUREMENT																	
• PSQD					●			●		●				●	●		
• OFFICE/FIELD									●		●					●	
MPQAD																	
• JACKSON										●				●	●	●	●
• DQAE		●	●		●	●	●	●	●	●		●		●	●	●	●
• QAE									●			●	●	●	●	●	●
• IE & TV												●	●	●	●	●	●
• PQAE															●	●	●

● DIRECT INVOLVEMENT
○ INPUT ONLY
1 SITE MANAGER

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14/135

FEB 5 1982

Docket Nos.: 50-329
and 50-330 OM, OL

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 and 2

SUBJECT: SUMMARY OF OCTOBER 7, 1981 MEETING ON DIESEL GENERATOR BUILDING

On October 7, 1981, the NRC staff met in Bethesda, Maryland with Consumers Power Company, Bechtel, and consultants, to discuss soil consolidation test data and analyses for the Diesel Generator Building for Midland Plant, Units 1 and 2. Meeting attendees are listed by Enclosure 1. Enclosure 2 is a summary of the meeting with a compilation of the handouts and visual aids used in the course of the meeting.

Darl S. Hood, Project Manager
Licensing Branch No. 4
Division of Licensing

Enclosures:
As stated

cc: See next page

8202260315

OFFICE	DL:LB#4	LA:DL:LB#4	DL:LB#4				
SURNAME	D. Hood:eb	M. Duncan	E. Adensam				
DATE	2/4/82	2/4/82	2/5/82				

MEETING SUMMARY DISTRIBUTION

Docket File
NRC/PDR
Local PDR
TIC/NSIC/TERA
LB #4 r/f
H. Denton
E. Case
D. Eisenhut
R. Purple
B. J. Youngblood
A. Schwencer
F. Miraglia
J. Miller
G. Lainas
R. Vollmer
J. P. Knight
R. Bosnak
F. Schauer
R. E. Jackson
Attorney, OELD
OIE (3)
ACRS (16)
R. Tedesco

NRC Participants:
L. Heller
F. Rinaldi
F. Cherny
H. Brammer
M. Hartzman
J. Kane
A. Hodgdon
M. Blume
D. Hood
W. Paton

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G. Lear
S. Pawlicki
V. Benaroya
Z. Rosztoczy
W. Haass
D. Muller
R. Ballard
W. Regan
R. Mattson
P. Check
O. Parr
F. Rosa
W. Butler
W. Kreger
R. Houston
W. Gammill
L. Rubenstein
T. Speis
W. Johnston
S. Hanauer
R. Hernan
F. Schroeder
D. Skovholt
M. Ernst
K. Kniel
G. Knighton
A. Thadani
D. Tondi
J. Kramer
D. Vassallo
P. Collins
D. Ziemann
F. Congel
J. Stolz
M. Srinivasan
R. Baer
C. Berlinger
E. Adensam
Project Manager D. Hood
Licensing Assistant M. Duncan

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

FEB 5 1982

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and 50-330 OM, OL

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Darl Hood/[illegible]
Darl S. Hood, Project Manager
Licensing Branch No. 4
Division of Licensing

Enclosures:
As stated

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8202260315

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Geotechnical Engineers, Inc.
ATTN: Dr. Steve J. Poulos
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ENCLOSURE 1

ATTENDEES

NAME	ORGANIZATION
G. S. Keeley	Consumers Powers Company
J. Brunner	CPCo
D. Lewis	Bechtel
N. Ramanujam	CPCo
S. Afifi	Bechtel
A. Farnell	Isham, Lincoln & Deale
R. Zamarin	Isham, Lincoln & Deale
D. Budzik	CPCo
F. Rinaldi	NRC/SEB
F. Cherney	NRC/DE/MEB
H. Brammer	NRC/DE/MEB
M. Hartzman	NRC/DE/MEB
J. Kane	NRC/DE/HGEB
H. Singh	Army Corps of Engineers
A. Hodgdon	Attorney, NRC
M. Blume	Attorney, NRC
D. Hood	NRC/DL
W. Paton	Attorney, NRC
L. Heller	NRC/HGEB

ENCLOSURE 2

To File 0485.16 (w/a)

From GSKeeley, P-14-113B

Date October 26, 1981

Subject MIDLAND PROJECT
DISCUSSION WITH STAFF AND LAWYERS
ON D/G(SOILS AND STRUCTURAL)
ON 10/7/81
FILE 0485.16 SERIAL 14585

CONSUMERS
POWER
COMPANY

Internal
Correspondence

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SAfifi, Bechtel (w/a)
ABoos, Bechtel (w/o)
JBrunner, M-1079 (w/a)
RHuston, Bethesda (w/a)
NRamanujam, P-14-100 (w/a)
DMBudzik/TJSullivan, P-24-624A (w/o)
TRThiruvengadam, P-14-400 (w/o)
RZamarin, IL&B (w/o)

Discussed D/G samples. Discussed DGB consolidation test data. Ram indicated that CP Co and consultants had reviewed existing literature and did not find any problems with the max load of 64 Tsf. ASTM and corps of Engineers Manual clearly indicates that the loading can be higher so that one can be in the virgin portion of the consolidation curve. Woodward-Clyde Consultants and Dr Peck independently decided that they should go to 64 Tsf to define the virgin part of the curve. Based on the above fact CP Co feels that the maximum load of 64 Tsf in more applicable to define preconsolidation Pressure, Pc' for this kind of material that has been compacted and surcharged. Kane - agrees on review of data that 8 hours was adequate, but 16 Tons/ft^2 would be more adequate for preconsolidation. Sherif - load for testing has to be large enough for compacted, surcharged soil. Kane - says we're out of range of virgin curve because void ratios are too low. Agrees that lab data shows the soil to be very dense. Staff discussed with COE Ohio River and they have never run tests up to 64 T/ft^2. But H Singh said that he has seen tests up to 128 Tsf and higher.

Using new 16 T/ft^2 plots, staff picked out borings and levels where they suggested that settlement should be calculated. Will have to compute new Cc by same person who computed Cc from 64 T/ft^2 curve. If this calculation shows that its only slightly more than settlement shown by actual dewatering settlement readings, would they accept readings as being proper? They want range of settlement and not force us to use this calculated settlement for structural analysis.

Structural (Navy) needs what it is for soil springs (for settlement) and can compute stresses and then add to it what is estimated to occur. Have to model soil under footing and this has to be based on results of estimated settlement from preconsolidation tests. Kane - would agree to force the calculated settlement numbers by a percentage(50%)for jacking up measured numbers which are based on stiffness of structures. Use dewatering values to adjust calculated values from consolidation tests.

After CP Co Caucus - Met with Staff and Legal.

1. Use structural analysis model using soil springs. (Staff needs dynamic and static soil springs used and basis for them.)

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2. Geo Tech input modified as discussed previous to handle consolidation test data.

We want to talk to J W Cook on this before making a commitment.

Zam - on not providing staff testimony on October 30, 1981 is it strictly soils.

Patton - have problem on crack analysis.

Rinaldi - D/G structure is not a typical structure. Feels its a research type problem. NRC is still reviewing crack analysis info given them last week and addendum given them yesterday. Can't assume text book type design analysis. Also, have to resolve monitoring scheme for cracks for lifetime of plant. Also, have to factor in new analysis for Geo Tech input. All they're ready to do is give status report to board.

DMB - Crack report is our report and all we're talking about today is modifying spring constants and reruning model. Presented Model in April.

Rinaldi - Still have to decide whether crack analysis justifies structural adequacy.

DMB - our letter says no more crack analysis. Appendix J (white paper was presented to staff in April).

Rinaldi - Can't make decision until after discussing with management.

DMB - We used NUREG, which handles simply the cracks and we have run sophisticated computer program. Effects of cracks based on NUREG have been factored into structural calculations. Margin review program for SSRS will be during OL.

Patton - D/G building has to be analyzed for new SSRS. Kane - structural has been affected by surcharge and board could ask for adequacy of surcharge and effect it had on D/G building at new SSRS.

DMB - everything we've said is how other dockets have been done.

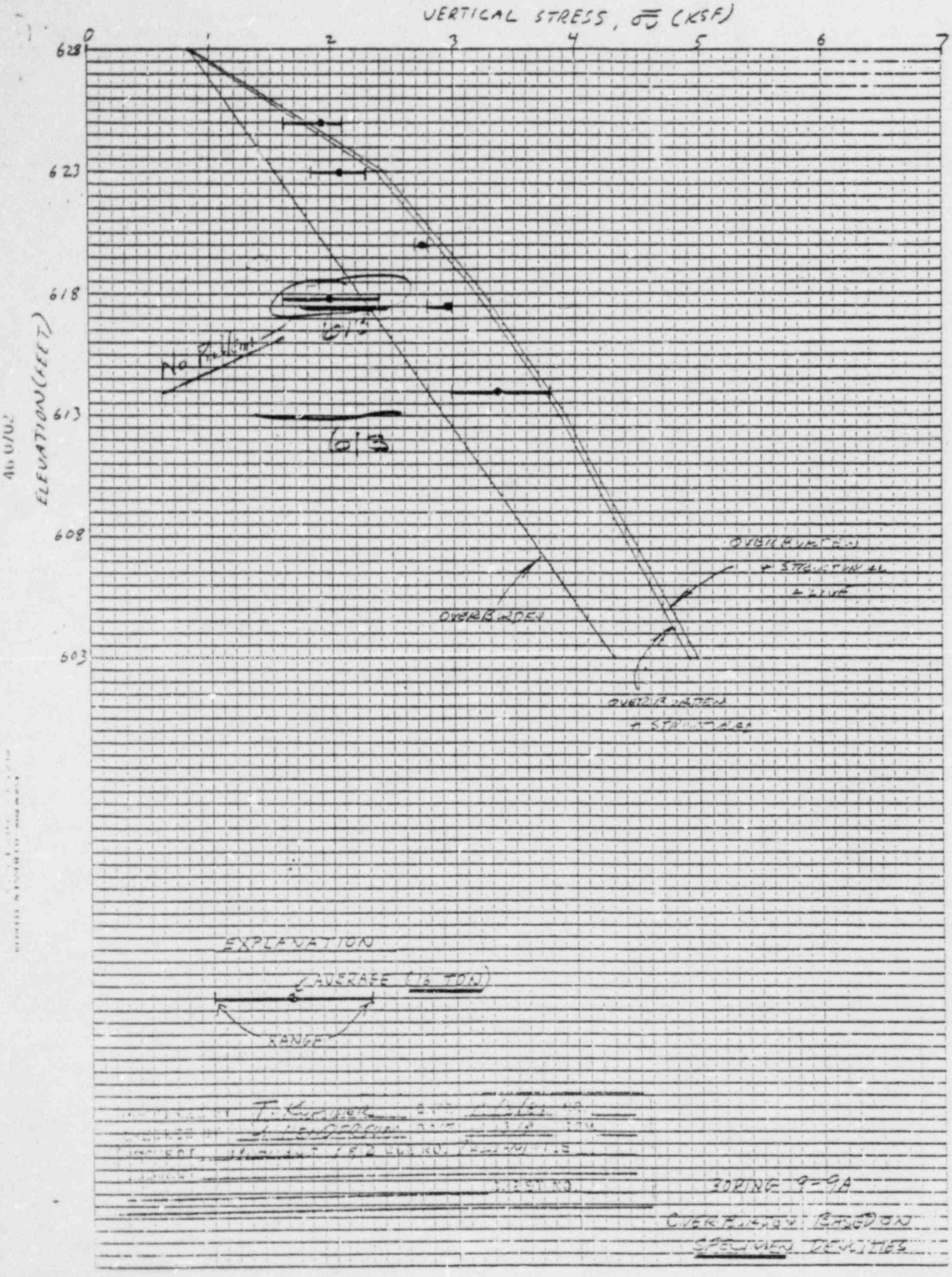
Zam - We don't have figures yet on SSRS and board will have to make decision based on fact that margin check won't come until OL. If we decide to do additional calc on consolidation tests and if we complete it by October 16, 1981, then staff has agreed this should handle Geo Tech.

Agreed to provide staff input and results of analysis done todate. They want new springs used. Will try to get this by October 16, 1981 and if they have this, they may be able to be ready for hearing on November 16, 1981.

Kane - thinks we will have settlement resolved by hearing date, but may not agree on crack analysis and use of SSRS.

Attachments:

Replots of load vs estimated preconsolidations pressure at 16 and 64 Tons/ft^2 with actual densities at sample location.



VERTICAL STRESS, σv (KSF)
0
1
2
3
4
5
6
7
628
623
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608
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ELEVATION (FEET)
No Problem
613
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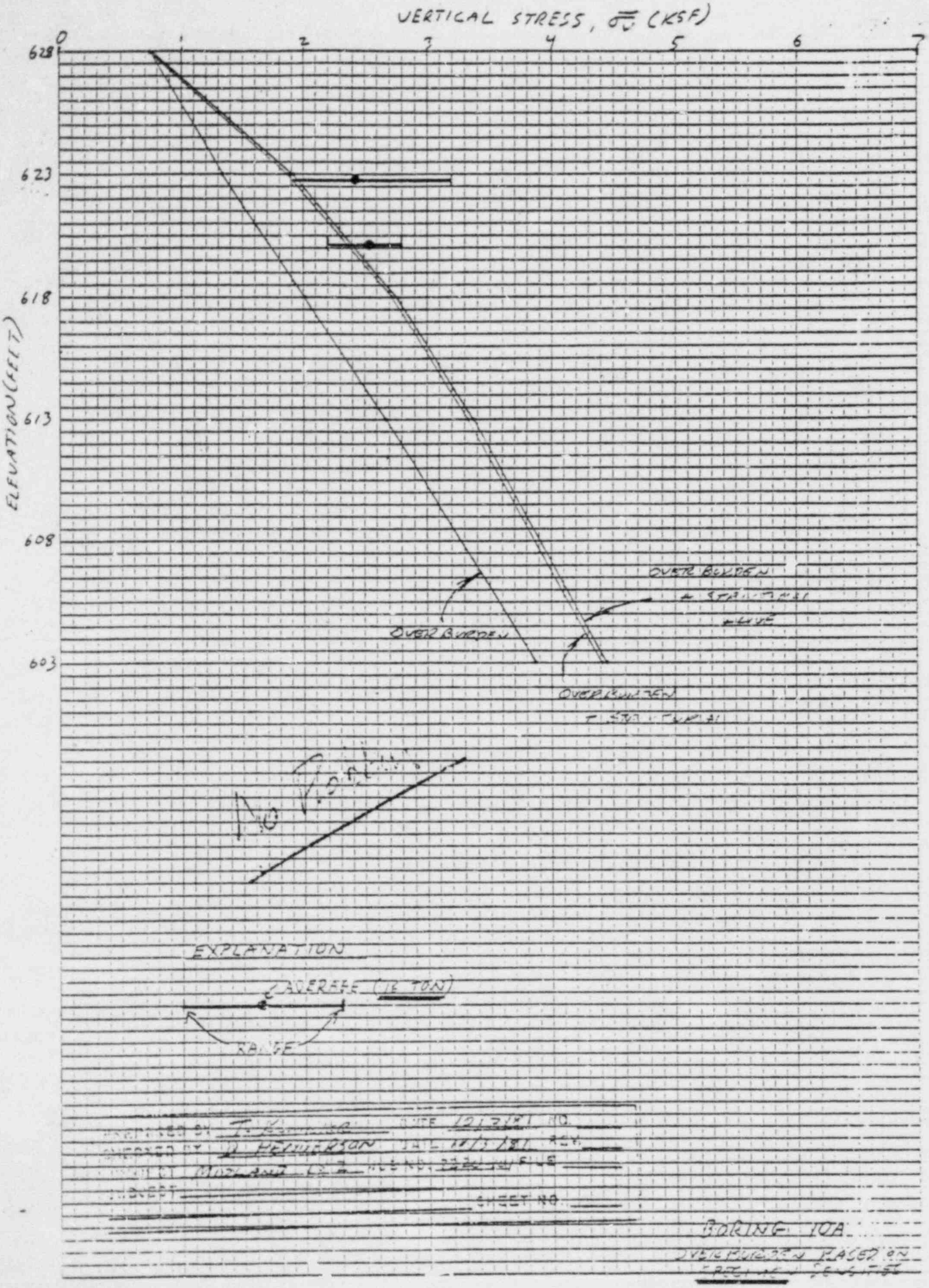
OVERBURDEN
OVERBURDEN + STRUCTURAL + LIVE
OVERBURDEN + STRUCTURAL
EXPLANATION
AVERAGE (16 TON)
RANGE
BORING 9-9A
OVERBURDEN BASED ON SPECIMEN DENSITIES


VERTICAL STRESS, σ_v (KSF)
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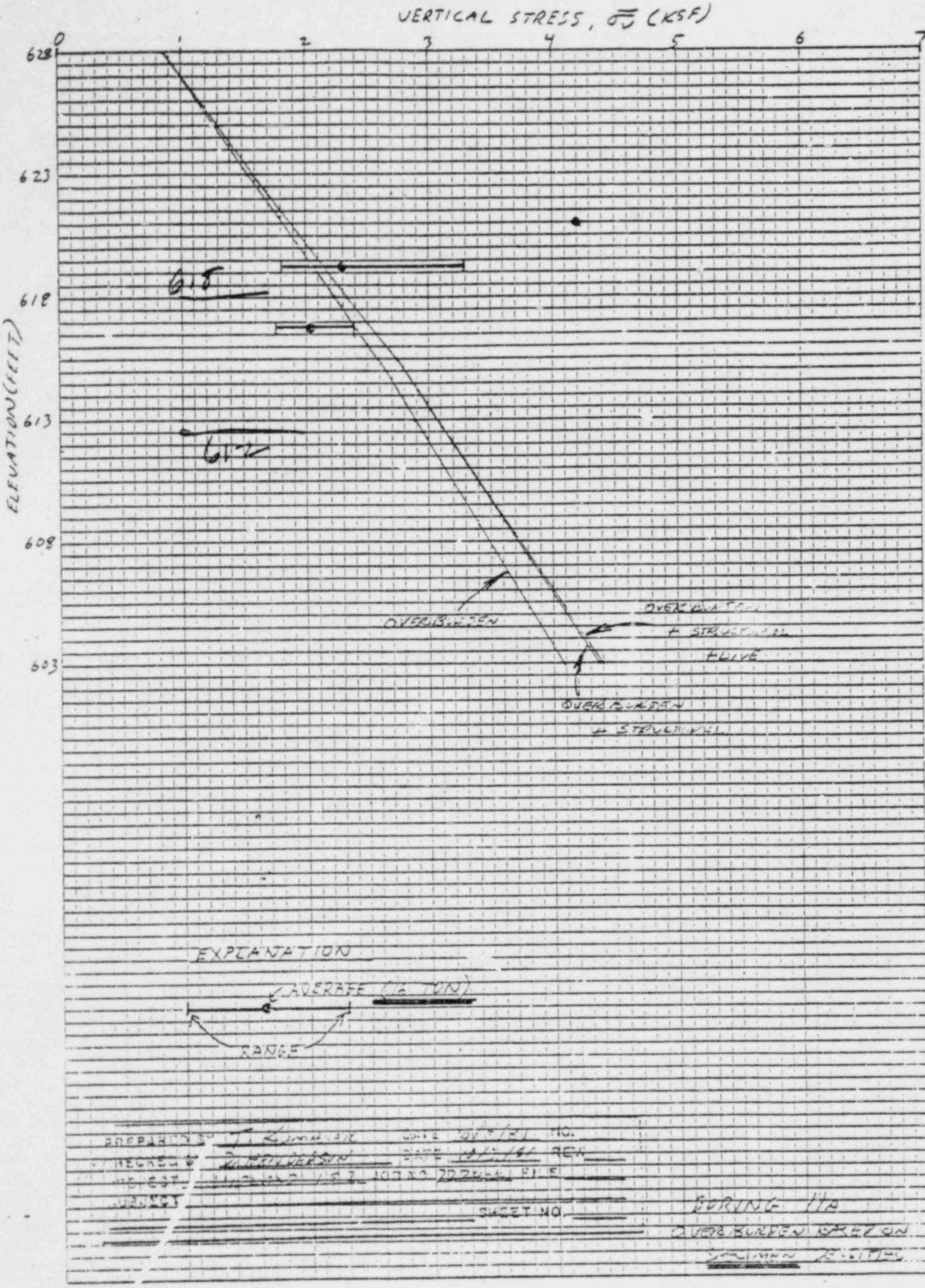
ELEVATION (FEET)
OVERBURDEN
EXPLANATION
AVERAGE
RANGE
BORING 10A


VERTICAL STRESS, σ_v (KSF)
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ELEVATION (FEET)
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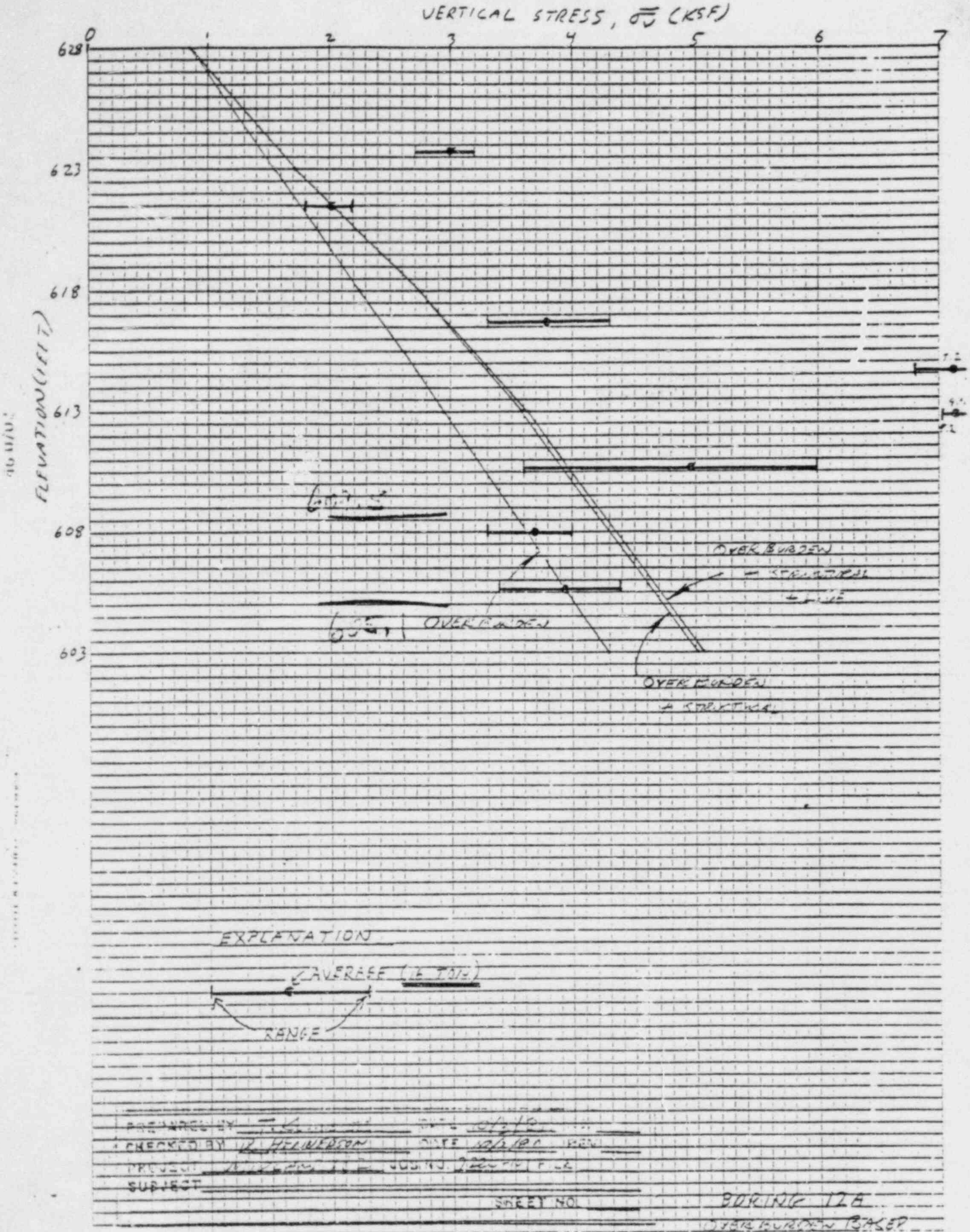
OVERBURDEN
OVERBURDEN + STRUCTURAL
EXPLANATION
AVERAGE
RANGE
PREPARED BY
CHECKED BY
DATE
NO.
REV.
FILE
SUBJECT
SHEET NO.
BORING 11A
OVERBURDEN PRESS ON


VERTICAL STRESS, σv (KSF)
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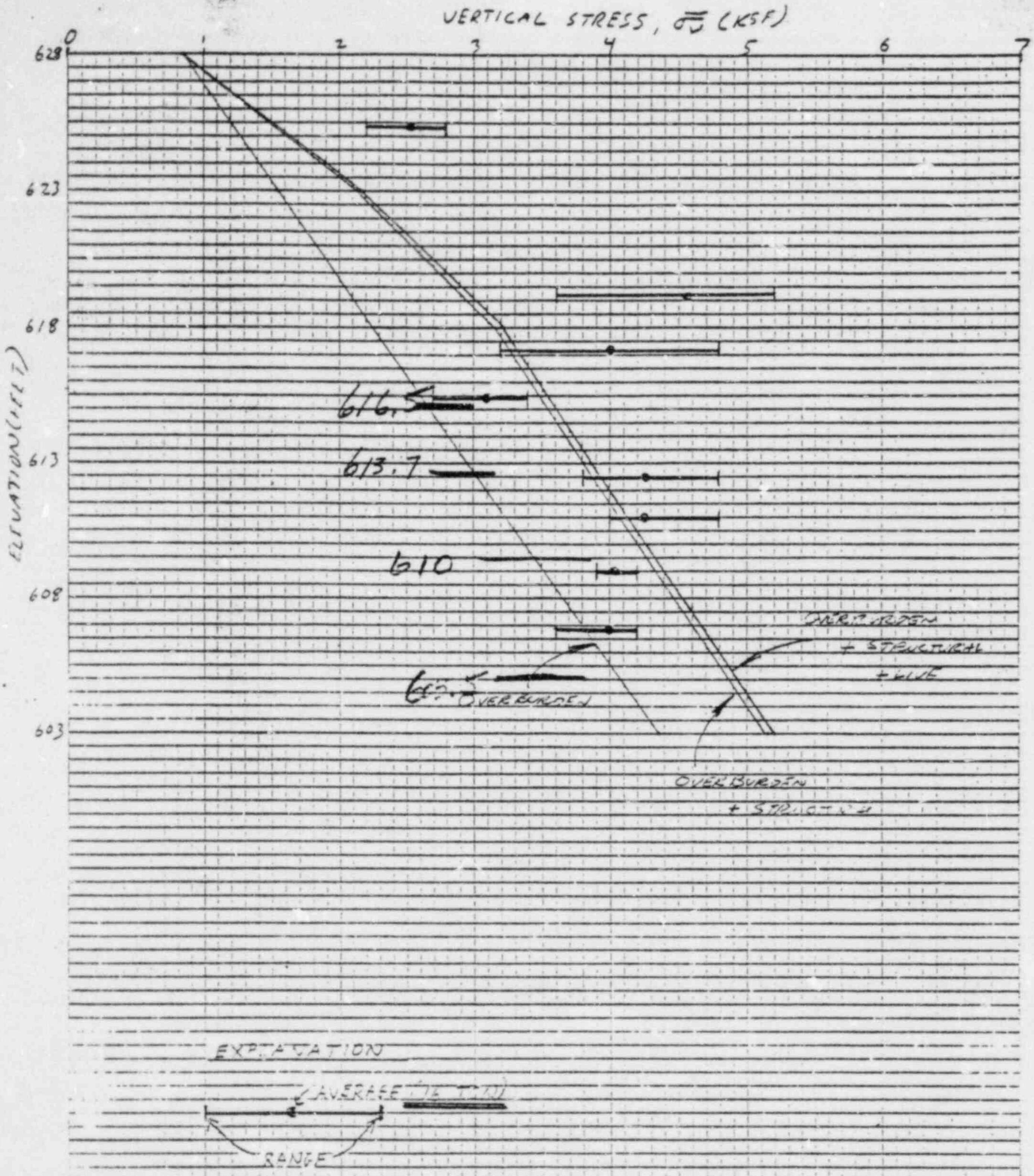
603
ELEVATION (FEET)
OVERBURDEN
OVERBURDEN + STRUCTURAL + LIVE
OVERBURDEN + STRUCTURAL
EXPLANATION
AVERAGE
RANGE
PREPARED BY
CHECKED BY
PROJECT
SUBJECT
SHEET NO.
BORING 12A
OVERBURDEN BASED ON SPECIMEN DENSITIES



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PROJECT [illegible] JOB NO. [illegible] FILE
SUBJECT ___
SHEET NO. ___

BORING [illegible]
~~OVERBURDEN BASED ON~~
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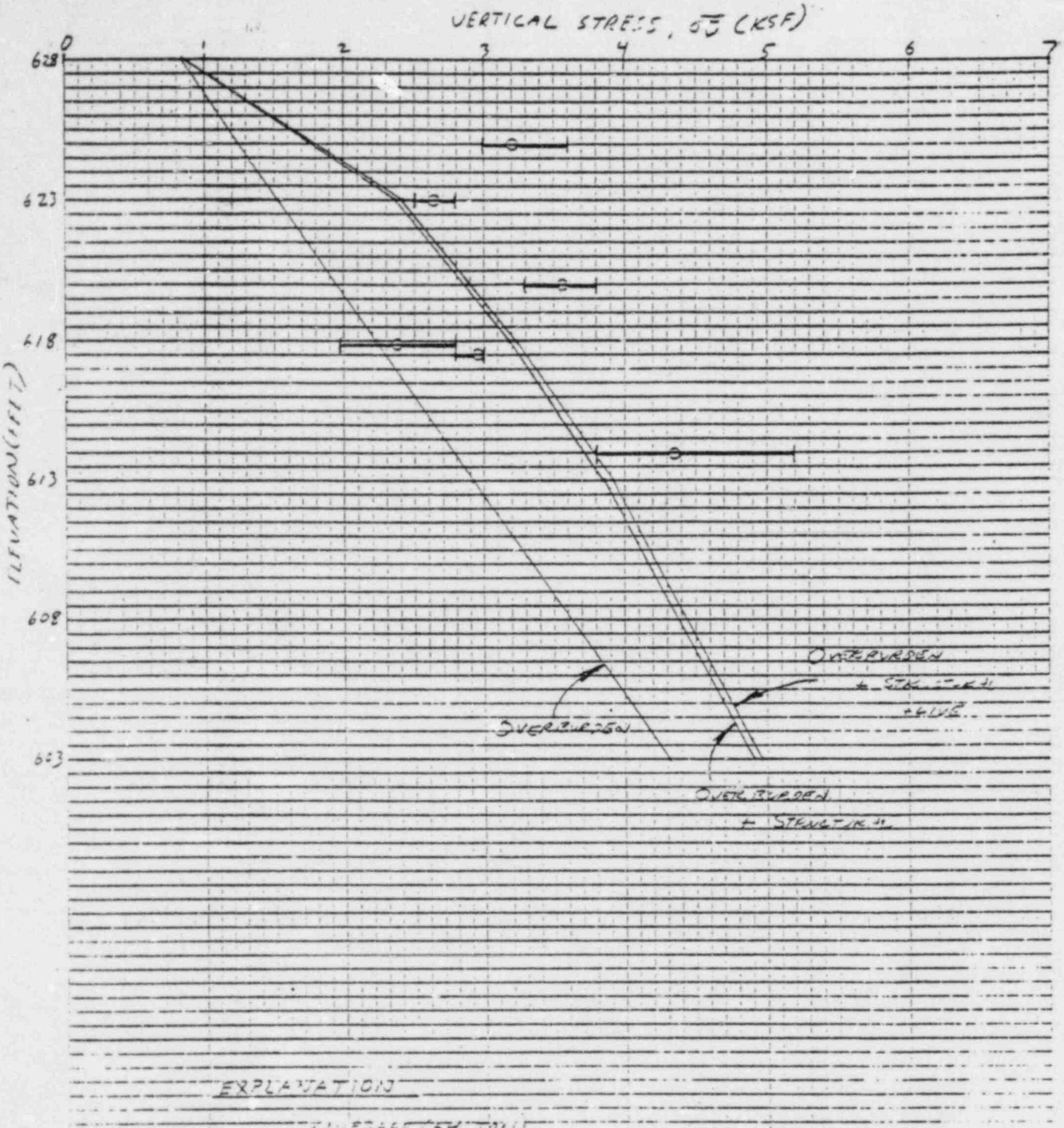

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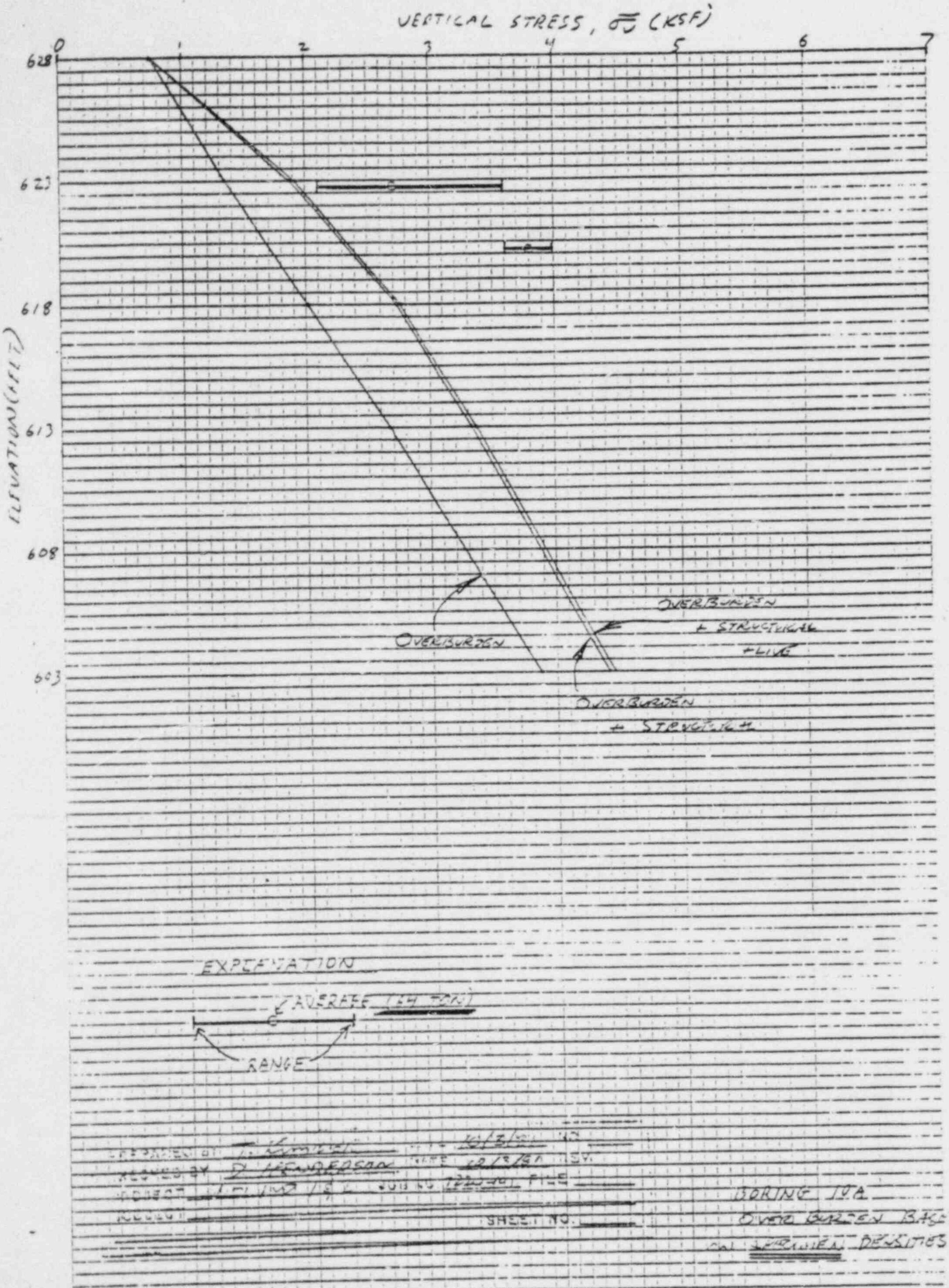
CHECKED BY R. [illegible] DATE 10/13/81
PROJECT MIDLAND [illegible] JOB NO. 7220-[illegible]
SUBJECT
SHEET NO.

BORING 9 + 9A
OVERBURDEN BASED
ON SPECIMEN TESTS


VERTICAL STRESS, σ_v (KSF)
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ELEVATION (FEET)
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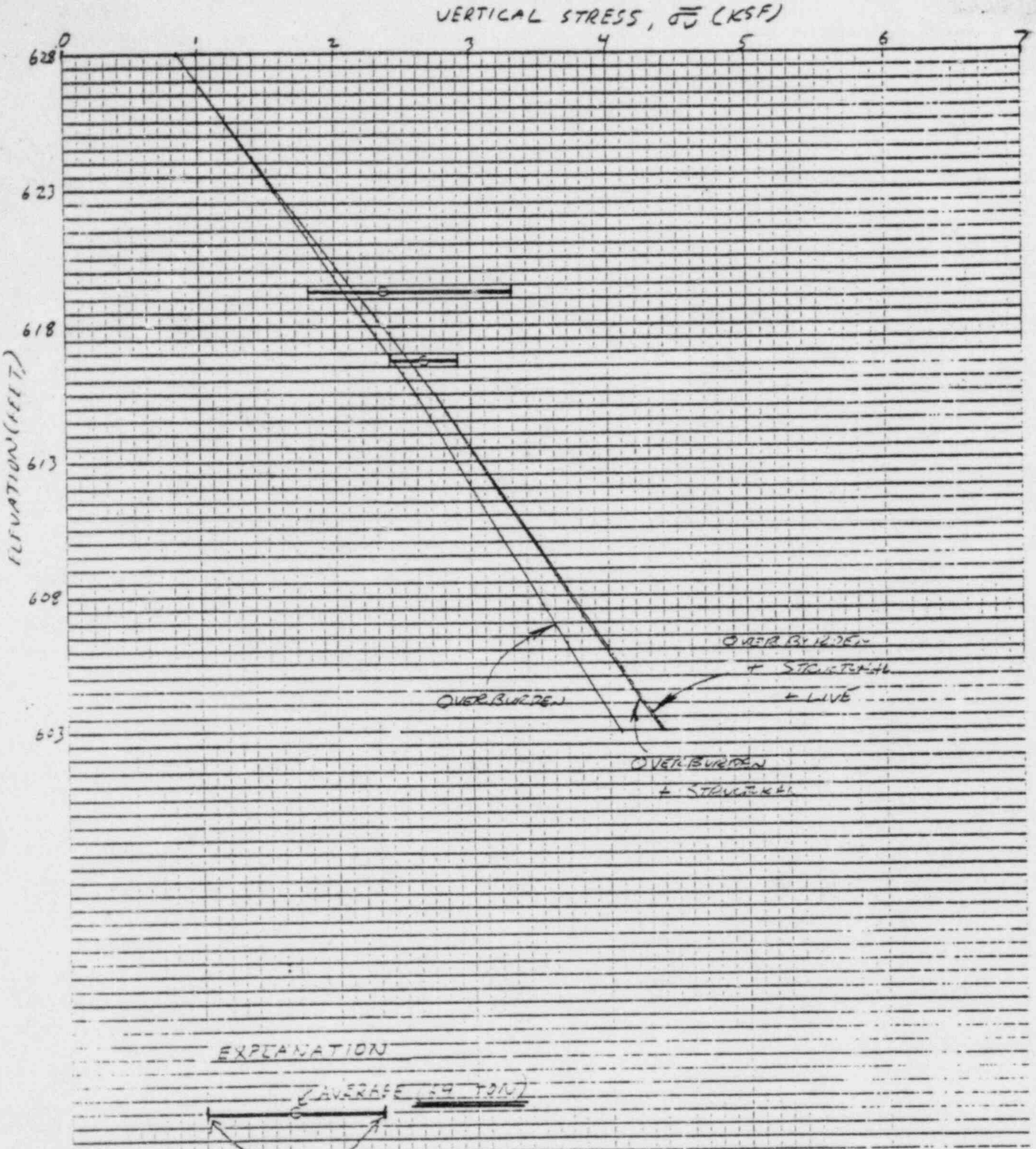
603
OVERBURDEN
OVERBURDEN + STRUCTURAL + LIVE
OVERBURDEN + STRUCTURAL
EXPLANATION
AVERAGE
RANGE
SHEET NO.
BORING 19A
DENSITIES



PREPARED BY J. K[illegible] DATE 10/5/81
CHECKED BY D. HENDERSON DATE [illegible]
PROJECT MIDLAND AS P. JOB NO. 7220 [illegible]
SUBJECT
SHEET NO.

BORING 11A
OVERBURDEN BASED ON
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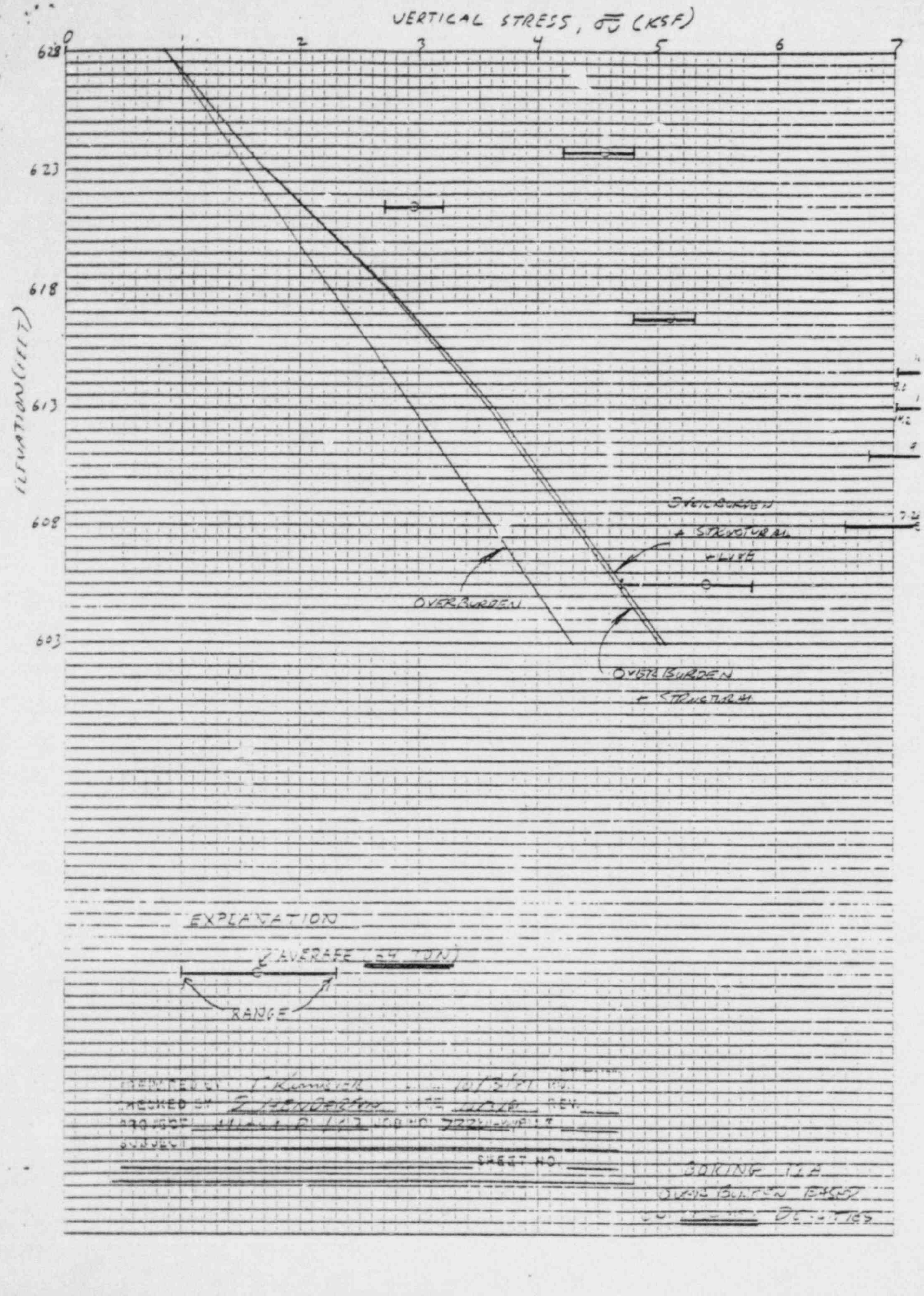

VERTICAL STRESS, σ_v (KSF)
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ELEVATION (FEET)
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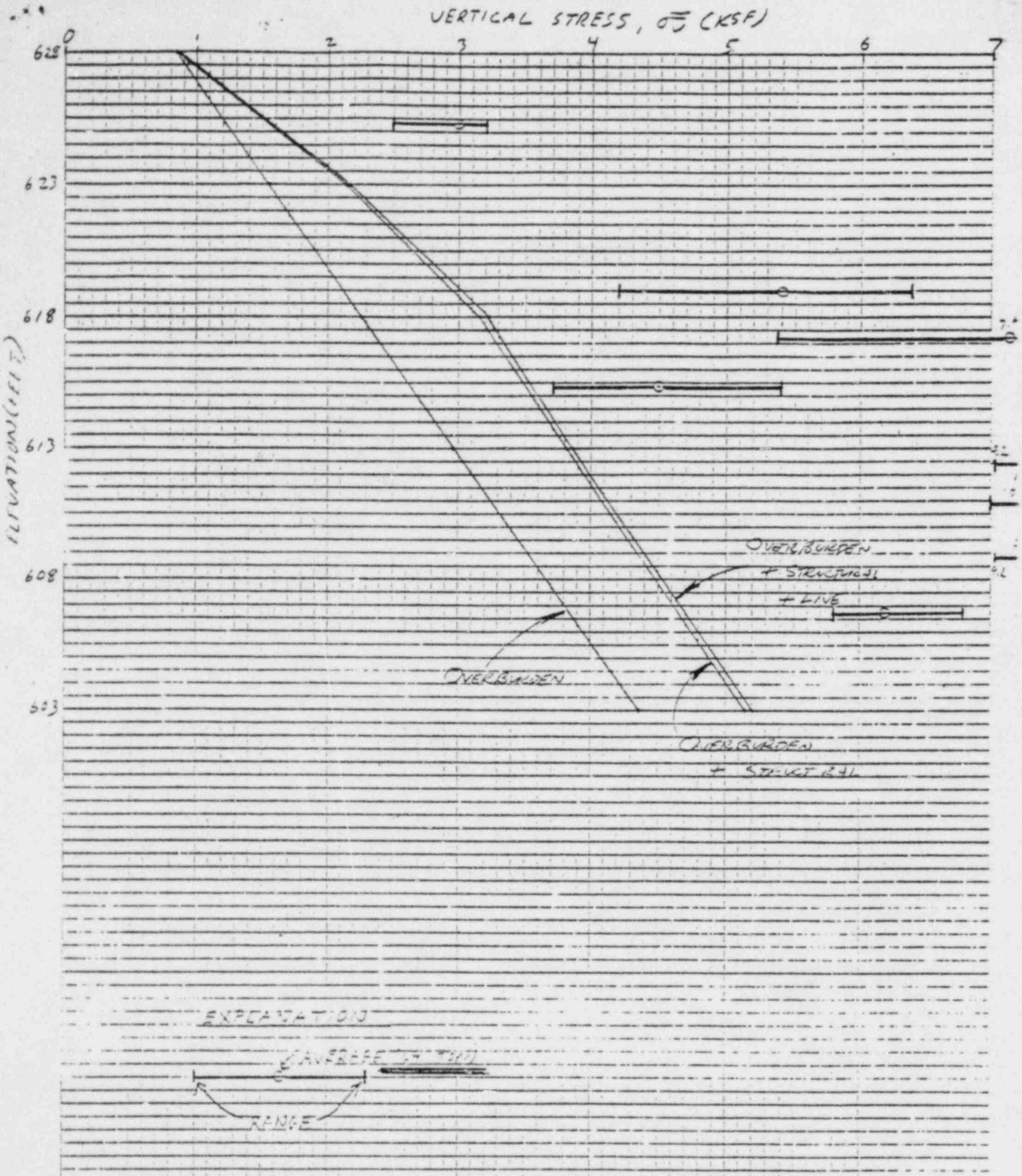
EXPLANATION
AVERAGE
RANGE
BORING 11A



MIDLAND 1 & 2

SHEET NO.

