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

February 18, 1983

Note to: The Atomic Safety and Licensing Board
for the Midland Cogeneration Power
Plant

From: T. Novak

Subject: Board Notification BN-83-16

The attached copy of the Board Notification BN 83-16 supersedes the one sent to you on February 15, 1983. That one was issued to the Board members only prematurely. Please discard that memo and replace it with the attached which is being sent to all parties.

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

MEMORANDUM FOR: The Atomic Safety and Licensing Board for the Midland Plant, Units 1 and 2

FROM: Thomas M. Novak, Assistant Director for Licensing
Division of Licensing

SUBJECT: NOTIFICATION OF VIOLATION AND PROPOSED IMPOSITION OF CIVIL PENALTIES (BN-83-16)

In accordance with present NRC procedures regarding Board Notifications, the enclosed Notice of Violation and Proposed Imposition of Civil Penalties issued February 8, 1983, is being provided as information material and relevant to safety issues in the Midland OM/OL proceeding. This Notice of Violation was based on Consumers Power Company's (CPCo) failure to implement an adequate quality assurance program as it related to the installation of electrical, mechanical and civil components in the diesel generator building and the action of quality control (QC) supervisors instructing QC inspection to suspend inspection if excessive deficiencies were found during the performance of inspection. This notification further supplements my letter of December 7, 1982, (BN-82-126) which, in part, forwarded a Preliminary Notification of a significant reduction in safety-related work-in-progress imposed by CPCo as a result of significant quality assurance and equipment concerns identified by this NRC inspection. Also enclosed is a press release regarding this matter.

Thomas M. Novak, Assistant Director
for Licensing
Division of Licensing

Enclosures:
As stated

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NOTE: SEE PREVIOUS WHITE FOR CONCURRENCE

DL:LB #4	DL:LB #4	AD:L:DL
*DHood/hmc	*EAdensam	TNovak
2/15/83	2/15/83	2/ /83

2/15/83
hmc

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

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2/9/83

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The enclosed memorandum (R. Warnick to D. Eisenhut dated January 9, 1983) forwards a Notice of Violation and Proposed Imposition of Civil Penalties issued February 8, 1983, as a result of inspections conducted by the NRC on October 12 - November 25, 1982, and on January 19-21, 1983, at the Midland Plant, Units 1 and 2. The inspection focused primarily upon equipment installed within the Diesel Generator Building to verify conformance to approved drawings and specifications. The results indicate a breakdown in the implementation of the quality assurance program of Consumers Power Company (CPCo). Also enclosed are the associated Notification of Significant Enforcement Action and a press release regarding this matter.

In accordance with present NRC procedures regarding Board Notifications, these documents an being provided as information material and relevant to safety issues in the Midland OM/OL proceeding. The notifications further supplements my letter of December 7, 1982, (8N-82-126) which, in part, forwarded a Preliminary Notification of a significant reduction in safety-related work-in-progress imposed by CPCo as a result of significant quality assurance and equipment concerns identified by this NRC inspection.

Thomas M. Novak, Assistant Director
for Licensing
Division of Licensing

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As stated

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2/ /83	2/ /83	2/ /83

2/B4

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

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 & 2

SUBJECT: TELEPHONE DISCUSSIONS OF JANUARY 11 & 12, 1983 REGARDING UNDERPINNING SETTLEMENT READINGS

On January 11 and 12, 1983, the NRC and its consultant from Geotechnical Engineers, Inc. (GEI) participated in a telephone discussion with Consumers Power Company (CPC) and Bechtel. The call briefly discussed settlement records for deep-seated benchmarks associated with underpinning construction of the two Electrical Penetration Areas (EPA's) located at the southern portion of the Midland Auxiliary Building. CPC's plans for underpinning the EPA's and the Service Water Pump Structure (SWPS) are described in Supplement 2 of the Safety Evaluation Report (NUREG-0793, October 1982).

Enclosure 1 is a record of this telephone conversation.

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

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

JAN 19 1983

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

Enclosure:
As stated

cc: See next page

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Supplemental page to the Midland OM, OL Service List

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Washington, D. C. 20555

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ENCLOSURE

RECORD OF TELEPHONE CONVERSATION

DATE: January 11, 1983 @ 2:00 PM PROJECT: Midland
RECORDED BY: Joseph D. Kane

TALKED WITH:

CPC	Bechtel	GEI	NRC
J. Mooney	M. DasGupta	S. Poulos	R. Landsman
J. Schaub	W. Paris		J. Kane
T. Thiruvengadam	R. Wheeler		
K. Razdan	G. Murray		
R. Ramanujam	B. Cwikl		
	J. Darby		
	B. Adler		
	M. Lewis		
	B. Crouse		

ROUTE TO:

J. Knight	H. Singh, COE
G. Lear	S. Poulos, GEI
L. Heller	R. Landsman, Region III
D. Hood	J. Kane

MAIN SUBJECT OF CALL: To discuss background settlement readings - Auxiliary Building Underpinning

ITEMS DISCUSSED:

This call had been arranged at the request of NRC to discuss the background (underpinning had not yet started) settlement records provided to NRC for the period from 8/23/82 to 10/14/82. The records provided were for DSB-AN1, DSB-1E, DSB-2E, DSB-AS4 and DMD-3E and the ambient air temperatures for the same time frame. Region III had requested that HGEB review the background data and provide comments on the apparent upward movement of the EPA which is indicated by the settlement monitoring program.

1. CPC was asked to briefly describe the procedure that was followed to establish the uncorrected and corrected settlement curves which were provided for the deep-seated benchmarks (DSB). The uncorrected curves are based on the recorded LVDT readings. The occasional small triangles plotted on the curves are points established from the back-up dial gages. The corrected curves adjust the uncorrected curves for temperature changes measured at the deep-seated benchmarks (DSB) since the time of initial

installation. Temperature changes are measured at each DSB location at depths of 3 ft, 15 ft and 50 ft through thermocouples which were placed during installation. Minimal changes in temperature are being observed below the upper thermocouple. CPC is to provide the temperature readings with depth to support their position that temperature corrections at DSB-AN1, DSB-AN2 DSB-1E and DSB-1W are not required in the future. The plot of ambient air temperatures which was provided was not used in correcting for temperature variations.

2. During this call the following information was provided by CPC on Δ_1 values (See Drawing C-1493(Q) and prior reports for definition of differential settlement, Δ_1).

Building Monitoring Location	Uncorrected Settlement (in mils as of 1/11/83)	Corrected Settlement (in mils as of 1/11/83)
DSB-AN1 (North Main Auxil.)	68	118
DSB-AS4 (South Main Auxil.)	46	63
DSB-2E (East EPA)	35	43
DSB-3E (Control Tower)	22	44
DSB-2W (West EPA)	27	39

Computed values of Δ_1 that were given include:

DSB-2E: Δ_1 = -18 mils

DSB-3E: Δ_1 = -17 mils

DSB-2W: Δ_1 = -15 mils

DSB-3W: Δ_1 = -10 mils

These values are based on uncorrected readings for DSB-AN1 and corrected readings for the other locations. The minus signs reflects a magnitude of settlement at the EPA and Control Towers less than the Main Auxiliary Building.

3. Additional information provided by CPC included:

Building Monitoring Location	Actual Settlement (corrected) (in mils as of 1/3/83)
DSB-2W	29
DSB-3W	38
DSB-3E	39
DSB-2E	30

Estimated bearing pressures: EPA = 4.5 ksf, Control Tower = 5.2 ksf and Auxil. Bldg. = 9.5 ksf

4. Possible explanations for the larger amount of settlement occurring at the north end of the Main Auxiliary Building were discussed and included:

   a. The heavier loaded Auxiliary Building which rests on glacial till may be picking up additional load from the EPA and Control Tower through cantilever action because the more compressible till beneath the EPA and Control Tower is providing little foundation support.

   b. The EPA is affected more by changes in temperature than the other structures which causes an upward expansion of the EPA. This is reflected as less settlement than the other structures.

   c. The dewatering for underpinning is causing an uneven immediate settlement over a relatively large area in the thick glacial till layer.

5. The NRC Staff and its consultant made the following recommendations for plotting of the settlement data in order to sort out the many variables affecting the settlement readings.

   a. Plot the uncorrected and corrected readings for each monitor location along one line (North Auxil. Bldg. through to Control Tower) at the noon time interval. (On 1/12/83 this was later agreed to be at the midnight interval). Two settlement history plots on standard 11" by 17" graph paper should be developed for each monitoring location. One plot would have both horizontal and vertical (suggested 1 inch = 20 or 40 mils) arithmetic scales and the other plot would graph time in days (1, 10, 100, 1000) on semi-log paper. The temperatures used to correct the data should be plotted on the same graph at the same time interval (Temperature plot needed only on settlement graph plotted to arithmetic scales).

6. CPC indicated the requested settlement plots would be furnished to NRC in about one week's time. This was noted to be acceptable and will permit staff review prior to any site visit for reviewing underpinning progress (now planned for time when pier load test of W11 is being conducted).

7. The staff and its consultant believe the relatively small settlement values and the trends of that data which have been recorded to date are a result of temperature changes. It is felt that if sufficient background data were available, where comparable temperature and seasonal conditions were repeated, that the effects of sustained temperature changes would be clearer. It is also felt that the apparent upward movement of the EPA with respect to the other structures will be quickly reversed as underpinning operations progress beneath its foundation slab. The present trend indicated by the settlement readings is favorable with respect to the settlement acceptance criteria which has been established to control underpinning operations.

8. At the request of R. Ramanujam, CPC, several other items were discussed and included:

   a. CPC plans to explore for buried utilities in advance of drilling the SWPS dewatering wells and soldier piles by using a jet-wash type boring (3-1/2" diameter water pipe) which would be inspected by the Resident Geotechnical Engineer. R. Landsman and J. Kane, NRC, agreed that this type of boring would be acceptable for attempting to locate utilities when performed in foundation soils which would eventually be removed either in underpinning operations or in replacement of service water piping.

      There is a concern when using this type of drilling that the jetting and washing action, if not properly controlled, could cause development of voids and loosening of cohesionless foundation soils. The NRC staff expressed preference for other types of exploratory drilling (e.g., augering) in areas where future foundation stability was required. W. Paris of CPC indicated that this position does give them problems. At the staff's request, CPC is to identify the specific location of proposed borings which will be located in permanent foundation soils required to remain stable. This information will be used to guide the staff in a future response on the use of the jet-wash type boring.

b. R. Landsman indicated that his review of underpinning procedures developed by CPC has identified a problem. The procedures presently indicate that backpacking behind pit excavation lagging is not required when "neat cut" of the pit excavation is made. CPC indicated that the lagging would be essentially in direct contact with the foundation soils when neat cutting was performed. After considerable discussion the major difference became centered on the interpretation of essential and whether the entire length of lagging is required to be in contact, or if short, narrow intermittent voids were acceptable behind lagging. All parties did agree that backpacking should be required, even if neat cutting procedures were used, if sufficient voids behind lagging did exist. It was acknowledged that reasonable judgements will have to be made during construction when faced with widely differing conditions of voids that may run from several inches to several feet in length behind the lagging. It is hoped that the early planned site visit will permit the typical void conditions to be viewed where a consensus of agreement can be reached.

9. An additional call from J. Kane to R. Landsman and K. Razdan on 1/12/83 requested that settlement be plotted vertically downward in the conventional engineering manner on the settlement history plots which CPC has agreed to provide. In addition CPC agreed to provide the background readings for the extensometers and strain monitoring devices.

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1/19/83 Maynard

JAN 19 1983

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

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FACILITY: Midland Plant, Units 1 & 2

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Enclosure 1 is a record of this telephone conversation.

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

Enclosure:
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cc: See next page

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DHood:eb EAdensam

November 22, 1982

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MEETING SUMMARY DISTRIBUTION

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NRC/PDR
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[redacted]
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Project Manager D. Hood
Licensing Assistant M. Duncan

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J. Kane
E. Sullivan
M. Miller
P. T. Kuo
F. Rinaldi
W. Paton
W. Haass
E. Adensam
J. P. Knight
T. Novak
L. Heller

bcc: Applicant & Service List

November 22, 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 NOVEMBER 5, 1982, MEETING ON INDEPENDENT ASSESSMENT OF AUXILIARY BUILDING UNDERPINNING

On November 5, 1982, the NRC staff met in Bethesda, Maryland with Consumers Power Company (CPCo); Stone and Webster Engineering Corp. (S&W); and Parsons, Brinkerhoff, Quade and Douglas, Inc. (PBQD) to discuss the qualifications and charter of S&W and PBQD regarding the independent assessment of the implementation of the auxiliary building underpinning work. Representatives of the Government Accountability Project (GAP), a public interest group, also attended and provided questions and comments. Meeting attendees are listed by Enclosure 1. Handouts (Enclosure 2) were provided during CPCo's presentation.

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OFFICE ▶			12 pp.			
SURNAME ▶	8212020210					
DATE ▶						

NRC FORM 318 (10-80) NRCM 0240 OFFICIAL RECORD COPY USGPO: 1981—335-96

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

Enclosure:
As stated

cc: See next page

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DATE	11/16/82	11/17/82					

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ENCLOSURE 1

ATTENDEES
11/5/82

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W. D. Shafer	OCS RIII
J. A. Mooney	CPCo
John Schaub	CPCo
A. S. Lucks	Stone & Webster
Wayne E. Kilker	Stone & Webster
Louis Silano	Parsons, Brinckerhoff
Jim Brunner	CPCo, legal
George Lear	HGEB-DE-NRR
Joseph Kane	NRR:DE:HGEB
E. J. Sullivan, Jr.	NRC:DE
Melanie A. Miller	NRR:DL:LB #4
P. T. Kuo	NRR:DE:SEB
Frank Rinaldi	NRR:DE:SEP
William Paton	OELD
Walter Haass	NRR/QAB
E. G. Adensam	NRR:DL:LB #4
J. P. Knight	NRR:DE
T. M. Novak	NRC:DL
Billie Garde	GAP
Lyman Heller	NRR/HGEB
Roger Houston	CPCo
Charles Ader	Stone & Webster
S. Holuy	GAP

OFFICE ▶							
SURNAME ▶							
DATE ▶							

11/5/82
J. Mooney

Enclosure 2

MIDLAND PROJECT

SOILS REMEDIAL WORK

INDEPENDENT ASSESSMENT

COMMITMENT

(LETTER OF SEPTEMBER 17, 1982)

- RETAIN THIRD PARTY
  - INDEPENDENT APPRAISAL
  - INITIAL PHASES OF CONSTRUCTION
  - AUXILIARY BUILDING UNDERPINNING

- PROVISION TO EXPAND BOTH SCOPE AND DURATION

- ASSESSMENT TEAM
  - CONSTRUCTION EXPERTS
  - QA EXPERTS
  - SUPPLEMENTED BY UNDERPINNING CONSULTANT

- REVIEW TO INCLUDE
  - SOILS DESIGN DOCUMENTS,
  - CONSTRUCTION PLANS
  - CONSTRUCTION ACTIVITIES

- ASSESSMENT TO INSURE
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SELECTION OF ASSESSMENT TEAM

- SELECTION CRITERIA
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  - EXPERIENCED
    - Design Review
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    - Underpinning
    - Nuclear QA/QC
- ASSESSMENT TEAM REQUIRED JOINT EFFORT
  - NUCLEAR AE/CONSTRUCTOR
  - UNDERPINNING SPECIALIST

ASSESSMENT TEAM

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  - INDEPENDENT
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  - EXPERIENCED IN THIRD PARTY INSPECTIONS

- PARSONS, BRINCKERHOFF, QUADE & DOUGLAS
  - INDEPENDENT
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  - EXPERIENCED IN THIRD PARTY INSPECTIONS

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- DEVELOPMENT OF ASSESSMENT PROGRAM COVERING AUXILIARY BUILDING UNDERPINNING
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- DURATION OF ASSESSMENT WILL BE DETERMINED BY ASSESSMENT TEAM
- NO LIMIT ON NUMBER OF ASSIGNED PERSONNEL

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

November 22, 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 NOVEMBER 5, 1982, MEETING ON INDEPENDENT ASSESSMENT OF AUXILIARY BUILDING UNDERPINNING

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Ronald W. Hernan for

Darl Hood, Project Manager
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Joseph Kane	NRR:DE:HGEB
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E. G. Adensam	NRR:DL:LB #4
J. P. Knight	NRR:DE
T. M. Novak	NRC:DL
Billie Garde	GAP
Lyman Heller	NRR/HGEB
Roger Houston	CPCo
Charles Ader	Stone & Webster
S. Holuy	GAP

11/5/82
J. Mooney

Enclosure 2

MIDLAND PROJECT

SOILS REMEDIAL WORK

INDEPENDENT ASSESSMENT

COMMITMENT

(LETTER OF SEPTEMBER 17, 1982)

- RETAIN THIRD PARTY
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- REVIEW TO INCLUDE
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11/12/82
Hmc

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 NOVEMBER 5, 1982, MEETING ON INDEPENDENT ASSESSMENT OF AUXILIARY BUILDING UNDERPINNING

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

Enclosure:
As stated

cc: See next page

DL:LB #4	DL:LB #4
DHood/hmc	EAdensam
11/ /82	11/ /82

ENCLOSURE 1

ATTENDEES
11/5/82

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Lyman Heller	NRR/HGEB
Roger Houston	CPCo
Charles Ader	Stone & Webster
S. Holuy	GAP

4/B4

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

NOV 12 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 JULY 27 - 30, 1982, AUDIT ON SOILS REMEDIAL ACTIVITIES

On July 27-30, 1982, the NRC staff and its consultants met in Ann Arbor, Michigan with Consumers Power Company (the Applicant), Bechtel and their consultants to audit analyses, designs and preparations for remedial measures to correct the foundations and utilities on inadequately compacted fill soils at the Midland site. Meeting attendees are listed by Enclosure 1.

On July 19, 1982, the staff issued a draft of the second supplement for the Midland SER which primarily addresses the soils settlement review. A listing of the outstanding review items in this draft SSER was prepared by the applicant and served as the meeting agenda. The list was updated at the conclusion of the meeting to indicate which of those items had been included in the staff's audit. Enclosure 2 is the resulting agenda. The same-numbered items from Enclosure 2 are discussed below in this summary. Selected handouts provided during the meeting are shown as attachments within Enclosure 3.

General Items

1 - 5. Not included in Audit

6. NRC input into the final SSER will cover range of applied bearing pressures' static and dynamic loading

A draft of FSAR Table 2.5-14, including bearing pressure data for the Auxiliary Building (AB), was provided (Attachment 1). The staff reviewed the table, noted that the information was acceptable and that once provided for the docket and verified, this item would be technically closed.

7 & 8. The applicant was requested to determine that 1.5 x FSAR seismic response spectra analyses are conservative for the auxiliary building (AB), service water pump structure (SWPS), and borated water storage tank (BWST) in comparison to site-specific response spectra (SSRS).

The applicant has not provided comparative plots of floor response spectra that were requested by the staff for all buildings (seismic margin review).

The NRC structural engineering staff reviewed calculations at 5 points of elevation for the AB to determine if 1.5 x FSAR response

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spectra enveloped the results obtained by using the SSRS. For these five points, the floor response spectra generated by the use of 1.5 times the FSAR spectra enveloped the respective floor response spectra developed from SSRS. Additional locations in this and other structures will be addressed as part of the seismic margin study.

The applicant also noted that the use of the floor response spectra derived from the seismic margin earthquake would be according to the seismic margin review criteria submitted to the staff by letter of September 25, 1981. The results of the seismic margin review will be submitted to the staff during the first quarter of 1983.

9. Test data on #9 and #10 Fox-Howlett rebar splices with up to 2% strain

Copies of test data up to 2% strain for #9 and #10 Fox-Howlett rebar splices were provided to the NRC during the audit. Copies were also sent to the NRC consultant, Science Applications Institute by letter dated July 16, 1982.

The NRC found the information acceptable after preliminary review. Pending subsequent NRC discussions with its consultant, this item may be closed.

10. Identification, inspection, and repair procedures for concrete crack repair

Criteria for concrete cracks were agreed upon and will be documented by the applicant in a letter in early August 1982 (Post script: see applicant's letter of August 2, 1982).

The crack repair program applies to the DGB, SWPS, Control Tower and Electrical Penetrations Areas of the Auxiliary Building and Feed... Isolation Pits, which will be completed prior to the first refueling of the plant. It consists of the following three points:

(1) Repair by epoxy injection any crac.. in the structures which are below the permanent groun.. water table and which exhibit weeping characteristic. This repair will be performed from the inside of the structures.

(2) Coat the splash zone of the exterior su·face of the south wall of the Service Water Pump Structure which is in contact with cooling pond water ..ith waterproofing compounds. The waterproofing compound will be one of the three compounds recommended by consultants in their report "Effects of Cracks on Serviceability of Structures in the Plant".

(3) Repair by epoxy injection existing cracks which are 20 mils and larger and apply a sealant to the surfaces of the concrete walls in the following accessible areas (i.e. areas where removal of soil or installed equipment or installed components is not necessary to perform the repair). The extent (length) of the crack that will be injected with epoxy will include at least that portion with crack width of 10 mils or larger.

Prior to the initiation of repairs, all cracks 20 mils and larger and weeping cracks in the applicable areas will be identified. A verification of this identification to a tolerance of +5 mils will be performed. This verification and subsequent will be in accordance with the quality program. The material for structural epoxy adhesive will be "concresive-1380" manufactured by Adhesive Engineering Company, or equivalent.

The areas to be repaired for each applicable building are as follows:

DGB

(a) All accessible interior reinforced concrete walls.
(b) All accessible exterior concrete walls.

CT&EPAs

(a) All accessible exterior concrete walls.

SWPS

(a) All accessible exterior walls.

11 & 12. Not included in audit.

Auxiliary Building

1. Resolution of allowable vertical differential settlement and strain that will stop underpinning construction and require installation of temeporary supports

The NRC staff reviewed the allowable settlement calculation resulting from analysis of the construction condition using a subgrade modules of 70 KCF and analysis of reduced support along the EPA due to tunneling (Attachment 4).

Attachment 2 provides definitions of "alert", "action" and "requalify" levels which were agreed upon for underpinning activities. Attachment 3 provides numerical values which were agreed upon. The levels apply to Phases II, III, and IV.

This item was accepted by the staff.

2. Compaction control specification for granular fill beneath feedwater isolation valve pits (FIVPs)

It was agreed that the fill beneath the FIVP will be tested using the procedures outlined in the Seabrook FSAR. A copy of a similar FSAR section was provided by the NRC. It was also agreed that the fines portion of the fill shall be non-plastic. This will be verified by the resident geotechnical engineer by appropriate testing (hydrometer of Atterberg limits). The backfill will be properly moisture conditioned by soaking immediately prior to compaction. The soaking means will be approved by the resident geotechnical engineer. Compaction acceptance criteria will be 95% modified proctor or 85% relative density (whichever testing standard results in the maximum dry density) based on tests performed prior to placement. The applicant also committed to performing a laboratory compaction or relative density test to establish maximum dry density on soil material taken from each field density test location. Bechtel compaction control specification will be revised.

Additional compaction equipment (e.g. self propelled double drum compactor) will be qualified by the test fill method.

3. Methodology for transferring final loads to permanent underpinning wall

Preliminary copies of Mergentime/Hanson Drawings S-74 and S-74a (see SSER #2, Appendix I) not yet reviewed by Bechtel, were provided for staff review. Analysis of the permanent wall and preliminary design details were also reviewed. The review included methodology, rebar stresses in critical areas, and connection to existing structure. The staff found these items to be acceptable.

The transfer of loads will be accomplished by the use of hydraulically actuated steel jacks that are incrementally increased to the specific loads determined by the structural analyses. When the predetermined loads have been developed by the jacks, the loads will be maintained and locked off provided that the following criteria are met:

(1) The pier will be loaded to 125% of its specified jacking load and continued at the load until the relative movement between the top of the pier and the underpinning structure is less than 0.01 in. in a continuous 1 hour period. When this condition is satisfied,

(2) The pier load will be reduced to 110% of its specified jacking load and continued at that load until the relative movement between the top of the pier and the underpinning structure is less than 0.01 in. for a continuous 24-hour period. When this condition is satisfied, the pier will be locked off.

(3) Jacking loads for the permanent underpinning will be maintained at the specified value for at least 30 days.

(4) A semilogarithmic plot of settlement versus time will be developed to allow determination of when secondary consolidation has been reached.

(5) The settlement increment in the last 30 days of sustained load will not exceed 0.05 in.

(6) The settlement in the last 10 days of sustained load will not exceed 0.01 in.

(7) Wedges to be used for the permanent wall will be driven tight and permanently welded in place. In case a predicted jacking load is not obtained (when a 0.03-in. upward movement of the existing structure occurs) jacking loads should be reduced to 80% of the load at which the movement occurred and this load will be used in the analyses to determine subsequent jacking loads.

4. Updated scope of construction for Phases III and IV

The plan which describes the construction scope (Drawing 7220-SK-C-0101) (see SSER #2, Appendix I) was reviewed. A discussion was also held regarding construction sequence. The staff found these matters to be acceptable.

5. Resolution of pier and plate load test details on maximum test load, locations, and time for performing test

The load test will be performed on Pier W-11. The proposed load sequence is to jack the load from 0 to 50% of the bearing pressure allowed for the seismic loading combination, then decrease the load to 25%, and then increase the load to 130%. The staff agreed that no additional plate load test is required. The staff found these details to be acceptable.

6. Long-term settlement monitoring plan during plant operation

This is a technical specifications item. The information will be provided to the NRC as part of the FSAR technical specification submittal in October 1982.

7. FSAR documentation on as-built conditions

This is a confirmatory item which will provide the level of construction information typical of an FSAR. The information will be provided to the NRC once the appropriate construction stage has been achieved.

8. Design modification at freezewall crossing with duct banks

The applicant had previously committed to provide a report addressing the installed surcharge loading program, monitoring results and backfill techniques. The proposed method for backfilling monitoring pits will be provided prior to accomplishing the work. This carryover item from earlier meetings continues as a confirmatory issue.

9. Resolution of required depths of construction dewatering wells

The applicant agreeds with a staff position that, when excavating in cohesionless (natural or fill) soils, the groundwater will be maintained 2 feet below the advance of excavation.

In addition, a probing program will be used in selected piers. As a minimum, these piers include E12, W12, E10, W10, E7, W7, E4, W4, CT1, CT6, and CT12. Test holes between 1 in. and 4 in. in diameter will be advanced to a depth of 5 ft beneath the proposed bearing level (from a level 5 ft above the bearing level) in these 11 selected piers to determine whether groundwater under pressure exists in sufficient volume to require special pier dewatering. It water pressures are low, excavation to the bearing level will continue. If water pressures are shown to be high in the test holes, special dewatering (e.g., wellpoint or other suitable means) will be used to lower the water table at that pier to at least 2 ft below the bearing level. The hole beneath the final bearing level will be grouted. Although the available information indicates that the bearing stratum is a fairly homogeneous hard clay, it is possible that special pier dewatering will be needed. These holes will be used

by the applicant as a conservative measure to confirm subsurface conditions before the bearing level is reached. Interpretation will be done by the resident geotechnical engineer. This item is acceptable to the staff on this basis.

10. Monitoring matrix showing allowable settlements and strains

An updated copy of the monitoring matrix (Bechtel Drawing 7220 C-1493(Q), Rev. 1) (Attachment 7) was provided. Alert, action and requalify levels will be added as agreed above (AB Item 1).

The staff agreed that no alert or action level needs to be established for monitoring strain. However, the strain data are considered supplementary to understand the behavior of the building and strain levels greater than 0.0010 in/in. are a factor to be considered in the raising of the alert and action settlement levels. This item is acceptable to the staff on this basis.

11. Electrical penetration area (EPA) and control tower (CT) relative horizontal movement criteria

The NRC staff reviewed drawings showing the gap detail between the EPA/CT and the turbine building (TB). The minimum gap between structural members of the CT and TB is 8 in.; the minimum gap between structural members of the EPA and TB is 6 in.

The staff agreed that no acceptance criteria will be required for horizontal movement during underpinning. Data from the horizontal instrumentation measurements will be recorded and used as supplementary information to the differential settlement records in the overall evaluation of structure movement during underpinning work.

12. Changes in pier configuration

The applicant has determined that piers CT4X and CT9X located along Column line K_c at 5.9 and 7.2 will not be required. Piers will be required at H_k and 5, and at H_k and 8. The NRC staff reviewed Bechtel Drawing 7720-SK C-0101 (Rev. 0) and Mergentime/Hanson drawing S-74 (Rev. 2) showing the details of these piers (see SSER #2, Appendix I). This is acceptable to the staff.

13. Details on stiffened bulkhead during drift excavation

The NRC staff reviewed and agreed with the calculations of the drift/stiffened bulkhead design. The staff also

agreed to constructing the drift support system in 2-foot increments, with lagging and tight backpacking completed up to the bottom of the EPA foundation slab and with an excavation bench on the FIVP side.

14. As-built plan for deep-seated benchmarks

The NRC staff reviewed Bechetel Drawings 7220-C-1490 and C-1491 (Attachment 7) showing as-built locations of the AB deep-seated benchmarks and found them to be technically acceptable.

15. Review of Specification 7220-C-200, Emergency Actions

The flow charts for the emergency actions of Specification 7220-C-200 were reviewed in detail. The staff found the flow charts to be acceptable.

Service Water Pump Structure

1. Complete staff review of sliding and lateral soil pressure calculation under dynamic loading

The NRC staff completed review of the sliding and lateral soil pressure calculation. Seismic loads equal to 1.5 times the FSAR SSE loads were used and were found to exceed SSRS loads. Factors of safety against sliding were 1.45 (N-S direction) and 1.50 (E-W direction), which exceed the staff's minimum requirement of 1.1. This technical item is closed.

2. Resolution of pier and plate load test details on maximum test load, locations, and time for performing test

The load test will be performed on Pier 1 (east side). The proposed load sequence is to jack the load from 0 to 50% of the bearing pressure allowed for the seismic loading combination, then decrease the load to 25%, and then increase the load to 130%. The staff agreed that no plate load test will be required. This technical item is closed.

3. Resolution of required depths of construction dewatering wells

For monitoring of construction dewatering at the SWPS, 12 piezometers will be provided. Six will be sealed in the zone from el 570' to el 590'. Soil sampling will be continuous from el 570' to el 585' in borings at the location of the six perimeter piezometers. The other six will be installed at the subcontractor's discretion.

The water surface will be maintained 2 feet below the bottom of pier excavations if sand is present within 8 ft of the pier foundations as indicated by the continuous sampling in the six perimeter piezometers. If sand layers are identified in the exploratory borings for the piezometer installations, the wells will be lowered to maintain the 2 foot requirement. The results of the explorations and the final installation depths of the dewatering wells are to be provided to the NRC staff when available. This technical item is closed.

4. Methodology for transferring loads from jacks to permanent wall and locking off

Drawing 7220-C-2035-Q Rev. 2, with the relevant parts of Specification 7220-C-194 showing final load transfer procedures, were reviewed by the NRC staff and found to be acceptable. This technical item is closed.

5. Long-term settlement monitoring plan during plant operation

This is a technical specification issue. The information will be provided to the NRC as part of the FSAR technical specification submittal in October 1982.

6. FSAR documentation on as-built conditions

This is a confirmatory item with technical issues resolved. The information will be provided to the NRC once the appropriate construction stage has been achieved.

6a. Strain monitoring to measure acceptable allowable strain

The NRC staff's evaluation of the applicant's June 14, 1982, submittal indicated the proposed 5/16 inch displacement (extension) criterion over a single 20-foot gage length was not acceptable and the staff recommended that several gages of shorter lengths be installed to permit identification of the more highly stressed sections. In the meeting of June 25, 1982, the applicant committed to using four 5-foot long gages in place of or in addition to the single 20-foot gage. The action and alert limits for the 5-foot long gages will be based on the yield strain of the reinforcing steel.

7. Staff input into the final SSER will describe computed earth pressures under both static and dynamic loading and design methods

Review of computed earth pressures was completed. This technical item is closed.

8. The NRC staff is to review and evaluate the applicant's analysis as identified in response to Request 2.8 of Enclosure 8, NRC letter dated 5/25/82 (interaction of circulating water and SWPS wall).

   The NRC staff reviewed the drawing showing the structural gap between the circulating water intake structure (CWIS) and the SWPS, and compared this gap with the predicted deflections for each structure under earthquake loads. The 1 in. minimum gap is sufficient to accomdate the relative calculated gap of 0.518 in. Simarily, the 1 in. gap between the SWPS and the cooling pond retaining wall accomodates the calculated relative gap of 0.25 in. during a SSE. This item is closed.

9. Check dowels for shear and tension capability

   The staff reviewed the design calculations, discussed the design methodology, and determined the shear and tension capability of connections for the underpinning to the existing structure. The items were found to be acceptable. This item is closed.

Borated Water Storage Tank

1. Long-term settlement monitoring plan during plant operation

   This is a technical specification issue. The information will be provided to the NRC as part of the FSAR technical specification submittal in October 1982.

2. FSAR documentation on as-built conditions

   This is a confirmatory item with technical issues resolved. This information will be provided to the NRC once the appropriate construction stage is achieved.

3. Staff calculational review for governing loading combinations in structural design

   The NRC staff reviewed the calculation for design of the new ring beam foundation for applicable load combinations. The governing load combination is:

   $$U = 1.4D + 1.4T + 1.4F + 1.7L + 1.7H + 1.9E$$

   where component loads are identified by FSAR Section 3.8.6.3.1.

The staff also reviewed the methodology used for design of a typical section considering forces and moments and found it to be acceptable. Additional information of a confirmatory nature will be provided as part of the seismic margin study to demonstrate the adequacy of use of 1.5 times the FSAR response spectra relative to use of SSRS.

Underground Piping

1. Staff evaluation of previously submitted reports on underground piping not completed

The NRC staff and its consultant from ETEC reviewed the calculations for stresses due to seismic and settlement effects. The staff agreed with the assumptions, methodology, and results of the analyses.

The staff completed its geotechnical review of previously submitted reports. The applicant agreed to add five additional settlement and strain monitoring stations as requested, plus settlement markers at each end of transition zones of replaced/rebedded pipes as shown on Drawing 7220-SK-C-745 (see SSER #2, Figure 2.11). The five addi- tional settlement and strain marker locations are station 1 + 32 and 3 + 15 for line 26"-OHBC-15; station 1 + 55 for line 26"-OHBC-20; station 0 + 80 for line 26"-OHBC-55 and station 3 + 00 for line 26"-OHBC-54. The The applicant also agreed to change the monitoring frequency to once per month for the first 6 months of plant operation. The frequency of readings will be lengthened to the 90 day interval following the intial six month period if the settlement readings have stabilized (not larger than 0.10 inch change from the previous reading). This will be written into the technical specifications. This item is closed.

2. The applicant's proposed reinstallation of 26-inch and 36-inch diameter pipes including review of analysis, properties of backfill, extent of excavation, details of transition, and controls during consturction

The staff consultant visited the site and observed the arrangement of the service water piping in the SWPS.

The design approach for reinstallation of the service water pipe was reviewed and approved. The applicant provided a preliminary stress summary table for the piping to be reinstalled. The final table will be provided by August 20, 1982. Drawing 7220-SK-C-745 was marked to show the settlement and strain monitoring locations that were agreed upon.

Properties of the proposed backfill were provided for review. It is planned to use a mixture of sand, cement, and fly ash. The commercial name of this product is "K-Krete" (Attachment 6).

The next FSAR revision will document the design for the reinstalled piping, properties of the backfill material, and the stress summary table. This item is closed.

3 & 5. Plant control restricting placement of heavy loads over buried piping and conduits

Technical specification proposal by applicant for long-term settlement and strain monitoring plan during plant operation

These are technical specification items. The information will be provided to the NRC as part of the FSAR technical specification submittal.

4. FSAR documentation on as-built conditions

This is a confirmatory item with all technical issues resolved. The information will be provided to the NRC once the appropriate construction stage is acheived.

Diesel Generator Building Analysis

1. Resolution of assumptions (structural rigidity) and completion of analysis that uses correct settlement values; documentation of these results with comparison to recorded and predicted settlements

The NRC staff reviewed calculations for the diesel generator building which included settlement effects prior to, during, and after surcharge, including predicted values for the life of the plant.

The maximum calculated stress for the period March 28, 1978, to August 18, 1978, is approximately 11 ksi.

The NRC staff expressed the need to further review the results of calculations on the effects of settlement on the DGB including the method used by the applicant to characterize the shape of the structure resulting from actually recorded settlements and predicted settlement values.

Bearing pressures were reviewed and found to be acceptable.

2. Long-term settlement monitoring plan during plant operation

This is a technical specification item. The information will be provided to the NRC as part of the FSAR technical specification submittal.

Permanent Dewatering

1. Resolve availability of 60-day period in view of recharge rate in wells in AB railroad bay area

The applicant reviewed with the NRC staff the events related to the rupture of a construction water pipe which affected the recharge response in the railroad bay area.

Information in response to written questions by NRC Hydraulic Engineering Section were provided for future review in Bethesda and included information on the period to initiate shutdown. This period will be documented in the technical specifications. A report will be submitted after system installation to document the water contours developed by the permanent dewatering system. This report will provide verification of any water source in the railroad bay area.

2. Requirements of permanent dewatering system during plant operation

This is a technical specification item. The information will be provided to the NRC as part of the FSAR technical specification submittal.

3. Results of typical well fines monitoring

The applicant provided typical results from the July fines monitoring of the AB construction dewatering wells.

Well	5 micron (ppm)	50 micron (ppm)
ME-7	0.5	0.2
ME-8	1.1	0.4
ME-9	0.5	0.3
ME-46	0.6	1.0

This item is closed.

Other Items

A presentation was given on the project organization and consultants for the soils work (Attachment 5).

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

Enclosures:
As stated

cc: See next page

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ENCLOSURE 1

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Enclosure 2

7/30/82

O - Open Item
CON - Confirmatory Item
TS - Operating License Technical Specification
R - Technical Resolution Staff Input Pending
C - Closed Item

MIDLAND PLANTS UNIT 1 AND 2
REVIEW OF DRAFT SER, SUPPLEMENT NO 2

		SSER STATUS	AUDIT ITEM
GENERAL ITEMS			
1.	Staff's input for the final SSER will include summary of subsurface investigations.	R	No
2.	Staff's input into final SSER will describe laboratory and field testing.	R	No
3.	Staff's input into the final SSER will include staff evaluation of pertinent soil profiles sectional views.	R	No
4.	Summerize the settlement history of Catagory I structures other than the AB & SWPS.	R	No
5.	Long term settlement monitoring plans during plant operation for other structures.	TS	No
6.	NRC's input into the final SSER will cover range of applied bearing pressures static and dynamic loading.	R	Yes
7.	Applicant was requested to determine that 1.5 x FSAR seismic response spectra analyses are conservative for the auxiliary building, SWPS, and BWST in comparison to site specific response spectra.	CON	Yes
8.	Applicant has not provided comparative plots of floor response requested by the staff for all buildings (seismic margin review).	O	Yes

		SSER STATUS	AUDIT ITEM
9.	Test data on #9 and #10 Fox Howlett with up to 2% strain.	CON	Yes
10.	Identification, inspection and repair procedures for concrete crack repair.	CON	Yes
11.	Use of concrete expansion anchors to attach piping and equipment to masonry walls is disallowed by Staff criteria (non-soils).	O	No
12.	Staff's input into the final SSER will summarize geotechnical engineering review efforts and SHAKE computer code studies.	R	No

		SSER STATUS	AUDIT ITEM
AUXILIARY BUILDING			
1.	Resolution of allowable vertical differential settlement and strain that will stop underpinning construction and require installation of temporary supports.	O	Yes
2.	Compaction control specification for granular fill beneath FIVP's.	O	Yes
3.	Methodology for transferring final loads to permanent underpinning wall.	O	Yes
4.	Updated scope of construction for Phases 3 and 4.	O	Yes
5.	Resolution of pier a[redacted] test details on maximum test load, locations and time for performing test.	O	Yes
6.	Long term settlement and strain monitoring plan during plant operation.	TS	Yes
7.	FSAR documentation on as-built conditions.	CON	No
8.	Design modification at freezewall crossing with duct banks.	CON	No
9.	Resolution of required depths of construction dewatering wells.	CON	Yes
10.	Monitoring matrix showing allowable settlements and strains	CON	Yes
11.	EPA and CT relative horizontal movement criteria	CON	Yes
12.	Changes in pier configuration	CON	Yes
13.	Details on stiffened bulkhead during drift excavation	CON	Yes
14.	As built plan for deep seated benchmarks	CON	Yes
15.	Review of emergency actions C-200	CON	Yes

		SSER STATUS	AUDIT ITEM
SERVICE WATER PUMP STRUCTURE			
1.	Complete Staff review of sliding and lateral soil pressure calculations under dynamic loading.	CON	Yes
2.	Resolution of pier and plate load test details on maximum test load, locations, and time for performing test.	CON	Yes
3.	Resolution of required depths of construction dewatering wells.	O	Yes
4.	Methodology for transferring loads from jacks to permanent wall and locking-off.	O	Yes
5.	Long term settlement and strain monitoring plan during plant operation and program for monitoring horizontal movement.	TS	Yes
6.	FSAR documentation on as-built conditions.	CON	No
6a.	Strain monitoring to measure acceptable allowable strain.	CON	Yes
7.	Staff's input into final SSER will describe computed earth pressures under both static and dynamic loading and design methods.	R	Yes
8.	Staff to review and evaluate Applicant's analysis as identified in response to Request 2.8 of Enclosure 8, NRC letter dated 5/25/82. (interaction of circ water & SWPS walk)	CON	Yes
9.	Check dowels for shear and tension capability.	CON	Yes

		SSER STATUS	AUDIT ITEM
BORATED WATER STORAGE TANK			
1.	Long term settlement monitoring plan during plant operation.	TS	No
2.	FSAR documentation on as-built conditions.	CON	No
3.	Staff calculational review for governing loading combinations in structural design.	CON	Yes

		SSER STATUS	AUDIT ITEM
UNDERGROUND PIPING			
1.	Staff's evaluation of previously submitted reports on underground piping not completed.	R	Yes
2.	Applicant's proposed reinstallation of 26-inch 36-inch diameter pipes including review of analysis, properties of backfill, extent of excavation details of transition, controls during construction.	O	Yes
3.	Plant control restricting placement of heavy loads over buried piping and conduits.	TS	No
4.	FSAR documentation on as-built conditions.	CON	No
5.	Tech Spec proposal by Applicant for long term settlement and strain monitoring plan during plant operation.	TS	No

	SSER STATUS	AUDIT ITEM
DIESEL GENERATOR BUILDING ANALYSIS		
1. Resolution of assumptions (structural rigidity)and completion of analysis that uses correct settlement values. Documentation of these results with comparison to recorded and predicted settlements.	O	Yes
2. Long term settlement monitoring plan during plant operation.	TS	No

		SSER STATUS	AUDIT ITEM
PERMANENT DEWATERING			
1.	Resolve availability of 60 day period in view of recharge rate in wells in railroad bay area of Auxiliary Building.	O	Yes
2.	Requirements on permanent dewatering system during plant operation.	TS	No
3.	Results of typical well fines monitoring	CON	Yes

Enclosure 3

Selected Handouts for

July 27-30, 1982, Audit

attachment 1
sheet 1 of 4

FOR INFORMATION ONLY

RS-003-03

7220

TABLE 2.5-14

SUMMARY OF CONTACT STRESSES AND ULTIMATE BEARING CAPACITY FOR FOUNDATIONS SUPPORTING SEISMIC CATEGORY I AND OTHER SELECTED STRUCTURES

| 18
| 44

Unit	Supporting Soils	Foundation Elevation	Contact Stress Beneath Footing (lb/ft^2)				Net Ultimate Bearing Capacity (lb/ft^2)	Factor of Safety	
			Gross Dead and Live Load	Net Dead and Live Load	Gross Dead, Live, and Seismic Load	Net Dead, Live, and Seismic Load		Dead and Live Load	Dead, Live, and Seismic Load
Category I Structures									
Reactor containment buildings	Very stiff to hard natural cohesive soils	582.5	10,000	3,300	19,500	12,800	45,000	13.6	3.5
Auxiliary building area[1]	Very stiff to hard natural cohesive soils	562	7,000	—	8,200	4,000	45,000	NA	45.0
Auxiliary building areas B and C[1]	Very stiff to hard natural cohesive soils	579	6,600	400	10,200	4,000	45,000	11.2	11.3
Auxiliary building Area D[1]	Very stiff to hard natural cohesive soils	556	15,000	13,400	20,600	19,000	45,000	3.4	2.4
Auxiliary building Areas E and F[1]	Very stiff to hard natural cohesive soils	571	11,000	4,300	19,800	13,100	45,000	10.5	3.4
Auxiliary building Area G[1]	Zone 2[3]	630.5	1,400	1,000	3,400	3,000	15,000	15.0	5.0
Auxiliary building Area H[1]	Zone 2[3]	610	1,400	NA	5,100	2,200	30,000	NA	13.6
Auxiliary building Areas I and J[1]	Very stiff to hard natural cohesive soils	569	6,800	0	9,200	2,400	45,000	NA	18.8

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Attachment 1
Sheet 2 of 4

FOR INFORMATION ONLY

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RS-003-03

TABLE 2.5-14 (continued)

Unit	Supporting Soils	Foundation Elevation	Contact Stress Beneath Footing (lb/ft^2)				Net Ultimate Bearing Capacity (lb/ft^2)	Factor of Safety	
			Gross Dead and Live Load	Net Dead and Live Load	Gross Dead, Live, and Seismic Load	Net Dead, Live, and Seismic Load		Dead and Live Load	Dead, Live, and Seismic Load
Auxiliary building Areas K and L[1]	Very stiff to hard natural cohesive soils	579	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Feedwater isolation valve pit	Structural sand backfill	601	4,200	(4)	10,100	5,800	25,000	(4)	4.3
Diesel generator building	Zone 2[3]	628	4,400	3,600	5,700	4,900	14,000	3.9	2.9
Diesel generator pedestal foundation	Zone 2[3]	628	1,670	900	2,050	1,300	8,000	8.9	6.2
Borated water storage tank	Zone 2[3]	629	2,000	1,400	4,600	4,000	12,000	8.6	3.0
Service Water Pump Structure									

44

Attachment 1
Sheet 3 of 4

FOR INFORMATION ONLY

RS-003-03

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TABLE 2.5-14 (continued)

Unit	Supporting Soils	Foundation Elevation	Contact Stress Beneath Footing (lb/ft^2)				Net Ultimate Bearing Capacity (lb/ft^2)	Factor of Safety		44
			Gross Dead and Live Load	Net Dead and Live Load	Gross Dead, Live, and Seismic Load	Net Dead, Live, and Seismic Load		Dead and Live Load	Dead, Live, and Seismic Load	
Circulating water isolation system	Very stiff to hard natural cohesive soils and dense natural sands	596.5	4,030	3,800	4,090	3,900	25,000	6.6	6.4	

Note: Factor of safety is defined as the ratio of net ultimate bearing capacity to net contact stress beneath footing.

[1] Refer to Figure 2.5-47 for auxiliary building areas.