BORING 13A & 13B

15/B5

MEETING SUMMARY DISTRIBUTION

Docket File
NRC/PDR
Local PDR
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[redacted]
H. Denton
E. Case
D. Eisenhut
R. Purple
B. J. Youngblood
A. Schwencer
F. Miraglia
J. Miller
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R. E. Jackson
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OIE (3)
ACRS (16)
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NRC Participants:

bcc: Applicant & Service List

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W. Kreger
R. Houston
W. Gammill
L. Rubenstein
T. Speis
W. Johnston
S. Hanauer
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J. Stolz
M. Srinivasan
R. Baer
E. Adensam
Project Manager D. Hood
Licensing Assistant M. Duncan
J. Kane
F. Rinaldi

Docket Nos: 50-329 OM, OL
and 50-330 OM, OL

MAR 1 0 1982

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 & 2

SUBJECT: SUMMARY OF JANUARY 18 & 19, 1982, AUDIT ON PLANS FOR EXCAVATION BENEATH MIDLAND FEEDWATER VALVE PITS AND TURBINE BUILDING FOR AUXILIARY BUILDING UNDERPINNING

On January 18 & 19, 1982, the NRC Staff and its consultants conducted an audit of the plans and preparations for "Phase II" of the construction sequence for the underpinning of the Auxiliary Building at Midland Plant, Units 1 & 2. The underpinning construction is to be conducted in four phases. The first phase provided for installation of vertical access shafts and was approved by the NRC on November 24, 1981. Phase II, the subject of this audit, generally provides for further deepening of the access shaft, construction of limited drifts under the Feedwater Isolation Valve Pits (FIVPs) and Turbine Building, and installation of certain piers. Enclosure 1 describes the construction sequence logic more fully. The audit was conducted in Ann Arbor, Michigan, pursuant to Table A20 of the staff testimony presented during the OM, OL hearing session of December 1-4, 1981. Enclosure 2 identifies the agenda for presentations given by the applicant and speakers. The calculations, specifications and drawings audited are listed by Enclosure 3.

The applicant reviewed Phase I construction to begin in early February 1982, and informed the staff of a change in its plans to use a hollow steam auger for drilling soldier pile holes for the access shaft. The applicant anticipates difficulty in penetrating the hard glacial till with this technique. Instead, the holes will be augered with a solid stem auger driven by a Kelly bar, and will use a bentonite slurry and casing to insure stability of the hole. The NRC noted its approval of this alternate procedure. A letter to the staff and licensing board will describe the revised procedures.

Mr. D. Bartlett described the Phase II construction sequence and its effects upon the Auxiliary Building foundation. This discussion is given by Enclosure 4. Mr. Bartlett's viewgraph slides are given by Enclosure 5.

Using the slides from Enclosures 6 & 7, Messrs. S. Lo and N. Rawson described the design details for Phase II underpinning, including the overhead support for the FIVPs, and drift under the FIVP and Turbine Building, and the Turbine Building underpinning. The presentation revealed two recent changes: (1) Piers 11 through 14 will be relocated about 4 feet south so as to be in line with piers 9 and 10, and (2) two 6' X 6' underpinning piers will be added beneath structural columns within the Turbine Building.

8203220581

OFFICE							
SURNAME							
DATE							

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(6) After completion of jacking of permanent underpinning

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(8) After any rejacking

OFFICE ▶							
SURNAME ▶							
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DATE	3/5/82	2/26/82	3/5/82	2/ /82	2/ /82		

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

MAR 1 0 1982

Docket Nos: 50-329 OM, OL
and 50-330 OM, OL

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 & 2

SUBJECT: SUMMARY OF JANUARY 18 & 19, 1982, AUDIT ON PLANS FOR EXCAVATION BENEATH MIDLAND FEEDWATER VALVE PITS AND TURBINE BUILDING FOR AUXILIARY BUILDING UNDERPINNING

On January 18 & 19, 1982, the NRC Staff and its consultants conducted an audit of the plans and preparations for "Phase II" of the construction sequence for the underpinning of the Auxiliary Building at Midland Plant, Units 1 & 2. The underpinning construction is to be conducted in four phases. The first phase provided for installation of vertical access shafts and was approved by the NRC on November 24, 1981. Phase II, the subject of this audit, generally provides for further deepening of the access shaft, construction of limited drifts under the Feedwater Isolation Valve Pits (FIVPs) and Turbine Building, and installation of certain piers. Enclosure 1 describes the construction sequence logic more fully. The audit was conducted in Ann Arbor, Michigan, pursuant to Table A20 of the staff testimony presented during the OM, OL hearing session of December 1-4, 1981. Enclosure 2 identifies the agenda for presentations given by the applicant and speakers. The calculations, specifications and drawings audited are listed by Enclosure 3.

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Mr. D. Bartlett described the Phase II construction sequence and its effects upon the Auxiliary Building foundation. This discussion is given by Enclosure 4. Mr. Bartlett's viewgraph slides are given by Enclosure 5.

Using the slides from Enclosures 6 & 7, Messrs. S. Lo and N. Rawson described the design details for Phase II underpinning, including the overhead support for the FIVPs, and drift under the FIVP and Turbine Building, and the Turbine Building underpinning. The presentation revealed two recent changes: (1) Piers 11 through 14 will be relocated about 4 feet south so as to be in line with piers 9 and 10, and (2) two 6' X 6' underpinning piers will be added beneath structural columns within the Turbine Building.

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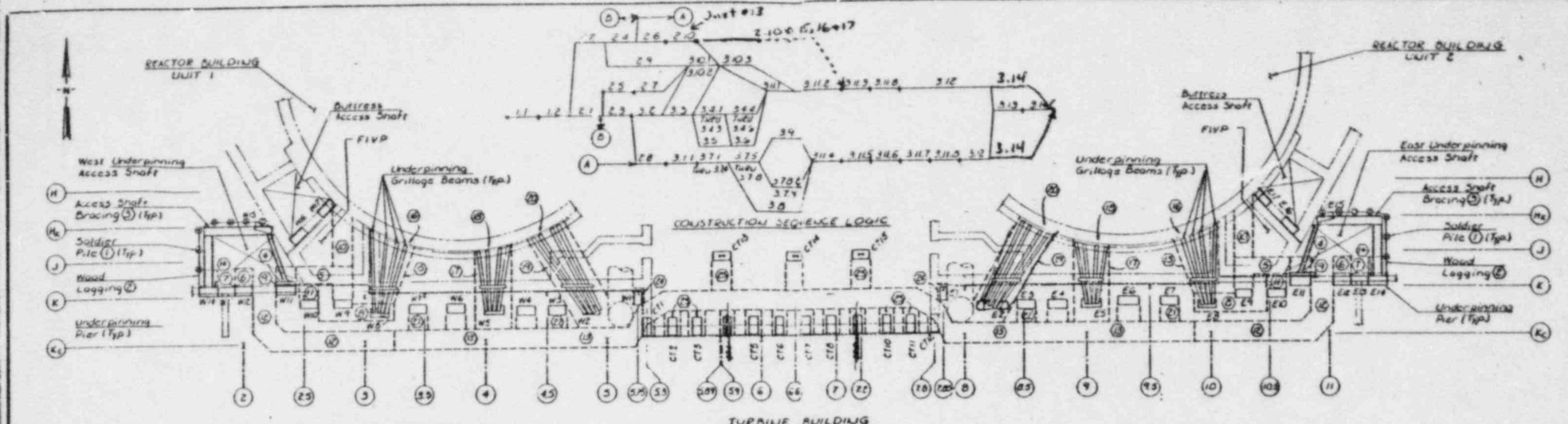
Enclosure 1



CONSTRUCTION SEQUENCE

PHASE I - CONSTRUCT EAST AND WEST ACCESS SHAFTS TO ELEVATION 609.0

1.1. ACCESS SHAFTS TO ELEVATION 626.0

1.1.1. DRILL AND INSTALL SOLDIER PILES TO ELEV. 561.0 - (1)

1.1.2. EXCAVATE AND INSTALL LAGGING TO ELEV. 626.0 - (2)

1.1.3. INSTALL ACCESS SHAFT BRACING LEVEL A AT ELEV. 629.0 - (3)

1.2. ACCESS SHAFTS TO ELEVATION 609.0

1.2.1. EXCAVATE AND INSTALL LAGGING (INCREMENTALLY) TO ELEV. 611.0 - (2)

1.2.2. INSTALL ACCESS SHAFT BRACING LEVEL B AT ELEV. 613.0 - (3)

1.2.3. COMPLETE EXCAVATION AND INSTALL LAGGING TO ELEV. 609.0 - (2)

PHASE II - EXTEND ACCESS SHAFT TO ELEVATION 597.0

2.1. PIERS E/W 9

2.1.1. EXCAVATE, BRACE AND LAG APPROACH PIT ADJACENT TO PIERS E/W 11 - (4)

2.1.2. EXCAVATE, BRACE AND LAG APPROACH DRIFT TO PIERS E/W 9 - (5)

2.1.3. EXCAVATE AND LAG PIERS E/W 9.

2.1.4. PLACE REBARS AND CONCRETE IN PIERS E/W 9.

2.1.5. JACK DESIGN LOADS INTO PIERS E/W 9.

2.2. PIERS E/W 12

2.2.1. EXCAVATE, BRACE AND LAG APPROACH PIT ADJACENT TO PIERS E/W 13 - (6)

2.2.2. EXCAVATE, BRACE AND LAG APPROACH DRIFT TO PIERS E/W 12 - (7)

2.2.3. EXCAVATE AND LAG PIERS E/W 12.

2.2.4. PLACE REBARS AND CONCRETE FOR PIERS E/W 12.

2.2.5. JACK DESIGN LOADS INTO PIERS E/W 12.

2.3. PIERS E/W 8

2.3.1. EXTEND APPROACH DRIFTS FROM PIERS E/W 9 (2.1.2), TO PIERS E/W 8 - (8)

2.3.2. EXCAVATE AND LAG PIERS E/W 8.

2.3.3. PLACE REBARS, INSTRUMENTATION AND CONCRETE FOR PIERS E/W 8.

2.3.4. JACK DESIGN LOAD INTO PIERS E/W 8.

2.4. PIERS E/W 11

2.4.1. EXCAVATE, BRACE AND LAG APPROACH DRIFT, TO PIERS E/W 11 - (9)

2.4.2. EXCAVATE AND LAG PIERS E/W 11.

2.4.3. PLACE REBARS AND CONCRETE FOR PIERS E/W 11.

2.4.4. JACK DESIGN LOADS INTO PIERS E/W 11.

2.5. DRIFTS TO REACTOR BUILDING

2.5.1. EXTEND APPROACH DRIFTS FROM PIERS E/W 9 (2.1.2), TO REACTOR BUILDINGS - (10)

2.5.2. REBRACE DRIFT COLUMNS ADJACENT TO THE AUXILIARY BUILDING, PERMITTING REMOVAL OF OUTSIDE DRIFT WALLS UNDER ITEM (2.7.2).

2.6. PIERS E/W 10

2.6.1. EXTEND APPROACH DRIFTS FROM PIERS E/W 9 (2.1.2) TO PIERS E/W 10 - (11)

2.6.2. EXCAVATE AND LAG PIERS E/W 10.

2.6.3. PLACE REBARS AND CONCRETE FOR PIERS E/W 10.

2.6.4. JACK DESIGN LOADS INTO PIERS E/W 10.

2.7. ACCESS SHAFTS TO ELEVATION 597.0

2.7.1. EXCAVATE AND INSTALL LAGGING (INCREMENTALLY) TO ELEV. 597.0.

2.7.2. EXCAVATE ACCESS SHAFT TO ELEV. 597.0. MAINTAIN BERM AT ELEV. 602.0 IN FRONT OF TEMPORARY DRIFT WALL BULKHEAD, (2.5.2).

2.7.3. INSTALL ACCESS SHAFT BRACING LEVEL C AT ELEV. 599.5.

2.8. LONG ACCESS DRIFTS (E/W)

2.8.1. EXCAVATE, BRACE AND LAG LONG ACCESS DRIFTS FROM PIERS E/W 11 TO COL. LINE 3/10 - (12)

2.8.2. EXCAVATE, BRACE AND LAG LONG ACCESS DRIFT FROM COL. LINE 3/10 TO COL. LINE 3.25/7.85 - (13)

2.9. PIERS E/W 14

2.9.1. EXCAVATE, BRACE AND LAG APPROACH PITS AND DRIFTS TO PIERS E/W 14 - (14)

2.9.2. EXCAVATE AND LAG PIERS E/W 14.

2.9.3. PLACE REBARS AND CONCRETE FOR PIERS E/W 14.

2.9.4. JACK DESIGN LOADS INTO PIERS E/W 14.

2.10. PIERS E/W 13, 15, 16 & 17

2.10.1. EXCAVATE, LAG, PLACE REBAR, CONCRETE AND JACK DESIGN LOADS.

2.10.2. NO TWO ADJACENT PIERS MAY BE EXCAVATED SIMULTANEOUSLY.

PHASE III - CONSTRUCT REMAINING AUXILIARY BUILDING & [illegible]

3.1. LONG ACCESS DRIFTS (E/W)

3.1.1. CONTINUE TO EXCAVATE, BRACE AND LAG E/W ACCESS DRIFT TO PIER CT 1.

3.2. GRILLAGE BEAMS E/W 8

3.2.1. EXCAVATE, BRACE AND LAG DRIFT, FROM PIERS E/W 8, NORTH TO REACTOR BUILDING - (15)

3.2.2. REMOVE TEMPORARY BULKHEADS (AS REQUIRED) UNDER FIVP STRUCTURES, ITEM 2.5.[illegible]

3.2.3. EXCAVATE AND LAG GROUND PITS ADJACENT TO REACTOR BUILDING.

3.2.4. INSTALL COLUMNS AND GRILLAGE BEAMS - (16)

3.2.5. JACK TO PERFORM LOAD TRANSFER TO UNDERPINNING SYSTEMS.

3.3. PIERS AND GRILLAGE BEAMS E/ 5

3.3.1. EXCAVATE, BRACE AND LAG DRIFTS, FROM LONG ACCESS DRIFT ADJACENT PIERS E/W 5 NORTH TO REACTOR BUILDING - (17)

3.3.2. EXCAVATE AND LAG PITS E/W 5.

3.3.3. EXCAVATE AND LAG COLUMN PITS ADJACENT TO REACTOR BUILDING.

3.3.4. PLACE REBARS, INSTRUMENTATION AND CONCRETE FOR PIERS E/W 5.

3.3.5. INSTALL COLUMNS AND GRILLAGE BEAMS - (18)

3.3.6. JACK TO PERFORM LOAD TRANSFER TO UNDERPINNING SYSTEM.

3.4. PIERS AND GRILLAGE BEAMS E/ 3

3.4.1. EXCAVATE DRIFTS, FROM LONG ACCESS DRIFTS TO PIER E/W 3.

3.4.2. EXCAVATE AND LAG PITS E/W 3.

3.4.3. PLACE REBARS, INSTRUMENTATION AND CONCRETE FOR PIERS E/W 3 AND TRANSFER TURBINE BLDG. LOAD.

3.4.4. EXCAVATE DRIFT AND PIT FOR COLUMNS (19)

3.4.5. INSTALL COLUMNS AND GRILLAGE BEAMS - (20)

3.4.6. JACK TO PERFORM LOAD TRANSFER TO UNDERPINNING SYSTEM.

3.5. PIERS E/W 6 AND E/W 7

3.5.1. EXCAVATE, BRACE AND LAG DRIFT NORTH FROM LONG ACCESS DRIFT - (21)

3.5.2. EXCAVATE AND LAG PIERS E/W 6.

3.5.3. PLACE REBARS AND CONCRETE FOR PIERS E/W 6.

3.5.4. JACK DESIGN LOADS INTO PIERS E/W 6.

3.5.5. REPEAT 3.5.1 THRU 3.5.4 FOR PIERS E/W 7.

3.5.6. PIERS MAY BE CONSTRUCTED AFTER LOAD TRANSFER IS COMPLETED AT E/W 5.

3.5.7. NO TWO ADJACENT PIERS MAY BE CONSTRUCTED SIMULTANEOUSLY.

3.6. PIERS E/W 2 AND 4

3.6.1. CONSTRUCTION SEQUENCE IS IDENTICAL TO THAT OUTLINED FOR PIERS E/W 6 AND 7 - (22) (3.5.1. THRU 3.5.4.).

3.6.2. PIERS MAY BE CONSTRUCTED AFTER TURBINE BLDG. LOAD TRANSFER IS COMPLETED AT E/W 3.

3.6.3. NO TWO ADJACENT PIERS MAY BE CONSTRUCTED SIMULTANEOUSLY.

3.7. PIERS CT 1 THRU CT 4 AND CT 7 THRU CT 12

3.7.1. EXCAVATE, BRACE AND LAG DRIFTS, SOUTH FROM LONG ACCESS DRIFT (23)

3.7.2. EXCAVATE AND LAG PIERS CT 1 AND 12.

3.7.3. PLACE REBARS AND CONCRETE FOR PIERS CT 1 AND 12.

3.7.4. JACK DESIGN LOADS INTO PIERS CT 1 AND 12.

3.7.5. CONSTRUCT PIERS CT 2 AND CT 11 FOLLOWING SEQUENCE 3.7.1 THRU 3.7.4 AFTER LOAD-TRANSFER IS COMPLETED AT PIERS CT 1 AND CT 12, RESPECTIVELY.

3.7.6. CONSTRUCT PIERS CT 3 AND CT 10 FOLLOWING SEQUENCE 3.7.1 THRU 3.7.4 AFTER LOAD-TRANSFER IS COMPLETED AT PIERS CT 2 AND CT 11, RESPECTIVELY.

~~3.7.7. CONSTRUCT PIERS CT 4 AND CT 9 FOLLOWING SEQUENCE 3.7.1 THRU 3.7.4 AFTER LOAD-TRANSFER IS COMPLETED AT PIERS CT 3 AND CT 10, RESPECTIVELY.~~

3.7.8. CONSTRUCT PIERS CT 5 AND CT 8 FOLLOWING SEQUENCE 3.7.1 THRU 3.7.4 AFTER EXCAVATION IS COMPLETED AT PIERS CT 4 AND CT 9, RESPECTIVELY.

3.7.9. CONSTRUCT PIERS CT 6 AND CT 7 FOLLOWING SEQUENCE 3.7.1 THRU 3.7.4 AFTER EXCAVATION IS COMPLETED AT PIERS CT 5 AND CT 8 AND AFTER LOAD-TRANSFER IS COMPLETED AT PIERS CT 4 AND CT 9, RESPECTIVELY.

3.8. PIERS E/W 1

3.8.1. CONSTRUCTION SEQUENCE IS IDENTICAL TO THAT OUTLINED FOR PIERS E/W 6 AND 7 - (24) (3.5.1. THRU 3.5.4)

3.8.2. CONSTRUCT PIERS E/W 1 AFTER LOAD-TRANSFER IS COMPLETED AT PIERS CT 12 AND CT 1, RESPECTIVELY.

3.9. PIERS CT 13, CT 14 AND CT 15

3.9.1. CONSTRUCTION SEQUENCE IS IDENTICAL TO THAT OUTLINED FOR PIERS E/W 6 AND 7 - (25) (3.5.1 THRU 3.5.4).

3.9.2. CONSTRUCT PIERS CT 13 AND CT 15 AFTER LOAD-TRANSFER IS COMPLETED AT PIER CT 4 AND CT 8 RESPECTIVELY.

3.9.3. CONSTRUCT PIERS CT 14 AFTER LOAD-TRANSFER IS COMPLETED AT PIERS CT 13 AND CT 15.

3.10. ACCESS SHAFTS TO ELEVATION 571.0

3.10.1. EXCAVATE AND INSTALL LAGGING (INCREMENTALLY) TO ELEV. 587.0.

3.10.2. INSTALL BRACING LEVEL - D AT ELEV. 589.5.

3.10.3. COMPLETE EXCAVATION AND LAGGING INSTALLATION (INCREMENTALLY) TO ELEV. 571.0.

3.11. [illegible] EXCAVATION, BRACING AND LAGGING

3.11.1. EXCAVATE AND LAG BETWEEN PIERS TO ELEV. 581 FROM COL. LINE 3/10 TO 3/8 THEN INSTALL TOP STRUTS.

3.11.2. EXCAVATE AND LAG BETWEEN PIERS TO ELEV. 562 FROM COL. LINE 3/10 TO 3/8 THEN INSTALL LOWER STRUTS

3.11.3. EXCAVATE AND LAG TO ELEVATION 572 FROM COL. LINES 3/10 TO 3/8.

3.11.4. EXCAVATE AND LAG AS REQUIRED TO ELEV. 581 FROM COL. LINE 3/8 TO 6.6 THEN INSTALL TOP STRUTS.

3.11.5. SUPPORT ELECTRIC DUCTS.

3.11.6. EXCAVATE AND LAG AS REQUIRED TO ELEV. 574 THEN INSTALL LOWER STRUTS.

3.11.7. EXCAVATE AND LAG AS REQUIRED TO ELEV. 563.

3.11.8. EXCAVATE LAST FOOT INSPECT SUBGRADE AND PLACE MUD MAT.

Phase IV

3.12. PLACE PERMANENT WALL REBAR, CONCRETE AND ANCHORS

3.13. LOAD PERMANENT WALL UNTIL ACCEPTANCE CRITERIA IS ACHIEVED THEN TRANSFER LOAD TO PERMANENT WALL

3.14. BACKFILL

CONSUMERS POWER COMPANY
MIDLAND PLANT UNITS 1 & 2

UNDERPINNING AUXILIARY BUILDING
CONSTRUCTION SEQUENCE LOGIC

1-20-82

Swanberg
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Enclosure 2
(Page 1 of 2)

AUXILIARY BUILDING UNDERPINNING

AGENDA

1)	INTRODUCTION	N. Swanberg
2)	CONSTRUCTION SEQUENCE	D. Bartlett
3)	DESIGN DETAIL	
	A) FIVP Temporary	S. Lo
	B) Extention of Acess Shaft to elevation 597	N. Rawson
	C) Drift under FIVP, Turbine Building	N. Rawson
	D) Turbine Building Underpinning	N. Rawson
4)	Monitoring Details	R. Adler

Enclosure 2
(page 2 of 2)

PROPOSED CONSTRUCTION RELEASE (PHASE II)

1) EXTEND ACCESS SHAFTS TO ELEVATION 597

2) CONSTRUCT DRIFTS UNDER F I V P AND TURBINE BUILDING UP TO PIER W8 AND E8

3) CONSTRUCT PIERS W8 THRU W14 AND E 8 THRU E14

Enclosure 3

<u>Calculations</u>

FIVP Temporary Support
Turbine Wall below el 609
Turbine Mat for Undermining
Piers adjacent to FIVP under Turbine Bldg.
Buttress access shaft for Wale loads from acess shaft
Containment wall for strut loads
Lagging Calculations
Turbine Building Permanent Condition
Bearing Pressure Calculations for Piers

<u>Specifications</u>

Access Shaft Installation
Underpinning (Information Draft)

<u>Drawings</u>

FIVP Support Steel
Tunnel Details
Pier Details
Pit Details (Sketch)
Strut Details
Construction Sequence
Deep Seated Bench Marks
Monitoring Instrumentation
Monitoring Data Forms

1-19-82

A DISCUSSION ON THE EFFECTS OF PHASE II CONSTRUCTION ON THE AUXILIARY BUILDING FOUNDATION

This discussion presents reasons why Phase II construction will not be detrimental to the foundation support of the auxiliary building. Phase II is primarily the construction of several 3 ft. by 6 ft. hand dug piers and 7 ft. high by 6 ft. wide access drifts necessary for access to the pier locations. Phase II does not include any undermining or removal of the supporting soil directly beneath the auxiliary building. Although there is lateral excavation adjacent to the materials supporting the auxiliary building, and there are excavations for hand dug piers, as explained below, these excavations and the construction of the piers will not be detrimental to the auxiliary building foundation.

The first consideration must be the strength and rigidity of the auxiliary building structure. The massive east-west shear wall is capable of redistributing the building loads to the underlying soil if necessary. A preliminary finite element analysis of the structure indicates that approximately 7 ksi maximum increase in rebar stress will occur if a 20 ft. width of soil were removed under both the east and west ends of the electrical penetration wings. This is a design case far more severe than any condition that could exist in Phase II construction. Therefore, this acceptable increase in stress provides assurance that the Phase II construction will not be detrimental to the auxiliary building foundation. In the actual case, there will not be any soil removed from under the auxiliary building; only a minor redistribution of the soil pressure bulb will take place, as a result of the construction.

Construction procedures are an important consideration. For the access drift, the procedure will be to advance the excavation approximately four feet without lagging. The unlagged excavation can be expected to stand at greater than 3 vertical to 1 horizontal during this stage of construction. After the excavation has been extended, a steel support frame will be installed four feet beyond the last in-place frame. Lagging will be placed along the sides of the drift between these two frames. Previously excavated soil will then be packed behind the lagging to restore lateral support to the unexcavated soil.

The pits will be constructed by the "excavate a foot - lag a foot" method in the fill material. Immediately after the lagging is in place, it will be backpacked to return lateral support to the surrounding soil.

These construction procedures for the access drifts and the pits are by controlled hand methods. They are also very localized construction activities. Additionally, no two adjacent pits will be worked on at the same time.

From field experience and the references listed at the end of this discussion, approximate limits of significantly disturbed soil adjacent to drift excavation can be expected to resemble the shape shown in Figures A1 and B1. The maximum horizontal projection of these zones of influence is approximately one half the height of the excavation. These figures, drawn to scale, indicate that the expected zones of influence do not extend to the soil supporting the auxiliary building.

The effect that the excavation will have on the "bulb of pressure" beneath the auxiliary building must also be evaluated. The vertical pressure in the supporting soil reduces with depth. The pressure lines on Figures A2 and B2 represent the bulb of pressure corresponding to one-tenth of the contact pressure beneath the foundation of the auxiliary building. Thus, it is seen from Figures A2 and B2 that this one-tenth ratio line does not intersect the access drifts.

However, there is an overlap of the zone of influence of significantly disturbed soil from Figures A1 and B1 with the 0.1 pressure bulb . This overlap will cause a redistribution of pressure, but because it occurs in a zone of low pressure the effect on the auxiliary building will be insignificant.

In a similar manner, excavation for the pits will cause disturbance of the low stress regions of the pressure bulb created by the auxiliary building. Again, this is a minor redistribution having an insignificant effect.

A contingency plan for ground stabilization will be implemented if the soil is found to be instable, or if the instrumentation indicates movement of the auxiliary building.

The above discussion clearly indicates that Phase II construction will not be detrimental to the auxiliary building.

REFERENCES

1. Foundation Design, Wayne C. Teng, page 125, 126.

2. NAVFAC DM-7, Department of Navy, Figure 13-8.

3. Rock Tunneling With Steel Supports, Proctor & White, page 62.

4. Cofferdams, White and Prentis, page 61.

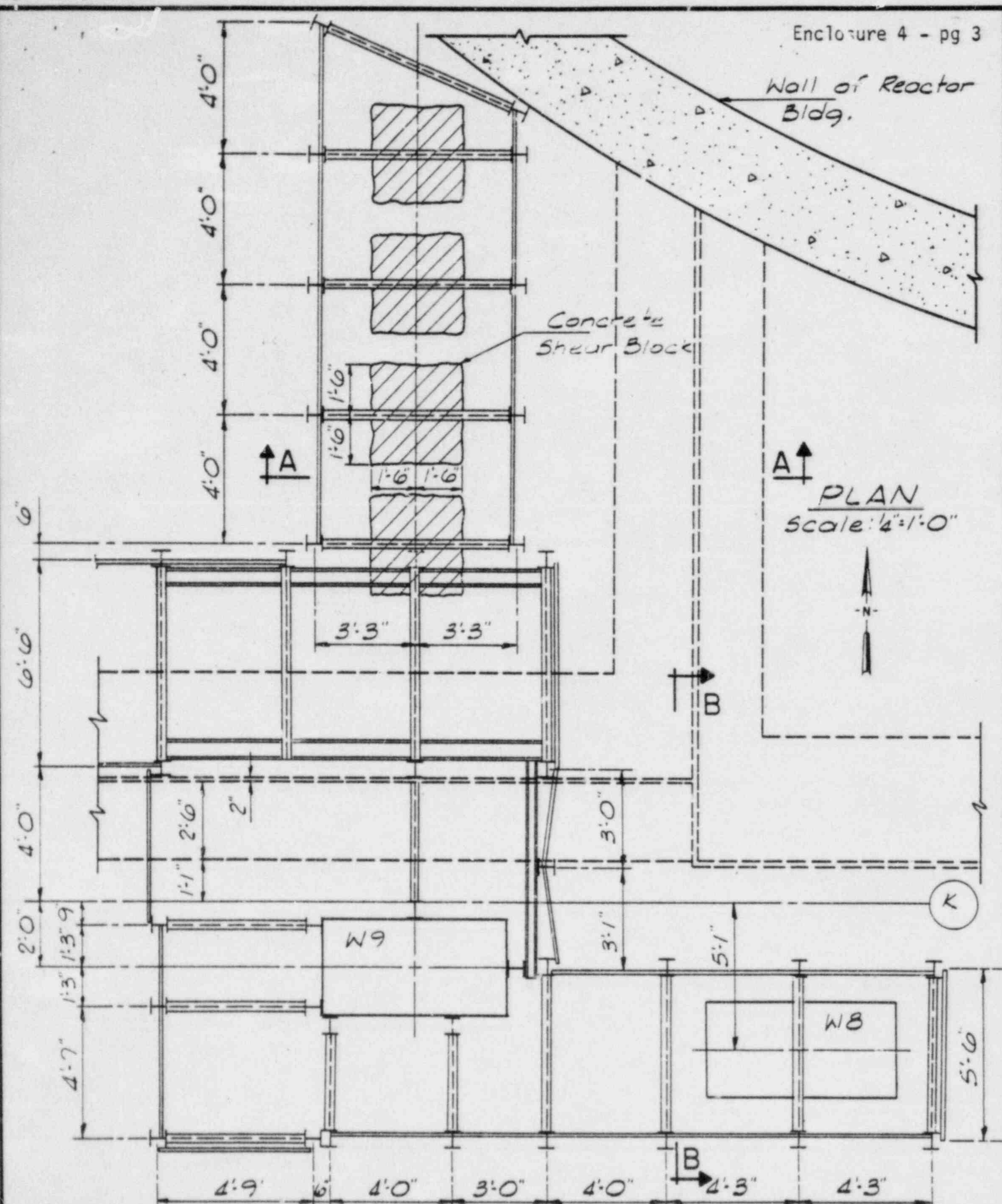
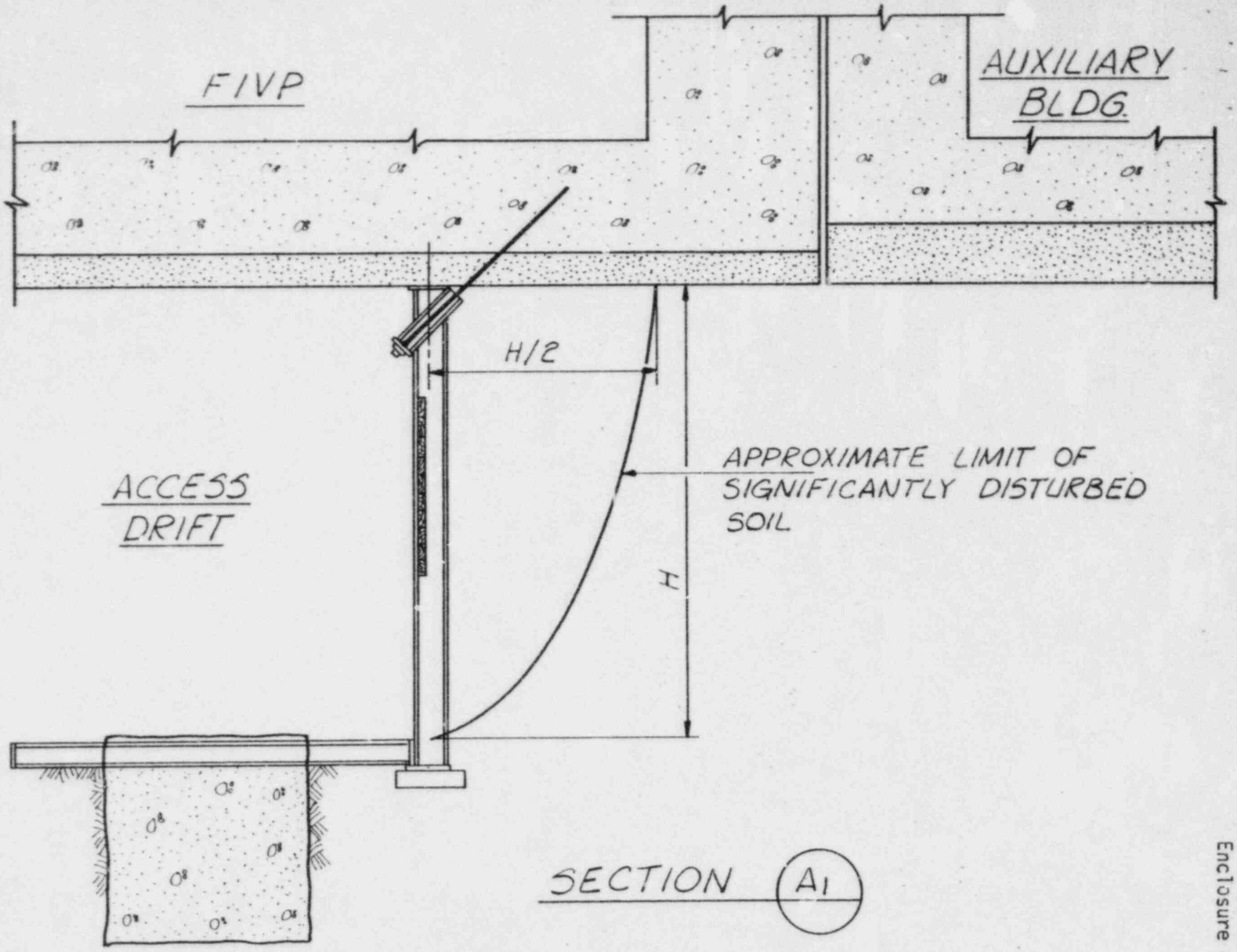


FIGURE A

1-20-82



SECTION A1

FIGURE A1

1-20-82

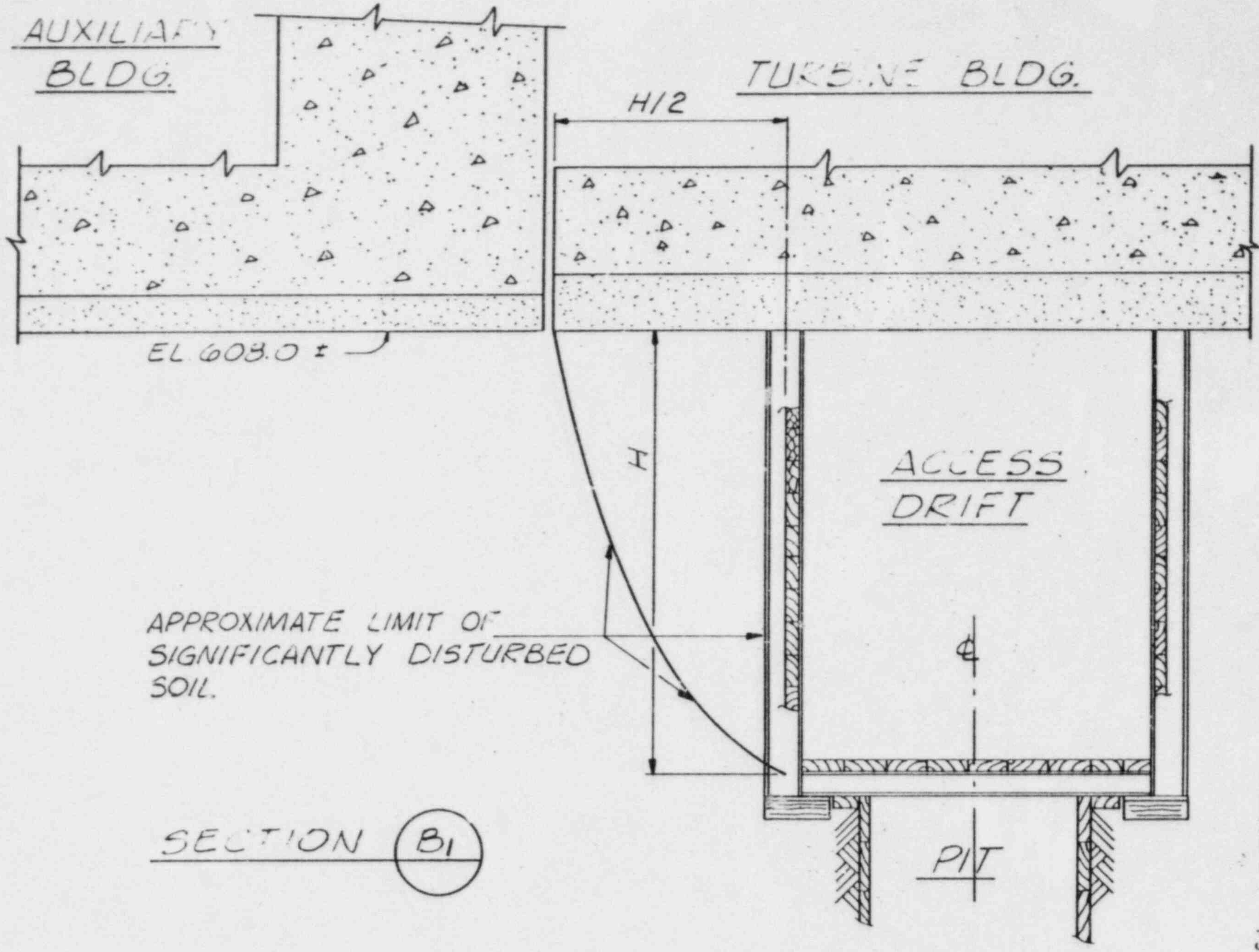


FIGURE B1

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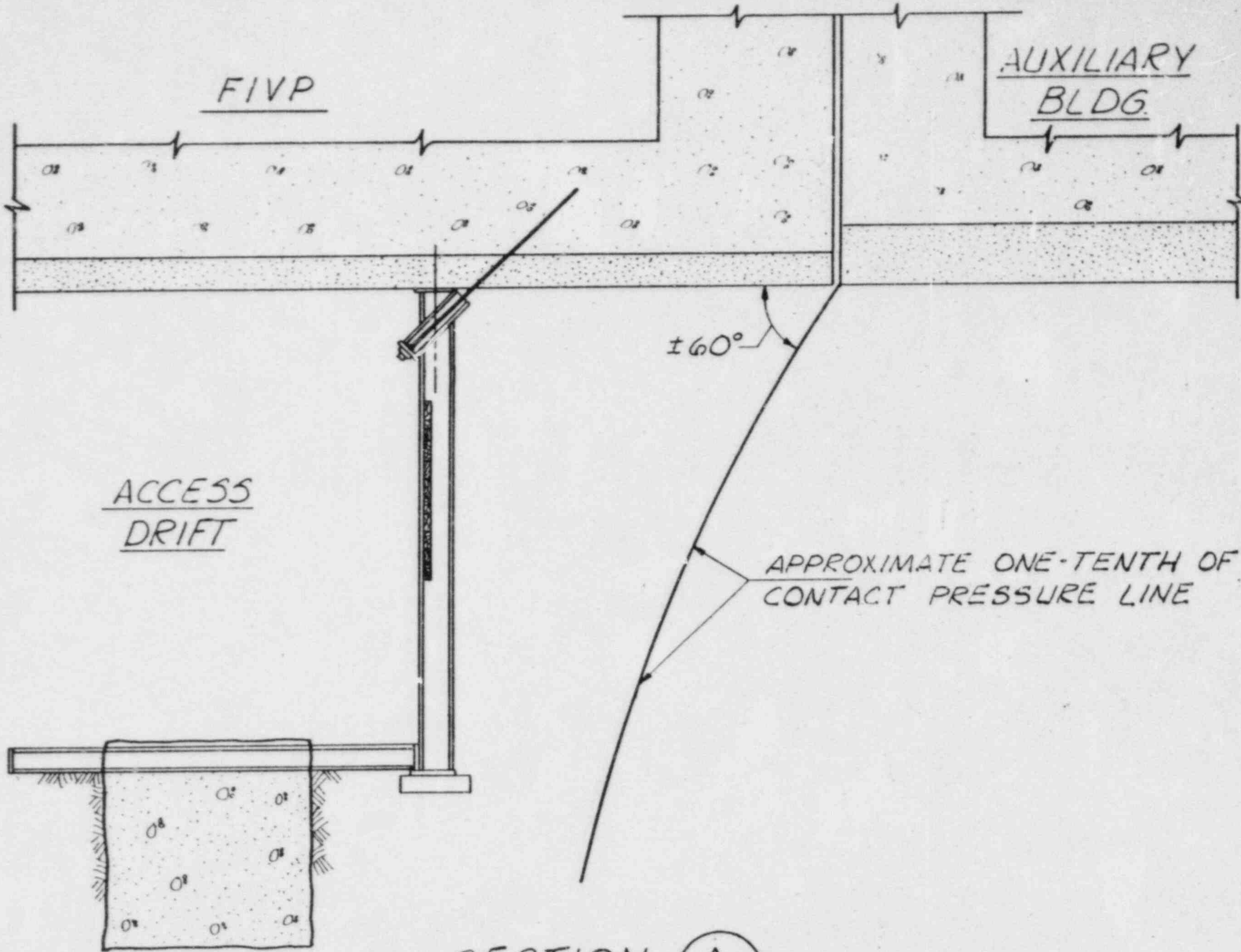
Enclosure 4 - pg 5

FIGURE A2

1-20-82



SECTION A2

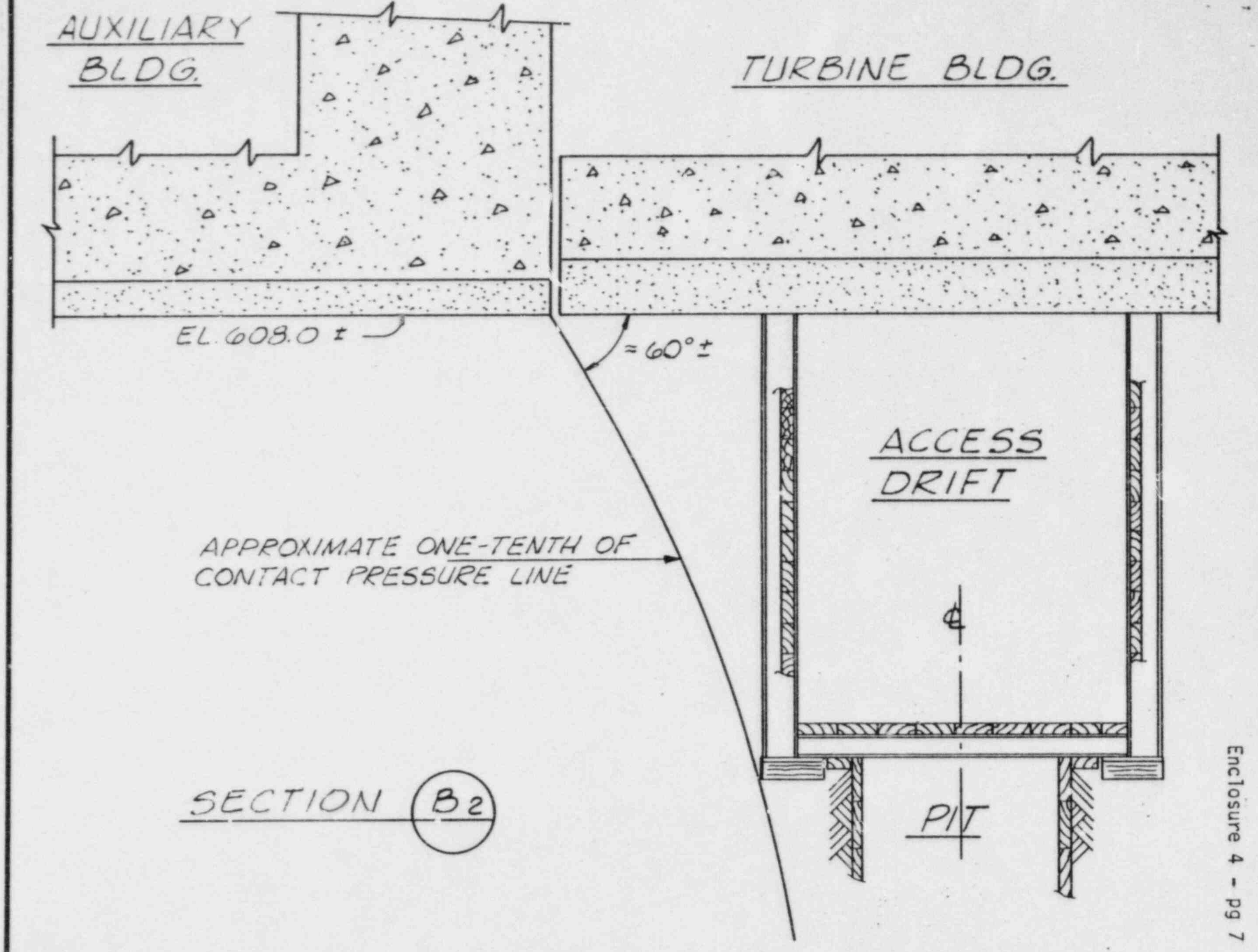


FIGURE B2

1-20-82

Enclosure 4 - pg 7

Let L_{l+d} = live load + dead load for the column which has the largest live load/dead load ratio;

L_s = service load for the same column;

= dead load + ½ live load for ordinary buildings;

q_a = allowable bearing pressure as determined by the principles discussed in Sec. 6-5;

q_d = design pressure for all footings except the one with largest live load/dead load ratio.

Then A = area of footing supporting the column with the largest live load/dead load ratio.

$= L_{l+d}/q_a$

$q_d = L_s/A$

$$\text{Area for other footings} = \frac{\text{Service load}}{q_d}$$

6-7 Stress on Lower Strata

1. For stability analysis of footings, the pressure under a footing may be assumed to spread out on a slope of 2 vertical to 1 horizontal. Thus, a load Q acting concentrically on a footing area of $B \times L$ is assumed to be distributed over an area of $(B + Z)(L + Z)$ at a depth Z below the footing, Fig. 6-8. If any stratum of soil is inadequate to sustain this spread-out pressure, the design bearing pressure should be reduced. However, for a two layer system of clays, the procedure described in Fig. 6-11 gives more reliable results.

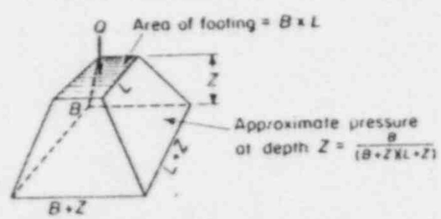


Fig. 6-8 Approximate distribution of vertical pressure under footing.

2. For settlement analysis, the approximation above may not be sufficient, and a more accurate approach based on elastic theory may be required. All elastic methods are developed from the Boussinesq's equation which deals with a single load acting on the surface of a half-space (infinitely large area and depth).

$$q = \frac{3Qz^3}{2\pi R^5} = \frac{3Q}{2\pi z^2}\cos^5\psi \tag{6-5}$$

where q = vertical stress at any given point;

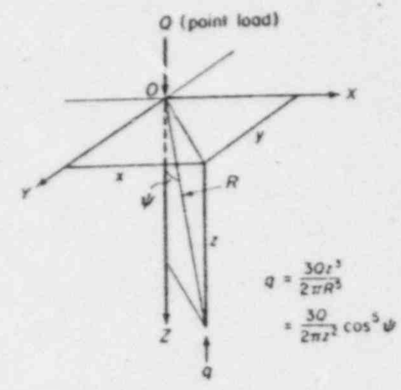


Fig. 6-9 Vertical stress due to a point load.

Q = surface load;

z = depth of the given point;

$r = \sqrt{x^2 + y^2 + z^2}$, see Fig. 6-9;

ψ = angle between line R and vertical.