[2] ~~Revised values are to be provided by amendment following reanalysis.~~ 18

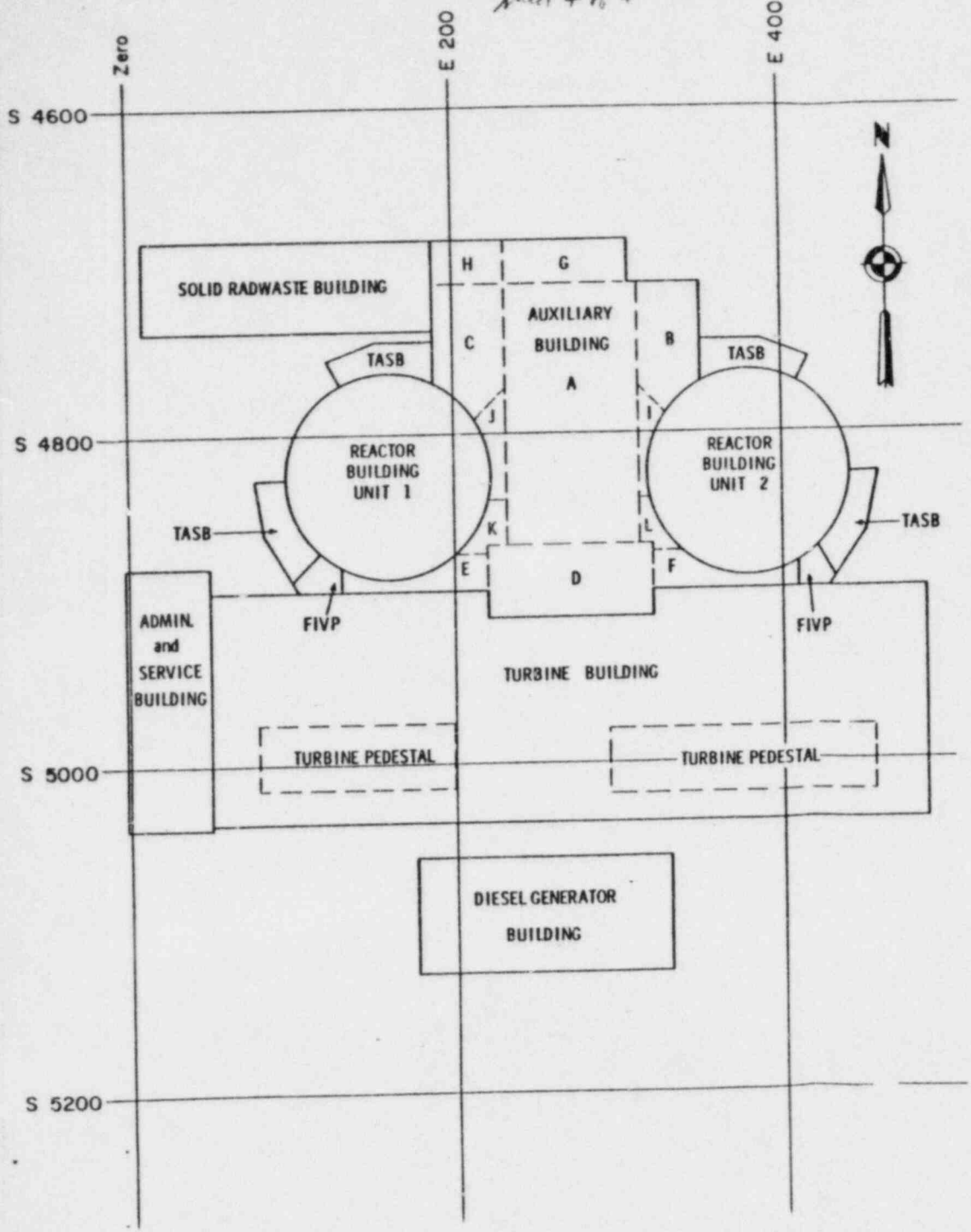
[3] Refer to Table 2.5-10 for description of Zone 2 soil.

[4] For these cases, the applied loads are less than or about equal to the depth of embedment times the unit weight of the soil. Therefore, net loads are negative or insignificant and the factor of safety against bearing capacity failure is not applicable. 44

2. LOAD IS TRANSFERRED TO AREAS D, E & F AS A RESULT OF THE UNDERPINNING OPERATION. (FROM K&L)

5. GROSS SOIL PRESSURE UNDER THE AREAS A THRU L ASSUME THE WATER TABLE IS AT EL. 585'-0.

Attachment 1
Sheet 4 of 4



		El_m	P_s	P_{n1}	P_{n2}
AREA FILL LOAD		603	4.03	4.03	2.53
SOLID RADWASTE BLDG		629.5	4.9	4.9	4.9
AUXILIARY BLDG	A	562	9.7	6.66	2.60
	B & C	579	2.9	1.04	-1.95
	D	609	5.3	5.3	4.18
	E & F	609	6.0	6.0	4.88
	G	630.5	0.9	0.9	0.9
	H	610	0.9	0.9	-0.16
	I & J	569	1.4	-1.15	-4.77
	K & L	579	0.8	-1.06	-4.05
REACTOR BLDGS 1 & 2		582.5	10.0	8.39	5.61
TURBINE BLDG.		609	3.0	3.0	1.88
TURBINE PEDESTALS (2)		602	5.0	4.87	3.31
DIESEL GENERATOR BUILDING		628	SEE	NOTE	6
FEEDWATER ISOLATION VALVE PIT (FIVP)		616.0	1.5	1.5	0.81
TENDON ACCESS SHAFT BUTTRESS (TASB)		587.5	1.0	-0.27	-2.73
ADMINISTRATION AND SERVICE BUILDING		629.5	4.5	4.5	4.5

NOTES:

1. El_m is the elevation of the bottom of the foundation,
2. P_s is the gross structural load.
3. P_{n1} is the net load intensity before the cooling water reservior filling $P_{n1} = P_s$ - Excavation load (corrected for bouyancy).
4. P_{n2} is the net load intensity after the cooling water reservior filling $P_{n2} = P_{n1}$ - Hydrostatic pressure.
5. All units for load intensity in kips per foot square (ksf), elevations in feet from U. S. G. S. datum.
6. $P_s = P_{n1} = P_n = 3.0$ ksf was used for the diesel generator building load and 2.0 ksf was used for the surcharge load for determining the influence on the power block structures only.

FOR INFORMATION ONLY

7220

RS-003-03

0 25 50 100 150 200
SCALE IN FEET

ATTACHMENT TO
CALC. NO. DQ 67(Q) Rev 0

SH 4

CONSUMERS POWER COMPANY
MIDLAND PLANT UNITS 1 & 2
FINAL SAFETY ANALYSIS REPORT

Soil Pressures Used
In Settlement Analysis
of Power Block
(CK-G-59, Rev 2)

FSAR Figure 2.5-47

Alert Level

All values up to the alert level are considered to be within normal working ranges.

Settlement readings should be reviewed by the resident structural engineer daily. In general, for readings below the alert level, attention should be focused on the value of the readings versus the construction progress and any indication of trends that would indicate the alert level will be exceeded.

Once the alert level is exceeded, the site resident engineer must inform engineering in Ann Arbor of the situation. The data including information from the other appropriate data mechanisms should be evaluated in total. Where trends exist that indicate the action level is likely to be reached, plans should be evaluated to remedy the situation. (Note: It is recognized that the evaluation may well conclude that no changes are warranted.)

Action Levels*

Differential settlement* values which reach the action level must be reviewed by the resident structural engineer and as soon as possible by engineering in Ann Arbor.

and actions described in Specification C-200
Plans, should be initiated to modify the condition that caused the settlement reading to ~~exceed~~ reach the action level. Consumers Power Company must be informed of the revised plan so that the NRC can be advised of the situation. The revised plan shall be initiated immediately upon verbal notification by the resident structural engineer. ~~(Note: It is recognized that the evaluation may well conclude that no changes are warranted.)~~ ~~If continuous movement beyond action level occurs, immediate action shall be taken per Specification C-200.~~

Requalify Level

~~(Requalify Level)~~

If the differential settlements reach 0.50 inch, the applicant will start discussions with NRC for consideration of and concurrence with future actions before implementing those actions.

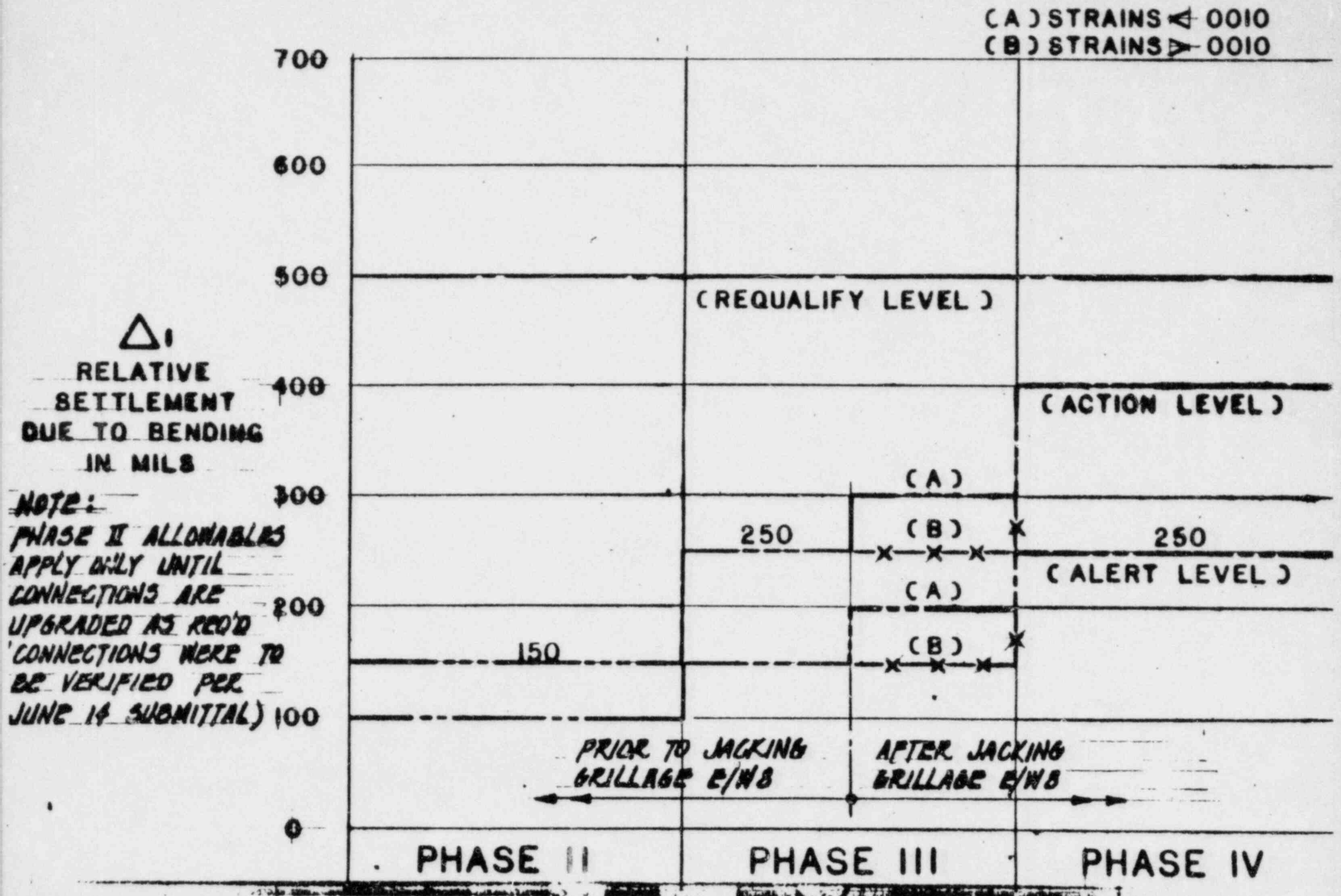
* - Cracking levels correspond to these definitions for Alert and Action.

/dj

072801

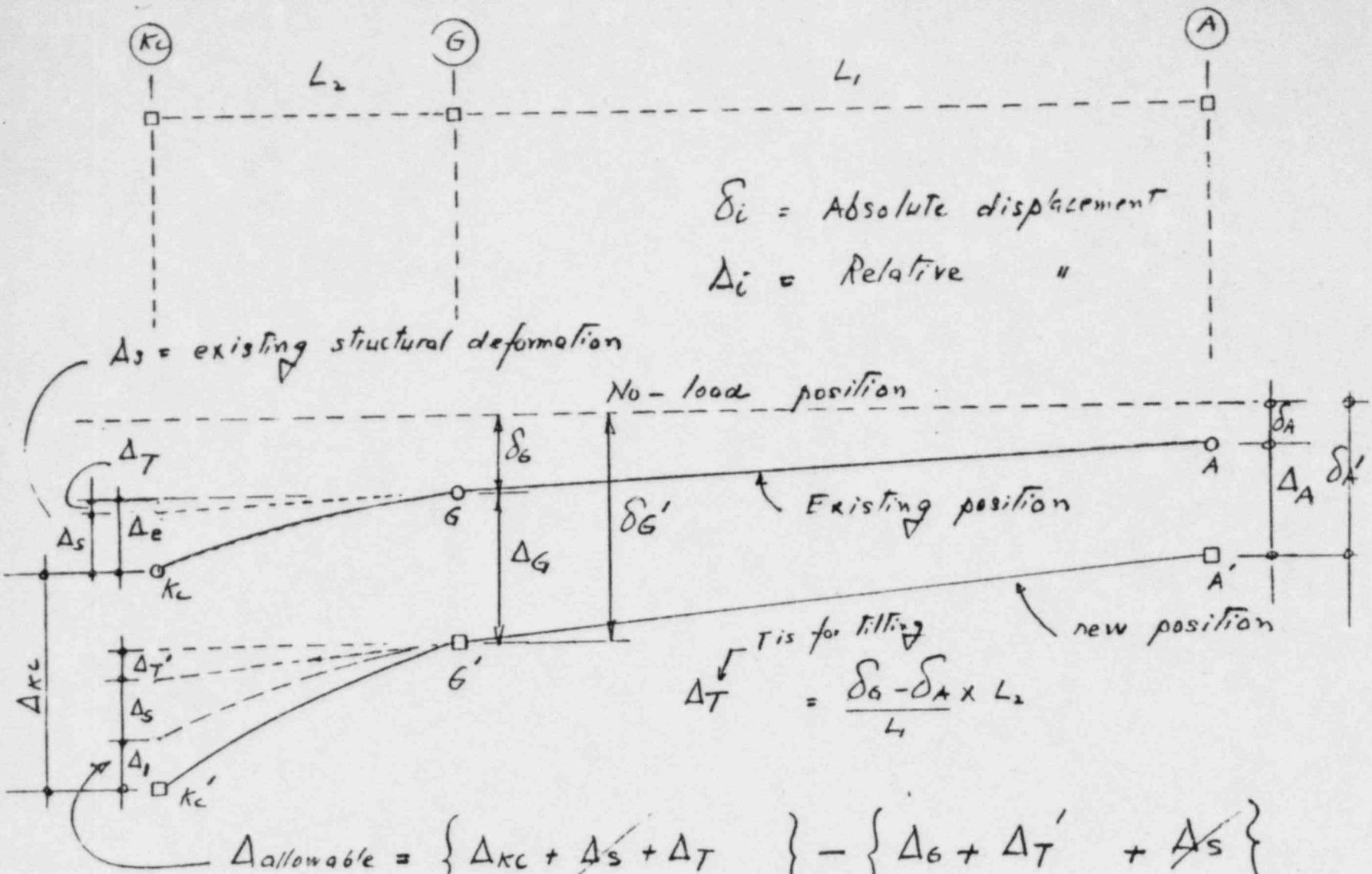
REMEDIAL SOILS

SETTLEMENT MONITORING MATRIX



Δ1 RELATIVE SETTLEMENT DUE TO BENDING IN MILS

NOTE:
PHASE II ALLOWABLES APPLY ONLY UNTIL CONNECTIONS ARE UPGRADED AS REQ'D (CONNECTIONS WERE TO BE VERIFIED PER JUNE 14 SUBMITTAL)



$$\Delta_{allowable} = \left\{ \Delta_{KC} + \cancel{\Delta_s} + \Delta_T \right\} - \left\{ \Delta_G + \Delta_T' + \cancel{\Delta_s} \right\}$$

$$= \Delta_{KC} + \Delta_T - \Delta_G - \Delta_T'$$

7/29/82

Attachment 4

CALCULATED DISPLACEMENTS AT DEEP SEATED BENCHMARKS

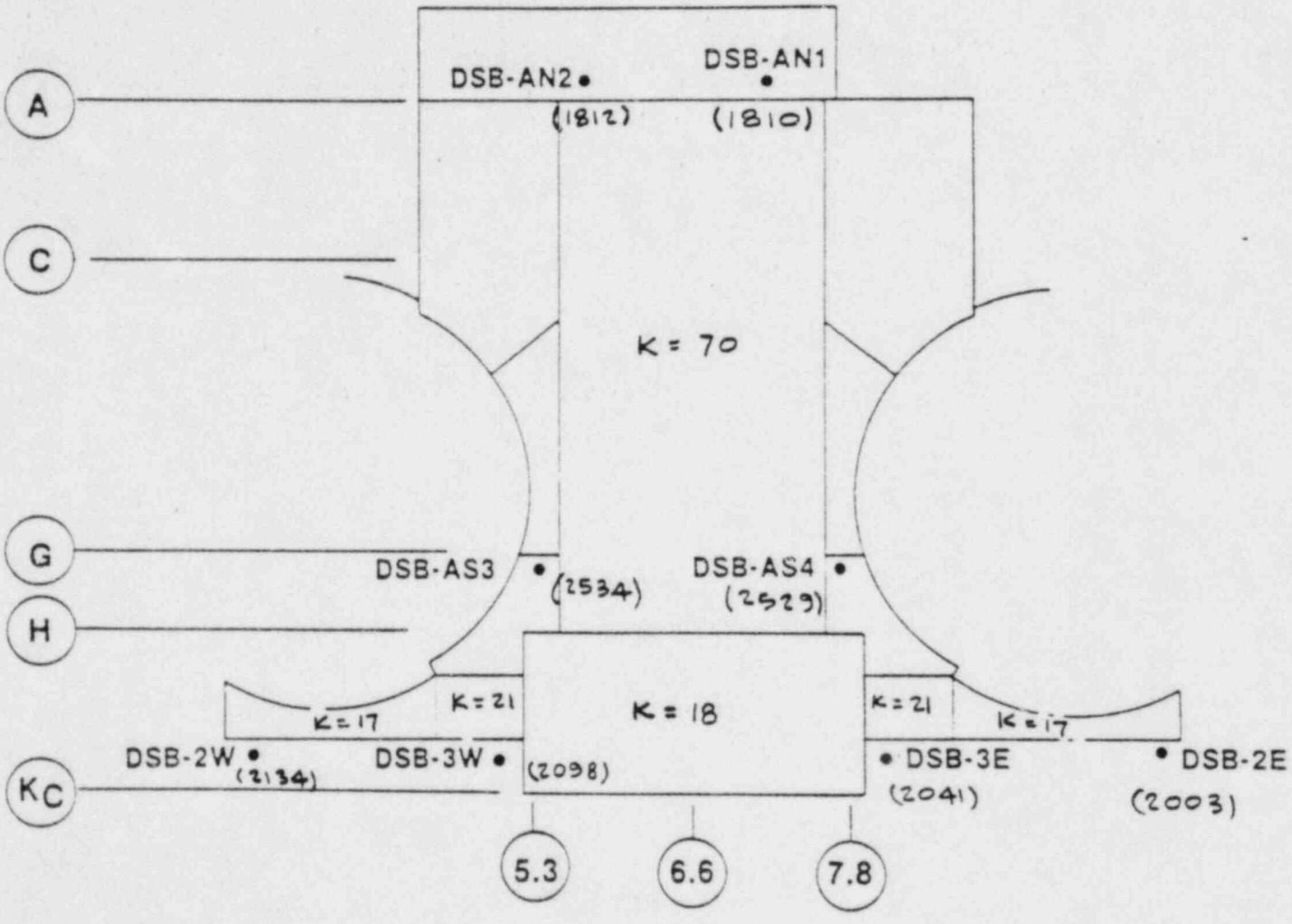


Figure 1

*Exact locations are shown on drawings C-1490 and C-1491

G-2516-02

BECHTEL

Attachment 4

501 (9/79)

DISPLACEMENTS WITH K = 70 KCF

NODE	BENCH MARK	EXIST NG ①	STAGE 1 ②	STAGE 1 ③	STAGE 2 ④	STAGE 2 ⑤	STAGE 3 ⑥	STAGE 3 ⑦	
1810	DSB-AN1	-1.03"	-0.974	-1.037	-1.007	-1.120	-0.560	-0.854	
1812	DSB-AN2	-1.10	-1.056	-1.117	-1.091	-1.204	-0.649	-0.942	
2003	" - 2E	-2.25	-2.484	-2.158	-2.158	-1.834	-3.915	-2.853	
2041	" - 3E	-2.36	-2.556	-2.315	-2.419	-1.993	-4.160	-3.021	
2038	" - 3W	-2.48	-2.688	-2.44	-2.563	-2.129	-4.333	-3.180	
2134	" - 2W	-2.54	-2.844	-2.492	-2.56	-2.197	-4.369	-3.265	
2529	" - AS4	-1.70	-1.776	-1.669	-1.72	-1.553	-2.48	-1.991	
2534	" - AS3	-1.182	-1.884	-1.772	-1.834	-1.663	-2.619	-2.118	

① - EXISTING DISPLACEMENTS
② - STAGE 1 SOIL REMOVAL
③ - " 1 " " + JACKING LOAD
④ - " 2 " "
⑤ - " 2 " " + JACKING LOAD
⑥ - " 3 " "
⑦ - " 3 " " + JACKING LOAD

ASSUMPTIONS

① ONLY 13 ELEMENTS REDUCED IN STIFFNESS

Attachment 4

CALCULATED DISPLACEMENTS AT DEEP SEATED BENCHMARKS

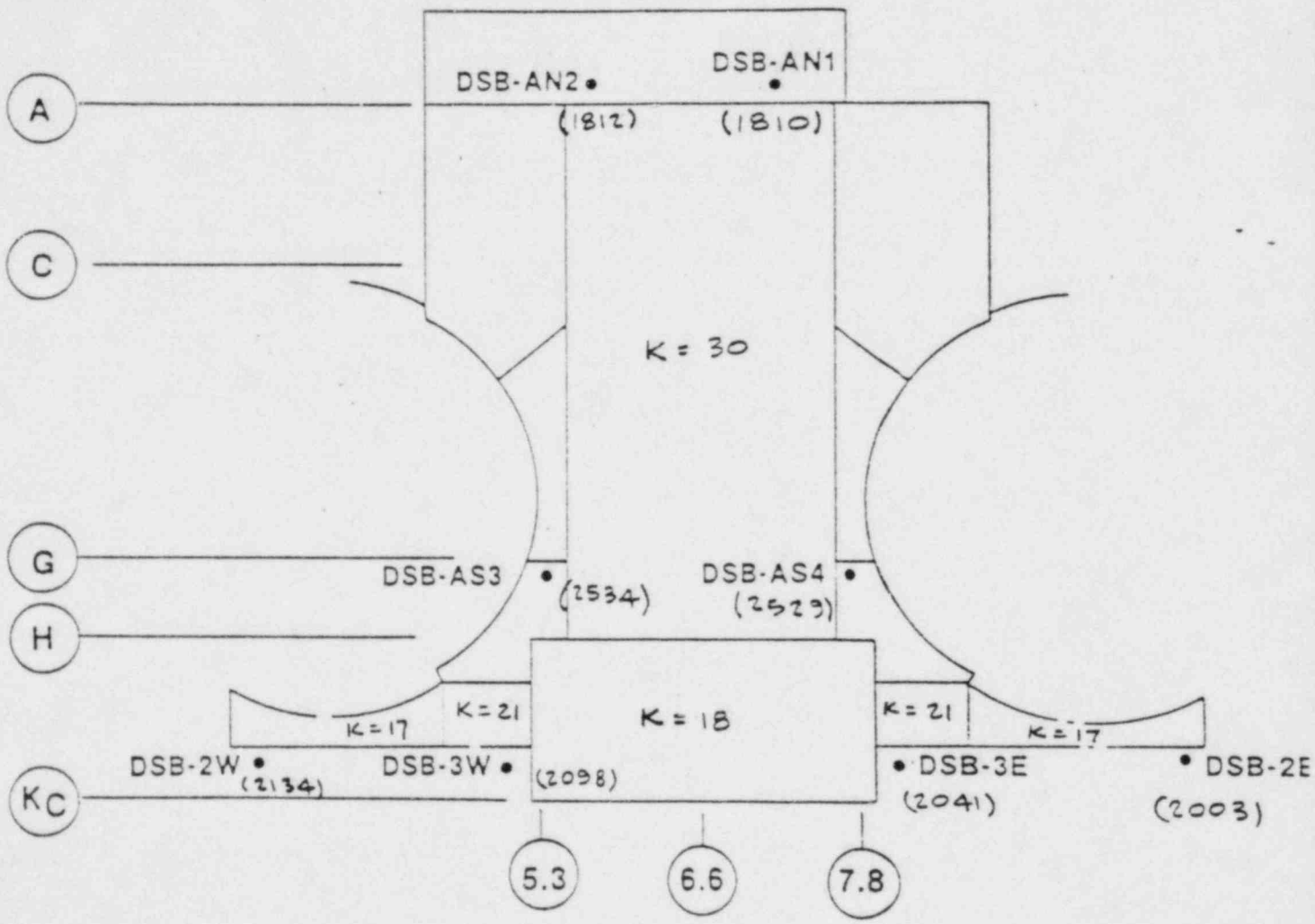


Figure 1

*Exact locations are shown on drawings C-1490 and C-1491

G 25-8-C2

Attachment 4

BECHTEL

DISPLACEMENTS WITH K = 30 KCF

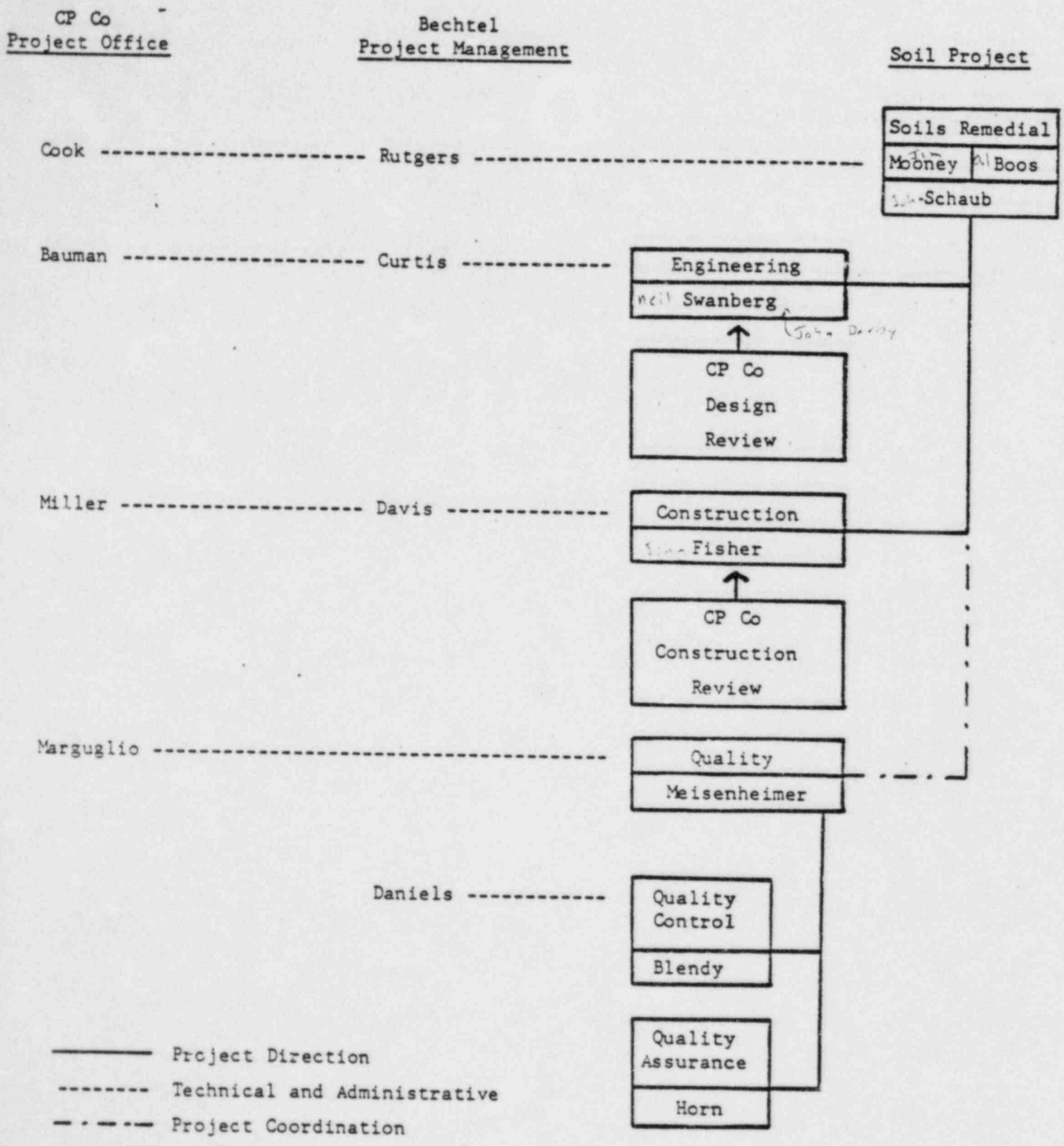
	EXISTING	1ST STAGE		2ND STAGE		3RD STAGE		4TH STAGE	
		3A	3A+3B	4A	4A+4B	5A	5A+5B	7A	7A+7B
1810	-2.79	-2.79"	-2.81"	-2.80"	-2.88"	-2.82	-2.93	-2.77	-2.83
1812	-2.83	-2.851"	-2.87"	-2.86"	-2.95"	-2.88	-2.99	-2.86	-2.92
2003	-3.26	-3.41"	-3.19"	-3.3"	-2.66"	-3.22	-2.38	-3.46	-3.12
2041	-3.32	-3.44"	-3.29"	-3.36"	-2.72"	-3.31	-2.44	-3.65	-3.28
2098	-3.34	-3.516"	-3.37"	-3.46"	-2.80"	-3.41	-2.52	-3.8	-3.42
2134	-3.46	-3.62"	-3.42"	-3.53"	-2.88"	-3.47	-2.62	-3.86	-3.50
2529	-3.08	-3.10"	-3.04"	-3.06"	-2.76	-3.06	-2.63	-3.28	-3.08
2534	-3.11"	-3.16"	-3.01"	-3.13"	-2.83"	-3.14	-2.69	-3.34	-3.20

3A	- STAGE 1	SOIL REMOVAL		
3A + 3B	- "	"	+ JACKING	LOAD
4A	- " 2	"	"	
4A + 4B	- " 2	"	+ JACKING	"
5A	- " 3	"	"	
5A + 5B	- " 3	"	+ JACKING	"
7A	- " 4	"	"	
7A + 7B	- " "	"	+ JACKING	"

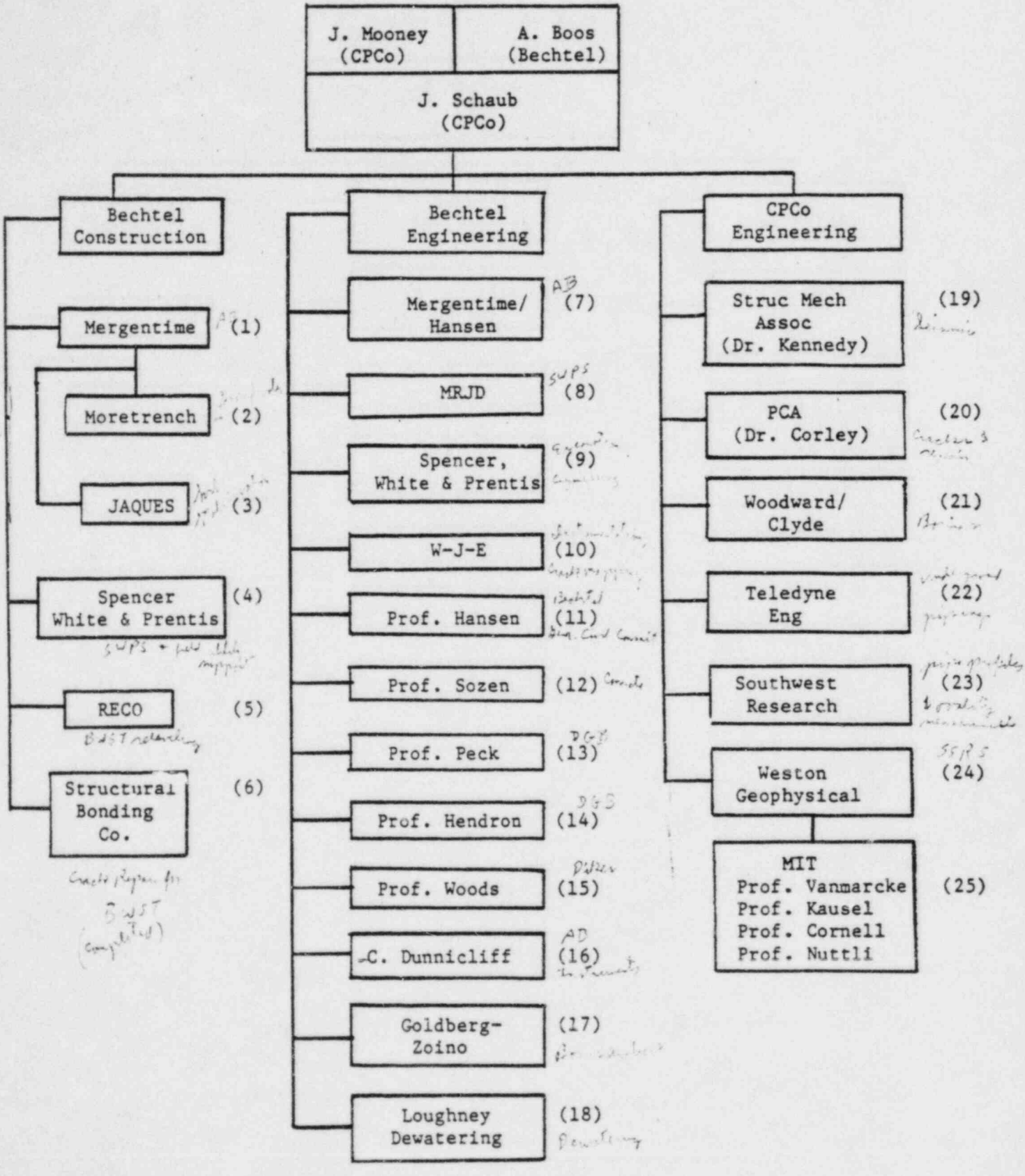
7/29/82

attachment 5

MIDLAND PROJECT



LIST OF SPECIALTY CONSULTANTS AND SUBCONTRACTORS FOR MIDLAND REMEDIAL SOILS WORK



LIST OF SPECIALTY CONSULTANTS
AND SUBCONTRACTORS FOR
MIDLAND REMEDIAL SOILS WORK

1.	Subcontractor	Performing underpinning of auxiliary building and FIVP foundation material replacement
2.	Subcontractor	Responsible for groundwater control in support of auxiliary building underpinning
3.	Subcontractor	Responsible for soils stabilization (if necessary)
4.	Subcontractor	Performing service water pump structure underpinning; also providing system for temporary support of utilities during fill replacement north of SWPS and CWIS
5.	Subcontractor	Has developed a proposal for and will relevel borated water storage tank 1T-60
6.	Subcontractor	Performed crack repair on BWST foundations
7.	Consultant	Providing input for design of auxiliary building underpinning and review major underpinning details of auxiliary building
8.	Consultant	Providing input for design of service water pump structure underpinning and review major underpinning details of auxiliary building and SWPS; also providing overview of construction at the Midland jobsite
9.	Consultant	Providing input for integrating SWPS underpinning and removal of soil in designated part of service water piping
10.	Consultant	Providing instrumentation of auxiliary building and SWPS to detect movement and measure strain of selected points; also developed procedures and performed crack mapping in auxiliary building and SWPS
11.	Consultant	Bechtel chief civil engineer's staff; reviews structural model, analytical technique and results of analysis for auxiliary building, SWPS, and BWST
12.	Consultant	Provides input to Bechtel regarding behavior of concrete, including variation of staffness due to cracking in concrete

13.	Consultant	Provided recommendations on remedial action for the diesel generator building and the general approach to permanent plant dewatering and underpinning
14.	Consultant	Provided recommendations on remedial action for the diesel generator building and the general approach to permanent dewatering and underpinning; provided testimonies on static and seismic stability, ECWR dikes, and the BWST soils aspects
15.	Consultant	Made dutch cone and shear wave velocity measurements; performed dike stability calculations and settlement calculations
16.	Consultant	Provided consulting services on instrumentation for diesel generator building
17.	Subcontractor	Performed laboratory and field soil tests and installed and monitored instrumentation
18.	Consultant and Subcontractor	Provided consulting and subcontract service on site temporary dewatering; subcontractor to SW&P on SWPS temporary dewatering
19.	Consultant	Provided overview of design basis, seismic criteria, and dynamic models for seismic analyses; separately performed seismic margin review for site specific response spectra earthquake
20.	Consultant	Performed evaluation of cracks in concrete structures, specifically, auxiliary building, FIVP, SWPS, and DGB under existing conditions, their effects on structural integrity and serviceability; will also be responsible for evaluation of concrete cracks during underpinning
21.	Subcontractor	Performed soil investigation through boring programs and developed laboratory test results
22.	Consultant	Overall consultant on underground piping; developed acceptance criteria for same
23.	Consultant	Performed pipe profile measurements
24.	Consultant	Developed site specific response spectra; performed seismic hazard analysis and soil amplification studies through fill material
25.	Consultants	Provide consulting services to Weston Geophysical for soil amplification, studies, seismic hazard analysis and seismology

SUMMARY OF SOIL CHARACTERISTICS FOR K-KRETE (1)

Attachment 6 sheet 1

	Case 2 (2)	Case 3 (2)	References	
Compression wave velocity	10,000 fps	10,000 fps	1,2	14 15
Shear wave velocity	5,000 fps	5,000 fps	1,2	18
Surface wave velocity	4,675 fps	4,675 fps	1,3	21
Maximum particle velocity (all wave types)	2.80 in/sec	3.61 in/sec	4	24 25
Maximum particle acceleration (all wave types)	23.16 in/sec^2	69.48 in/sec^2	3,5	28 29
Soil unit weight	130 pcf	130 pcf		32
Poisson's ratio	0.25	0.25		35
Angle of internal friction	25°	25°		38 39
Coefficient of lateral pressure	0.33	0.33		42 43
Coefficient of friction	0.700	0.700		46
Shear wave velocity (3)				47
E max	3,322 fps	3,322 fps		51
E min	1,500 fps	1,500 fps		53
Ultimate compressive strength	250 psi	250 psi		56 57
Maximum soil strain in/in	$(6.17)\ 10^{-5}$ in/in	$(1.85)\ 10^{-4}$ in/in	1	60 61
				63

(1) K-KRETE is a brand name for a type of low-strength fly ash concrete to be used in place of compacted backfill. 65 66

(2) The shear modulus and Young's modulus are assumed to remain constant with shear strain. 68 69

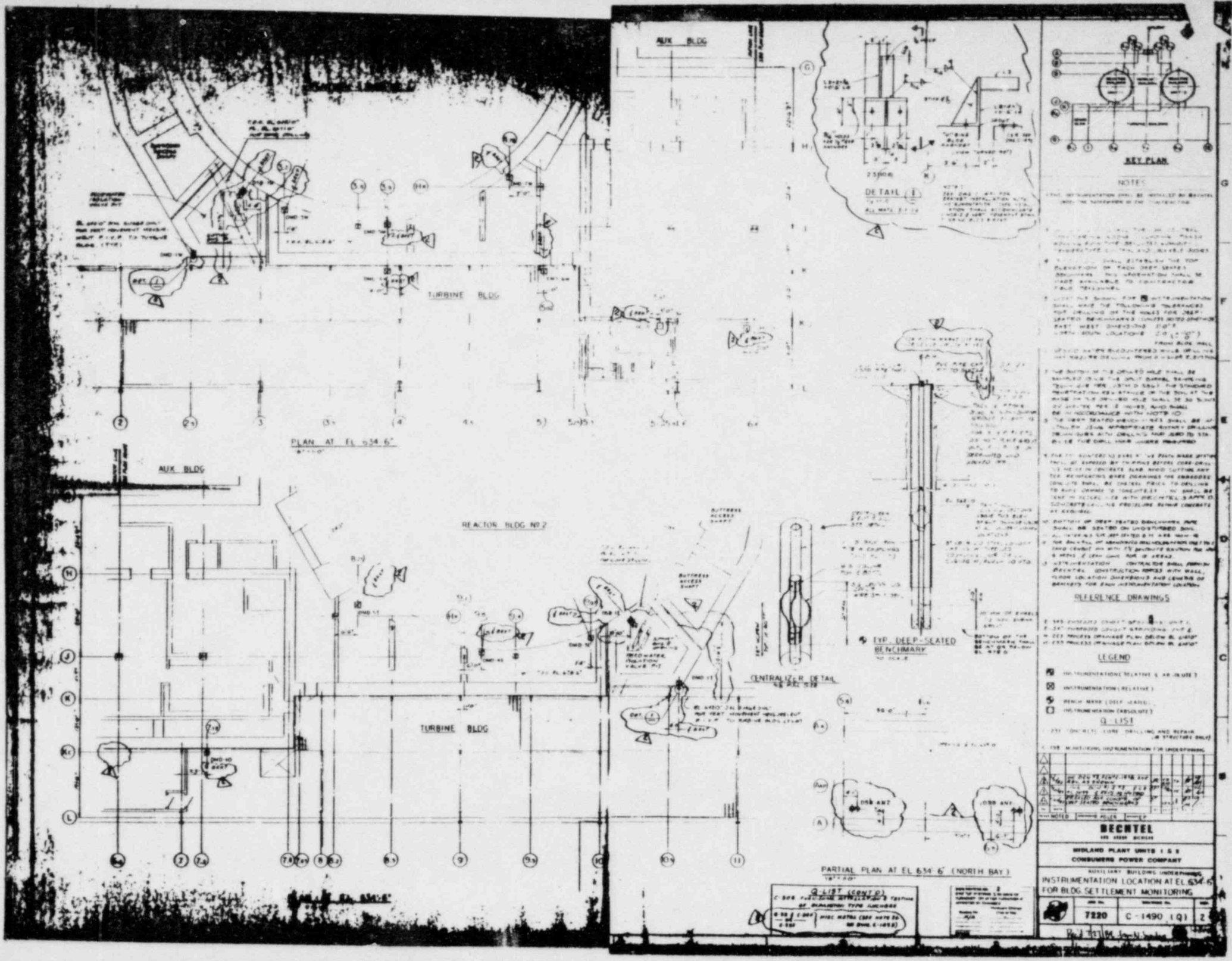
(3) SSE acceleration has been increased by 50% to provide a margin for the site-specific response spectra. 71 72

Enclosure 3

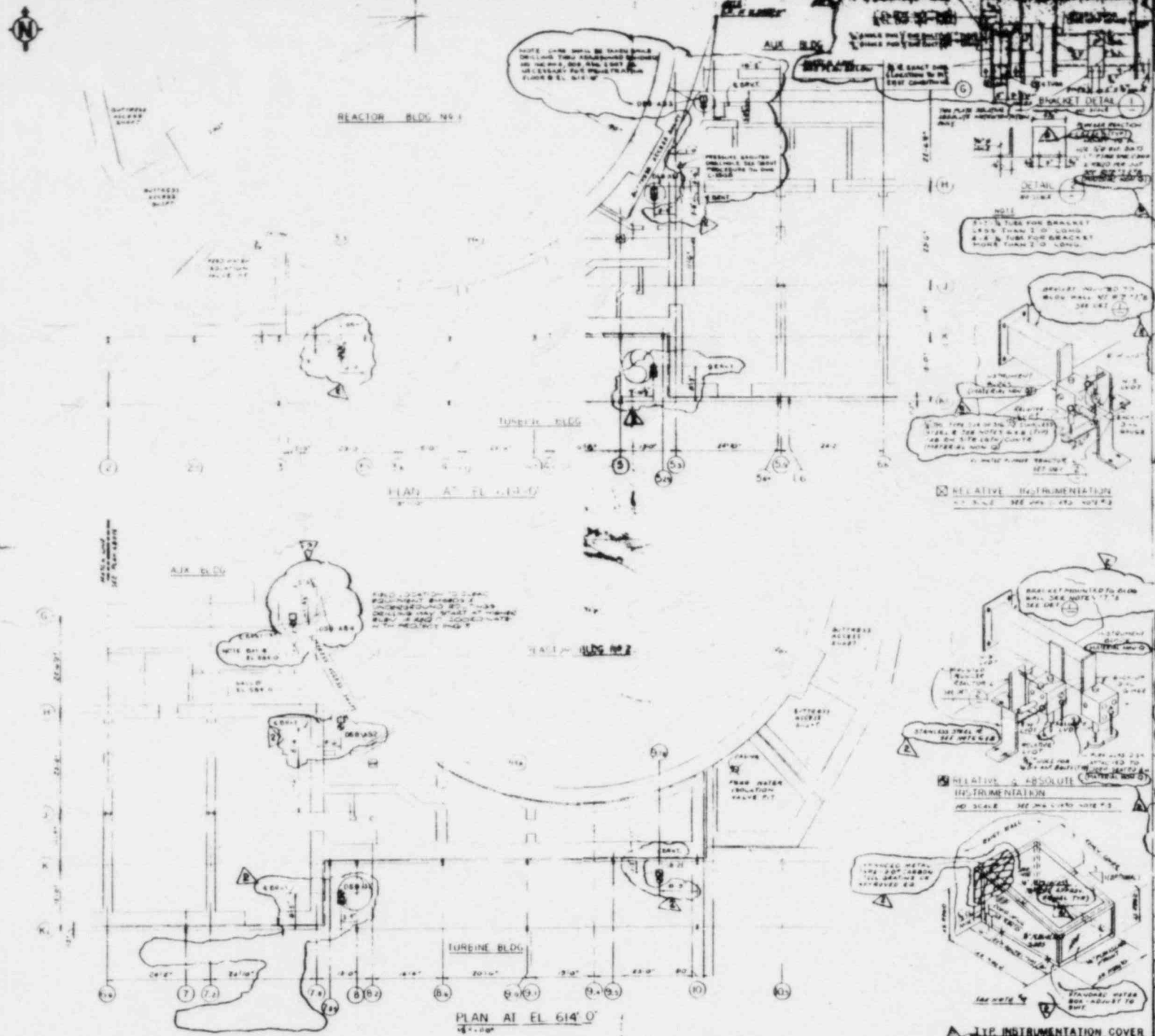
Attachment 7

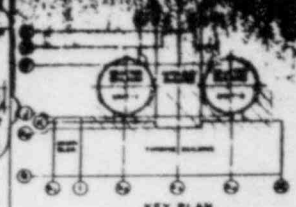
INDEX

Bechtel Drawing	7220-C-1490(Q), Rev. 2
Bechtel Drawing	7220-C-1491(Q), Rev. 2
Bechtel Drawing	7220-C-1493(Q), Rev. 1
Bechtel Drawing	7220-C-1495(Q), Rev. 0


AUX BLDG
TURBINE BLDG
PLAN AT EL 634'6"
REACTOR BLDG NO.2
TYP. DEEP-SEATED BENCHMARK
CENTRALIZER DETAIL
PARTIAL PLAN AT EL 634'6" (NORTH BAY)
DETAIL 1
KEY PLAN
NOTES
REFERENCE DRAWINGS
LEGEND
Q-LIST
BECHTEL
MIDLAND PLANT UNITS 1 & 2
CONSUMERS POWER COMPANY
INSTRUMENTATION LOCATION AT EL 634'-6"
FOR BLDG SETTLEMENT MONITORING
7220
C-1490 (Q)

C-1491





NOTES

Q LIST

BECHTEL

MIDLAND PLANT UNITS 1 & 2
CONSUMERS POWER COMPANY

INSTRUMENTATION LOCATION AT EL 614'-0"
FOR BLDG SETTLEMENT MONITORING

7220	C-1491	(Q)

C-1493(Q)