Based on Boussinesq's equation, the vertical stresses under continuous, rectangular and circular footings have been computed. The results are shown in Fig. 6-10. In these figures the magnitude of vertical pressure at various points are given in terms of the bearing pressure q. For example the vertical pressure at any point along the line $0.2q$ is equal to 20

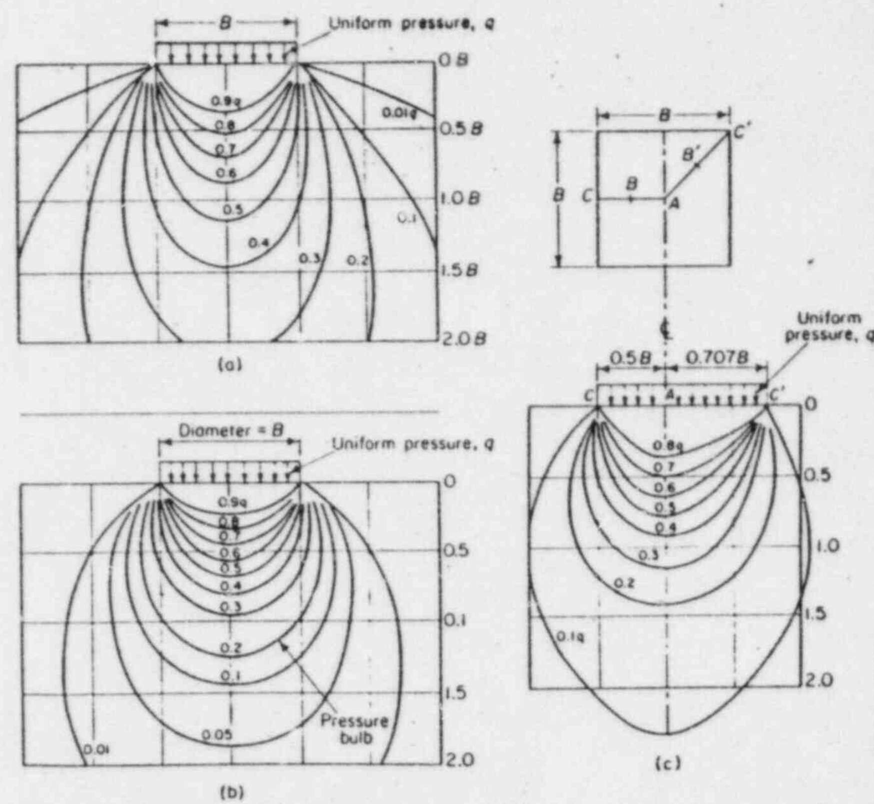
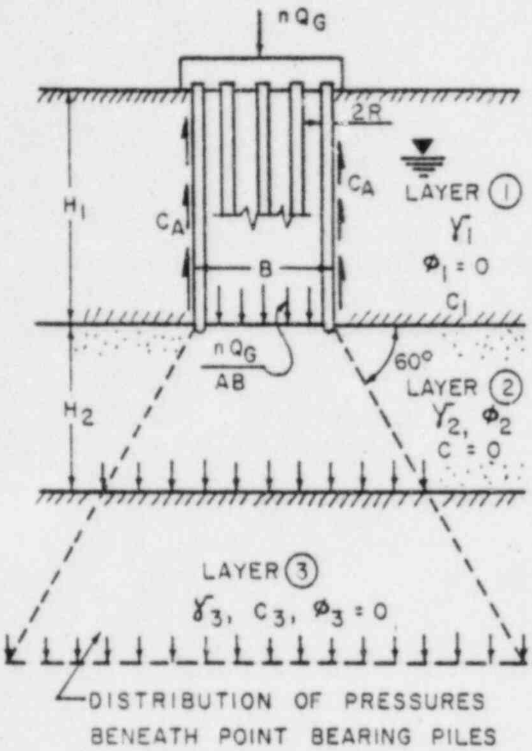
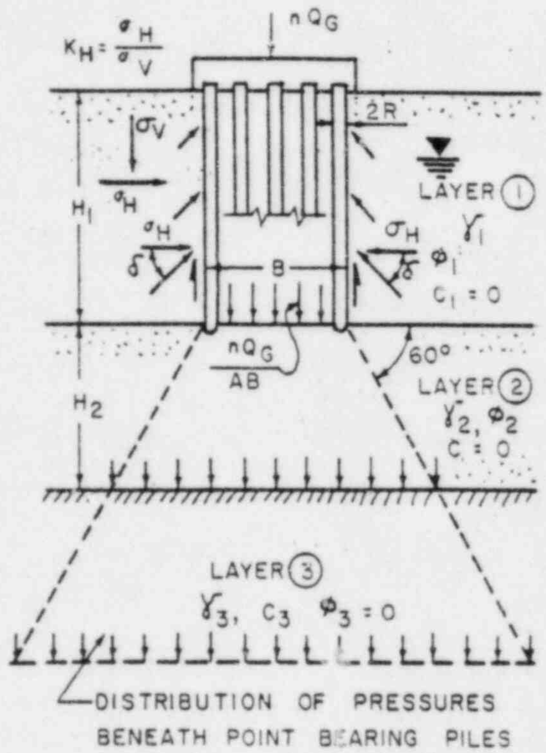


Fig. 6-10 Vertical stresses under footing: (a) under a continuous footing: (b) under a circular footing; (c) under a square footing.

Enclosure 4 - pg 8

OUTSIDE DIMENSIONS OF PILE GROUP IN PLAN = A × B, (B) IS SMALLER DIMENSION. PILES STOP IN TOP OF COARSE GRAINED LAYER (2). LAYER (2) IS UNDERLAIN BY COHESIVE STRATUM. LAYER (3). n = NUMBER OF PILES.





LAYER (1) IS COHESIVE ($\phi = 0$)

nQ_G = ULTIMATE LOAD CAPACITY OF GROUP

Q_{ult} = ULTIMATE CAPACITY OF SINGLE PILE (WEIGHT OF PILES NEED NOT BE INCLUDED IN APPLIED LOAD).

FAILURE IN LAYER (2) ($H_2 \geqq B$)

PILE SPACING $\leqq$ 6R:

$$nQ_G = (\gamma_1 H_1 N_{q2} + 0.4 \gamma_2 B N_{\gamma 2}) A \times B + 2C_A (A+B) H_1 - AB\gamma_1 H_1$$

PILE SPACING > 16R: $nQ_G = n(Q_{ult})$

$$Q_{ult} = (\gamma_1 H_1 N_{q2} + 0.4 \gamma_2 B N_{\gamma 2}) \pi R^2 + 2C_A \pi R H_1 - \pi R^2 \gamma_1 H_1$$

LAYER (1) IS COHESIONLESS (C = 0)

FAILURE IN LAYER (2) ($H_2 \geqq B$)

IF GROUND WATER IS AT DEPTH GREATER THAN (B) BELOW TOP OF LAYER (2):

IF LAYER (1) IS ESSENTIALLY SIMILAR TO TO LAYER (2), OBTAIN nQ_G FROM FIG. 13-2.

IF ϕ_1 DIFFERS GREATLY FROM ϕ_2:

PILE SPACING < 6R:

$$nQ_G = (\gamma_1 H_1 N_{q2} + 0.4 \gamma_2 B N_{\gamma 2}) A \cdot B + (A+B) K_H \gamma_1 \tan \delta_1 H_1^2 - AB\gamma_1 H_1$$

PILE SPACING > 16R: $nQ = n(Q_{ult})$

$$Q_{ult} = (\gamma_1 H_1 N_{q2} + 0.4 \gamma_2 B N_{\gamma 2}) \pi R^2 + \pi R \gamma_1 K_H \tan \delta_1 H_1^2 - \pi R^2 \gamma_1 H_1$$

FOR PILE SPACING BETWEEN 6R AND 16R, INTERPOLATE BETWEEN THE VALUES FOR 6R AND 16R.

FOR WATER NEAR TO THE GROUND SURFACE, SUBSTITUTE $\gamma_{1\,sub}$ FOR γ_1 AND $\gamma_{2\,sub}$ FOR γ_2 IN THE ABOVE FORMULAS. INTERPOLATE BETWEEN THESE LIMITS FOR INTERMEDIATE WATER LEVEL.

IN ANY CASE THE POSSIBILITY OF FAILURE IN CLAY LAYER (3) MUST BE INVESTIGATED. THIS IS PARTICULARLY IMPORTANT IF LAYER (2) IS THIN COMPARED TO DIMENSION (B). FAILURE OF LAYER (3) OCCURS IF LOAD DISTRIBUTED ON TOP OF LAYER (3) AS SHOWN EXCEEDS $1.3C_3N_c$.

FACTORS N_c N_γ & N_q OBTAINED FROM FIG. 11-1 FOR ALL CONDITIONS EXCEPT FOR COHESIONLESS SOILS WHEN LAYER (1) IS SIMILAR TO LAYER (2). IN THIS CASE USE N_c, N_γ AND N_q FROM FIG. 13-2.

FIGURE 13-8
Ultimate Load Capacity of Pile Groups in Layered Subsoils

The rock load H_p is represented in *Fig. 27* by the rectangle e f f_1 e_1. The balance of the weight of the overburden is carried by the ground arch. The weight of the middle part c d d_1 c_1 is transferred by the ribs of the tunnel support to the floor of the tunnel. The weight of the outer part acts as a surcharge on the top of the wedge-shaped bodies which tend to slide into the tunnel and increase the horizontal pressure exerted by these bodies.

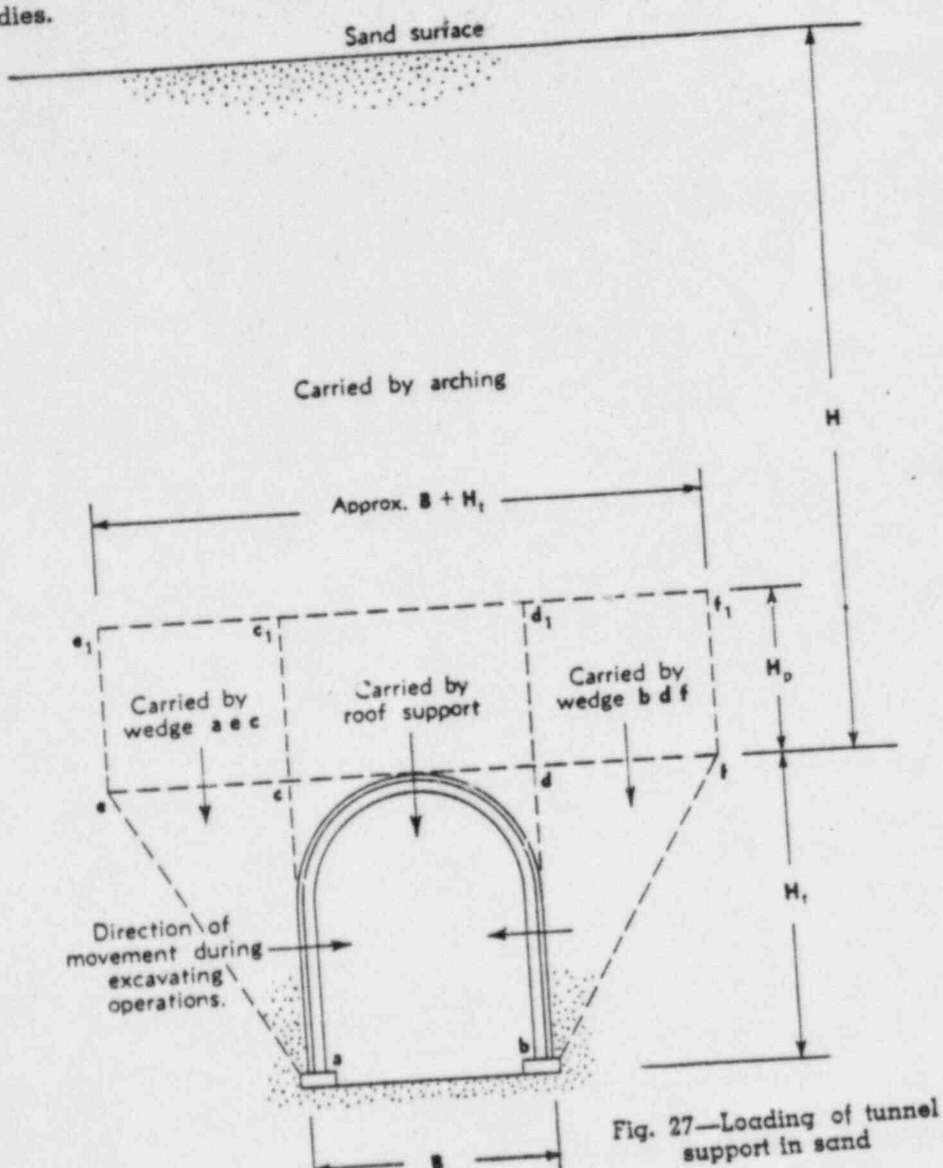


Fig. 27—Loading of tunnel support in sand

The rock load H_p is determined by eq. (2). According to the text accompanying this equation, the value of the constant C depends on the degree of compactness of the materials in which the tunnel is located and on the distance d through which the crown of the ground arch yielded before the support was installed. The distance d is not known and it can hardly be determined by practicable means. At a given width B of the tunnel it depends to a large extent on the skill of the miners and on the care with which the tunnel support is backpacked. The following numerical values are exclusively based on the results of the model tests with dry sand. Nevertheless it is

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$$P = \frac{H \times \frac{1}{2}H}{2} \times \frac{w}{2} = \frac{1}{8}wH^2$$

Comparing the above to the liquid pressure of a material of the same unit weight, we get a ratio of 0.25, as liquid pressure would be $\frac{1}{2}wH^2$. This ratio is called the coefficient K and was intro-

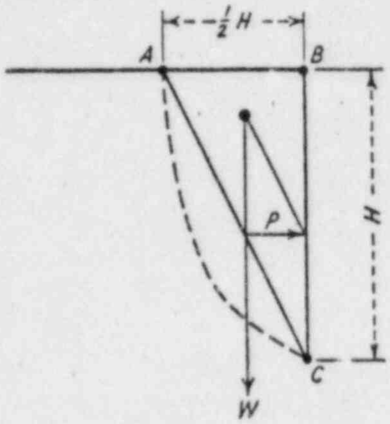


FIGURE 63. APPROXIMATE BREAK IN A BANK, SIMPLIFIED FOR COMPUTATION

duced by Terzaghi.[1] It is an aid to rough computations of earth pressures, but in many respects is misleading, as the distribution of pressure along the face of a solid may be entirely different from that produced by a liquid. It will be noted from Figure 63 that

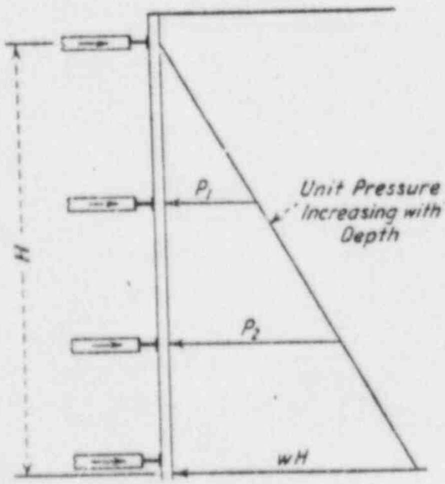


FIGURE 64. LIQUID PRESSURE ON A WALL

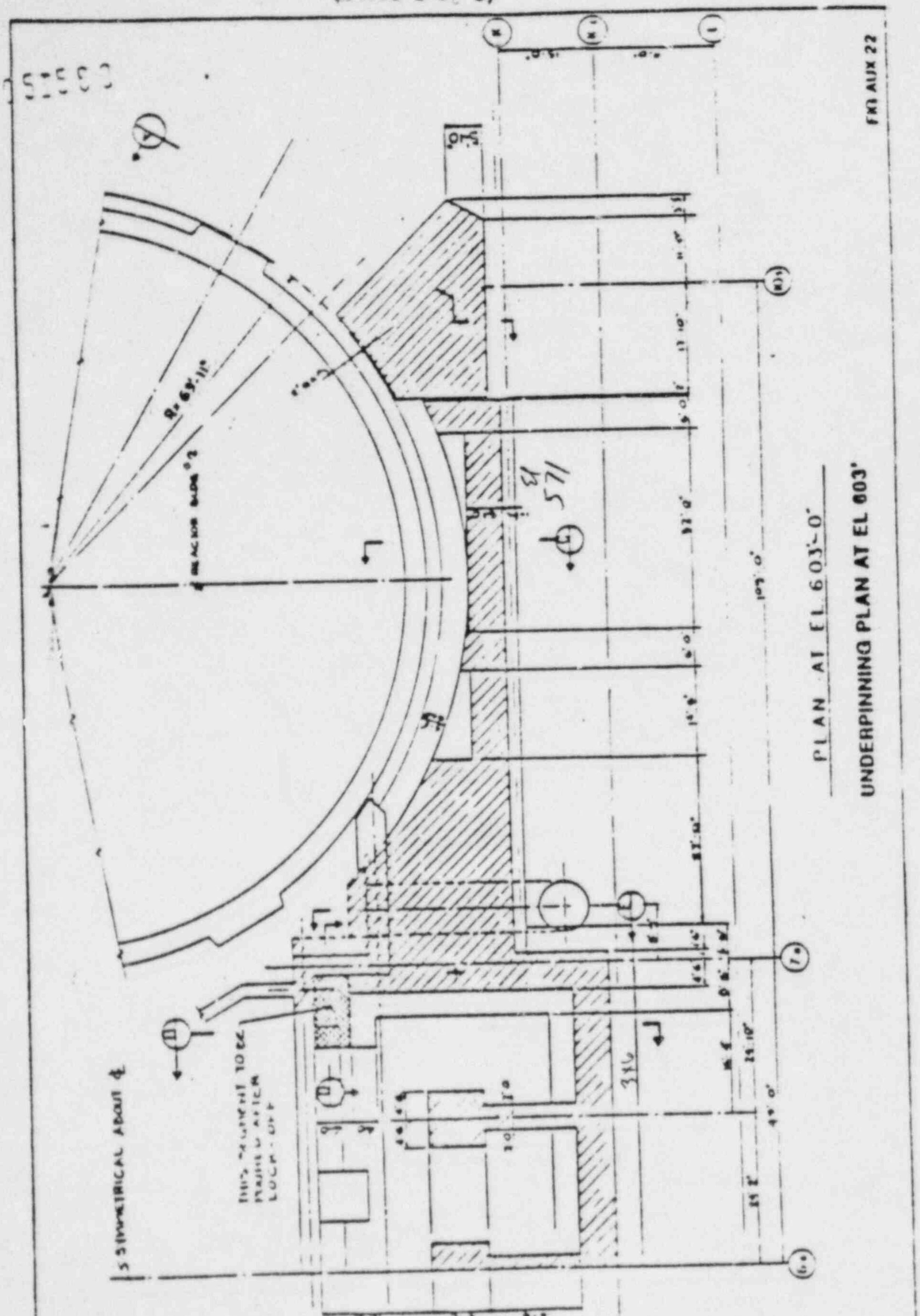
Total pressure (P) for unit width: $P = \frac{1}{2}wH^2$.

[1] *Soil Mechanics in Engineering Practice* by Karl Terzaghi and Ralph Peck, John Wiley & Sons, Inc., 1948, p. 353.

4

Don Bartlett
1-18-82

Enclosure 5
(slide 1 of 8)



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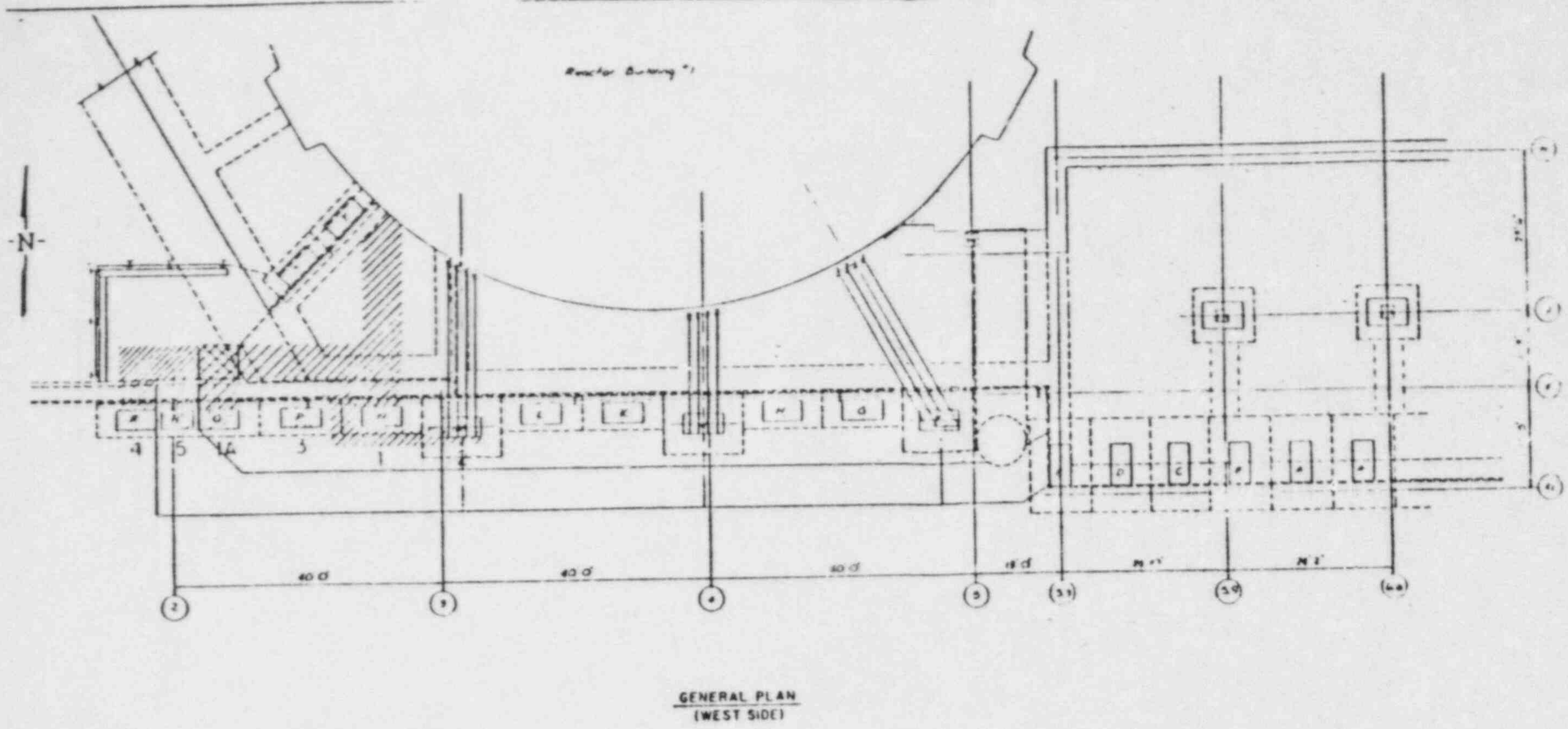
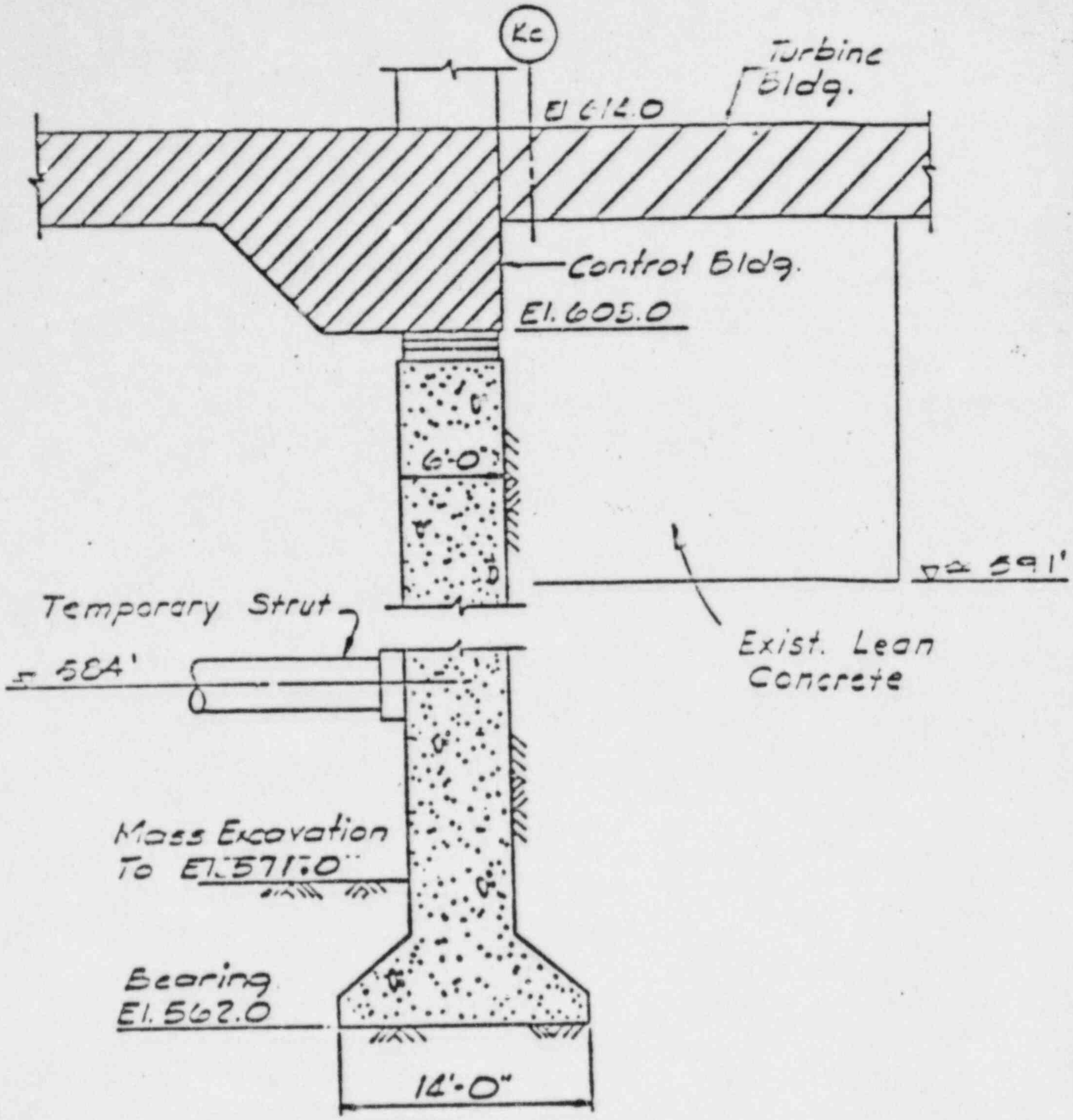


Slide 2 of 8

CONSUMERS POWER COM
MIDLAND PLANT UNITS 1 &
CONCEPT DRAWING
UNDERPINNING AUXILIARY BUIL
GENERAL PLAN

APPENDIX C FIGURE I

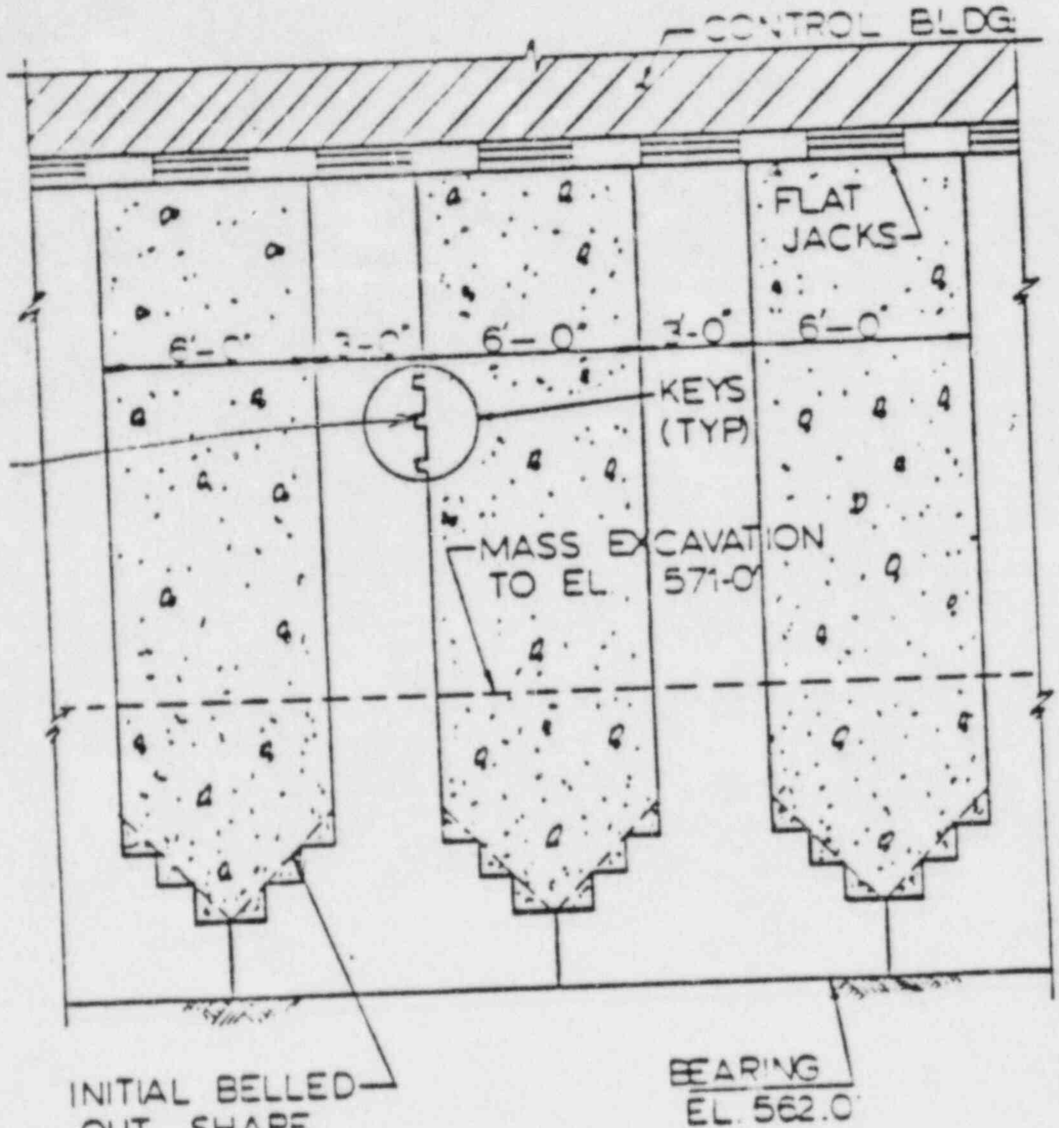


SECTION B-B

SECTION AT CONTROL TOWER UNDERPINNING WALL

FIG AUX-34

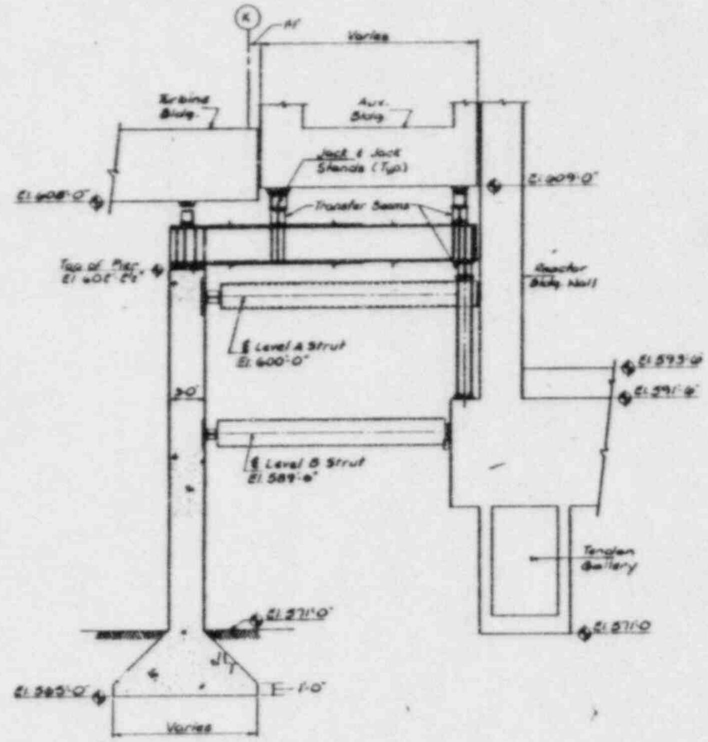
22



SECTION C-C

ELEVATION AT CONTROL TOWER
UNDERPINNING WALL

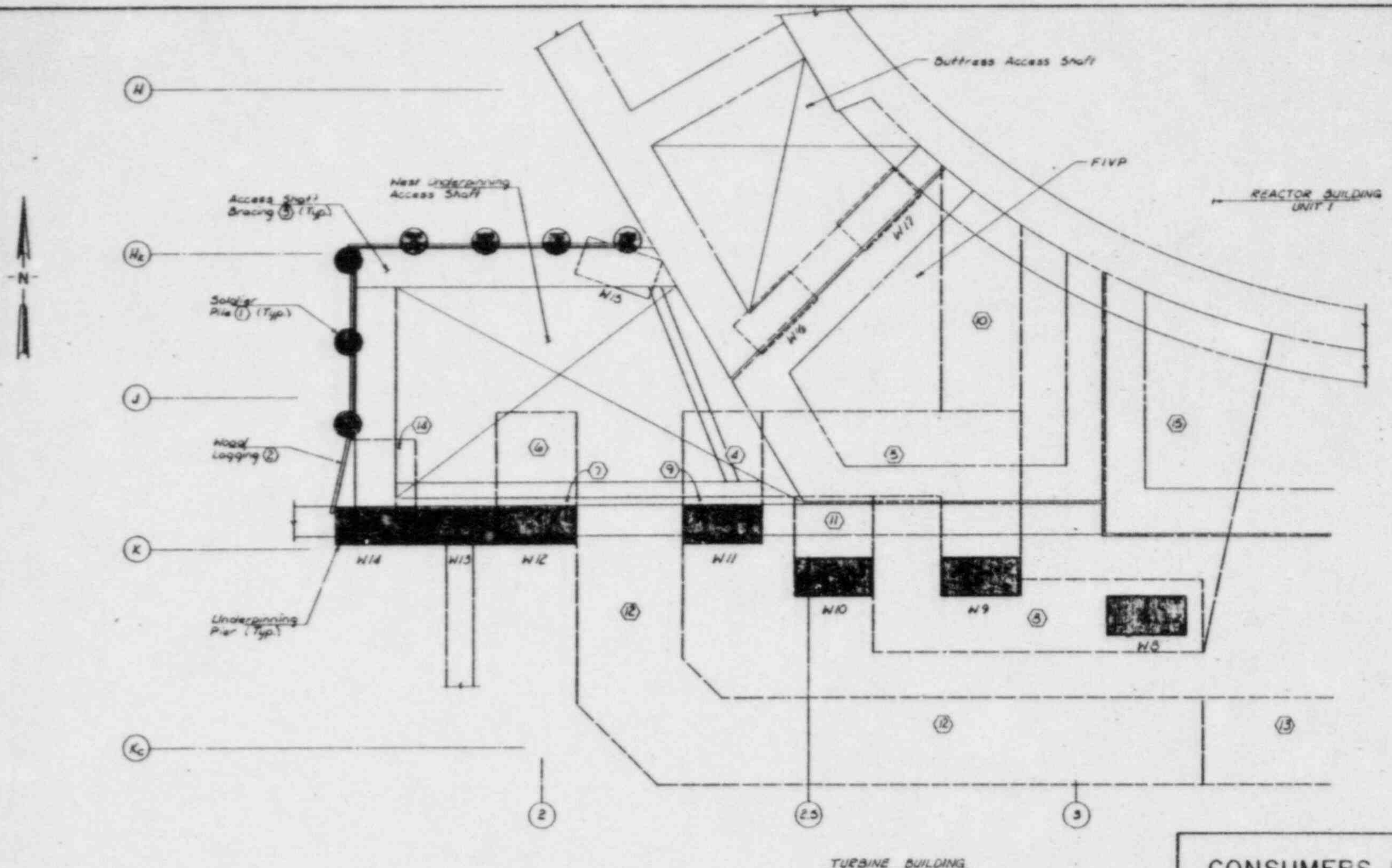
FIG AUX-35



CONSUMERS POWER COMPANY
MIDLAND PLANT UNITS 1 & 2

UNDERPINNING AUXILIARY BUILDING

TYPICAL SECTION



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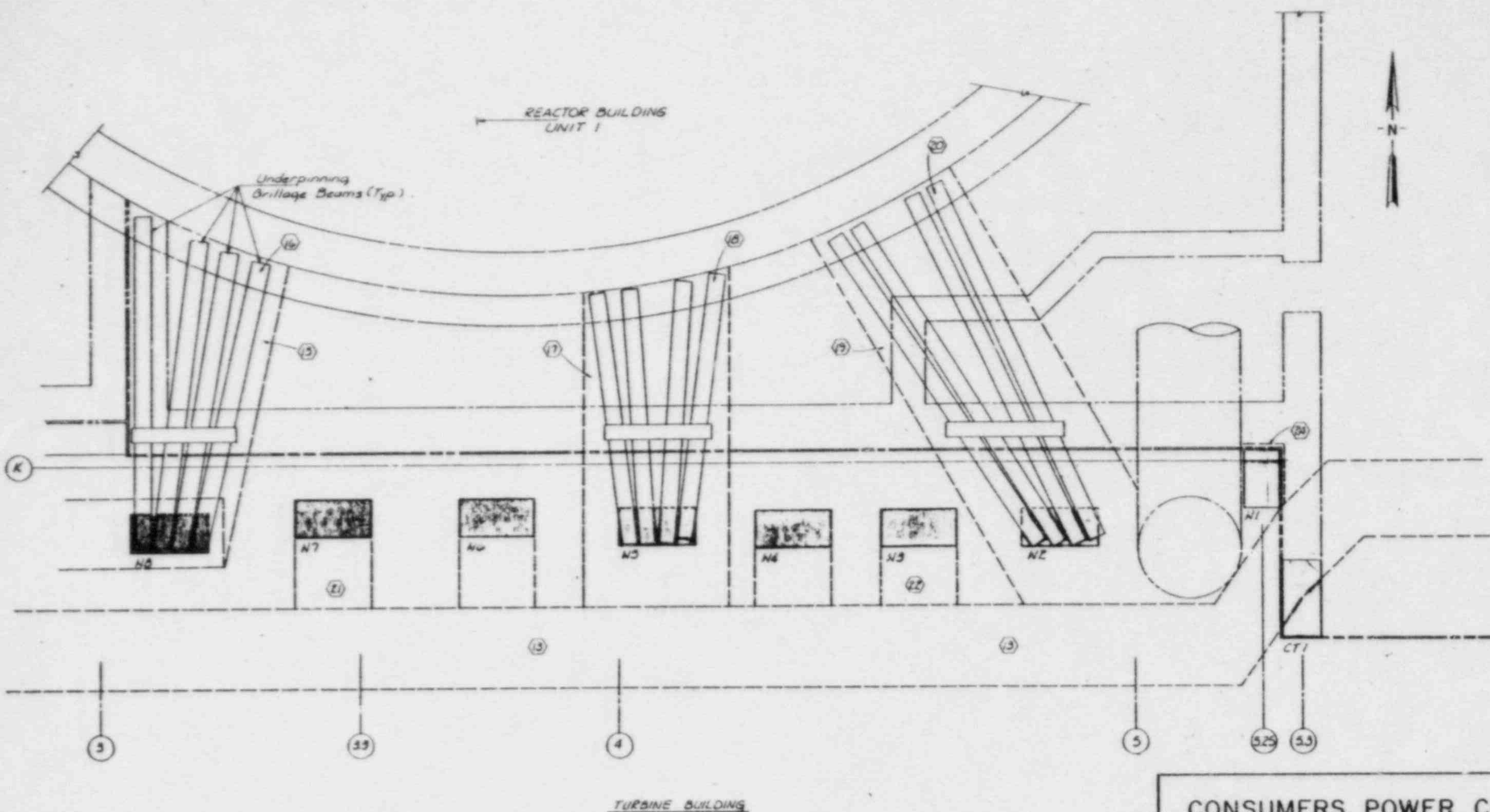
MIDLAND PLANT UNITS 1 & 2

UNDERPINNING AUXILIARY BUILDING

CONSTRUCTION SCHEMATIC 1

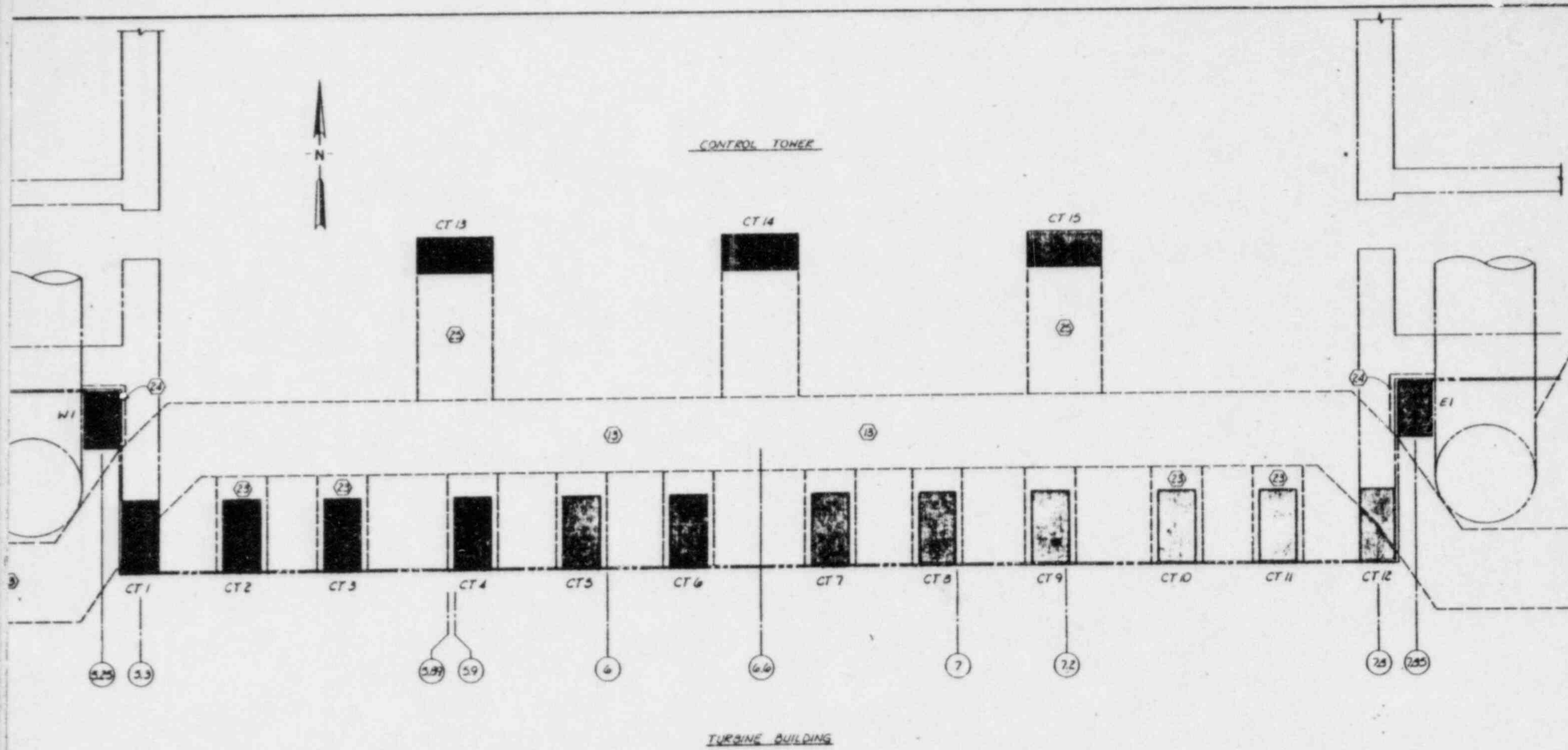
Slide 6 of 8



CONSUMERS POWER COMPANY
MIDLAND PLANT UNITS 1 & 2

UNDERPINNING AUXILIARY BUILDING

CONSTRUCTION SCHEMATIC 2



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MIDLAND PLANT UNITS 1 & 2

UNDERPINNING AUXILIARY BUILDING

CONSTRUCTION SCHEMATIC 3

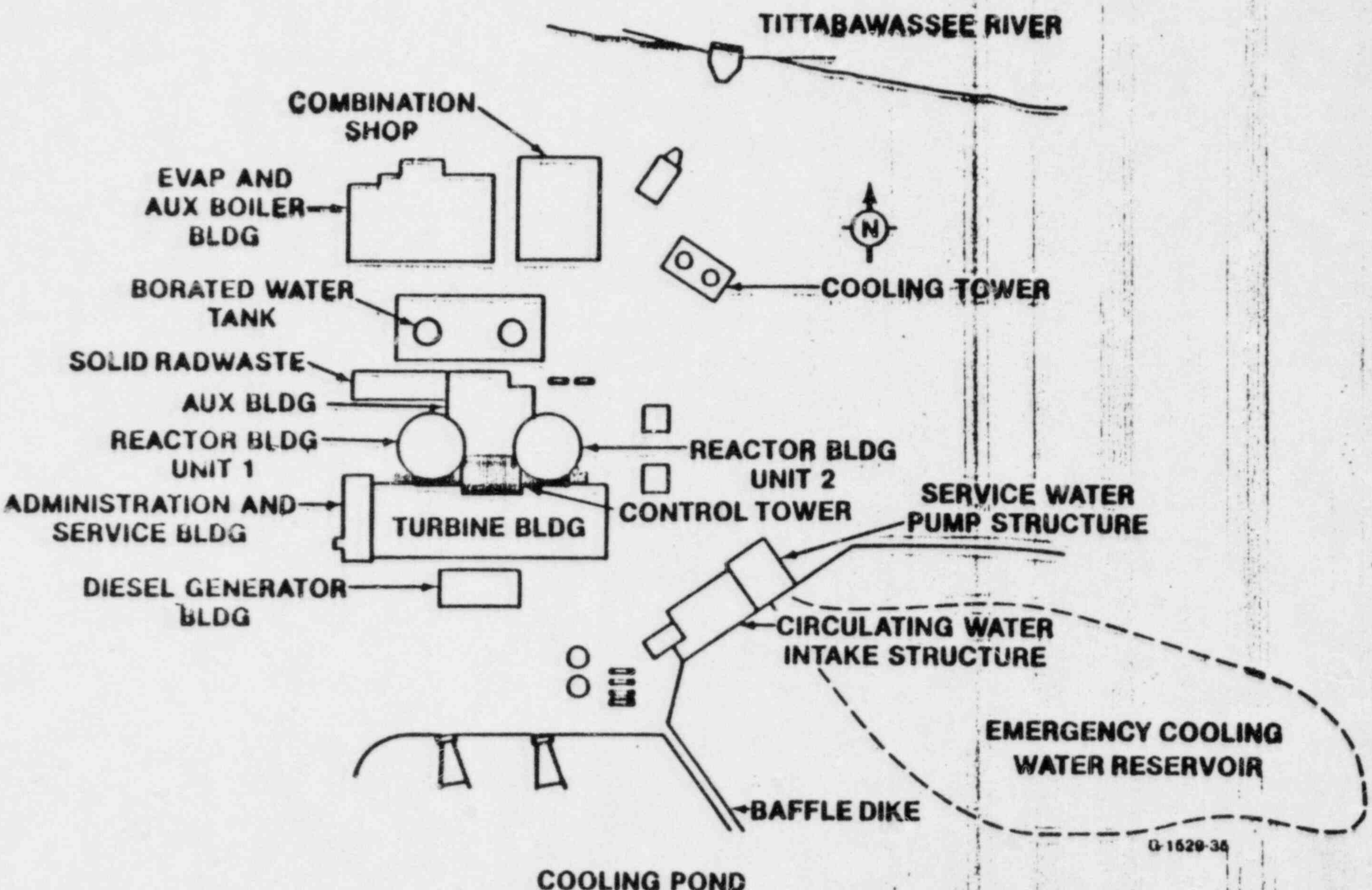
AUXILIARY BUILDING UNDERPINNING

FEEDWATER ISOLATION VALVE PIT TEMPORARY SUPPORT STRUCTURE

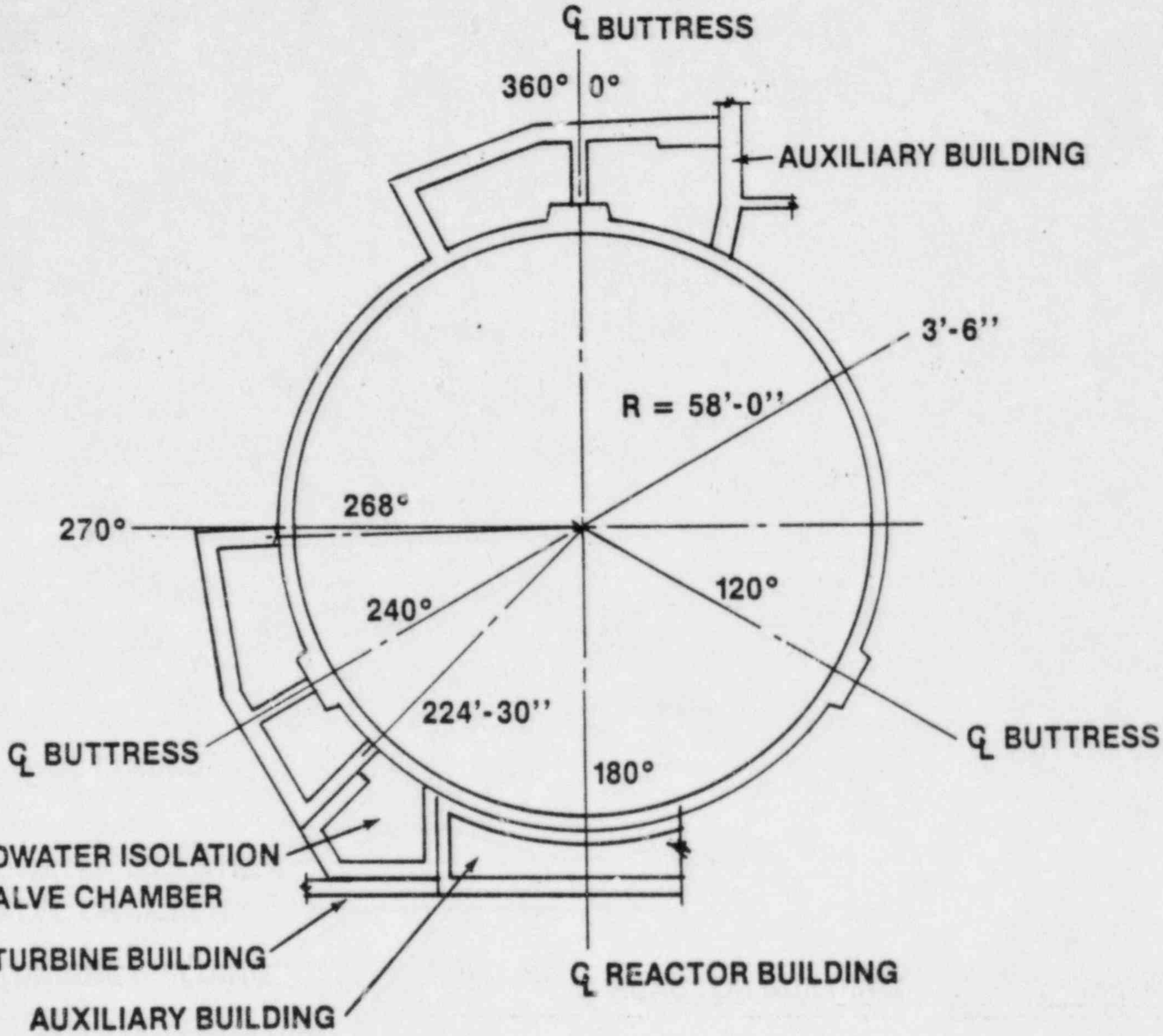
SUMMARY OF PRESENTATION

- DESCRIPTION OF FIVP
- DESCRIPTION OF TEMPORARY SUPPORT STRUCTURE
- METHOD OF ANALYSIS AND DESIGN
- LOAD TRANSFER PROCEDURE
- MONITORING PROGRAM

MIDLAND SITE PLAN



AUXILIARY BUILDING UNDERPINNING
FEEDWATER ISOLATION VALVE CHAMBER LOCATION PLAN



UNIT 1 SHOWN - UNIT 2 OPPOSITE HAND

G-1932-05

AUXILIARY BUILDING UNDERPINNING
FUNCTIONS OF FEEDWATER ISOLATION VALVE PIT

- ENCLOSE SEISMIC CATEGORY I FEEDWATER PIPE AND ISOLATION VALVES

- PROVIDE MISSILE PROTECTION

AUXILIARY BUILDING UNDERPINNING
DESCRIPTION OF FIVP

- APPROXIMATE DIMENSION - 28' (E-W) x 26' (N-S) x 26'-6" (height)
- WALL - 2'-6" TO 3'-6" THICK
- ROOF - 2'-0" THICK
- BASE SLAB - 4'-0" THICK (nominal)
- WEIGHT - 1950 KIPS EACH

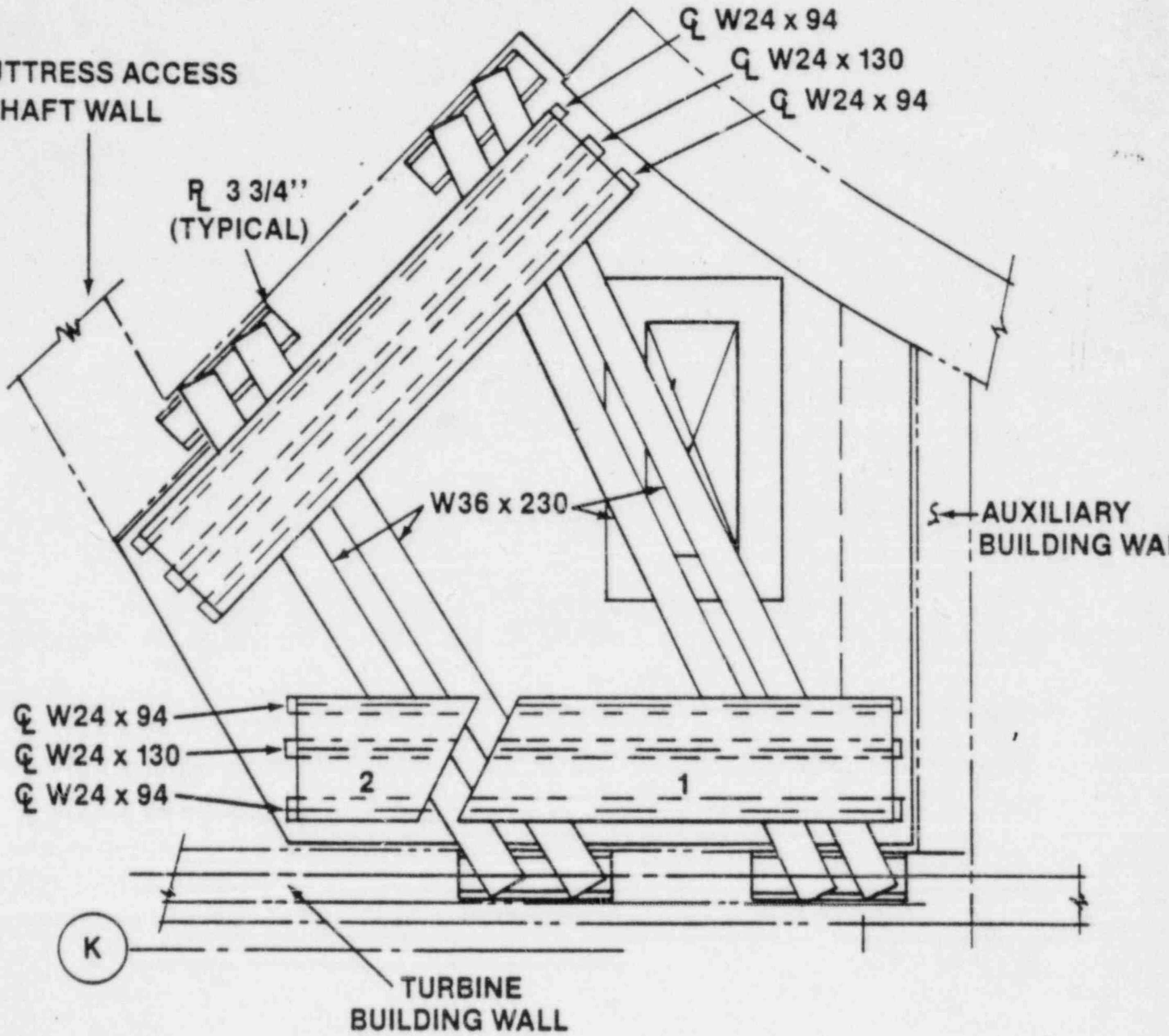
AUXILIARY BUILDING UNDERPINNING
MATERIALS USED FOR FIVP

- CONCRETE - 5,000 psi

- REBAR - 60 ksi MINIMUM YIELD

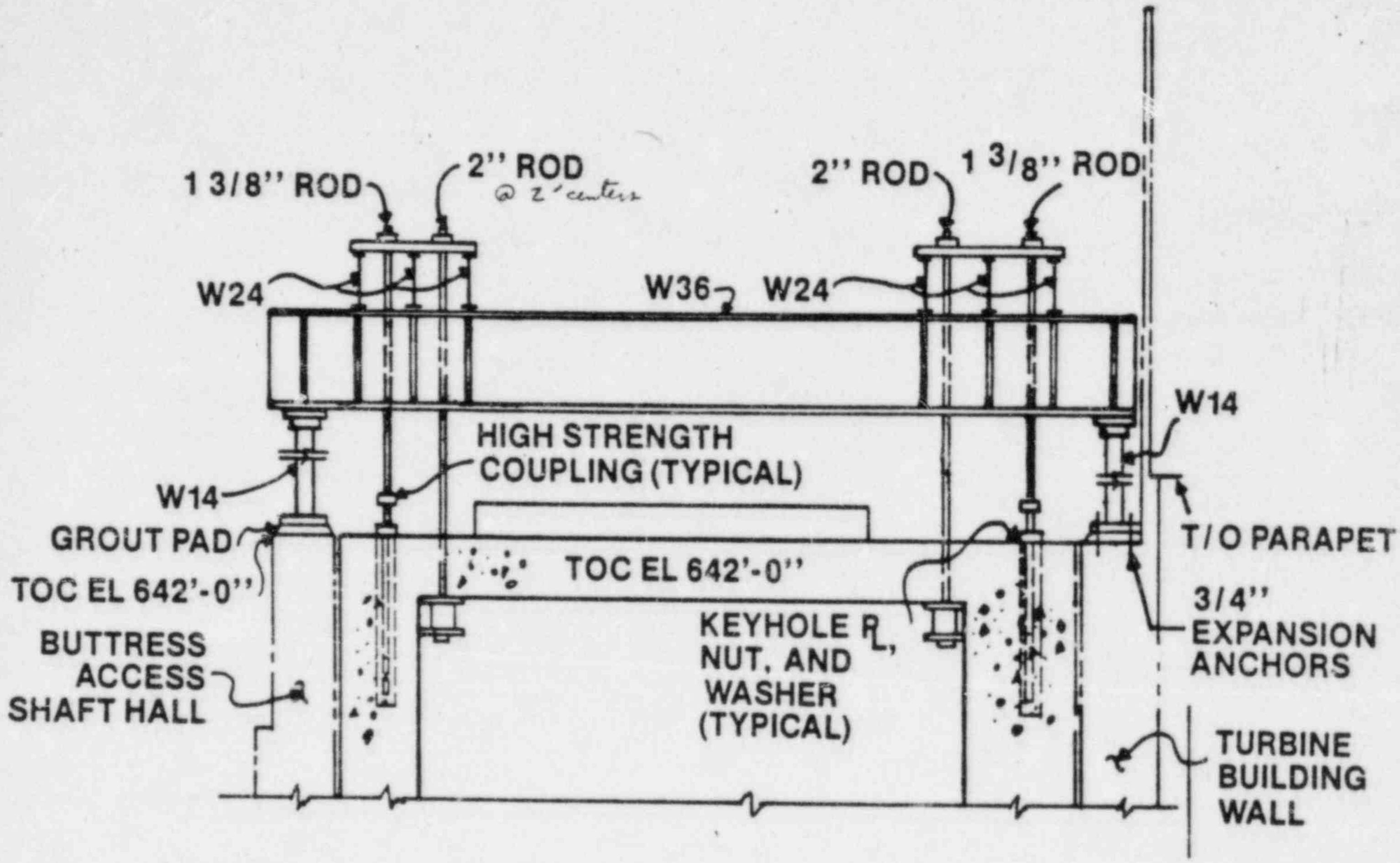
AUXILIARY BUILDING UNDERPINNING

FEEDWATER ISOLATION VALVE PIT PLAN VIEW OF SUPPORT



PLAN AT EL 651'-0"

AUXILIARY BUILDING UNDERPINNING
FEEDWATER ISOLATION VALVE PIT SECTION VIEW OF SUPPORT



MIDLAND UNITS 1 AND 2
AUXILIARY BUILDING UNDERPINNING 1/15/82

G-1932-02

AUXILIARY BUILDING UNDERPINNING

FIVP TEMPORARY SUPPORT

METHOD OF ANALYSIS

- APPROXIMATE METHOD
- COMPUTER METHOD

AUXILIARY BUILDING UNDERPINNING
MATERIALS USED FOR FIVP TEMPORARY SUPPORT

- STRUCTURAL SHAPES - A36
- STRUCTURAL PLATES - A 36 AND A588
- RODS - 2''ϕ RODS OF A354 GRADE BD
- ROCK BOLTS - 1-3/8''ϕ SUPER HIGH STRENGTH WILLIAM ROCK ANCHOR

AUXILIARY BUILDING UNDERPINNING

FIVP TEMPORARY SUPPORT

APPROXIMATE METHOD OF ANALYSIS

- CONSIDER STIFFNESSES OF RODS, BEAMS
- LOCATE CENTER OF STIFFNESS AND CENTER OF MASS
- DISTRIBUTE FIVP WEIGHT TO RODS AND BEAMS

AUXILIARY BUILDING UNDERPINNING

FIVP TEMPORARY SUPPORT

COMPUTER ANALYSIS

- USE STRUDL PROGRAM
- MODEL RODS AND BEAMS
- APPLY JACKING FORCE TO BEAM SUPPORTS

AUXILIARY BUILDING UNDERPINNING

FIVP AND TEMPORARY SUPPORT DESIGN CRITERIA

- ACI FOR CHECKING FIVP
- AISC FOR DESIGN OF STRUCTURAL STEEL MEMBERS AND RODS
- MANUFACTURER RECOMMENDATION FOR ROCK BOLT DESIGN
- 1/3 STRESS INCREASE FOR STRUCTURAL STEEL DESIGN O FOR CONSTRUCTION CONDITION

AUXILIARY BUILDING UNDERPINNING

SUMMARY OF STRESSES FOR FIVP TEMPORARY SUPPORT

	ACTUAL	ALLOWABLE
• W36 BEAM	20.6 KSI	22.0 KSI
• W24 BEAM	13.3 KSI	24.0 KSI
• 2" ROD	141 KIPS	259 KIPS
• 1 3/8 ROCK BOLT	100 KIPS	98 KIPS (2% OVER FOR 2 BOLTS)

AUXILIARY BUILDING UNDERPINNING

SUMMARY OF STRESSES FOR FIVP

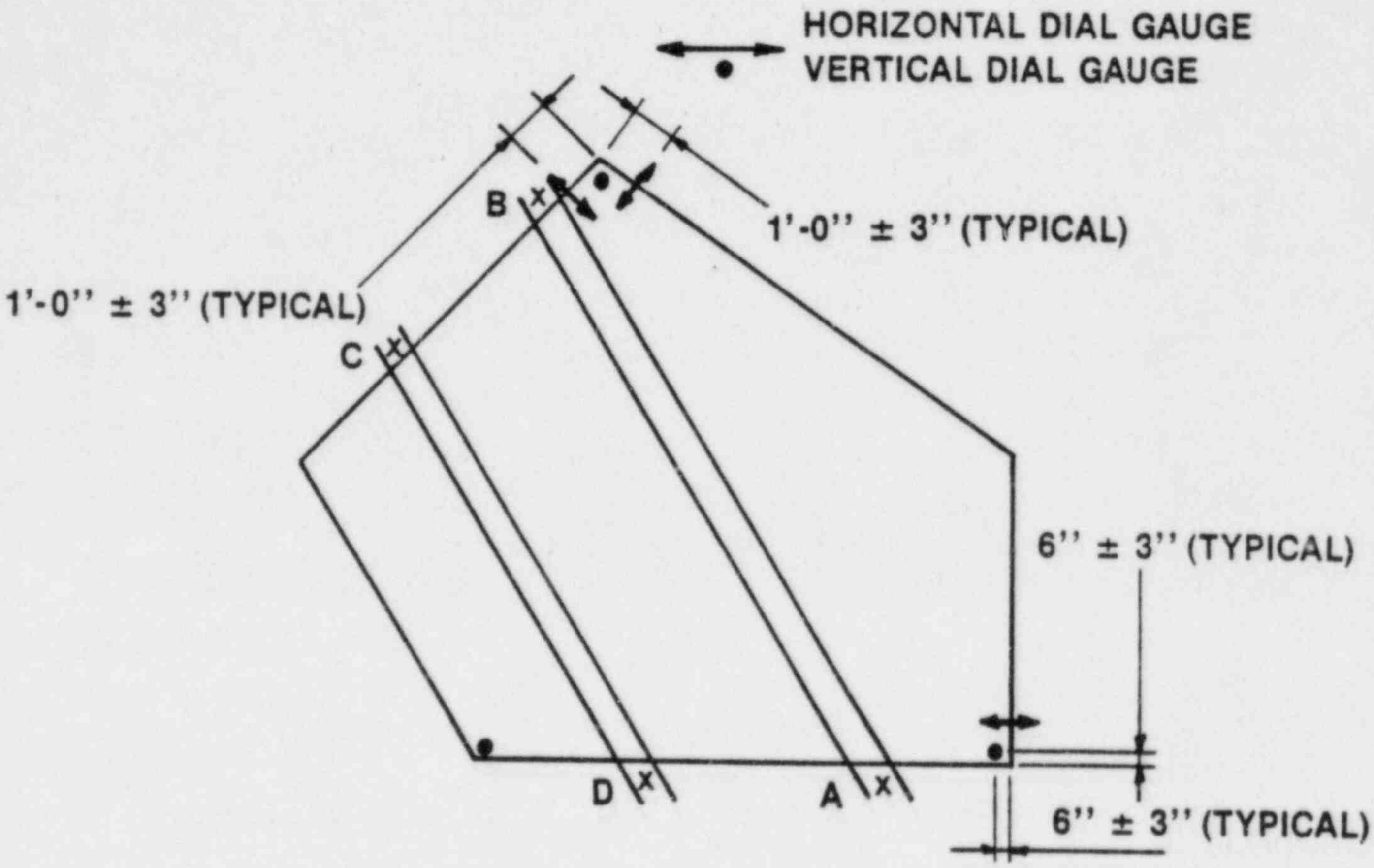
	ACTUAL	ALLOWABLE
SHEAR AT ROOF SLAB	43 K/FT	60 K/FT
MOMENT AT ROOF SLAB	41 K'/FT	49 K'/FT
TENSION ON WALLS	1950 KIPS	2065 KIPS (FOR 2 WALLS)

AUXILIARY BUILDING UNDERPINNING

SUMMARY OF STRESSES FOR TURBINE BLDG & BUTTRESS ACCESS SHAFT

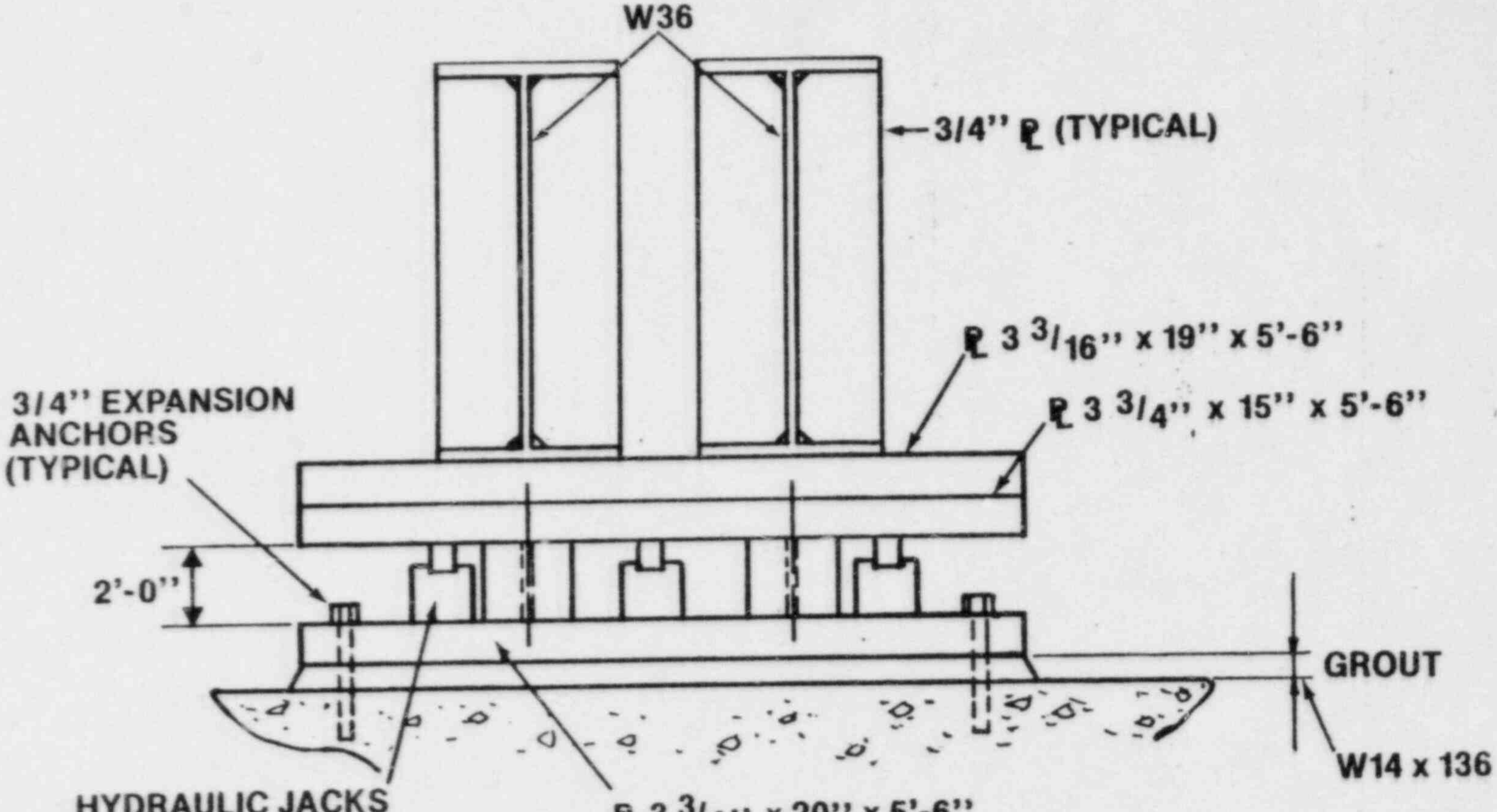
	ACTUAL	ALLOWABLE
CONCRETE BEARING		
TURBINE BLDG WALL	0.6 KSI	0.89 KSI
BUTTRESS ACCESS SHAFT WALL	0.52 KSI	1.49 KSI
INCREASE IN LOCAL SOIL BEARING		
TURBINE BLDG	3.5 KSF	10 KSF
BUTTRESS ACCESS SHAFT	3.4 KSF	15 KSF

AUXILIARY BUILDING UNDERPINNING
FEEDWATER ISOLATION VALVE PIT LOAD AT SUPPORTS



SUPPORT NO.	LOAD (K)
A	650
B	550
C	550
D	650

AUXILIARY BUILDING UNDERPINNING
FEEDWATER ISOLATION VALVE PIT SECTION

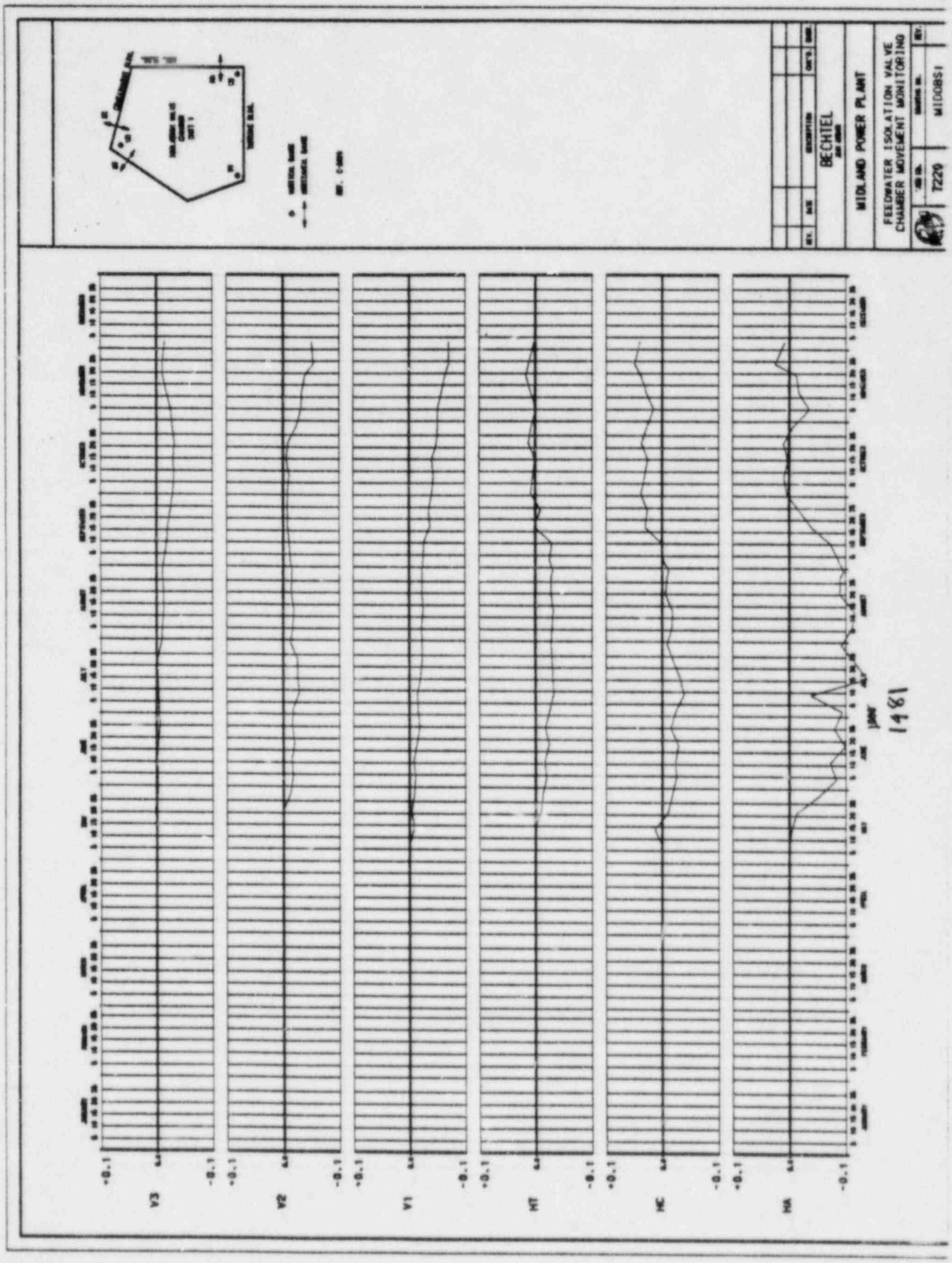


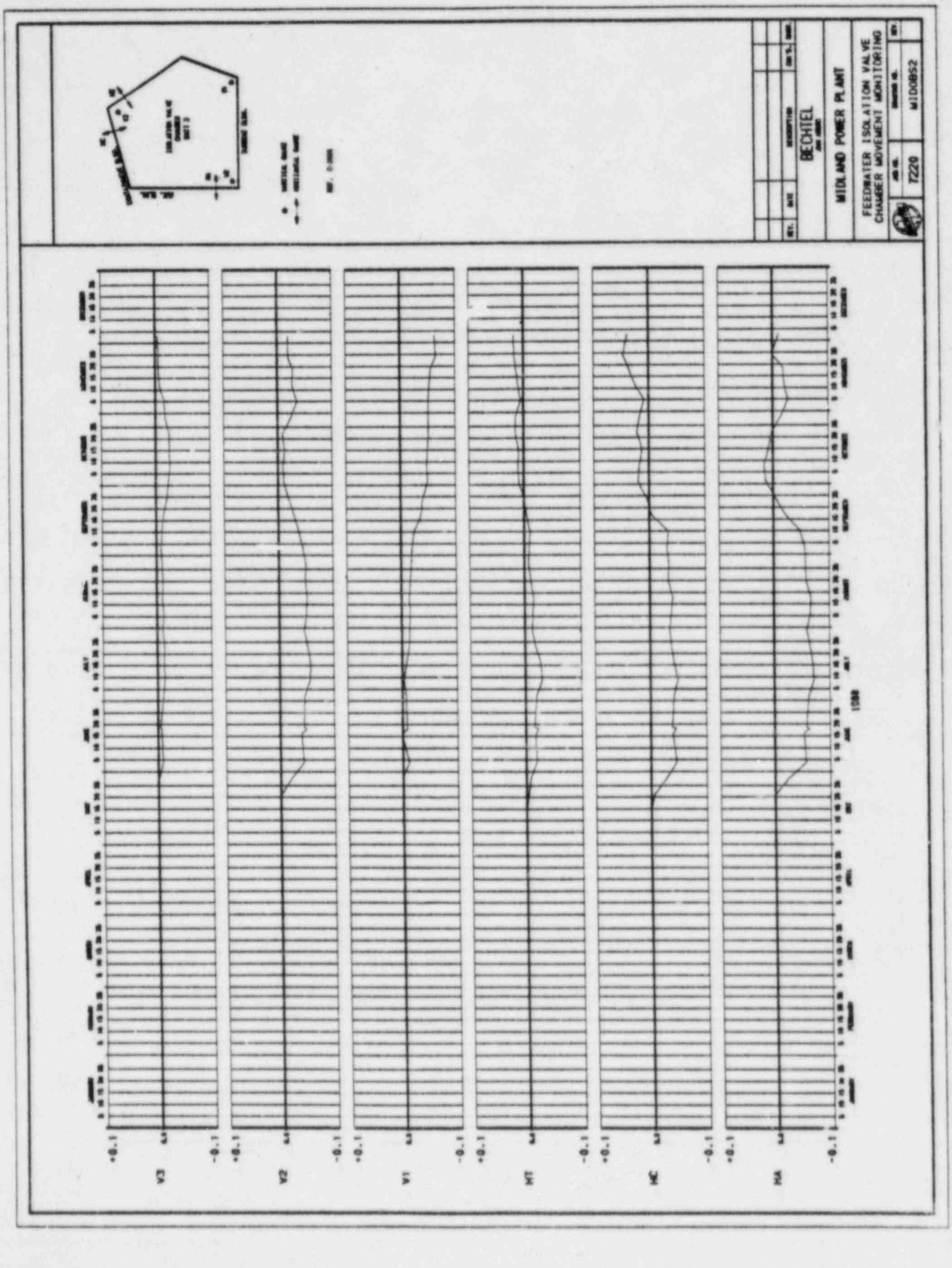
AUXILIARY BUILDING UNDERPINNING

FEEDWATER ISOLATION VALVE PIT

PRESENT MONITORING PROGRAM

- DIAL GAGES TO MEASURE HORIZONTAL AND VERTICAL MOVEMENTS
- ½ INCH MAXIMUM SETTLEMENT BASED ON FEEDWATER PIPING
- GAGES READ WEEKLY


BECHTEL
MIDLAND POWER PLANT
FEEDWATER ISOLATION VALVE CHAMBER MOVEMENT MONITORING
7220
MID0BS1
V3
V2
V1
HT
HC
HA
1981



MIDLAND POWER PLANT
FEEDWATER ISOLATION VALVE CHAMBER MOVEMENT MONITORING
BECHTEL
7220

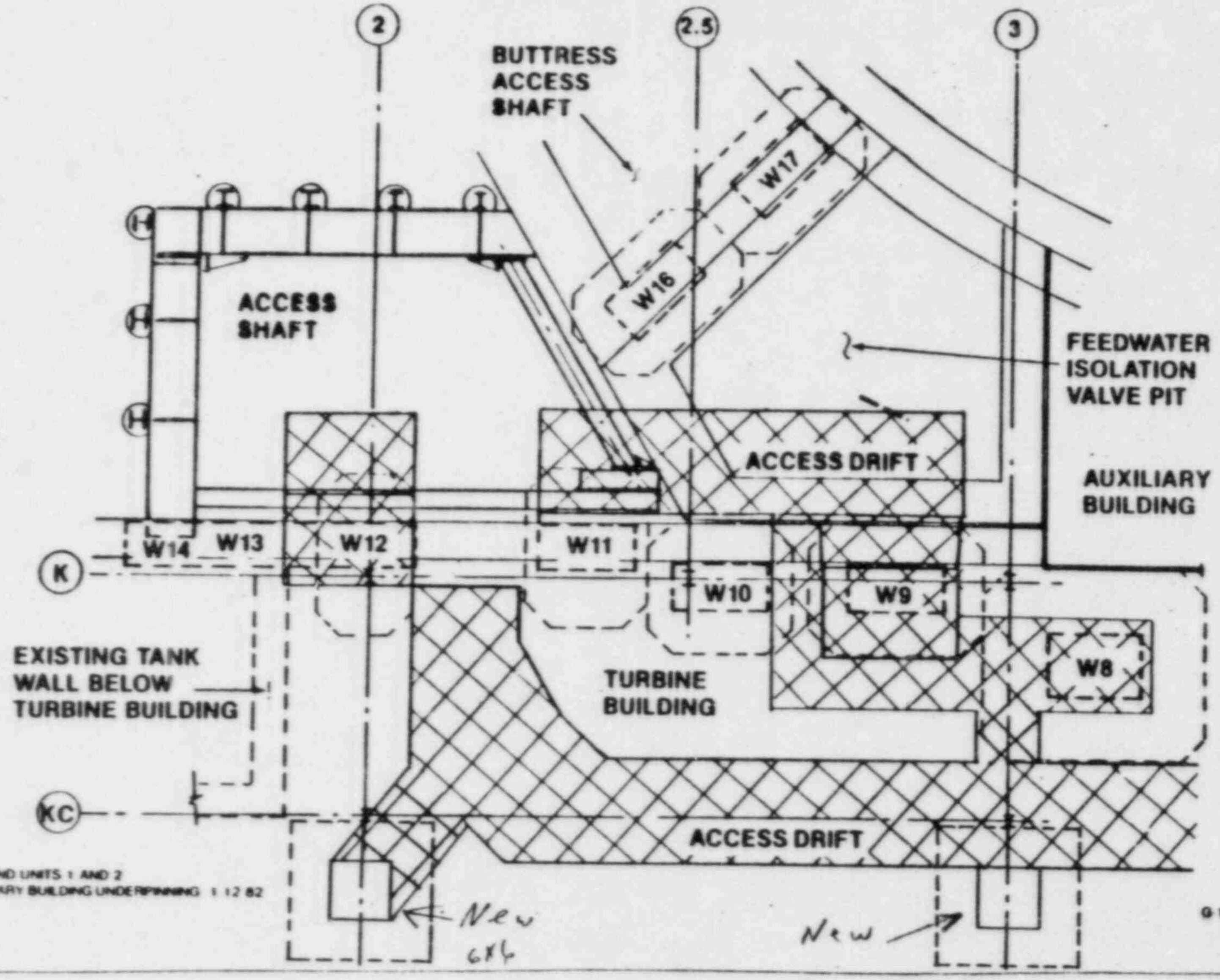
AUXILIARY BUILDING UNDERPINNING

FEEDWATER ISOLATION VALVE PIT

MONITORING DURING UNDERPINNING

- FIVP MONITORING PART OF OVERALL UNDERPINNING PROGRAM
- REJACK FIVP WHEN SETTLEMENT APPROACHES 3/8 INCH
- CRACK MAP FIVP BEFORE AND AFTER EACH MAJOR CONSTRUCTION ACTIVITY AFFECTING FIVP

PLAN - ACCESS SHAFT AND ACCESS DRIFT



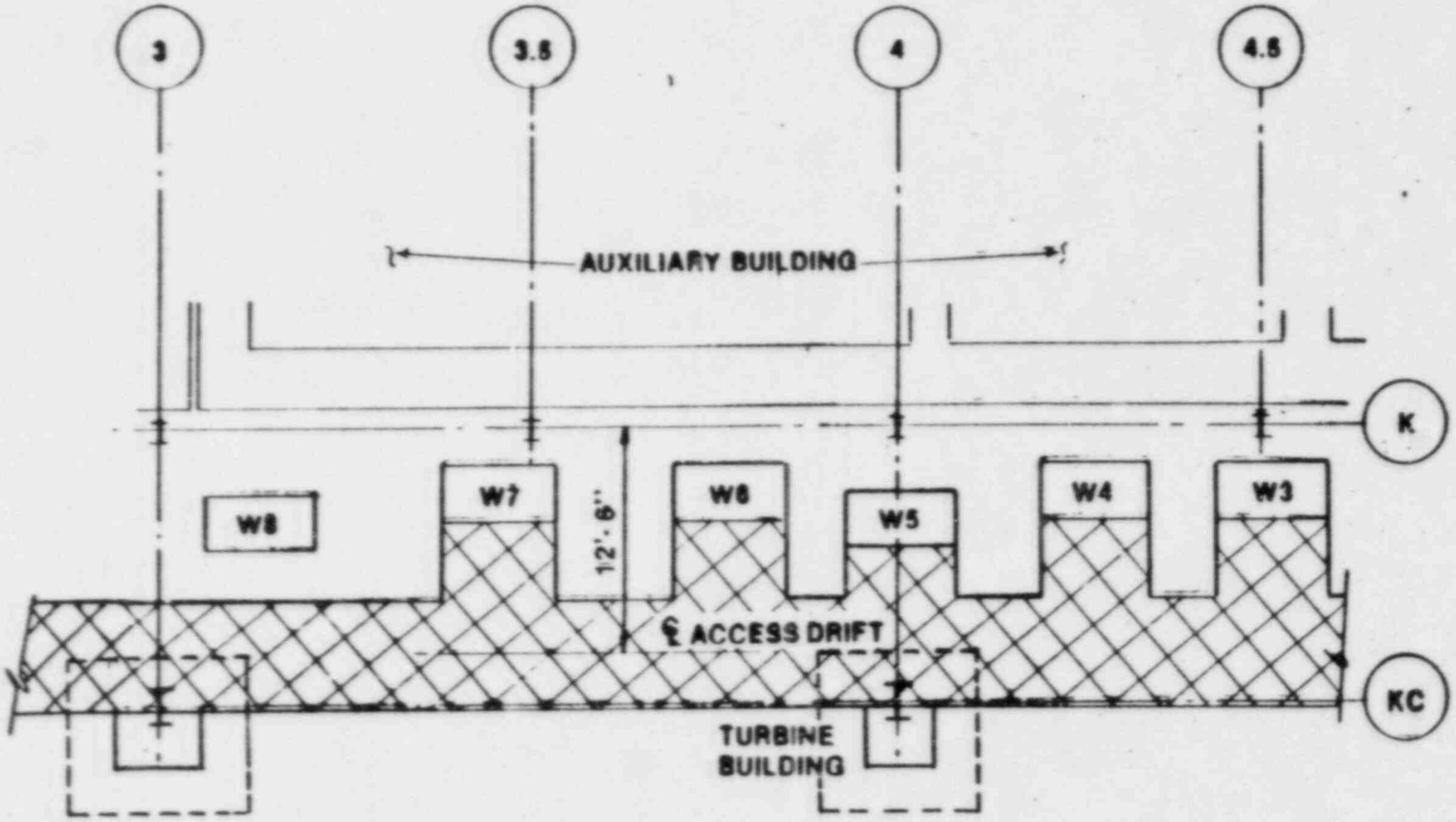
MIDLAND UNITS 1 AND 2
AUXILIARY BUILDING UNDERPINNING 1 12 82

G-1929-06

Enclosure 7
(Page 1 of 16)