BUILDING MOVEMENT MONITORING MATRIX

NO.	LOCATION	MOVEMENT READINGS	MWA OPERATIONAL	MINIMUM FREQUENCY OF READING	INSTRUMENT	MOVEMENT LIMITS ALLOWABLE
[illegible]	[illegible]	[illegible]	BEFORE CONSTRUCTION SEQUENCE [illegible]	[illegible]	[illegible]	[illegible] HOLD
[illegible]	[illegible]	[illegible]	BEFORE CONSTRUCTION SEQUENCE [illegible]	[illegible]	[illegible]	[illegible] HOLD
[illegible]	[illegible]	[illegible]	BEFORE CONSTRUCTION SEQUENCE [illegible]	[illegible]	[illegible]	[illegible] HOLD
[illegible]	[illegible]	[illegible]	BEFORE CONSTRUCTION SEQUENCE [illegible]	[illegible]	[illegible]	[illegible] HOLD
[illegible]	[illegible]	[illegible]	BEFORE CONSTRUCTION SEQUENCE [illegible]	[illegible]	[illegible]	[illegible] HOLD
[illegible]	[illegible]	[illegible]	BEFORE CONSTRUCTION SEQUENCE [illegible]	[illegible]	[illegible]	[illegible] HOLD
[illegible]	AUX. BLDG. [illegible]	ABSOLUTE VERTICAL MOVEMENT [illegible]	BEFORE CONSTRUCTION SEQUENCE [illegible]	[illegible]	[illegible] DIAL GAUGE [illegible]	N/A
[illegible]	AUX. BLDG. [illegible]	ABSOLUTE VERTICAL MOVEMENT [illegible]	BEFORE CONSTRUCTION SEQUENCE [illegible]	[illegible]	[illegible] DIAL GAUGE [illegible]	N/A
[illegible]	AUX. BLDG. [illegible]	ABSOLUTE VERTICAL MOVEMENT [illegible]	BEFORE CONSTRUCTION SEQUENCE [illegible]	[illegible]	[illegible] DIAL GAUGE [illegible]	N/A
[illegible]	AUX. BLDG. [illegible]	ABSOLUTE VERTICAL MOVEMENT [illegible]	BEFORE CONSTRUCTION SEQUENCE [illegible]	[illegible]	[illegible] DIAL GAUGE [illegible]	N/A
[illegible]	AUX. BLDG. [illegible]	ABSOLUTE VERTICAL MOVEMENT [illegible]	BEFORE CONSTRUCTION SEQUENCE [illegible]	[illegible]	[illegible] DIAL GAUGE [illegible]	N/A
[illegible]	AUX. BLDG. [illegible]	ABSOLUTE VERTICAL MOVEMENT [illegible]	BEFORE CONSTRUCTION SEQUENCE [illegible]	[illegible]	[illegible] DIAL GAUGE [illegible]	N/A
[illegible]	[illegible]	DETECT VERTICAL RELATIVE MOVEMENT [illegible]	BEFORE CONSTRUCTION SEQUENCE [illegible]	[illegible]	[illegible] DIAL GAUGE [illegible]	N/A
[illegible]	[illegible]	RELATIVE HORIZONTAL AND VERTICAL MOVEMENT [illegible]	BEFORE CONSTRUCTION SEQUENCE [illegible]	[illegible]	[illegible] DIAL GAUGE [illegible]	N/A
[illegible]	TURBINE BLDG. [illegible]	RELATIVE HORIZONTAL AND VERTICAL MOVEMENT [illegible]	BEFORE CONSTRUCTION SEQUENCE [illegible]	[illegible]	[illegible] DIAL GAUGE [illegible]	N/A
[illegible]	[illegible]	RELATIVE HORIZONTAL AND VERTICAL MOVEMENT [illegible]	BEFORE CONSTRUCTION SEQUENCE [illegible]	[illegible]	[illegible] DIAL GAUGE [illegible]	N/A
[illegible]	[illegible]	RELATIVE HORIZONTAL AND VERTICAL MOVEMENT [illegible]	BEFORE CONSTRUCTION SEQUENCE [illegible]	[illegible]	[illegible] DIAL GAUGE [illegible]	N/A
[illegible]	[illegible]	RELATIVE HORIZONTAL AND VERTICAL MOVEMENT [illegible]	BEFORE CONSTRUCTION SEQUENCE [illegible]	[illegible]	[illegible] DIAL GAUGE [illegible]	N/A
[illegible]	CONTROL ROOM [illegible]	RELATIVE HORIZONTAL AND VERTICAL MOVEMENT [illegible]	BEFORE CONSTRUCTION SEQUENCE [illegible]	[illegible]	[illegible] DIAL GAUGE [illegible]	N/A
[illegible]	CONTROL ROOM [illegible]	RELATIVE HORIZONTAL AND VERTICAL MOVEMENT [illegible]	BEFORE CONSTRUCTION SEQUENCE [illegible]	[illegible]	[illegible] DIAL GAUGE [illegible]	N/A
[illegible]	CONTROL ROOM [illegible]	RELATIVE HORIZONTAL AND VERTICAL MOVEMENT [illegible]	BEFORE CONSTRUCTION SEQUENCE [illegible]	[illegible]	[illegible] DIAL GAUGE [illegible]	N/A
[illegible]	EPA WALL AND TURBINE STRUCTURE [illegible]	RELATIVE HORIZONTAL MOVEMENT [illegible]	BEFORE CONSTRUCTION SEQUENCE [illegible] (SEE NOTE 2B)	[illegible]	[illegible] DIAL GAUGE [illegible]	N/A

BUILDING MOVEMENT MONITORING MATRIX

NO.	LOCATION	MOVEMENT READINGS	MWA OPERATIONAL	MINIMUM FREQUENCY OF READING	INSTRUMENT	MOVEMENT LIMITS ALLOWABLE
[illegible]	CONTROL ROOM [illegible]	RELATIVE HORIZONTAL MOVEMENT [illegible]	BEFORE CONSTRUCTION SEQUENCE [illegible] (SEE NOTE 2B)	[illegible]	[illegible] DIAL GAUGE [illegible]	N/A
[illegible]	EPA WALL AND TURBINE STRUCTURE [illegible]	RELATIVE HORIZONTAL MOVEMENT [illegible]	BEFORE CONSTRUCTION SEQUENCE [illegible] (SEE NOTE 2B)	[illegible]	[illegible] DIAL GAUGE [illegible]	N/A
[illegible]	F.I.V.P. [illegible] TURBINE BLDG. [illegible]	DETECT RELATIVE VERTICAL MOVEMENT [illegible]	BEFORE CONSTRUCTION SEQUENCE [illegible]	[illegible]	[illegible] DIAL GAUGE [illegible]	N/A
[illegible]	REACTOR #1 WALL AND EPA FLOOR [illegible]	DETECT RELATIVE VERTICAL AND HORIZONTAL MOVEMENT [illegible]	BEFORE CONSTRUCTION SEQUENCE [illegible]	[illegible]	[illegible] DIAL GAUGE [illegible]	N/A
[illegible]	REACTOR #2 WALL AND EPA FLOOR [illegible]	DETECT RELATIVE VERTICAL AND HORIZONTAL MOVEMENT [illegible]	BEFORE CONSTRUCTION SEQUENCE [illegible]	[illegible]	[illegible] DIAL GAUGE [illegible]	N/A
[illegible]	REACTOR #2 WALL AND EPA FLOOR [illegible]	DETECT RELATIVE VERTICAL AND HORIZONTAL MOVEMENT [illegible]	BEFORE CONSTRUCTION SEQUENCE [illegible]	[illegible]	[illegible] DIAL GAUGE [illegible]	N/A

NOTES

[illegible]

TABLE 1

△4 MONITORING		
PIER JACKING	MONITORED BENCHMARK	FREQUENCY OF READING
[illegible]	[illegible]	@ EVERY LOAD INCREMENT
[illegible]	[illegible]	↓
[illegible]	[illegible]	↓
[illegible]	[illegible]	↓
[illegible]	[illegible]	↓
[illegible]	[illegible]	↓

BUILDING STRAIN MONITORING MATRIX (BEAMS, WALLS AND SLABS)

NUMBER	COLUMN LOCATION	MWA OPERATIONAL	MINIMUM FREQUENCY OF READING	INSTRUMENTS	PREDICTED ELONGATION PER UNIT LENGTH (IN/IN) (NOMINALLY SET @ 50% OF ALLOWABLE ELONGATION)	ALLOWABLE ELONGATION PER UNIT LENGTH (IN./IN.)
EX1	[illegible]	PRIOR TO [illegible] (SEE NOTE 5B)	[illegible]	[illegible] DIAL GAUGE	[illegible]	[illegible]
EX2	[illegible]	↓	↓	↓	↓	↓
EX3	[illegible]	↓	↓	↓	↓	↓
EX4	[illegible]	↓	↓	↓	↓	↓
EX5	[illegible]	↓	↓	↓	↓	↓
EX6	[illegible]	↓	↓	↓	↓	↓
EX7	[illegible]	↓	↓	↓	↓	↓
EX8	[illegible]	↓	↓	↓	↓	↓
EX9	[illegible]	↓	↓	↓	↓	↓
S1	[illegible]	↓	↓	1 STRAIN GAUGE	[illegible]	[illegible]
S2	[illegible]	↓	↓	1 STRAIN GAUGE	[illegible]	[illegible]

Q-LIST	
[illegible]	[illegible] FOR UNDERPINNING
[illegible]	CORRECTIVE ACTION DURING UNDERPINNING

ISSUED FOR CONSTRUCTION

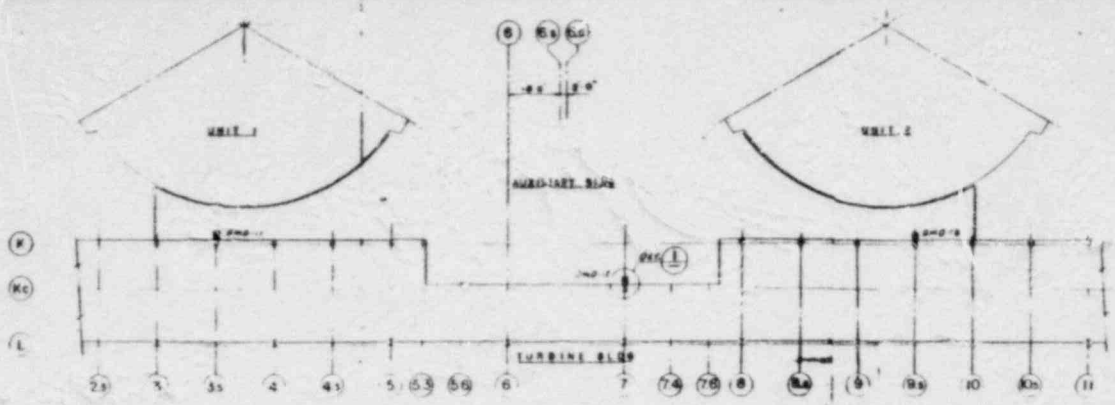
BECHTEL

MIDLAND PLANT UNITS 1 & 2
CONSUMERS POWER COMPANY

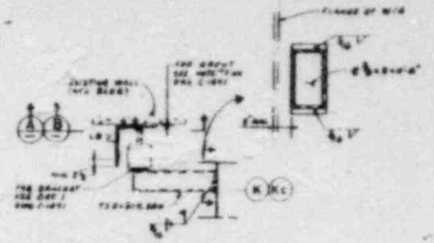
AUXILIARY BLDG. & F.I.V.P.
INSTRUMENTATION SYSTEM
MONITORING MATRIX SH.1

JOB No.	DRAWING No.	REV
7220	C-1493 (Q)	1

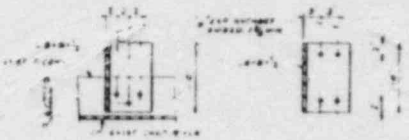
C-1495



PLAN AT ELEV. 695'-0"

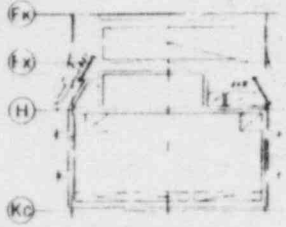


DETAIL 1

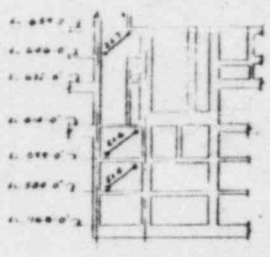


SECTION A

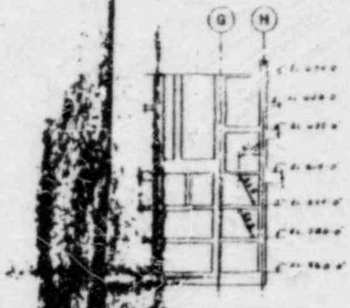
SECTION B



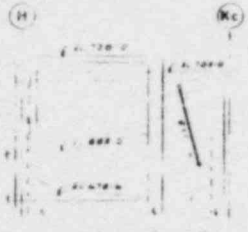
PLAN AT ELEV. 659'-0"



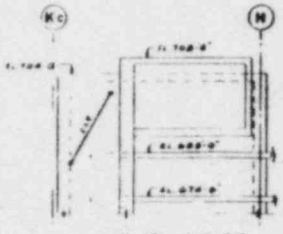
WALL AT COL. LINE 5.3 & 6.6



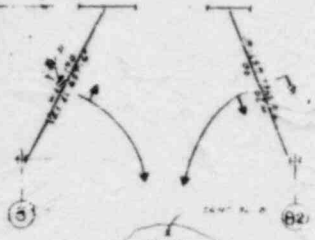
WALL AT COL. LINE 7 & 7.8



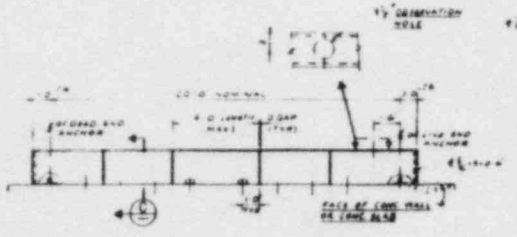
WALL AT COL. LINE 5.3



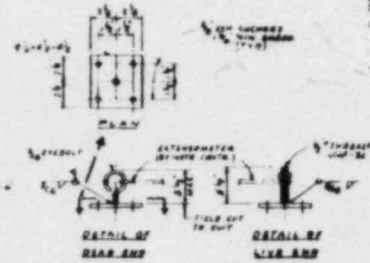
WALL AT COL. LINE 7.8

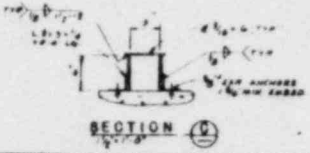


PLAN AT ELEV. 659'-0"

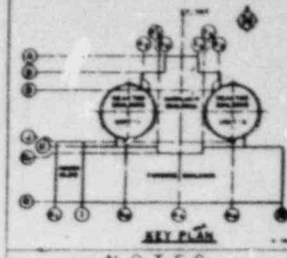


TYPICAL EXTENSOMETER SUPPORT BRACKETS & COVER





SECTION C



KEY PLAN

NOTES

REFERENCE DRAWINGS

Q LIST

BECHTEL

MIDLAND PLANT UNITS 1 & 2
CONSUMERS POWER COMPANY

DIX BLDG CONSTRUCTION UNDERPINNING

INSTRUMENTATION LOCATION FOR STRAIN & SETTLEMENT MONITORING

	7220	C-1495 (Q)	0

ATTACHMENT 21 DATE

MEETING SUMMARY DISTRIBUTION

NOV 8 5/84 1982

Docket No(s):
NRC/PDR
Local PDR
NSIC
PRC System
LB #4 r/f
Attorney, OELD
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Project Manager D. Hood
Licensing Assistant M. Duncan
RHernan
MMiller
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W. Shafer
E. Sullivan
J. P. Knight*
S. Black
M. A. Miller
D. Allison
M. Wilcove
R. Vollmer*
T. Novak
D. Eisenhut
N. Wright
H. Denton*

bcc: Applicant & Service List

NOV 8 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 25, 1982 MEETING ON INDEPENDENT DESIGN VERIFICATION PROGRAM

A meeting to discuss Midland's proposed Independent Design Verification Program (IDVP) was held October 25, 1982, between the NRC staff and representatives of Consumers Power Company (CPCo), Management Analysis Corporation (MAC), and TERA Corporation. Representatives of the Government Accountability Project (GAP), a public interest organization, also attended and provided statements. The list of attendees is provided in Enclosure 1. Viewgraph slides used during the meeting are shown in Enclosures 2 and 3.

CPCo, MAC, and TERA representatives reviewed the contents of an October 5, 1982, transmittal which proposes a three part IDVP: (1) an INPO type of construction and design evaluation by MAC, (2) a biennial audit by MAC, and (3) an IDVP of the auxiliary feedwater system by TERA. Overall integration of the program would be performed by MAC.

Following opening remarks by the applicant, the MAC representative described the proposed INPO type of Construction evaluation. This evaluation is intended only to review work in progress. It will investigate past work only as related to present deficiencies found by MAC and as time allows.

TERA representatives briefly addressed their company's participation in the performance of the Independent Design Verification or "vertical slice" of the IDVP. As proposed, TERA would be assessing the design of the Auxiliary Feedwater System (AFWS) of Unit 2 in terms of design adequacy and would review the as-built configuration on a limited basis. TERA would also be performing a sampling of design calculations and component inspections.

Questions were raised by the staff regarding the MAC-TERA interaction. The applicant explained that TERA personnel would be involved with the MAC-sponsored INPO evaluation, but each organization would report independently on its own review. MAC would then coordinate both reports into a single document and include conclusions derived from the overall integration of the two studies. This final report is presently scheduled for completion in late February of 1983.

The staff also asked how construction problems at Midland would be addressed in the IDVP. The staff noted that in its present form, the IDVP would not provide assurance of as-built construction adequacy and considers this to be a significant deficiency in the present proposal.

OFFICE ▶							
SURNAME ▶							
DATE ▶							

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

8211160118 54pp.

The staff requested clarification regarding the manner in which negative findings by TERA would be resolved. TERA representatives indicated that a determination would be made as to whether or not the error was random or systematic. The root cause of the error would then be determined and then recommendations would be made accordingly.

Another question evolved around direct INPO involvement in the INPO type Construction Evaluation. INPO will overview the final report but there will be no INPO personnel involved in the actual performance of the review.

The staff questioned if the probabilistic risk assessment (PRA) results had been utilized in choosing a system for review. The applicant replied that although a PRA had been performed on the AFWS, it had been chosen from the criteria cited in the October 5, 1982, letter. The applicant indicated that the choice was not biased due to previous review of this system.

The GAP representatives summarized selected comments contained in an October 22, 1982, letter (Enclosure 4) to H. R. Denton and J. G. Keppler. They suggested holding two public meetings: one to address "single-point accountability" (Enclosure 4, pgs. 13-15) and a second to address the charters of the independent contractors (Enclosure 4, pgs. 10-12). Discussion resulting from these comments related to the independence of MAC. The GAP representatives stated that because MAC had previously done QA audits at Midland they could not be considered independent contractors. The MAC representative replied that independence is achieved since none of the MAC personnel involved in this review have had any connection with Midland and also added that the review is broader in scope than those performed by MAC in the past. MAC further stated that, while exact figures were not available at this meeting, the income derived from its involvement with CPCo is not a major portion of MAC's overall income. In a letter of September 17, 1982, CPCo described an independent assessment to be performed by Stone and Webster (S&W) regarding underpinning activities for the Midland auxiliary building. The qualifications of S&W for this task were also questioned by GAP. The GAP representatives concluded by stating that they will provide supplementary comments as a result of the October 25 meeting.

At the conclusion of the meeting, the applicant asked for policy guidance from the staff regarding its proposal. The staff indicated that additional consideration regarding the extent of the program would be necessary. The agenda for this meeting did not include review of the independent assessment of the soils remedial work to be performed by S&W. The staff noted that it would consider an additional meeting for this purpose prior to an assessment of the overall independent design verification program.

The staff emphasized the importance of all firms engaged in this program providing copies of all written reports, including raw data, to the NRC at the same time as submitting them to the applicant. The staff discouraged the use of any verbal reports or closed meetings. The staff agreed to provide preliminary feedback to Consumers Power by October 29, 1982, and to arrange for additional meetings as deemed appropriate.

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

Enclosures: As stated

cc: See next page

OFFICE	DL:LB#4	DL:LB#4					
SURNAME	DHood:eb	EAdensam					
DATE	11/5 /82	11/ /82					

MEETING SUMMARY DISTRIBUTION

NOV 8 1982

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R. Vollmer*
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D. Eisenhut
N. Wright
H. Denton*

bcc: Applicant & Service List

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

NOV 8 1982

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

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 and 2

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5 pp.

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

Enclosures: As stated

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MIDLAND

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

NOV 8 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 25, 1982 MEETING ON INDEPENDENT DESIGN VERIFICATION PROGRAM

A meeting to discuss Midland's proposed Independent Design Verification Program (IDVP) was held October 25, 1982, between the NRC staff and representatives of Consumers Power Company (CPCo), Management Analysis Corporation (MAC), and TERA Corporation. Representatives of the Government Accountability Project (GAP), a public interest organization, also attended and provided statements. The list of attendees is provided in Enclosure 1. Viewgraph slides used during the meeting are shown in Enclosures 2 and 3.

CPCo, MAC, and TERA representatives reviewed the contents of an October 5, 1982, transmittal which proposes a three part IDVP: (1) an INPO type of construction and design evaluation by MAC, (2) a biennial audit by MAC, and (3) an IDVP of the auxiliary feedwater system by TERA. Overall integration of the program would be performed by MAC.

Following opening remarks by the applicant, the MAC representative described the proposed INPO type of Construction evaluation. This evaluation is intended only to review work in progress. It will investigate past work only as related to present deficiencies found by MAC and as time allows.

TERA representatives briefly addressed their company's participation in the performance of the Independent Design Verification or "vertical slice" of the IDVP. As proposed, TERA would be assessing the design of the Auxiliary Feedwater System (AFWS) of Unit 2 in terms of design adequacy and would review the as-built configuration on a limited basis. TERA would also be performing a sampling of design calculations and component inspections.

Questions were raised by the staff regarding the MAC-TERA interaction. The applicant explained that TERA personnel would be involved with the MAC-sponsored INPO evaluation, but each organization would report independently on its own review. MAC would then coordinate both reports into a single document and include conclusions derived from the overall integration of the two studies. This final report is presently scheduled for completion in late February of 1983.

The staff also asked how construction problems at Midland would be addressed in the IDVP. The staff noted that in its present form, the IDVP would not provide assurance of as-built construction adequacy and considers this to be a significant deficiency in the present proposal.

The staff requested clarification regarding the manner in which negative findings by TERA would be resolved. TERA representatives indicated that a determination would be made as to whether or not the error was random or systematic. The root cause of the error would then be determined and then recommendations would be made accordingly.

Another question evolved around direct INPO involvement in the INPO type Construction Evaluation. INPO will overview the final report but there will be no INPO personnel involved in the actual performance of the review.

The staff questioned if the probabilistic risk assessment (PRA) results had been utilized in choosing a system for review. The applicant replied that although a PRA had been performed on the AFWS, it had been chosen from the criteria cited in the October 5, 1982, letter. The applicant indicated that the choice was not biased due to previous review of this system.

The GAP representatives summarized selected comments contained in an October 22, 1982, letter (Enclosure 4) to H. R. Denton and J. G. Keppler. They suggested holding two public meetings: one to address "single-point accountability" (Enclosure 4, pgs. 13-15) and a second to address the charters of the independent contractors (Enclosure 4, pgs. 10-12). Discussion resulting from these comments related to the independence of MAC. The GAP representatives stated that because MAC had previously done QA audits at Midland they could not be considered independent contractors. The MAC representative replied that independence is achieved since none of the MAC personnel involved in this review have had any connection with Midland and also added that the review is broader in scope than those performed by MAC in the past. MAC further stated that, while exact figures were not available at this meeting, the income derived from its involvement with CPCo is not a major portion of MAC's overall income. In a letter of September 17, 1982, CPCo described an independent assessment to be performed by Stone and Webster (S&W) regarding underpinning activities for the Midland auxiliary building. The qualifications of S&W for this task were also questioned by GAP. The GAP representatives concluded by stating that they will provide supplementary comments as a result of the October 25 meeting.

At the conclusion of the meeting, the applicant asked for policy guidance from the staff regarding its proposal. The staff indicated that additional consideration regarding the extent of the program would be necessary. The agenda for this meeting did not include review of the independent assessment of the soils remedial work to be performed by S&W. The staff noted that it would consider an additional meeting for this purpose prior to an assessment of the overall independent design verification program.

The staff emphasized the importance of all firms engaged in this program providing copies of all written reports, including raw data, to the NRC at the same time as submitting them to the applicant. The staff discouraged the use of any verbal reports or closed meetings. The staff agreed to provide preliminary feedback to Consumers Power by October 29, 1982, and to arrange for additional meetings as deemed appropriate.

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Enclosures: As stated

cc: See next page

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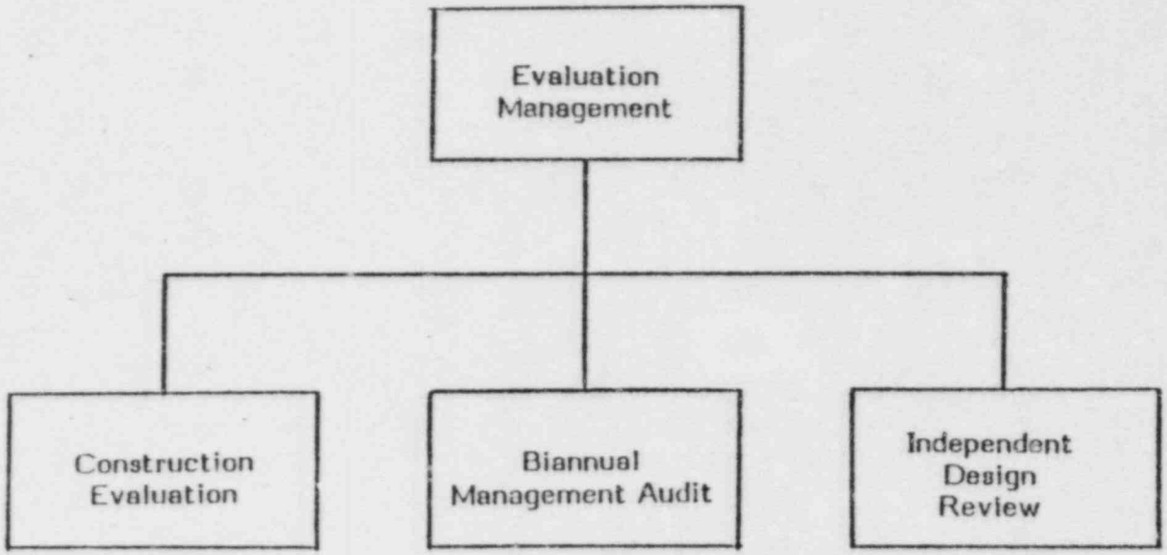
ENCLOSURE 2

MAC VIEWGRAPHS

MIDLAND EVALUATIONS



WHAT IS A CONSTRUCTION PROJECT EVALUATION

- TEAM INVESTIGATION
  - MULTI-DISCIPLINE
  - EXPERIENCED IN NUCLEAR INDUSTRY
  - DIVERSE FIELDS AND TALENTS

- DEVELOP FACTS
  - DOCUMENTATION REVIEW
  - OBSERVE WORK IN PROGRESS
  - INTERVIEWING

- ASSESS PERFORMANCE
  - MANAGEMENT INVOLVEMENT AND COMMITTMENT TO QUALITY
  - EXECUSION OF WORK
  - QUALIFICATIONS, EXPERIENCE AND TRAINING
  - QUALITY OF PROGRAMS

- MEASURE QUALITY
  - PERFORMANCE OBJECTIVES DEVELOPED BY INPO
  - INDUSTRY PRACTICES

KEY POINTS TO REMEMBER

- HORIZONTAL SLICE
- SNAP SHOT IN TIME
- GUIDELINES ON DEPTH OF INVESTIGATION

CONSTRUCTION EVALUATION

PROGRAM HISTORY

Late 1981	Industry Problems with Plants under Construction
January 1982	Industry met with Regulatory to Propose Corrective Action Plan
Feb. - June	INPO Chartered with Establishing Performance Objectives and Supporting Criteria
July - Aug.	Pilot Evaluation Conducted
Aug. - Sept.	Performance Objectives and Supporting Criteria Updated
Sept. - Dec.	Self-Initiated Evaluations Conducted

AD HOC COMMITTEE

D. SCHNELL, CHAIRMAN, UNION ELECTRIC COMPANY

J. COOK, ASST. CHAIRMAN, CONSUMERS POWER COMPANY

W. CAHILL, GULF STATES UTILITIES

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R. GLASSCOCK, WASHINGTON PUBLIC POWER SUPPLY COMPANY

T. MARTIN, PUBLIC SERVICE ELECTRIC & GAS COMPANY

M. McDUFFIE, CAROLINA POWER & LIGHT COMPANY

D. PATTERSON, TENNESSEE VALLEY AUTHORITY

W. SHEWSKI, COMMONWEALTH EDISON

W. SHIELDS, PUBLIC SERVICE INDIANA

H. TAUBER, DETROIT EDISON COMPANY

E. VAN BRUNT, ARIZONA PUBLIC SERVICE

PILOT EVALUATIONS

GPC - VOGTLE
W - PWR
BECHTEL (LA)
SOUTHERN COMPANY SERVICES

CP&L - SHEARON HARRIS
W - PWR
EBASCO

PSE&G- HOPE CREEK
GE - BWR
BECHTEL (SF)

LESSONS LEARNED

THE FOLLOWING IS A BRIEF SUMMARY OF "LESSONS LEARNED" FROM THE THREE PILOT EVALUATIONS:

A. SCHEDULE FLEXIBILITY

1. EVALUATORS MUST BE ABLE TO ADJUST THEIR SCHEDULE TO ACCOMODATE CHANGE IN PLANNED ACTIVITIES.

B. COMMUNICATIONS

1. THE EVALUATOR MUST TALK TO INDIVIDUALS AT THE WORKING LEVEL (CRAFTSMEN) WITHOUT THE PRESENCE OF SUPERVISION TO ENSURE A FREE FLOW OF INFORMATION.

2. DO MORE LISTENING THAN TALKING.

C. EVALUATION TECHNIQUES

1. UNANNOUNCED OBSERVATIONS OF ACTIVITIES IN PROGRESS ARE SUPERIOR TO THOSE SCHEDULED BY PRIOR NOTICE. THE LATTER TEND TO BE OVERSUPERVISED AND STAGED.

2. AN EFFECTIVE TOTAL EVALUATION INCLUDES OBSERVATIONS OF OTHER ACTIVITIES IN THE AREA AS WELL AS THE SUBJECT EVALUATION WHICH IS IN PROGRESS.

3. WHEN EVALUATING A WORK CONTROL SYSTEM, IT IS BEST TO TRACK A NONCONFORMING WORK ITEM SINCE IT CAN BETTER POINT OUT WEAKNESSES IN THE WORK CONTROL SYSTEM.

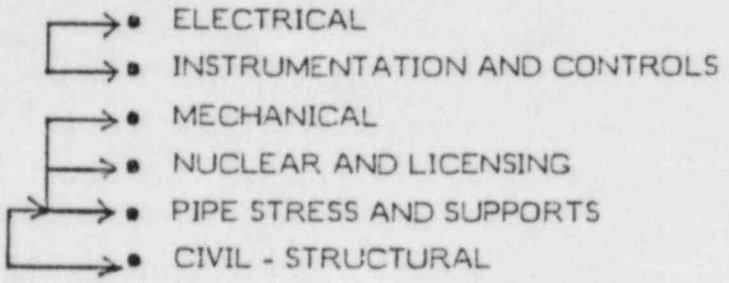
D. INTERVIEW TECHNIQUES

1. A PLANNED LINE OF QUESTIONING, WITH AN OBJECTIVE IN MIND, IS ESSENTIAL TO THE FORMULATION OF AN EFFECTIVE SCHEDULE.

E. EVALUATION TEAM COMPOSITION

1. THE MEMBERS OF THE EVALUATION TEAM SHOULD REPRESENT A CROSS SECTION OF VARIOUS DISCIPLINES AND VARIED PROFESSIONAL BACKGROUNDS. A MIXING OF ENGINEERING, CONSTRUCTION, QUALITY ASSURANCE AND QUALITY CONTROL PERSONNEL ENSURES THAT THE PERFORMANCE OBJECTIVES ARE ADEQUATELY ADDRESSED FROM VARIOUS PERSPECTIVES.

2. THE DESIGN TEAM SHOULD BE CAPABLE OF COVERING ALL DISCIPLINES (ARROWS SHOW LOGICAL OVERLAP).



3. IN ADDITION TO DISCIPLINE OVERLAP, TEAM MEMBERS SHOULD HAVE FAMILIARITY WITH QA, PROCUREMENT AND ORGANIZATION AND ADMINISTRATION FUNCTIONS.

EVALUATION CONTENT

OA ORGANIZATIONAL AND ADMINISTRATIVE

OA.1 ORGANIZATIONAL STRUCTURE

OWNER'S CORPORATE ORGANIZATION SHOULD ENSURE EFFECTIVE PROJECT MANAGEMENT CONTROL.

OA.2 MANAGEMENT INVOLVEMENT AND COMMITMENT TO QUALITY

SENIOR AND MIDDLE MANAGERS EXHIBIT INTEREST, AWARENESS AND KNOWLEDGE.

OA.3 THE ROLE OF FIRST-LINE SUPERVISORS AND MIDDLE MANAGERS

QUALIFIED BY VERIFIED BACKGROUND AND EXPERIENCE AND HAVE NECESSARY AUTHORITY.

DC DESIGN CONTROL

DC.1 DESIGN INPUTS

INPUTS SHOULD BE DEFINED AND CONTROLLED.

DC.2 DESIGN INTERFACES

EXTERNAL AND INTERNAL INTERFACES ARE IDENTIFIED AND COORDINATED.

DC.3 DESIGN PROCESS

MANAGEMENT OF THE DESIGN PROCESS IN COMPLIANCE WITH DESIGN REQUIREMENTS.

DC.4 DESIGN OUTPUT

DOCUMENTS SHOULD SPECIFY CONSTRUCTABLE DESIGNS.

DC.5 DESIGN CHANGES

CHANGES CONTROLLED TO ENSURE COMPLY WITH DESIGN REQUIREMENTS.

CC CONSTRUCTION CONTROL

CC.1 CONSTRUCTION ENGINEERING

CONTROLLED TO CONSISTENCY WITH BASIC DESIGN CRITERIA.

EVALUATION CONTENT (Continued)

CC.2 CONSTRUCTION FACILITIES AND EQUIPMENT

PLANNED, ACQUIRED, INSTALLED AND MAINTAINED.

CC.3 MATERIAL CONTROL

INSPECTED, CONTROLLED AND MAINTAINED.

CC.4 CONTROL OF CONSTRUCTION PROCESSES

MONITOR AND CONTROL PROCESSES TO ENSURE COMPLETED TO DESIGN REQUIREMENTS.

CC.5 CONSTRUCTION QUALITY INSPECTIONS

VERIFY AND DOCUMENT THAT PRODUCT MEETS DESIGNS AND QUALITY REQUIREMENTS.

CC.6 CONSTRUCTION CORRECTIVE ACTIONS

EVALUATE AUDITS, INSPECTIONS AND SURVEILLANCES AND TAKE CORRECTIVE ACTION.

CC.7 TEST EQUIPMENT CONTROL

EQUIPMENT SHOULD BE CONTROLLED.

PS PROJECT SUPPORT

PS.1 INDUSTRIAL SAFETY

PROGRAM SHOULD ACHIEVE HIGH DEGREE OF PERSONNEL SAFETY.

PS.2 PROJECT PLANNING

ENSURE IDENTIFYING, INTERRELATING AND SEQUENCING TASKS

PS.3 PROJECT CONTROL

ENSURE OBJECTIVES OF PROJECT PLANS ARE MET THROUGH USE OF PROJECT RESOURCES.

PS.4 PROJECT PROCUREMENT PROCESS

ENSURE EQUIPMENT, MATERIALS AND SERVICES MEET PROJECT REQUIREMENTS.

PS.5 CONTRACT ADMINISTRATION

METHODS FOR ADMINISTERING AND CONTROLLING CONTRACTORS AND MANAGING CHANGES.

PS.6 DOCUMENTATION MANAGEMENT

EFFECTIVE CONTROL AND COORDINATION OF DOCUMENTATION.

TN TRAINING

TN.1 TRAINING MANAGEMENT SUPPORT

EFFECTIVE PROGRAM FOR INDOCTRINATION, TRAINING AND QUALIFICATION.

TN.2 TRAINING ORGANIZATION AND ADMINISTRATION

ENSURE EFFECTIVE CONTROL AND IMPLEMENTATION.

TN.3 GENERAL TRAINING AND QUALIFICATION

EMPLOYEES RECEIVE INDOCTRINATION AND TRAINING REQUIRED TO PERFORM EFFECTIVELY.

TN.4 TRAINING FACILITIES, EQUIPMENT, AND MATERIAL

SUPPORT AND ENHANCE TRAINING ACTIVITIES

QP QUALITY PROGRAMS

QP.1 QUALITY PROGRAMS

PROGRAM APPROPRIATE, DEFINED CLEARLY AND UNDERSTOOD.

QP.2 PROGRAM IMPLEMENTATION

QUALITY ASSURANCE AND QUALITY CONTROL FUNCTIONS SUPPORT AND CONTROL PROJECT ACTIVITIES.

QP.3 INDEPENDENT ASSESSMENTS

EFFECTIVE, INDEPENDENT ASSESSMENT OF PROJECT ACTIVITIES.

QP.4 CORRECTIVE ACTIONS

CORRECTIONS OR IMPROVEMENTS RESOLVED IN EFFECTIVE AND TIMELY MANNER.

EVALUATION CONTENT (Continued)

TC TEST CONTROL

TC.1 TEST PROGRAM

VERIFY THE PLANT'S CAPABILITY TO OPERATE AS INTENDED.

TC.2 TEST GROUP ORGANIZATION AND STAFFING

ENSURE EFFECTIVE IMPLEMENTATION.

TC.3 TEST PLAN

PLAN AND SCHEDULE SUPPORT MAJOR SCHEDULE MILESTONES.

TC.4 SYSTEM TURNOVER FOR TEST

PROCESS CONTROLLED EFFECTIVELY.

TC.5 TEST PROCEDURES AND TEST DOCUMENTS

PROVIDE DIRECTION AND VERIFY OPERATIONAL AND DESIGN FEATURES.

TC.6 SYSTEM STATUS CONTROLS

METHOD TO IDENTIFY STATUS OF SYSTEM OR COMPONENT AND ORGANIZATION HOLDING CONTROL.

EVALUATION PROGRAM

PRE-PLANNING

- REVIEW PROJECT SCHEDULE
- SELECT CANDIDATE REVIEW AREAS:
  - COMPLEXITY
  - STATUS
  - INTERFACES
  - SAFETY SIGNIFICANCE
  - HISTORY OF PROBMEMS (PLANT AND INDUSTRY WIDE)
- REFINE LIST OF CANDIDATES WITH
- DEFINE REVIEW MATERIAL REQUIRED:
  - PROCEDURES
  - PSAR/FSAR COMMITMENTS
  - CRITERIA/SPECIFICATIONS
- DEVELOP TENTATIVE TEAM ASSIGNMENTS
- DEVELOP "HIT LIST" OF QUESTIONS FOR EVALUATION:
  - WHO
  - WHAT
  - WHY
  - WHEN

DETAIL PLANNING

- TOUR PLANT
- VIEW ALL CANDIDATE REVIEW AREAS
- SELECT AREAS:
  - DIVERSITY OF ACTIVITIES
  - MOST REPRESENTATIVE
- FIRM UP TEAM ASSIGNMENTS
- IDENTIFY UTILITY INTERFACE REPRESENTATIVE/S:
  - SENIOR PERSON
  - ACTIVITY INVOLVED
  - REPRESENTS UTILITY

EVALUATION PROGRAM (CONTINUED)

PERFORM EVALUATION OF AREA

- DEVELOP DAILY/HOURLY SCHEDULE
- OBSERVE ACTIVITIES
- INTERVIEW
- REQUEST BACK-UP INFORMATION
- REVIEW MATERIAL
- DISCUSS FINDINGS WITH OTHER TEAM MEMBERS
- REINVESTIGATE CONFLICTING INFORMATION
- DRAFT FINDINGS/OBSERVATIONS
- INFORMALLY REVIEW WITH UTILITY REPRESENTATIVE(S)
- CLOSE-OUT ANY OPEN ISSUES.

SUMMARIZATION

- COLLECT ALL DETAILS ONTO DATA SHEETS
- FINALIZE OBSERVATION INCORPORATING INPUT FROM OTHER TEAM MEMBER
- DRAFT DATA SHEETS
- REVIEW MATERIAL WITH UTILITY REPRESENTATIVE(S)
- CORRECT ANY ERRORS AND CLARIFY ISSUES AS REQUIRED
- FINALIZE DOCUMENTATION

REPRESENTATIVE AREAS FOR OBSERVATIONS

CIVIL

A. CONTROLLED COMPACTED FILL
B. SOIL CEMENT INSTALLATION
C. CONCRETE PLACEMENT
D. CADWELDING REBAR
E. EQUIPMENT GROUTING
F. STRUCTURAL STEEL RIGGING, BOLTING, WELDING
G. POST TENSIONING STRESSING OF A TENDON
H. MASONRY SEISMIC WALL INSTALLATION
I. APPLICATION OF COATINGS
J. WELDING OF POOL LINERS
K. INSTALLATION OF SEISMIC RESTRAINTS (SNUBBERS OR RIGID SUPPORTS)
L. PLACING OF IMBEDS
M. INSTALLATION OF DRILLED-IN ANCHORS

MECHANICAL

A. IN PLACE MAINTENANCE OF EQUIPMENT
B. PINE AND HVAC DUCT SUPPORT INSTALLATION
C. PIPE FABRICATION AND INSTALLATION
D. EQUIPMENT RIGGING
E. FIT-UP AND WELDING
F. PIPE ERECTION
G. INSTALLATION OF HVAC DUCTWORK
H. INSTRUMENTATION SYSTEM INSTALLATION
I. INSTRUMENTATION CALIBRATION
J. HYDRO TESTING
K. EQUIPMENT ALIGNMENT AND LEVELING
L. REACTOR INTERNALS INSTALLATION
M. POST WELD HEAT TREATING
N. VALVE ASSEMBLY AND/OR DISASSSEMBLY
O. BOLTING OF EQUIPMENT OR PIPE FLANGES

ELECTRICAL

A. EQUIPMENT INSTALLATION AND SETTING
B. BUS DUCT INSTALLATION
C. HANGERS AND SUPPORTS INSTALLATION
D. CABLE PULLING
E. CABLE TERMINATION
F. IN-PLACE MAINTENANCE OF EQUIPMENT
G. CABLE TRAY INSTALLATION
H. CONDUIT INSTALLATION
I. EQUIPMENT GROUTING
J. STORAGE OF EQUIPMENT
K. GROUDNING INSTALLATION
L. MAKING STRESS CONES AT SPLICES AND TERMINATIONS
M. CABLE SPLICING
N. BOLTING OF EQUIPMENT
O. EQUIPMENT, CONDUIT AND TRAY IDENTIFICATION
P. GENERAL
Q. CALIBRATION OF TOOLS

QUALITY CONTROL

A. SOIL TESTING
B. CONCRETE TESTING
C. NDE TESTING
D. RECEIVING INSPECTION
E. IN-PROCESS INSPECTION
F. FINAL INSPECTION
G. NONCONFORMANCE PROCESSING
H. INSPECTION PERSONNEL INTERFACING WITH OTHER PERSONNEL -- CRAFT, CONSTRUCTION, ENGINEERING, ETC.
I. QC SUPERVISORS PROVIDING DIRECTION TO SUBORDINATES
J. INSPECTORS PREPARING INSPECTION REPORTS
K. TRAINING SESSIONS
L. TREND ANALYSIS MEETING
M. CERTIFICATION TESTING (NDE PRACTICAL)
N. INSPECTORS INTERFACING WITH THE AUTHORIZED NUCLEAR INSPECTOR (ANI)

GENERIC PROBLEMS

PROBLEMS WHICH OCCUR ACROSS DISCIPLINES. THE TYPE OF PROBLEMS EVALUATION IS ATTEMPTING TO IDENTIFY.

EXAMPLES:

- TRAINING

  MAY BE IDENTIFIED BY OBSERVING QUALITY PROBLEMS CAUSED BY LACK OF TRAINING. SUCH AS:

  - WELDING
  - RIGGING
  - PAINTING/COATING
  - INSPECTING
  - DOCUMENT REVIEWS

- MANAGEMENT

  MAY BE IDENTIFIED BY MANAGEMENT ACTIVITIES WHICH AFFECT QUALITY:

  - SCHEDULING
  - BUDGETING
  - ENFORCEMENT OF QUALITY PROGRAM
  - INVOLVEMENT IN CONSTRUCTION QUALITY

- CORRECTIVE ACTION

  MAY BE IDENTIFIED BY OBSERVING INEFFECTIVE CORRECTIVE ACTIONS, SUCH AS:

  - NONCONFORMANCE DISPOSITION
  - DEFICIENCY RESOLUTIONS
  - NONCONFORMANCE IDENTIFICATION

- ROOTS CAUSES

  MAY BE A GENERIC PROBLEM IF NOT IDENTIFIED AND CORRECTED, MAY BE IDENTIFIED BY:

  - REPETITIVE DEFICIENCIES OR NONCONFORMANCES IN AN AREA
  - REPETITIVE MATERIAL OR EQUIPMENT DEFICIENCIES
  - CONTINUOUS OR FREQUENT DESIGN CHANGES

- PROGRAM DEFICIENCIES

  GENERALLY NOT AS FREQUENT A PROGLEM AS PROGRAM IMPLEMENTATION. MAY BE IDENTIFIED BY:

  - LACK OF PROCEDURE TO DESCRIBE AN ACTIVITY
  - PROBLEMS OCCURING WITH PROGRAM HAS NOT BEEN IDENTIF..D.

- PEOPLE NON-COMPLIANCE

  MAY BE IDENTIFIED BY:

  - OBSERVATION OF PROCEDURE NOT BEING FOLLOWED
  - DOCUMENTATION INACCURATE
  - ACTIVITY NOT PERFORMED

EVALUATION METHODOLOGY

- DOCUMENT REVIEW
- PRESENTATIONS (BY PROJECT STAFF)
- PLANT WALK DOWNS
- OBSERVATIONS
- INTERVIEWS
- DETAIL FACT FINDING
- SUMMARIZATION

PERF. OBJ. NO. ___

EVALUATION/CONTACT REPORT

EVALUATOR/S _____ DATE _____

CONTACTS _____

IDENTIFICATION (AREA, COMPONENT, ACTIVITY, ETC.) _____

_____

CRITERIA/S IMPACTED _____

REFERENCES _____

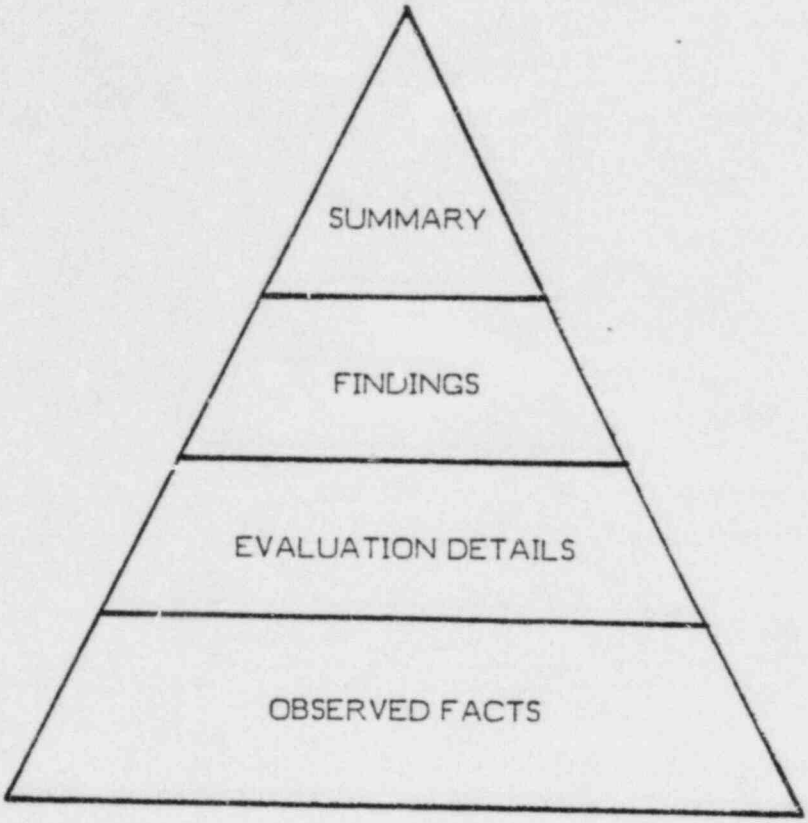
_____

_____

COMMENTS

FOLLOW-UP REQUIRED

VERIFICATION OF FOLLOW-UP _____

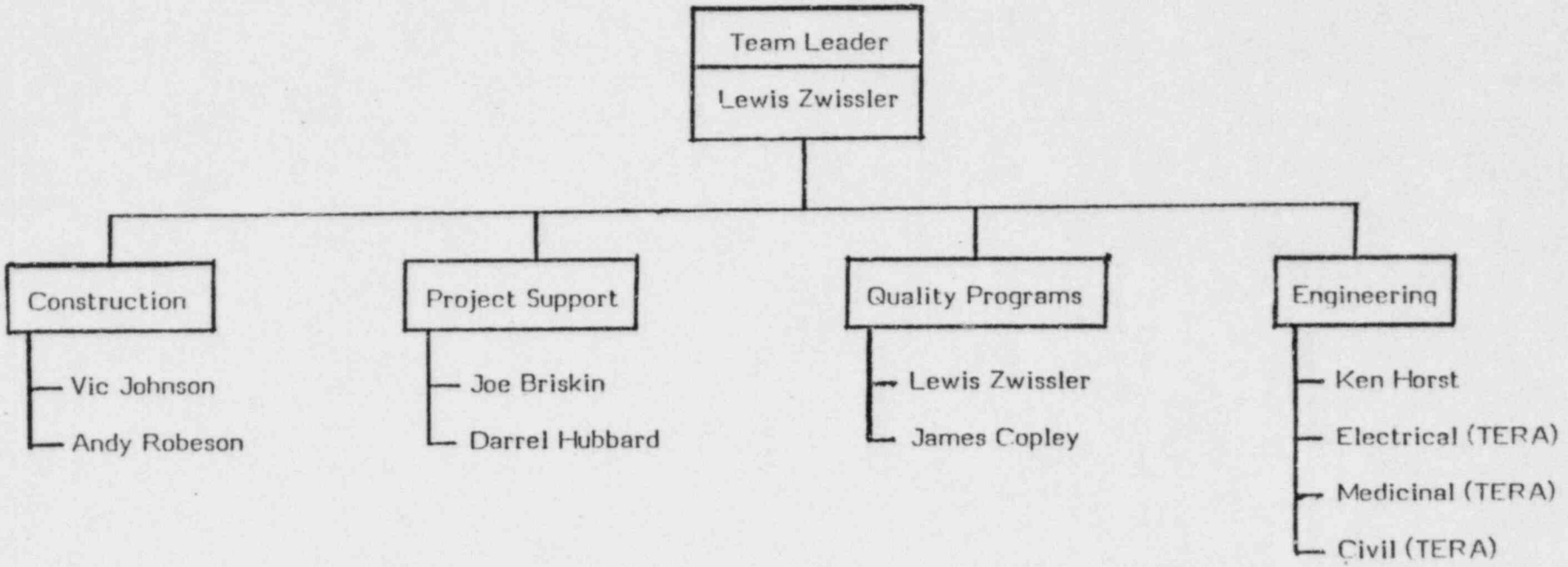


DEVELOPMENT OF AN EVALUATION

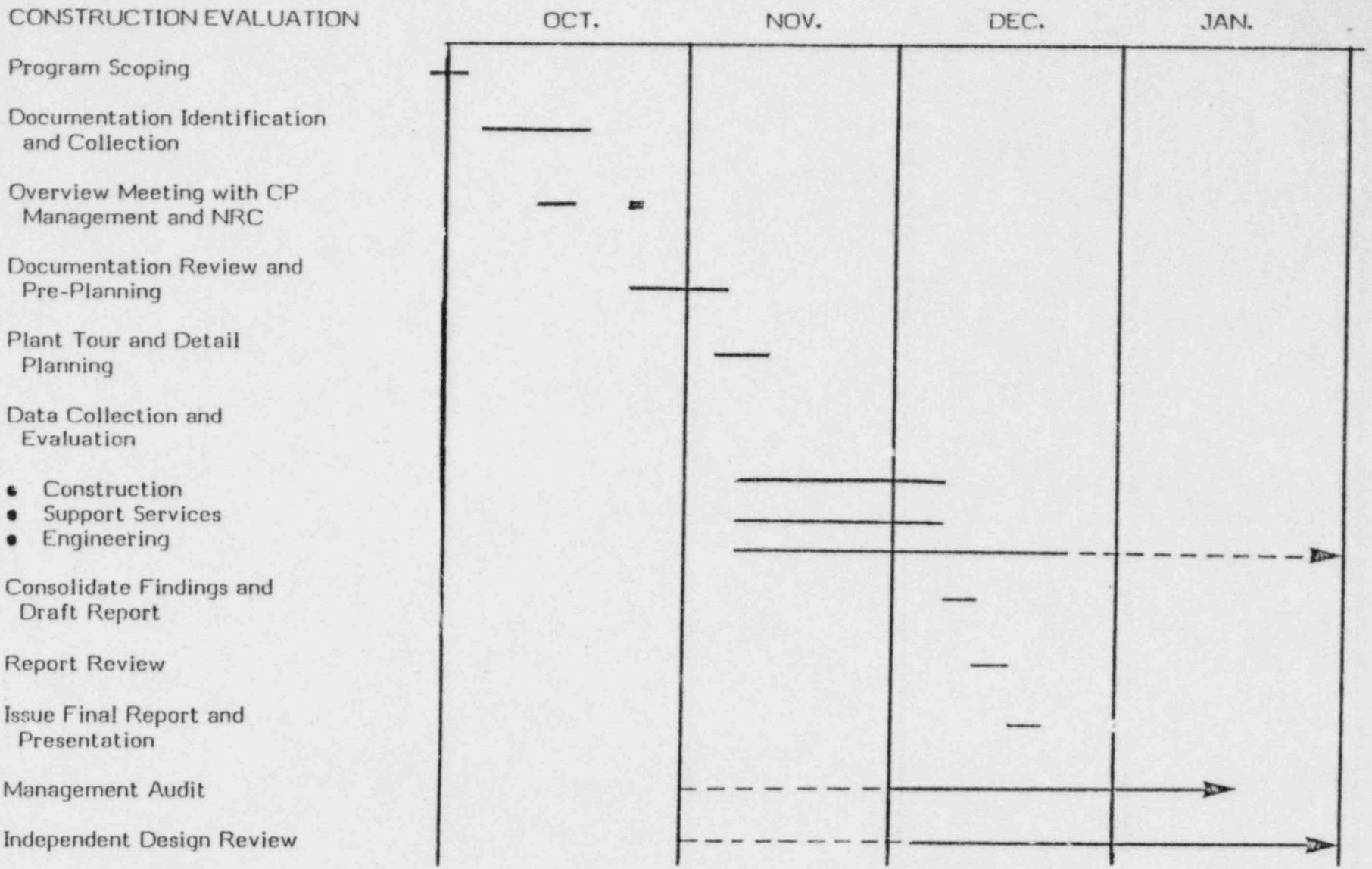
(By Performance Objective)

CONSTRUCTION EVALUATION

KEY TEAM MEMBERS



MIDLAND CONSTRUCTION EVALUATION SCHEDULE

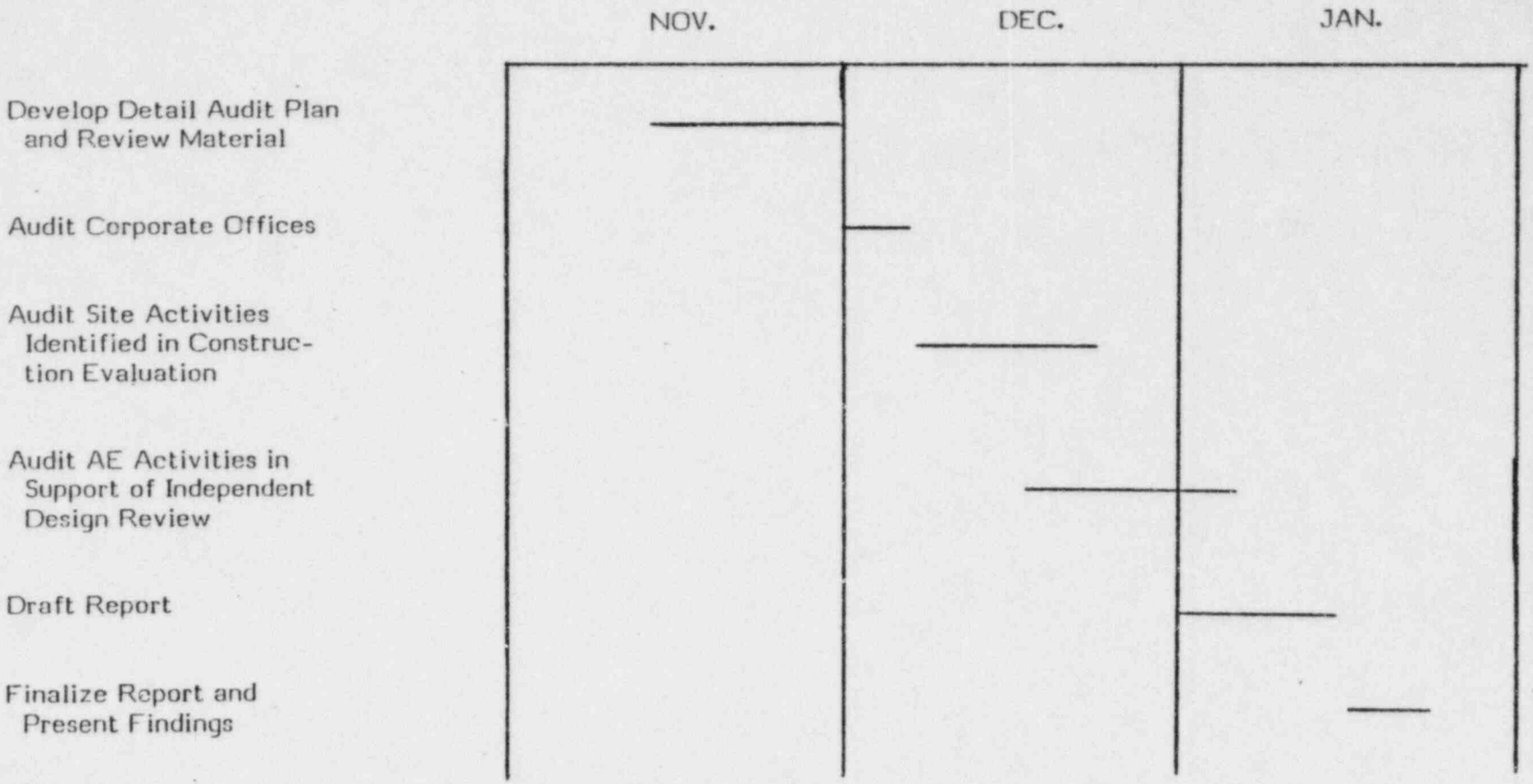


BIENNIAL QUALITY AUDIT

- EVALUATION OF QUALITY ASSURANCE PROGRAM
  - DEVELOP AN AUDIT PLAN
  - AUDIT CORPORATE OFFICES
  - AUDIT SITE ACTIVITIES
  - AUDIT AE ACTIVITIES

- COMPLIANCE WITH
  - REGULATORY GUIDE 1.144 (9/80, REV. 1)
  - REGULATORY GUIDE 1.146 (8/80, REV. 0)

MANAGEMENT AUDIT OF MIDLAND



ENCLOSURE 3

TERA VIEWGRAPHS

MIDLAND INDEPENDENT DESIGN VERIFICATION PROGRAM

OCTOBER 25, 1982

TERA CORPORATION

MIDLAND INDEPENDENT DESIGN VERIFICATION PROGRAM GOALS

PRIMARY GOAL

- PROVIDE AN INDEPENDENT EVALUATION OF THE QUALITY OF THE MIDLAND PLANT DESIGN

OBJECTIVES

- EVALUATE QUALITY OF DESIGN BY EVALUATING A SAMPLE (VERTICAL SLICE) OF ENGINEERED SYSTEMS, COMPONENTS AND STRUCTURES SUCH THAT RESULTS MAY BE EXTRAPOLATED TO SIMILARLY DESIGNED FEATURES WITH A HIGH DEGREE OF CONFIDENCE

- ADDRESS DESIGN CONTROL PROGRAMMATIC AREAS (E.G. DESIGN INPUTS/OUTPUTS, INTERFACES, PROCESS, CHANGES, ETC.)

- EVALUATE DESIGN FEATURES BY UTILIZING A COMBINATION OF METHODS SUCH AS:

  - REVIEW OF DESIGN CRITERIA, REGULATORY AND LICENSING COMMITMENTS

  - CHECK OF ANALYSES, CALCULATIONS AND EVALUATIONS

  - CONFIRMATORY ANALYSES, CALCULATIONS AND EVALUATIONS

  - CHECK OF DRAWINGS AND SPECIFICATIONS

- COMPARE INSTALLATION AGAINST AS-BUILT DRAWINGS

SYSTEM SELECTION CRITERIA

- IMPORTANCE TO SAFETY

- INCLUSION OF DESIGN INTERFACES

  - INVOLVES MULTIPLE DESIGN INTERFACES AMONG ENGINEERING DISCIPLINES AND DESIGN ORGANIZATIONS

- ABILITY TO EXTRAPOLATE RESULTS

  - DESIGN CRITERIA, DESIGN CONTROL PROCESS ARE SIMILAR TO OTHER SAFETY SYSTEMS

- DIVERSE IN CONTENT

  - SYSTEM INCLUDES DIVERSE FEATURES, THUS REQUIRING DESIGN INPUT FROM MAJOR ENGINEERING DISCIPLINES

- SENSITIVE TO PREVIOUS EXPERIENCE

  - PREVIOUSLY EXHIBITED PROBLEMS CAN BE TESTED

- ABILITY TO TEST AS-BUILT INSTALLATION

TECHNICAL REVIEW TASKS

- IDENTIFICATION OF DESIGN CHAIN INCLUDING DESIGN ORGANIZATIONS, THEIR INTERFACES AND DESIGN PRACTICES

- REVIEW OF 50.55e REPORTS, NONCONFORMANCE REPORTS, NRC REGION III AND IV INSPECTION REPORTS, CPC DESIGN QA MONITORING REPORTS

- DEVELOPMENT OF DETAILED REVIEW PROGRAM CHECKLIST

- IDENTIFICATION AND COLLECTION OF INFORMATION (PROCEDURES, SPECIFICATIONS, DRAWINGS, CALCULATIONS, ETC.)

- REVIEW OF DESIGN CRITERIA AND COMMITMENTS

  - IDENTIFICATION OF UNIQUE FEATURES, CIRCUMSTANCES, OR DESIGN CHANGES ASSOCIATED WITH EACH DESIGN AREA

  - REFINEMENT OF SCOPE

- DESIGN REVIEW

  - REVIEW OF IMPLEMENTING DOCUMENTS
  - CHECK OF ANALYSES, CALCULATIONS, AND EVALUATIONS
  - CONFIRMATORY CALCULATIONS OR EVALUATIONS
  - CHECK OF DRAWINGS AND SPECIFICATION
  - VERIFICATION OF CONFIGURATION

- IDENTIFICATION OF POTENTIAL FINDINGS

TECHNICAL REVIEW TASKS
(CONTINUED)

- EVALUATION OF SIGNIFICANCE OF FINDINGS
- SENIOR REVIEW TEAM EVALUATION
- FORWARDING OF FINDINGS TO DESIGN ORGANIZATIONS AND EVALUATION OF THEIR RESPONSE
- DOCUMENTATION/REPORTING

SCOPE OF DESIGN REVIEW

- REVIEW OF DESIGN CRITERIA AND COMMITMENTS
  - REGULATIONS
  - LICENSING COMMITMENTS
  - DESIGN OUTPUTS WHICH SERVE AS CRITERIA INPUTS TO OTHER DESIGN AREAS

- REVIEW OF IMPLEMENTING DOCUMENTS
  - EXISTENCE OF IMPLEMENTING DOCUMENT (E.G. PROJECT INSTRUCTIONS, DISCIPLINE DESIGN INSTRUCTIONS, CALCULATIONS/EVALUATIONS ETC.)
  - DESIGN CRITERIA PROPERLY DEFINED AND INTERPRETED
  - CLOSEOUT (CALCULATIONS/EVALUATIONS SIGNED OFF IN ACCORDANCE WITH INSTRUCTIONS)

- CHECK OF ANALYSES, CALCULATIONS AND EVALUATIONS
  - SAMPLING CHECK OF ORIGINAL ANALYSES, CALCULATIONS OR EVALUATIONS; REVIEW OF
    - DESIGN INPUTS (INCORPORATION OF DESIGN CRITERIA, CONFORMANCE WITH COMMITMENTS, TRANSFER OF INFORMATION)
    - ASSUMPTIONS

SCOPE OF DESIGN REVIEW
(continued)

- METHODOLOGY (INCLUDING ANALYTICAL TECHNIQUES, EVALUATION PROCEDURES)
- VALIDATION AND USE OF COMPUTER CODES
- REVIEW OF OUTPUTS
- COMPLIANCE WITH CODES, STANDARDS, NRC GUIDANCE

- CONFIRMATORY CALCULATIONS OR EVALUATIONS
  - "BLIND" INDEPENDENT RE-ANALYSIS OR RE-EVALUATION FOR SELECTED DESIGN AREA(S)
  - INDEPENDENT RE-ANALYSIS OR RE-EVALUATION FOR DESIGN AREA THAT MAY BE SUSPECT ON BASIS OF A REVIEW OF ORIGINAL CALCULATIONS OR EVALUATIONS
  - ALTERNATIVE TECHNIQUES, SIMPLE BOUNDING EVALUATIONS OR DETAILED ANALYTICAL TECHNIQUES MAY BE EMPLOYED

- CHECK OF DRAWINGS AND SPECIFICATIONS
  - VERIFICATION THAT THE DRAWING OR SPECIFICATION REFLECTS DESIGN REQUIREMENTS SPECIFIED IN THE DESIGN CALCULATIONS OR EVALUATIONS

SCOPE OF DESIGN REVIEW
(continued)

- VERIFICATION OF CONFIGURATION
  - INSTALLATION OF SYSTEM IN ACCORDANCE WITH P&IDs
  - INSTALLATION OF COMPONENTS AND PIPING IN ACCORDANCE WITH ARRANGEMENT DRAWINGS AND ISOMETRICS (APPROXIMATE LOCATION AND ORIENTATION)
  - INSPECTION OF SELECTED FEATURES FOR COMPLIANCE WITH DESIGN DETAILS (APPROXIMATE DIMENSIONS)
  - VERIFICATION THAT EQUIPMENT PART NUMBERS AGREE WITH DRAWINGS AND SPECIFICATIONS

PRELIMINARY MIDLAND INDEPENDENT DESIGN VERIFICATION REVIEW MATRIX FOR THE AUXILIARY FEEDWATER SYSTEM

DESIGN AREA	SCOPE OF REVIEW					
	REVIEW OF DESIGN CRITERIA AND COMMITMENTS	REVIEW OF IMPLEMENTING DOCUMENTS	CHECK OF CALCULATIONS AND EVALUATIONS	CONFIRMATORY CALCULATION OR EVALUATION	CHECK OF DRAWINGS AND SPECIFICATIONS	VERIFICATION OF CONFIGURATIONS
I. AFW SYSTEM PERFORMANCE REQUIREMENTS						
SYSTEM OPERATING LIMITS	X	X	X			
ACCIDENT ANALYSIS CONSIDERATIONS	X					
SINGLE FAILURE	X	X	X			
TECHNICAL SPECIFICATIONS	X					
SYSTEM ALIGNMENT/SWITCHOVER	X	X				
REMOTE SHUTDOWN	X					
SYSTEM ISOLATION/INTERLOCKS	X	X				
OVERPRESSURE PROTECTION	X					
COMPONENT FUNCTIONAL REQUIREMENTS	X	X	X		X	
SYSTEM HYDRAULIC DESIGN	X	X	X			
SYSTEM HEAT REMOVAL CAPABILITY	X	X	X			
COOLING REQUIREMENTS	X					
WATER SUPPLIES	X	X				
PRESERVICE TESTING/CAPABILITY FOR OPERATIONAL TESTING	X					
POWER SUPPLIES	X	X				
ELECTRICAL CHARACTERISTICS	X					
PROTECTIVE DEVICES/SETTINGS	X	X			X	
INSTRUMENTATION	X	X	X		X	
CONTROL SYSTEMS	X	X	X			
ACTUATION SYSTEMS	X					
NDE	X					
MATERIALS SELECTION/TRACEABILITY	X					

PRELIMINARY MIDLAND INDEPENDENT DESIGN VERIFICATION REVIEW MATRIX FOR THE AUXILIARY FEEDWATER SYSTEM (CONTINUED)

DESIGN AREA	SCOPE OF REVIEW					
	REVIEW OF DESIGN CRITERIA AND COMMITMENTS	REVIEW OF IMPLEMENTING DOCUMENTS	CHECK OF CALCULATIONS AND EVALUATIONS	CONFIRMATORY CALCULATION OR EVALUATION	CHECK OF DRAWINGS AND SPECIFICATIONS	VERIFICATION OF CONFIGURATIONS
II. AFW SYSTEM PROTECTION FEATURES						
SEISMIC DESIGN	X					
• PRESSURE BOUNDARY	X	X	X	X	X	
• PIPE/EQUIPMENT SUPPORT	X	X	X	X	X	X
• EQUIPMENT QUALIFICATION	X	X	X		X	X
HIGH ENERGY LINE BREAKS	X					
• PIPE WHIP	X	X				
• JET IMPINGEMENT	X					
ENVIRONMENTAL PROTECTION	X					
• ENVIRONMENTAL ENVELOPES	X	X	X	X	X	
• EQUIPMENT QUALIFICATION	X	X	X		X	X
• HVAC DESIGN	X					
FIRE PROTECTION	X	X	X			
MISSILE PROTECTION	X					
SYSTEMS INTERACTION	X					
III. STRUCTURES THAT HOUSE THE AFW SYSTEM						
SEISMIC DESIGN/INPUT TO EQUIPMENT	X	X	X		X	
WIND & TORNADO DESIGN/MISSILE PROTECTION	X					
FLOOR PROTECTION	X					
HELB LOADS	X					
CIVIL/STRUCTURAL DESIGN CONSIDERATIONS	X					
• FOUNDATIONS	X	X	X			
• CONCRETE/STEEL DESIGN	X	X	X			
• TANKS	X	X	X			

CONFIRMATORY ANALYSES, CALCULATIONS OR EVALUATIONS

PIPE STRESS EVALUATION

- SCOPE
  - PIPING PROBLEM FROM AFW PUMP 6" Ø DISCHARGE LINE
  - MODEL DEVELOPED FROM FIELD VERIFIED DRAWINGS
  - DEADWEIGHT, PRESSURE AND SEISMIC LOADS CONSIDERED
  - HIGHER STRESSED POINTS COMPARED TO DESIGN ANALYSIS

PIPE SUPPORT

- SCOPE
  - SEVERAL SUPPORTS ASSOCIATED WITH PIPING VERIFICATION TO BE SAMPLED (E.G. SNUBBER, RIGID RESTRAINT, SPRING HANGER)
  - FIELD VERIFICATION TO BE PERFORMED
  - STRESS CALCULATION FOR SAMPLED SUPPORTS BASED UPON PIPING VERIFICATION LOADS
  - LOAD COMPARISON TO DESIGN LOADS FOR REMAINDER OF SUPPORTS ASSOCIATED WITH PIPING VERIFICATION

CONFIRMATORY ANALYSES CALCULATIONS OR EVALUATIONS

(continued)

ENVIRONMENTAL ENVELOPE EVALUATION

- SCOPE
  - TEMPERATURE/PRESSURE/HUMIDITY ENVIRONMENT FOR A SELECTED COMPARTMENT OUTSIDE CONTAINMENT
  - MODEL DEVELOPMENT TO INCLUDE INDEPENDENT VERIFICATION OF INPUT PARAMETERS (E.G. VENT AREAS, COMPARTMENT VOLUMES, ETC.)
  - ENVELOPE COMPARED TO DESIGN ENVELOPE USED FOR THE QUALIFICATION OF EQUIPMENT AND STRUCTURE

CRITERIA FOR ISSUING A FINDING

- LICENSING CRITERIA OR COMMITMENTS ARE NOT MET
- DESIGN METHODOLOGY DEFICIENCY (E.G. FAILURE TO USE ACCEPTED ANALYTICAL APPROACH, USE OF INCORRECT INPUTS, ETC.)
- QUALITY ASSURANCE PROGRAM AND DESIGN CONTROL IMPLEMENTATION NONCONFORMANCE
- INDEPENDENT CALCULATION RESULTS DIFFER FROM DESIGN ANALYSIS
- DIFFERENCE BETWEEN DESIGN OUTPUT AND THAT WHICH IS CALLED FOR IN A PROCUREMENT SPEC
- DIFFERENCE IN FIELD CONFIGURATION VERSES AS-BUILT DRAWINGS

TREATMENT OF FINDINGS

- CLASSIFICATION OF FINDINGS BY LEAD REVIEWER
  - OPEN - POTENTIAL FOR BECOMING CONFIRMED FINDING
  - CONFIRMED - JUDGED TO BE AN APPARENT ERROR NECESSITATING ADDITIONAL INVESTIGATION (E.G. FURTHER DOCUMENTATION, ANALYSES, DESIGN/CONSTRUCTION CHANGES)
  - RESOLVED - ONGOING REVIEW OF ADDITIONAL INFORMATION LEADS TO CLOSEOUT OF FINDINGS (ROOT CAUSE IDENTIFIED AND IMPACT ASSESSED)
- INTEGRATED REVIEW BY PROJECT TEAM UNDER DIRECTION OF PROJECT MANAGER
  - FURTHER TECHNICAL REVIEW TO CLARIFY, EXPAND OR REASSESS
  - REVIEW OF CLASSIFICATION
- PREPARATION OF ERROR REPORTS
- SENIOR REVIEW TEAM REVIEW
  - POSSIBLE IDENTIFICATION OF NEED FOR CLARIFICATION, EXPANSION OF REVIEW OR REASSESSMENT
  - EVALUATION OF SAFETY SIGNIFICANCE
- FORWARDING OF FINDINGS AND ERRORS TO CPC AND ORIGINAL DESIGN ORGANIZATIONS FOR THEIR REVIEW AND RESPONSE
- REVIEW OF DESIGN ORGANIZATION RESPONSE TO ERROR REPORTS

ADDITIONAL VERIFICATION AND SAMPLING

- UNDERTAKEN FOR FINDINGS CLASSED "OPEN" FOR RECLASSIFICATION TO "CONFIRMED" OR "RESOLVED"

- ROOT-CAUSE IDENTIFICATION

  - RANDOM ERROR

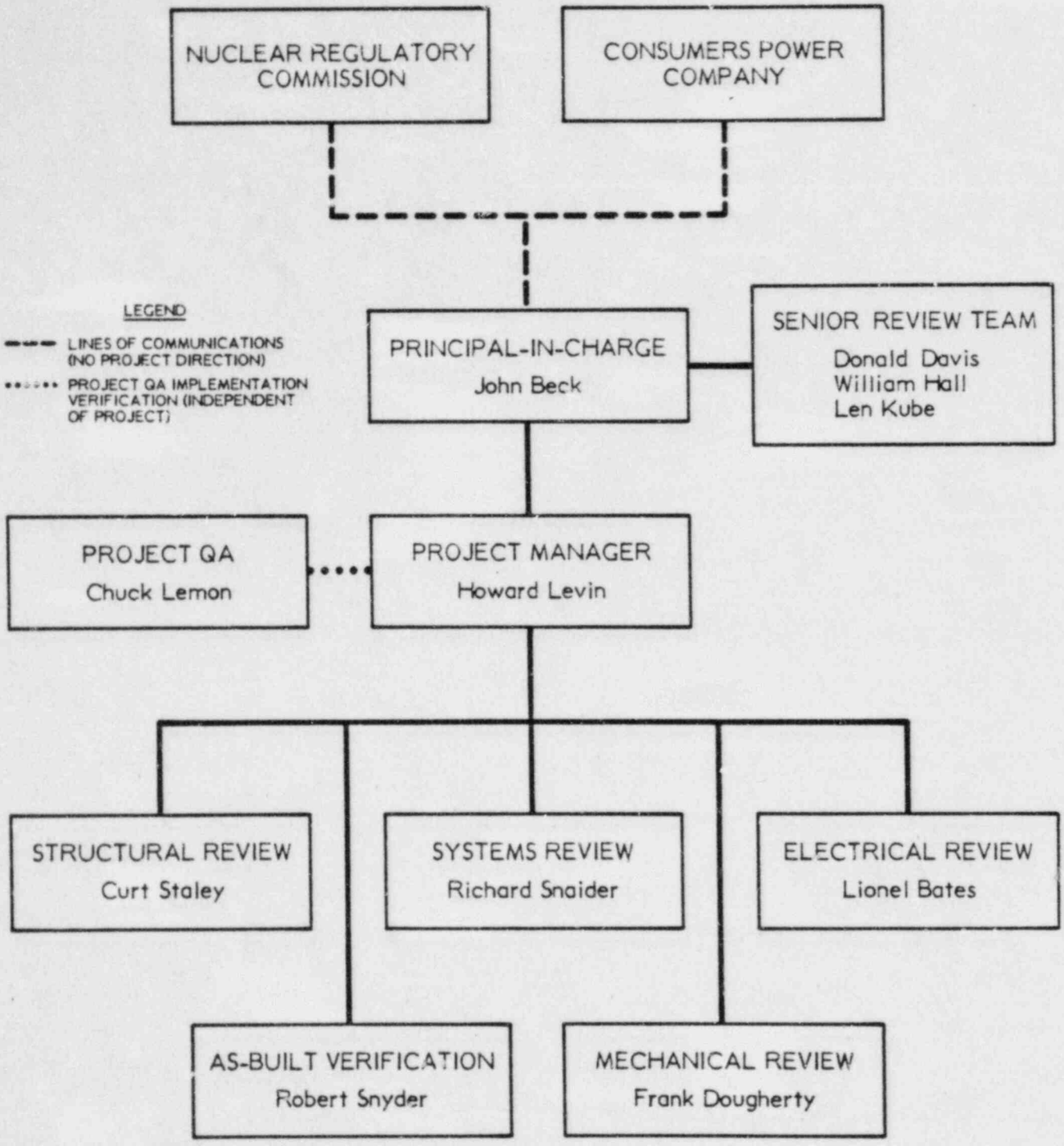
  - SYSTEMATIC ERROR

- DETERMINATION OF EXTENT

- IMPROVEMENT OF LEVEL OF CONFIDENCE

- BOTH INPO AND IDV FINDINGS WILL BE CONSIDERED

PROJECT ORGANIZATION
MIDLAND INDEPENDENT DESIGN VERIFICATION



KEY PERSONNEL
MIDLAND INDEPENDENT DESIGN VERIFICATION PROGRAM

- PROJECT DIRECTION

JOHN BECK, PRINCIPAL-IN-CHARGE

NUCLEAR POWER PLANT OPERATIONS AND CORPORATE MANAGEMENT, LICENSING, ENGINEERING AND PROJECT MANAGEMENT

HOWARD LEVIN, PROJECT MANAGER

NUCLEAR POWER PLANT STRUCTURAL, MECHANICAL DESIGN AND CONSTRUCTION, EQUIPMENT QUALIFICATION, OPERATING REACTOR SAFETY, LICENSING, PROJECT MANAGEMENT

- SENIOR REVIEW TEAM

DONALD DAVIS, TERA

NUCLEAR SAFETY AND LICENSING, PLANT AND REACTOR SYSTEMS, THERMAL-HYDRAULIC ANALYSIS, ACCIDENT ANALYSIS

WILLIAM J. HALL, UNIVERSITY OF ILLINOIS

ENGINEERING ANALYSIS AND DESIGN, STRUCTURAL ENGINEERING, STRUCTURAL MECHANICS AND DYNAMICS, SOIL MECHANICS, FRACTURE MECHANICS, ENGINEERING CRITERIA DEVELOPMENT FOR MAJOR PROJECTS

LEONARD KUBE, MAC

NUCLEAR SAFETY AND LICENSING, QUALITY PROGRAMS, PROJECT MANAGEMENT

KEY PERSONNEL
(continued)

- DESIGN REVIEW TEAM

CURT STALEY, LEAD STRUCTURAL REVIEWER

NUCLEAR POWER PLANT STRUCTURAL, MECHANICAL DESIGN, CONSTRUCTION PROJECT MANAGEMENT AND CONTROL

FRANK DOUGHERTY, LEAD MECHANICAL REVIEWER

NUCLEAR POWER PLANT MECHANICAL DESIGN, QUALITY ASSURANCE, SAFETY AND RELIABILITY ANALYSIS, SYSTEM DESIGN/CRITERIA DEVELOPMENT

RICHARD SNAIDER, LEAD SYSTEMS REVIEWER

NUCLEAR POWER PLANT OPERATIONS, MAINTENANCE AND DESIGN, SYSTEMS ENGINEERING, LICENSING PROJECT MANAGEMENT, MECHANICAL ENGINEERING

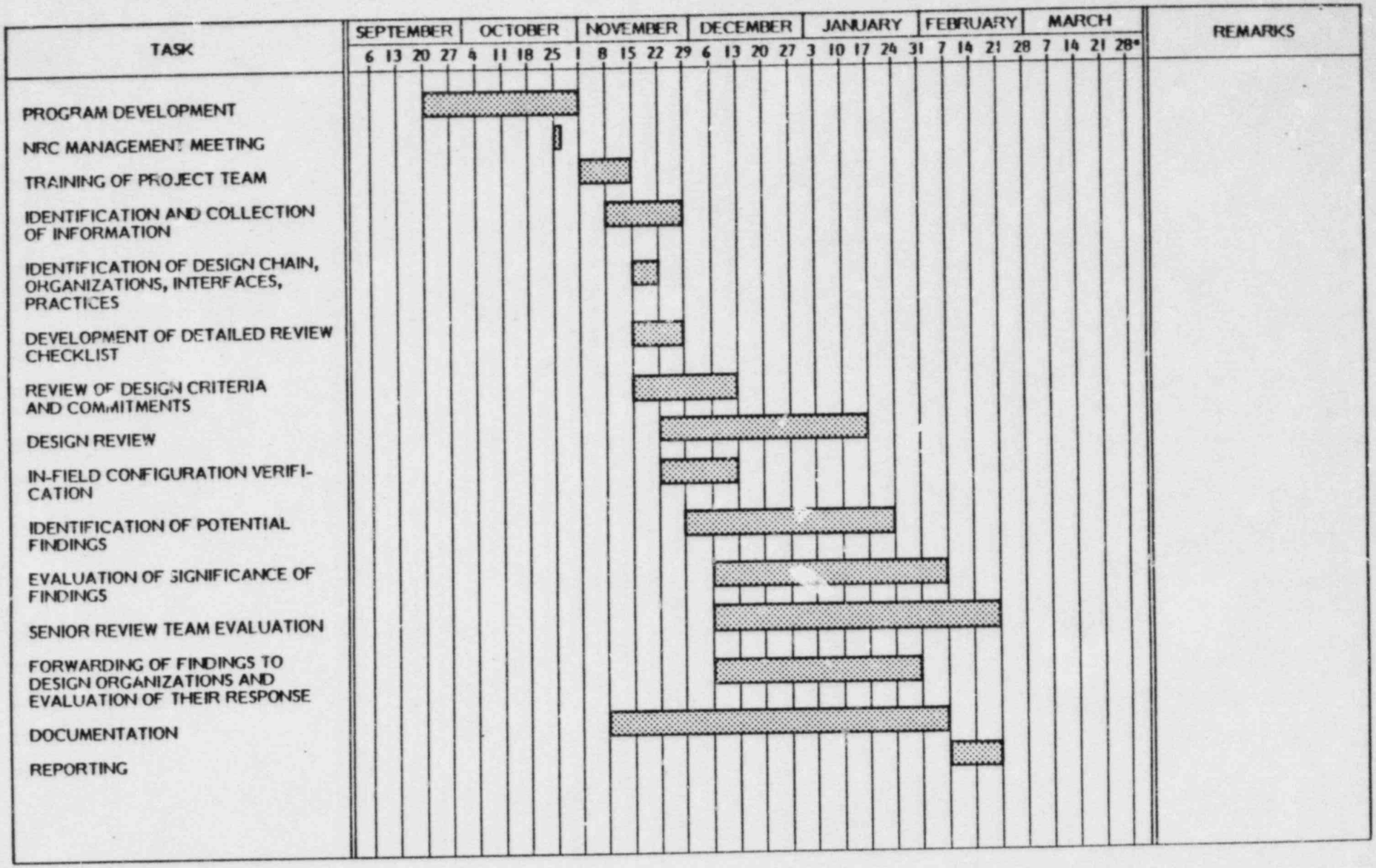
ROBERT SNYDER, LEAD FIELD VERIFICATION

NUCLEAR POWER PLANT DESIGN AND CONSTRUCTION, PROJECT MANAGEMENT, START-UP AND OPERATIONS

LIONEL BATES, LEAD ELECTRICAL REVIEWER

NUCLEAR POWER PLANT ELECTRICAL, INSTRUMENTATION AND CONTROL SYSTEMS DESIGN, EQUIPMENT QUALFICATION, PLANT OPERATIONS AND MAINTENANCE

SCHEDULE FOR MIDLAND INDEPENDENT DESIGN VERIFICATION



* DATES BEGIN ON MONDAY

ENCLOSURE 4

GAP LETTER TO NRC

GOVERNMENT ACCOUNTABILITY PROJECT
Institute for Policy Studies
1901 Que Street, N.W., Washington, D.C. 20009
(202) 234-9382

October 22, 1982

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Mr. J.G. Keppler
Administrator, Region III
U.S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, IL 60137

RE: Midland Nuclear Power Plant, Units I & II
-Consumers Power Company Quality Assurance Program Implementation for Soils Remedial Work
-Consumers Power Company Midland Plant Independent Review Program

This letter provides additional comments to the current negotiations between the Nuclear Regulatory Commission ("NRC") and Consumers Power Company ("CPCo") regarding two major areas of concern to local citizens and our own staff:

1) soils remedial construction; and
2) Independent Review Program.

On behalf of those former employees, local citizens and the Lone Tree Council, the Government Accountability Project ("GAP") reviewed the various proposals submitted by the licensee of an independent review program as well as their description of the independent soils assessment program. Our questions and comments about both programs are outlined below. We appreciate the opportunity to provide this information.

Based on our review of the licensee proposals, we are asking the NRC to not approve the independent audit proposal in its present form. Further, we request on behalf of the local residents that live and work around the plant that the details of the independent contract be finalized in a series of public meetings--one in Jackson, Michigan (the corporate home of CPCo) and one in Midland, Michigan (the plant site). Further, we ask that the public comment offered at these two meetings, as well as this letter, be included in the analysis of CPCo's proposal.

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This request is consistent with Mr. Keppler's stated intention to invite public comment surrounding Midland's problems; and also in line with Region III policy surrounding the Zack controversy at LaSalle, which allowed several public participants to comment and suggest improvements in the independent audit of the Heating, Ventillating and Air Conditioning ("HVAC")equipment imposed on Commonwealth Edison by the NRC.

As you know, it is the position of our project that the only avenue to restore public confidence in a nuclear power plant that has suffered from extreme loss of credibility is to offer the public the opportunity to participate in the decision-making process. This is particularly applicable to the situation at the Midland plant.

Clearly the utility and the regulators are aware of the substantial problems that have occurred in building the Midland plant. Indeed, it is the history of these problems that have led to this meeting in the first place. Yet, apparently there has been little desire to tackle the real issue of corporate negligence in the construction of this plant.

Background

The Government Accountability Project is a project of the Institute for Policy Studies. It is a national public interest organization that assists individuals, often called "whistleblowers," who expose waste, fraud or abuse in the federal workplace; or safety and health hazards within communities through GAP's Citizen's Clinic for Accountable Government. As an organization dedicated to protecting individuals who have the courage to bring information forward on behalf of their fellow citizens GAP has had a close working relation with various Congressional and Senatorial committees, government agencies and other public interest organizations.

In recent years GAP has been approached by a growing number of nuclear witnesses from various nuclear power plants under construction. In keeping with its objectives the GAP Whistleblower Review Panel and the Citizens Clinic Review Panel have directed the staff to pursue aggressively the complaints and problems that nuclear workers bring forward. Our first case involving a nuclear witness began when we were approached by a Mr. Thomas Applegate about serious problems at the William H. Zimmer Nuclear Power Station near Cincinnati Ohio. As you are aware Mr. Applegate's allegations and the subsequent investigations, reinvestigations, Congressional inquiries, and intense public scrutiny have revealed the Mr. Applegate exposed only the tip of the iceberg of problems. Zimmer was recently described in the Cleveland Plain Dealer as "the worst nuclear construction project in the midwest, possibly the country...." (October 3, 1982.)*

*This article also referred to the Midland Plant. Mr. John Sinclair, an NRC inspector, responded to the question of whether there are other "Zimmers" around the country by stating that Zimmer's problems "were similar to those found at [Midland]."

Following the GAP staff work at Zimmer we received a request from the Lone Tree Council of the Tri-City Michigan area to pursue worker allegations of major problems at the Midland Nuclear Power Plant in Midland, Michigan. Our preliminary investigation resulted in six affidavits being filed with the Nuclear Regulatory Commission on June 29, 1982. Since then we have filed an additional four affidavits resulting from the HVAC quality assurance breakdown revelations. We are also preparing an expanded affidavit of one of our original witnesses, Mr. E. Earl Kent, of serious welding construction problems at the Midland site. Other worker allegations-ranging from security system breakdowns to worker safety problems have come to our attention at an alarming rate.

The Citizens Clinic Review Panel a panel of seven respected individuals, met recently to review the status of Clinic cases. It was their unanimous recommendation to begin a thorough and aggressive probe of Midland's problems. We look forward to beginning that probe shortly. Unfortunately our previous experience at Zimmer and LaSalle has given us a good idea of what to look for and what we will find.

I. SOILS REMEDIAL WORK

The 1980/81 SALP Report, issued April 20, 1982 gave CPCo a Category 3 rating in soils and foundations.

A Category 3 rating, according to the SALP criteria states:

> Both NRC and licensee attention should be increased... weaknesses are evident; licensee resources appear to be strained or not effectively used such that minimally satisfactory performance with respect to operational safety or construction is being achieved.

Clearly this rating, the lowest rating that can be given was deserved by the licensee. Although the soils settlement problems have resulted in the most serious construction problems that CPCo has faced, the SALP report points out in its analysis:

> In spite of this attention, every inspection involving regional based inspectors and addressing soils settlement issues has resulted in at least one significant item of non-compliance. (p. 9)

This trend continues to the present date. As recently as May 20, 1982, Mr. R.B. Landsman the soils specialist of the Region III Midland Special Team discovered significant differences between the as-built condition of the plant in relation to the soils remedial work and the approved April 30, 1982 ASLB order.

Although Mr. Landsman had no quarrel with the technical aspects of the excavation in question he had a significant disagreement with the licensee's failure to notify NRR of their plans. He aptly captured the essence of the problem in his August 24, 1982 memo to Mr. W.D. Shafer, Chief of the Midland Section:

> Since the licensee usually does not know what is in the ground or where it is, as usual the 22 foot duct bank was found at approximately 35 feet. It also was not in the right location. . . in addition, . . . they inadvertently drilled into the duct bank. . . .

On August 20, 1982 Mr. Keppler requested the Office of Investigations to investigate two instances of apparent violation of the April 30, 1982 ASLB Order.

This latest experience with the licensee's failure to comply with NRC requirements is indicative of the reasons that the Advisory Committee on Reactor Safeguards, in a letter to NRC Chairman Nunzio Palladino, deferred its approval of full power operation of the Midland plant until an audit of the plant's quality. This QA program audit is to include electrical, control, and mechanical systems as well as underground piping and foundations.

Now CPCo is again asking for "another chance" to get its corporate act together. They offer to institute a series of steps to "enhance the implementation of the quality program with regard to the soils remedial work." (Letter to Mr. Harold Denton from Mr. James Cook, September 17, 1982, p. 2.) Unfortunately, as pointed out below, the program on soils remedial work leaves much to be desired if public confidence is to be restored in the ultimate safety of the Midland plant.

A. Consumers Power Company Retention of Stone & Webster as a Third Party to Independently Assess the Implementation of the Auxillary Building Underpinning Work

Based on a careful investigation of Stone & Webster's ("S&W") performance in the nuclear power industry this decision, already made, may unfortunately for the licensee prove to be as disasterous as the pre-load operation of several years ago.

Our assessment is based on information obtained from the NRC Public Documents Room, private audits of S&W's performance on nuclear projects, legal briefs from intervenors, NRC "Notice of Violation" reports, public source information, and interviews with intervenors, engineers, as well as current and former employees of the NRC familiar with S&W's work.

1. History

S&W has t en the chief contractor and architect/engineer at eight plants now operating, and for six plants presently under construction. In reviewing numerous documents concerning two nuclear plants now under construction at which S&W was, or still is, the Project Manager and chief architect/engineer, this investigation has documented S&W's reputation for massive cost overruns at its nuclear construction sites, major problems with Quality Control and contruction management, and significant design errors at a number of these plants. The Shoreham plant on Long Island, N.Y., and the Nine Mile 2 plant near Syracuse, N.Y., are both infamous nuclear boondoggles constructed by S&W.

a) Nine Mile 2

The Nine Mile 2 plant has been described as a "disaster area." Cost overruns have gone from an original 360 million to 3.7 billion dollars, and the NRC has cited the plant for numerous violations. According to an article in the Syracuse Post-Standard newspaper (May 17, 1982), "Nearly everything that can go wrong with a major construction project has beset Nine Mile 2."

In 1980 Niagara Mohawk, the utility which is building the plant, hired the firm of Black and Veatch Consulting Engineers to conduct and "independent assessment" of the management systems, costs, and work accomplished at the Nine Mile 2 plant. The final Project Evaluation Report (September 1980) was extremely critical of S&W's performance, describing their work as "poor," "lacking" and "confused." The evaluation found 127 problem areas at the plant. Below is a list of some of the problems S&W were explicitly cited for:

* Failure to effectively implement the Quality Control program.
* Significant overruns against budget.
* Ineffective Project Management Reports.
* Inadequate management control of engineering work.
* Engineering Management System was "never properly implemented on the Unit 2 project."
* "Key components of good cost control are not present.
* Inadequate "problem identification, impact analysis, and descriptions of corrective action plans."
* Failure to keep abreast of regulatory changes.

* Drawings used for construction based on unapproved documents.

* Inadequate construction pre-planning/constructability review.

* Inaccuracies in the engineering and procurement status which have diminished user confidence in existing reports.

Many of the conditions cited in this audit have not been improved. According to a May 17, 1982 inspection letter from the NRC, S&W has failed to remedy these identified problems:

> There is a significant problem in the timeliness of corrective action resulting from S&W responses to Niagara Mohawk audit findings. Determination of corrective action to be taken is repeatedly delayed due to either belated answers by S&W and/or inadequate responses by S&W. NMPC Quality Assurance Management has been unable to correct the problem.

On top of these problems, the NRC cited S&W, in the May 17, 1982 letter, for "significant" nonconformances with NRC regulations. One major problem was found in S&W's philosophy on QC. Instead of analyzing problems to find their causes, S&W would just put the identified mistake into "technical acceptability." According to the NRC, this caused a repetition of problems:

> The lack of identification and correction of the root cause of the nonconformance has led to numerous nonconformances being written in a short period of time involving the same functional area . . .

The QC program was also cited for its lack of training and its high personnel turnover.

S&W also failed to properly oversee subcontractors at Nine Mile 2. For example, over 300 bad welds were identified as made by one sub-contractor. These faulty welds were discovered after S&W inspectors had certified that they met construction standards. (Post-Standard, May 19, 1982.)

b) Shoreham

S&W was the Project Manager and chief architect/engineer at Shoreham. In September 1977 the Long Island Lighting Company ("LILCo"), the utility which is building the Shoreham plant, removed S&W as Project Manager. Although initially denied, LILCo reports obtained by intervenors in discovery, have documented LILCo's dissatisfaction with S&W--dissatisfaction which led to their termination.

In an April 1977 report (Shoreham Nuclear Power Station Schedule and Construction Management Evaluation), prepared by LILCo's Project Manager and other LILCo engineers, S&W was criticized and the utility was urged to terminate their services. Examples of S&W's unsatisfactory performance outline in this report were:

* Design problems.

* Inaccurate monitoring and controlling systems.

* Unnecessary and redundant procedures.

* Responsibility for cost overruns.

Other LILCo documents charged:

* Failure to produce or meet work schedules.

* Inability to adequately define urgent needs.

* Poor physical work documents.

Shoreham, described by the New York State Public Service Commission as "seriously deficient," has suffered from cost overruns which will make the electricity produced at the plant the most costly of any nuclear plant in the country. The overrun has been from 265 million to 2.49 billion dollars.

S&W was also at fault with Shoreham's largest design error. The reactor size which was originally planned for Shoreham was increased, but S&W failed to make adjustments and increases in the size of the reactor building. According to Newsday, this error had led to costly design problems and changes, and cramped work space within the reactor building.

Shoreham has also been cited by the NRC for numerous violations. Between 1975 and 1981 the Commission cited Shoreham for 46 violations. For example, S&W was cited for repeatedly failing to have electrical cables installed correctly, and for allowing dirt in sensitive areas.

2. Problems Found in S&W Operating Reactors

Most serious for the Midland plant was our discovery of S&W's work at the North Anna Plant.

a) North Anna

According to a Washington Star article (May 5, 1978), the North Anna plant has suffered from serious design problems regarding soils settlement. A pumphouse, designed to funnel cooling water into the

reactor in event of a nuclear emergency, "settled" into the ground at a much higher rate than planned. In only six years the pump-house sunk more than 79% of the amount planned for its forty year life expectency. This settlement caused "cracks in nearby walls and forced accordion-like pleats to be added to nearby pipes." According to the Star, this soils problem could lead to the plant's premature closing.