Norm Rawson
1-18-82

PARTIAL PLAN OF ACCESS DRIFT

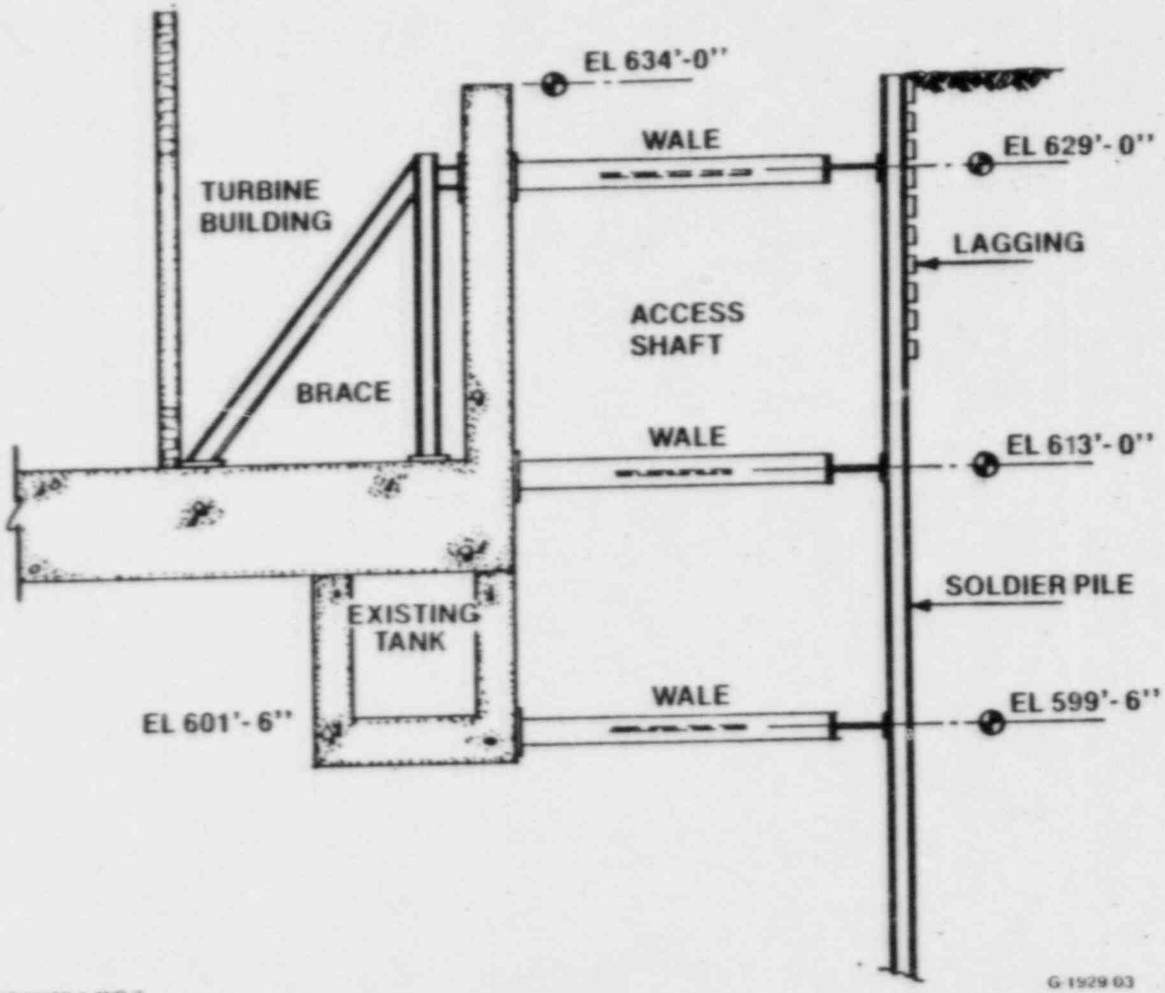


MIDLAND UNITS 1 AND 2
AUXILIARY BUILDING UNDERPINNING 1 12 82

G 1929 12

Enclosure 7 - pg 2 of 16

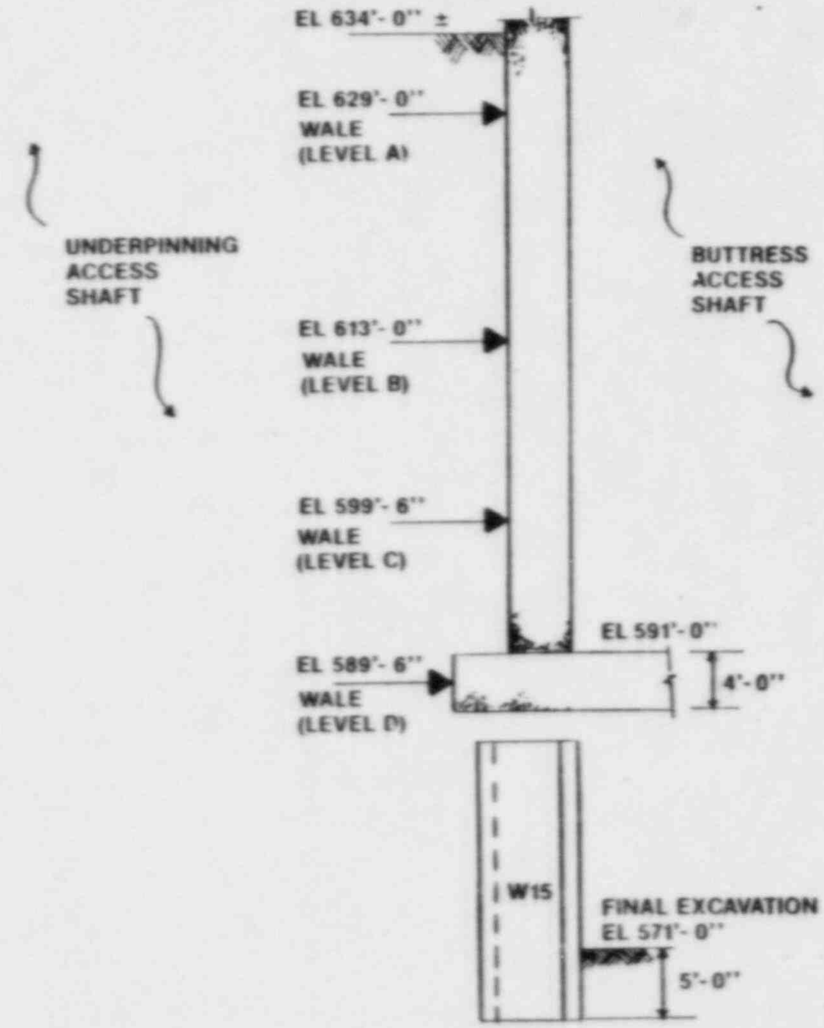
SECTION - ACCESS SHAFT/TURBINE BUILDING



MIDLAND UNITS 1 AND 2
AUXILIARY BUILDING UNDERPINNING 1 12 82

G-1929 03

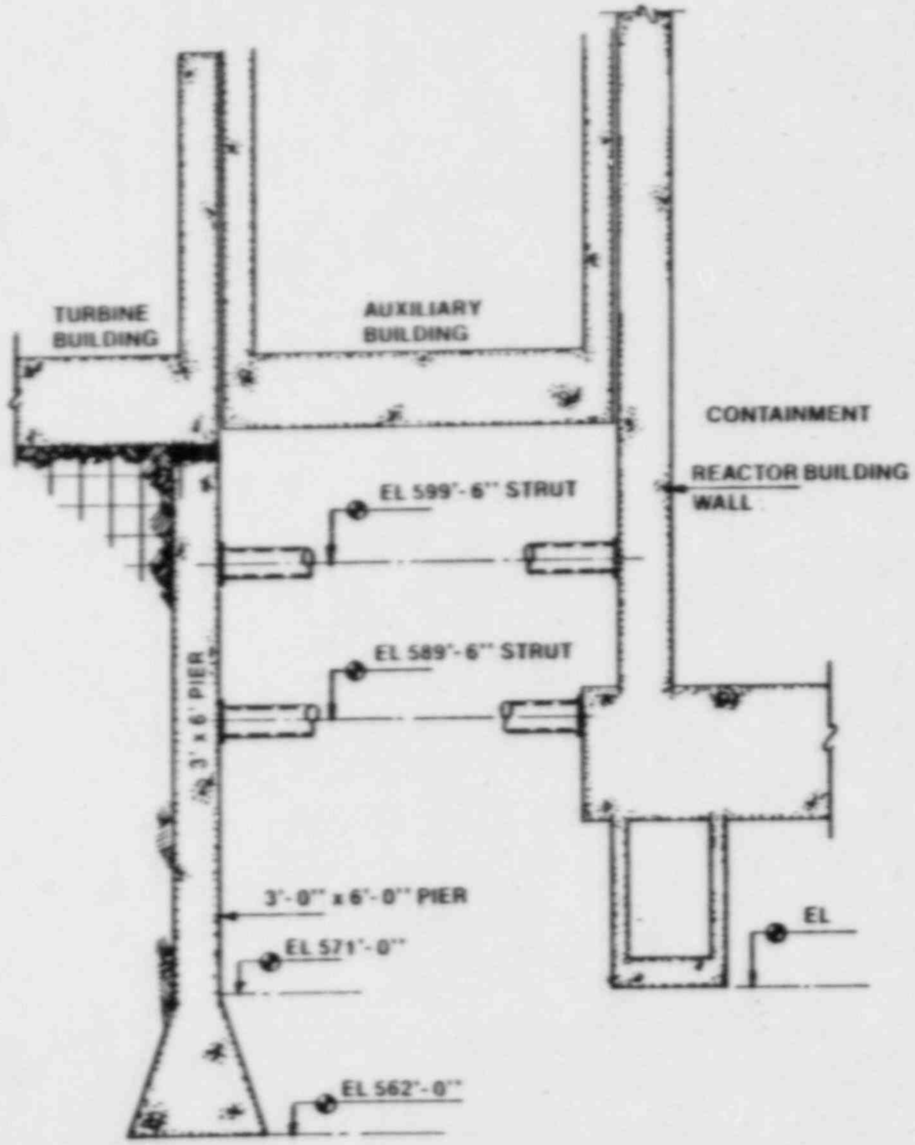
ACCESS SHAFT
WALES AT BUTTRESS
ACCESS SHAFT



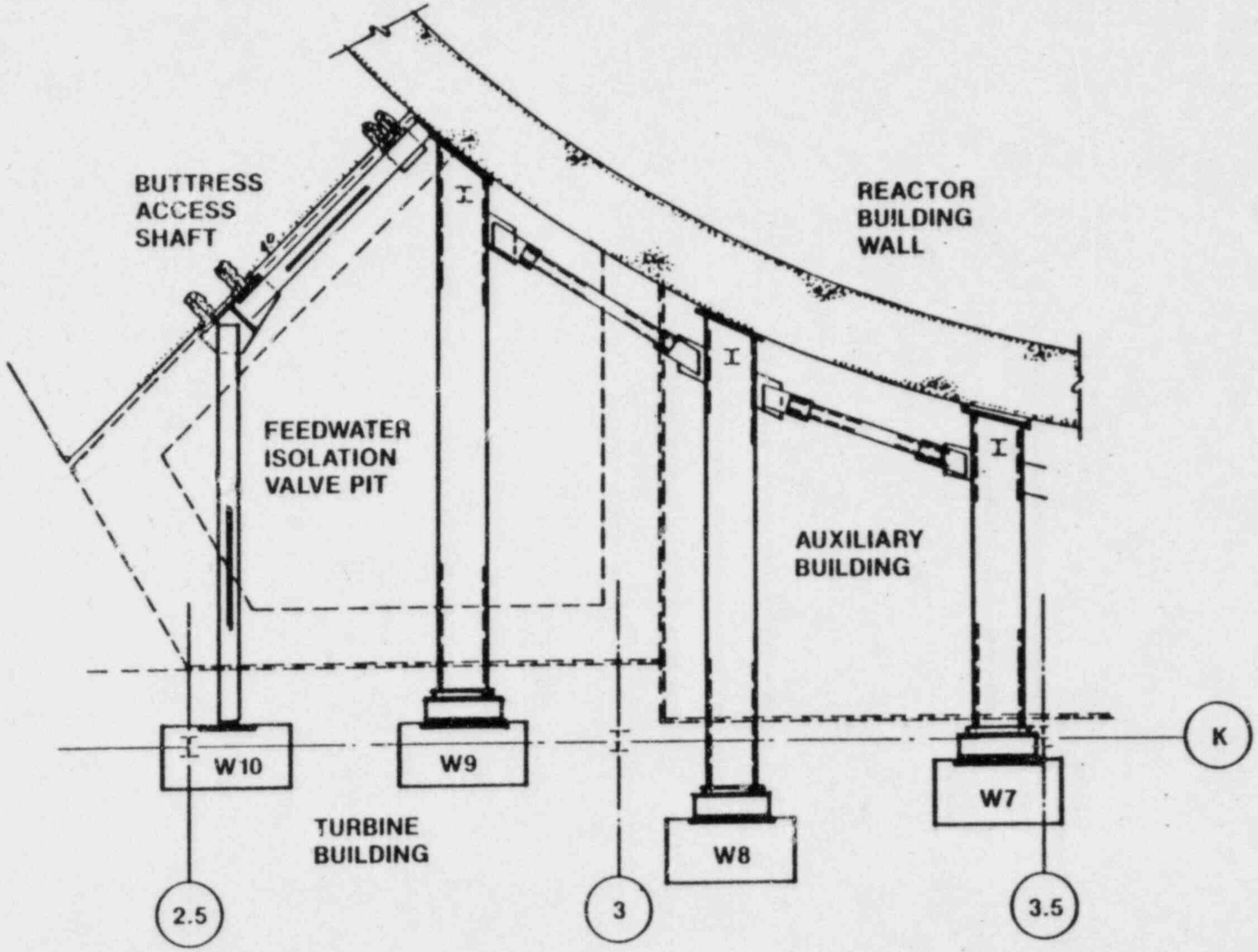
MIDLAND UNITS 1 AND 2
AUXILIARY BUILDING UNDERPINNING 1-15-82

G-1929-16

PIER BRACING



STRUT BRACING

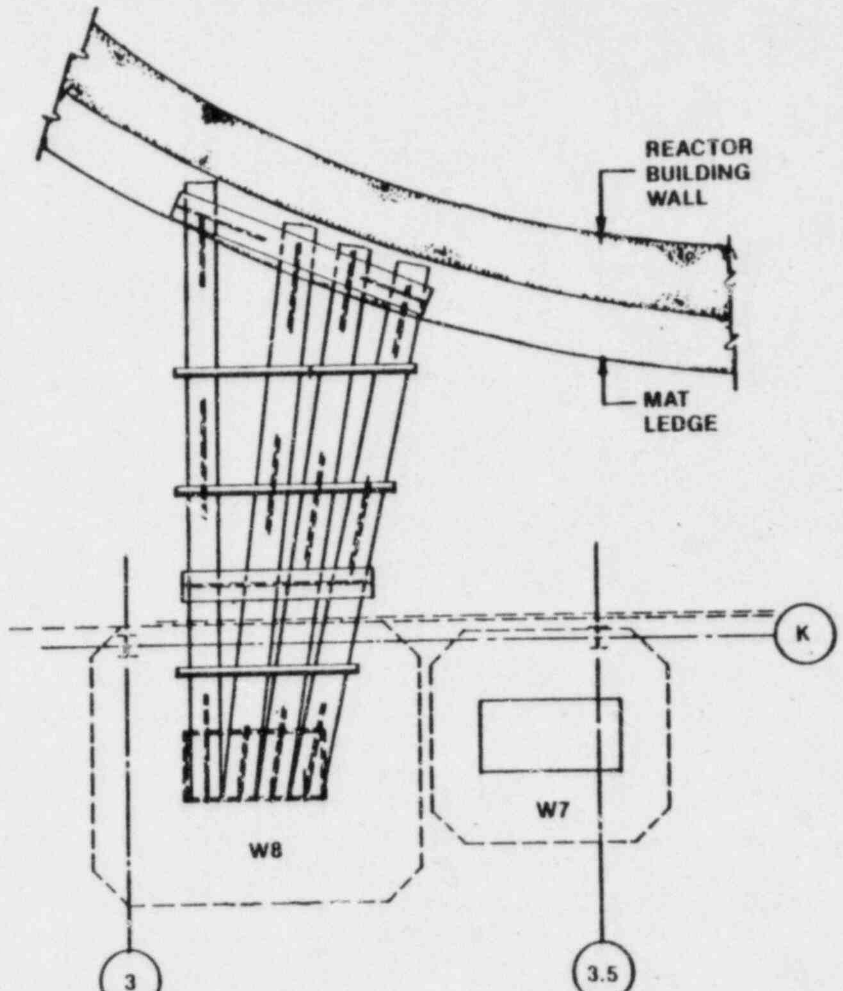


MIDLAND UNITS 1 AND 2
AUXILIARY BUILDING UNDERPINNING 1 12 82

G-1929-05

Installation of grillage not relevant to this audit

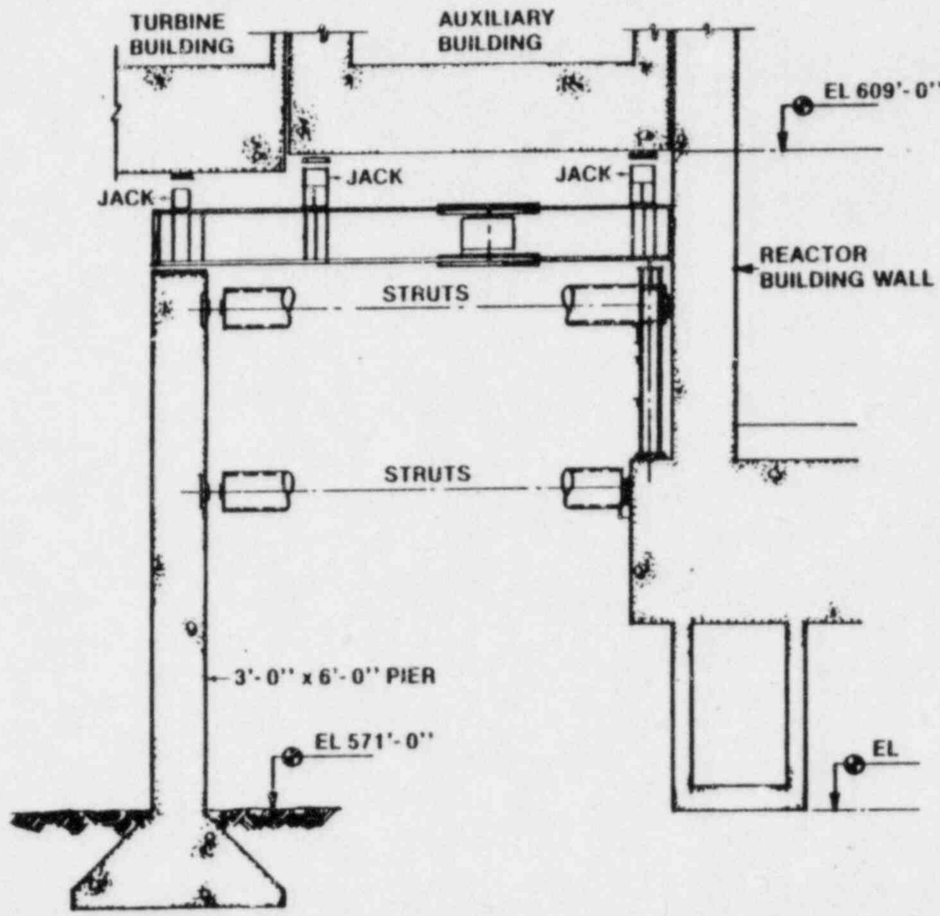
AUXILIARY BUILDING UNDERPINNING GRILLAGE



MIDLAND UNITS 1 AND 2
AUXILIARY BUILDING UNDERPINNING 1 12 82

G 1929-09

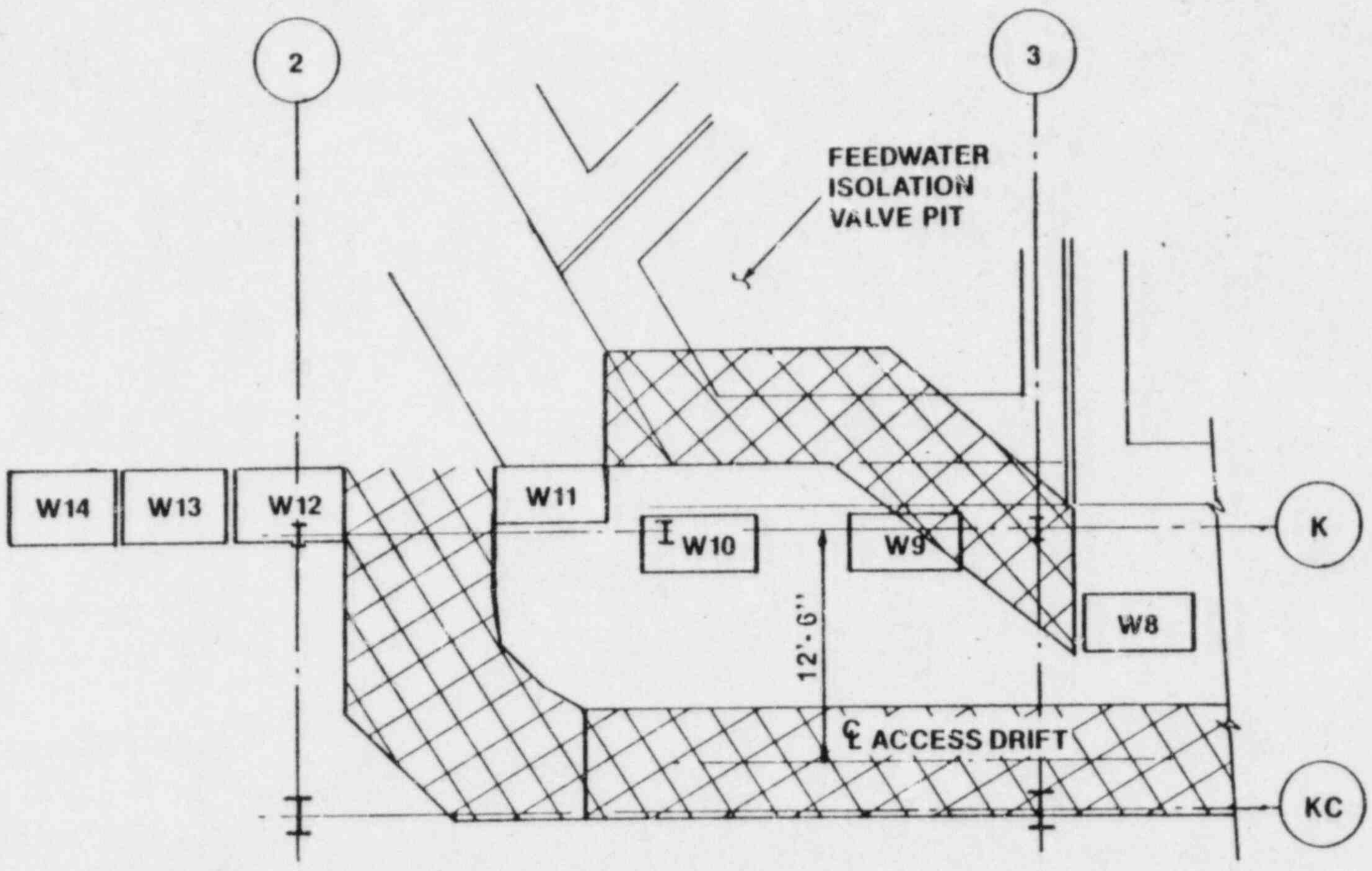
SECTION AT UNDERPINNING GRILLAGE



MIDLAND UNITS 1 AND 2
AUXILIARY BUILDING UNDERPINNING 1 12 82

G-1929-11

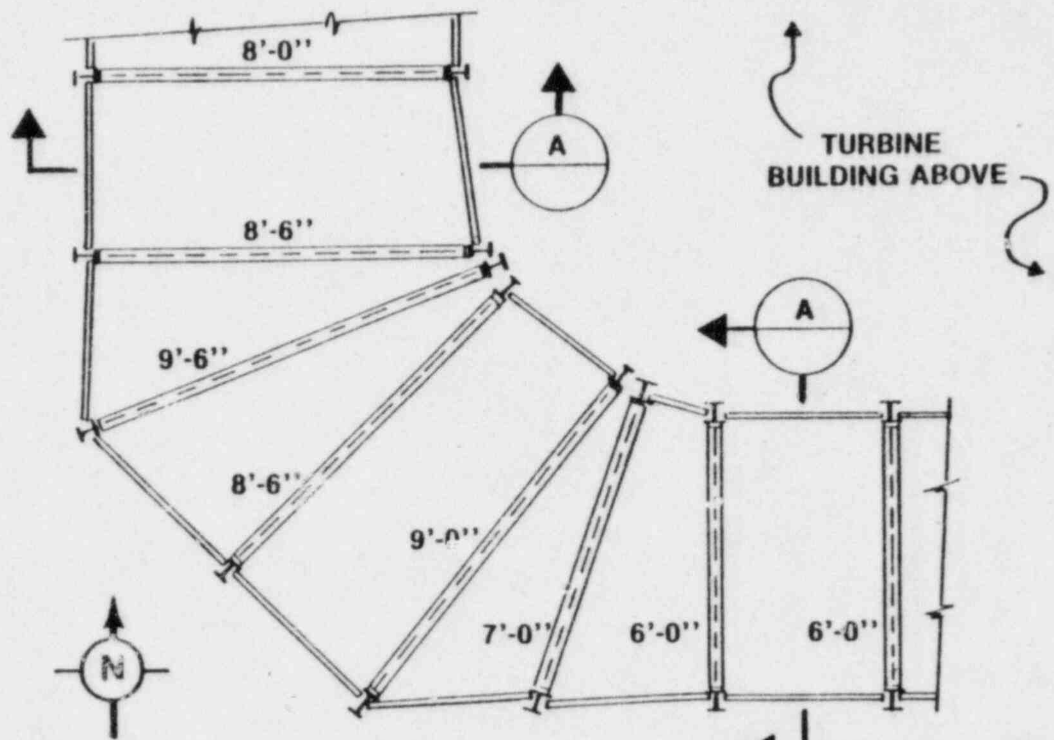
PARTIAL PLAN OF ACCESS DRIFT



MIDLAND UNITS 1 AND 2
AUXILIARY BUILDING UNDERPINNING 1 12 82

G 1929-10

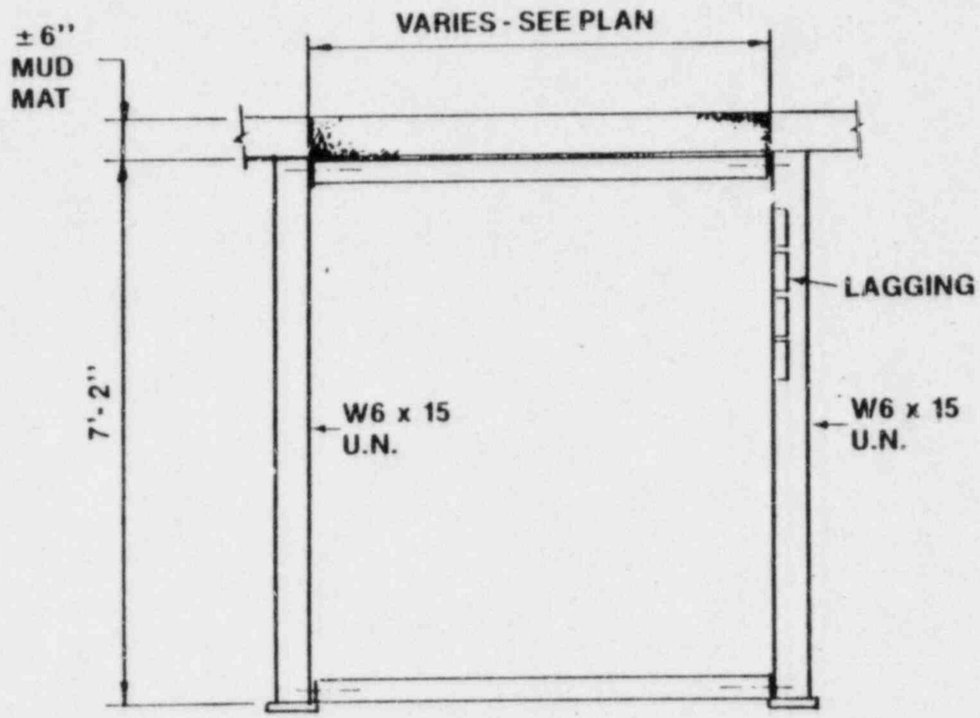
PARTIAL PLAN - ACCESS DRIFT



MIDLAND UNITS 1 AND 2
AUXILIARY BUILDING UNDERPINNING 1-12-82

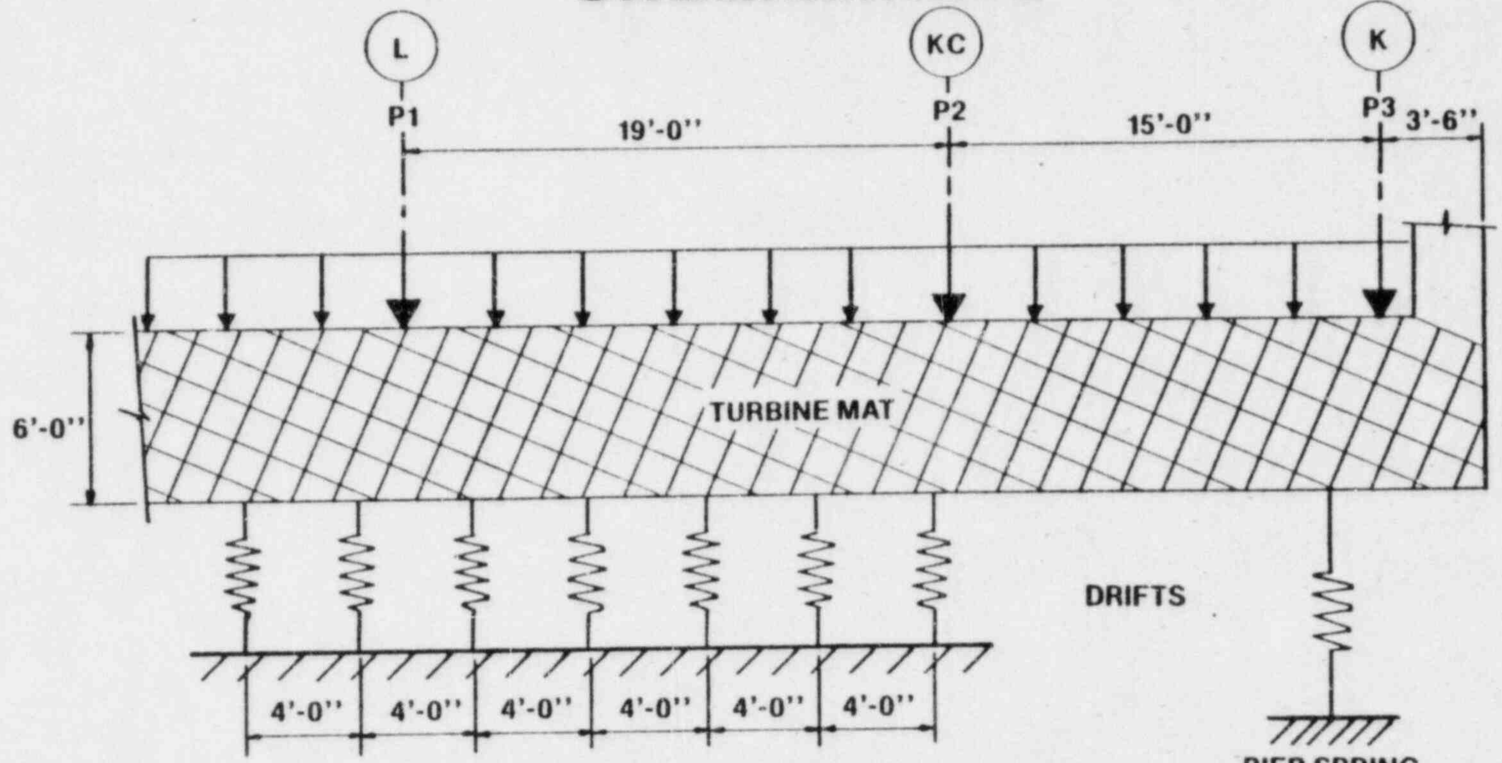
G-1929-02

TYPICAL ACCESS DRIFT FRAME



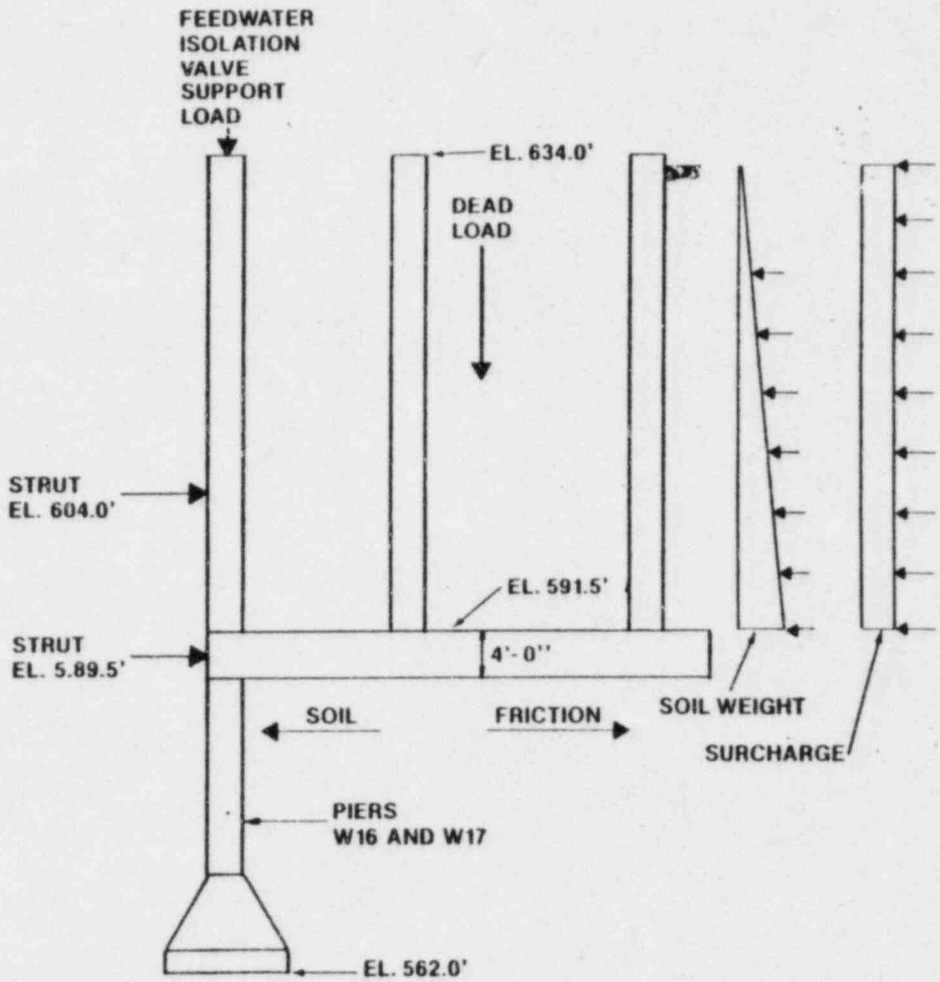
SECTION A

TURBINE MAT CHECK FOR UNDERMINING



Buttress access shaft

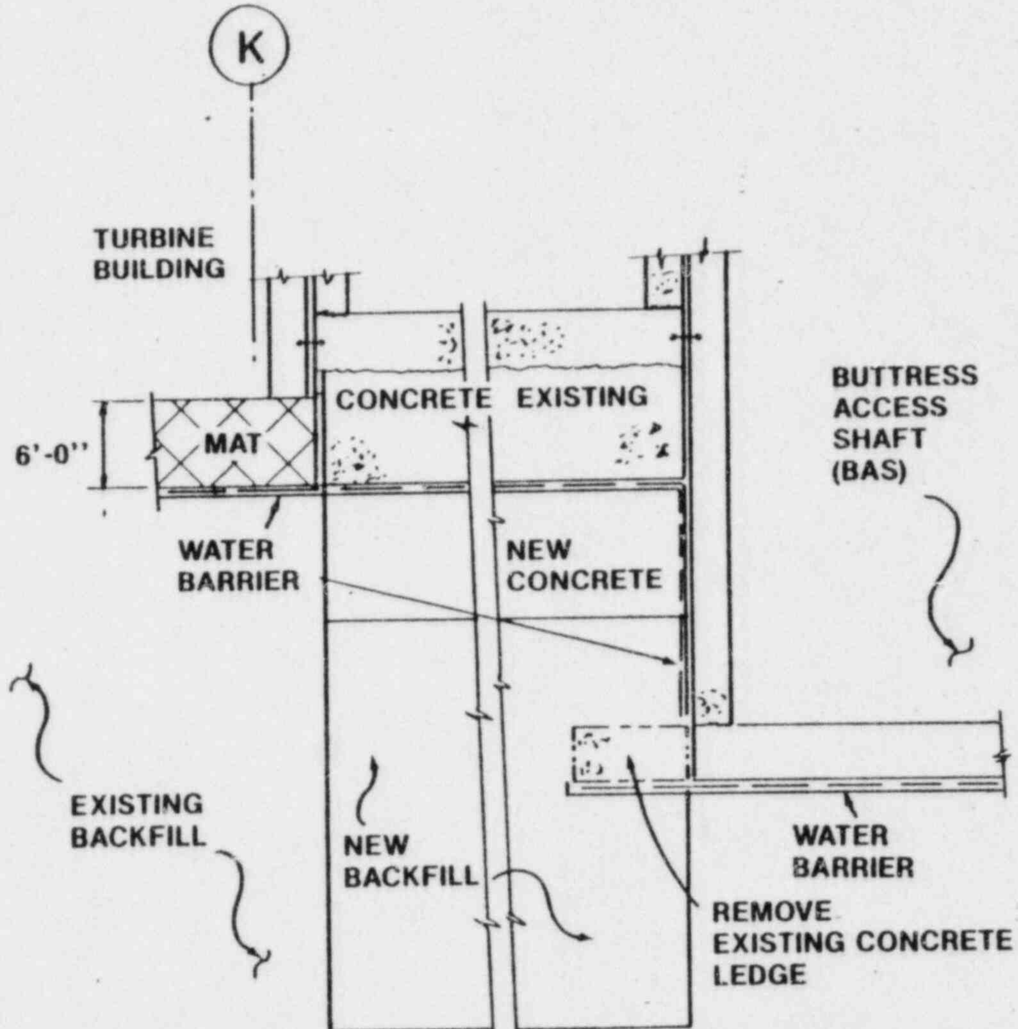
LOADS ON BAS FOR CONSTRUCTION CONDITION



MIDLAND UNITS 1 AND 2
AUXILIARY BUILDING UNDERPINNING 1 15 82

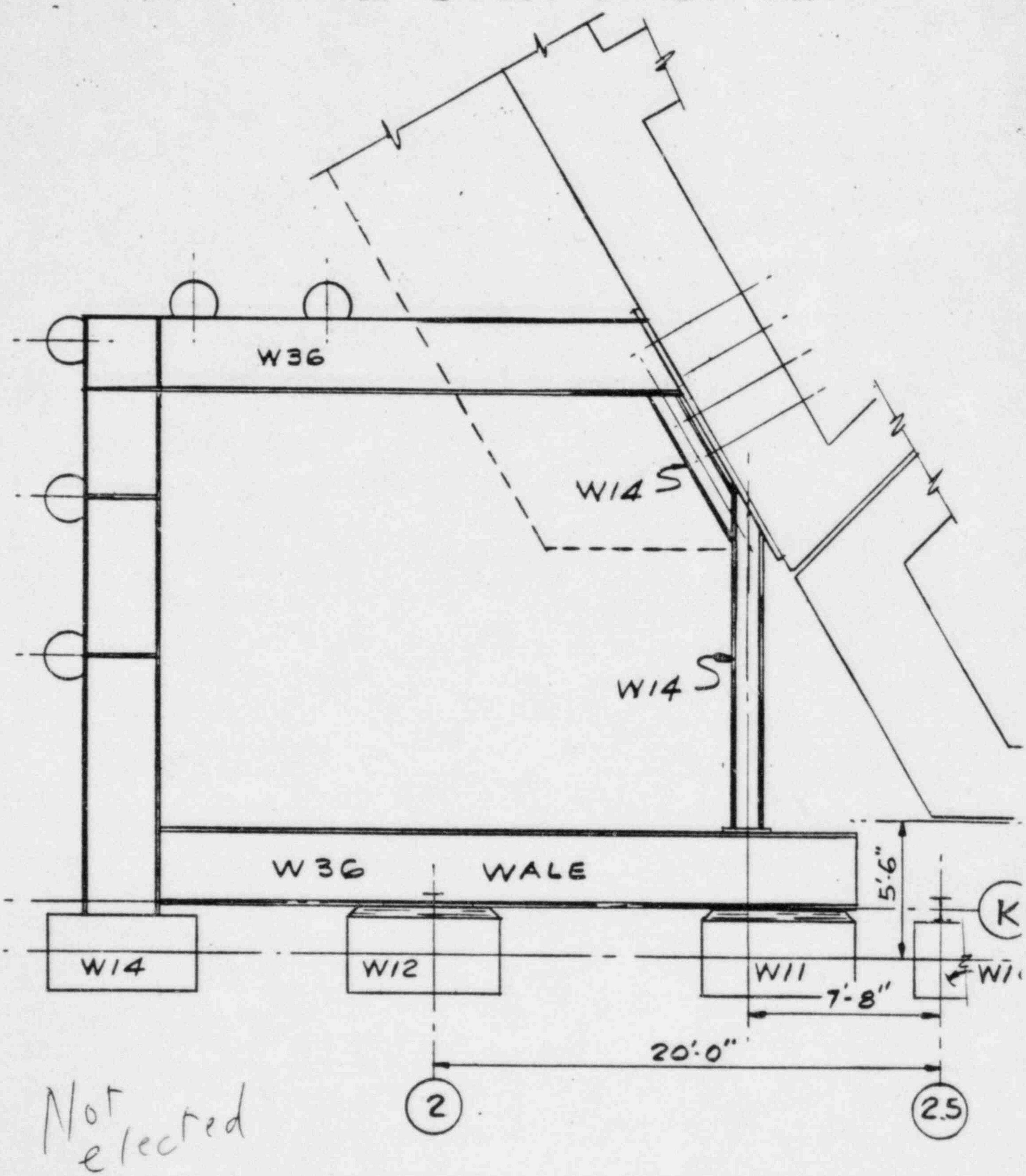
G 1929 15

NEW PERMANENT FOUNDATION CONFIGURATION AT(BAS)

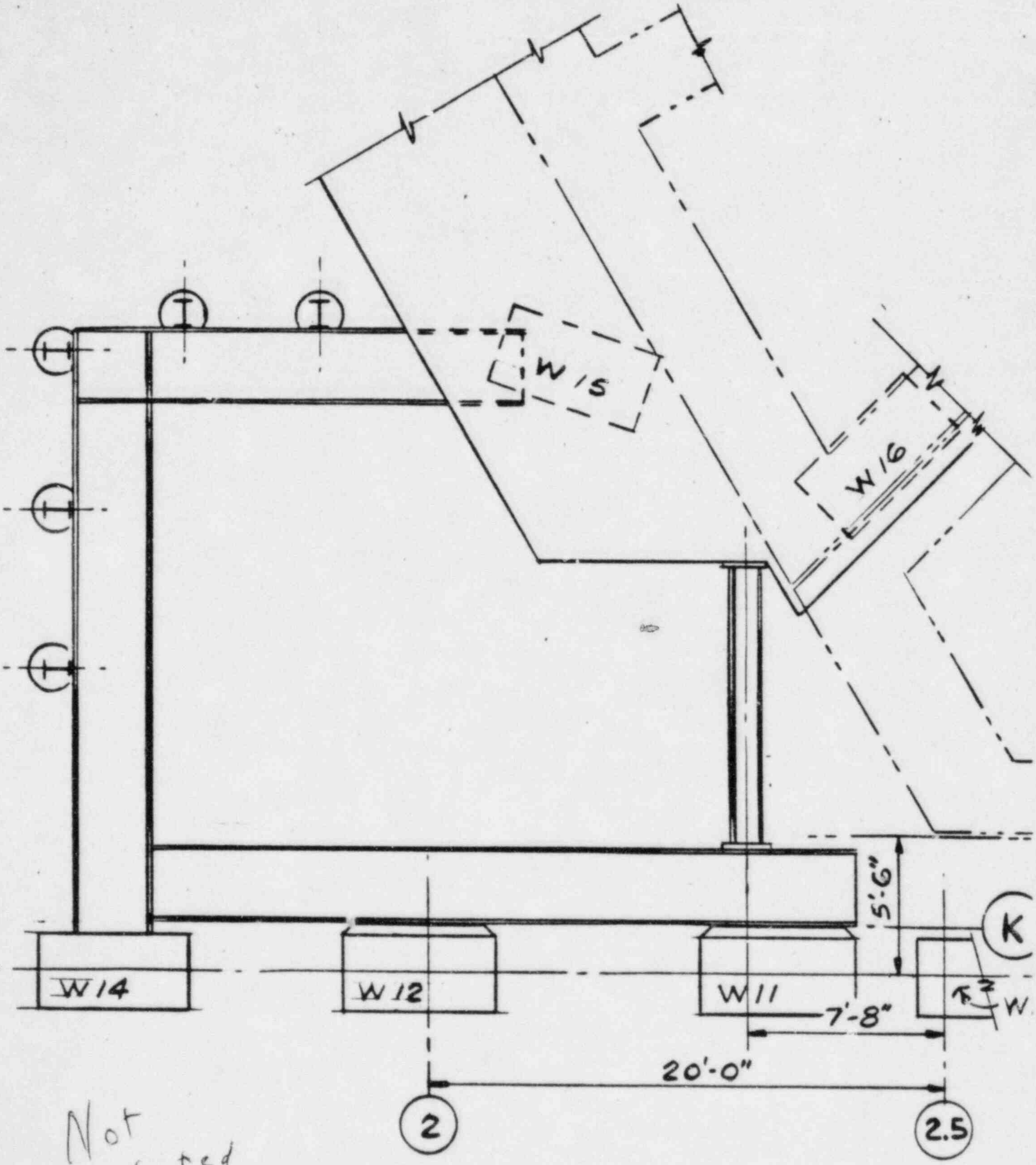


MIDLAND UNITS 1 AND 2
AUXILIARY BUILDING UNDERPINNING 1/12/82

G 1929 13



PLAN AT EL. 599'-6" (LEVEL C)
(POSSIBLE ALTERNATE)

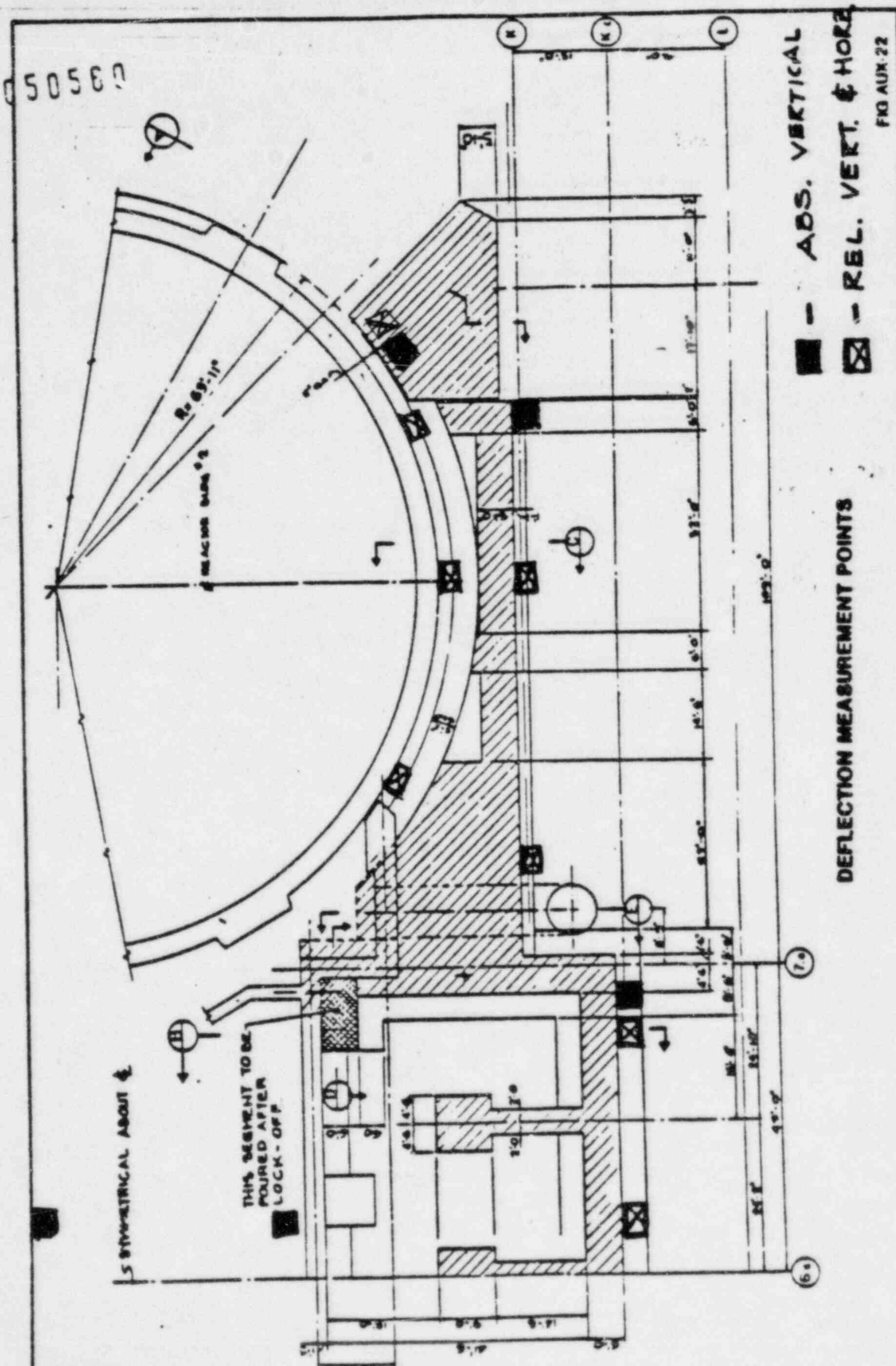


Not elected

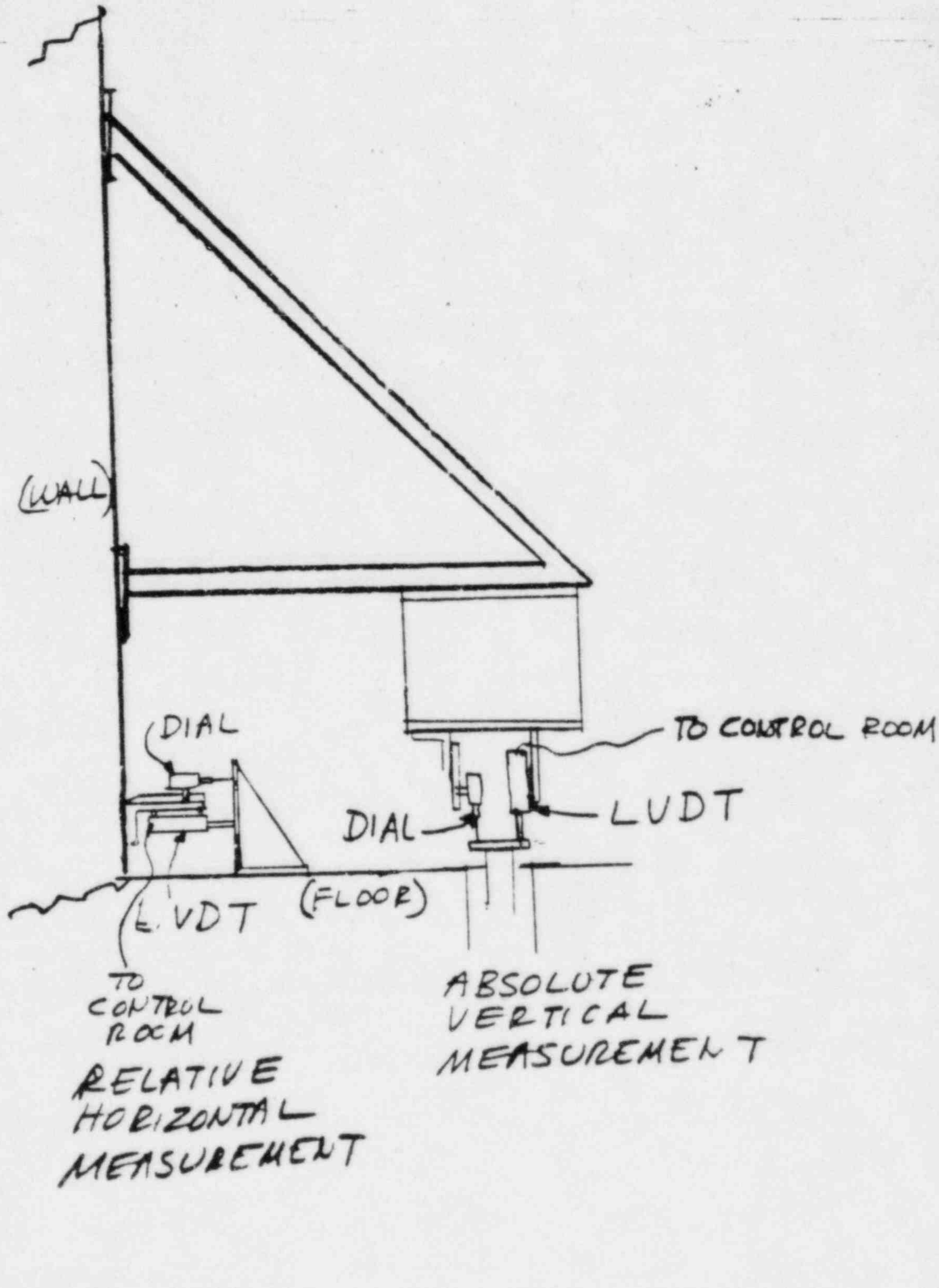
PLAN AT EL. 589'-6" (LEVEL D)
(POSSIBLE ALTERNATE)

1 | 37

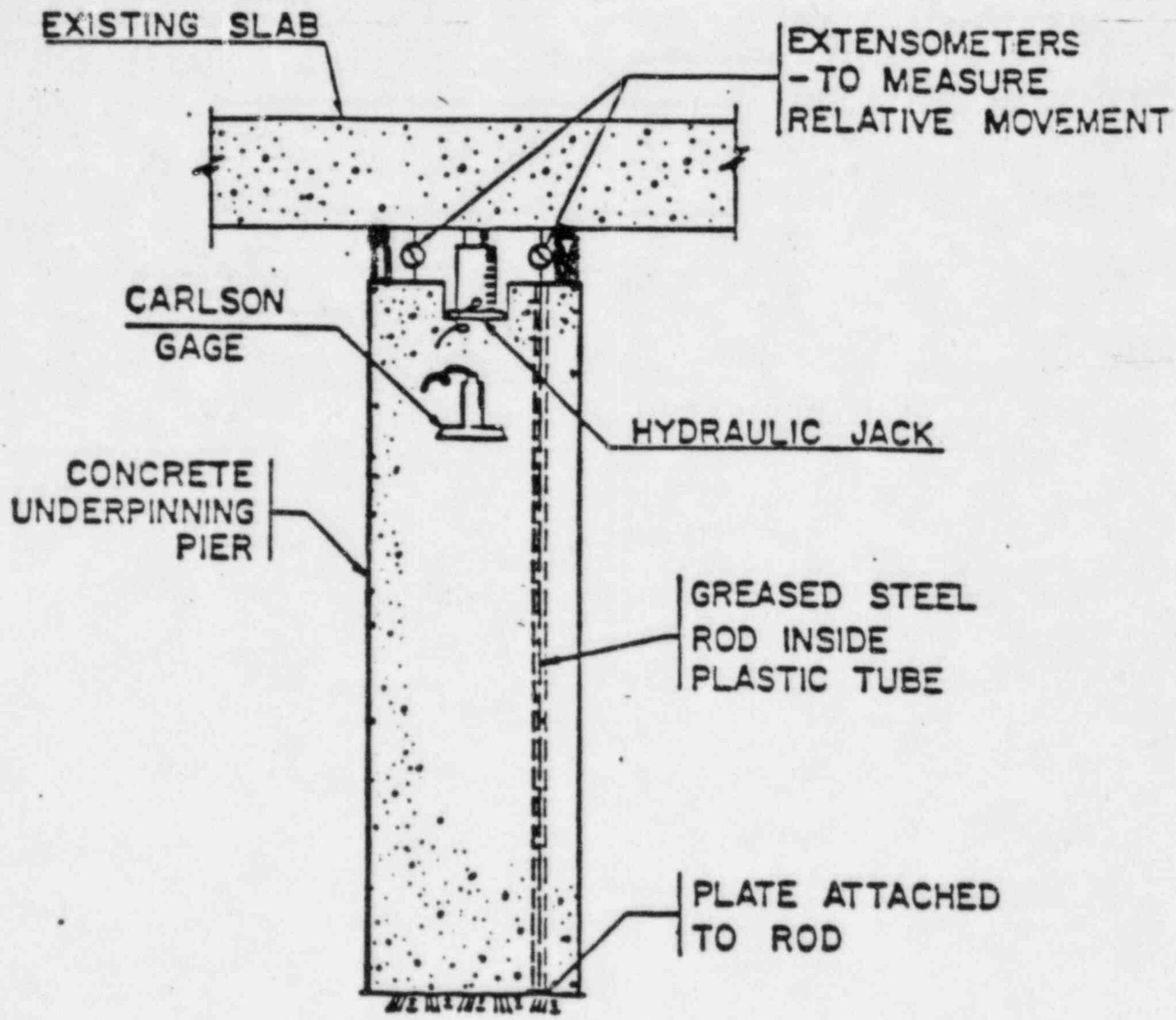
050560



FIVP will include ☒

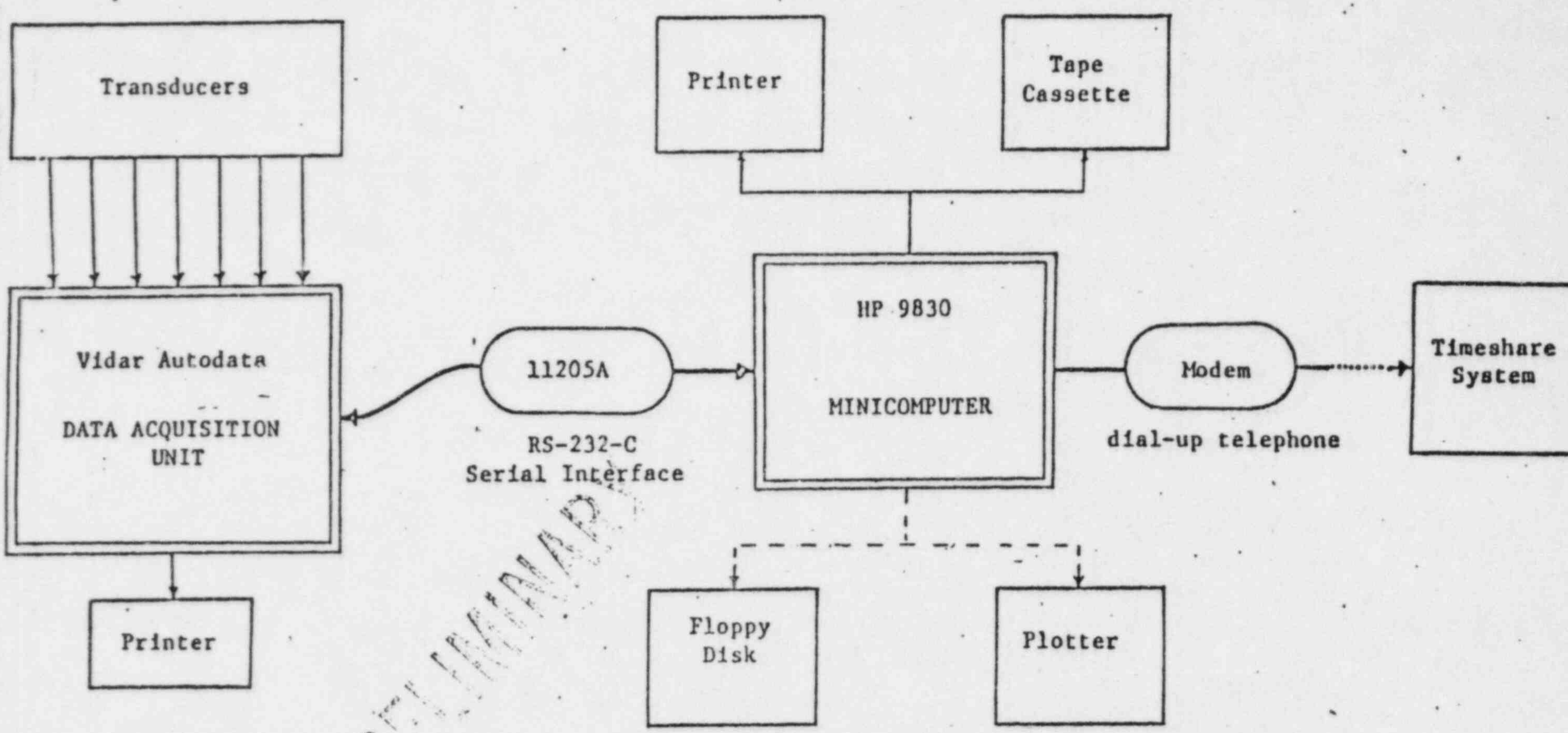

(WALL)
DIAL
TO CONTROL ROOM
LVDT
DIAL
LVDT
(FLOOR)
TO CONTROL ROOM
RELATIVE HORIZONTAL MEASUREMENT
ABSOLUTE VERTICAL MEASUREMENT

36



SECTION THROUGH INSTRUMENTED
UNDERPINNING PIER

FIG AUX-32



Data Acquisition and Data Processing System

NRC AUDIT ON JANUARY 18 & 19, 1982

ACTION ITEMS FROM F. RINALDI

1. FIVP TEMPORARY SUPPORT:

- Check diagonal tension in roof slab.
- Check roof slab for moment due to Dead Load superimposed on the moment due to rod.
- Evaluate effect of cut rebars on capacity of anchors and all other applicable calculations during the temporary support and also the final support condition.