Other mechanical malfunctions have also been reported at North Anna. For example, a malfunction in a steam pump and turbine contributed to a "negligible" overexposure of five plant workers to radiation, and the release of contaminated gas. (Washington Post, September 27, 1979.)

It is incredulous to us that the NRC could allow S&W, a construction firm that has caused untolled amounts in cost overruns, shut-down damaged plants and lengthy lists of NRC violations to be transformed into an independent party, capable of enough internal reform to audit the work of the Bechtel construction of the Midland plant.

Further, S&W committed a serious design error in the vital cooling system's pipe design. This error potentially rendered the pipes exposed to failure in the event of even a minor earthquake, and could have created a major nuclear accident. Upon discovery of the error, the NRC ordered all five plants temporarily closed for investigation and repair. (Excerpt from the Public Meeting Briefing on Seismic Design Capability of Operating Reactors, NRC, June 28 1979.)

When the NRC entered these plants to inspect the pipes, they found additional problems. According to the NRC document Surry I, Beaver Valley and FitzPatrick all suffered from "significant differences between original design and the 'as built' conditions...." For example, Surry I had the following problems: "mislocated supports, wrong support type, and different pipe geometry."

b) Other plants

All of the other operating nuclear plants investigated reported numerous problems. For example, in 1981 a faulty weld at the Beaver Valley plant caused a "minor leakage" of radioactivity into the local environment. Within one year after the Maine Yankee was turned on in 1972, 58 "malfunctions" were reported, including leaks in the cooling water systems. A review of the NRC report--Licensed Operating Reactors Status Report--of May 1982 revealed that all S&W plants were operating at an operating history of below 80% of the industry goal. Beaver Valley, for example, had a lifetime operating history of only 30%.

3. Stone & Webster Corporate Attitude

Our review of S&W's past attempts at constructing nuclear power plants prevents us from being convinced of anything but a future that is a dismal repeat of the past.

This fear was confirmed by an article written by the Chairman and Chief Executive Office of Stone and Webster, Mr. William T. Allen, Jr. in the Public Utilities Fortnightly, May 13, 1982, entitled "Much of the Anxiety about Nuclear Power Is Needless."

In this article Mr. Allen displays a critical disregard and disrespect for the regulatory system that this nation has mandated to protect its citizens from the corporate instincts of profit and survival. His dialogue begins by labeling the public as apathetic about energy needs. He wishfully hypothesizes a 12% boost of electrical demand for a single year when the economy recovers.

Mr. Allen moves quickly to his conclusion that the energy needs of the future can be met with only coal and nuclear power, but his real point is made when he calls for the "necessary institutional adjustments to revitalize the nuclear industry." Mr. Allen's view of the revitalization is a chilling indication of his companies committment to safety. This excerpt is most revealing:

> [W]e are working, along with others in the industry, in support of those activities which we hope will restore nuclear power to a state of robust health. In that connection, one specific effort we have undertaken within Stone & Webster is the consolidation and analysis of recent data pertaining to the amount of radiation which possibly would be released to the environment in the event of an accident in a nuclear power plant. . . . [B]ased on information our people have assembled it now is becoming clear to the scientific and engineering communities that criteria established years ago, but still in use today, are incredibly and needlessly conservative."

This quoted paragraph captures Mr. Allen's observations although he goes on to attempt to convince his "apathetic public" that the three basic components in the source term (the quantity of radioactivity postulated to be available for leakage from the reactor containment into the environment) are needlessly conservative. The arguments into the size of a "safe dose of radioiodine" contradict all other literature we have reviewed on the subject. Mr. Allen's attempts to allay the fears of the public about nuclear power have only increased the fears that GAP has about its allegedly independent audit of the soils work.

If Mr. Allen's corporation believe s the regulations over nuclear power are needlessly conservative, and he is not concerned with the

levels of radioiodine, I find it difficult to believe he will approach the Midland Auxillary Building with the attitude it will take to produce any replica of a safe nuclear facility.

As a result of our investigation, and our well-known support for independent audits of nuclear construction projects, it is impossible for GAP to accept the S&W review of the soils work under the Auxillary Building as anything more than another licensee "rubber stamp."

B. Recommendations

It is the recommendation of the Government Accountability Project that certain minimum requirements be used by the NRC in determining the acceptability of independent audit charters. Further we recommend that the Midland public meeting (infra, at 15) include a presentation of the charters, and the availability of the auditors for public questioning into the understanding of this contract responsibility. These charters should include the following:

1) The independent contractor should be responsible directly to the NRC, submitting all interim and final product simultaneously with CPCo and the NRC.

This is somewhat different from the proposal explained in the CPCo letters, which suggests that all reports would first be processed through the licensee.

2) The independent contractor should do a historical assessment of CPCo's prior work, including a frank report of the causes of the soils settlement problem.

This suggestion from the ACRS July 9, 1982 letter, is particularly appropriate to get on the public record.

3) The charter should ensure that, once hired, CPCo cannot dismiss the independent contractor from the project without prior notice to the NRC and a NRC-sponsored public meeting to justify the decision.

Further, the NRC should make it clear that the licensing conditions will not be met for Midland if the NRC does not approve of any such dismissal. Although CPCo is hiring and paying several auditors, their credibility in the eyes of the public will be voided without a truly independent accountability structure. Otherwise the entire excercise is little better than an expensive public relations gimmick.

4) The charter should require that each auditor, at least 5 already identified, sub-contract any services for which its

direct personnel are not qualified.

Proof of qualifications should be provided for every task in the Midland contracts.

5) The charter should require that the proposed methodology be disclosed; specifically selection criteria and size of the samples for inspections and testing.

This is particularly critical with the proposed audits of the historical quality assurance breakdown. It is impossible to have any confidence in the results of an independent inspection and testing program if the selection criteria and size of the sample are a mystery.

6) The charter should require the auditors to provide calculations demonstrating that it is possible to adequately complete its work during the proposed timeframe.

This is particularly important at the Midland site where "rush jobs" are all too common under the pressure of the 1984 deadline.

7) The charter should require the auditors to support its proposed methodology through references to established professional codes (ASIM, ASME, ANSI, AWS, etc.).

This will insure that the methodology is a product of professional standards, rather than CPCo's timetable for operations. This is particularly important in the light of recent disclosures putting the Bechtel codes in opposition to the AWS codes.

8) The charter's should require all auditors to report all safety-related information directly to the NRC.

CPCo's own judgment in determining when to inform the NRC, and about what, is highly suspect. Only with stringent guidelines for an independent auditor is there any hope for public trust in the work performed on CPCo's payroll.

9) The employees and auditors should demonstrate that the personnel assigned to the project are free from conflicts of interest.

In the October 5 letter, CPCo references the conflict of interest points presented in a February 1, 1982 letter from NRC Chairman Nunzio Pallidino to Representative John Dingell. These five points should apply to all employees of the audit teams. It is insufficient for the company to be free of conflicts of interest if the key fact finders and decision-makers are not.

It seems only reasonable that all auditors should guarantee and demonstrate the absence of any conflicts of interest on the organizational and individual levels. Insignificant conflicts should be fully disclosed and explained, subject to the NRC's approval.

10) The auditors must recommend corrective action, and then control its implementation.

If the independent auditors are not allowed to develop corrective actions the teams become a highly paid research department for the licensee. The NRC must receive the independent recommendations of the auditor teams prior to the finalizations of any licensee plan on any system. Without this final and critical step there will be no resolution of the key question--can Midland ever operate safely?

II. CONSUMERS POWER COMPANY INTEGRATION OF THE SOILS QA AND QA/QC FUNCTIONS UNDER THE DIRECTION OF MPQAD

This reorganization, putting CPCo in charge of the Quality Assurance/Quality Control program raises serious questions in our analysis. First, CPCo has consistently disregarded the importance of Quality Assurance/Quality Control in the past. Nothing in their historical performance or their recent past indicates that CPCo's MPQAD has the type of serious commitment to QA/QC that will produce meticulous attention to detail. Further, the experience that GAP's witnesses have had with MPQAD have been far from favorable. In fact, all of our witnesses (but one who resigned after refusing to approve faulty equipment) have tried in vain to get their in-house management to do something about their allegations. All of them were dismissed--the result of their efforts to ensure a safe nuclear plant.

Mr. Dean Darty, Mr. Terry Howard, Mrs. Sharon Morella, Mr. Mark Cions and Mr. Charles Grant have attested to the failure of the MPQAD. If the Zack experience has demonstrated nothing else, it has certainly left a clear warning to construction employees that committing the truth is not a virtue at the Midland site.

GAP's previous experience with nuclear construction projects that take total control of a QA program has firmly been negative. At Zimmer the switch from contractor to owner brought with it deliberate coverups instead of corporate bungling. We believe that based on CPCo's previous performance and attitude that it is unacceptable for CPCo to offer their MPQAD to be the new answer to an old problem.

In a September 30, 1982 Midland Daily News article, Mr. Wayne Shafer stated that the new move to put CPCo at the helm will give

them "first hand knowledge" of the problems with the Midland plant. Mr. Shafer has apparently mistaken Midland for Zimmer on a very serious point.

At Zimmer the owner, Cincinnati Gas and Electric Company, was fined $200,000.00 in November 1981. They claimed that their main failure was to supervise their contractor, Kaiser, in the construction. At Midland there has never been a question of who is in control of the construction decisions. CPCo has consistently had some degree of involvement--usually substantial--with the history of probems on the site.

III. CONSUMERS POWER COMPANY HAS PROPOSED A SINGLE-POINT ACCOUNTABILITY SYSTEM TO ACCOMPLISH ALL WORK COVERED BY THE ASLB ORDER

Although none of the documentation defines what "single-point accountability" is, there is some hint through other comments from CPCo. In both the September 17, 1982 letter from Mr. Cook to Messrs. Keppler and Denton and several local newspapers, there is a specific reference to "good and dedicated" employees. Even Robert Warnick, acting director of the Office of Special Cases, stated in the September 30, 1982 Midland Daily News article, "Consumers to Take Responsiblity for QC":

> It'll only work if you've got good, strong people doing the job. I guess the proof of the pudding is in the performance.

We agree whole heartedly with Mr. Warnick. GAP has always maintained that the only way to make any regulatory system work effectively is to have strong, trustworthy individuals of high integrity. As a project GAP has watched many "good, strong people" attempt to do their jobs correctly, only to be scorned, fined and ostracized by corporations or bureaucracies that ignored their responsibility to the public.

Ironically, perhaps the strongest, most credible good person GAP has worked with recently was fired by Bechtel and CPCo from the Midland site--Mr. E. Earl Kent.

Mr. Kent's allegation's were among those submitted on June 29, 1982 to the NRC. After GAP submitted his allegations to the NRC , Mr. Kent prepared his evidence and documentation for the anticipated visit by NRC investigators. Unfortunately the investigators never arrived. In mid-August, at Mr. Kent's own expense, he went to the Regional Office of the NRC to talk to the government officials charged with investigating his allegations. He wanted to insure that the investigators understood completely the detail and specifically of his claims about the problems at Midland. Further he

wanted to clarify that the NRC was aware of his knowledge about serious hardware problems at the two other sites. Mr. Kent was seriously disappointed in his reception.

Following the mid-August visit, GAP wrote a letter to Mr. James Keppler, Regional Director, emphasizing our concerns about Mr. Kent's visit. In the three months following the submission of Mr. Kent's claims--serious construction flaws--there remained no efforts on the part of the NRC, other than Mr. Kent's own, to begin to untangle the mystery of Bechtels' inadequate welding procedures.

Mr. Kent's personal life has been irrevocably harmed as he has waited patiently for his allegations to be substantiated by the nuclear regulators that he placed his trust in. He has been unemployed for nearly a year. His professional reputation hangs in the balance of an ongoing federal investigation. His financial condition has dropped daily. However, it was not until a few weeks ago that Mr. Kent gave up on the NRC. Like so many other good strong workers before him, Mr. Kent sincerely believed that the regulators would pursue his allegations made in defense of the public health and safety, instead he discovered an agency promoting the industry positions.

Last week WXYZ Television Station, in Detroit, the Los Angeles Times, the Wall Street Journel, the Detroit Free Press, numerous local stations in California and Michigan--both radio and television, and national wire services carried the details of Mr. Earl Kent's allegations.

In the wake of the public revelation of Mr. Kent's claims the NRC has finally acted. The Region III office, in a flurry of "catch-up work," finally sent the affidavit to the Region V office. Region V investigators met with Mr. Kent for a seven and a half hour session on October 15, 1982. . Unfortunately, the intent of their questioning raises extensive concerns among GAP staff who have worked with nuclear witnesses and the NRC before. In fact, one of the first comments made by one of the investigators was to inform Mr. Kent that his allegations were well-known now all over the United States, as "well as Russia."

The direction of the NRC's questioning was obvious to Mr. Kent. He remains unconvinced that there will be an aggressive investigation into the allegations he has been making for the past eighteen months. His concerns over serious structural flaws at three nuclear plants remain as real as when he risked--and lost--his career to bring them to the attention of his industry supervisors.

Mr. Kent is by far one of the most credible and honest individuals with whom GAP has had the opportunity to work. Our investigation

of his qualifications, professional experience, and contributions to the field of welding impressed us even more than his humility and integrity. I urge either or both of you to personally talk to Mr. Kent if there is any doubt about the allegations that he is making, or about the seriousness of the consequences if these problems that he has identified remain unresolved.

Mr. Warnick's statement about the "proof being in the pudding" seems hopelessly blinded as to the experience of nuclear witnesses at the Midland facility.

A single-point accountability system certainly depends on strong individuals, but with CPCo's reputation for swift and cruel disposition of those workers who point out problems, only a fool would allow himself to be placed in a position of single-point accountability ("SPA").

In order for this proposition to have any credibility GAP recommends that this critical QA/QC link be explained fully at the GAP-proposed meeting in Jackson, Michigan. Along with specific details of this SPA system, we would request that the individual or individuals who are to perform this function explain their personal approach to their position.

Along with the above, GAP recommends the following structural elements be included in this ombudsman program:

1) Final approval of the individual(s) should rest with the NRC in a courtesy agreement between CPCo and Region III.

2) The SPA officials should have at least one meeting with those public nuclear witnesses who do not believe their allegations have been resolved. This visit should include a site tour structured by the witness to satisfy himself/herself whether repairs have been made on the systems he/she raised questions about. No group of individuals is better prepared to or qualified to assist with identifying problems to be corrected than the witnesses themselves.

3) These SPA officials should have frequent (weekly) regularly scheduled meetings with the public to discuss the status of the repair work. These meetings should include an honest discussion of all problems encountered in construction. This "good faith" measure on the part of the utility would do much to recapture some of its lost credibility.

IV. UPGRADED TRAINING ACTIVITES AND THE QUALITY IMPROVEMENT PROGRAM

The concepts incorporated into the proposals on upgraded retraining were largely positive steps forward. GAP's analysis specifically

approves of the extensive training efforts--including the test pit--to provide as much direct training for workers and quality control personnel involved in the massive work involved. Most specifically GAP appreciates the efforts to increase communication between "individual feedback."

We would like to have more specific information on the mechanisms within the Quality Improvement Program for feedback. Further, if these steps are deemed appropriate to the soils project it would seem only reasonable to incorporate them throughout the construction project. Our analysis of the QIP was limited by the lack of information and we look forward to receiving more detail before the final assessment.

GAP recommends that the training session that covers Federal Nuclear Regulations, the NRC Quality Programs in general and the Remedial Soils Quality Plan be expanded significantly and that the NRC review and comment on the training materials.

Further, that the NRC provide a summary of its intentions and expectations of workers-in soils remedial work as well as QA in general.

GAP also requests that Mr. Keppler conduct a personal visit to the site, similar to his visit to Zimmer, and talk to all the QA/QC employees as soon as possible.

V. INCREASED MANAGEMENT INVOLVEMENT

Finally we express reservations about the increased senior management involvement. While we recognize the intent of this commitment, we are concerned with the lack of corporate character demonstrated to date. It appears quite clear to us that there has been extensive senior management level direct participation to date. That involvement has been less than complimentary to CPCo. In recent months the "argumentative attitude" of CPCo officials have emerged in many forums:

- An August article in the Detroit News, in which President John Selby said he was tired of "subsidizing the public."
- The June and July public "red-baiting" of GAP for its work on behalf of citizens and former workers.
- The recent distribution of a flyer accusing a Detroit television station of "sensationalist and yellow journalism."
- The continuous attempts to influence and intimidate local reporters, editors and newspapers to print only biased accounts of the Midland story.

Although approving in principal of the weekly in depth reviews of all aspects of the construction project, we remain skeptical of this step doing anything to improve the Midland situation. Certainly it should not be confused with the independent audit recommendation of the ACRS, ASLB, and NRC staff.

VI. INPO EVALUATION

The answer to the mystery of Midland's problems is to be provided by an INPO evaluation conducted by qualified, independent contractors. This results from the June 8, 1982 ACRS report, and the July 9, 1982 NRC staff letter requesting such an assessment.

The proposal offered by CPCo, a replica of INPO criteria for independent evaluations, is divided into three parts:

1) Horizontal type review;
2) Biennial QA Audit; and
3) Independent Design Verification (Vertical slice).

It is particularly distressing to us to note that CPCo received proposals and then selected the Management Analysis Company ("MAC") to perform two of the three audits.

MAC is far from an independent contractor on CPCo construction projects. In fact, MAC has been involved with both the Midland and Palisades projects at various times throughout the past decade. For example:

- In 1981 MAC performed an assessment of the hardware problems on site. They failed to identify Zack's continuing HVAC problems, the bad welds in the control panals, and improper welds and cable tray/hanger discrepancies.

- Further, MAC failed to identify the problems of uncertified and/or unqualified welders on site.

GAP strongly disagrees with the choice of MAC. It is an insult to the NRC and the public to accept MAC's review of its own previous analysis as a new and independent audit. Although Mr. L.J. Keebe appears to be both an experienced and credible individual, it does not remove the connection of MAC to two other CPCo-Bechtel productions. This relationship is simply too close for the comfort of the public.

The MAC INPO review may be extremely valuable to CPCo officials as a self-criticism review, however, it should not be presented to the NRC as "independent" by any stretch of the imagination.

Further, there was a marked lack of specific methodology and information about the audit to be performed. GAP staff was particularly disappointed with the lack of specificity into the work to be performed by the "experts." [This report read more like a college term paper review than a technical review of a crucial independent audit.]

It confirms GAP's overall reservations about INPO audits as building an effective wall between the public and the true nature of the problems on the site. Our reservations seems confirmed with reference to establishing layers of informal reporting--including an initial verbal report to the project--before the actual acknowledgement of identified problems. (October 5, 1982 letter, p. 12.)

The selection of the Tera Corporation to perform the Independent Design Verification is more positive. (GAP was unable to determine whether or not the Tera Corporation has been involved previously with the Midland plant.) Tera's work experience, as presented in the October 5, 1982 letter, at the Vermont Yankee Nuclear Power Plant has been determined to be both extremely thorough and of high quality. The Yankee Plant is rated amony the best operating nuclear power plants (those with the least problems) according to the Nuclear Power Safety Report: 1981 (Public Citizen). With the acknowledgement of previous reservations and recommendations about independent audit work at Midland, we concur with the selection of the Tera Corporation for the Independent Design Verification.

The October 5 letter referred extensively to the confirmation of installed systems reflecting system design requirements. GAP hopes that, unlike other audits we have seen, the Tera Corporation does not simply confirm the findings.

Additionally GAP requests that the entire record of comments, investigations and additional information will be provided to the NRC, and also placed in the Public Documents Room, as opposed to CPCo's offer to "maintain" the "auditable record."

There was no reference to the percentage of the work that would be audited by a field verification. This is critical to any type of credible independent review of construction, particularly at plants like Midland and Zimmer where every weld and cable is suspect. We believe the percentage of field review should be established.

The discrepancies documented thoughout the review ("findings") should be reported to the NRC simultaniously with the referral to senior level review teams. There is little point to delaying the referral of the findings -- only delays the inevitable, taking time that CPCo doesn't have.

VII. CONCLUSION

The evidence of noncompliances, improprieties, quality assurance breakdowns, misrepresentations, false statements, waste, corporate imprudence and massive construction failures repeatedly meets the general NRC and Region III criteria for suspension of a construction permit or the denial of an operating license. The NRC's own assessment concludes that Midland's Quality Assurance Program--the backbone of any safe nuclear construction--had generic problems. Mr. Keppler concluded that, next to Zimmer, Midland was the worst plant in his region. Last year William Dircks classified it as one of the worst five plants in the country.

In recent months Midland has been the subject of repeated revelations and accusations of construction flaws, coverups, and negligence. The evidence already on the record is indicative of a significant failure on the part of CPCo to demonstrate respect for the nuclear power it hopes to generate, or the agency which regulates its activities.

CPCo has taken repeated risks with its stockholders' investments, its corporate credibility and its regulatory image. In each of these risks it has lost. It is too much to expect citizens to accept CPCo's arrogant disregard for the public's health and safety.

GAP recognizes the steps forward by the Regional office--establishing a Special Section to monitor Midland's problems and the request for an independent audit. However, this must only be the beginning.

CPCo has numerous problems to worry about, and it is clearly not in their own best interest to put the strictest possible construction on the regulations under which they have agreed to build this nuclear facility. It is for just this reason that the nuclear industry is regulated -- but ever regulation, fines, extensive public mistrust, and corporate embarrasment have not humbled Consumers Power Company. If Midland is ever going to be a safe nuclear facility, someone else is going to have to put their professional credibility on the line. This independent auditor, paid by CPCo, must be given strict guidelines for accountability and responsibility in order to justify its hard line recommendations.

GAP hopes that both the Office of Nuclear Reactor Regulation and the Region III office of the NRC will give serious consideration to GAP's concerns and recommendations set forth above and implement a system whereby there is a truly independent system of auditing the extensive problems with the Midland plant.

Sincerely,

Billie Pirner Garde

Billie Pirner Garde
Director, Citizens Clinic for
Accountable Government

11/5/82

NOV 8 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 25, 1982 MEETING ON INDEPENDENT DESIGN VERIFICATION PROGRAM

A meeting to discuss Midland's proposed Independent Design Verification Program (IDVP) was held October 25, 1982, between the NRC staff and representative of Consumers Power Company (CPCo), Management Analysis Corporation (MAC), and TERA Corporation. Representatives of the Government Accountability Project (GAP), a public interest organization, also attended and provided statements. The list of attendees is provided in Enclosure 1. Viewgraph slides used during the meeting are shown in Enclosures 2 and 3.

CPCo, MAC, and TERA representatives reviewed the contents of an October 5, 1982, transmittal which proposes a three part IDVP: (1) an tremial INPO type of construction and design evaluation by MAC, (2) a ~~biannual~~ audit by MAC, and (3) an IDVP of the auxiliary feedwater system by TERA. Overall integration of the program would be performed by MAC.

Following opening remarks by the applicant, the MAC representative described the proposed INPO type of Construction evaluation. This evaluation is intended only to review work in progress. It will investigate past work only as related to present deficiencies found by MAC and as time allows.

TERA representatives briefly addressed their company's participation in the performance of the Independent Design Verification or "vertical slice" of the IDVP. As proposed, TERA would be assessing the design of the Auxiliary Feedwater System (AFWS) of Unit 2 in terms of design adequacy and would review the as-built configuration on a limited basis. TERA would also be performing a sampling of design calculations and component inspections.

Questions were raised by the staff regarding the MAC-TERA interaction. The applicant explained that TERA personnel would be involved with the MAC-sponsored INPO evaluation, but each organization would report independently on its own review. MAC would then coordinate both reports into a single document and include conclusions derived from the overall integration of the two studies. This final report is presently scheduled for completion in late February of 1983.

The staff also asked how construction problems at Midland would be addressed in the IDVP. The staff noted that in its present form, the IDVP would not provide assurance of as-built construction adequacy and considers this to be a significant deficiency in the present proposal.

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The staff requested clarification regarding the manner in which negative findings by TERA would be resolved. TERA representatives indicated that a determination would be made as to whether or not the error was random or systematic. The root cause of the error would then be determined and then recommendations would be made accordingly.

Another question evolved around direct INPO involvement in the INPO type Construction Evaluation. INPO will overview the final report but there will be no INPO personnel involved in the actual performance of the review.

The staff questioned if the probabilistic risk assessment (PRA) results had been utilized in choosing a system for review. The applicant replied that although a PRA had been performed on the AFWS, it had been chosen from the criteria cited in the October 5, 1982, letter. The applicant indicated that the choice was not biased due to previous review of this system.

The GAP representatives summarized selected comments contained in an October 22, 1982, letter (Enclosure 4) to H. R. Denton and J. G. Keppler. They suggested holding two public meetings: one to address "single-point accountability" (Enclosure 4, pgs. 13-15) and a second to address the charters of the independent contractors (Enclosure 4, pgs. 10-12). Discussion resulting from these comments related to the independence of MAC. The GAP representatives stated that because MAC had previously done QA audits at Midland they could not be considered independent contractors. The MAC representative replied that independence is achieved since none of the MAC personnel involved in this review have had any connection with Midland and also added that the review is broader in scope than those performed by MAC in the past. MAC further stated that, while exact figures were not available at this meeting, the income derived from its involvement with CPCo is not a major portion of MAC's overall income. In a letter of September 17, 1982, CPCo described an independent assessment to be performed by Stone and Webster (S&W) regarding underpinning activities for the Midland auxiliary building. The qualifications of S&W were for this task also questioned by GAP. The GAP representatives concluded by stating that they will provide supplementary comments as a result of the October 25 meeting.

At the conclusion of the meeting, the applicant asked for policy guidance from the staff regarding its proposal. The staff indicated that additional consideration regarding the extent of the program would be necessary. The agenda for this meeting did not include review of the independent assessment of the soils remedial work to be performed by S&W. The staff noted that it would consider an additional meeting for this purpose prior to an assessment of the overall independent design verification program.

The staff emphasized the importance of all firms engaged in this program providing copies of all written reports, including raw data, to the NRC at the same time as submitting them to the applicant. The staff discouraged the use of any verbal reports or closed meetings. The staff agreed to provide preliminary feedback to Consumers Power by October 29, 1982, and to arrange for additional meetings as deemed appropriate.

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

Enclosures: As stated

cc: See next page

DL:LB#4 DL:LB#4
DHood:eb EAdensam

11/2/82
(Tape)

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

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 and 2

SUBJECT: SUMMARY OF OCTOBER 25, 1982 MEETING ON INDEPENDENT DESIGN VERIFICATION PROGRAM

A meeting to discuss Midland's Independent Design Verification Program (IDVP) was held October 25, 1982, between the NRC staff and representatives of Consumers Power Company (CPCo), Management Analysis Corporation (MAC), and TERA Corporation. The list of attendees is provided in Enclosure 1. Viewgraph slides used during the meeting are shown in Enclosures 2 and 3.

CPCo, MAC, and TERA representatives elaborated on the contents of an October 5, 1982, transmittal listed as Reference 1 above. Following opening remarks by the applicant, the MAC representative described the proposed INPO Construction Evaluation. This evaluation is intended only to review work in progress. It will investigate past work only as related to present deficiencies found by MAC and as time allows.

TERA representatives briefly addressed their company's participation in the performance of the Independent Design Verification or "vertical slice" of the IDVP. As proposed, TERA would be assessing the design of the Auxiliary Feedwater System (AFWS) of Unit 2 in terms of design adequacy and would review the as-built configuration on a limited basis. TERA would also be performing a sampling of design calculations and component inspections.

The meeting continued with a discussion related to several NRC concerns. Questions were raised by the staff regarding the MAC-TERA interaction. The applicant explained that TERA personnel would be involved with the MAC-sponsored INPO evaluation, but each organization would report on its own review which would be independent of the other. MAC would then coordinate both reports into a single document presently scheduled for completion in late February of 1983. This final report will also include conclusions derived from the overall intergration of the two studies.

A second NRC concern brought out at the meeting was how construction problems at Midland would be addressed in the IDVP. The staff believes that in its present form, the IDVP would not provide enough assurance of as-built construction adequacy.

Clarification was needed regarding the manner in which negative findings by TERA would be resolved. TERA representatives indicated that a determination would be made as to whether or not the error was random or systematic. The root cause of the error would then be determined and then recommendations would be made accordingly.

Another question evolved around direct INPO involvement in the INPO type Construction Evaluation. INPO will overview the final report but there will be no INPO personnel involved in the actual performance of the review.

The staff questioned if the probabilistic risk analysis results would be utilized in choosing a system for review. The applicant replied that although a Probabilistic Risk Assessment (PRA) had been performed on the AFWS, it had been chosen for reasons cited in the October 5, 1982, letter. The applicant indicated that the system choice was not biased due to previous review.

Government Accountability Project (GAP) representatives summarized comments contained in an October 22, 1982, letter (Enclosure 4) to H. R. Denton and J. G. Keppler. They suggested holding two public meetings: one to address "single-point accountability" (Enclosure 4, pgs. 13-15) and a second to address the charters of the independent contractors (Enclosure 4, pgs. 10-12). Discussion resulting from these comments related to the independence of MAC. The GAP representatives stated that because MAC had previously done QA audits at Midland they could not be considered independent contractors. The MAC representative replied that independence is achieved since none of the MAC personnel involved in this review have had any connection with Midland and also added that the review is broader in scope than those performed by MAC in the past. The qualifications of Stone & Webster was also questioned by GAP. The GAP representatives concluded by stating that they will provide supplementary comments as a result of this meeting.

At the conclusion of the meeting, the applicant asked for policy guidance from the staff. The staff indicated that additional consideration into the extent of the program by the staff would be necessary. The agenda for this meeting did not include review of the independent assessment of the soils remedial work to be performed by Stone and Webster. The staff would consider an additional meeting for this purpose necessary prior to an assessment of the overall independent design verification program. However, the importance of all firms

Nov 11, 1982

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

MEMORANDUM FOR: Elinor G. Adensam, Chief
Licensing Branch No. 4
Division of Licensing

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

SUBJECT: NOTICE OF MEETING - MIDLAND, UNITS 1 AND 2

DATE & TIME: November 9, 1982
8:30 a.m. - 11:30 a.m.

LOCATION: Room P-422
Phillips Building
Bethesda, Maryland

PURPOSE: To discuss seismic analyses of Service Water Pump Structure and BWST.

PARTICIPANTS:[1/]

NRC	Consumers Power Company
F. Rinaldi	T. Thiruvengadam
	D. Budzik

Structural Mechanics, Associates (CPCo consultant)

R. Kennedy

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

cc: See next page

1/ Meetings between NRC technical staff and applicants for licenses are open for interested members of the public, petitioners, intervenors, or other parties to attend as observers pursuant to "Open Meeting and Statement of NRC Staff Policy", 43 Federal Register 28058, 6/28/78.

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engaged in this program providing copies of all written reports, including raw data, to the NRC at the same time as submitting them to the applicant was emphasized. The use of verbal reports and closed meetings was discouraged in order to maintain the desired independence and credibility of the reviews. The staff agreed to provide preliminary feedback to Consumers Power by October 29, 1982, and arrange for additional meetings as deemed necessary.

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

Enclosures: As stated

cc: See next page

DL:LB#4 DL:LB#4
DHood:eb EAdensam

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

7 B 7 4 2 1 1/85

NOV 23 1981

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

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 & 2

SUBJECT: SUMMARY OF NOVEMBER 12, 1981 MEETING ON CONSTRUCTION SCHEDULES FOR FOUNDATION MODIFICATIONS TO AUXILIARY BUILDING

On November 12, 1981, the NRC staff met in Bethesda, MD, with Consumers Power Company (CPCo) to discuss construction schedules needed for the planned remedial actions to the Auxiliary Building at the Midland plant. The remedial action, underpinning, results from the settlement potential of the backfill soils beneath the control tower and electrical penetrations area of that structure. Similar action is planned for the adjacent Feedwater Isolation Valve Pits and was included in the meeting discussions. Meeting attendees are listed in Enclosure 1.

Vice President J. Cook of CPCo reviewed the development history for the proposed remedial action which had initially been based upon use of jacking caissons, but which, by September 1981, had been changed to a structural wall extending to the glacial till. Mr. Cook emphasized that the construction schedule for the Auxiliary Building underpinning was critical to the July 1983 fuel load date for Unit 2. For this reason, Consumers had earlier asked the Licensing Board to rearrange the hearing sessions to consider the Auxiliary Building before the Diesel Generator Building session. To prepare for implementing the underpinning, a vertical access shaft on the east and west ends of the auxiliary building and adjacent to each feedwater isolation valve pit and the turbine building needs to be started by mid-December 1981, and a freezewall by December 29, 1981. Staff approval of these two matters were requested by Mr. Cook's letter of October 28, 1981. The schedule for start of drifting beneath the structures is February 15, 1982. Mr. Cook further emphasized that continuing staff review throughout the underpinning process was needed, rather than a traditional two-step staff approval process. He felt that more staff review and observation in the field should be considered to expedite the review process. Review procedures such as that which had been followed during the staff's structural design audit at Anne Arbor, Michigan, in May 20 - 24, 1981, were also recommended.

Mr. D. Eisenhut agreed that staff approval prior to implementing the fix was needed. In view of the construction schedule, he suggested specific approval points by the staff or other conditions be defined based upon the planned construction activities and sequences comprising the underpinning scheme. He noted that establishment of acceptable conditions could assist in the authorization to proceed. It was agreed that a working meeting the following week would be scheduled to this end. To the extent possible, such conditions would be reflected in hearing testimony.

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Mr. M. Miller, Esq., noted that conditions could not be established within the existing schedule for filing testimony (due November 17, 1981) and that Consumers would like to ask the Board to accept a delay of a few days in the filing date. Mr. W. Olmstead, Esq., replied that the staff would not object to such a request.

Messrs. G. Keeley and D. Budzik of CPCo described the preliminary analysis of the Auxiliary Building to be provided for staff review on November 20, 1981. The preliminary analysis will consider selected critical structural members and selected loading combinations. An analysis of the construction sequence for the underpinning scheme will be completed January 1, 1982. The final analysis will be provided for staff review February 15, 1982. It was noted that the latter date corresponds to the start of drifting beneath the structure. The final analysis is primarily for the electrical penetration area and control tower portions of the structure. The analyses for the overall structure will be completed April 15, 1982. June 1, 1982 is the earlist date that the FSAR can be updated to reflect the results of the completed analyses.

At the conclusion of the meeting, and in preparation of the working session planned for November 17, 1981, Mr. Budzik provided the following schedule drawings to the staff's project manager:

(1) Drawing 7220-PPS-020, Revision 0, dated 11/06/81, "Project Production Schedule: Auxiliary Building Underpinning Schedule", sheets 1 and 2.

(2) Drawing 7220-PPS-021, Revision 0, dated 11/06/81, "Service Water Pump Structure Remedial Action - (Underpinning Wall)".

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

Enclosure:
As stated

cc: See next page

OFFICE	DL:LB#4	DL:LB#4	DL:LB#4				
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DATE	11/18/81	11/19/81	11/19/81				

MIDLAND

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Jerry Harbour, Esq.
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Washington, D. C. 20555

ENCLOSURE

LIST OF ATTENDEES

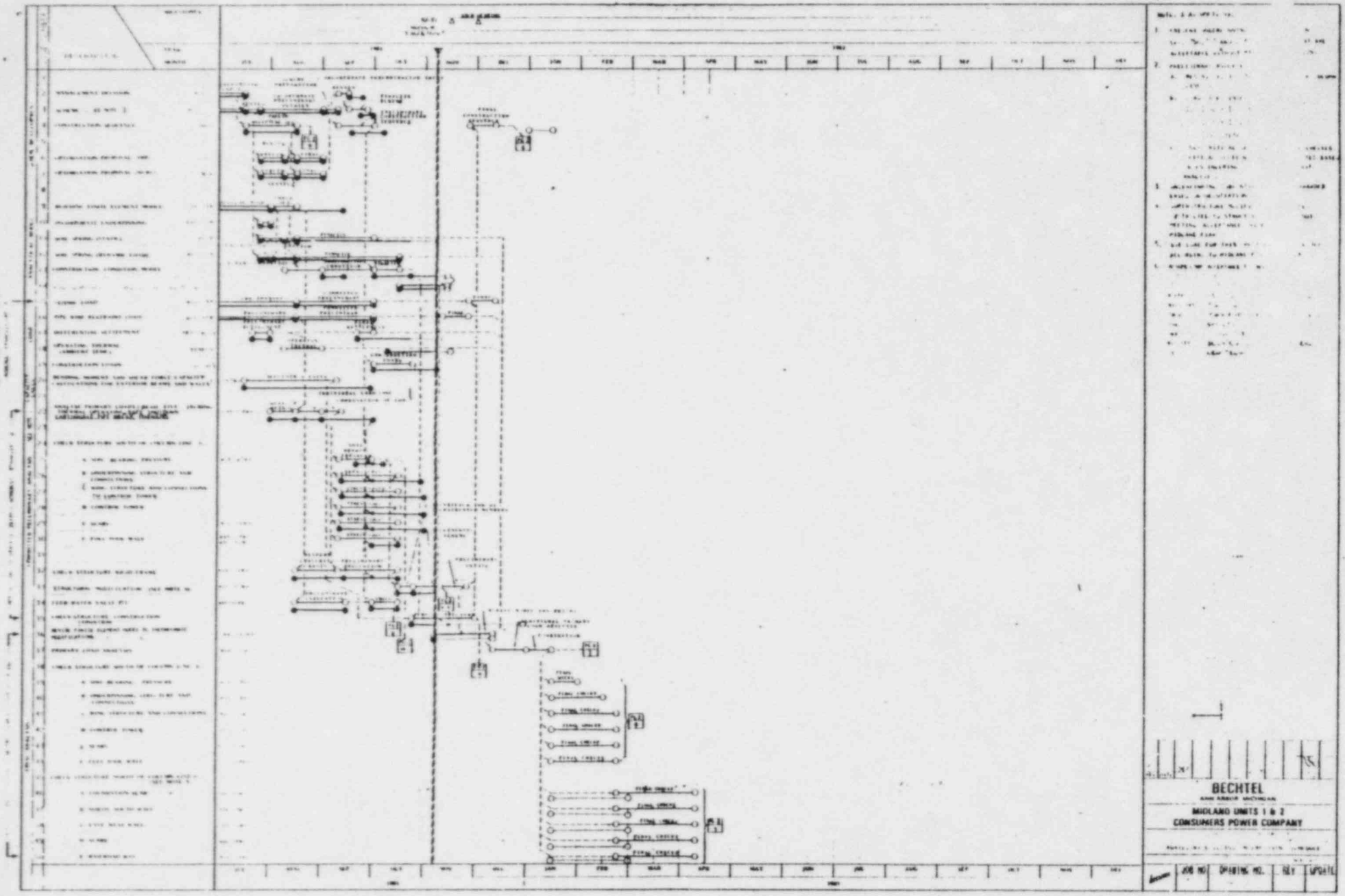
MIDLAND MEETING 11/12/81

NRC

D. Eisenhut
R. Vollmer
J. P. Knight
E. Adensam
W. Olmstead
J. Rutburg
W. Paton
D. Hood
J. Kane
F. Rinaldi
A. Cappucci
G. Lear
F. Schauer
R. Landsman

Consumers

J. Cook
D. Keeley
D. Budzik
M. Miller (IL&B)



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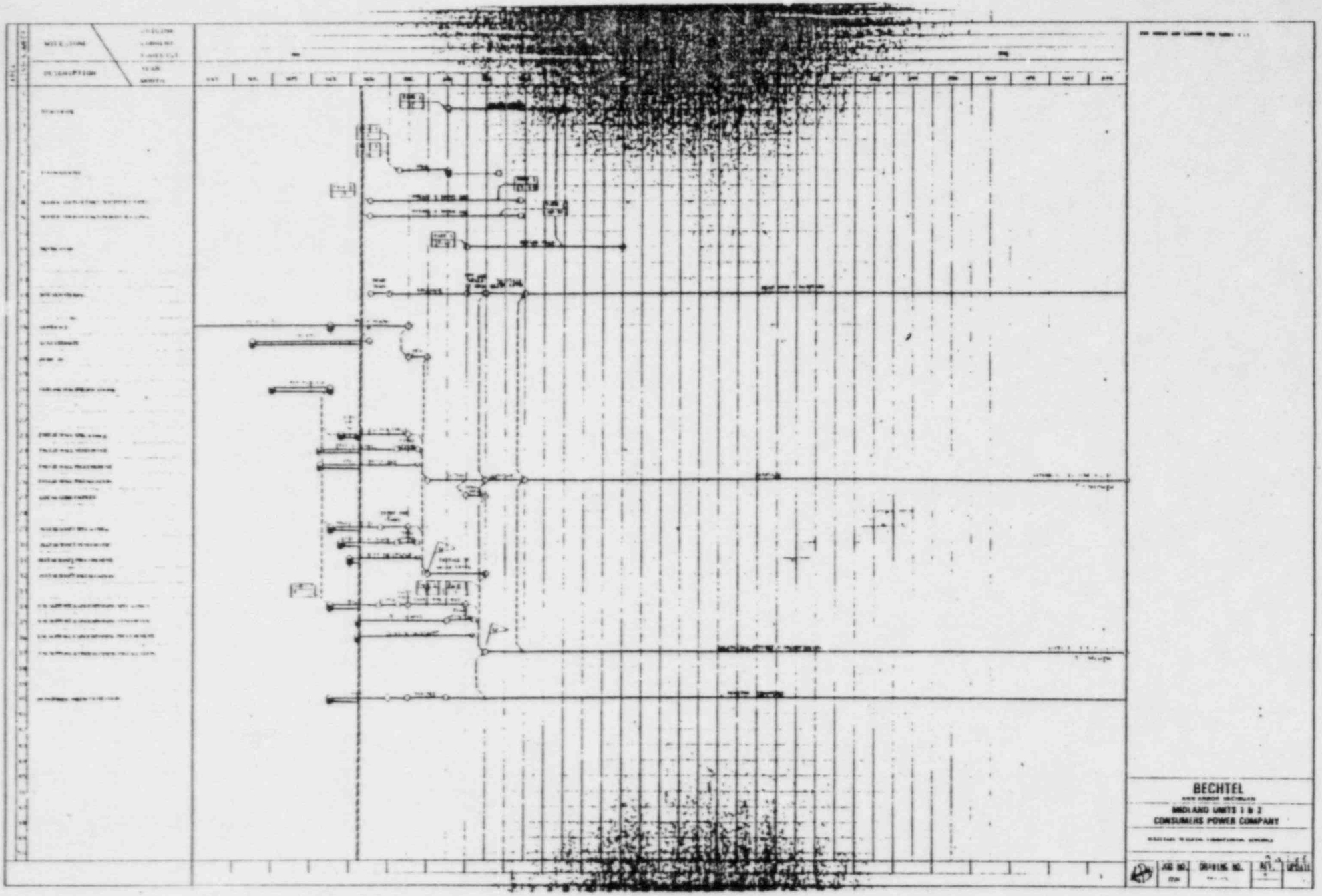
MIDLAND UNITS 1 & 2
CONSUMERS POWER COMPANY



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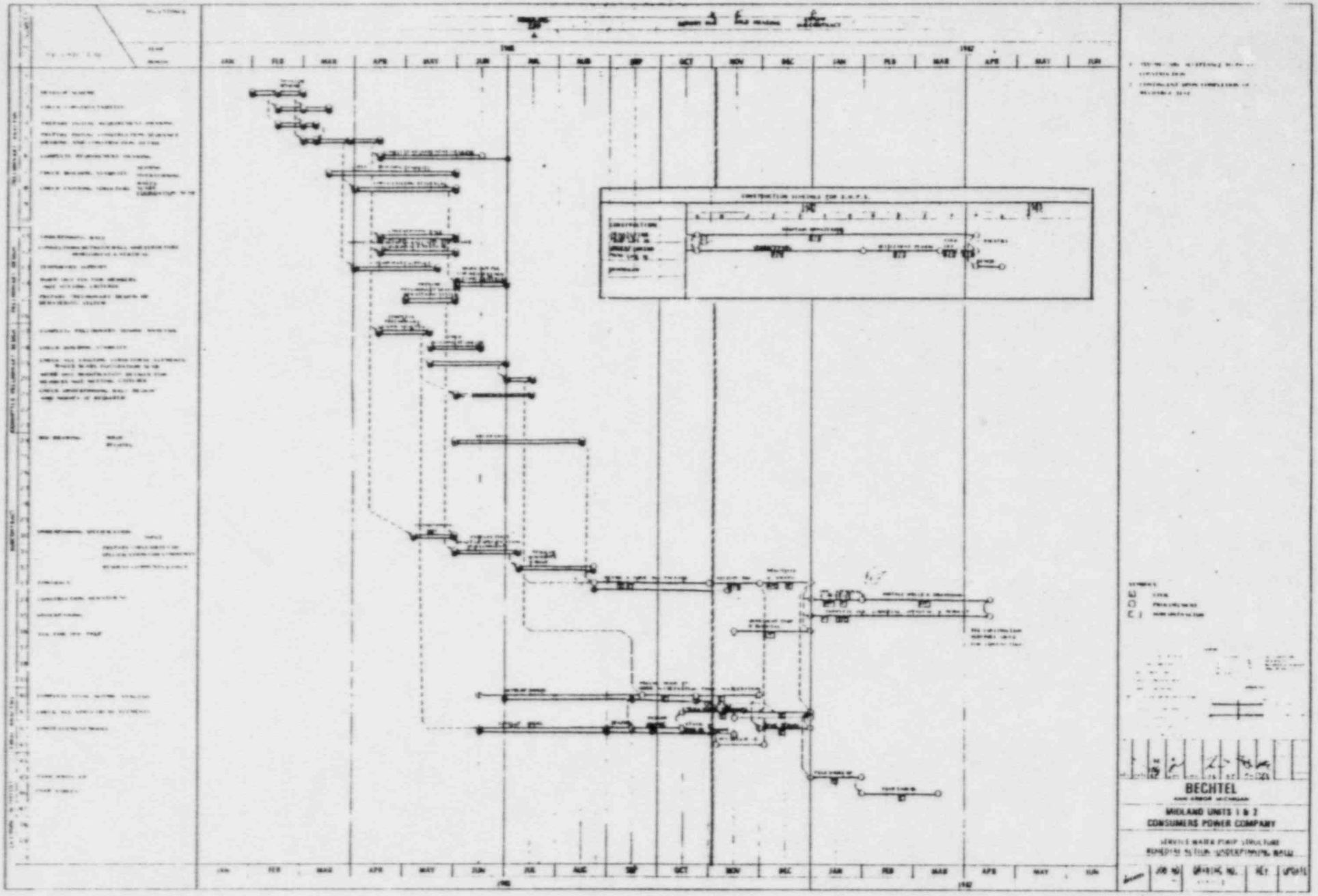
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MIDLAND UNITS 1 & 2
CONSUMERS POWER COMPANY

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

NOV 23 1981

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

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 & 2

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Darl Hood

Darl Hood, Project Manager
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Division of Licensing

Enclosure:
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ENCLOSURE

LIST OF ATTENDEES

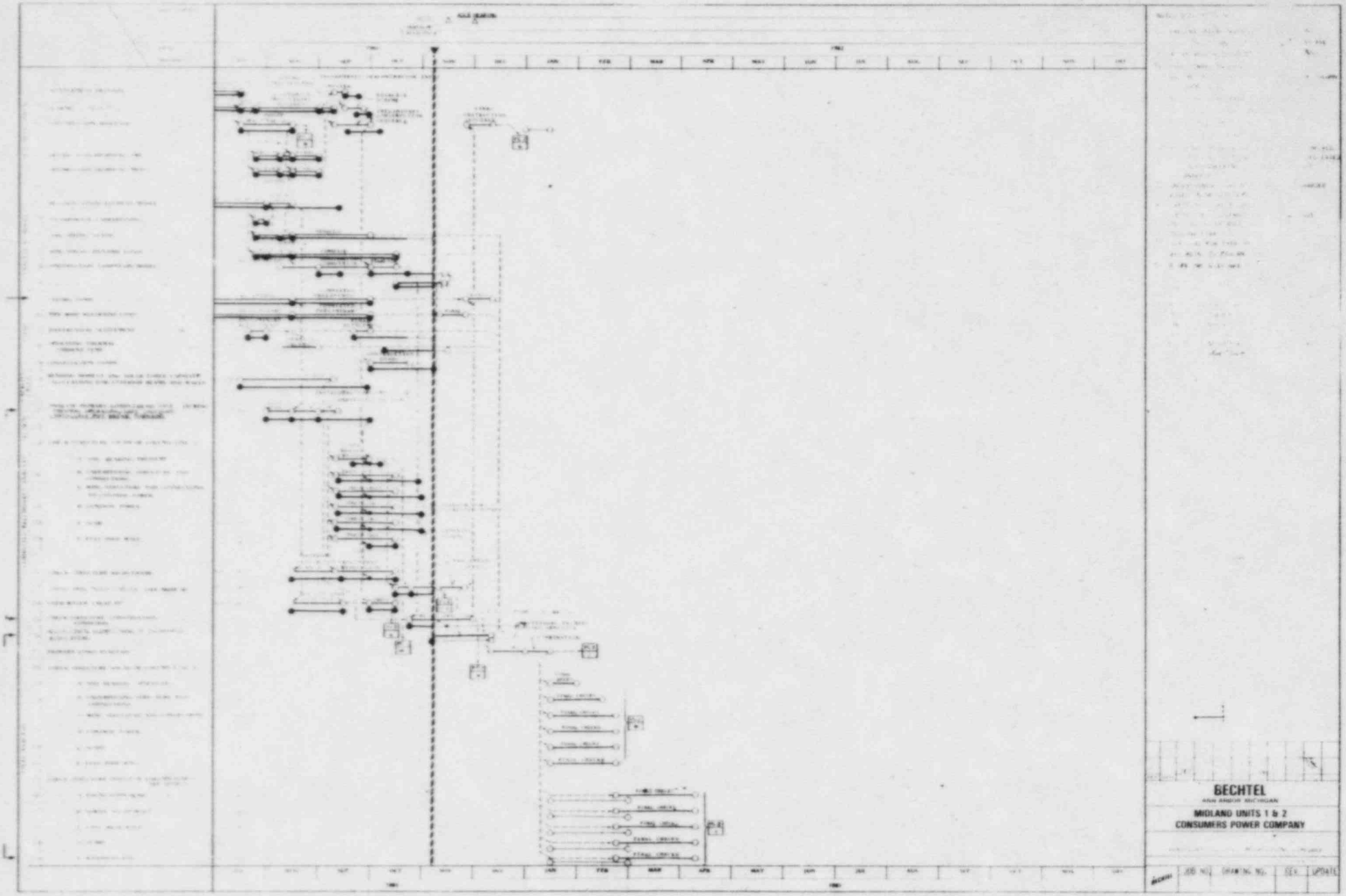
MIDLAND MEETING 11/12/81

NRC

D. Eisenhut
R. Vollmer
J. P. Knight
E. Adensam
W. Olmstead
J. Rutburg
W. Paton
D. Hood
J. Kane
F. Rinaldi
A. Cappucci
G. Lear
F. Schauer
R. Landsman

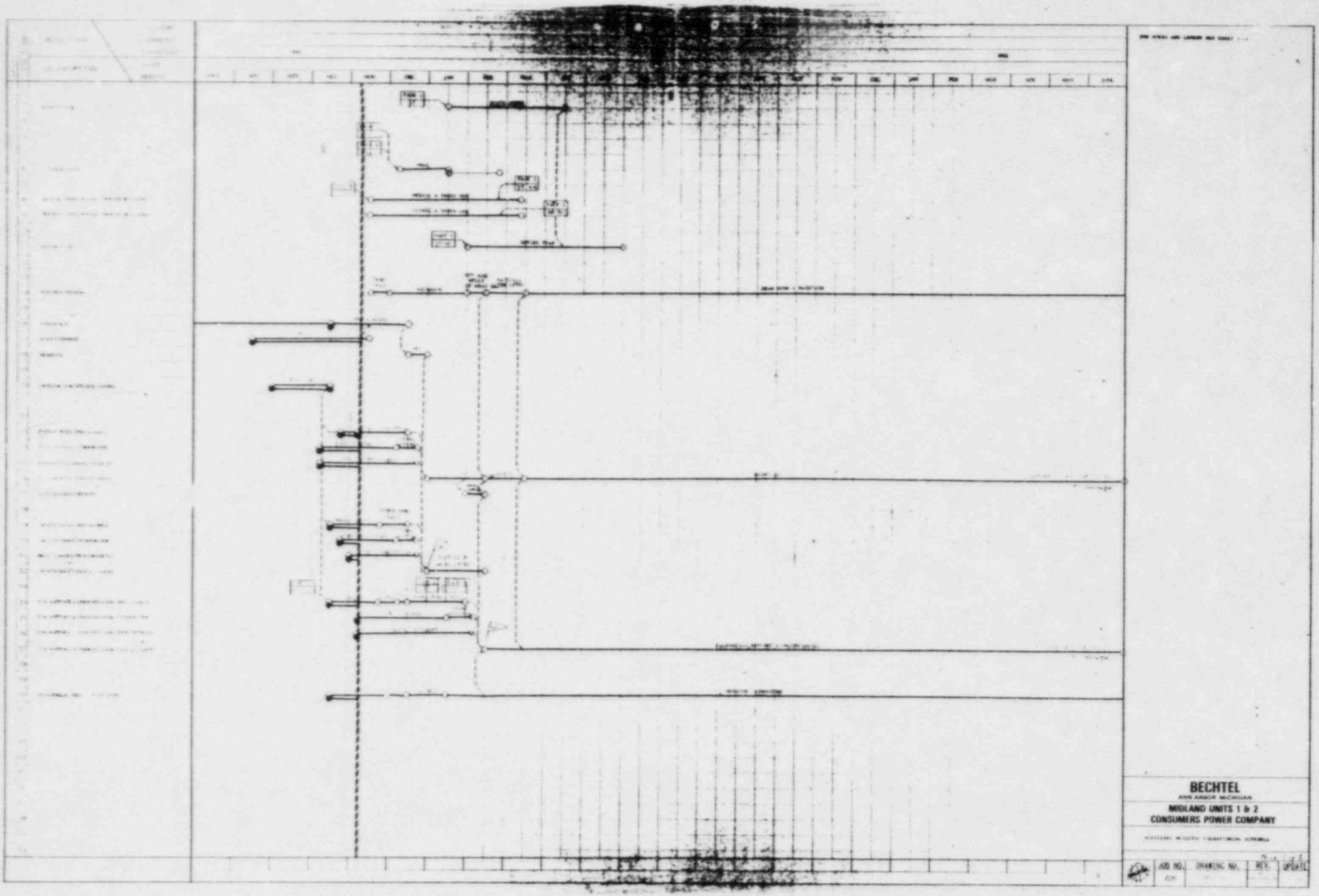
Consumers

J. Cook
D. Keeley
D. Budzik
M. Miller (IL&B)



BECHTEL

MIDLAND UNITS 1 & 2
CONSUMERS POWER COMPANY



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ANN ARBOR MICHIGAN
MIDLAND UNITS 1 & 2
CONSUMERS POWER COMPANY

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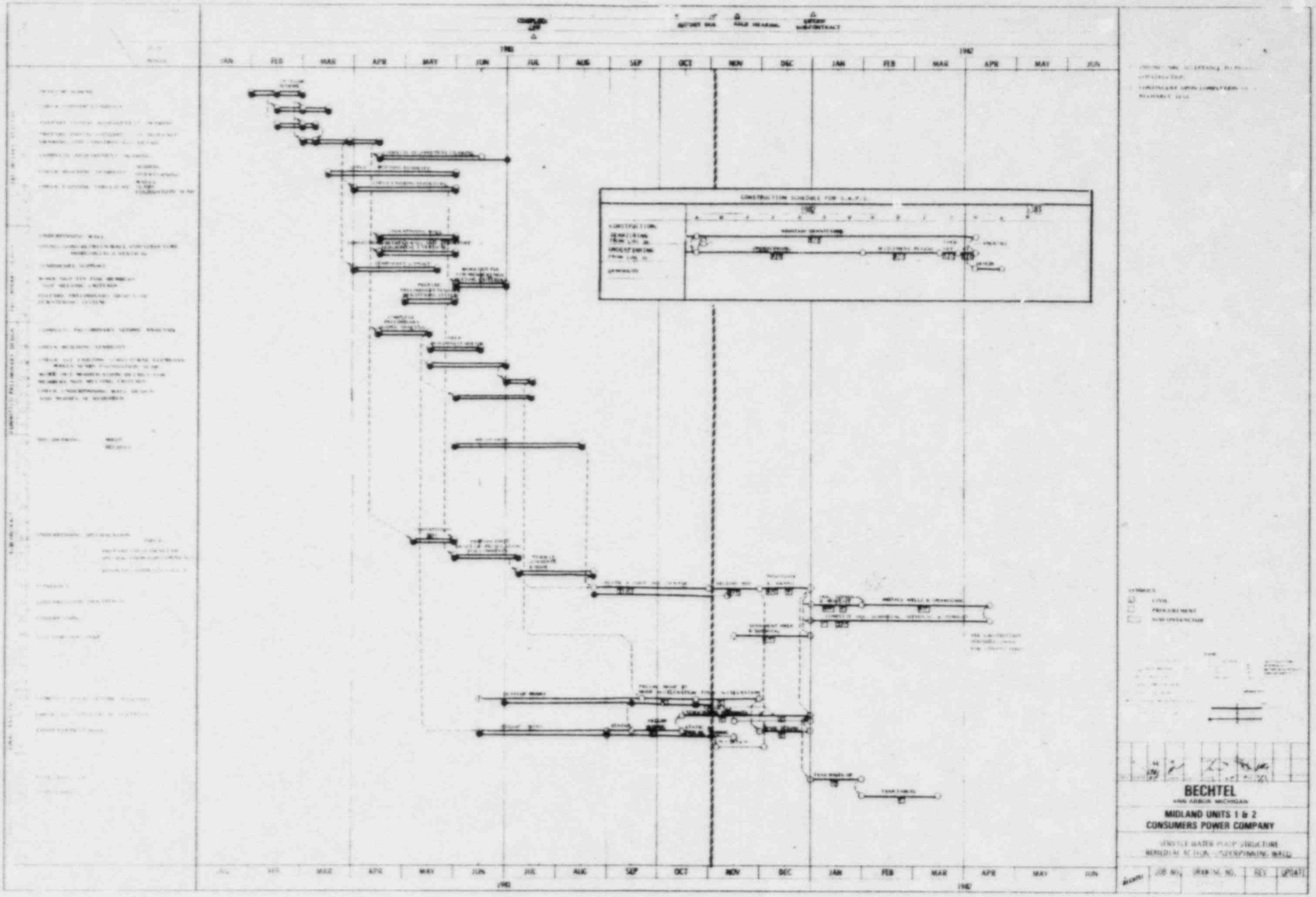
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BECHTEL
ANN ARBOR MICHIGAN
MIDLAND UNITS 1 & 2
CONSUMERS POWER COMPANY

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

NOV 23 1981

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

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 & 2

SUBJECT: SUMMARY OF SEPTEMBER 17, 1981 MEETING ON FOUNDATION MODIFICATIONS FOR SERVICE WATER PUMP STRUCTURE

On September 17, 1981, the NRC staff and its consultants met in Bethesda, MD. with Consumers Power Company (the applicant), Bechtel and Mueser, Rutledge, Johnston and Desmione (MRJD). The purpose was to discuss the preliminary design of modifications proposed to the foundation of that portion of the Midland Service Water Pump Structure founded on inadequate fill. Meeting attendees are listed in Enclosure 1.

Background

The applicant's letter of March 23, 1981, advised the NRC that the underpinning concept for the overhanging portion of the service water pump structure (SWPS) had been changed to a full length wall extending into the natural till material. This full length wall concept replaced the original remedial action, a driven pile support concept. A subsequent letter on August 26, 1981, forwarded a report entitled, "Technical Report on Underpinning the Service Water Pump Structure" which describes the design and construction requirements of this remedial action. That report included the following types of information: (1) drawings showing the underpinning scheme and a description of the construction sequence for this scheme; (2) dewatering for construction; (3) the design and acceptance criteria for the underpinning scheme, including load combinations, bearing pressures, structural stresses, and seismic loads; (4) applicable codes; and (5) scope of the quality assurance requirements. The meeting of September 17, 1981, reviewed and expanded upon the information in these two letters.

Summary

Mr. Budzik presented the applicant's design and construction schedule as shown in the enclosed copies of the viewgraph slides (Enclosure 2). The applicant stated that Preliminary Analysis and Design have been completed and an installation specification has been issued for bid. The preliminary analysis will not be submitted to the NRC. The final analysis is yet to be completed. Following the final analysis, a revision to the FSAR will be made incorporating the design of these modifications. The applicant's schedule also calls for construction of underpinning to start in early 1982. The FSAR revision is presently scheduled

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for February or March 1982. The NRC noted that this schedule is not consistent with completion of NRC review to support start of construction nor issuance of a Safety Evaluation Report in May 1982. The present SER schedule means that the staff review would have to be deferred to a supplement to the SER.

Mr. B. Dhar of Bechtel and Dr. E. Burke of MRJD described the proposed modification details and construction sequences for the underpinning. These presentations are primarily summarized by the slides of Enclosure 2. The proposed remedial underpinning is approximately a 4-foot thick, reinforced concrete wall that is approximately 30 feet high with a flared base at the north wall and is constructed to act as a continuous member urder the perimeter of that portion of the structure founded on backfill material. The underpinning wall will be founded on undisturbed material and will be constructed in sections or "piers". The wall will be attached to the existing structure by bolts anchored to the wall of that portion of the structure founded on original material and by through-bolting to the floor of the portion now founded on fill. A predetermined jacking force will be applied to the full perimeter of the SWPS overhang during construction to provide load transfer from the structure to the underpinning wall. Post-tensioning ties along the extension walls of the SWPS at the roof elevation will also be used during construction of underpinning.

The underpinning wall is comprised of piers in order to maintain support of the existing structure during construction. This installation scheme will therefore require the horizontal reinforcing steel bar to be spliced. The confined working space and problems with toxic fumes which may be created by welding operations dictate a mechanical splice. The applicant has elected to use a mechanical splice manufactured by Fox-Howlett. This design is the subject of a topical report previously submitted for NRC review by the manufacturer. Final approval of the topical report was not granted principally because no applicant had yet proposed use of this connection. Use of this connection will thus require completion of NRC approval consistent with the Midland review schedules.

Mr. Dhar stated that preliminary design analyses have been completed in the following areas:

1. Margin to sliding and overturning,

2. Bearing Pressure,

3. Evaluation of the Adequacy of reinforcing steel and its connections,

4. Evaluation of the base slab (592' elevation) for bending moment and shear,

5. Evaluation of the base slab currently founded on fill (620' elevation) under the new conditions imposed by the modified support,

6. Evaluation of shear and moment imposed on the east and west walls.

The presentation also discussed plans for crack and settlement monitoring. Permanent benchmarks will need to be installed soon near the northeast and northwest corners of the SWPS. An extentometer capable of reading two thousands of an inch will be attached to the structure off these benchmarks. Additional settlement markers will also be made at selected points of the structure. Dr. Burke also provided estimates for top of pier deflection with time. Quality assurance requirements was not discussed.

During the discussion, the following items of additional information were request by the NRC staff:

1. A description of the crack monitoring and settlement monitoring to be performed and the associated criteria.

2. Plans for monitoring of the groundwater table during this work.

3. Values and methodology for soil spring constants used in the design. The applicant will develop a schedule for providing this information and will inform the Project Manager of this schedule.)

4. Identification and justification of the criteria to be used during construction for evaluating pier settlement (include criteria for determining that a bearing capacity problem may exist).

5. Settlement predictions for the final structure.

6. An estimate of the changes to the bearing pressure on the existing structure due to the modification and its post-tensioning process.

7. Formal documentation of the information on settlement monitoring discussed during this meeting which has not previously been submitted to NRC.

8. Document how the structure will be protected.

9. Submit the assumption and inputs used in all six preliminary design analyses (identified above). The description of the structural analysis should include the material properties. Provide the critical results.

10. The staff stated that it may need to review portions of the construction specification at a later date.

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

Enclosures: As stated

OFFICE	cc: See next page	DL:LB#4		DL:LB#4		
SURNAME		RHerman:lb	MDuncan	JKane	EAdensam	
DATE		11/15/81	11/ /81	11/18/81	11/19/81	

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Docket File
LB#4 r/f
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NSIC
TERA
ACRS (16)
D. Hood

2/B5

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

NOV 23 1981

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

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 & 2

SUBJECT: SUMMARY OF SEPTEMBER 17, 1981 MEETING ON FOUNDATION MODIFICATIONS FOR SERVICE WATER PUMP STRUCTURE

On September 17, 1981, the NRC staff and its consultants met in Bethesda, MD. with Consumers Power Company (the applicant), Bechtel and Mueser, Rutledge, Johnston and Desmione (MRJD). The purpose was to discuss the preliminary design of modifications proposed to the foundation of that portion of the Midland Service Water Pump Structure founded on inadequate fill. Meeting attendees are listed in Enclosure 1.

Background

The applicant's letter of March 23, 1981, advised the NRC that the underpinning concept for the overhanging portion of the service water pump structure (SWPS) had been changed to a full length wall extending into the natural till material. This full length wall concept replaced the original remedial action, a driven pile support concept. A subsequent letter on August 26, 1981, forwarded a report entitled, "Technical Report on Underpinning the Service Water Pump Structure" which describes the design and construction requirements of this remedial action. That report included the following types of information: (1) drawings showing the underpinning scheme and a description of the construction sequence for this scheme; (2) dewatering for construction; (3) the design and acceptance criteria for the underpinning scheme, including load combinations, bearing pressures, structural stresses, and seismic loads; (4) applicable codes; and (5) scope of the quality assurance requirements. The meeting of September 17, 1981, reviewed and expanded upon the information in these two letters.

Summary

Mr. Budzik presented the applicant's design and construction schedule as shown in the enclosed copies of the viewgraph slides (Enclosure 2). The applicant stated that Preliminary Analysis and Design have been completed and an installation specification has been issued for bid. The preliminary analysis will not be submitted to the NRC. The final analysis is yet to be completed. Following the final analysis a revision to the FSAR will be made incorporating the design of these modifications. The applicant's schedule also calls for construction of underpinning to start in early 1982. The FSAR revision is presently scheduled

for February or March 1982. The NRC noted that this schedule is not consistent with completion of NRC review to support start of construction nor issuance of a Safety Evaluation Report in May 1982. The present SER schedule means that the staff review would have to be deferred to a supplement to the SER.

Mr. B. Dhar of Bechtel and Dr. E. Burke of MRJD described the proposed modification details and construction sequences for the underpinning. These presentations are primarily summarized by the slides of Enclosure 2. The proposed remedial underpinning is approximately a 4-foot thick, reinforced concrete wall that is approximately 30 feet high with a flared base at the north wall and is constructed to act as a continuous member under the perimeter of that portion of the structure founded on backfill material. The underpinning wall will be founded on undisturbed material and will be constructed in sections or "piers". The wall will be attached to the existing structure by bolts anchored to the wall of that portion of the structure founded on original material and by through-bolting to the floor of the portion now founded on fill. A predetermined jacking force will be applied to the full perimeter of the SWPS overhang during construction to provide load transfer from the structure to the underpinning wall. Post-tensioning ties along the extension walls of the SWPS at the roof elevation will also be used during construction of underpinning.

The underpinning wall is comprised of piers in order to maintain support of the existing structure during construction. This installation scheme will therefore require the horizontal reinforcing steel bar to be spliced. The confined working space and problems with toxic fumes which may be created by welding operations dictate a mechanical splice. The applicant has elected to use a mechanical splice manufactured by Fox-Howlett. This design is the subject of a topical report previously submitted for NRC review by the manufacturer. Final approval of the topical report was not granted principally because no applicant had yet proposed use of this connection. Use of this connection will thus require completion of NRC approval consistent with the Midland review schedules.

Mr. Dhar stated that preliminary design analyses have been completed in the following areas:

1. Margin to sliding and overturning,

2. Bearing Pressure,

3. Evaluation of the Adequacy of reinforcing steel and its connections,

4. Evaluation of the base slab (592' elevation) for bending moment and shear,

5. Evaluation of the base slab currently founded on fill (620' elevation) under the new conditions imposed by the modified support,

6. Evaluation of shear and moment imposed on the east and west walls.

The presentation also discussed plans for crack and settlement monitoring. Permanent benchmarks will need to be installed soon near the northeast and northwest corners of the SWPS. An extentometer capable of reading to thousands of an inch will be attached to the structure off these benchmarks. Additional settlement markers will also be made at selected points of the structure. Dr. Burke also provided estimates for top of pier deflection with time. Quality assurance requirements was not discussed.

During the discussion, the following items of additional information were request by the NRC staff:

1. A description of the crack monitoring and settlement monitoring to be performed and the associated criteria.

2. Plans for monitoring of the groundwater table during this work.

3. Values and methodology for soil spring constants used in the design. The applicant will develop a schedule for providing this information and will inform the Project Manager of this schedule.

4. Identification and justification of the criteria to be used during construction for evaluating pier settlement (including criteria for determining that a bearing capacity problem may exist).

5. Settlement predictions for the final structure.

6. An estimate of the changes to the bearing pressure on the existing structure due to the modification and its post-tensioning process.

7. Formal documentation of the information on settlement monitoring discussed during this meeting which has not previously been submitted to NRC.

8. Document how the structure will be protected.

9. Submit the assumption and inputs used in all six preliminary design analyses (identified above). The description of the structural analysis should include the material properties. Provide the critical results.

10. The staff stated that it may need to review portions of the construction specification at a later date.

Darl Hood

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

Enclosures: As stated

cc: See next page

MIDLAND

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ENCLOSURE 1

LIST OF ATTENDEES

Meeting of September 17, 1981
Midland, Units 1 & 2

NRC

D. S. Hood
A. P. Hodgdon
S. B. Kim
R. B. Landsman
J. Kane
L. Heller

Consumers Power

K. B. Razdan
T. R. Thiruvengadam
R. Huston
D. Budzik
N. Ramanujam

Bechtel

B. Dhar

Mueser, Rutledge, Johnston & Desmione

E. Burke

U.S. Army Corps of Engineers, Chicago

H. N. Singh

NSWC/WO

J. P. Matra, Jr.

ENCLOSURE 2

View-graph Slides Used During
September 17, 1981 Meeting

Midland Plant, Units 1 & 2

AGENDA

PRESENTATION OF REMEDIAL MEASURES

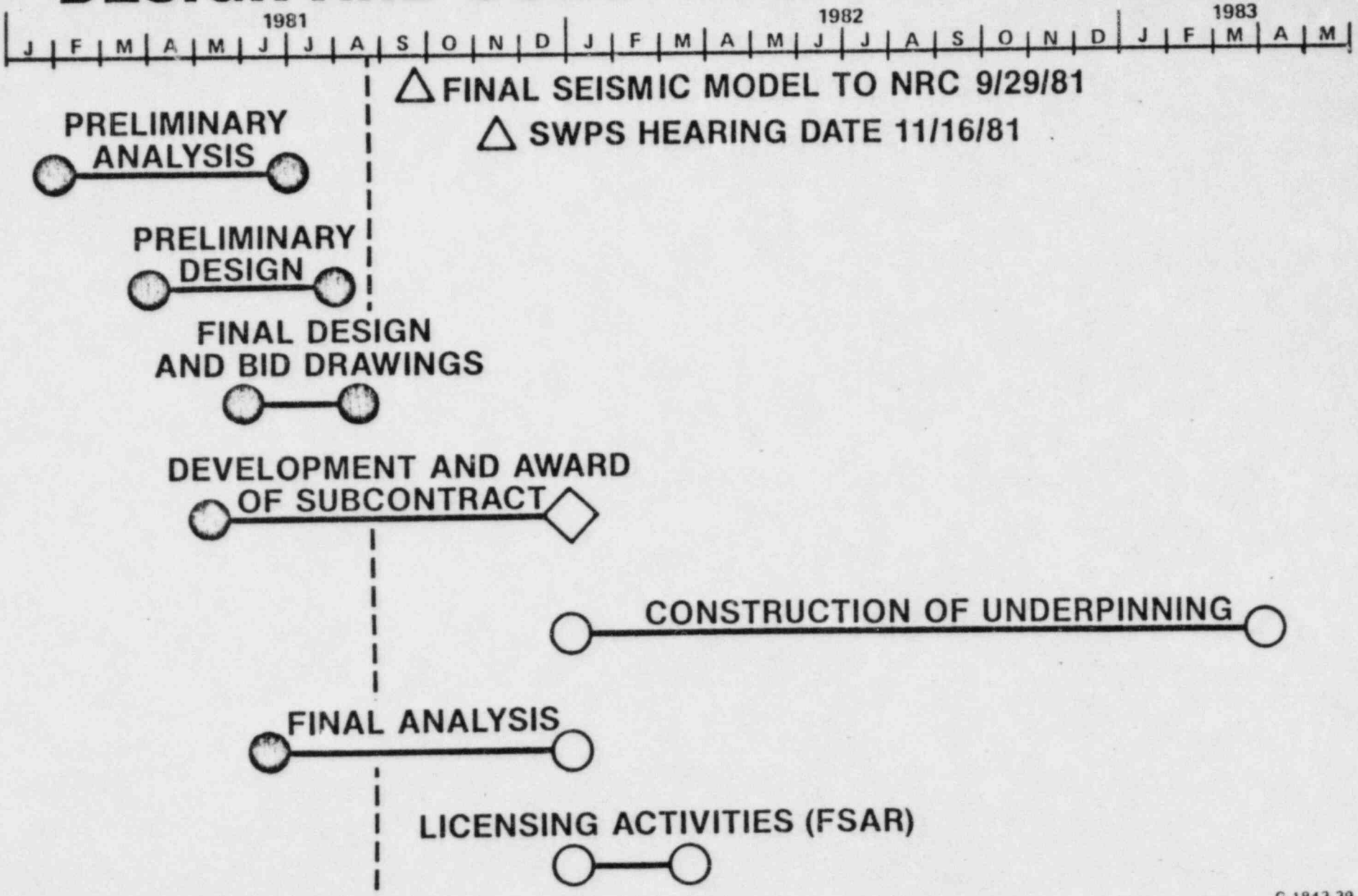
FOR MIDLAND SERVICE WATER PUMP STRUCTURE

SEPTEMBER 17, 1981, 8:30 a.m.

MARYLAND NATIONAL BANK BUILDING, ROOM 6507

- Introduction
- Design and Construction Schedule — Budzik
- Overview and ~~construction Schedule~~ Structural details — Dhar
- Underpinning Scheme — Burke
- Q-Listed Activities (Not discussed)
- Discussion

SUMMARY OF SERVICE WATER PUMP STRUCTURE (SWPS)
DESIGN AND CONSTRUCTION SCHEDULE



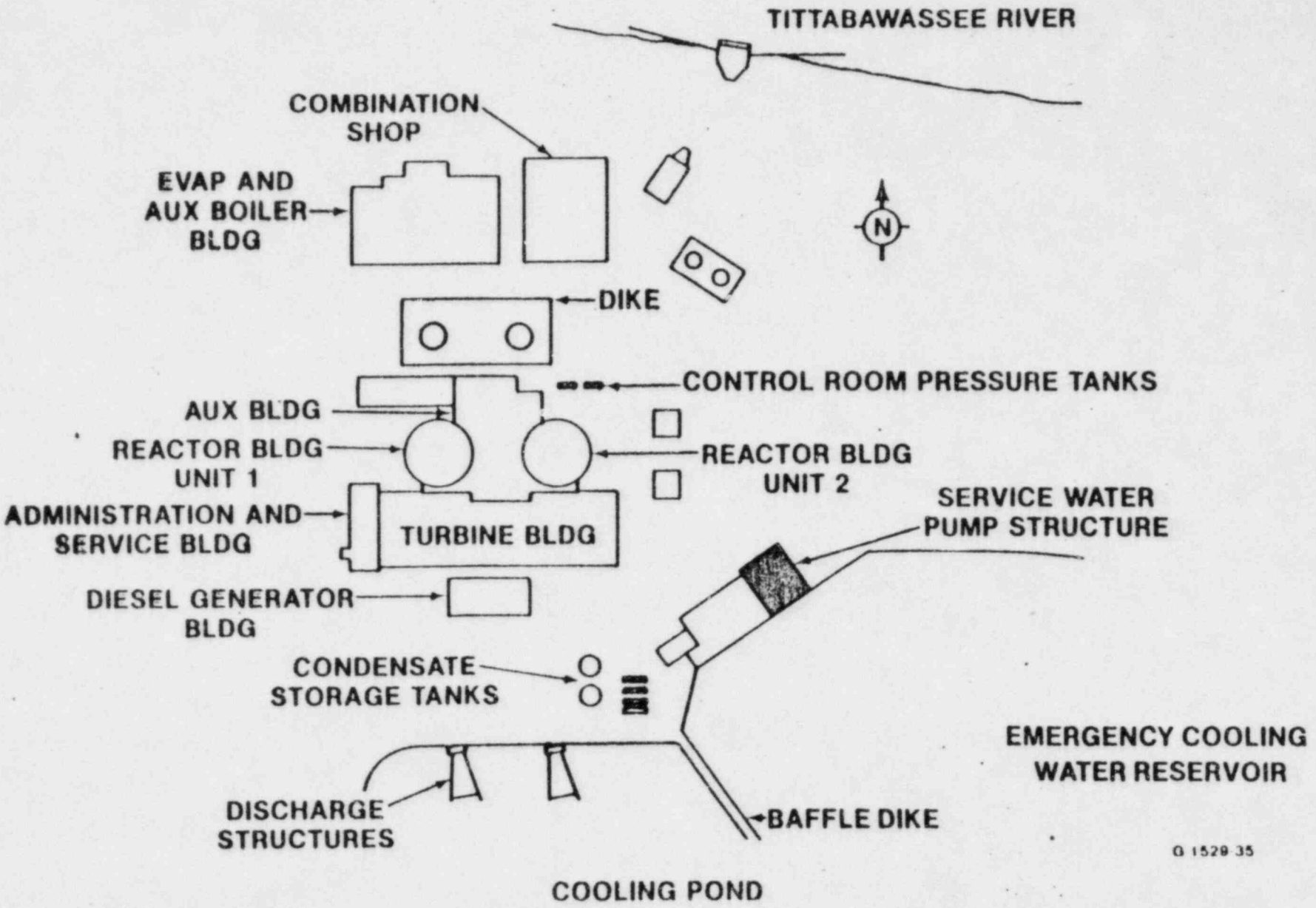
REFERENCE PPS-021, REV 0, DATED 8/24/81

G-1843-39

◇ = Completed

B Paul
4/17/81

MIDLAND SITE PLAN



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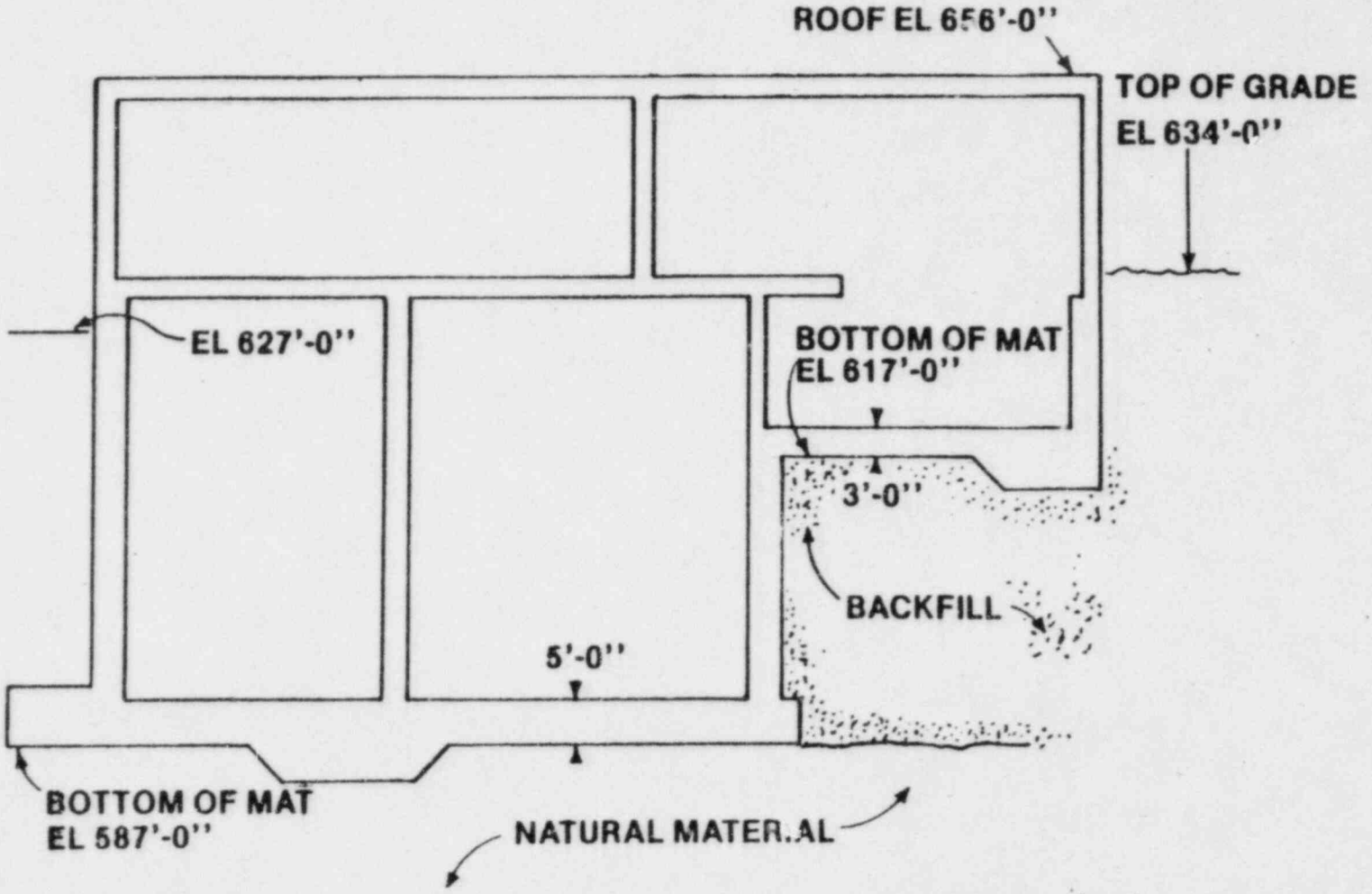
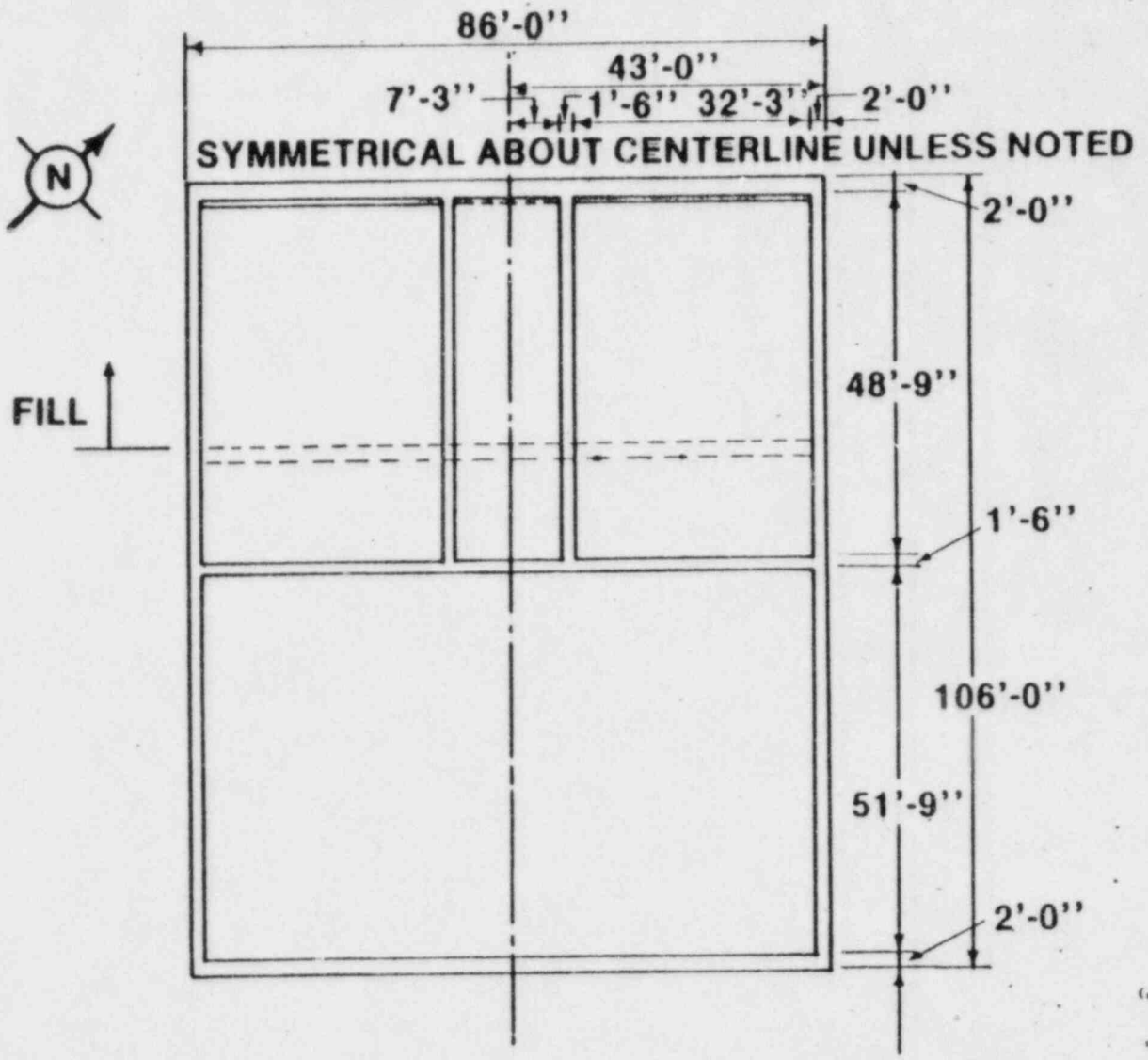
SERVICE WATER PUMP STRUCTURE
TYPICAL SECTION
(Looking West)



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



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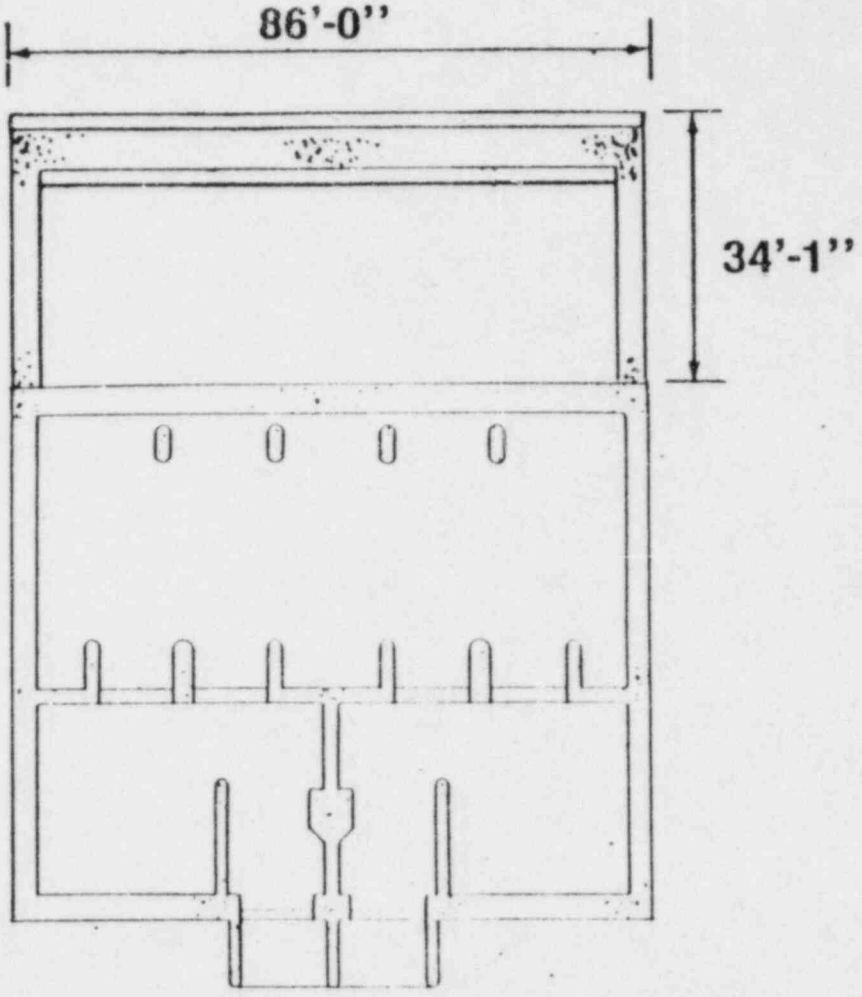
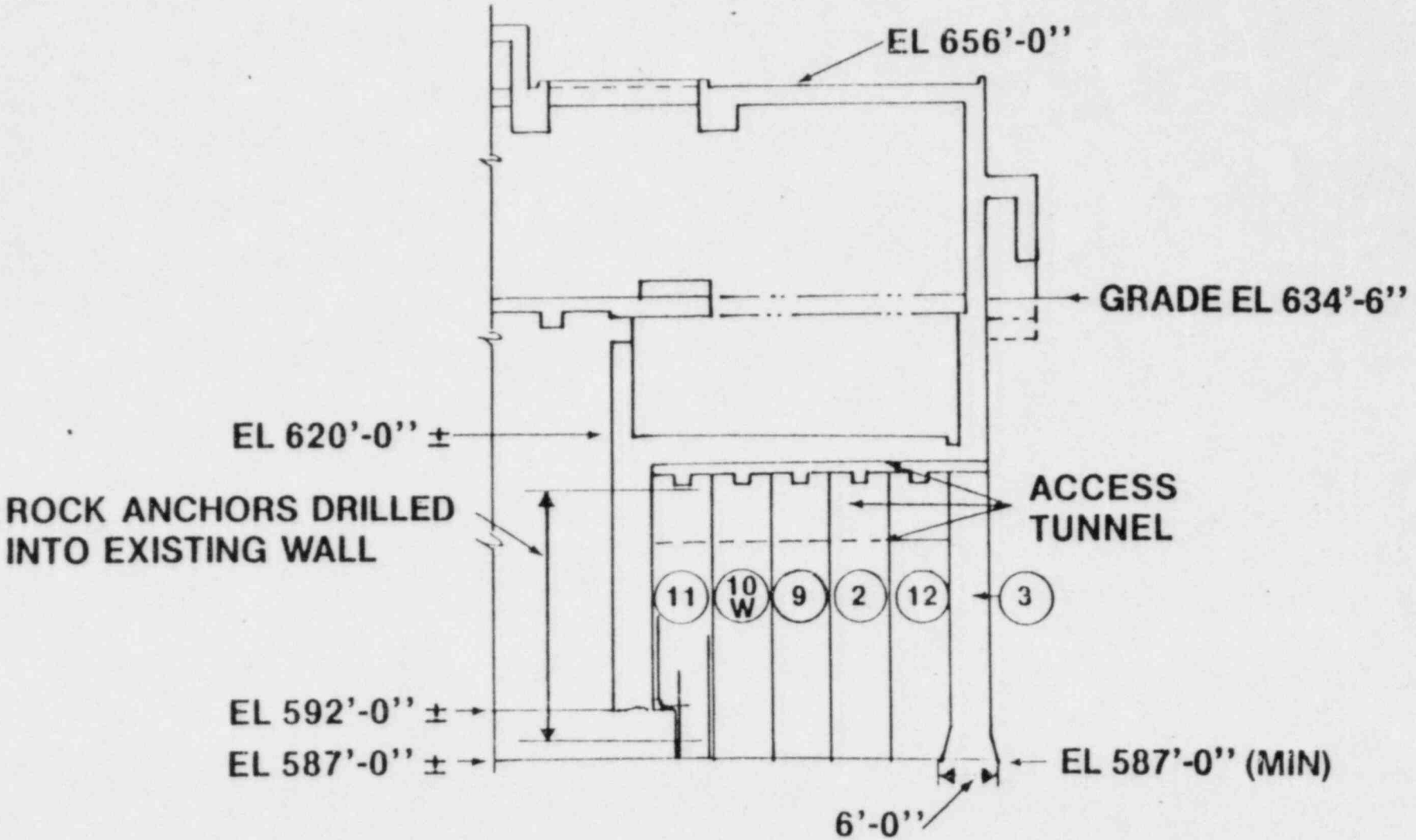
SERVICE WATER PUMP STRUCTURE
PLAN AT EL 592'-0"

	INITIAL JACKING LOAD (KIPS)	FINAL JACKING LOAD (KIPS)
END WALL	2,500	3,500
EACH SIDE WALL	315	450



SERVICE WATER PUMP STRUCTURE
SECTION

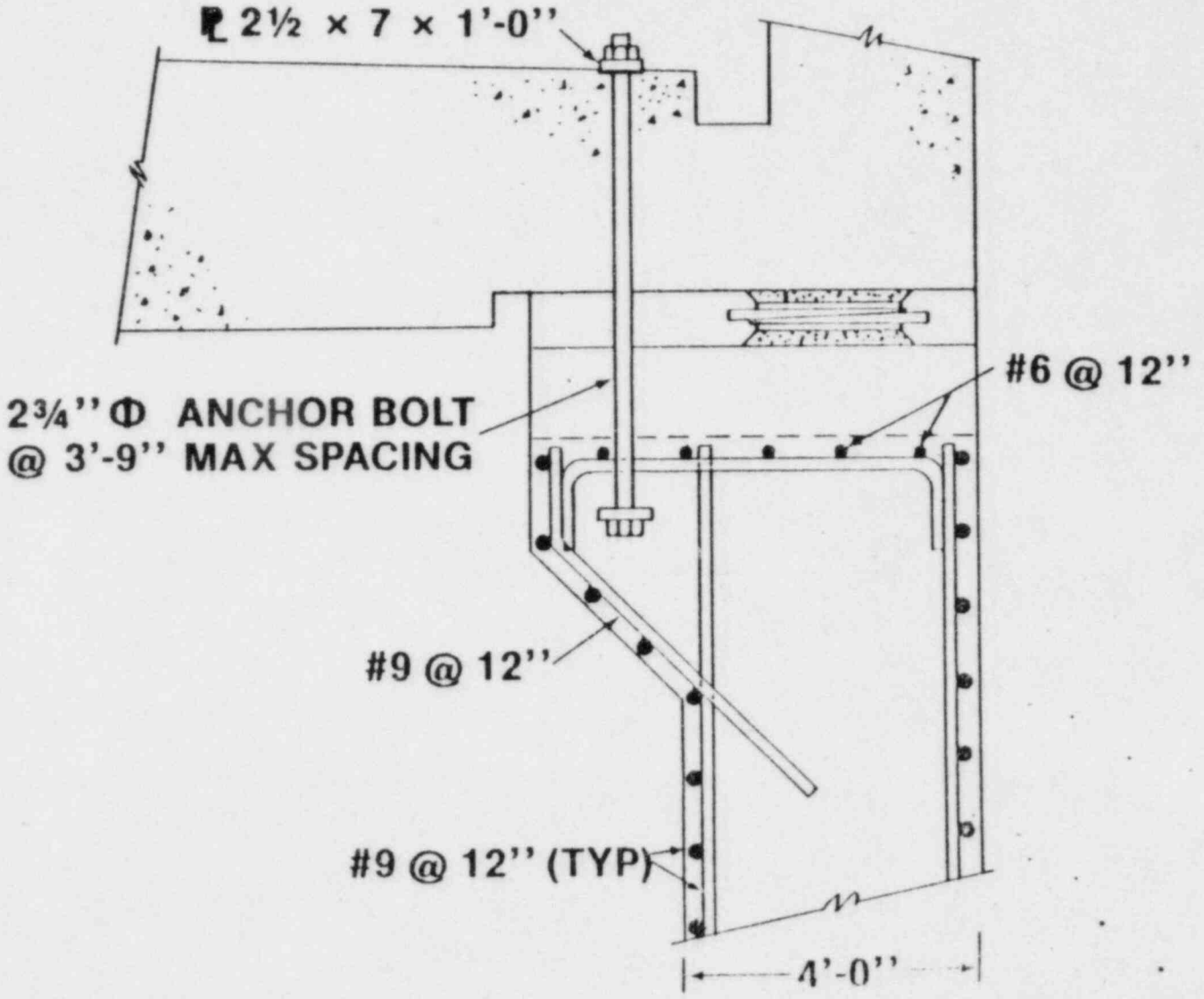


UNDERPINNING WALL DESIGN FEATURES

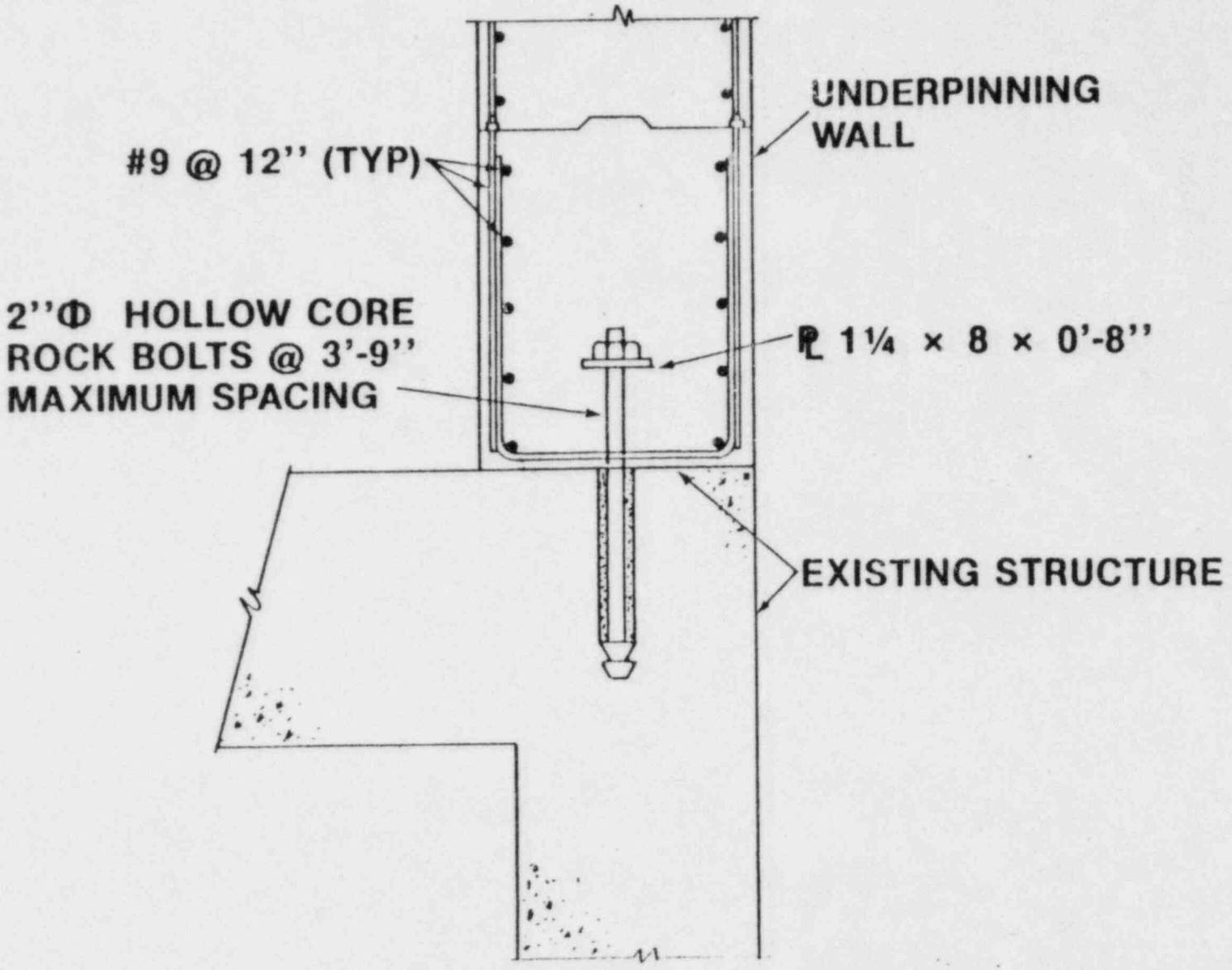
- CONTINUOUS PERIMETER REINFORCED CONCRETE WALL
- DOWELS AT HORIZONTAL AND VERTICAL INTERFACE
- WALL FOUNDED ON UNDISTURBED NATURAL MATERIAL
- WALL BELLED OUT AS REQUIRED TO MEET SPECIFIED FACTOR OF SAFETY FOR BEARING PRESSURE
- LOADS JACKED INTO STRUCTURE TO ASSURE POSITIVE TRANSFER
- JACKING LOAD MAINTAINED TO REDUCE STRESS
- DOWEL CONNECTION COMPLETED AFTER FINAL JACKING
- TEMPORARY COMPRESSIVE FORCE APPLIED TO TOP OF STRUCTURE BEFORE DEWATERING