2. CONTAINMENT WALL:

- Check containment for moment due to the worst loaded strut. Assume Load dispersion at 45°. Superimpose the resulting stresses on the stresses due to prestressing.

3. BUTTRESS ACCESS SHAFT FOR WALE LOADS:

- Update calc for wall A using #11 @ 8" c/c which gives 1-1/2 bars per foot instead of 2 bars per foot assumed in calc. (A quick check showed that the design is still adequate.)
- Complete calc for wall B. There was a note in the calc that the moment capcity was o.k. Indicate how?

4. RETAINING WALL BRACING:

- Justify with Geotech branch the use of 36° as angle of friction Ø as against 30°.
- Clarify the origin of loads, i.e., 297^k, 449^k, 349^k, etc., in the calculations. (Note: this comment is for all other calcs as well).

5. BURIED TANK:

- The tank is affected by wale loads at Levels B & C. However, the calcs have used levels A & B for design. Even though the design is conservative, a clarification is needed in design.
- Check the reinforcing which connects the tank to the turbine building for tension and shear. In considering the shear wall action, in each direction, an effective flange may be considered to resist bending and the web may be considered to resist shear.

6. STEEL LAGGING:

- Provide reference in the calculation for the 50% reduction in soil pressure for arching action.

7. FINAL CONDITION OF PIERS 8, 9 & 10:

- Redo calc considering additional piers put under turbine buidling columns.
- Complete drawing, e.g., rebar for bell was not called out on drawing.

8. RING BEAM ALONG CONTAINMENT:

- Check the unbalanced load condition when only half side is loaded. Consider each side for stability.
- The strut size in calc is 26"Ø t=5/8" whereas the drawing shows 28"Ø t=1/2". Update the calc to show adequacy of the strut.
- Provide details of end ties at two ends. How are they tied, etc.
- Complete calculation for level B.

9. GENERAL COMMENT:

- Provide a sketch in the calcs showing how the forces in the various wales and struts are balanced and transferred.
- Provide corrected* copies of FIVP calcs and construction condition calcs to NRC at time of 2/1/82 audit.

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* incorporating all above mentioned comments

Subject: Design Issues to be Audited by HGEB at January 18 - 19, 1982 Audit in Ann Arbor, Michigan

License Condition No.	Review Issue	Documentation Anticipated to be Presented to HGEB	Results of Design Audit Jan 18 - 20, 1982 Ann Arbor, Michigan
2a & 2b	Freeze Wall	Show soil types and stratification, groundwater level and estimates of soil permeabilities on Figures 5 through 8 of January 6, 1982, submittal. Anticipate discussions with Consumers on January 6, 1982, submittal (Mooney to Denton) on Freeze Wall Installation.	Location of Piez. to be provided @ Recharge Meeting. Will provide Figures (crossings) w/soil stratification by mail.
2c	NRC Questions Identified in Oct. 30, 1981 Conference Call Attach. 21, Q.3.	Well installation data sheets, pumping well construction summaries and well logs and records of soil particle monitoring for the permanent dewatering wells (including back-up wells) already installed.	Will provide (today) typical records incl. latest soil erosion records for temp & perm well @ SW structure and Aux. Building.
2c	Attach. 21, Q.4.	See above comments on License Condition Nos. 2a & 2b	Resolved
2d	NRC Testimony Nov. 20, 1981, Q.14	HGEB considers the bearing capacity issue to be resolved with the submittal of Consumers testimony (Johnson, Burke, Corley, Sozen and Gould-December 1-3, 1982) and Part 2, Test Results, Auxiliary Building, November 24, 1981).	Resolved
2d	NRC Testimony Nov. 20, 1981, Q.17	Anticipate discussion with Consumers on appropriate preconsolidation pressures to be used for structures founded on glacial till and on history of overburden stresses (e.g., sequence of fill placement and construction of structures).	Resolved
3a	FIVP Stability	Plan and sectional views that show details of transmitting FIVP loads to Turbine Building and Buttress Access Shafts.	Provided by handouts
		Calculations which determined imposed loads from FIVP onto Turbine and Buttress Access structures. Location and magnitude of bearing stresses at the top surface of the concrete walls of the Turbine and Buttress Access Shaft structures.	Resolved
		Procedure for distributing the additional bearing stresses to the foundations of the Turbine Building and Buttress Access Shafts due to FIVP load transfer.	Turbine Bldg. resolved, Revised calculation needed for Buttress Access Shaft to be provided - will send via R. Huston next week.

License Condition No.	Review Issue	Documentation Anticipated to be Presented by HGEB	Results of Design Audit Jan 18 - 20, 1982 Ann Arbor, Michigan
3b	FIVP Stability	Details of an acceptable monitoring program (settlement and lateral deflection) that will demonstrate no adverse impact on FIVP and utilities while it is undermined. Details should include type of monitoring, frequency, location and criteria on tolerable limits of total and differential settlement to be required with engineering basis for these limits. Affected utilities to be identified on plan and sectional views.	Provide instrumentation drawings (C-1490 & 1491). Revised botton of deep seated B.M. (EL.425) Revised monitoring location (between Turbine & FIVP & relative movement FIVP & deep seated B.M. Above provided @ next audit (Feb. 1 - 5, 1982) Discuss criteria of 3/8" how established where measured, actions to be taken (jacking when reached, address past settlement, when connected.
	Vert. Access Shaft	In response to ASLB questioning - Anticipate a presentation by CPC on procedure for drilling holes for vertical access shaft and a discussion with NRC on the need for any requirements (e.g., drilling and backfilling one hole at a time, etc.) while work for installing the vertical access shaft is completed (Refer to ASLB transcripts of December 3, 1981).	Will provide letter report which summarizes CPC presentation of 1/19/82 & indicate NRC concurrence. Will not proceed until letter is received by NRC.
		Plan and sectional views showing areal and depth limits of compacted granular backfill beneath FIVP. Discussion on field procedures for placement and compaction and compaction control requirements.	Will provide @ next audit. Indicate measures to be taken to assure separation of jacking slab from reactor & completed underpinning wall.
3c	NRC questions identified in Oct. 30, 1981 Conference Call	(HGEB considers Questions 5, 8, 11, 13, 24, and 26 to be resolved. Refer to D. Hood for any additional resolution required by NRR or I&E Branches).	Resolved
	Attach. 21, Q.12	Calculations for determining the soil Modulus of Elasticity from rebound-reload test results. Verification that Modulus of Elasticity corresponds to the stress level comparable to the actual bearing pressures on foundation soils.	Resolved

License Condition No.	Review Issue	Documentation Anticipated to be Presented to HGEB	Results of Design Audit Jan 18 - 20, 1982 Ann Arbor, Michigan
3c	Attach 21, Q.27	Details of monitoring set-ups for measuring relative movements at critical points (between main Auxiliary Building - Control Tower connection and outer walls of Control Tower, and between EPA-Control Tower connection and free ends of EPA's) Details of calculational procedure for determining relative movement at the above critical points.	Will discuss @ next audit (Feb. 1 - 5, 1982). Data reduction Will provide installation dates for ALL devices, indicate frequency, type of instrument, location, criteria, action level.
3c	Attach. 21, Q.29	Response to Q.29 submitted on Nov. 16, 1981, is inadequate. Provide sketch, locations and typical details of instrumentation as previously requested.	Submit literature on Carlson stress meter. Modification of tell-tale installation (Difference from ASTM). Provide by Jan. 22, 1982.
4a	Effect of Drift Excavation Beneath Turbine Building	Plan & sectional views showing relationship of drift excavation to Turbine Building and Auxiliary Building foundations with analysis that demonstrates no adverse impact on Auxiliary Building. Underground piping and conduits should be identified on plan and sectional views in areas affected by drift excavation and underpinning of Turbine Building. Calculations indicating factors of safety against bearing type failure for required loading conditions and calculations of estimated settlements (total and differential) with engineering evaluation of these results on the foundation stability of the Turbine Building and Buttress Access Shafts and affected conduits and piping.	NRC to respond by Feb. 5, 1982, to Don Bartlett's presentation. Resolved F.S. = 2.5 (Allow Bearing 15 to 17 ksf). Have not checked settlement of Turbine Bldg. Are checking by calculations (soil spring constants) which allows for new interior piers under Turbine Bldg. Will discuss @ next audit.
4b	Effect of Drift Excavation	License condition 4b requirements are self explanatory.	Are covered by other discussions of review issue.

License Condition No.	Review Issue	Documentation Anticipated to be Presented to HGEB	Results of Design Audit Jan 18 - 20, 1982 Ann Arbor, Michigan
4c	Effect of Drift Excavation	Calculations for factor of safety against bearing type failure and settlements (total and differential) for the permanent support system along the north side of the Turbine Building. Discussion of these results with respect to any impact on the Auxiliary Building and underground conduits and piping	Requiring F.S. = 3.0 for long-term Resolved Allow. bearing capacity = 15 ksf Duct banks thru Control Tower involved. Will discuss @ next audit - Support during excavation. (only duct banks involved, no piping involved)
4d	Attach. 21, Q.9	Structural analysis calculations that considered differential settlement with proper load combination and resulting concrete and steel stresses. Provide values of settlement used in analysis. Based on analysis, provide acceptance criteria for differential and absolute settlements for construction underpinning as identified in response to Q.9.	Auxiliary Bldg. & Control Tower Two parts - Construction - Discuss @ next audit. Long-Term or Perm. - Discuss @ May Audit.
4d	Attach. 21, Q.14	Calculations of the bearing pressures and total settlements established at the selected foundation locations. Calculations of the initially determined static soil spring constants and final spring constant values determined by iteration.	Resolved Will furnish calculations. NRC to respond QUICKLY. Response to Q.14 is superseded by approach shown in calculations. @ next audit resolve 20 ksf
4d	Attach. 21, Q.15	Longitudinal sectional view along drift excavation alignment showing location and outline of Cat. I utilities to be encountered.	Will cover @ next audit. Only control tower & duct bank are involved.
4d	Attach. 21, Q.25	Details of deep seated bench marks and instrumentation for monitoring relative and horizontal movement and absolute horizontal movement.	Will be provided by next audit (Feb. 1-5, 1982).

License Condition No.	Review Issue	Documentation Anticipated to be Presented to HGEB	Results of Design Audit Jan 18 - 20, 1982 Ann Arbor, Michigan
4d	Attach. 21, Q.30	Forms to be used for recording data from the various types of monitoring. (Refer to Pgs. D-5 and D-6, Sect. 3, Par. 3A.1, 3A.2, 3A.3 of Encl. 3 to the Sept. 30, 1981, submittal from J. W. Cook to H. R. Denton).	Both Bechtel & NRC to review. To be discussed at next audit.
		Lateral Earth Pressure — Adopt $\phi = 30^{\circ}$ Discuss @ next audit If $\phi = 36^{\circ}$ is needed, present justification.	Provide calculations for lateral pressure against vertical access shaft (Used in design for walers) along w/justiciation of $\phi' = 36^{\circ}$.
		Crack Monitoring & Sealing	CPC Testimony will provide their plans for sealing cracks. NRC should be prepared to address. Possibly have meeting w/CPC to resolve differences & license conditions

16/B5

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

MAR 1 5 1982

MEMORANDUM FOR: Robert L. Tedesco, Assistant Director for Licensing
Division of Licensing

THRU: Elinor G. Adensam, Chief
Licensing Branch #4
Division of Licensing

FROM: Darl Hood, Project Manager
Licensing Branch #4
Division of Licensing

SUBJECT: SUMMARY OF MARCH 4, 1982 MEETING ON HEARING SCHEDULES

The purpose of this memorandum is to illustrate that our current practice of supporting whatever Midland soils hearing schedule the Applicant wants, is resulting in inefficient reviews due to changing construction priorities by the Applicant.

BACKGROUND

On March 4, 1982 the NRC met briefly with Consumers Power Company to discuss schedules and topics for the instant OM, OL hearing on soils matters. As discussed during the February 19, 1982 hearing, the next scheduled hearing was to have been for a two week session beginning March 30, 1982 and was to have considered all remaining issues. However, technical meetings during February 23-26, 1982 and March 3, 1982 have revealed that much information remains to be provided for staff review and closure on the issues to the present schedule was considered by the staff to be questionable, at best. Most of the information is scheduled for submittal to the staff after or concurrent with the filing date of proposed testimony (March 16, 1982).

SUMMARY

Mr. Budzik of Consumers Power Company expressed his belief that four issues would be resolved in time for an April 5, 1982 revision:

1. Questions by Judge Harbour concerning QA/QC involvement in underpinning design and construction. The Staff noted that a meeting was scheduled for March 10, 1982 on this subject.

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2. Underground piping. The information requested by the staff during the February 16 hearing session will be submitted for review March 15, 1982.

3. Dewatering. Mr. Budzik stated that if the staff finds that "a second earthquake" (aftershocks of significant magnitude) must be considered after failure of non-seismic underground lines near the Diesel Generator Building, then Consumers would prefer to go to the hearing with this issue open and refer the matter to the Board for resolution.

4. Diesel Fuel Oil Storage Tanks. Mr. Budzik believes the information requested by the Staff during the March 3, 1982 meeting can be provided before or during the March 16-19, 1982 audit meeting in Ann Arbor. The information is intended to show that loose sand identified beneath the tank does not give rise to a liquefaction concern.

Ms. Adensam noted that since the technical staff will be in Ann Arbor, March 16-19, 1982, the following week for preparation and filing of testimony only leaves one week for Board review, whereas a two week period is typically provided for. The Staff stated that a two week hearing session beginning April 27, 1982, in its opinion, is the earliest that resolution of issues should reasonable be expected. Mr. Budzik replied that an earlier hearing is necessary because, in his experience, "if the staff is not confronted with a hearing, it will use its time on matters not Midland related, and the Midland review will be later." Ms Adensam stated that holding a hearing prior to resolution of an issue is not in the interest of the schedule, but the Staff will not object to whatever hearing schedule Consumers believes to be in it's best interest.

Mr. Budzik believes that issues remaining after the April 5 session should be scheduled for an April 26 hearing session. These issues include those for the Service Water Pump Structure, the Diesel Generator Building, various QA issues, and any remaining matters on the Borated Water Storage Tanks.

Mr. Budzik further stressed that the technical staff should direct its efforts to matters of significance to the immediate construction schedule, rather than upon matters soon to be the subject of the next hearing. Of immediate interest to construction is (1) excavation beneath the Feedwater Isolation Valve Pits and Tubine Building (i.e., Phase II of the Auxiliary Building underpinning), (2) underpinning initiation of the Service Water Pump Structure, and (3) construction of the new ring foundation for the Borated Water Storage Tanks. A preliminary list of construction priorities had been provided to the Staff on March 1, 1982 (Enclosure 2), and a revised listing will be provided shortly by telephone. 1/

1/ Subsequent to this meeting, Messrs Budzik and Brunner called Ms Adensam on March 5, 1982 to provide Consumers revised list of construction priorities. See Enclosure 3

CONCLUSION

A real need exists to establish and adhere to a fixed review sequence for the various remedial activities at Midland. It is recommended that Enclosure 3 be used as a basis for Staff's Midland review priorities and hearing scheduling purposes, and that substantial justification be required for changes in this priority. The applicant should be formally advised of this staff position.

Darl Hood

Darl Hood, Project Manager
Licensing Branch #4
Division of Licensing

Enclosures:
As stated

<u>ENCLOSURE 1</u>

<u>ATTENDEES</u>

March 4, 1982

<u>Consumers</u>

D. Budzik
J. Brunner, Esq.

<u>NRC</u>

W. Paton, Esq.
M. Blume, Esq.
J. Rutber, Esq.
E. Adensam
D. Hood
R. Hernan

ENCLOSURE 2

The following Midland construction schedules for soils remedial actions were provided by Mr. J. Mooney to E. Adensam on March 1, 1982:

Imminent - Start construction of BWST new ring beam

Mid-March - Auxiliary Building Ventical Access Shaft to reach Elevation 609'

March 18 - Start excavation under FIVP and TB (Phase II)

March 23 - Activation of freezewall

April 15 - May 1 - Start preparation work for replacement of underground 36" SWS pipes

April 15 - Start SWPS access shaft and submit final design

April 19 - Start excavation beneath Auxiliary Building (Phase III)

Mid-May - Start excavation beneath SWPS and construction of piers

May 20 - Reset BWST

June 1 - Cut and replace 36" SWS piping

ENCLOSURE 3

The following Midland construction schedules for soils remedial actions were provided by Mr. D. Budzik and Mr. J. Brunner, Esq. to Ms. E. Adensam, onm March 5, 1982:

Priorities

1.	QA Plan on Underpinning	3/12/82
2.	Phase II construction for the Aux. Bldg.	3/15/82
3.	Service Water Pump Structure	
	a. Vertical access shaft and construction dewatering	3/23/82
	b. Remainder of Underpinning construction (Q-listed work, excavation, etc.)	4/15/82
4.	Underground Piping	4/15/82
5.	Borated Water Storage Tank	
	a. Construction of new ring foundation	3/26/82
	b. Re-leveling of tanks	5/21/82
6.	Phase III construction for Aux. Bldg. underpinning	6/15/82
7.	Diesel Generator Building	

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

MAR 12 1982

Docket Nos.: 50-329
and 50-330 OM, OL

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 and 2

SUBJECT: SUMMARY OF FEBRUARY 23-26, 1982, MEETINGS ON REMEDIAL ACTIONS FOR STRUCTURES ON PLANT FILL

On February 23-26, 1982, the NRC Staff and its consultants met in Bethesda, Maryland with Consumers Power Company (the applicant), Bechtel and their consultants to discuss (1) dewatering and recharge tests in progress at the site, (2) results of surcharging the Borated Water Storage Tank (BWST) valve pits, (3) the Diesel Generator Building, (4) Service Water Pump Structure and (5) monitoring criteria for underpinning the Auxiliary Building. Meeting attendees are listed in Enclosure 1A through 1D.

Dewatering and Recharge

Mr. W. Parris of Bechtel described the recharge test which began February 4, 1982 after the water table was lowered to elevation 595' or below. All but two of the observation wells indicated the water table had reached 595' or lower. At these two locations the water was only slightly above elevation 595' because of soil stratification conditions which appeared to indicate a perched water level overtop an impervious foundation layer near elevation 595'. The object of the test is to demonstrate that adequate reaction time exists in the event of loss of dewatering capability before liquefaction potential exists beneath critical structures or components (i.e., before the water table rises to elevation 610').

The Applicant provided a Bechtel drawing entitled "Ground Water Levels Prior to Start of Recharge Test (2-3-82)". This is a large size drawing and a copy is retained at the NRC Central Files, Bethesda, Maryland. Enclosure 2 shows the ground water measurements at twenty wells observed since early January 1982. Observation wells in the area of the Railroad Bay (i.e., the north part of the Auxiliary Building) have shown no response in water levels since the recharge test was initiated on February 4, 1982. Enclosure 3 is the Applicant's estimated repair times for various well failure mechanisms. Extrapolation of the present data base indicates that about 48 days or more is the shortest period of time that may be available after loss of wells before the ground water rises from elevation 595' to 610'. This 48 days is based on observations of well COE-13A which is located just south of the Diesel Generator Building. The applicant will have thirty days of data by March 4, 1982 and will meet with NRC March 3, 1982 to determine whether an adequate basis for extrapolation has been established before terminating

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the recharge test. The March 3, 1982 meeting should also better define which structures and components are of liquefaction concern and their associated control level and monitoring details. The Applicant will also address failure of non-seismic piping, including the condensate storage tank lines and circulating water lines which are near or beneath the Diesel Generator Building.

BWST Valve Pits

Mr. J. Kane of the NRC geotechnical staff stated that on February 19, 1982 the Applicant had provided an informal information package of settlement results of the BWST ring walls and valve pits due to the surcharge. On the basis of that information, Mr. Kane concludes that the surcharge may now be removed from the BWST valve pits. The NRC will formally document its concurrence. The Applicant was asked to submit the following formally:

1. A letter discussing the predicted maximum differential settlement between both valve pits and the new ring beam foundations following removal of the surcharge, and a comparison of this projection with the maximum differential settlement which was calculated in the structural analysis of the BWST.
2. Time-settlement plots for both tank units. These plots should identify significant event dates (e.g., dates for filling tanks, raising cooling pond level, dewatering, placement of surcharge). The plots should also be marked to indicate the above identified maximum differential settlements.

The Applicant will also provide information on the placement of strain gauges for the new ring beam on March 16 and details of the procedure for re-leveling the Unit 1 tank on April 15, 1982.

The Applicant will provide information to establish that the load combination identified in its testimony for the February 16-19 hearing session is the controlling load combination for the design of the BWST ring foundation. The Applicant will also provide information to establish that 1.5 times the FSAR seismic spectra will envelope the Midland Site Specific Response Spectra for the evaluation of the BWSTs and their ring foundations.

Service Water Pump Structure (SWPS)

1. Structural Items

   Mr. C. Dirnbauer of Bechtel reviewed the three-dimensional, finite-element models for the SWPS and the status of their use in analyzing the existing structure and underpinning design. The analyses for the various loading combinations will be completed in mid-March, 1982. Mr. Dirnbauer's presentation is given by Enclosure 4. The finite-element models are described by Appendix A (Enclosure 5) of the Applicant's report "Technical Report on Underpinning the Service Water Pump Structure," submitted under cover letter dated November 6, 1981.

In support of its discussion of jacking loads for the SWPS underpinning design, the Applicant also provided a draft copy of its proposed hearing testimony for the SWPS prepared December 31, 1981 (Enclosure 13). Section 5.2 of this draft testimony addresses jacking loads.

The Applicant stated that a report on the cracks in the SWPS will be submitted for Staff review about March 1, 1982.

The NRC has scheduled an audit of the SWPS underpinning design and associated design calculation for March 16-19, 1982 in Ann Arbor, Michigan. Mr. F. Rinaldi of the NRC identified the following areas of structural interest for this audit:

1. Details of the prestressing system and associated loads, including any effects on the structure.
2. Deriation of the jacking loads
3. Results of analyses for all load conditions and applicable load combinations.
4. Crack control and monitoring, including pressure grouting plans.
5. Limits for building movement and differential settlements during underpinning construction and during plant life, and an evaluation of effects on the structural components.

2. Geotechnical Items

Enclosure 6 lists 26 questions by Mr. H. Singh of the Corps of Engineers resulting from his review of the November 16, 1981 technical report on the SWPS. The response given at the meeting to each question follows:

Q1. Procedures for attaching settlement indicators to benchmarks for the SWPS will be the same as those for the Auxiliary Building.
Q2. This is addressed in paragraph 4.6.1 (page 24) of Enclosure 13. At least two deep benchmarks at the north end of SWPS are already installed. All deep benchmarks will be installed by March 15, 1982.
Q3. Analysis to establish allowable building movements during underpinning are in progress. Response to this question is deferred to the March 16, 1982 audit meeting.
Q4. This is addressed in section 8.2 (page 47) of Enclosure 13.
Q5. Applicant's analyses are incomplete at present and results will be presented during March 16 audit. The approach being used is addressed in Section 7 of Enclosure 13.
Q6. The reference in the design report will be corrected. Instrumentation details will be discussed during the March 16, 1982 audit.

Q7. Text is unclear and will be clarified.
Q8. This is discussed on page 49 of Enclosure 13.
Q9. This is discussed in Section 5.2.1 of Enclosure 13.
Q10. This is discussed in Enclosure 13.
Q11. Applicant confirms that only 20 days has been allowed for primary consolidation but is committed to await achievement of a straight line to define secondary consolidation. Applicant states that it is not critical to the construction schedule if more than 20 days is needed.
Q12. Applicant's testimony gives 0.01" in 10 days for settlement rate limit. Basis for this will be discussed at March 16 audit.
Q13. This is addressed in Enclosure 13.
Q14. Final plans for construction dewatering during underpinning construction will be provided to Applicant by contractor during May 1982. Only a preliminary plan is available to the Applicant at present and this will be submitted to the NRC Staff for review of the dewatering concept.
Q15. NRC needs to review the soil spring constants which were provided by Consumers on February 23, 1982.
Q16. The Applicant finds that the change due to the unsymmetric jack load procedure for piers 4 and 5 is small. This item is resolved.
Q17. The Applicant's loading sequence will take this concern into account.
Q18. This is addressed in Enclosure 13, Table SWP-2.
Q19. This is addressed in Enclosure 13 at Section 8.1 and Tables SWP-3 & 4.
Q20. This item was discussed during the structural presentation and has been resolved.
Q21. This is clarified by substitution of "jacking load" for "dead load" and the issue is resolved.
Q22. Applicant will respond by March 5, 1982.
Q23. The loading combination presented was explained to be the most severe of the combinations considered.
Q24. The Applicant committed to recheck the load equations and respond by telephone during the week of March 1, 1982.
Q25. See Figure SWP-15 of Applicant's testimony. Applicant will respond by telephone during the week of March 1, 1982 showing how shear is developed.
Q26. The NRC staff intends to discuss this question with its Structural Engineering Branch before pursuing the question with Applicant.

Enclosure 7 lists 28 questions by NRC consultant S. Poulos from his review of the Applicant's SWPS submittals including the Applicant's draft testimony dated December 31, 1981. The response to each question given at the meeting follows:

Q1.1 The Applicant will respond later. In response to Applicant's request for staff concurrence of the soil spring values proposed for use in its finite-element model, Dr. Poulos addressed the six cases of Table 1 in Enclosure 5 accordingly:

- Case 1 and 2: Staff will respond March 16, 1982.
- Case 3: These appear to be the correct values.
- Case 4: Further Staff review of this case is needed.
- Case 5: This is an open item to be discussed March 16, 1982.
- Case 6: Not discussed.

Q1.2 Addressed in Applicant's testimony (Enclosure 13).
Q1.3 Applicant will compute the maximum differential to be allowed between adjacent piers.
Q1.4 Applicant will provide pressure diagram of lateral earth, seismic and hydrostatic pressures used in design at the March 16, 1982 audit.
Q1.5 This will be addressed during March 16, 1982 audit.
Q1.6 This will also be provided at the March audit.
Q1.7 Yes. The SWPS can span between corner piers without assuming any soil support. This is resolved.

Q2.1 Applicant's conceptual plan will be provided March 8.
Q2.2 This will be addressed March 16, 1982, to the extent known (coordinate with Singh's Q14).
Q2.3 See H. Singh Q14 question. The bottom water elevation levels to be maintained during SWPS underpinning, monitoring details, and allowances for perched water will be submitted to the Staff in May 1982. The Applicant has committed to not excavate below the water level during SWPS underpinning construction.

Q3.1 & 3.2 These will be addressed during the March 16, 1982 meeting.
Q3.3 & 3.4 These were discussed in part during the meeting where similar to the Auxiliary Building situation and will be concluded during the March 16, 1982 meeting.
Q3.5 No response from Consumers is needed to this statement.
Q3.6 Applicant agrees and intends to comply.

Q4.1 One of six Bechtel resident geotechnical engineers will accept the bearing stratum.

Q4.2 Dr. Poulos finds that the foundation adequacy of the alluvium may not be appropriately verified by the calibration curve for proposed cone penetration method and that another method may be needed. The Applicant will re-examine the proposed method and discuss with the Staff during the March 16 audit. Applicant will also establish a maximum thickness of lean concrete to be placed under piers.

Q4.3 The Applicant will review boring information to establish a maximum elevation difference between foundations of adjacent piers. The Applicant will also develop procedures which could be followed in the event field conditions would require the established maximum elevation difference to be exceeded.

Q4.4 The correct answer is 1/2". The drawing showing 3/4" needs correction.

Q4.5 No, there is no significant amounts of gravel prevalent in the hard clay. Yes, the material is stratified.

Q5.1 The drift is beneath the SWPS because there are several obstructions alongside, including SW pipes and electrical duct banks.

Q5.2 Test loading up to 130% of design load is recommended for either pier 1 or pier 2. The Applicant will consider this and advise the Staff of its decision.

Q5.3 This question is deleted.

Q5.4 Piers 11 are built after removal of jacks so that shear is not introduced into rock bolts.

Q5.5 The QC inspector will take readings of loads on pier jacks independently of construction crews. Only the QC inspector's reading is a Q-listed activity. The frequency of the reading will be provided at March 16 meeting.

Q6.1 The contract for SWPS underpinning will be awarded about March 16, 1982. This includes dewatering. Construction start is anticipated about March 23, 1982.

Q6.2 See Q 3.3

Q6.3 This is provided in Applicant's testimony.

Mr. J. Kane requested that the adopted upper water surface resulting from permanent dewatering conditions be presented at the March 16, 1982 audit in conjunction with calculations that establish imposed loads for bearing capacity analyisis.

3. Quality Assurance Items

Dr. R. Landsman of Region III continues to await receipt of the list of non-Q listed activities for both the Auxiliary Building and SWPS underpinning which he requested during the meeting of October 1, 1981 and again on January 12, 1982. Mr. J. Schaub will expedite this previous request. The NRR Staff noted that acceptance of the Q-list is necessary prior to staff concurrence of Phase II construction for the Auxiliary Building.

Dr. Landsman asked whether the Applicant planned to solicit staff approval of the six Bechtel resident geotechnical engineers. Bechtel replied that it considers such approval unnecessary. Dr. Landsman considers such approval to be advisable in view of past disagreements in this area.

Dr. Landsman asked whether monitoring of the water level during underpinning was a Q-listed activity. The Applicant replied that this is unnecessary since monitoring of the subgrade takes care of this and is Q-listed. The staff finds that control of water level has a direct effect on maintaining foundation stability and that water level during underpinning monitoring should be Q-listed.

Dr. Landsman also noted that excavation of the pits for pier footings was not Q-listed and indicated the need for further discussions on this matter.

A meeting will be scheduled in the near future to resolve NRC concerns regarding quality assurance aspects of the underpinning for the Auxiliary Building and SWPS.

Diesel Generator Building (DGB)

The principal document for this discussion was the Applicant's proposed hearing testimony for the DGB as provided to the NRC January 27, 1982 (Enclosure 14). Enclosure 8 shows the DGB settlement measured during surcharge, measured settlements since surcharge removal, and predicted settlements for plant life as presented on the blackboard by Dr. Afifi.

Enclosure 9 shows the DGB dewatering settlements which were observed from September 1, 1980 to February 4, 1982. Enclosure 10 shows settlement vs time during and after surcharge for several different DGB settlement markers and updated through February 4, 1982.

Dr. Afifi proposed a change to Figure DGB-8 in the Applicant's proposed testimony (Enclosure 14) with respect to the settlement values indicated for Surface D. The proposal was to substitute settlement values at the individual marker locations which was a sum of the settlements measured since surcharge removal plus the predicted settlements from December 31, 1981 to December 31, 2025 (See Encl. 8). The Staff and its Consultant agreed with this proposal since actual settlement records would then be used for the time period which has actually occurred since surcharge removal, rather than predicted values during this same time period.

The NRC Staff commented on the smoothing effect of the long term settlement profile (Surface C) which results in the Applicant's finite element analysis for determining stresses in the Diesel Generator Building due to settlements since surcharge removal. The Applicant's position is that this settlement profile is the most likely surface because it allows for the Diesel Generator Building rigidity. The Staff and its Consultant do not agree with this position, contending that Surface D, as modified by Dr. Afifi's proposal, is the best estimate of the long term settlement profile at this time and is based on past observations of Diesel Generator Building behavior under field loading which would appropriately reflect the actual rigidity of the structure. In addition, the Staff pointed out past statements by the Applicant's consultants that these predicted settlements would be used in structural analysis in assessing the adequacy of the Diesel Generator Building. The Applicant was requested to perform additional analysis and vary the static soil spring constants, possibly as low as zero in areas to represent potential bridging to produce analytical results that more nearly approximate the predicted settlement profile as proposed by Dr. Afifi. The Staff noted that the major portion of settlement which the Diesel Generator Building has experienced occurred before surcharge removal and questioned the results of structural analysis during pre-surcharge removal period. The Applicant indicated the results of this analysis are now being completed and would be submitted to the NRC Staff by March 8, 1982. The Applicant indicated its intention to demonstrate to the Staff that settlements which occurred prior to surcharging the Diesel Generator Building (January 1979) need not be analyzed for inducing structural stresses.

With respect to long term monitoring, the Applicant proposes to monitor at 6 points on the DGB. The Staff find that a minimum number of 10 points should be monitored.

The Applicant considers that the seismic analysis for the DGB should be deferred for the OL review and these analyses have not been reviewed. Staff conclusions regarding the adequacy of the DGB surcharge must therefore be limited in the instant hearing, even though this remedial action is completed. Mr. Rinaldi also requested information showing that 1.5 times the FSAR seismic spectra envelopes the Midland Site Specific Response Spectra for the DGB.

Dr. M. Sozen reviewed the enclosure to the Applicant's letter of February 16, 1982 entitled "Evaluation of the Effect on Structural Strength of Cracks in the Walls of the Diesel Generator Building". The Applicant has not evaluated the diagonal cracks at the south-east corner of the east exterior wall of the DGB. The Staff questioned whether the diagonal cracks were due to distortion from settlement of the structure and whether the structure was behaving as a rigid body. The Staff requested a statistical analysis of the DGB settlement data and the basis for concluding that the structure is settling as a rigid body. This statistical analysis should consider expected errors in the surveyed data and is intended to see if changes in curvature in the structure are the result of survey tolerances or actual curved distortions.

The Staff also questioned what analysis has been performed along the south wall due to actually measured settlements. The Applicant's consultants indicated that they had not been requested to evaluate the effects of this settlement and questioned the tolerances of the survey measurements which established these settlement records.

The Applicant has not yet determined whether cracks in the DGB will be repaired. Mr. Rinaldi of NRR stated that cracks affected by the fill or by other significant effects should be repaired prior to plant operation. The Applicant will advise the Staff of its decision during the third week of March, 1982.

Mr. Rinaldi of the NRC noted that spacing of cracks and the sum of crack widths should be considered in the Applicant's crack criteria. These criteria are significant with respect to the total elongation of rebar. In response to this concern, the Applicant stated that a stress criterion of 54 ksi would be used in the analysis, rather than yield stress.

Replacement of 36" Diameter Piping

The Applicant stated that its plans for the replacement of the 36" underground SWS headers will be submitted to the Staff on March 15, 1982. This submittal will also include piping profile information with boring data superimposed as previously requested by Mr. J. Kane and plans for settlement monitoring during plant operation. The transmittal letter will request Staff concurrence by April 15, 1982.

Monitoring Program for Auxiliary Building Underpinning

Viewgraph slides used for this presentation are shown by Enclosure 11.

The Applicant described an analysis of soil stiffness variations beneath the main Auxiliary Building during "stage 1" excavation beneath the east and west ends of the Electrical Penetration Areas. The purpose of this parametric study was to determine the effect of soil modulus variation on the inducement of stresses during Auxiliary Building underpinning. The Applicant has established allowable settlements based upon analyses using a soil modulus of 30 KCF beneath the main Auxiliary Building. The NRC Geotechnical Staff finds that the field information supporting selection of the soil modulus is quite limited and therefore a reasonable range of values should be examined. The Staff's concern is whether a moderate increase in soil stiffness value such as to 70 KCF, is significant and important in defining control movements during construction. For a value of 70 KCF, smaller allowable building movements than those proposed (see slide 10 of Enclosure 11) might result. The Applicant noted that controls are provided for since the high stressed areas (659' slabs and Control Tower shear walls) will be monitored during construction by strain gages on the steel. Since these areas are already cracked, the stress is probably redistributed and therefore should be lower in value. The NRC Staff will advise the Applicant by March 5, 1982 whether a determination of allowable movements based upon a modulus of 70 KCF is needed.

Mr. Rinaldi of NRR noted that cracks should be repaired prior to plant operation.

Mr. Rinaldi of NRR noted that during the February 2-5 audit meeting he had requested that the concrete modulus value not be reduced (the Applicant is using E_c = 1.8), and that the Applicant agreed to this request. However, in the evaluation of soil stiffness variations, the Applicant uses the same reduction term.

Mr. John Anderson of Bechtel discussed his parametric evaluation for construction spring constants. Results of this evaluation are shown in Enclosure 12. Mr. Anderson also addressed calculations for spring constants (normal and long term) during the last phase (Phase IV) of Auxiliary Building underpinning. Phase IV provides for construction of the permanent underpinning wall, load transfer and backfill of the excavation.

The Applicant also described the division of responsibilities between Bechtel and the several contractors during Auxiliary Building underpinning (see slides 11 and 12 of Enclosure 11), and the administrative plan for action for the monitoring of building settlement (slide 13, Enclosure 11) and cracks (slide 14, Enclosure 11).

The Staff requested additional information regarding the Applicant's decision not to activate the freezewall near the Turbine Building-SWPS duct bank crossing. Rather than the freezewall, dewatering wells will be used here.

Dr. R. Landsman of Region III advised the NRC Staff that several dewatering wells had been installed along the underground west plant dike near the Administration Building. The Staff requested further discussion of these wells during a March 3, 1982 meeting.

The Applicant will provide the Staff with its plans for the reading frequency and evaluation frequency for the strain gauges to be located at the Elevation 659 slab and at the Control Tower shear walls by March 15, 1982.

The Staff noted that several significant changes have occurred in the construction sequences diagram for the Auxiliary Building underpinning and requested an updated copy. The Applicant will provide this during the March 16-19, 1982 audit. One of these changes is that the grillage beams from pier W-8 to the Containment Building will be installed before the long drift beneath the Turbine Building to the Control Tower (previously included under Phase II construction) is made; both activities are now part of Phase III construction.

The Staff requested further discussions of the Applicant's backup plans in the event of unexpected or excessive building motions during underpinning construction.

Concluding Remarks of Staff Project Manager

Near the conclusion of this meeting, the NRC Staff Project Manager advised Mr. J. Schaub of Consumers Power Company that a surprisingly large amount of information still awaits the March 16-19, 1982 audit and beyond.

This date is inconsistent with the March 16, 1982 filing date for hearing testimony established for the March 30, 1982 hearing session. The Staff intends to re-evaluate its ability to provide substantive hearing testimony to the present schedule.

Darl Hood

Darl Hood, Project Manager
Licensing Branch #4
Division of Licensing

Enclosures:
As stated

cc: See next page

18/B5

MAR 2 1982

Docket Nos.: 50-329/330 OM, OL

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 and 2

SUBJECT: SUMMARY OF APRIL 20-24, 1981 AUDIT OF MIDLAND SEISMIC AND STRUCTURAL DESIGN CALCULATIONS

By its letter of July 7, 1980, the NRC Staff notified Consumers Power Company (the Applicant) of its plans to perform an audit of seismic and structural design analyses of safety-related structures, and provided guideline questions for the topics to be covered. The audit was subsequently conducted on April 20-24, 1981 in Ann Arbor, Michigan. The meeting agenda and speakers are shown on Enclosure 1. Meeting attendees are listed by Enclosure 2.

At the audit, the NRC Staff was given a ten-volume set of documents entitled "NRC Structural Technical Audit" responding to the guideline questions of July 7, 1980. Enclosure 3 is a general index for the ten volumes. Since the audit consisted primarily of a review of the information in these documents, and also of a review of the actual associated design calculations, a detailed summary by this paper is unnecessary. A copy of these volumes is retained by the NRC Central Files, Bethesda, Maryland.

Open items identified by the NRC Staff during the audit are listed by Enclosure 4 (See post-script below for disposition of these items).

Post-Script

Since this audit, the Applicant's letter of October 19, 1981 has provided updated pages for the document "NRC Structural Technical Audit" and responded to the open items (Enclosure 4) identified during the April 20-24, 1981 audit. The letter also noted that no further revisions to the document were planned, although remaining longer-term issues related to the audit would be documented by FSAR revisions or separate correspondence to the NRC.

Darl Hood, Project Manager
Licensing Branch No. 4
Division of Licensing

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Enclosures:
As stated

cc: See next page

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MEETING SUMMARY DISTRIBUTION

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W. Paton

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

MAR 2 1982

Docket Nos.: 50-329/330 OM, OL

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 and 2

SUBJECT: SUMMARY OF APRIL 20-24, 1981 AUDIT OF MIDLAND SEISMIC AND STRUCTURAL DESIGN CALCULATIONS

By its letter of July 7, 1980, the NRC Staff notified Consumers Power Company (the Applicant) of its plans to perform an audit of seismic and structural design analyses of safety-related structures, and provided guideline questions for the topics to be covered. The audit was subsequently conducted on April 20-24, 1981 in Ann Arbor, Michigan. The meeting agenda and speakers are shown on Enclosure 1. Meeting attendees are listed by Enclosure 2.

At the audit, the NRC Staff was given a ten-volume set of documents entitled "NRC Structural Technical Audit" responding to the guideline questions of July 7, 1980. Enclosure 3 is a general index for the ten volumes. Since the audit consisted primarily of a review of the information in these documents, and also of a review of the actual associated design calculations, a detailed summary by this paper is unnecessary. A copy of these volumes is retained by the NRC Central Files, Bethesda, Maryland.

Open items identified by the NRC Staff during the audit are listed by Enclosure 4 (See post-script below for disposition of these items).

Post-Script

Since this audit, the Applicant's letter of October 19, 1981 has provided updated pages for the document "NRC Structural Technical Audit" and responded to the open items (Enclosure 4) identified during the April 20-24, 1981 audit. The letter also noted that no further revisions to the document were planned, although remaining longer-term issues related to the audit would be documented by FSAR revisions or separate correspondence to the NRC.

Darl Hood, Project Manager
Licensing Branch No. 4
Division of Licensing

Enclosures:
As stated

cc: See next page

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NRC STRUCTURAL DESIGN AUDIT
MIDLAND PLANT UNITS 1 and 2

LOCATION Bechtel Professional Associates Corp
777 Eisenhower Parkway
Ann Arbor, Michigan

DATE: April 20-24, 1981

AGENDA TOPICS

Introduction and General Design Features
Containment Building
Auxiliary Building
Diesel Generator Building
Service Water Pump Structure
Buried Pipes and Tanks
Borated Water Tanks

NRC STRUCTURAL DESIGN AUDIT
BECHTEL ORAL PRESENTATIONS

Introduction..................Lynn Curtis

General Civil Design..........Ted Johnson
* Bechtel Audit Coordinator...Gordon Tuveson

Soil Settlement History Building.....Shing Lo
General Seismic Analysis.............Chuck McConnel

Containment General Design...........Bob Yuan
" Seismic Analysis.........Chuck McConnel
" Reactor Vessel Support Modifications.....Mo Elgaaly

Auxiliary Bldg. General Design...............Lakshmi Lakshminarayanan
" " Seismic Analysis.............Chuck McConnel
" " Foundation Modifications.....Shing Lo
" " New Siesmic Analysis.........Chuck McConnel

Diesel Generator Bldg. General Design.............Paul Shen
" " " Seismic Analysis...........Chuck McConnel
" " " Reanalysis Due to Surcharge Load.....Shing Lo
" " " New Seismic Analysis.......Chuck McConnel

Service Water Pump Structure General Design.............Paul Shen
" " " " Seismic Analysis...........Chuck McConnel
" " " " Foundation Modifications...Shing Lo
" " " " New Seismic Analysis.......Chuck McConnel

Buried Steel Pipes General Design........John Legette
Buried Concrete Pipes " " ....S. Rao
Buried Tanks " " ....S. Rao
Buried Pipes and Tanks Seismic Analysis......Chuck McConnel

Borated Water Tanks General Design..........S. Rao
" " " Seismic Analysis........Chuck McConnel
" " " Foundation Settelment Analysis....Shing Lo
" " " New Seismic Analysis....Chuck McCornel

* No presentation being given

Attendees
4/20/81

Name	Organization
Darl S. Hood	NRC/DOL Proj. Mgr
Gunnar Harstead	HEA NRC Consultant
FRANK RINALDI	NRC/NRR/SEB
Pao C. HUANG	NSWC /NRC consultant
John P. MATRA Jr	NSWC/NRC CONSULTANT
H. N. Singh.	Corps of Engineers. NRC consultant.
M. Elgaaly	Bechtel
Steve Sobkowski	Bechtel
T.E. JOHNSON	BECHTEL
B.R. Mozafari	Bechtel
P. SHUNMUGAVEL	"
B.C. McConnel	Bechtel
S. C. LO	Bechtel
G. A. TUVESON	Bechtel
D.M. BUDZIK	CPCO
T.R. THIRUVENGADAM	CPCo
B.F. Henley	CPCo
L.H. Curtis	Bechtel
B. Dhar	Bechtel
V. Lakshminarayan	Bechtel Engr.
RL TEUTEBERG	CPCo-LICENSING

Attendees
NRC Structural Audit
4/21/22/81

Name	Organization
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Gunnar Harstead	HEA / NRC Consult.
FRANK RINALDI	NRC/NRR/SEB
Pao Huang	NSWC/NRC Consultant
John P Matra Jr	NSWC/NRC Consultant
H.N. SINGH	Corps of Engineers, NRC Consultant
M. Elgaaly	BECHTEL
Brenda Mozafari	Bechtel
T.E. JOHNSON	BECHTEL
P SHUNMUGAVEL	"
D. YUAN	"
W Hawthorn	"
D. CHOW	"
G. TUNCSON	"
V. Lakshminarayan	"
J. Ross	"
Steve Hardy	"
Deborah Magnuson	"

Structural Audit - Midland Plant

Attendees
4/23/81

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FRANK RINALDI	USNRC/NRR/SEB
Pao Huang	NSWC/NRC Consultant
John P Matra	NSWC/NRC CONSULTANT
H. N. SINGH	Corps of Engineers/NRC consultant
J V Rotz	Bechtel Civil/Struct Staff
Steve Sobkowski	Bechtel
Brenda Mozafari	Bechtel
T.E. JOHNSON	BECHTEL
B.C. McConnel	BECHTEL
Paul P. Shen	Bechtel
D. A. Zanese	Bechtel
G. A. TUVESON	BECHTEL
M. LITKE	BECHTEL
S C Lo	BECHTEL
TR Thiruvengadam	CPCo
BF Henley	CPCo

NRC Structural Audit

4/24/81

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Gunnar Harstead	HEA/NRC Consultant
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P HUANG	NSWC/NRC CONSULTANT
J. P. MATRA JR.	NSWC/NRC CONSULTANT
H.N. SINGH	U.S. Corps of Engineer/NRC Consultant.
B.P. Mozafari	Bechtel
Steve Sobrowski	"
T.E. JOHNSON	"
P. SHUNMUGAVEL	"
BOB YUAN	"
G. TUVESON	"

ENCLOSURE 3
"NRC STRUCTURAL TECHNICAL AUDIT"

GENERAL INDEX

NRC STRUCTURAL AUDIT

PRELIMINARY LIST OF OPEN ITEMS

Containment

a. Review Numbers on Page 21, Table 3.8-1

b. Verify that torsion was used on components and internal structures.

c. Membrane shear allowable in equipment hatch area shear allowable (400 psi) needs verification

d. Bijlaard: Show that this technique is applicable for containment shell

e. Check adequacy of baseslab shear reinforcement #9's on vertical wide flanges.

f. Impact effect of 1/32 inch gap steam generator needs to be assessed

g. Allowable membrane tension, $3\sqrt{f'_c}$ and $6\sqrt{f'_c}$ - which load combination in tension and bending and where does it apply

h. Want to know the actual yield stress for reinforcement in the primary shield.

i. Explain Mu and Vu along with safety factor; Page 57

j. Reactor pressure vessel upper lateral support is this considered in analysis

k. To tabulate shear values in all tables

Auxiliary Building

a. Check for possible additional loading on control tower due to the effects of caissons

b. Bending on foundation of wing due to revised outer caissons must be assessed

c. Stiffness of caissons should consider concrete and soil together

d. Is friction between the caissons required to develop full load

e. Subgrade modulus should be calculated from tests for use in the foundation design

f. Fuel rack calcs-unchecked (vendor calc) impact factor used between fuel racks, and pool walls from tipping needs to be studied

(Resolved) g. Calcs for shear wall should be explained showing approach used

h. How does thru cracks affect load capability

i. Effect of long-term settlement on control tower versus main section of auxiliary building

j. Use an acceptable method to analyze the thru cracks, to verify capacity of isolated typical section.