SERVICE WATER PUMP STRUCTURE

TOP OF UNDERPINNING WALL DETAIL

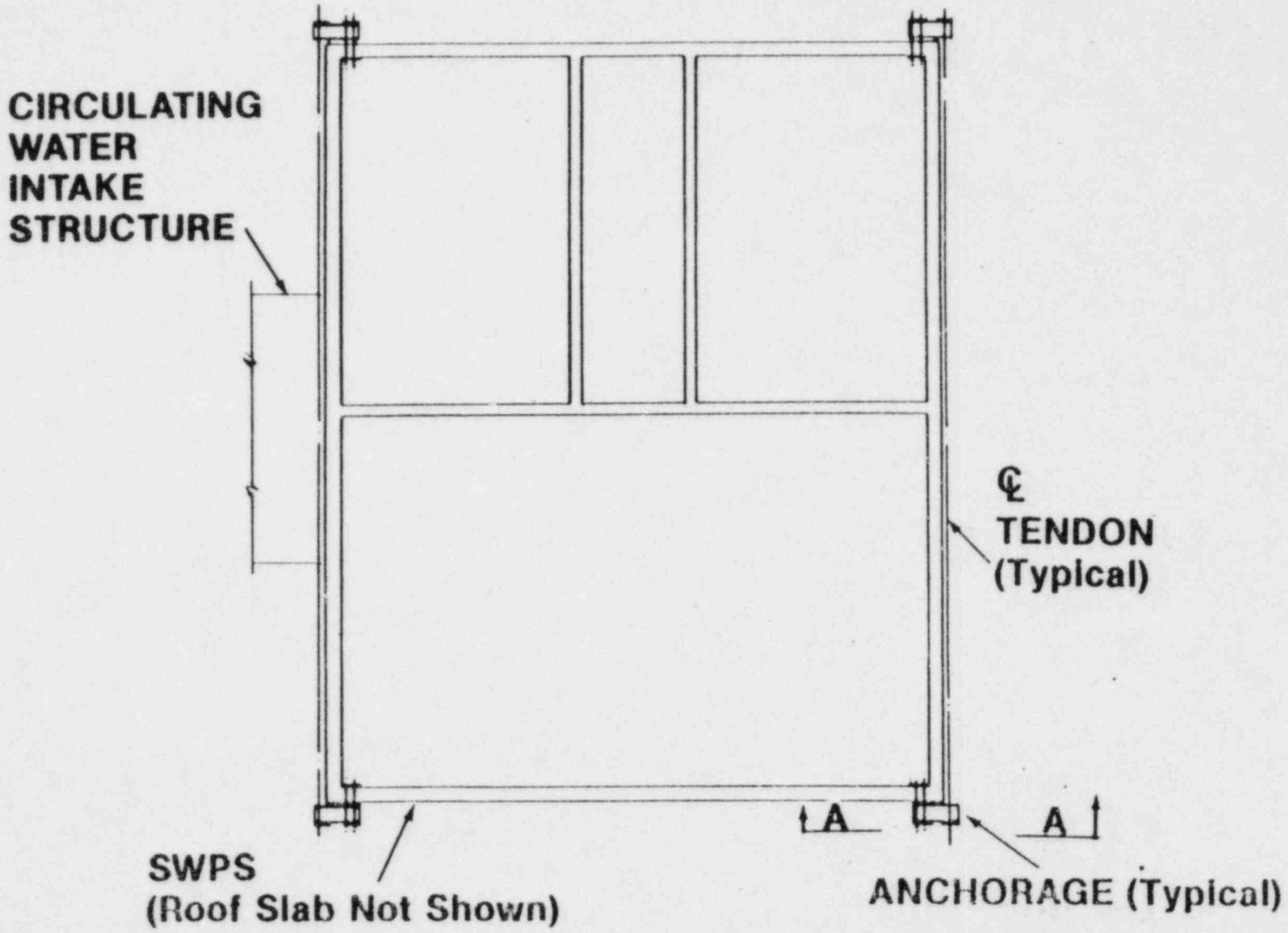


SERVICE WATER PUMP STRUCTURE
ROCK BOLT DETAIL

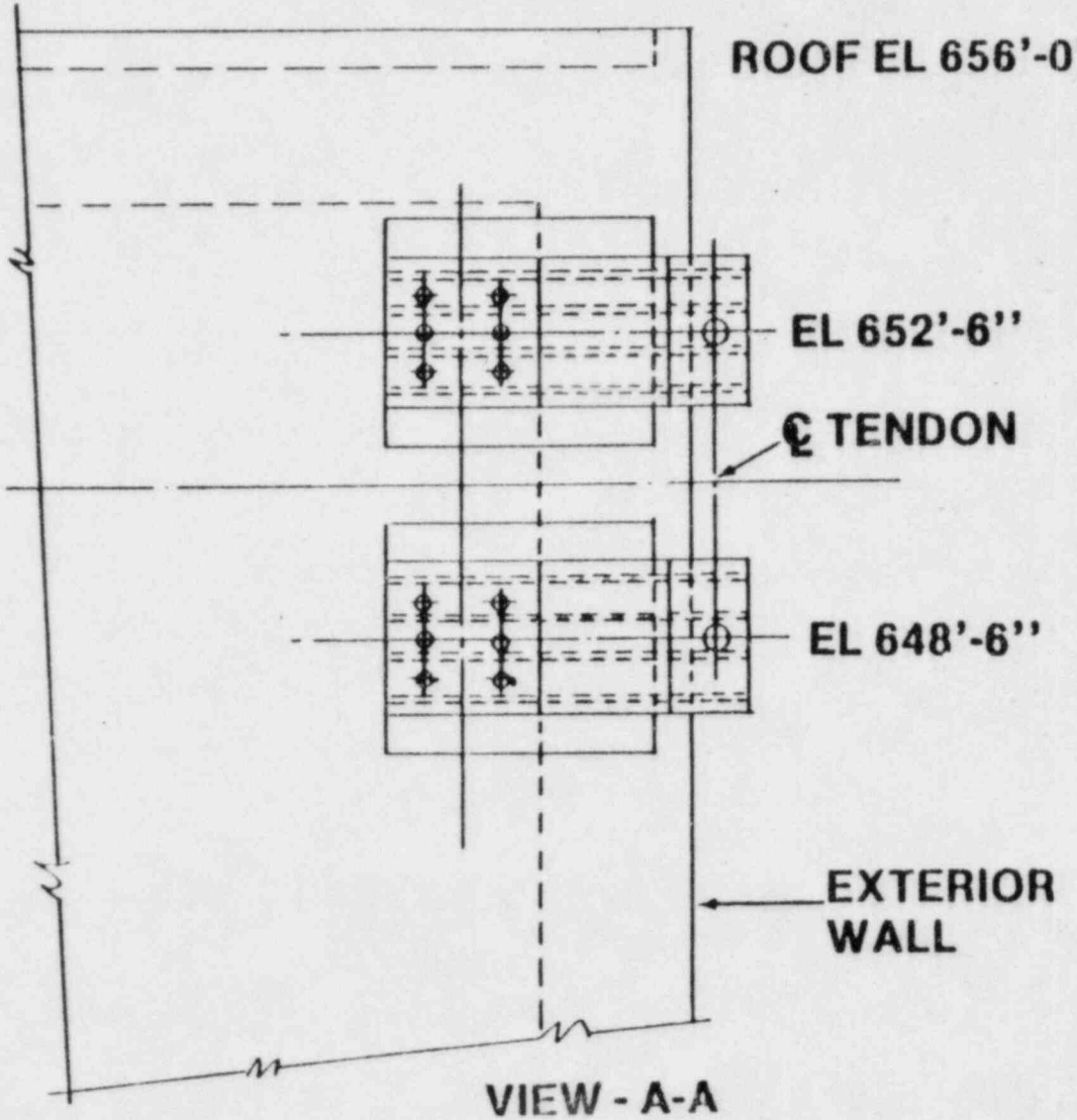


SERVICE WATER PUMP STRUCTURE

DETAILS OF POST-TENSIONING TIES



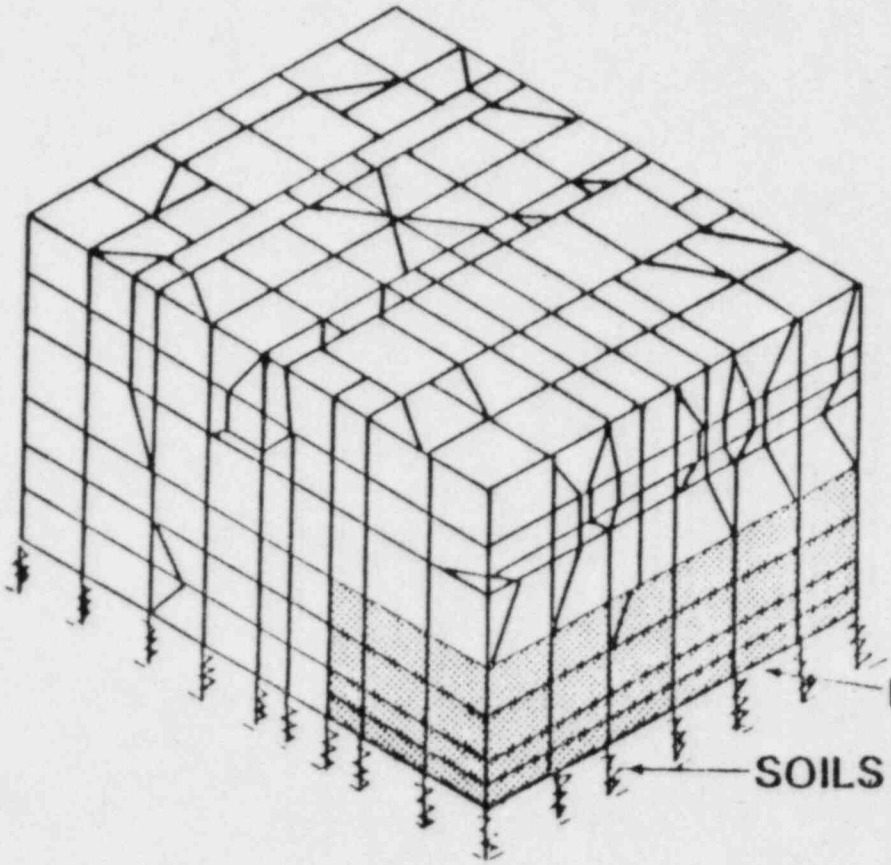
SERVICE WATER PUMP STRUCTURE
VIEW OF POST-TENSIONING ANCHORAGES



ANALYSIS AND DESIGN

- LOADS AND LOAD COMBINATIONS - MIDLAND FSAR MODIFIED FOR THE JACKING LOAD
- SEISMIC LOAD BASED ON MIDLAND FSAR SPECTRA
- SSE LOAD INCREASED BY 50% ABOVE MIDLAND SPECTRA FOR UNDERPINNING WALL AND CONNECTION DESIGN
- STRUCTURAL ANALYSIS ACCOUNT FOR UNDERPINNING WALL AND ITS CONSTRUCTION SEQUENCE
- VERTICAL AND HORIZONTAL LOAD TRANSFERRED TO FOUNDATION MEDIUM BY BASE SLAB AT 587' AND UNDERPINNING WALL BEARING AREA
- STRUCTURE ACCEPTANCE CRITERIA IN ACCORDANCE WITH MIDLAND FSAR
- CRITICAL SECTIONS IN STRUCTURE TO BE ANALYSED PER ACI 349-76 AND RG 1.142 FOR NRC INFORMATION
- PRELIMINARY ANALYSIS RESULTS

SERVICE WATER PUMP STRUCTURE
ISOMETRIC VIEW OF FINITE ELEMENT MODEL

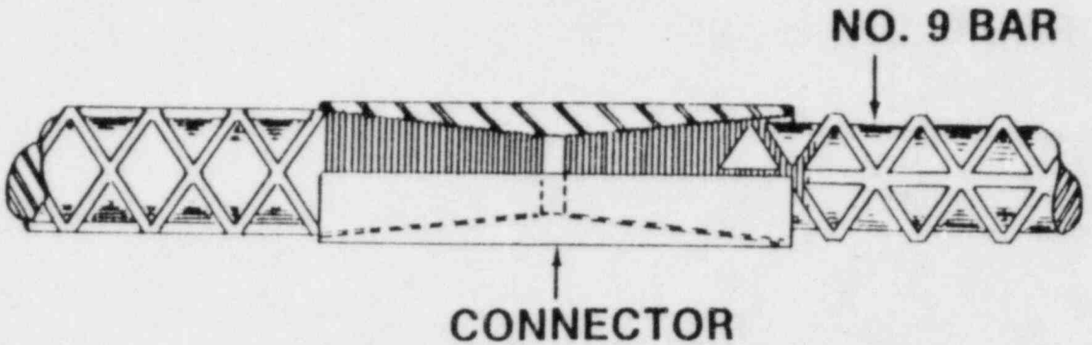


MECHANICAL SPLICING OF REINFORCEMENT

- HORIZONTAL REINFORCING BARS ONLY
- REBAR STRESSES NOT CRITICAL
- TYPE-TAPER THREADED SPLICES
- CONFORM TO ASME CODE, SECTION III, DIVISION II (Section CC-4330)
- PREQUALIFIED SPLICES (Fox-Howlett)
- PRODUCTION SPLICING PROCEDURES
- INITIAL QUALIFICATION TESTS
- PRODUCTION TESTS

SERVICE WATER PUMP STRUCTURE

TAPER THREADED CONNECTOR



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CRACK MONITORING REQUIREMENTS

- FREQUENCY OF MEASUREMENTS

  Whenever any of the following occur:

  - Installation of Post-Tensioning Ties
  - Activation of General Area Dewatering System
  - Activation of Subcontractor Dewatering System
  - Initial Jacking of:

    Pier 1

    Pier 3

    Pier 7

    Pier 8

  - Release of Post-Tensioning Ties
  - Completion of Final Stage Jacking
  - Termination of Subcontractor Dewatering System

OR (Frequency of monitoring cracks shall not exceed 4 months) whenever else it occurs

G 1854 15

CRACK MONITORING REQUIREMENTS (cont'd)

- METHOD OF MEASUREMENT
  - All Cracks Wider Than 0.005 Inches Shall Be Monitored
  - Location of Ends of Cracks and Points of Maximum Crack Widths Shall Be Measured to Nearest Inch

UNDERPINNING

DIVISION OF RESPONSIBILITY BETWEEN BECHTEL AND MRJD

- BECHTEL
  - Seismic and Structural Analyses
  - Connection Details Between Existing Structure and Underpinning
  - Rebar Requirements of Underpinning Wall
  - Initial and Final Jacking Load Requirement for Structure
  - Dewatering
  - Underpinning Subcontract Administration

SW-6E

UNDERPINNING

DIVISION OF RESPONSIBILITY BETWEEN BECHTEL AND MRJD (cont'd)

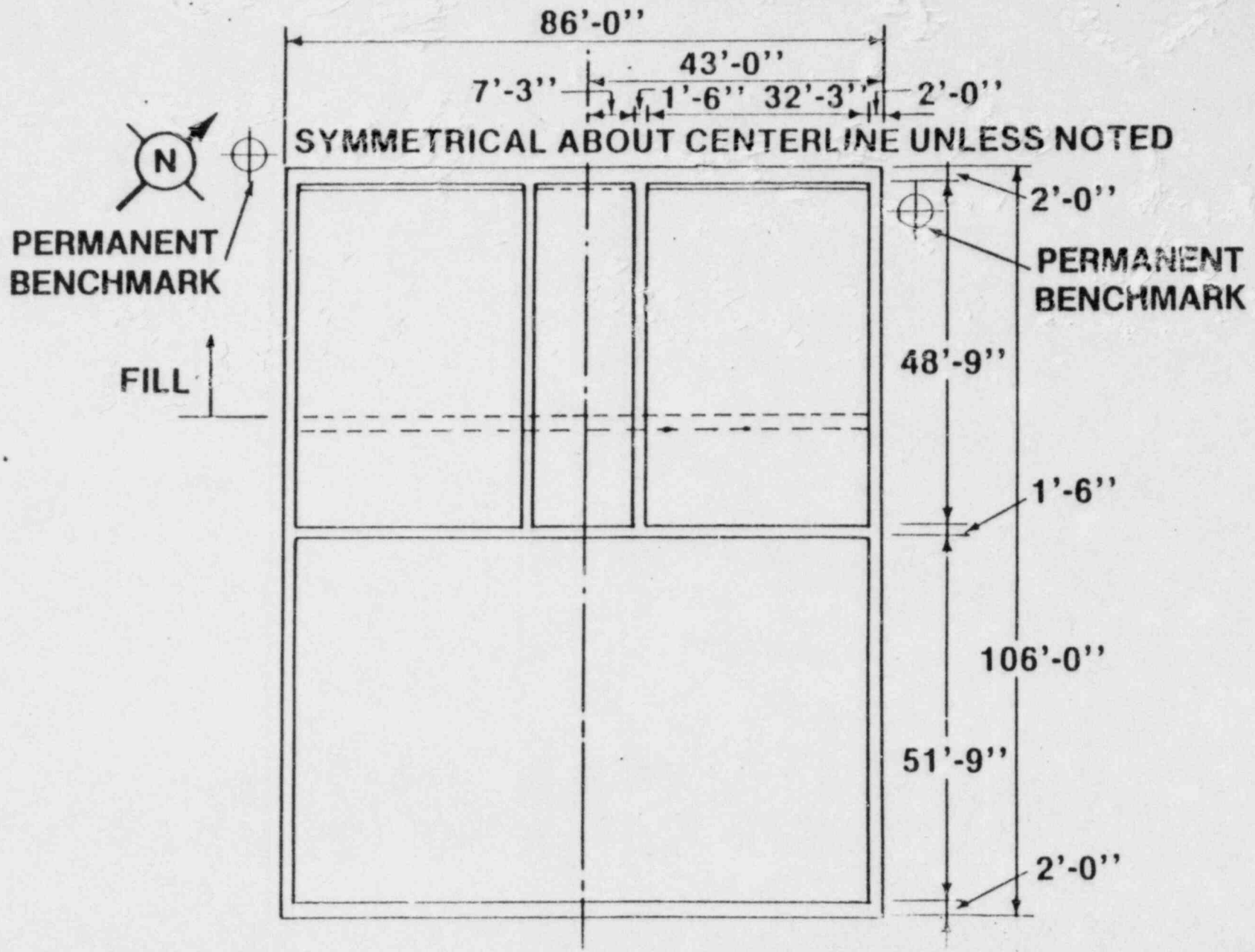
- MRJD
  - Depth and Base Requirement of Underpinning Wall
  - Construction Procedure and Rebar Detail
  - Settlement Calculations and Settlement Monitoring Program
  - Input for Underpinning Specification

QUALITY ASSURANCE REQUIREMENTS

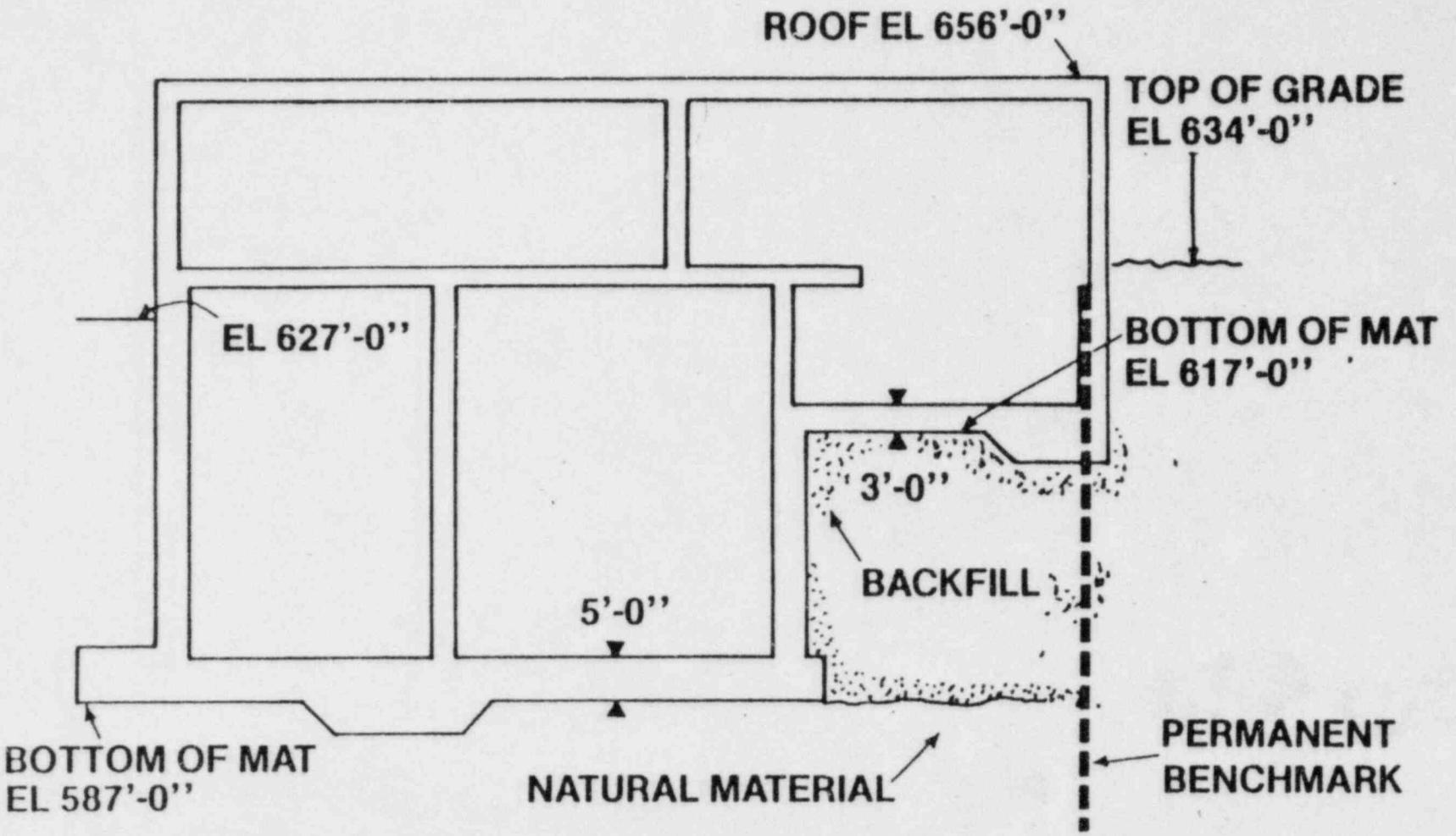
- Q LISTED ACTIVITIES
  - Construction of All Permanent Structure and Connection
  - Any Activity or Structure Necessary to Protect Existing Structure
- ALL OTHER TEMPORARY CONSTRUCTION ACTIVITIES NON-Q LISTED

SERVICE WATER PUMP STRUCTURE

PLAN AT EL 634'-6"



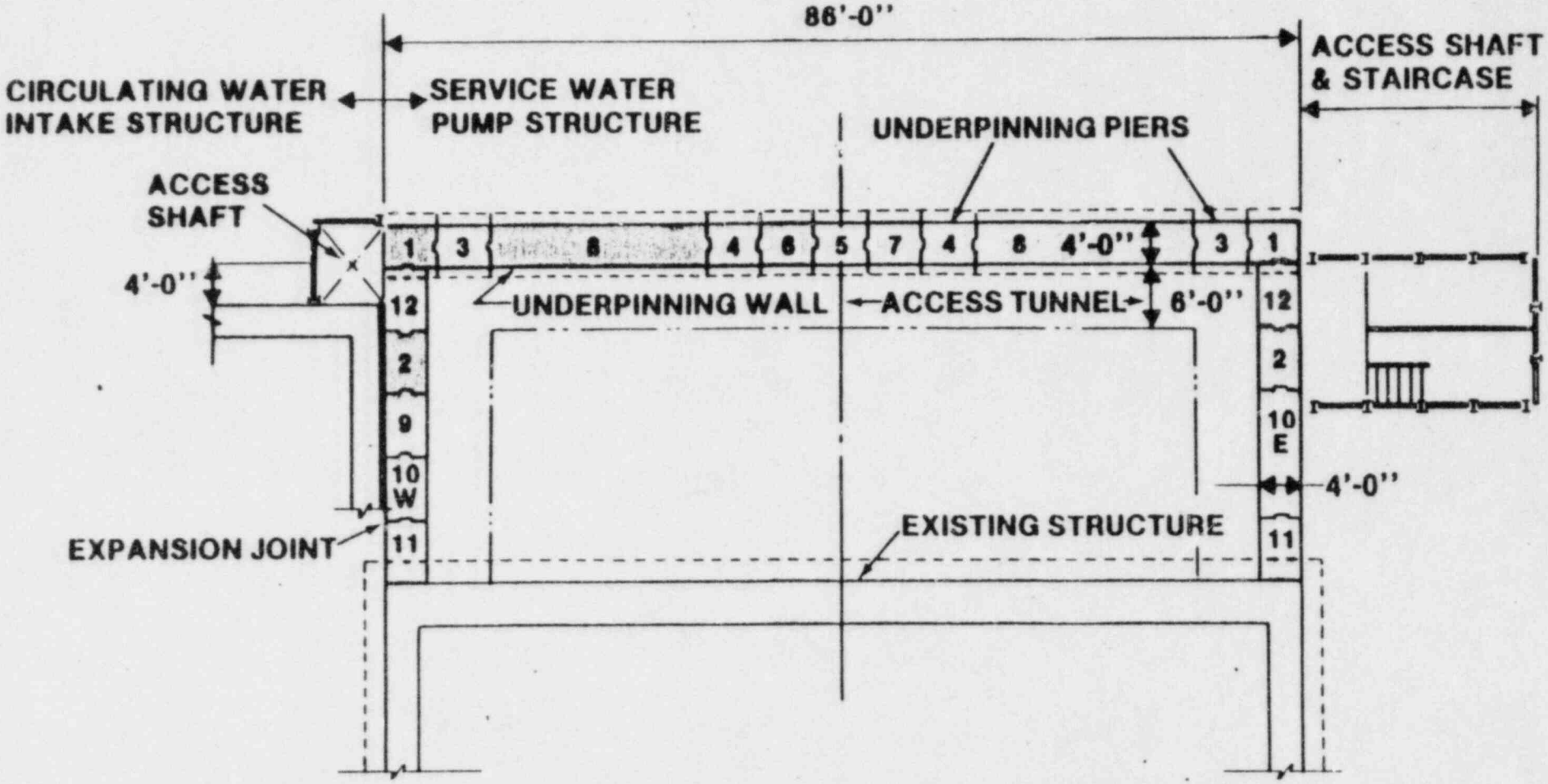
SERVICE WATER PUMP STRUCTURE
TYPICAL SECTION
(Looking West)



1 AND 2

G-1854-04

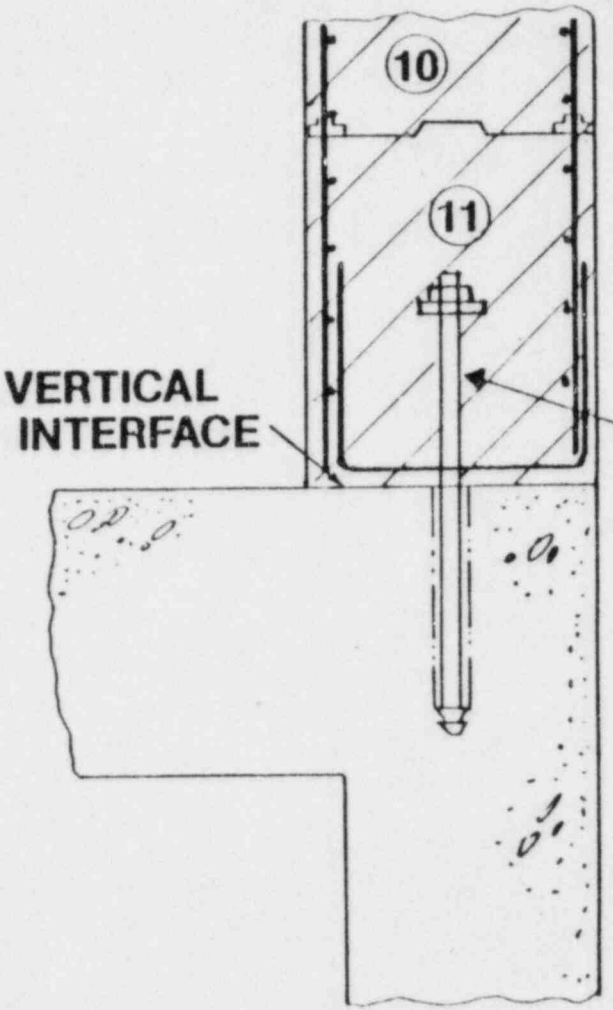
SERVICE WATER PUMP STRUCTURE
PLAN



SERVICE WATER PUMP STRUCTURE

PLAN

(Connection to Existing Structure)

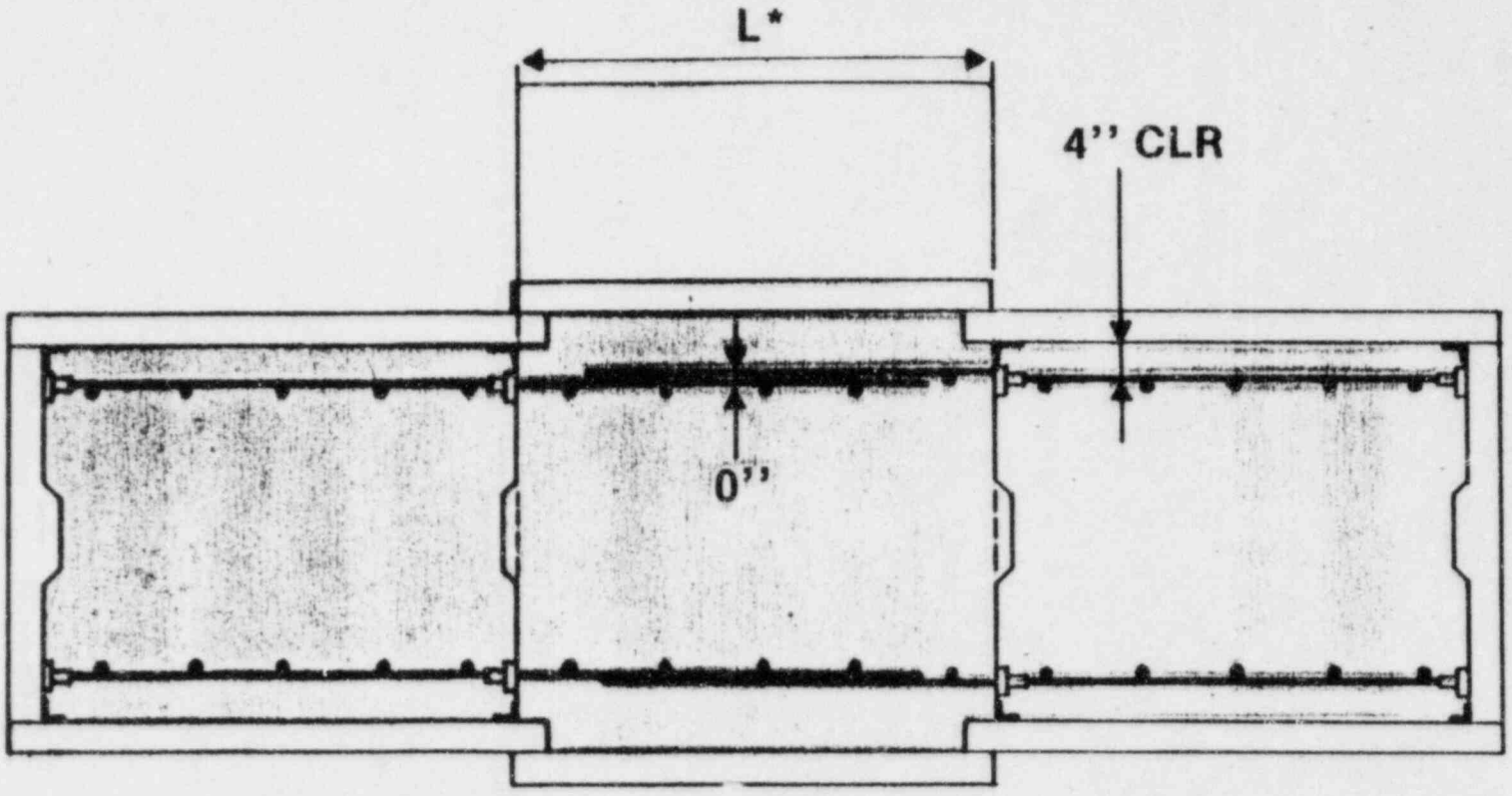


NOTES:

1. DRILL AND GROUT ROCK ANCHORS INTO EXISTING WALL
2. PIERS 11 TO BE POURED ONLY AFTER COMPLETION OF ALL JACKING PROCEDURES

MIDLAND UNITS 1 AND 2

SERVICE WATER PUMP STRUCTURE
DETAILS OF ADJOINING PIERS

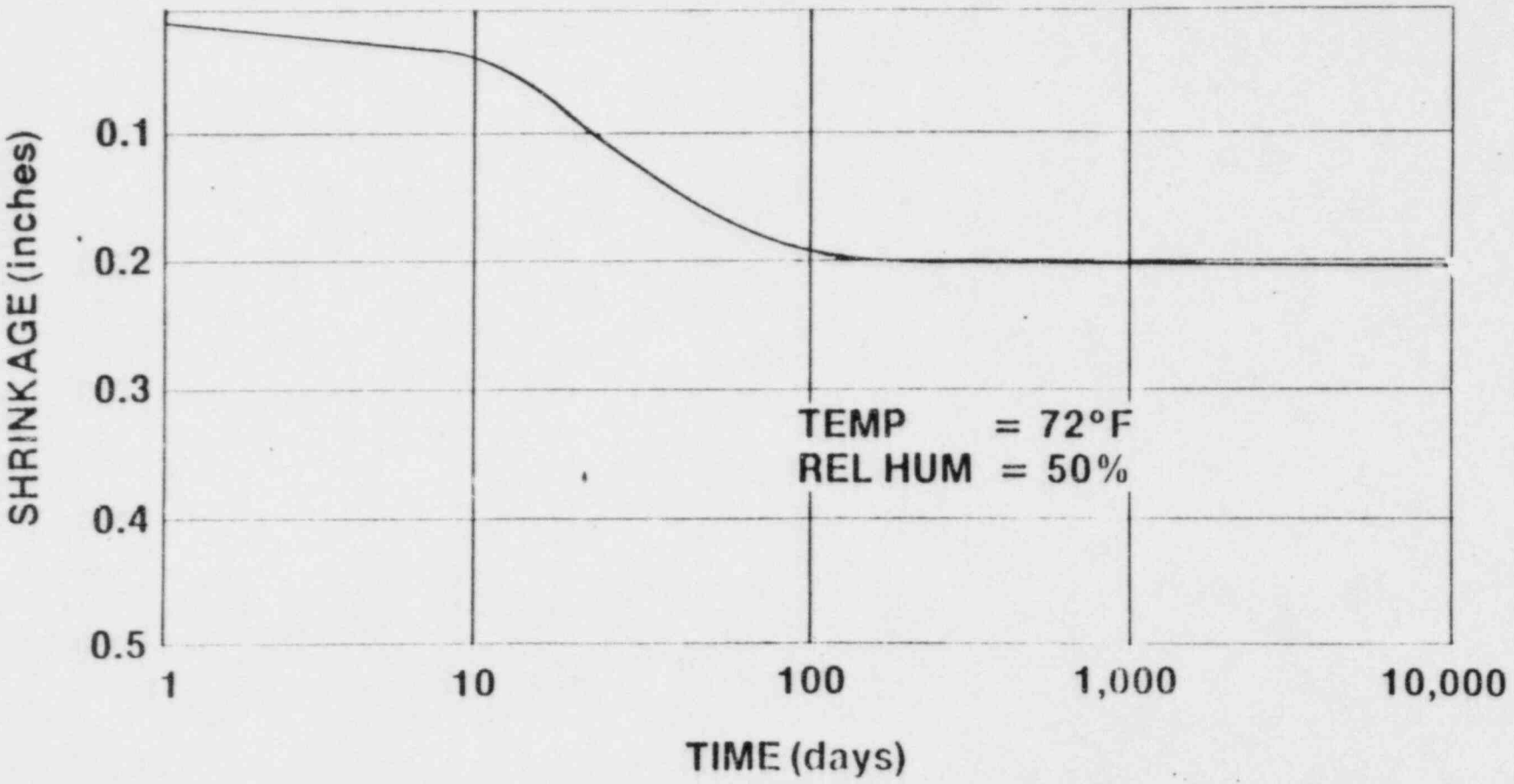


MIDLAND UNITS 1 AND 2

G-1555-06

SERVICE WATER PUMP STRUCTURE

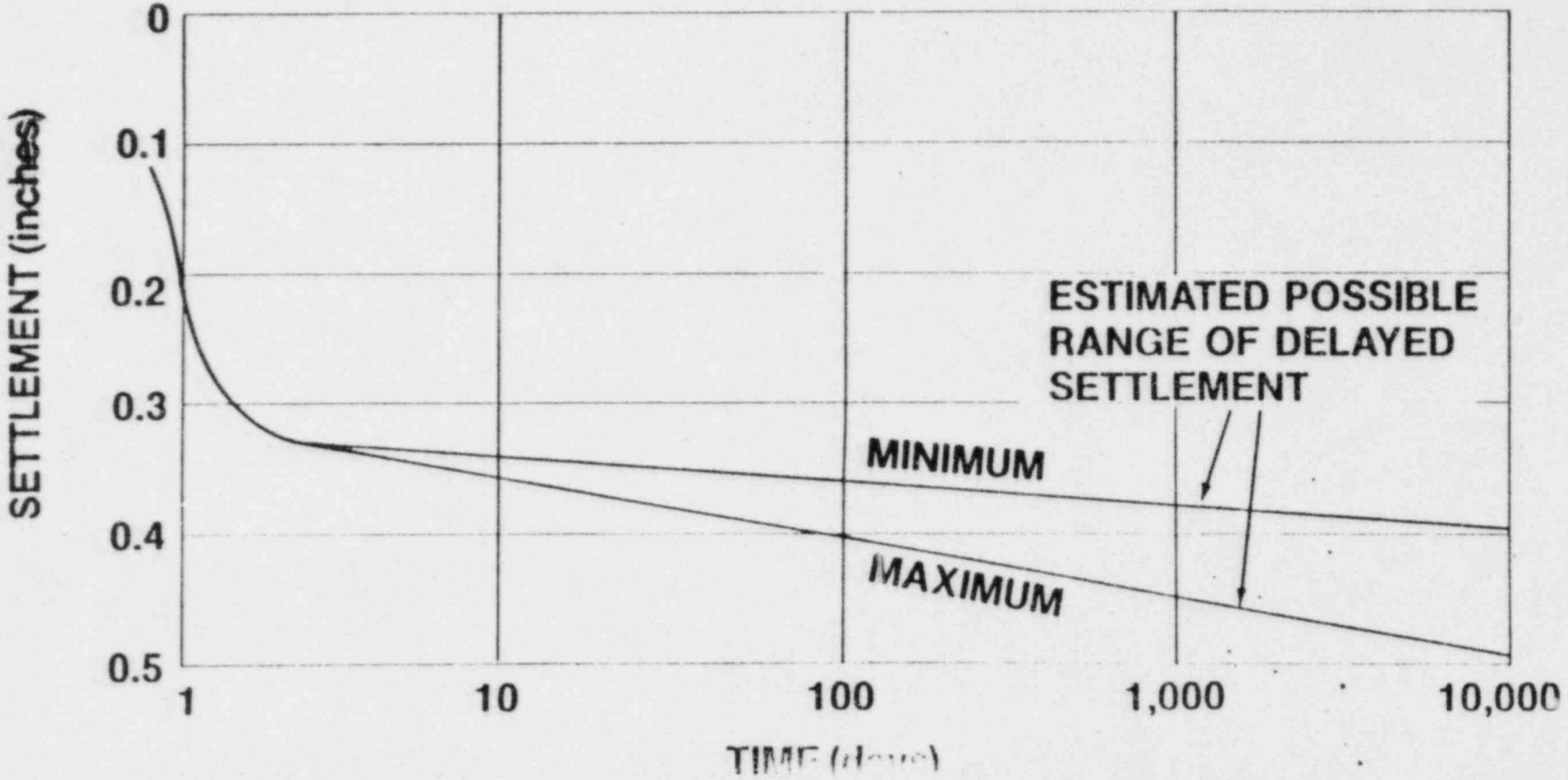
ESTIMATED TOP OF PIER DEFLECTION DUE TO SHRINKAGE OF CONCRETE VS TIME



SERVICE WATER PUMP STRUCTURE

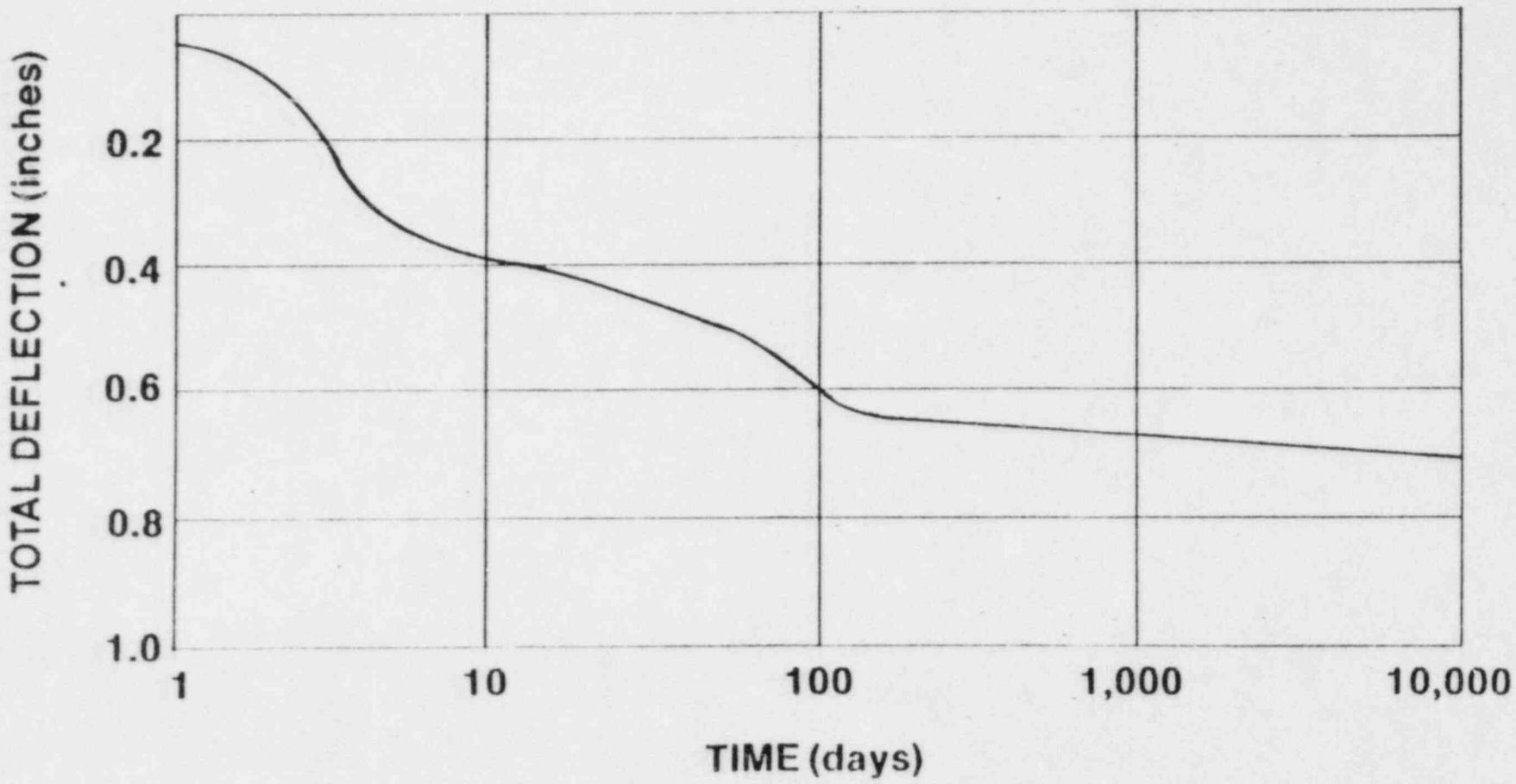
ESTIMATED TOP OF PIER DEFLECTION DUE TO CONSOLIDATION OF SOIL VS TIME

(Time Is Measured from Start of Jacking)