Diesel Generator Building

a. Verify spring constants

b. Cracks: estimate stress; also consider widening of cracks

c. Cracks should include reversal effects of seismic loads

d. Co-ordinate with vendor on pedestal design and seismic qualification for diesel generators

e. Want commitment to evaluate cracks influence on structural capacity

f. Present evaluation of tornado missile effects on a wall with thru-cracks

Service Water Pump Structure

a. Monitor cracks

b. Hydrodynamic loads on interior walls

c. Foundation bearing capacity of new wall needs identified factor of safety

d. Commit to monitor service water pipes for settlement effects.

Borated Water Storage Tanks

a. Provide details of final design, especially connection between the two foundation walls

b. Provide Vendor acceptance of tank foundation modifications

c. Pipes should also be monitored in the valve pit

d. Commit to monitor high stress points after implementation of fix for cracks

Buried Pipe and Tanks

a. Earthquake should be considered in tank piping connection design

b. Control room tanks should be monitored for displacements

c. Describe air supply lines to control room from tanks

General

a. Want schedule for design of remedial fixes

b. Want copy of calculation index for fixes

19/135

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RTedesco NSIC
RVollmer TIC
JKramer ACRS (16)
RMattson
RHartfield, MPA
FRinaldi
RLandsman
JKane

Docket Nos: 50-329 OM, OL
and 50-330 OM, OL

MAR 2 6 1982

Mr. J. W. Cook
Vice President
Consumers Power Company
1945 West Parnall Road
Jackson, Michigan 49201

Dear Mr. Cook:

Subject: Staff Concurrence for Grouting of Cracks in Concrete Foundations of Borated Water Storage Tanks

By 50.55(e) reports, meetings and testimony during the February 16, 1982, hearing session, you have advised the NRC of plans for remedial measures regarding cracking of the concrete foundations for the Borated Water Storage Tanks for Midland Plant, Units 1 and 2. Your plans include stiffening of the ring foundation by construction of a concentric reinforced concrete ring beam attached to the existing ring foundation by shear connectors. Preparations for construction of the new ring beam have included surcharging the adjacent valve pits, and staff concurrences for surcharge placement and removal were indicated by my letters of September 25, 1981, and February 26, 1982, respectively.

Your preparations for construction of the new beam also include grouting of cracks in the existing concrete foundations. At least all cracks with widths in excess of 10 mils are to be pressure grouted. The NRC staff agrees that grouting will protect reinforcing bars in the existing foundations from the long term effects of corrosion and concurs with your plans to proceed with grouting of the existing cracks.

This confirms the verbal concurrence of our Licensing Project Manager to Mr. J. Mooney of your company on March 19, 1982.

Sincerely,

Original signed by
Robert L. Tedesco

Robert L. Tedesco, Assistant Director
for Licensing
Division of Licensing

8204080068

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RTedesco
3/24/82

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DATE	3/24/82	3/24/82	3/25/82	3/24/82	3/2?/82	3/24/82	3/24/82

NRC FORM 318 (10-80) NRCM 0240 OFFICIAL RECORD COPY USGPO: 1981-335-960

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

MAR 26 1982

Docket Nos: 50-329 OM, OL
and 50-330 OM, OL

Mr. J. W. Cook
Vice President
Consumers Power Company
1945 West Parnall Road
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Dear Mr. Cook:

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Sincerely,

R L Tedesco

Robert L. Tedesco, Assistant Director
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Docket Nos: 50-329/330 OM, OL

Mr. J. W. Cook
Vice President
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1945 West Parnall Road
Jackson, Michigan 49201

Dear Mr. Cook:

Subject: Compilation of Information Requested for Completion of Staff Review of Phase 2 Underpinning of Midland Auxiliary Building

Pursuant to the request of Mr. J. Mooney of your Company on March 11, 1982, Enclosure 1 is a compilation of the information needed for completion of the NRC's review of "phase 2" of the construction activities for underpinning of the Midland Auxiliary Building. "Phase 2" is defined by the Construction Sequence Logic Diagram provided the staff during a January 18-19, 1982 audit meeting (Enclosure 1 of our meeting summary dated March 10, 1982), and generally provides for further deepening of the vertical access shaft, construction of limited drifts under the Feedwater Isolation Valve Pits (FIVPs) and Turbine Building, and installation of certain piers.

Your prompt attention to these matters should provide for staff concurrence with minimal impact to your present construction schedule.

The reporting and/or recordkeeping requirements contained in this affect fewer than ten respondents; therefore, OMB clearance is not required under P.L. 96-511.

Sincerely,

Original signed by
Robert L. Tedesco

Robert L. Tedesco, Assistant Director
for Licensing
Division of Licensing

Enclosure:
As stated

cc: See next page

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MIDLAND

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ENCLOSURE 1

Identification of Review Concerns Prior to Initiating Phase 2
Underpinning Work Midland - Auxiliary Building

I. GEOTECHNICAL ENGINEERING

Phase 2a*

No.	Review Concern
1	Submittal of Updated Construction Sequence Drawing (Identified in Feb. 3-5 Audit and Feb. 26, 1982 Meeting).
2.	Letter documenting actual work to be performed under Phase 2a (telephone record, March 8, 1982, Par. 3). Letter should provide commitment not to proceed with 2b until the analyses using NRC recommended stiffness valves are completed and results reviewed by NRC Staff.
3.	Update drawing of "Monitoring Matrix", No. C-1493(Q) that will include tolerance criteria (Telephone record, Mar. 8, 1982, Par. 4.b).
4.	CPC commitment to have 6 deep seated bench marks with instruments installed and operational before beginning Phase 2a work. (Telephone record, March 8, 1982, Par. 4.B and Par. 5). Also instruments DMD-1W, DMD-1E, DSB-1W, DSB-1E are to be installed and operational. (Feb 3-5 Design Audit).
5.	Submittal of strain gage installation details @ El 659 with limiting strain valves and basis (Feb. 26, 1982 meeting and telephone record, Mar. 8, 1982, Par 4.d).
6.	Commitment to perform test load above design load (e.g., 1.30 times) on installed pier to develop load-deflection curve for verification of hard clay soil modulus. Identify pier. (Feb. 3-5 Design Audit).
7.	Submittal of measures to be required during periods of work shutdown to support faces of drifts and bottoms of pits (Feb. 3-5 Design Audit).
8.	Submittal of plans for dewatering localized water pockets (e.g., placing wells in sand fill around reactor perimeter) in advance of pit construction (Feb. 3-5 Design Audit).

* Phase 2a items are those not impacted by analyses of the change in soil modulus values beneath the main Auxiliary Building.

3/11/82
2-12
J Kane

Phase 2b

No.	Review Concern
1.	Provide instrumentation details and horizontal movement tolerance criteria with basis, for 3 instruments to be installed at top of EPA's and Control Tower (Telephone record, March 8, 1982, Par. 4.c and Par. 5).
2.	Submittal of results from analysis that establishes induced stresses at El 659 assuming EPA is supported by first temporary support (Pier W8) and using Existing Soil Springs under EPA and Control Tower and Auxiliary Building (Feb. 3-5 Design Audit)
3.	Commitment by CPCo to have installed and operational all of the remaining instruments identified on Drwg C-1493(Q).

II. STRUCTURAL ENGINEERING (Phase 2a)

Strain gauges or equivalent shall be provided at critical locations, including:

a. Elevation 659' slab
b. Control Tower shear wall
c. Slabs and walls near post-tensioning cables at the Control Tower and Electrical Penetration Areas
d. Steel beams shall have strain gauges, and not deflection meters.

Information shall be provided for these gauges regarding:

1. Location
2. Monitoring frequency
3. Limits (initial and distress points)
4. Evaluations of results (method and acceptance criteria)
5. Commitment that instruments shall be in place and operational before beginning Phase 2a.

III. MECHANICAL ENGINEERING BRANCH (Prior to drifting beneath FIVP)

1. Allowable movements shall be based upon total settlements since the main feedwater piping was first installed in 1977.

2. A commitment that the 2" steam generator drain lines shall first be shown not to be limiting for allowable structural movements in the event a decision should be made to connect this piping prior to completion of underpinning.

IV. QUALITY ASSURANCE

Applicant shall notify NRC that all underpinning construction will be Q listed consistent with the NRC Staff's findings during the meeting of March 10, 1982.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

MAR 22 1982

Docket Nos: 50-329/330 OM, OL

Mr. J. W. Cook
Vice President
Consumers Power Company
1945 West Parnall Road
Jackson, Michigan 49201

Dear Mr. Cook:

Subject: Compilation of Information Requested for Completion of Staff Review of Phase 2 Underpinning of Midland Auxiliary Building

Pursuant to the request of Mr. J. Mooney of your Company on March 11, 1982, Enclosure 1 is a compilation of the information needed for completion of the NRC's review of "phase 2" of the construction activities for underpinning of the Midland Auxiliary Building. "Phase 2" is defined by the Construction Sequence Logic Diagram provided the staff during a January 18-19, 1982 audit meeting (Enclosure 1 of our meeting summary dated March 10, 1982), and generally provides for further deepening of the vertical access shaft, construction of limited drifts under the Feedwater Isolation Valve Pits (FIVPs) and Turbine Building, and installation of certain piers.

Your prompt attention to these matters should provide for staff concurrence with minimal impact to your present construction schedule.

The reporting and/or recordkeeping requirements contained in this affect fewer than ten respondents; therefore, OMB clearance is not required under P.L. 96-511.

Sincerely,

R L Tedesco

Robert L. Tedesco, Assistant Director
for Licensing
Division of Licensing

Enclosure:
As stated

cc: See next page

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ENCLOSURE 1

Identification of Review Concerns Prior to Initiating Phase 2
Underpinning Work Midland - Auxiliary Building

I. GEOTECHNICAL ENGINEERING

Phase 2a*

No.	Review Concern
1	Submittal of Updated Construction Sequence Drawing (Identified in Feb. 3-5 Audit and Feb. 26, 1982 Meeting).
2.	Letter documenting actual work to be performed under Phase 2a (telephone record, March 8, 1982, Par. 3). Letter should provide commitment not to proceed with 2b until the analyses using NRC recommended stiffness valves are completed and results reviewed by NRC Staff.
3.	Update drawing of "Monitoring Matrix", No. C-1493(Q) that will include tolerance criteria (Telephone record, Mar. 8, 1982, Par. 4.b).
4.	CPC commitment to have 6 deep seated bench marks with instruments installed and operational before beginning Phase 2a work. (Telephone record, March 8, 1982, Par. 4.B and Par. 5). Also instruments DMD-1W, DMD-1E, DSB-1W, DSB-1E are to be installed and operational. (Feb 3-5 Design Audit).
5.	Submittal of strain gage installation details @ El 659 with limiting strain valves and basis (Feb. 26, 1982 meeting and telephone record, Mar. 8, 1982, Par 4.d).
6.	Commitment to perform test load above design load (e.g., 1.30 times) on installed pier to develop load-deflection curve for verification of hard clay soil modulus. Identify pier. (Feb. 3-5 Design Audit).
7.	Submittal of measures to be required during peri- , of work shutdown to support faces of drifts and bottom of pits (Feb. 3-5 Design Audit).
8.	Submittal of plans for dewatering localized water pockets (e.g., placing wells in sand fill around reactor perimeter) in advance of pit construction (Feb. 3-5 Design Audit).

* Phase 2a items are those not impacted by analyses of the change in soil modulus values beneath the main Auxiliary Building.

3/11/82
2-12
J.Kane

Phase 2b

No.	Review Concern
1.	Provide instrumentation details and horizontal movement tolerance criteria with basis, for 3 instruments to be installed at top of EPA's and Control Tower (Telephone record, March 8, 1982, Par. 4.c and Par. 5).
2.	Submittal of results from analysis that establishes induced stresses at El 659 assuming EPA is supported by first temporary support (Pier W8) and using Existing Soil Springs under EPA and Control Tower and Auxiliary Building (Feb. 3-5 Design Audit)
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d. Steel beams shall have strain gauges, and not deflection meters.

Information shall be provided for these gauges regarding:

1. Location
2. Monitoring frequency
3. Limits (initial and distress points)
4. Evaluations of results (method and acceptance criteria)
5. Commitment that instruments shall be in place and operational before beginning Phase 2a.

III. MECHANICAL ENGINEERING BRANCH (Prior to drifting beneath FIVP)

1. Allowable movements shall be based upon total settlements since the main feedwater piping was first installed in 1977.

2. A commitment that the 2" steam generator drain lines shall first be shown not to be limiting for allowable structural movements in the event a decision should be made to connect this piping prior to completion of underpinning.

IV. QUALITY ASSURANCE

Applicant shall notify NRC that all underpinning construction will be Q listed consistent with the NRC Staff's findings during the meeting of March 10, 1982.

Midland
21/B5 Jan 18-20, 1982

MEETING SUMMARY DISTRIBUTION

MAR 16 1982

Docket File
NRC/PDR
Local PDR
TIC/NSIC/TERA
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D. Eisenhut
R. Purple
B. J. Youngblood
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F. Rinaldi
R. Landsman
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MAR 16 1982

Docket Nos: 50-329/330 OM OL

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 and 2

SUBJECT: SUPPLEMENTAL SUMMARY OF JANUARY 18-20, 1982 AUDIT AND MEETING ON PHASE II CONSTRUCTION FOR UNDERPINNING THE AUXILIARY BUILDING

A meeting summary dated March 10, 1982 described the January 18-19, 1982 audit by the NRC and its consultants on the plans and preparations for "Phase II" of the construction sequence for underpinning of the Auxiliary Building at Midland Plant, Units 1 and 2. Enclosure 1 provides the meeting notes of Consumers Power Company of this audit and supplements the March 10, 1982 summary. Attachments 1 and 2 from Enclosure 1 are excluded here since they correspond to Enclosures 2 through 8 of the March 10 summary.

On January 20, 1982, the NRC met in Ann Arbor with Consumers Power Company and Bechtel to discuss plans for installation and activation of the freezewall. This discussion is included in Enclosure 1 hereto, and in Enclosure 10 of the March 10, 1982 summary. The freezewall is further discussed in the Applicant's letter of January 6, 1982.

Darl S. Hood, Project Manager
Licensing Branch No. 4
Division of Licensing

Enclosure:
As stated

cc: See next page

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OFFICE	DL:LB#4	LA:DL:LB#4	DL:LB#4					
SURNAME	DHood:eb DSH	MDuncan	EAdensam					
DATE	3/15/82	3/15/82	3/16/82					

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

MAR 16 1982

Docket Nos: 50-329/330 OM OL

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Darl Hood

Darl S. Hood, Project Manager
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WASHINGTON, D. C. 20555

MAR 16 1982

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Darl Hood

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ENCLOSURE 1

Recvd from R. Houston 3/10/82

MEETING NOTES NO. 1541

MIDLAND PLANT UNITS 1 AND 2

CONSUMERS POWER COMPANY

BECHTEL JOB 7220

DATE: January 18 through 20, 1982

PLACE: Bechtel Ann Arbor Office

SUBJECT: Nuclear Regulatory Commission Audit: Midland Auxiliary Building and Feedwater Isolation Valve Pit

ATTENDEES:

NUCLEAR REGULATORY COMMISSION

D.S. Hood
J.D. Kane
F. Rinaldi

Consultants

D. Bartlett - Hanson Engineers
E. Burke - Mueser-Rutledge, Johnston & DeSimone
G. Harstend - Harstead Engineering Associates
J.P. Matra - Naval Surface Weapons Laboratory
S.J. Poulos - Geotechnical Engineering, Inc.
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CONSUMERS POWER COMPANY

D.M. Budzik
J. Meisenheimer
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J.M. Anderson
T. Bell*
T. Broze*
B. Dhar
T. Johnson
J. Larson*
S.C. Lo
N. Rawson
N. Swanberg
G.A. Tuveson
V.J. Verma

*Part-time

PRINCIPAL AGREEMENTS:

1) The meeting was held for NRC audit of the design and calculations for the feedwater isolation valve pit (FIVP) temporary support and turbine building underpinning. The audit is to satisfy special licensing conditions 3 and 4 of Table A.20 of the NRC testimony

1) submitted for the auxiliary building underpinning as part of the soils public hearings. Satisfaction of these conditions will permit the following.

a. Extending the vertical access shaft below el 609'-0" and removing soil foundation support from beneath the FIVP.

b. Beginning drift excavation beneath the turbine building and continuing to piers E-8 and W-8.

2) The agenda of formal presentations is included as Attachment 1. Presentations were made on construction sequence, FIVP temporary support, extension of access shaft to el.597, access drifts under FIVP and turbine building and turbine building underpinning, monitoring details and spring constants.

3) The handouts for the formal presentations are included as Attachment 2. Additional details and discussions on the presentations are provided below in items 4, 5, 6, 7 and 8.

4) Construction Sequence

a. Additional piers will be placed under the turbine building mat along column line K_c.

b. The access shaft soldier pile installation procedure will be modified to delete use of a hollow stem auger. Details of the procedure are included as Attachment 3. The NRC staff indicated concurrence with the revised procedure; therefore, the hearing board will be advised and a letter will be provided to the NRC documenting the revision.

c. To provide construction access, piers 11, 12, 13, and 14 will be moved south to align with piers 9 and 10.

d. The electrical duct banks below the control tower will be isolated from the new underpinning wall to account for relative settlement effects.

5) FIVP

a. Piping within the FIVP was connected in 1977.

b. Dewatering in the area was initiated in 1980.

c. The weight of the FIVP was transferred to the temporary supports in January 1981.

d. The acceptance criteria for vertical movement of the FIVP is 1/2 inch based on deflection of the feedwater piping.

e. When vertical movement has reached 3/8 inch, the FIVP will be jacked to its original position.

f. It must be shown that the stress levels in the piping within the FIVP are within allowable limits for all loading conditions, including past and future settlement.

g. The crack monitoring program for the FIVP is included as Attachment 4.

6) Extension of Access Shaft to El 597'-0", Access Drifts Under the FIVP and Turbine Building and Turbine Building Underpinning

a. The containment wall will be checked for loads due to the struts.

b. The additional piers along column line K_c will control differential settlement effects on the turbine building basemat between column lines K and K_c.

7) Monitoring Details

The bottom of the deep-seated bench marks will be lowered to el 425'-0".

8) Soil Spring Constants

The method for establishing soil spring constants as discussed in Question 14 of Response to the NRC Staff Request for Additional Information Pertaining to the Proposed Underpinning of the Auxiliary Building and Feedwater Isolation Valve Pits (J.W. Cook Letter to H.R. Denton, CPCo Serial 14869, 11/16/81) is being modified.

Calculations using the modified procedure were presented to the NRC Staff for review. The spring sets developed were for the following cases:

a. Normal Soil Springs - Springs used to represent subgrade for analysis of structure for FSAR loading conditions. (A subcase of this is the seismic condition in which the springs are based on the dynamic models.)

b. Existing Condition - Springs used to represent subgrade for analysis of existing state of stress in the structure.

c. Long Term Settlement Condition - Springs which represent the behavior of the structure due to secondary consolidation of the soil after lock-off.

The springs for Case 1 are based on settlement data obtained since 1977 and the load increment added during that time. For the seismic subcase the springs are based on the stiffness used in the seismic model.

For the second Case (existing condition) the springs are computed at the center of each area using elastic half space theory and assuming a flexible footing.

For the long term settlement case the springs are computed from the estimated settlement after lock-off and the estimated loads. There are two subcases which were considered.

a. Where the underpinned areas settle more than the main auxiliary building.

b. Where the main auxiliary building settles more than the underpinned areas.

ACTION ITEMS:

Responsibility	Action	Date Due
Bechtel	1) Provide marked up drawings showing recharge procedures	2/1/82
Bechtel	2) a. To satisfy license condition 2a, provide figures showing soil conditions in the vicinity of the freeze wall	2/1/82
Bechtel	b. If monitoring of Category I utilities at freeze wall crossings shows significant heave, access pits shall be left open until freeze wall has been unfrozen. If heave is minimal, backfill of access pits may be done after freezing.	6/1/82
Bechtel	c. Provide location of piezometers.	3/1/82

Bechtel	3)	To satisfy license conditions 3a, provide allowable bearing capacity for material beneath the buttress access shaft.	2/1/82
Bechtel	4)	To satisfy license condition 3b: a. Provide basis for 1/2-inch allowable pipe movement at the FIVP. b. Provide extent of fill and compaction requirements beneath the FIVP and measures to ensure separation of jacking slab from the containment.	2/1/82
Consumers	5)	Provide a letter documenting revision to the soldier pile augering procedure.	2/1/82
Bechtel	6)	a. To satisfy license condition 3c, provide details of the monitoring procedures, Carlson stress meters, and pier telltale procedure based on ASTM standards. b. Provide a matrix for the monitoring instruments showing location, frequency of monitoring, precision, date of installation. Show also how relative movements are calculated from these readings.	2/1/82
NRC	7)	To satisfy license condition 4a, the NRC will provide any comments on the paper "Discussion on the Effects of Phase II Construction on the Auxiliary Building Foundation."	2/9/82
	8)	To satisfy license condition 4d:	
Bechtel		a. Provide monitoring forms for instrumentation	2/1/82
NRC		b. The NRC will review the soil spring calculations	2/9/82
Bechtel	9)	Provide a discussion of the basis for the apparent pressure diagram used to design the access shaft. (See item 13a)	2/1/82
Bechtel	10)	FIVP temporary support: a. Check diagonal tension in roof slab	2/1/82

	b. Check roof slab for moment due to dead load superimposed on the moment due to hanger rod	
	c. Evaluate effect of cut rebars on capacity of anchors and all other applicable calculations during the temporary support and final support condition	
Bechtel	11) Containment wall: Check containment for moment due to the worst loaded strut. Assume load dispersion at 45°. Superimpose the resulting stresses on the stresses due to prestressing.	2/1/82
Bechtel	12) Buttress access shaft for wale loads:	2/1/82
	a. Update calculation for Wall A using #11 @ 8" c/c which gives 1-1/2 bars per foot instead of 2 bars per foot as assumed in the calculation	
	b. Complete calculation for wall B. There was a note in the calculation that the moment capacity was acceptable; indicate the basis for this.	
Bechtel	13) Retaining wall bracing:	2/1/82
	a. Justify the use of 36° as angle of friction Ø instead of 30°.	
	b. Clarify the origin of loads, i.e., 297^k, 349^k, etc, in the calculations.	
Bechtel	14) Tank below turbine mat:	2/1/82
	a. The tank is affected by wale loads at Levels B and C. However, the calculations have used Levels A and B for design. Although the design is conservative, clarification of design is needed.	
	b. Check the reinforcing which connects the tank to the turbine building for tension and shear. In considering the shear wall action in each direction, an effective flange may be considered to resist bending and the web may be considered to resist shear.	

Bechtel	15) Steel lagging: Provide reference in the 2/1/82 calculation for the 50% reduction in soil pressure for arching action		
	16) Final condition of Piers 8, 9, and 10:		
Bechtel		a. Recalculate considering additional piers put under turbine building columns	2/1/82
Bechtel		b. Complete drawing, e.g., rebar for bell was not called out on drawing	2/1/82
Bechtel	17) Ring beam along containment:		2/1/82
		a. Check the unbalanced load condition when only half side is loaded; consider each side for stability	
		b. The strut size in the calculation is 26" diameter , t = 5/8" whereas the drawing shows 28" t = 1/2"; update the calculation to show adequacy of the strut	
		c. Provide details of end ties at two ends (how are they tied, etc)	
		d. Complete calculation for Level B	
Bechtel	18) General comment:		2/1/82
		a. Provide a sketch in the calculations showing how the forces in the various wales and struts are balanced and transferred	
		b. Provide Copies of FIVP calculations and construction condition calculations to NRC at time of February 1, 1982 audit, incorporating the above comments	
		c. A list of the calculations audited by the NRC is provided as Attachment 5	

Prepared by: N Swanberg

N. Swanberg
Project Engineering

NS/bjh/2/23/82

ACCESS SHAFT SOLDIER PILE INSTALLATION PROCEDURE

1. Hole will be augered using a solid stem auger driven by a Kelly bar. Cutting teeth of the auger will be 2 inches larger in radius than auger flights.

2. Bentonite slurry will be added when the hole has reached 10 feet in depth.

3. If an obstruction is encountered, a 30 inch casing will be installed to the obstruction and the obstruction will be removed by chopping.

4. When the hole has reached design depth, the pile will be inserted and 4000 psi concrete will be placed by tremie to a depth of 10' in the hole bottom.

5. The remainder of the hole will be filled with a flyash/cement mixture placed by pump tremie methods.

The use of bentonite slurry or casing will insure the stability of the hole during augering and installation. Adjacent piles will not be installed simultaneously.

ENCLOSURE 2
FEEDWATER ISOLATION VALVE PIT
CRACK MONITORING PROGRAM

During the underpinning operation, cracks in the feedwater isolation valve pit structures will be monitored by mapping at the time of the following construction milestones:

1. Prior to extending the access shaft below Elevation 609' for the purpose of taking baseline measurements.
2. During the tunneling to Pier W 9 (ie, Pier N on Figure 8 of Enclosure 1.)
3. After completion of tunneling to Pier W 9.
4. After completion of all excavation under the feedwater isolation valve pits.
5. At two-month maximum intervals after completion of the excavation under the feedwater isolation valve pits, or at increased intervals if settlement becomes significant.
6. Prior to jacking of the permanent underpinning.
7. After jacking of the permanent underpinning.
8. After any rejacking of the temporary support system.

BORATED WATER STORAGE TANK

DQ-2(Q) Support for Feedwater Isolation Valve Pit

<u>AUXILIARY BUILDING UNDERPINNING</u>

DQ-47.1(Q)	Strut Loading on Containment Shell Due to Auxiliary Building Underpinning
DQ-47.2	Check of Turbine Building Penetration for Auxiliary Building Underpinning and FWIVP Loads
DQ-47.3	Underpinning Auxiliary Building Local Effects on Buttress Access Shaft
DQ-47.5	Turbine Building Wall Brace for Auxiliary Building Underpinning
DQ-47.6	Check of Turbine Building for Wall Loads at Elevations 613' and 599.5'
DQ-47.7	Steel Lagging for Underpinning and Access Shaft Lagging to Elevation 571'-0"
DQ-47.8	Piers E-8, 9, 10, W8, 9, and 10 Final Condition
DQ-47.9	Turbine Building Mat Check
DQ-47.10(Q)	Auxiliary Building Underpinning; Revised Access Shaft Levels C and D
DQ-47.11	Auxiliary Building Underpinning Piers 8, 9, and 10
DQ-47.12(Q)	Analysis of Ring Beam and Strut System for Underpinning Between Reactor Building and Turbine Building Walls
DQ-47.13	Turbine Building Interior Pier Calculation
DQ-47.14(Q)	Reactor Building Mat Check
DQ-47.15(Q)	Pit Strut Design Pit 10
DQ-47.16	Turbine Building and Piers 8 and 9 Drift Design
DQ-47.17	Jacking Design and Details
DQ-47.18	Check of Turbine Building Foundation Mat for Pier Loads of Underpinning

DQ-47.19(Q)	Underpinning Auxiliary Building Access Drift Pit 9 to Reactor Building
DQ-47.20	Southwest and Southeast Soldier Piles of Access Shaft/12" x 12" 5/16" Tube Lagging at Southwest and Southeast Corner
DQ-30.1(Q)	Auxiliary Building Spring Stiffnesses for Load Cases 1 and 3 (Normal and Long Term)
DQ-30.2(Q)	Auxiliary Building Spring Stiffnesses for Load Case 2 (Existing Soil Springs)
S-181	Auxiliary Building Analysis Soil Parameters Proposed Elastic Moduli E to be Used in the Auxiliary Building Analysis
DQ-48.1(Q)	Control Tower Piers Design
DQ-48.2(Q)	Pier Design, Piers 15, 16, and 17
DQ-48.3	Pits W8 and E8 Temporary Beam Support
DQ-48.4(Q)	Temporary Support System at Pits E5 and W5
DQ-48.6(Q)	Temporary Supports at E2 and W2
DQ-48.5(Q)	Underpinning Piers W1 and W7
DQ-48.7(Q)	Control Tower Strut Design

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MAR 16 1982

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Docket Nos: 50-329/330 OM, OL

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 and 2

SUBJECT: Notification of Loose Sands Beneath Service Water Piping

On March 12, 1982, the NRC was notified of loose sands located in the plant fill, north of the Service Water Structure and Circulating Water Intake Structure, at Midland Plant, Units 1 and 2. The sand extends to Elevation 610 and is located beneath about 500 feet of seismic Category I pipe.

Enclosure 1 is a record of the telephone conversation which provided this notification. Enclosure 1 also indicates the Applicants decision to remove this material to avoid potential liquefaction problems.

/S/
Darl Hood, Project Manager
Licensing Branch #4
Division of Licensing

Enclosure:
As stated

cc: See next page

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DATE	3/15/82	3/15/82	3/16/82				

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

MAR 1 9 1982

Docket Nos: 50-329/330 OM, OL

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Darl Hood

Darl Hood, Project Manager
Licensing Branch #4
Division of Licensing

Enclosure:
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Geotechnical Engineers, Inc.
ATTN: Dr. Steve J. Poulos
1017 Main Street
Winchester, Massachusetts 01890

RECORD OF TELEPHONE CONVERSATION

DATE: March 12, 1982 9:45 a.m. PROJECT: Midland

RECORDED BY: Joseph Kane CLIENT:

TALKED WITH: James Meisenheimer OF Consumers Power Co.

ROUTE TO: INFORMATION ACTION

G. Lear
L. Heller
✓D. Hood
M. Hartzman
H. Singh
P. Hadala
J. Kane

MAIN SUBJECT OF CALL: CPC future submittal of information on results of liquefaction studies

ITEMS DISCUSSED:

J. Meisenheimer indicated that CPC has mailed the results of Dr. Afifi's evaluation of liquefaction to Dr. Hadala and that he will have this same information for me to review during next week's design audit. This information was identified as being required for Staff review at the March 3, 1982 meeting in Bethesda on permanent dewatering. The results of Bechtel's study on liquefaction do show loose sands in the plant fill above elev. 610 at locations other than the Diesel Generator Building and Railroad Bay.

J. Meisenheimer indicated the loose sands located in the plant fill north of the Service Water Structure and Circulating Water Intake Structure within the foundation area of the 26" diameter service water lines will be removed and replaced with either lean concrete or stabilized soils. This is the first notification to NRC of this intended replacement work and involves approximately a 500 foot length of Cat. I pipe (26"Ø) and will extend indepth to El 610. The replacement option has been selected by CPC in this area rather than relying on the permanent dewatering system to maintain the water level at elevation 595.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

MAR 1 6 1982

Docket Nos: 50-329/330 OM, OL

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 and 2

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Darl Hood
Darl Hood, Project Manager
Licensing Branch #4
Division of Licensing

Enclosure:
As stated

cc: See next page

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1017 Main Street
Winchester, Massachusetts 01890

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TALKED WITH: James Meisenheimer OF Consumers Power Co.

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L. Heller
✓D. Hood
M. Hartzman
H. Singh
P. Hadala
J. Kane

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MAY 2 5 1982

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Docket Nos: 50-329 OM, OL
and 50-330 OM, OL

Mr. J. W. Cook
Vice President
Consumers Power Company
1945 West Parnall Road
Jackson, Michigan 49201

Dear Mr. Cook:

Subject: Completion of Soils Remedial Activities Review

In several meetings and discussions held during the months of April and May 1982, you were informed by the staff of the approach to be used for the review of the soils remedial activities at Midland Plant, Units 1 and 2. This approach is intended to make the review process more consistent with that followed by the staff for license applications and improve the efficiency of the staff review. Specifically, the previous staff practice of approving each individual construction step for each remedial measure as the review progresses will generally be discontinued by the staff. The staff intends to complete the entire review of the soils remedial activities and related matters as an integrated package and then proceed with ACRS meetings and hearing sessions in the normal fashion.

Although no activities directed to remedial actions for the soils deficiencies are expected to be approved prior to completion of the staff's integrated review, those for which staff review was substantially completed as of April 1, 1982, are, however, approved. These are discussed below.

On the basis of the staff technical review of documents listed in Enclosure 1, the staff concurs with your plan to proceed with Phase 2 underpinning activities (which involve excavation under the feedwater isolation valve pit and the turbine building) subject to the successful completion of conditions listed in Enclosure 2. Accomplishment of these conditions should be documented and Region III notified. Enclosure 3 provides a definition of Phase 2 on which the staff's approval is based, and further discusses the staff's understanding of approved quality assurance plans for this and other soils work.

We are further responding to your letter of May 10, 1982, which addresses certain soils construction work you believe had staff approval prior to the Licensing Board's Memorandum and Order of April 30, 1982. Staff comments and conclusions on Paragraphs I and II are provided in Enclosure 4.

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With respect to your Paragraph III, you note you are continuing with certain soils remedial work with full awareness and concurrence of the staff for which explicit written approval had not been obtained. You also noted that this work has been stopped in accordance with the Order and requested that the staff verify its concurrence so that the work can be reactivated. The three work items you identified in this category are:

(1) installation of deep-seated benchmarks,
(2) installation and operation of construction dewatering wells that were not previously operating, and
(3) installation of monitoring system instruments and mounting.

Items (1) and (2) are conditionally approved as addressed by Enclosure 5 and 6, respectively. With respect to item (3), your letter notes that work on the monitoring system instruments and mounting for the auxiliary building is presently stopped because Region III concurrence has not been obtained. We are advised that Region III will provide explicit written confirmation of NRC approval following resolution of existing QA deficiencies.

Your letter of May 10, 1982, also forwarded Drawing 7220-C-45 for purposes of defining which soils at the Midland site are safety related (i.e., are considered to be under and around safety-related structures and systems). During a May 5, 1982, conference telephone call with the Licensing Board and hearing parties, Consumers proposed to use this drawing to define the bounds for the term "around" in Sections VI(1)(a), (b) and (c) of the Board's April 30, 1982, Memorandum and Order. The Board's subsequent Memorandum and Order of May 7, 1982, requested the staff to advise the Board of the results of its review of Drawing 7220-C-45. The results of our review are presented in Enclosure 7; and, on the basis of your commitments to modify the drawing, we find this drawing to be acceptable for the purpose of defining areas around safety-related structures and systems.

In addition, Enclosure 8 lists the information required by the staff to conclude its review of the soils remedial work. This list is based upon staff review of information provided by your letter of March 31, 1982, and earlier submittals. Certain of the information needs may already have been transmitted by you. You are requested to provide your response schedule within seven (7) days of receipt of this letter. Once your schedule is received, the staff will develop the review completion schedule for this effort.

OFFICE							
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DATE							

Mr. J. W. Cook - 3 -

The reporting and/or recordkee, 'ng requirements contained in this letter affect fewer than ten respondents; therefore, OMB clearance is not required under P.L. 96-511.

Sincerely,

Original signed by
Darrell G. Eisenhut

Darrell G. Eisenhut, Director
Division of Licensing

Enclosures:
As stated

cc: See next page

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NRC FORM 318 (10-80) NRCM 0240 OFFICIAL RECORD COPY USGPO: 1981—335-960

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LISTING OF ENCLOSURES

Enclosure 1 - "Basis for Staff Concurrence for Start of Phase 2"

Enclosure 2 - "Conditions for Staff Acceptance of Phase 2"

Enclosure 3 - "Definition of Phase 2 Underpinning Activities and Quality Assurance Plans for Soils Activities"

Enclosure 4 - "Staff Comments on Continuing or Planned Soils Activities Previously Approved by the Staff"

Enclosure 5 - "Installation of Deep Seated Benchmarks"

Enclosure 6 - "Construction Dewatering Wells"

Enclosure 7 - "Staff Evaluation of Drawing 7220-C-45"

Enclosure 8 - "Additional Information Required to Complete Staff Review of Soils Remedial Work"

OFFICE ▶							
SURNAME ▶							
DATE ▶							

ENCLOSURE 1

BASIS FOR STAFF CONCURRENCE FOR START OF PHASE 2

1. Letter to R. Vollmer from R. T. Hamilton, dated July 8, 1975, transmitting Bechtel quality assurance topical BQ-TOP-1, Revision 1A

2. Letter to H. R. Denton from J. W. Cook, dated September 30, 1981, Submitting the Auxiliary Building Dynamic Model, Technical Report on Underpinning the Auxiliary Building and Feedwater Isolation Valve Pits

3. Letter to H. R. Denton from J. W. Cook, dated November 16, 1981, on Response to the NRC Staff Request for Additional Information Pertaining to the Proposed Underpinning of the Auxiliary Building and Feedwater Isolation Valve Pits

4. Hearing testimony by CPC witnesses (Johnson, Burke, Gould, Corley and Sozen) on remedial underpinning work for the Midland Auxiliary Building, November 19, 1981

5. Hearing testimony of D. Hood, J. Kane and H. Singh concerning the Remedial Underpinning of the Auxiliary Building Area, dated 11/20/81

6. Hearing testimony of F. Rinaldi, dated 11/20/81

7. Letter to H. R. Denton from J. W. Cook, dated 11/24/81 on Test Results, Auxiliary Building, Part 2, Soil Boring and Testing Program

8. Letter to H. R. Denton from J. W. Cook, dated December 3, 1981, with Addendum to Technical Report On Underpinning the Auxiliary Building and Feedwater Isoloation Valve Pits

9. Letter to H. R. Denton from J. W. Cook, dated January 6, 1982, on Auxiliary Building Underpinning - Freezewall; Effects of Freezewall on Utilities and Structures

10. Letter to H. Denton and J. Keppler from J. W. Cook, dated January 7, 1982, transmitting general Quality Plan for underpinning activities and Quality Plans and Q-Listed activities for SWPS and Auxiliary Building Underpinning

11. Design audits of January 18-20, 1982 (Summary dated March 10, 1982); Feburary 1-5, 1982; March 16-19, 1982; and meeting of February 23-26, 1982, (Summary dated March 12, 1982)

12. Letter to H. R. Denton from J. W. Cook, dated February 4, 1982, on Auxiliary Building Access Shaft - Augering Method for Soldier Pile Holes

OFFICE ▶							
SURNAME ▶							
DATE ▶							

13. Letter to J. W. Cook from R. L. Tedesco, dated February 12, 1982, on Staff Concurrence for Activation of Freezewall

14. Letter to H. R. Denton from J. W. Cook, dated March 10, 1982, on Protection of Excavation Face - Auxiliary Building Underpinning Shaft

15. Summary of March 8, 1982 Telephone Conversation Regarding Soil Spring Stiffnesses for Auxiliary Building Underpinning and Phase II Construction, dated March 11, 1982

16. Letter to H. R. Denton from J. W. Cook, dated March 31, 1982, on Response to the NRC Staff Request for Additional Information Required for Completion of Staff review of Phases 2 and 3 of the Underpinning of the Auxiliary Building and Feedwater Isolation Valve Pits

17. Letter to J. Keppler from J. W. Cook, dated April 5, 1982, describing Quality Assurance for Remedial Foundation Work

18. Letter to H. Denton from J. W. Cook, dated April 26, 1982, transmitting quality assurance topical CPC-1-A, Revision 12

Enclosure 2

CONDITIONS FOR STAFF ACCEPTANCE OF PHASE 2

1. Deep-seated bench marks DSB-AS1 and DSB-AS2. DSB-AS1 and DSB-AS2 shall be installed at a distance not to exceed 5-feet from the wall of the main auxiliary building which is founded at Elevation 562. Actual locations of these installed bench marks and any modifications in tolerance criteria required on Drawing C-1493(Q) due to changes from the original DSB-AS locations shall be documented.

2. Monitoring instrumentation required to be installed. The following deep seated benchmarks and relative-absolute measurement devices identified on audited drawings shall be properly installed and operating for at least 7 days prior to drifting under the turbine building or Feedwater Isolation Valve Pit (FIVP):

Deep-Seated Benchmarks		Relative-Absolute Measurement Devices
DSB-1W	DSB-AS1	DMD-1W
DSB-1E	DSB-AS2	DMD-1E
DSB-2W	DSB-AN	DMD-11
DSB-2E		DMD-12
DSB-3W		DMD-13
DSB-3E		

3. Strain gauge installation. Revisions shall be made to the proposed instrumentation shown in drawing C-1495, "Instrumentation - Elevation 695 - 0 5/16" for Building Settlement Monitoring". On the sectional view at the wall at Column Lines 7.4 and 7.8, change the orientation of proposed lower strain gauges between Elevations 584 to 614 to be perpendicular to the orientation shown on Drawing C-1495, Figure 3 in the March 31, 1982 submittal. On this same sectional view, add an additional strain gauge between Elevations 646 to 659 at an inclination similar to the above recommended orientation. Also, correct the labeling of column lines H and G which is reversed on the copy of the sectional view submitted to the staff.

4. Pier load test procedures. The following modifications and additions shall be made to the pier load test procedures provided by the April 22, 1982 submittal from J. Cook to H. Denton, "Response to the NRC Staff Request for Additional Information Required for Completion of Staff Review of the Borated Water Storage Tank and Underpinning of the Service Water Pump Structure." (Consumers Power Company (CPCo) stated that, although the procedures were submitted for underpinning work for the service water pump structure, the procedures are applicable to the pier load test to be conducted during Phase 2 underpinning work for the auxiliary building.)

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a. The maximum required test load should be equal to 1.3 times the maximum anticipated design load. As an alternative, should there be structural difficulties in developing the required reaction load for the prior test, the staff would accept a procedure where the maximum test load for the pier load test was equal to 90 percent the maximum anticipated design load and a plate load test (ASTM D1194) was performed to a maximum test load equal to 130 percent of the maximum anticipated design load. (See Page 12 of submittal).

b. Significant modifications to the specified ASTM D1143-81 test procedures, as may be appropriate, require advanced notification and approval of the Region III Office. (See Page 12 of submittal.)

c. The rate of settlement shall not exceed 0.005 inch per hour when controlling the length of time that the 90% test load increment is to be maintained. (See Page 12 of submittal).

d. In order to provide a more positive reduction of skin friction, plywood sheeting coated with 1/8-inch thick bitumen (or equivalent) shall be installed on all test pier sides prior to performing the pier load test as a replacement for the plastic sheeting proposed by CPCo. (See Page 12 of submittal).

e. To permit correlation with the previously approved measures proposed by CPCo to demonstrate the adequate foundation capacity of the other installed piers, a minimum of two in situ density tests and five cone penetrometer tests shall be performed on the soil at the bottom of the pier selected for test loading.

5. Construction dewatering. During underpinning of the auxiliary building area, the upper phreatic surface shall be maintained a minimum of 2 feet in depth below the bottom of any underpinning excavation at any given time. The final plan for the dewatering system shall be established and implemented in advance of drifting under the turbine building or FIVP. The dewatering plan should include the locations and depths of the dewatering wells and piezometers (observation wells). Criteria for monitoring loss of soil particles due to pumping shall be the same as those previously approved by the staff for the construction dewatering of the service water pump structure (R. Tedesco letter of April 2, 1982) or for the permanent dewatering wells (R. Tedesco letters of June 18, September 2, and October 22, 1981).

6. Monitoring movement of FIVPs. Jacking of the FIVP back to its original position shall be required if the relative settlement between the reactor containment and the FIVP reaches a total settlement of 3/8-inches since the time piping connections were made.

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ENCLOSURE 3

DEFINITION OF PHASE 2 UNDERPINNING ACTIVITIES AND QUALITY ASSURANCE PLAN FOR SOILS ACTIVITIES

Phase 2 construction activities for the Midland auxiliary building underpinning are defined by Bechtel drawing C-1418-1(Q) Revision A, "Auxiliary Building - Underpinning Construction Sequence", and associated plan and logic drawing C-1418(Q), Revision A, both issued for information 3/19/82 and provided to the staff during an audit meeting on that date.

With respect to quality assurance requirements for Phase 2 work, CPCo's letter to H. Denton/J. Keppler dated January 7, 1982, transmitted a general Quality Plan for underpinning activities along with quality plans for the service water pump structure underpinning system and for the auxiliary building underpinning system and FIVPs. These plans describe the basic QA program controls to be applied to items and activities associated with the soils remedial work. We find these plans, including the QA programs described in Revision 12 of Consumer's QA Topical Report CPC-1A and Bechtel's QA Topical Report BQ-TOP-1, Rev. 1A, acceptable for the soils remedial work. However, a condition for this finding is that these quality assurance plans and programs are to apply to 1) all items and activities identified in the ASLB Memorandum and Order of April 30, 1982, and 2) all of the to-go underpinning Q-listed and non Q-listed work described in your April 5, 1982 letter to J. Keppler, except that work stated in attachment 1 of that letter. We interpret these plans and program to mean that the Midland Project Quality Assurance Department will be actively involved in reviewing contractor's, sub-contractor's, and consultant's quality assurance capabilities and assuring thorough review of procedures and verifications that hardware is built and work is performed in accordance with design, specification, and procedural requirements. Accordingly, we conclude that the above referenced Quality Plan is acceptable for implementation as described above. Since the foregoing conforms to the April 30, 1982, Board Order, any deviations must be reported to the staff.

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ENCLOSURE 4

STAFF COMMENTS ON CONTINUING OR PLANNED SOILS ACTIVITIES PREVIOUSLY APPROVED BY THE STAFF

The following comments are provided to clarify the staff's prior approvals of remedial soils activities at the Midland Plant. Each listed item in paragraphs I and II of CPCo's May 10, 1982, letter is presented and addressed.

"I.a. Phase I Work (Auxiliary Building Underpinning)"

The specific activities for Phase I work referred to in our letter of concurrence (Reference 5) for installation of the vertical access shafts were those defined by Consumer's Drawing "Underpinning Auxiliary Building Construction Sequency Logic" dated January 20, 1982.

"I.b. Access Shaft (Auxiliary Building Underpinning)"

This item is included in the staff's definition of "Phase I work" and is discussed under paragraph I.a. above.

"I.c. Freezewall Installation, Underground Utility Protection, Soil Removal Cribbing and Related Work in Support of the Freezewall Installation, Freezewall monitoring and Freezewall activation"

References 5 and 7 provided staff concurrences for freezewall installation and activation, respectively. These approvals were based upon CPCo's plan to eliminate the inducement of stresses to the conduits and piping because of heaving by excavating the soil directly beneath affected utilities within the projected area of influence of the freezewall before ground freezing begins. The approvals also recognized your commitments (1) to demonstrate to the staff's satisfaction that recompression of the foundation soils beneath the piping or ducts has been completed before backfilling the excavation, and (2) to notify Region III personnel prior to drilling near seismic Category I underground utilities and structures. The approval was further contingent upon the successful audit by the NRC Regional Office III of the implementation procedures for excavation and monitoring.

The information which provided the basis for staff review and approval was provided by CPCo's letters of November 16 and 24, 1981, and January 6, 1982, and by hearing testimony of your consultant, J. P. Gould.

Consequently, the staff agrees that prior explicit concurrence for the activities listed by paragraph I.c. of CPCo's letter, May 10, 1982 had been obtained from the staff prior to the April 30, 1982 Order, except for the ambiguous phase you included "and related work in support of...". Therefore, the staff did not approve "related work" in its letters of concurrence or other records.

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"I.d. Installation and Operation of the Permanent Site Dewatering System"

The identity and location of the 65 permanent dewatering wells approved by the staff are given in References (1), (2) and (4). Installation and monitoring aspects of the permanent site dewatering system, exculding seismic aspects, was to be performed as Q-listed activities following staff review and approval of associated quality assurance and quality control documents.

"I.e. Operation of Existing Construction Dewatering Wells"

The only construction dewatering wells approved by the staff are those identified by References (6) and (10). This item is further discussed in Enclosure 6. As noted therein, however, construction wells installed and monitored to procedures equivalent to those for permanent wells may be considered acceptable.

"I.f. FIVP Proof Load Test"

The staff has no record or recollection of concurrence for a FIVP proof load test. Therefore, this test is not approved.

"II.a. Installation and Activation of Dewatering System for the Service Water Pump Structure"

Staff approval was indicated by Reference (10), subject to certain committed changes specified therein.

"II.b. The Repair of Cracks in the Borated Water Storage Tank Ring Wall"

Staff approval was indicated by Reference (9), which noted your commitment to pressure grout at least all cracks with widths in excess of 10 mils. This activity follows the completion of the valve pit surcharge programs which were also the subjects of prior staff approvals (References (?) and (8)).

In summary, ambiguity associated with CPCo's use of the terms "Phase I work" and "related [freeze wall] work" preclude confirmation of specific prior approval of these activities. Similarly, failure by CPCo to identify the particular existing construction dewatering wells precludes us from determining whether previous staff concurrence had been indicated. No description or discussion is provided for a "FIVP proof load test" and no record of prior staff approval can be located. Consequently, continuation of these activities in conformance with the foregoing staff comments will be in accordance with the Board Memorandum and Order of April 30, 1982. Any deviations must be reported and approved by the staff.

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References:
(1) R. Tedesco letter of June 18, 1981, "Staff Concurrence on Installation of Twelve Backup Dewatering Wells"
(2) R. Tedesco letter of September 2, 1981, "Staff Concurrence on Installation of Eight Backup Dewatering Wells"
(3) R. Tedesco letter of September 25, 1981, "Staff Concurrence on Surcharging of Valve Pits for Borated Water Storage Tank Foundations"
(4) R. Tedesco letter on October 22, 1981, "Staff Concurrence on Installation of Permanent Dewatering Wells and Request for Additional Information"
(5) R. Tedesco letter of November 24, 1981, "Staff Concurrence for Construction of Access Shafts and Freezewall in Preparation for Underpinning the Auxiliary Building and Feedwater Isolation Valve Pits"
(6) R. Tedesco letter of December 28, 1981, "Staff Concurrence for Five Temporary Dewatering Wells"
(7) R. Tedesco letter of February 12, 1982, "Staff Concurrence for Activation of Freezewall"
(8) R. Tedesco letter of February 26, 1982, "Staff Concurrence on Removal of Surcharge from Borated Water Storage Tank Valve Pits"
(9) R. Tedesco letter of March 26, 1982, "Staff Concurrence for Grouting of Cracks in Concrete Foundations of Borated Water Storage Tanks"
(10) R. Tedesco letter of April 2, 1982, "Staff Concurrence for Installation and Operation of Construction Dewatering and Observation Wells for the Service Water Pump Structure"

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ENCLOSURE 5

STAFF CONCURRENCE ON INSTALLATION OF DEEP SEATED BENCHMARKS

CPCo's letter of May 10, 1982 states that installation of deep-seated benchmarks is being carried out by Woodward Clyde Consultants, which is subject to its own quality assurance program and procedures approved by Consumers and previously subject to staff inspections. We are advised that these NRC inspections have resulted in a finding that these activities are being conducted to an acceptable quality assurance program.

CPCo has also provided the staff with information on the installation of deep-seated benchmarks and relative-absolute instrumentation beginning with the design audit of January 18-19, 1982 and continuing through the submittal of March 31, 1982 (Letter from J. Cook to H. Denton, Response to the NRC Staff Request for Additional Information Required for Completion of Staff Review of Phases 2 and 3 of the Underpinning of the Auxiliary Building and Feedwater Isolation Valve Pits). The information for the auxiliary building underpinning work which has been provided includes locations, depths, elevations, instrumentation accuracy and typical installation details of the proposed instruments. This information is contained in the following documentation:

a. Technical Specification for Monitoring Instrumentation for Underpinning Construction, Specification 7220-C-198(Q), January 18, 1982 Rev. 0 (Provided at the February 3, 1982 Design Audit)

b. Drawings C-1490(Q) and C-1491(Q), Auxiliary Building, Instrumentation Location for Underpinning, January 20, 1982; Revision 1 (Provided at the February 3, 1982 Design Audit)

c. Drawing C-1493(Q), Auxiliary Building and F.I.V.P., Instrumentation System and Monitoring Matrix, May 29, 1982, Rev. A (Provided by applicant's letter of March 31, 1982)

d. Sketches of Carlson Stress Meter and Telltale Installations, Midland Plant Instruments for Pier Measurements, January 15, 1982

On the basis of the technical review by the Staff and its consultants of the information in the above documents, including the quality assurance program, the staff concurs with Consumer's proceeding with the installation of the deep-seated benchmarks and relative-absolute instrumentation for monitoring the auxiliary building underpinning work.

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ENCLOSURE 6

CONSTRUCTION DEWATERING WELLS

In the past Consumer's position with respect to temporary or construction dewatering has been that this work was not permanent, it was being conducted to enable performance of construction activities and, therefore, the work did not require staff approval. Consumers did not provide the details of the construction dewatering design and installation and did not seek staff approval for these activities.

More recently the staff has concluded that certain aspects of construction dewatering activities related to underpinning the service water pump structure (SWPS) and auxiliary building could potentially affect the foundation stability of these nearly completed structures. The staff has actively reviewed the temporary construction dewatering plan for the SWPS and has reached agreement with CPCo on an acceptable plan (April 2, 1982 letter with enclosures from R. Tedesco to J. Cook, Staff Concurrence for Installation and Operation of Construction Dewatering and Observation Wells for the Service Water Pump Structure). The staff has not presently obtained or evaluated the final plan for construction dewatering during auxiliary building underpinning but has specified conditions for Phase 2 concurrence (Enclosure 3).

It is the staff's position, with respect to the remaining construction dewatering wells that are already installed and operating, that these wells be monitored for the loss of soil particles due to pumping similar to the requirements agreed upon and recorded in Enclosure 3 to the April 2, 1982 letter.

The specifications for a construction dewatering well are dependent upon the specific application. Consequently, approval for typical field practices, on other than a case-by-case basis is not meaningful. Therefore, for the future, the design and installation details of construction dewatering wells that have not yet been operated or installed should be addressed on a case-by-case basis following appropriate notification of the staff by the CPCo. This procedure will permit an assessment of the safety significance of the proposed well. However, any construction well for which the procedures for installing and monitoring the loss of soil particles are equivalent to those previously approved for permanent dewatering wells (which was in accord with a staff approved quality assurance plan) may be considered acceptable, provided also that the upper phreatic surface is maintained two feet below the bottom of any excavation or as otherwise approved in advance by Region III.

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ENCLOSURE 7

STAFF EVALUATION OF DRAWING 7220-C-45

Staff requirements for this drawing were provided by the staff on May 7, 1982, to Messrs J. Mooney, J. Schaub and others of CPCo. These were:

(1) The seismic Category I retaining wall to the east of the service water pump structure is shown to be located in the non-Q zone. CPCo should revise the drawing to provide for Q-listed control in the vicinity of this wall.

(2) The drawing should be revised to provide for Q control of soils activities for the emergency cooling water reservoir (ECWR), the concrete service water discharge lines, and the perimeter and baffle dikes adjacent to the ECWR.

(3) CPCo should implement Q controls for certain aspects of work outside the Q zone of Drawing 7220-C-45 which could impact safety related structures and systems. Examples include potential removal of fines by dewatering wells, improper location of borings near the Q boundary, and soil excavations at the boundary involving both Q and non-Q areas.

(4) CPCo should re-confirm that no seismic Category I underground utilities extend beyond the Q area bounds of the drawing.

CPCo's letter of May 10, 1982 notes the intent to revise the drawing to address the ECWR components and other appropriate areas. CPCo has also identified during the May 7 telephone discussion additional measures being implemented to assure proper location for drillings.

On the basis of CPCo's commitment to extend the controls of soils activities to incorporate these staff requirements, the staff approves the use of Drawing 7220-C-45 for defining the areas around safety-related structures and systems within which the restrictions and requirements of the April 30, 1982, Memorandum and Order shall apply.

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ENCLOSURE 8

ADDITION INFORMATION REQUIRED TO COMPLETE STAFF REVIEW OF SOILS REMEDIAL WORK

1. Provide the following information regarding the Auxiliary Building and Feedwater Isolation Valve Pits:

   1.1 redesign of stiffened bulkhead against earth pressures during drift excavation to install needle beam assembly
   1.2 revise report on crack evaluation to include consideration of the effects of multiple cracks
   1.3 analysis of the construction condition using a subgrade modulus of 70 KCF and provide results
   1.4 allowable differential settlements for Phase 3 (based on 1.3 above)
   1.5 horizontal movement acceptance criteria for Phase 3 for instruments at top of EPAs and control tower
   1.6 as-built report with confirmatory detail on underpinning in FSAR upon completion of construction
   1.7 acceptance criteria for strain monitors for Phase 3
   1.8 acceptability of 1.5 FSAR SSE versus SSRS as bounding design
   1.9 method to be followed for transfer of jacking load into permanent wall
   1.10 complete design analyses of permanent underpinning wall
   1.11 updated construction sequence for Phases 3 and 4
   1.12 settlement monitoring program to be required during plant operation with action levels and remedial measures identified (Tech. Spec.). Include RBA, EPA and Control Tower
   1.13 plans and details for permanently backfilling underpinning excavations including compaction specifications for granular fill under FIVP
   1.14 procedure to be required for detecting extent of planar openings uncovered in drift excavations and controls to minimize their effects.

2. Provide the following information regarding the Service Water Pump Structure:

   2.1 acceptability of 1.5 FSAR SSE versus SSRS as bounding design
   2.2 sliding calculation using site-specific response spectra (SSRS) seismic loads and provide results with basis for assumed soil input parameters
   2.3 stress condition for existing parts of structure:
      (a) Maximum stresses
      (b) Critical combinations
      (c) Identify true critical elements based on actual rebar

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2.4 calculation for determining lateral earth pressures under dynamic loading
2.5 settlement monitoring program to be required during plant operation with action levels and remedial measures identified (Tech. Spec.)
2.6 as-built report with confirmatory data on underpinning in FSAR upon completion of construction
2.7 report on crack evaluation to include consideration of the effects of multiple cracks.

3. Provide the following information regarding the Borated Water Storage Tanks:

3.1 adequacy of governing load combination used in design
3.2 acceptability of 1.5 FSAR SSE versus SSRS as bounding design
3.3 settlement monitoring program to be required during plant operation with action levels and remedial measures identified (Tech. Spec.)
3.4 as-built report with confirmatory data in FSAR on completed construction

4. Provide the following information regarding underground pipes:

4.1 basis for modeling of the piping inside the building in the terminal end analyses
4.2 controls to be required during plant operation to pervent placement of heavy loads over buried piping and conduits
4.3 as-built report with confirmatory data in FSAR on completed construction
4.4 justification why the BWST lines are not to be rebedded from the tank farm dike to the auxiliary building
4.5 a list of all penetrations for underground seismic Category I piping. Revise and submit your pipe monitoring program to include periodic measurements of rattelspace for plant operating life. Provide justification for all exceptions.
4.7 justification for the high (beyond limits) reported settlement stesses

5. Provide the following information regarding the Diesel Generator Building:

5.1 a structural reanalysis considering:
   (a) Presurcharge conditions
   (b) Conditions during the surcharge
   (c) 40-year settlement effects
   (d) The combined effects of (a) through (c) above
5.2 a structual reanalysis assuming reduction in soil spring stiffnesses between bays 3 and 4 on the south side and beneath adjacent cross wall
5.3 a statistical evaluation of settlements to evaluate impact of survey inaccuracies versus actual differential settlements which have been experienced

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5.4 acceptability of 1.5 X SSE (FSAR) versus SSRS for bounding design
5.5 criteria relating crack width and spacing to reinforcing steel stress
5.6 settlement monitoring program to be required during plant operation with action levels and remedial measures identified (Tech. Spec.)
5.7 evaluation of effect of past and future differential settlements to diesel lines from the day tank to the diesels.

6. Provide a settlement monitoring program to be required during plant operation with action levels and remedial measures identified (Tech. Spec.) for the underground Diesel Fuel Oil Storage Tanks.

7. Provide the following information regarding the permanent dewatering system:

   7.1 results of the dewatering recharge tests
   7.2 technical specification requirements on the permanent dewatering system.
   7.3 a summary dicussion of your contingency plans which would be implemented in the event groundwater levels at critical locations exceed limits in the technical specifications.

8. Provide a settlement monitoring program to be required for structures founded on natural soils and plant fill which have not been identified above with action levels and remedial measures identified. (Tech. Spec.)

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

MAY 25 1982

Docket Nos: 50-329 OM, OL
and 50-330 OM, OL

Mr. J. W. Cook
Vice President
Consumers Power Company
1945 West Parnall Road
Jackson, Michigan 49201

Dear Mr. Cook:

Subject: Completion of Soils Remedial Activities Review

In several meetings and discussions held during the months of April and May 1982, you were informed by the staff of the approach to be used for the review of the soils remedial activities at Midland Plant, Units 1 and 2. This approach is intended to make the review process more consistent with that followed by the staff for license applications and improve the efficiency of the staff review. Specifically, the previous staff practice of approving each individual construction step for each remedial measure as the review progresses will generally be discontinued by the staff. The staff intends to complete the entire review of the soils remedial activities and related matters as an integrated package and then proceed with ACRS meetings and hearing sessions in the normal fashion.

Although no activities directed to remedial actions for the soils deficiencies are expected to be approved prior to completion of the staff's integrated review, those for which staff review was substantially completed as of April 1, 1982, are, however, approved. These are discussed below.

On the basis of the staff technical review of documents listed in Enclosure 1, the staff concurs with your plan to proceed with Phase 2 underpinning activities (which involve excavation under the feedwater isolation valve pit and the turbine building) subject to the successful completion of conditions listed in Enclosure 2. Accomplishment of these conditions should be documented and Region III notified. Enclosure 3 provides a definition of Phase 2 on which the staff's approval is based, and further discusses the staff's understanding of approved quality assurance plans for this and other soils work.

We are further responding to your letter of May 10, 1982, which addresses certain soils construction work you believe had staff approval prior to the Licensing Board's Memorandum and Order of April 30, 1982. Staff comments and conclusions on Paragraphs I and II are provided in Enclosure 4.

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With respect to your Paragraph III, you note you are continuing with certain soils remedial work with full awareness and concurrence of the staff for which explicit written approval had not been obtained. You also noted that this work has been stopped in accordance with the Order and requested that the staff verify its concurrence so that the work can be reactivated. The three work items you identified in this category are:

(1) installation of deep-seated benchmarks,
(2) installation and operation of construction dewatering wells that were not previously operating, and
(3) installation of monitoring system instruments and mounting.

Items (1) and (2) are conditionally approved as addressed by Enclosure 5 and 6, respectively. With respect to item (3), your letter notes that work on the monitoring system instruments and mounting for the auxiliary building is presently stopped because Region III concurrence has not been obtained. We are advised that Region III will provide explicit written confirmation of NRC approval following resolution of existing QA deficiencies.

Your letter of May 10, 1982, also forwarded Drawing 7220-C-45 for purposes of defining which soils at the Midland site are safety related (i.e., are considered to be under and around safety-related structures and systems). During a May 5, 1982, conference telephone call with the Licensing Board and hearing parties, Consumers proposed to use this drawing to define the bounds for the term "around" in Sections VI(1)(a), (b) and (c) of the Board's April 30, 1982, Memorandum and Order. The Board's subsequent Memorandum and Order of May 7, 1982, requested the staff to advise the Board of the results of its review of Drawing 7220-C-45. The results of our review are presented in Enclosure 7; and, on the basis of your commitments to modify the drawing, we find this drawing to be acceptable for the purpose of defining areas around safety-related structures and systems.

In addition, Enclosure 8 lists the information required by the staff to conclude its review of the soils remedial work. This list is based upon staff review of information provided by your letter of March 31, 1982, and earlier submittals. Certain of the information needs may already have been transmitted by you. You are requested to provide your response schedule within seven (7) days of receipt of this letter. Once your schedule is received, the staff will develop the review completion schedule for this effort.

The reporting and/or recordkeeping requirements contained in this letter affect fewer than ten respondents; therefore, OMB clearance is not required under P.L. 96-511.

Sincerely,

Darrell G. Eisenhut, Director
Division of Licensing

Enclosures:
As stated

cc: See next page

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LISTING OF ENCLOSURES

Enclosure 1 - "Basis for Staff Concurrence for Start of Phase 2"

Enclosure 2 - "Conditions for Staff Acceptance of Phase 2"

Enclosure 3 - "Definition of Phase 2 Underpinning Activities and Quality Assurance Plans for Soils Activities"

Enclosure 4 - "Staff Comments on Continuing or Planned Soils Activities Previously Approved by the Staff"

Enclosure 5 - "Installation of Deep Seated Benchmarks"

Enclosure 6 - "Construction Dewatering Wells"

Enclosure 7 - "Staff Evaluation of Drawing 7220-C-45"

Enclosure 8 - "Additional Information Required to Complete Staff Review of Soils Remedial Work"

ENCLOSURE 1

BASIS FOR STAFF CONCURRENCE FOR START OF PHASE 2

1. Letter to R. Vollmer from R. T. Hamilton, dated July 8, 1975, transmitting Bechtel quality assurance topical BQ-TOP-1, Revision 1A

2. Letter to H. R. Denton from J. W. Cook, dated September 30, 1981, Submitting the Auxiliary Building Dynamic Model, Technical Report on Underpinning the Auxiliary Building and Feedwater Isolation Valve Pits

3. Letter to H. R. Denton from J. W. Cook, dated November 16, 1981, on Response to the NRC Staff Request for Additional Information Pertaining to the Proposed Underpinning of the Auxiliary Building and Feedwater Isolation Valve Pits

4. Hearing testimony by CPC witnesses (Johnson, Burke, Gould, Corley and Sozen) on remedial underpinning work for the Midland Auxiliary Building, November 19, 1981

5. Hearing testimony of D. Hood, J. Kane and H. Singh concerning the Remedial Underpinning of the Auxiliary Building Area, dated 11/20/81

6. Hearing testimony of F. Rinaldi, dated 11/20/81

7. Letter to H. R. Denton from J. W. Cook, dated 11/24/81 on Test Results, Auxiliary Building, Part 2, Soil Boring and Testing Program

8. Letter to H. R. Denton from J. W. Cook, dated December 3, 1981, with Addendum to Technical Report On Underpinning the Auxiliary Building and Feedwater Isoloation Valve Pits

9. Letter to H. R. Denton from J. W. Cook, dated January 6, 1982, on Auxiliary Building Underpinning - Freezewall; Effects of Freezewall on Utilities and Structures

10. Letter to H. Denton and J. Keppler from J. W. Cook, dated January 7, 1982, transmitting general Quality Plan for underpinning activities and Quality Plans and Q-Listed activities for SWPS and Auxiliary Building Underpinning

11. Design audits of January 18-20, 1982 (Summary dated March 10, 1982); Feburary 1-5, 1982; March 16-19, 1982; and meeting of February 23-26, 1982, (Summary dated March 12, 1982)

12. Letter to H. R. Denton from J. W. Cook, dated February 4, 1982, on Auxiliary Building Access Shaft - Augering Method for Soldier Pile Holes

13. Letter to J. W. Cook from R. L. Tedesco, dated February 12, 1982, on Staff Concurrence for Activation of Freezewall

14. Letter to H. R. Denton from J. W. Cook, dated March 10, 1982, on Protection of Excavation Face - Auxiliary Building Underpinning Shaft

15. Summary of March 8, 1982 Telephone Conversation Regarding Soil Spring Stiffnesses for Auxiliary Building Underpinning and Phase II Construction, dated March 11, 1982

16. Letter to H. R. Denton from J. W. Cook, dated March 31, 1982, on Response to the NRC Staff Request for Additional Information Required for Completion of Staff review of Phases 2 and 3 of the Underpinning of the Auxiliary Building and Feedwater Isolation Valve Pits

17. Letter to J. Keppler from J. W. Cook, dated April 5, 1982, describing Quality Assurance for Remedial Foundation Work

18. Letter to H. Denton from J. W. Cook, dated April 26, 1982, transmitting quality assurance topical CPC-1-A, Revision 12

Enclosure 2

CONDITIONS FOR STAFF ACCEPTANCE OF PHASE 2

1. Deep-seated bench marks DSB-AS1 and DSB-AS2. DSB-AS1 and DSB-AS2 shall be installed at a distance not to exceed 5-feet from the wall of the main auxiliary building which is founded at Elevation 562. Actual locations of these installed bench marks and any modifications in tolerance criteria required on Drawing C-1493(Q) due to changes from the original DSB-AS locations shall be documented.

2. Monitoring instrumentation required to be installed. The following deep seated benchmarks and relative-absolute measurement devices identified on audited drawings shall be properly installed and operating for at least 7 days prior to drifting under the turbine building or Feedwater Isolation Valve Pit (FIVP):

Deep-Seated Benchmarks		Relative-Absolute Measurement Devices
DSB-1W	DSB-AS1	DMD-1W
DSB-1E	DSB-AS2	DMD-1E
DSB-2W	DSB-AN	DMD-11
DSB-2E		DMD-12
DSB-3W		DMD-13
DSB-3E		

3. Strain gauge installation. Revisions shall be made to the proposed instrumentation shown in drawing C-1495, "Instrumentation - Elevation 695 - 0 5/16" for Building Settlement Monitoring". On the sectional view at the wall at Column Lines 7.4 and 7.8, change the orientation of proposed lower strain gauges between Elevations 584 to 614 to be perpendicular to the orientation shown on Drawing C-1495, Figure 3 in the March 31, 1982 submittal. On this same sectional view, add an additional strain gauge between Elevations 646 to 659 at an inclination similar to the above recommended orientation. Also, correct the labeling of column lines H and G which is reversed on the copy of the sectional view submitted to the staff.

4. Pier load test procedures. The following modifications and additions shall be made to the pier load test procedures provided by the April 22, 1982 submittal from J. Cook to H. Denton, "Response to the NRC Staff Request for Additional Information Required for Completion of Staff Review of the Borated Water Storage Tank and Underpinning of the Service Water Pump Structure." (Consumers Power Company (CPCo) stated that, although the procedures were submitted for underpinning work for the service water pump structure, the procedures are applicable to the pier load test to be conducted during Phase 2 underpinning work for the auxiliary building.)

a. The maximum required test load should be equal to 1.3 times the maximum anticipated design load. As an alternative, should there be structural difficulties in developing the required reaction load for the prior test, the staff would accept a procedure where the maximum test load for the pier load test was equal to 90 percent the maximum anticipated design load and a plate load test (ASTM D1194) was performed to a maximum test load equal to 130 percent of the maximum anticipated design load. (See Page 12 of submittal).

b. Significant modifications to the specified ASTM D1143-81 test procedures, as may be appropriate, require advanced notification and approval of the Region III Office. (See Page 12 of submittal.)

c. The rate of settlement shall not exceed 0.005 inch per hour when controlling the length of time that the 90% test load increment is to be maintained. (See Page 12 of submittal).

d. In order to provide a more positive reduction of skin friction, plywood sheeting coated with 1/8-inch thick bitumen (or equivalent) shall be installed on all test pier sides prior to performing the pier load test as a replacement for the plastic sheeting proposed by CPCo. (See Page 12 of submittal).

e. To permit correlation with the previously approved measures proposed by CPCo to demonstrate the adequate foundation capacity of the other installed piers, a minimum of two in situ density tests and five cone penetrometer tests shall be performed on the soil at the bottom of the pier selected for test loading.

5. Construction dewatering. During underpinning of the auxiliary building area, the upper phreatic surface shall be maintained a minimum of 2 feet in depth below the bottom of any underpinning excavation at any given time. The final plan for the dewatering system shall be established and implemented in advance of drifting under the turbine building or FIVP. The dewatering plan should include the locations and depths of the dewatering wells and piezometers (observation wells). Criteria for monitoring loss of soil particles due to pumping shall be the same as those previously approved by the staff for the construction dewatering of the service water pump structure (R. Tedesco letter of April 2, 1982) or for the permanent dewatering wells (R. Tedesco letters of June 18, September 2, and October 22, 1981).

6. Monitoring movement of FIVPs. Jacking of the FIVP back to its original position shall be required if the relative settlement between the reactor containment and the FIVP reaches a total settlement of 3/8-inches since the time piping connections were made.

ENCLOSURE 3

DEFINITION OF PHASE 2 UNDERPINNING ACTIVITIES AND QUALITY ASSURANCE PLAN FOR SOILS ACTIVITIES

Phase 2 construction activities for the Midland auxiliary building underpinning are defined by Bechtel drawing C-1418-1(Q) Revision A, "Auxiliary Building - Underpinning Construction Sequence", and associated plan and logic drawing C-1418(Q), Revision A, both issued for information 3/19/82 and provided to the staff during an audit meeting on that date.

With respect to quality assurance requirements for Phase 2 work, CPCo's letter to H. Denton/J. Keppler dated January 7, 1982, transmitted a general Quality Plan for underpinning activities along with quality plans for the service water pump structure underpinning system and for the auxiliary building underpinning system and FIVPs. These plans describe the basic QA program controls to be applied to items and activities associated with the soils remedial work. We find these plans, including the QA programs described in Revision 12 of Consumer's QA Topical Report CPC-1A and Bechtel's QA Topical Report BQ-TOP-1, Rev. 1A, acceptable for the soils remedial work. However, a condition for this finding is that these quality assurance plans and programs are to apply to 1) all items and activities identified in the ASLB Memorandum and Order of April 30, 1982, and 2) all of the to-go underpinning Q-listed and non Q-listed work described in your April 5, 1982 letter to J. Keppler, except that work stated in attachment 1 of that letter. We interpret these plans and program to mean that the Midland Project Quality Assurance Department will be actively involved in reviewing contractor's, sub-contractor's, and consultant's quality assurance capabilities and assuring thorough review of procedures and verifications that hardware is built and work is performed in accordance with design, specification, and procedural requirements. Accordingly, we conclude that the above referenced Quality Plan is acceptable for implementation as described above. Since the foregoing conforms to the April 30, 1982, Board Order, any deviations must be reported to the staff.

ENCLOSURE 4

STAFF COMMENTS ON CONTINUING OR PLANNED SOILS ACTIVITIES PREVIOUSLY APPROVED BY THE STAFF

The following comments are provided to clarify the staff's prior approvals of remedial soils activities at the Midland Plant. Each listed item in paragraphs I and II of CPCo's May 10, 1982, letter is presented and addressed.

"I.a. Phase I Work (Auxiliary Building Underpinning)"

The specific activities for Phase I work referred to in our letter of concurrence (Reference 5) for installation of the vertical access shafts were those defined by Consumer's Drawing "Underpinning Auxiliary Building Construction Sequency Logic" dated January 20, 1982.

"I.b. Access Shaft (Auxiliary Building Underpinning)"

This item is included in the staff's definition of "Phase I work" and is discussed under paragraph I.a. above.

"I.c. Freezewall Installation, Underground Utility Protection, Soil Removal Cribbing and Related Work in Support of the Freezewall Installation, Freezewall monitoring and Freezewall activation"

References 5 and 7 provided staff concurrences for freezewall installation and activation, respectively. These approvals were based upon CPCo's plan to eliminate the inducement of stresses to the conduits and piping because of heaving by excavating the soil directly beneath affected utilities within the projected area of influence of the freezewall before ground freezing begins. The approvals also recognized your commitments (1) to demonstrate to the staff's satisfaction that recompression of the foundation soils beneath the piping or ducts has been completed before backfilling the excavation, and (2) to notify Region III personnel prior to drilling near seismic Category I underground utilities and structures. The approval was further contingent upon the successful audit by the NRC Regional Office III of the implementation procedures for excavation and monitoring.

The information which provided the basis for staff review and approval was provided by CPCo's letters of November 16 and 24, 1981, and January 6, 1982, and by hearing testimony of your consultant, J. P. Gould.

Consequently, the staff agrees that prior explicit concurrence for the activities listed by paragraph I.c. of CPCo's letter, May 10, 1982 had been obtained from the staff prior to the April 30, 1982 Order, except for the ambiguous phase you included "and related work in support of...". Therefore, the staff did not approve "related work" in its letters of concurrence or other records.

"I.d. Installation and Operation of the Permanent Site Dewatering System"

The identity and location of the 65 permanent dewatering wells approved by the staff are given in References (1), (2) and (4). Installation and monitoring aspects of the permanent site dewatering system, exculding seismic aspects, was to be performed as Q-listed activities following staff review and approval of associated quality assurance and quality control documents.

"I.e. Operation of Existing Construction Dewatering Wells"

The only construction dewatering wells approved by the staff are those identified by References (6) and (10). This item is further discussed in Enclosure 6. As noted therein, however, construction wells installed and monitored to procedures equivalent to those for permanent wells may be considered acceptable.

"I.f. FIVP Proof Load Test"

The staff has no record or recollection of concurrence for a FIVP proof load test. Therefore, this test is not approved.

"II.a. Installation and Activation of Dewatering System for the Service Water Pump Structure"

Staff approval was indicated by Reference (10), subject to certain committed changes specified therein.

"II.b. The Repair of Cracks in the Borated Water Storage Tank Ring Wall"

Staff approval was indicated by Reference (9), which noted your commitment to pressure grout at least all cracks with widths in excess of 10 mils. This activity follows the completion of the valve pit surcharge programs which were also the subjects of prior staff approvals (References (3) and (8)).

In summary, ambiguity associated with CPCo's use of the terms "Phase I work" and "related [freeze wall] work" preclude confirmation of specific prior approval of these activities. Similarly, failure by CPCo to identify the particular existing construction dewatering wells precludes us from determining whether previous staff concurrence had been indicated. No description or discussion is provided for a "FIVP proof load test" and no record of prior staff approval can be located. Consequently, continuation of these activities in conformance with the foregoing staff comments will be in accordance with the Board Memorandum and Order of April 30, 1982. Any deviations must be reported and approved by the staff.

ENCLOSURE 5

STAFF CONCURRENCE ON INSTALLATION OF DEEP SEATED BENCHMARKS

CPCo's letter of May 10, 1982 states that installation of deep-seated benchmarks is being carried out by Woodward Clyde Consultants, which is subject to its own quality assurance program and procedures approved by Consumers and previously subject to staff inspections. We are advised that these NRC inspections have resulted in a finding that these activities are being conducted to an acceptable quality assurance program.

CPCo has also provided the staff with information on the installation of deep-seated benchmarks and relative-absolute instrumentation beginning with the design audit of January 18-19, 1982 and continuing through the submittal of March 31, 1982 (Letter from J. Cook to H. Denton, Response to the NRC Staff Request for Additional Information Required for Completion of Staff Review of Phases 2 and 3 of the Underpinning of the Auxiliary Building and Feedwater Isolation Valve Pits). The information for the auxiliary building underpinning work which has been provided includes locations, depths, elevations, instrumentation accuracy and typical installation details of the proposed instruments. This information is contained in the following documentation:

a. Technical Specification for Monitoring Instrumentation for Underpinning Construction, Specification 7220-C-198(Q), January 18, 1982 Rev. 0 (Provided at the February 3, 1982 Design Audit)

b. Drawings C-1490(Q) and C-1491(Q), Auxiliary Building, Instrumentation Location for Underpinning, January 20, 1982; Revision 1 (Provided at the February 3, 1982 Design Audit)

c. Drawing C-1493(Q), Auxiliary Building and F.I.V.P., Instrumentation System and Monitoring Matrix, May 29, 1982, Rev. A (Provided by applicant's letter of March 31, 1982)

d. Sketches of Carlson Stress Meter and Telltale Installations, Midland Plant Instruments for Pier Measurements, January 15, 1982

On the basis of the technical review by the Staff and its consultants of the information in the above documents, including the quality assurance program, the staff concurs with Consumer's proceeding with the installation of the deep-seated benchmarks and relative-absolute instrumentation for monitoring the auxiliary building underpinning work.

References:

(1) R. Tedesco letter of June 18, 1981, "Staff Concurrence on Installation of Twelve Backup Dewatering Wells"

(2) R. Tedesco letter of September 2, 1981, "Staff Concurrence on Installation of Eight Backup Dewatering Wells"

(3) R. Tedesco letter of September 25, 1981, "Staff Concurrence on Surcharging of Valve Pits for Borated Water Storage Tank Foundations"

(4) R. Tedesco letter on October 22, 1981, "Staff Concurrence on Installation of Permanent Dewatering Wells and Request for Additional Information"

(5) R. Tedesco letter of November 24, 1981, "Staff Concurrence for Construction of Access Shafts and Freezewall in Preparation for Underpinning the Auxiliary Building and Feedwater Isolation Valve Pits"

(6) R. Tedesco letter of December 28, 1981, "Staff Concurrence for Five Temporary Dewatering Wells"

(7) R. Tedesco letter of February 12, 1982, "Staff Concurrence for Activation of Freezewall"

(8) R. Tedesco letter of February 26, 1982, "Staff Concurrence on Removal of Surcharge from Borated Water Storage Tank Valve Pits"

(9) R. Tedesco letter of March 26, 1982, "Staff Concurrence for Grouting of Cracks in Concrete Foundations of Borated Water Storage Tanks"

(10) R. Tedesco letter of April 2, 1982, "Staff Concurrence for Installation and Operation of Construction Dewatering and Observation Wells for the Service Water Pump Structure"

ENCLOSURE 6

CONSTRUCTION DEWATERING WELLS

In the past Consumer's position with respect to temporary or construction dewatering has been that this work was not permanent, it was being conducted to enable performance of construction activities and, therefore, the work did not require staff approval. Consumers did not provide the details of the construction dewatering design and installation and did not seek staff approval for these activities.

More recently the staff has concluded that certain aspects of construction dewatering activities related to underpinning the service water pump structure (SWPS) and auxiliary building could potentially affect the foundation stability of these nearly completed structures. The staff has actively reviewed the temporary construction dewatering plan for the SWPS and has reached agreement with CPCo on an acceptable plan (April 2, 1982 letter with enclosures from R. Tedesco to J. Cook, Staff Concurrence for Installation and Operation of Construction Dewatering and Observation Wells for the Service Water Pump Structure). The staff has not presently obtained or evaluated the final plan for construction dewatering during auxiliary building underpinning but has specified conditions for Phase 2 concurrence (Enclosure 3).

It is the staff's position, with respect to the remaining construction dewatering wells that are already installed and operating, that these wells be monitored for the loss of soil particles due to pumping similar to the requirements agreed upon and recorded in Enclosure 3 to the April 2, 1982 letter.

The specifications for a construction dewatering well are dependent upon the specific application. Consequently, approval for typical field practices, on other than a case-by-case basis is not meaningful. Therefore, for the future, the design and installation details of construction dewatering wells that have not yet been operated or installed should be addressed on a case-by-case basis following appropriate notification of the staff by the CPCo. This procedure will permit an assessment of the safety significance of the proposed well. However, any construction well for which the procedures for installing and monitoring the loss of soil particles are equivalent to those previously approved for permanent dewatering wells (which was in accord with a staff approved quality assurance plan) may be considered acceptable, provided also that the upper phreatic surface is maintained two feet below the bottom of any excavation or as otherwise approved in advance by Region III.

ENCLOSURE 7

STAFF EVALUATION OF DRAWING 7220-C-45

Staff requirements for this drawing were provided by the staff on May 7, 1982, to Messrs J. Mooney, J. Schaub and others of CPCo. These were:

(1) The seismic Category I retaining wall to the east of the service water pump structure is shown to be located in the non-Q zone. CPCo should revise the drawing to provide for Q-listed control in the vicinity of this wall.

(2) The drawing should be revised to provide for Q control of soils activities for the emergency cooling water reservoir (ECWR), the concrete service water discharge lines, and the perimeter and baffle dikes adjacent to the ECWR.

(3) CPCo should implement Q controls for certain aspects of work outside the Q zone of Drawing 7220-C-45 which could impact safety related structures and systems. Examples include potential removal of fines by dewatering wells, improper location of borings near the Q boundary, and soil excavations at the boundary involving both Q and non-Q areas.

(4) CPCo should re-confirm that no seismic Category I underground utilities extend beyond the Q area bounds of the drawing.

CPCo's letter of May 10, 1982 notes the intent to revise the drawing to address the ECWR components and other appropriate areas. CPCo has also identified during the May 7 telephone discussion additional measures being implemented to assure proper location for drillings.

On the basis of CPCo's commitment to extend the controls of soils activities to incorporate these staff requirements, the staff approves the use of Drawing 7220-C-45 for defining the areas around safety-related structures and systems within which the restrictions and requirements of the April 30, 1982, Memorandum and Order shall apply.

ENCLOSURE 8

ADDITION INFORMATION REQUIRED TO COMPLETE STAFF REVIEW OF SOILS REMEDIAL WORK

1. Provide the following information regarding the Auxiliary Building and Feedwater Isolation Valve Pits:

   1.1 redesign of stiffened bulkhead against earth pressures during drift excavation to install needle beam assembly
   1.2 revise report on crack evaluation to include consideration of the effects of multiple cracks
   1.3 analysis of the construction condition using a subgrade modulus of 70 KCF and provide results
   1.4 allowable differential settlements for Phase 3 (based on 1.3 above)
   1.5 horizontal movement acceptance criteria for Phase 3 for instruments at top of EPAs and control tower
   1.6 as-built report with confirmatory detail on underpinning in FSAR upon completion of construction
   1.7 acceptance criteria for strain monitors for Phase 3
   1.8 acceptability of 1.5 FSAR SSE versus SSRS as bounding design
   1.9 method to be followed for transfer of jacking load into permanent wall
   1.10 complete design analyses of permanent underpinning wall
   1.11 updated construction sequence for Phases 3 and 4
   1.12 settlement monitoring program to be required during plant operation with action levels and remedial measures identified (Tech. Spec.). Include RBA, EPA and Control Tower
   1.13 plans and details for permanently backfilling underpinning excavations including compaction specifications for granular fill under FIVP
   1.14 procedure to be required for detecting extent of planar openings uncovered in drift excavations and controls to minimize their effects.

2. Provide the following information regarding the Service Water Pump Structure:

   2.1 acceptability of 1.5 FSAR SSE versus SSRS as bounding design
   2.2 sliding calculation using site-specific response spectra (SSRS) seismic loads and provide results with basis for assumed soil input parameters
   2.3 stress condition for existing parts of structure:
      (a) Maximum stresses
      (b) Critical combinations
      (c) Identify true critical elements based on actual rebar

2.4 calculation for determining lateral earth pressures under dynamic loading
2.5 settlement monitoring program to be required during plant operation with action levels and remedial measures identified (Tech. Spec.)
2.6 as-built report with confirmatory data on underpinning in FSAR upon completion of construction
2.7 report on crack evaluation to include consideration of the effects of multiple cracks.

3. Provide the following information regarding the Borated Water Storage Tanks:

3.1 adequacy of governing load combination used in design
3.2 acceptability of 1.5 FSAR SSE versus SSRS as bounding design
3.3 settlement monitoring program to be required during plant operation with action levels and remedial measures identified (Tech. Spec.)
3.4 as-built report with confirmatory data in FSAR on completed construction

4. Provide the following information regarding underground pipes:

4.1 basis for modeling of the piping inside the building in the terminal end analyses
4.2 controls to be required during plant operation to pervent placement of heavy loads over buried piping and conduits
4.3 as-built report with confirmatory data in FSAR on completed construction
4.4 justification why the BWST lines are not to be rebedded from the tank farm dike to the auxiliary building
4.5 a list of all penetrations for underground seismic Category I piping. Revise and submit your pipe monitoring program to include periodic measurements of rattelspace for plant operating life. Provide justification for all exceptions.
4.7 justification for the high (beyond limits) reported settlement stesses

5. Provide the following information regarding the Diesel Generator Building:

5.1 a structural reanalysis considering:
    (a) Presurcharge conditions
    (b) Conditions during the surcharge
    (c) 40-year settlement effects
    (d) The combined effects of (a) through (c) above
5.2 a structural reanalysis assuming reduction in soil spring stiffnesses between bays 3 and 4 on the south side and beneath adjacent cross wall
5.3 a statistical evaluation of settlements to evaluate impact of survey inaccuracies versus actual differential settlements which have been experienced

5.4 acceptability of 1.5 X SSE (FSAR) versus SSRS for bounding design
5.5 criteria relating crack width and spacing to reinforcing steel stress
5.6 settlement monitoring program to be required during plant operation with action levels and remedial measures identified (Tech. Spec.)
5.7 evaluation of effect of past and future differential settlements to diesel lines from the day tank to the diesels.

6. Provide a settlement monitoring program to be required during plant operation with action levels and remedial measures identified (Tech. Spec.) for the underground Diesel Fuel Oil Storage Tanks.

7. Provide the following information regarding the permanent dewatering system:

7.1 results of the dewatering recharge tests
7.2 technical specification requirements on the permanent dewatering system.
7.3 a summary dicussion of your contingency plans which would be implemented in the event groundwater levels at critical locations exceed limits in the technical specifications.

8. Provide a settlement monitoring program to be required for structures founded on natural soils and plant fill which have not been identified above with action levels and remedial measures identified. (Tech. Spec.)

Midland
May 7 Telecon

MAY 17 1982

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MEETING SUMMARY DISTRIBUTION

Docket Nos: 50-329/330 OM, OL
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MAY 1 7 1982

Docket Nos: 50-329 OM, OL
and 50-330 OM, OL

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 and 2

SUBJECT: SUMMARY OF MAY 7, 1982, CONFERENCE TELEPHONE CALL ON PHASE 2 ISSUES FOR AUXILIARY BUILDING UNDERPINNING

On May 7, 1982, the NRC Staff participated in a conference telephone call with Consumers Power Company (the applicant), and Bechtel to discuss issues associated with Phase 2 of the construction activities for the Auxiliary Building underpinning.

Enclosure 1 is a summary of this telephone conversation.

/s/
Darl S. Hood, Project Manager
Licensing Branch No. 4
Division of Licensing

Enclosure:
As stated

cc: See next page

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DATE	5/14/82	5/14/82				

NRC FORM 318 (10-80) NRCM 0240 OFFICIAL RECORD COPY USGPO: 1981—335-

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

MAY 17 1982

Docket Nos: 50-329 OM, OL
and 50-330 OM, OL

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 and 2

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Darl Hood

Darl S. Hood, Project Manager
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Enclosure:
As stated

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8205240021

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Enclosure 1

RECORD OF TELEPHONE CONVERSATION

DATE: May 11, 1982, 1:00 pm PROJECT: Midland

RECORDED BY: Joseph D. Kane CLIENT:

TALKED WITH:

CPC	Bechtel	NRC
J. Schaub	N. Swanberg	F. Rinaldi
J. Mooney	J. Anderson	D. Hood
	C. Russell	J. Kane
	B. Dhar	
	W. Paris	

ROUTE TO:

J. Knight	H. Singh
G. Lear	S. Poulos
L. Heller	R. Landsman, Region III
D. Hood	J. Kane
F. Rinaldi	

MAIN SUBJECT OF CALL: To discuss Phase 2 Issues - Auxiliary Building Underpinning

ITEMS DISCUSSED:

Consumers arranged this conference call to discuss review items related to Auxiliary Building underpinning. These items had been identified in a brief call on May 7, 1982 by J. Kane to J. Schaub where the NRC Staff had expressed their recommendations on the following items:

1. Location of deep seated benchmarks DSB-AS1 and DSB-AS2. The current hold on construction and field installation of monuments prevents the actual locations from being established. Consumers will provide actual locations when these benchmarks are installed and recognize these monuments are to be installed at a distance not to exceed 5 feet from the wall of the Main Auxiliary Building which is founded at Elevation 562.

2. Strain gage installation. The NRC Staff's comments for correction of drawing C-1495 were accepted and the drawing will be revised. (Lower strain gages at Elev. 584 to 614 on Sectional View-Wall at Col. Lines 7.4 and 7.8 are to be reorientated 90 degrees and column lines H and G will be corrected). Bechtel will check why strain gage at Elev. 646 to 659 range was not proposed for Wall at Col. lines 7.4 and 7.8 and will get back to Staff. The vertical alignment of strain gage on Col. Lines 5.3 and 5.6 at Elevation range 646 to 659 is being controlled by the need to avoid equipment obstructions on the wall. Consumers will make an analytical correction for the vertical alignment when evaluating strain gage readings.

3. Pier test procedures. Consumers indicated the dead load available in the existing structure for the reaction load in the pier load test is approximately 90 percent of the maximum design load. Consumers wished to further consider the Staff's recommendation to perform a plate load test where the maximum test load would be equal to 130 percent of the maximum design load and a pier load test at 90 percent of the maximum design load.

   Consumers accepted the Staff's recommendation for performing two in situ density tests and a minimum of five cone penetrometer tests on the soil at the bottom of the pier selected for load testing. Consumers also agreed to use bituminous coated plywood sheeting for reducing the effects of skin friction during the pier load test.

   Consumers wished to further consider the Staff's recommendation for requiring a rate of settlement that would not exceed 0.005 inch per hour when controlling the length of time that the 90 percent test load increment would be maintained.

   To better explain what the Applicant intended when it indicated that it would make modifications to ASTM D1143 as deemed appropriate, Consumers will provide the Staff with the pier load test procedures that identify the proposed modifications.

4. Construction dewatering. The Applicant indicated its plan for construction dewatering during underpinning is nearly complete and will be provided to the Staff within a week. Most of the dewatering wells are already installed but additional wells are planned. The additional wells are to be installed with Q/A procedures that are similar to the permanent dewatering wells which were previously approved by the NRC Staff. Monitoring for loss of soil particles due to pumping will be conducted according to the agreements reached for construction dewatering of the SWPS. (April 2, 1982 letter with enclosures, R. Tedesco to J. Cook).

   Consultants to Consumers indicated the already installed construction dewatering wells extend to the natural clay layer at approximately El 585. The Staff indicated that the anticipated plan for construction dewatering to be provided by Consumers should address the problem of handling seepage on the sides and bottom of pier excavations which extend below the bottom of the already installed wells.

5. Movement of Feedwater Isolation Valve Pit (FIVP). Consumers indicated its intent to assure transfer of the FIVP loading to the Turbine Building and Buttress Access Shafts by jacking the installed support system. It is not the intent of this jacking to restore the FIVP to its original position but

rather assure transfer of the load. The procedure for future jacking which Consumers indicated they would follow at the February 1-5, 1982 design audit and which was found acceptable by the NRC Staff requires jacking of the FIVP back to its original position if the relative settlement between the Reactor Containment and the FIVP reaches a total settlement of 3/8-inches since the date that the piping connections were made.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

MAY 17 1982

Docket Nos: 50-32? OM, OL
and 50-330 OM, OL

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 and 2

SUBJECT: SUMMARY OF MAY 7, 1982, CONFERENCE TELEPHONE CALL ON PHASE 2 ISSUES FOR AUXILIARY BUILDING UNDERPINNING

On May 7, 1982, the NRC Staff participated in a conference telephone call with Consumers Power Company (the applicant), and Bechtel to discuss issues associated with Phase 2 of the construction activities for the Auxiliary Building underpinning.

Enclosure 1 is a summary of this telephone conversation.

Darl Hood

Darl S. Hood, Project Manager
Licensing Branch No. 4
Division of Licensing

Enclosure:
As stated

cc: See next page

~~8205240021~~

MIDLAND

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Winchester, Massachusetts 01890

Enclosure 1

RECORD OF TELEPHONE CONVERSATION

DATE: May 11, 1982, 1:00 pm PROJECT: Midland

RECORDED BY: Joseph D. Kane CLIENT:

TALKED WITH:

CPC	Bechtel	NRC
J. Schaub	N. Swanberg	F. Rinaldi
J. Mooney	J. Anderson	D. Hood
	C. Russell	J. Kane
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