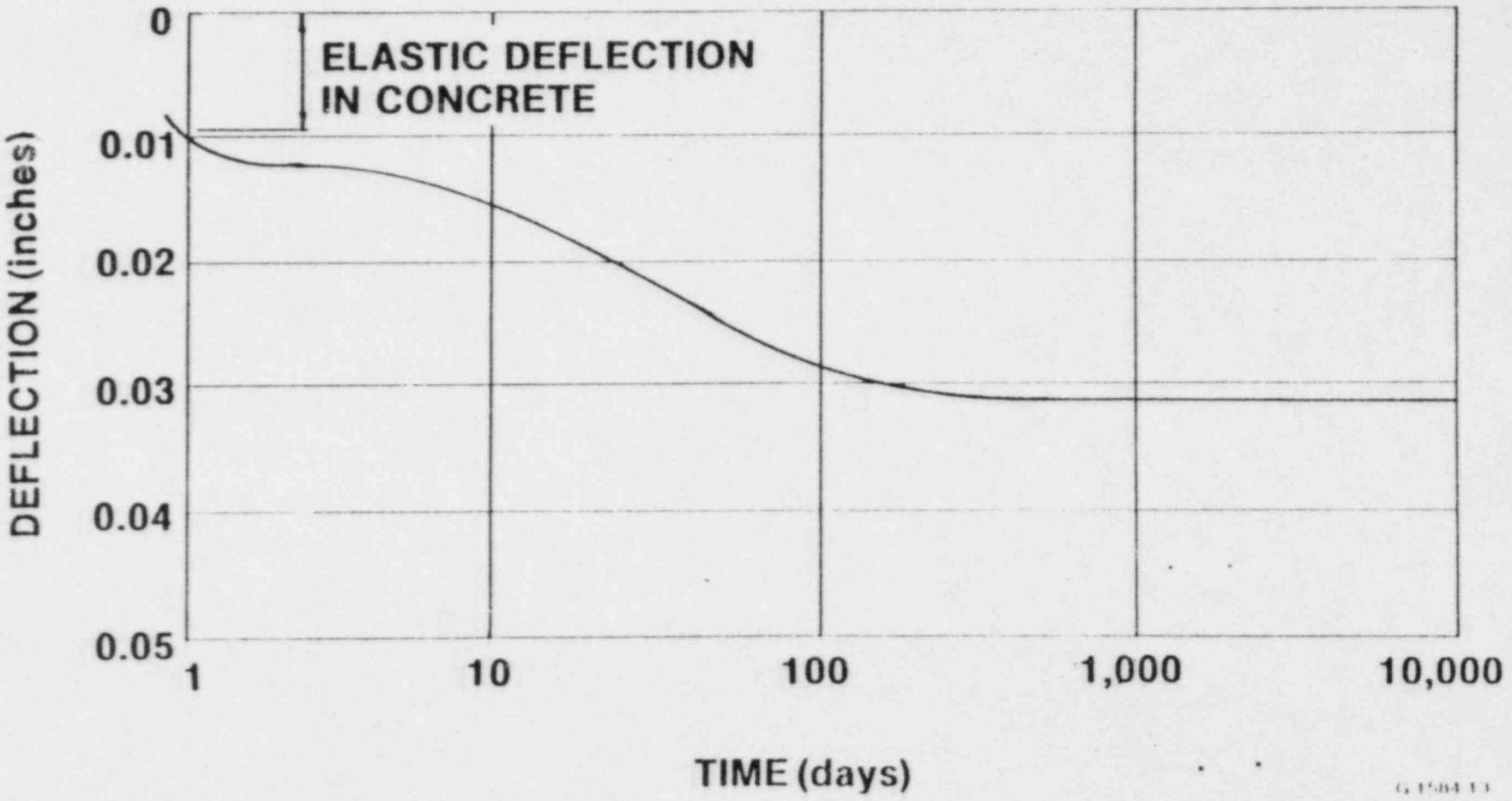
SERVICE WATER PUMP STRUCTURE

ESTIMATED TOP OF PIER DEFLECTION DUE TO TOTAL DEFORMATION VS TIME

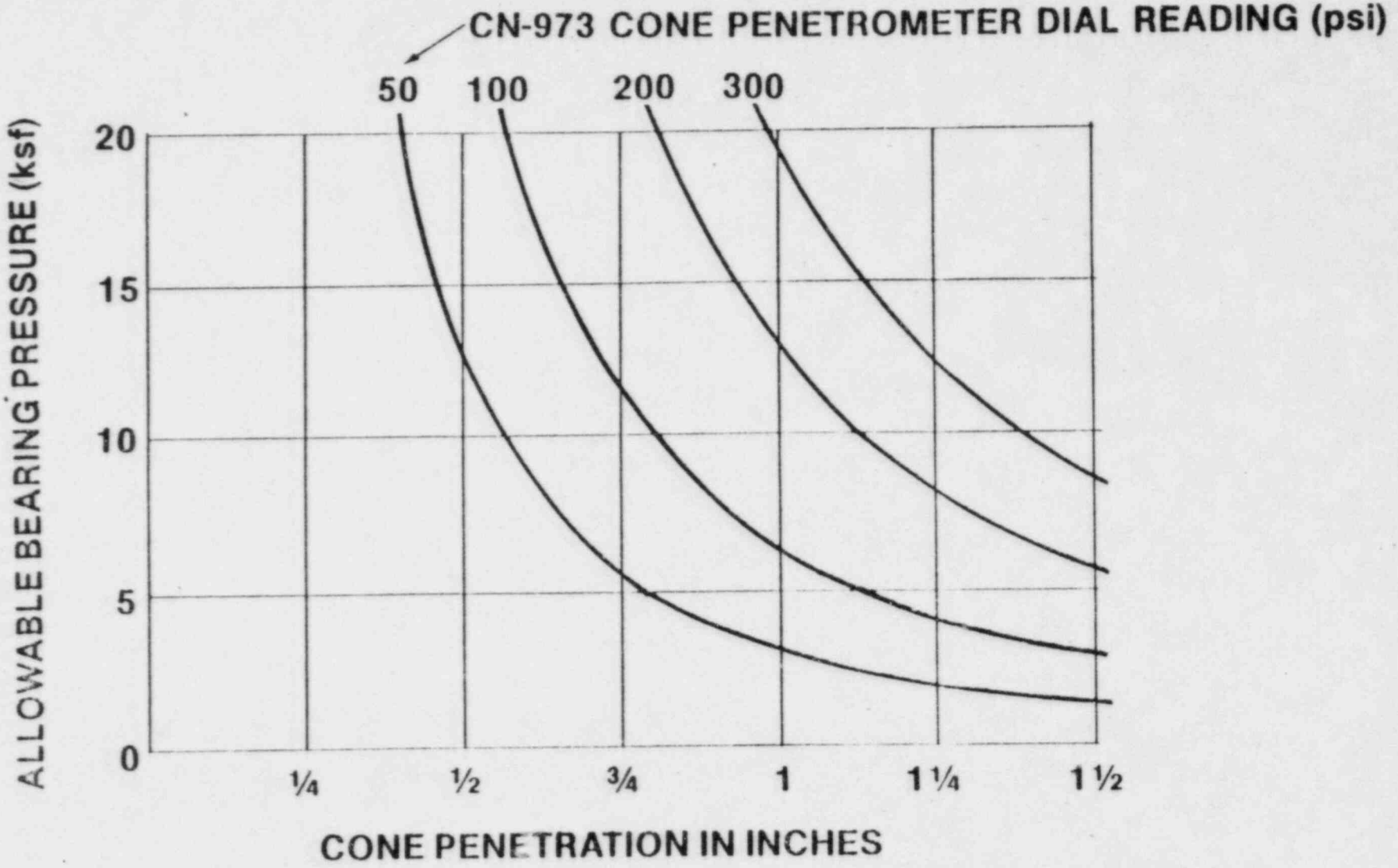


SERVICE WATER PUMP STRUCTURE

ESTIMATED TOP OF PIER DEFLECTION DUE TO CREEP OF CONCRETE VS TIME



SERVICE WATER PUMP STRUCTURE
PENETROMETER CORRELATION CURVES



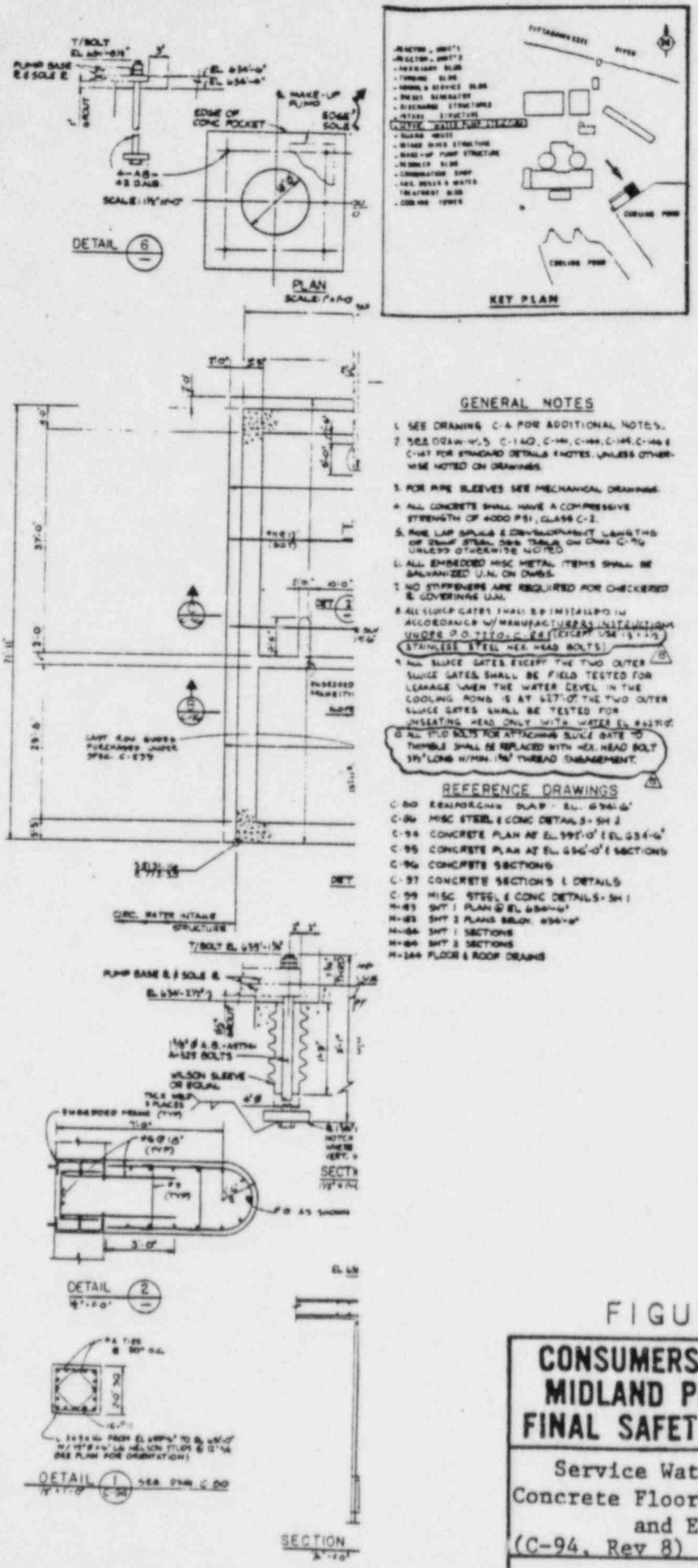


FIGURE 1

CONSUMERS POWER COMPANY
MIDLAND PLANT UNITS 1 & 2
FINAL SAFETY ANALYSIS REPORT

Service Water Pump Structure
Concrete Floor Plans at El. 592'-0"
and El. 634'-6"
(C-94, Rev 8)

FSAR Figure 3.8-56

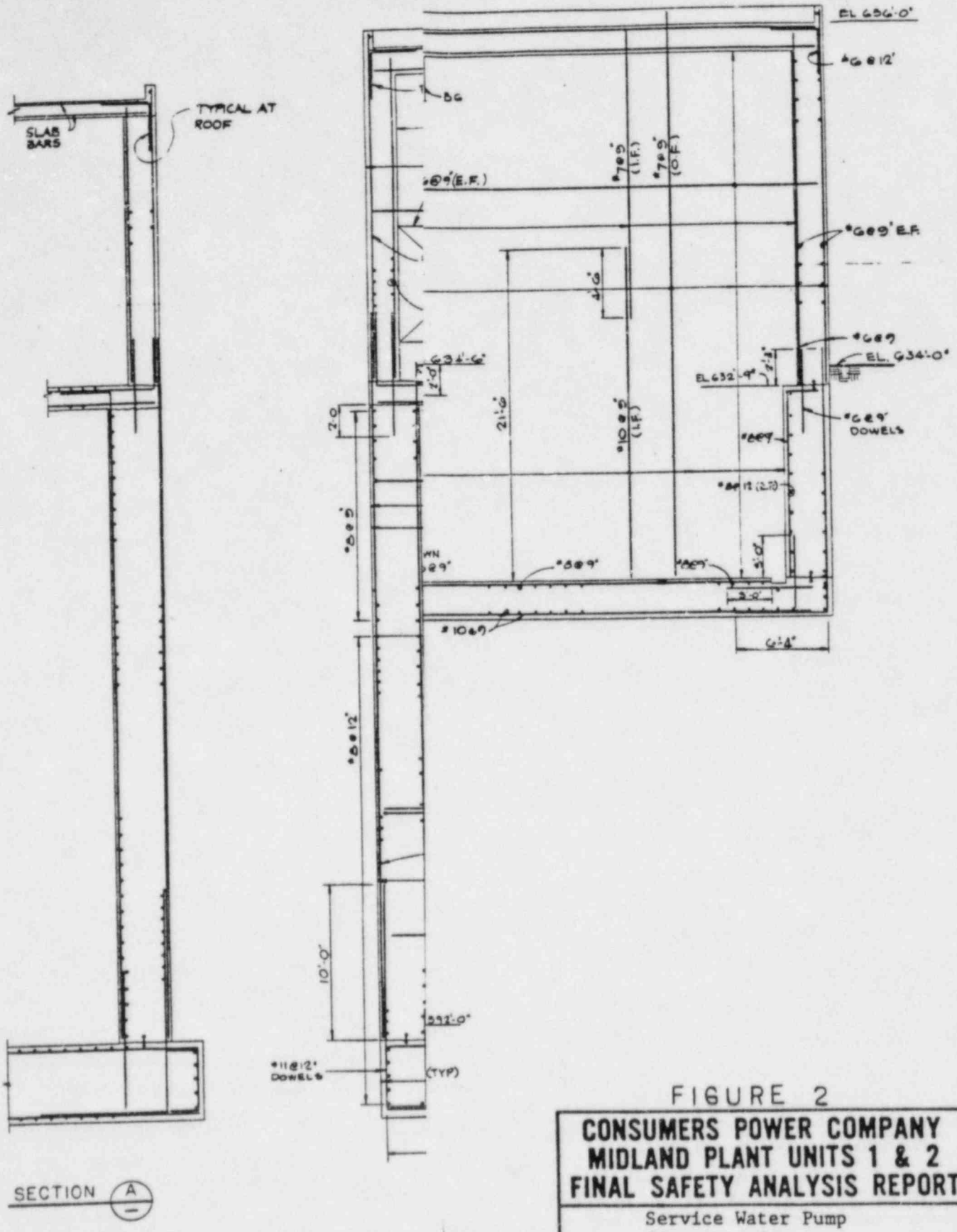


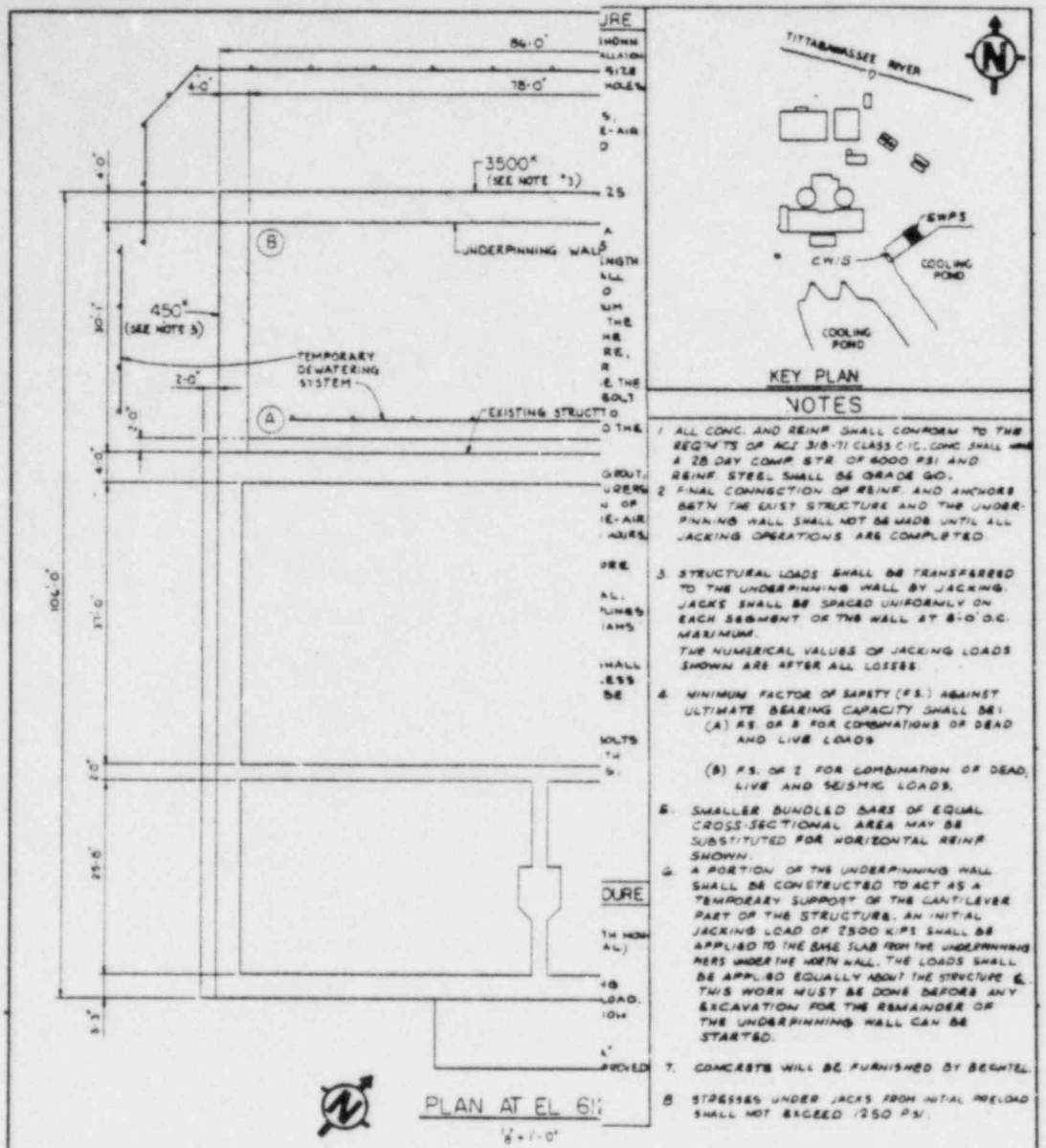
FIGURE 2

CONSUMERS POWER COMPANY
MIDLAND PLANT UNITS 1 & 2
FINAL SAFETY ANALYSIS REPORT

Service Water Pump
Structure Section

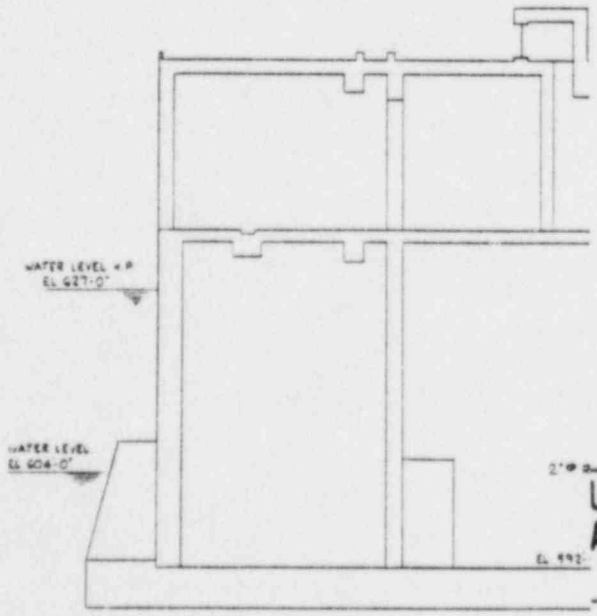
(C-97, Rev 2)

FSAR Figure 3.8-57



NOTES

1. ALL CONC. AND REINF. SHALL CONFORM TO THE REQ'MTS OF ACI 318-71 CLASS C.I.C. CONC. SHALL HAVE A 28 DAY COMP. STR. OF 6000 PSI AND REINF. STEEL SHALL BE GRADE 60.
2. FINAL CONNECTION OF REINF. AND ANCHORS BETW. THE EXIST. STRUCTURE AND THE UNDERPINNING WALL SHALL NOT BE MADE UNTIL ALL JACKING OPERATIONS ARE COMPLETED.
3. STRUCTURAL LOADS SHALL BE TRANSFERRED TO THE UNDERPINNING WALL BY JACKING. JACKS SHALL BE SPACED UNIFORMLY ON EACH SEGMENT OF THE WALL AT 8'-0" O.C. MAXIMUM.
   THE NUMERICAL VALUES OF JACKING LOADS SHOWN ARE AFTER ALL LOSSES.
4. MINIMUM FACTOR OF SAFETY (F.S.) AGAINST ULTIMATE BEARING CAPACITY SHALL BE:
   (A) F.S. OF 3 FOR COMBINATIONS OF DEAD AND LIVE LOADS
   (B) F.S. OF 2 FOR COMBINATION OF DEAD, LIVE AND SEISMIC LOADS.
5. SMALLER BUNDLED BARS OF EQUAL CROSS-SECTIONAL AREA MAY BE SUBSTITUTED FOR HORIZONTAL REINF. SHOWN.
6. A PORTION OF THE UNDERPINNING WALL SHALL BE CONSTRUCTED TO ACT AS A TEMPORARY SUPPORT OF THE CANTILEVER PART OF THE STRUCTURE. AN INITIAL JACKING LOAD OF 2500 K/FT SHALL BE APPLIED TO THE BASE SLAB FROM THE UNDERPINNING PIERS UNDER THE NORTH WALL. THE LOADS SHALL BE APPLIED EQUALLY ABOUT THE STRUCTURE C.L. THIS WORK MUST BE DONE BEFORE ANY EXCAVATION FOR THE REMAINDER OF THE UNDERPINNING WALL CAN BE STARTED.
7. CONCRETE WILL BE FURNISHED BY BECHTEL.
8. STRESSES UNDER JACKS FROM INITIAL PRELOAD SHALL NOT EXCEED 1250 PSI.

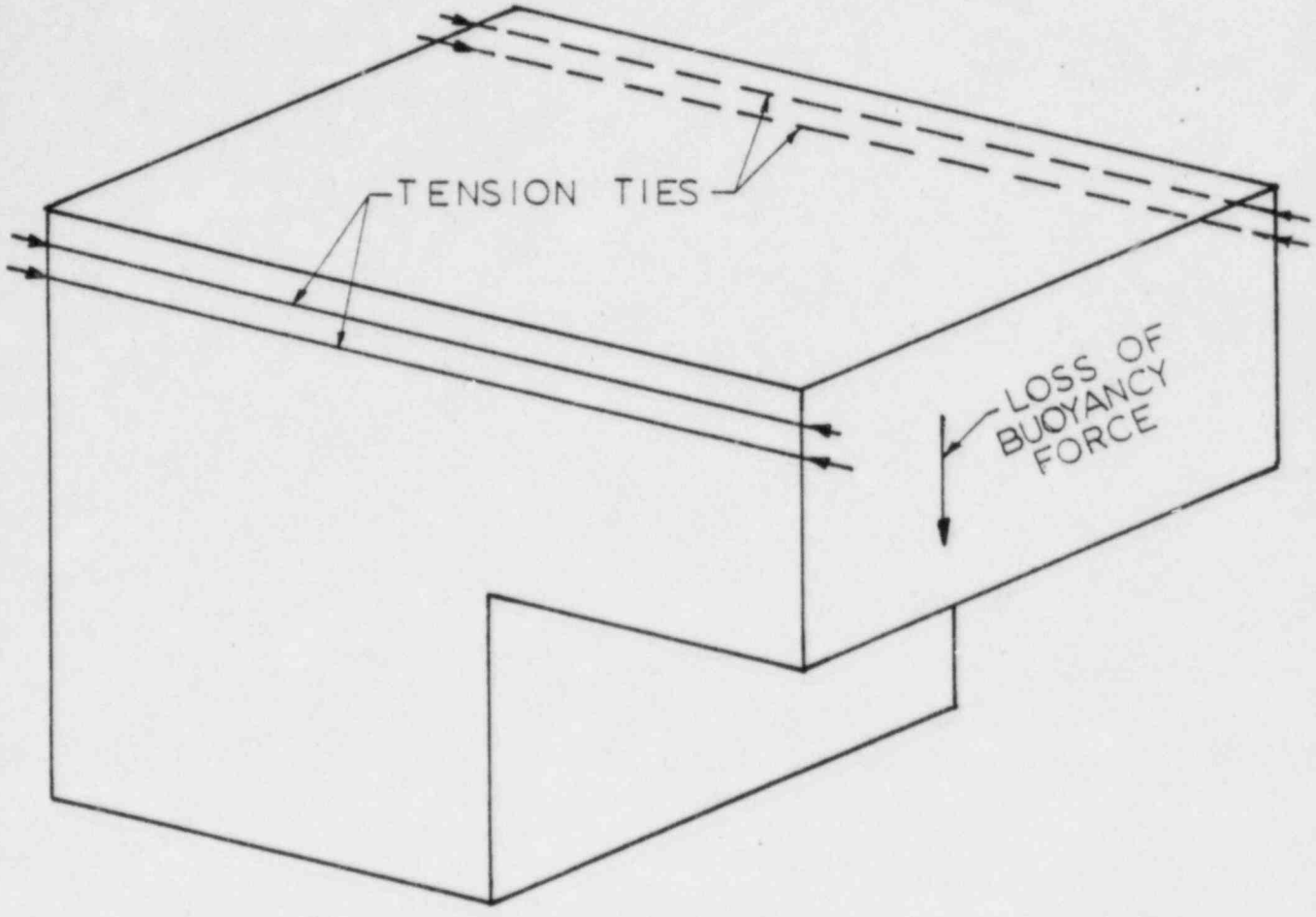


SECTION A
1/8" = 1'-0"

UMERS POWER COMPANY AND PLANT UNITS 1 & 2

VICE WATER PUMP STRUCTURE
UNDERPINNING REQUIREMENTS

Figure 3



CONSUMERS POWER COMPANY
MIDLAND PLANT UNITS 1 & 2

SERVICE WATER PUMP STRUCTURE
TENSION TIES

Figure 6

Excerpt from 12/31/81 summary of 11/4/81 meeting

3/85
Enclosure 5

RECORD OF TELEPHONE CONVERSATIONS

Date: October 30, 1981 Project: Midland 50-330

Recorded by: Joseph D. Kane

Talked With:	CPCo	Bechtel	NRC	COE
	D. Budzik	A. Boos	R. Landsman	H. Singh
	G. Keeley	N. Swanberg	F. Rinaldi	
			D. Hood	
			J. Kane	

Route To: For Information

L. Lear
L. Heller
D. Hood
W. Paton
F. Rinaldi
R. Landsman, I&E, Region III
H. Singh, COE, Chicago
J. Kane

Main Subject of Call: Remedial Underpinning of Auxiliary Building and Feedwater Isolation Valve Pits

Items Discussed:

1. Enclosure 3 to CPCo September 30, 1981 submittal from J. W. Cook to H. R. Denton entitled "Technical Report on Underpinning the Auxiliary Building and Feedwater Isolation Valve Pits". During the October 30, 1981 conference call CPCo was requested to respond to the following questions which had been developed in the COE/NRC review of Enclosure 3, relative to geotechnical engineering aspects in underpinning the Auxiliary Building.

   Q.1. (Pg. 2, Sect. 4, 2nd Para.) Please define "design jacking force," how established and the duration that it will be held?

   Q.2. (Pg. 2, Sect. 4, 3rd Para.) Discuss and provide detail of dowel connection. (Diameter, how distributed along wall, length of embedment, etc).

   Q.3. (Pg. 3, Sect. 5.1, last para) The agreed upon acceptance criteria for soil particle monitoring during dewatering requires 0.005 mm and not 0.05 mm. Correction by CPCo required.

8111240404 4pp.

Q.4. (Pg. 3, Sect. 5.1, Para. b) Installing the frozen cutoff membrane will cause expansion and possibly increase the soil voids. When ultimately unfrozen, what is the effect (e.g., further settlement) on safety related structures, conduits and piping. Provide discussion on the basic system of the frozen membrane [size and spacing of holes to be drilled, method for pumping brine into foundation layers, range of temperatures that are critical to wall stability which are to be monitored, decomissioning (e.g., grouting, etc)].

Q.5. (Pg. 3, Sect. 5.2) Clarify the procedure to be used in post tensioning the Electrical Penetration Area. Where will the buoyancy force be transmitted to the foundation and in what manner?

Q.6. (Pg. 4, Sect. 5.6, 2nd Para.) Please explain the meaning of "failure bearing capacity factors" and the basis for "the nine times the shear strength for the cone"?

Q.7. (Pg. 4, Sect. 5.b, 4th Para.) How will the equivalent soil modulus be determined? What is the depth that the measured settlement will be distributed over and what is the area to be used in determining the stress?

Q.8. (Pg. 4, Sect. 6) Presently, this paragraph implies that crack monitoring will not be performed on the existing structure. Please correct. Before remedial underpinning begins an accurate and up-to-date record of cracks should be developed for those safety related structures which could potentially be affected by the underpinning operations. This background record should be verified by I&E inspection and could serve as the basis for evaluating any changes in cracks due to underpinning operations.

Q.9. (Pg. 5, Sect 6.1.1 and 6.1.2) When will the acceptance criteria for the differential and absolute settlement be provided to the NRC?

Q.10. (Pg. 5, Sect. 6.2) Provide the basis for establishing the crack width of 0.03 inch. Appendix D should also address crack monitoring requirements during underpinning (frequency of reading, format for presenting observations, action levels etc).

Q.11. (Pg. 6, Sect. 7.2.1, last Para.) Provide discussion why the drained shear strength is not required to be considered in analyzing for adequate bearing capacity. Also in the last paragraph in Section 7.2.1, Pg. 7 indicate the basis for the 2 days and what would be required if the settlement rate does not reach a straight line trend in 2 days.

Q.12. (Pg. 7, Sect. 7.2.2) Where are the WCC controlled rebound-reload cycle soil test results? What is the corresponding stress level with a secant modulus of elasticity equal to 3500 KSF?

Q.13. (Pg. 8, Sect 7.2.3, 1st Para.) The estimates of settlement using the referenced NAVFAC DM-7 do not include secondary consolidation. What secondary consolidation would be indicated if the consolidation test results using the appropriate load increment were used? Compare this estimate with values for permanent wall conditions "after jacking, long term". Please provide basis for the three estimated settlement valves for "Load transfer points for temporary load to reactor footing" at the bottom of pg. 8 and discuss any effects of this settlement on the reactor and pipe connections.

Q.14. (Pg A-1, Sect. 1, 2nd Par.) Please indicate how the soil spring constants were established for long term loads.

Q.15. (Pg C-2, last Par. and Pg. C-6, Par. B) What are the protective construction measures planned for the Turbine Building and Buttress Access Shafts and when will they be placed? Please provide discussion on the sequence of operations to complete the drift beneath the Turbine Building and show sectional views of this work with respect to the Turbine Building foundations and affected piping and conduits.

Q.16. (Pg C-3, Par. A.1.a) Please explain what is meant by minimizing the amount of concrete to be removed.

Q.17. (Pg. C-3, Par. A.1.c. and A.1.d) What is the magnitude of the load for testing the temporary support pier and how was it established and how will it be applied? Is the EPA foundation slab capable of supporting this load at this time?

Q.18. (Pg. C-4, Sect. A.1.f., 1st complete para.) Provide discussion on monitoring of the control tower behavior at this time. What criteria will be used to decide if preload should be stopped and support capacity should be added to the control tower?

Q.19. (Pg. C-4, Sect. A.2.) What are the reasons why the three temporary supports under the EPA should not be completed before the permanent support at the control tower is initiated?

Q.20. (Pg. C-4, Sect. A.3.a) Questions are raised as to whether the EPA structure can withstand the overhang condition which results if the initial temporary supports is assumed to fail. What is the basis and need for this extreme assumption? Is the EPA structure capable of withstanding this loading condition?

Q.21. (Pg. C-4, Sect A.3.b and A.3.c) The distinction between 3.b and 3.c is unclear. What is the magnitude of the load for testing and how established? Is there a problem with the EPA foundation slab providing a sufficient reaction load?

Q.22. (Pg. C-5, Sect. 14 and 15) It appears the operations described in these items are intended only for the wings and not the control tower. How is the load test and load transfer for the control tower to be completed. For the long term load test on the wings, what is the load magnitude and how was it established? What is the final

sequence of operations in transferring the structure load to the permanent underpinning.

Q.23. (Pg. D-1, Sect 1.0, 2nd Par) Describe the procedure that relates allowable stresses and allowable strains with structure movements that are being monitored.

Q.24. (Pg D-2, Sect. 1, 3rd Par.) Please clarify the distinction between the first and second layer systems for detecting structure movement.

Q.25. (Pg D-2, Sect. 1, 4th, 6th, and 7th Para.) Please provide elevations and sectional views with typical details for the deep seated bench mark and the instrumentation for monitoring relative horizontal movement and absolute horizontal movement.

Q.26. (Pg. D.3, Sect. 2, 2nd Par.) Please clarify the explanation why the hydraulic pressure data cannot be used to measure load.

Q.27. (Pg. D-3, Sect. 2, 3rd Par.) Provide sectional view of set up for measuring difference in relative position. How does this procedure address the possibility of both the underpinning element and structure settling? Provide the basis for maintaining the jack/hydraulic system for 1 hour and for establishing the 0.01 inch movement.

Q.28. (Pg. D-4, Sect. 2, 4th Para.) When will the modeling and critical structural stresses and strains be determined and furnished to the NRC?

Q.29. (Pg D-5, Sect. 2, 2nd and 3rd Para.) Provide sketch and locations with typical details of instrumentation for measuring concrete stress, tell tale devices and predetermined points for monitoring vertical movement.

Q.30. (Pgs. D-5 and D-6, Sect. 3, Par. 3A.1, 3A.2, 3A.3) For the various types of monitoring described in these paragraphs provide an example of the forms to be used for plotting the recorded data. What are the predetermined levels of movements which would require adjustments and/or action by the onsite geotechnical engineer. Identify any specific instrumentation which would be continued to be read during plant operation and which eventually will be addressed by a Technical Specification.

2. Consumers was notified that the above questions do not contain the COE/NRC review comments on the laboratory test results for foundation soils beneath the Auxiliary Building. The COE/NRC comments on the test results will be furnished at a later date following CPCo submittal of the Part II lab test report which is expected to be submitted to the NRC the week of November 2, 1981.

3. Consumers indicated the questions asked in the conference call of October 30, 1981 would be addressed as far as possible in the upcoming meeting with NRC in Bethesda on November 4, 1981.

Staff Questions from
10/30/81 Telecon

1.	Paragraph 4.0, page 2	What is design jacking force; how established; how long held?
2.		What are details of dowels; dia., spacing, and embedment length?
3.	Para 5.1, page 3	Shouldn't 0.05 be 0.005?
		What are consequences of settling of structure in region of freezewall when it is "thawed"?
		Basic description of system, e.g. layout, materials, temperatures, decommissioning.
4.	Para 5.2, page 3	Where will the buoyancy forces be transmitted to structure?
5.	Para 5.6, page 4	Define failure bearing capacity and how was value of 9 established.
		How will equivalent soils modulus be computed? At what depth will equivalent strain be calculated and what is corresponding stress at that level?
6.	Para 6.0, page 4	What is date for last auxiliary building crack mapping?
		What are the plans for crack monitoring during construction and will be establish a baseline?
		How are we going to monitor cracks in inaccessible areas?
	Para 6.1.1, page 5	When will the program for differential and absolute settlement of structures be established including acceptance criteria?
	Para 6.1.2, page 5	When will the program for monitoring underpinning during jacking be established including acceptance criteria?
	Para 6.2, page 5	Justify crack widths stated.
	Para 7.2.1, page 6	Justify why drained shear strengths were not used to determine bearing capacity.
	Para 7.2.1, page 7	What are the plans if rate doesn't reach a straight line after 2 days?

7.	Para 7.2.2, page 7	Where is cyclic testing reported? How was the modulus of 3500 ksf obtained?
8.	Para 7.2.3, page 8	What settlement is to be attributed to secondary consolidation (NAVAC reference is elastic; it does not cover effects of secondary consolidation)? How were settlements after jacking values given in table determined? How were settlement values during temporary loading on reactor buliding estimated? What is effect on reactor building and pipe connections?
9.	Appendix A Para 1.0, page A-1	How were static long-term springs established?
10.	Appendix C Last para, page C-2	What are protective construction details; where support placed; when installed? What about details of turbine building underpinning and its effect on buried Category I utilities in this area?
11.	Page C-3	Discuss turbine building underpinning.
12.	Item 1-a	What is meant by "minimizing" concrete removal?
13.	Item 1-c	Give details of load test (what is load; how arrived at; and how applied).
14.	Item 1-d	Justify your statement about building performance as propped cantilever.
15.	Page C-4 Item 1-f	What are we doing to monitor performance of control tower? What are the criteria and if a problem occurs, then what action is taken?
16.	Item 2	Rationale behind not completing all 3 needle beams on electrical penetration area before starting pit control tower area.
17.	Item 3	Can electrical penetration area support an assumed failure of the end beam? Give details of test load and relate it to the design load. What are differences between 3b and 3c?

18.	Page C-5 Item 4	What is load test and load transfer program for control tower?
19.	Item 14	What is the load, how established, settlement acceptance criteria?
20.	Appendix D Page D-1, 2nd para	State program for correlating allowable strains and stresses.
21.	Page D-2	Discuss first layer and second layer movement monitoring. Give details of deep benchmark datum. Provide details of horizontal movement monitoring.
22.	Page D-3, para 2.0	Need better definition of hydraulic jacking program. Want sketch of setup for overall (building and underpinning) settling monitoring setup. What is basis for 1 hour and 0.01 inch?
23.	Page D-4	How will stress and strain be correlated?
24.	Page D-5	Give details on telltale setup and Carlson stress meters. Give details of settling monitoring points at end of electrical penetration area.
25.	Para 3.0 (A)	For each of 3A1, 2, 3, indicate: Data to be taken, what are predetermined allowable limits, how these limits are established, and action to be taken if these limits are reached. Which measurements will be included in technical specs?

12/3/81
LTR

Docket Nos: 50-329
and 50-330

APPLICANT: CONSUMERS POWER COMPANY

FACILITY: Midland Plant, Units 1 and 2

SUBJECT: SUMMARY OF MEETING TO DISCUSS REMEDIAL PLANS FOR AUXILIARY BUILDING AND FEEDWATER ISOLATION VALVE PIT FOUNDATIONS

On November 4, 1981, the NRC staff and their consultants met in Bethesda with Consumers Power Company (CPCo) representatives and their consultants to discuss remedial plans for auxiliary building and feedwater isolation valve pit foundations. A list of attendees is attached as Enclosure 1 and the meeting agenda is attached as Enclosure 2. The following provides a summary of the meeting.

E. Adensam stated that the Midland project manager and his backup were not available, and therefore, K. Jabbour would coordinate the meeting. OELD stated that the hearing testimony for Midland should be in the mail by November 17, 1981. Discussion of the seismic model is scheduled for December 14 - 18, 1981. It is expected that, during the hearings, the NRC staff will inform the Licensing Board on areas of agreement between Consumers and the staff.

CPC stated that they started procurement for freeze wall hardware and access shaft. They invited the NRC staff to visit two work sites in Philadelphia and Louisiana where freeze wall technology is applied. A schedule of CPC work progress is provided as Enclosure 3.

Representatives of Mergentime and Ground Water Technology, Inc., discussed their plans for the Midland site, the freezing and grouting operations, and their experience in this area. They provided sketches of the access shaft, frozen earth membrane, proposed freeze wall location, typical freeze element, and typical pressure and temperature monitor location. The sketches are attached as Enclosure 4. They also stated that there is no problem with frost heaving and committed to produce data on heaving.

22pp

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Following the presentation above, the attendees discussed the staff questions as stated in Enclosures 5 and 6. The NRC Structural Engineering Branch offered to provide their questions to Consumers on November 5, 1981. At the conclusion of the meeting, Consumers committed to provide written responses to all the questions. These responses were provided in a letter from CPC to H. R. Denton dated November 16, 1981.

Kahtan Jabbour, Project Manager
Licensing Branch No. 4
Division of Licensing

Enclosures:
As stated

cc: See next page

DL:LB #4	LA:DL:LB #4	HGEB	SEB	OELD	DL:LB #4
					EAdensam
KJabbour/hmc	MDuncan	JKane	FRinaldi		EAdensam
12/ /81	12/ /81	12/ /81	12/ /81	12/ /81	12/ /81

List of Attendees

November 4, 1981

NRC

K. Jabbour
E. Adensam*
J. Kane
A. Hodgdon
W. Paton*
F. Rinaldi
G. Lear
F. Schauer*
M. Blume*

NRC Consultants

M. Singh
J. Matra

Consumers Power Company

K. Razdan
G. Keely
N. Ramanujam

Bechtel

B. Dhar
S. Afifi
N. Swanberg

Hanson Engineers

D. Bartlett

ILSB

F. Williams

Mergentime

C. Gould

Ground Water Tech. Inc.

D. Maishman

Mueser Rutledge

J. Gould

*Denotes part-time participation

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

[illegible] 1981

Docket Nos: 50-329
and 50-330

APPLICANT: CONSUMERS POWER COMPANY

FACILITY: Midland Plant, Units 1 and 2

SUBJECT: SUMMARY OF MEETING TO DISCUSS REMEDIAL PLANS FOR AUXILIARY BUILDING AND FEEDWATER ISOLATION VALVE PIT FOUNDATIONS

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2211

8201220044

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Kahtan N. Jabbour

Kahtan Jabbour, Project Manager
Licensing Branch No. 4
Division of Licensing

Enclosures:
As stated

cc: See next page

4/1/85

DEC 18 1981

DISTRIBUTION
Docket
NRC PDR
[redacted]
EAdensam
MDuncan
DHood
OELD
OI&E(3)

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

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

SUBJECT: CORRECTIONS TO LICENSING CONDITIONS FOR AUXILIARY BUILDING AND FW PIT UNDERPINNING - MIDLAND UNITS 1 & 2

The attached Table A.20 from "Testimony of Darl Hood, Joseph Kane and Hari Singh concerning the Remedial Underpinning of the Auxiliary Building Area" is marked to reflect changes made during the OM-OL hearing on 12/03/81.

During the hearing Mr. Ted Johnson of Bechtel committed on behalf of the applicant to abide by the conditions of Table A.20, as amended, and not to proceed with the construction milestones in Table A.20 without staff approval.

The ASLB asked to be notified by NRR in the event that:

(1) Appeals reaching the Director of NRR should result in an impass or

(2) Consumers Power should decide to proceed with any of the construction milestones in Table A.20 without first receiving NRC approval.

The ASLB clarified that its desire to be notified did not include dates in the Table for supplying information or dates for starting construction. The staff stated that these dates were not intended to be licensing conditions, per se.

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

Enclosure:
As stated

cc: G.Lear
W. Paton
J. Keppler
J. Kane
F. Rinaldi
R. Landsman
R. Tedesco
D. Eisenhut
R. Herman

9pp

8201130543

OFFICE		DL:LB#4	DL:LB#4	DL:LB#4	AD:L/DL	D:DL
SURNAME		DHood:lb DSH	EAdensam	RHerman	RTedesco	DEisenhut
DATE		12/11/81	12/13/81	12/ /81	12/ /81	12/ /81

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

Table A.20

Construction Milestone	Date Information Available for Staff Review	Requested Starting Date of Construction Milestone
1. Install Vertical Access Shaft to El. 609 and Complete Freeze Wall Installation.	No submittal required	12/29/81
Proposed Special License Condition: None		
2. Activate Freezing of Soil along Freeze Wall Alignment	12/15/81	2/1/82

Proposed Special License Conditions:

2a. Provide documentation demonstrating the Freeze Wall, when activiated, will not adversely affect seismic Category I structures, conduits and pipes by causing ground heave or resettlement upon unfreezing.

2b. Provide a plan, with established criteria and basis, for field monitoring of the effects of the Freeze Wall. The required plan will include a commitment to monitor both vertical and lateral movements at a minimum of four locations where safety related structures and utilities could potentially be affected. This plan is to be provided by 1/15/82.

2c. Provide responses for questions 3 and 4 identified in Attachment 21 ~~except for Questions 9, 18, 23, 25, 28 and 30~~.

2d. Provide responses for review concerns identified in answers to questions 14 and 17 of this testimony.

Construction Milestone	Date Information Available for Staff Review	Requested Starting Date of Construction Milestone
3. Extend Vertical Access Shaft below El. 609 and begin to remove soil foundation support from beneath Feedwater Isolation Valve Pit.	1/15/82	2/15/82

Proposed Special License Conditions:

3a. Provide design analysis for temporarily supporting the Feedwater Isolation Valve Pits (FIVP) on beams extending from the Buttress Access Shaft to the Turbine Building. The design will identify actual loads and displacements and demonstrate the adequacy and safety of the temporary support system.

3b. Provide an acceptable monitoring program with criteria for avoiding adverse impact on FIVP.

3c. Provide responses to questions 5, 8, 10, 11, 12, 13, 24, 26, 27 and 29 identified in Attachment 21.

4. Begin drift excavation beneath the Turbine Building.	1/15/82	2/15/82

Proposed Special License Conditions:

4a. Provide design analysis (including supporting calculations, drawings and specifications) which evaluates the anticipated undermining and temporary construction loading on the Turbine Building at this stage. The analysis will be required to demonstrate an acceptable margin of safety for the Turbine Building to safely carry the imposed temporary construction loads so as to avoid adverse impact on the adjacent Auxiliary Building.

4b. Provide an acceptable monitoring program for affected Category I structures, conduits and pipes with criteria and basis for this construction stage. Criteria basis should describe how movements to be measured are related to code allowable stresses and allowable strains.

4c. Provide documentation demonstrating the adequacy of the final permanent support system along the north side of the Turbine Building in safely providing long-term support for the Turbine Building without adversely impacting the Auxiliary Building.

4d. Provide responses for questions 9, 14, 15, 25 and 30 which are identified in Attachment 21.

Construction Milestone	Date Information Available for Staff Review	Requested Starting Date of Construction Milestone
5. Begin removal of soil foundation support from beneath Auxiliary Building.	2/1/82	4/1/82

Proposed Special License Conditions:

5a. Provide design analysis (including supporting calculations, drawings and specifications) which evaluates the temporary support system for the Auxiliary Building at appropriate sequential stages of excavation and jacking. The design analysis will be required to demonstrate acceptable margins of safety at the various stages of temporary construction.

5b. Provide an acceptable monitoring program with criteria and basis for temporary conditions of loading at this stage of construction.

5c. Provide responses for questions 6, 7, 17, 18, 19, 20, 21, 22, 23 and 28 which are identified in Attachment 21.

5d. Provide design analysis (including supporting calculations, drawings and specifications) demonstrating the adequacy of the installed temporary post-tensioning system.

5e. Provide an engineering evaluation of all cracks (existing and new) and propose a plan for the detailed evaluation of through cracks.

6. Begin construction of permanent underpinning wall.	5/17/82	11/1/82

Proposed Special License Conditions:

6a. Provide design analysis (including supporting calculations, drawings and specifications) which evaluates the permanent underpinning structure. The design analysis will be required to address all load combinations including stability under seismic loading.

6b. Provide results of the evaluation of through cracks.

6c. Provide an acceptable monitoring program with criteria and basis for long-term plant operation condition.

6d. Provide responses for questions 1 and 2 which are identified in Attachment 21.

ATTACHMENT 21

RECORD OF TELEPHONE CONVERSATIONS

Date: October 30, 1981 Project: Midland 50-330

Recorded by: Joseph D. Kane

Talked With:	CPCo	Bechtel	NRC	COE
	D. Budzik	A. Boos	R. Landsman	H. Singh
	G. Keeley	N. Swanberg	F. Rinaldi	
			D. Hood	
			J. Kane	

Route To: For Information

G. Lear
L. Heller
D. Hood
W. Paton
F. Rinaldi
R. Landsman, I&E, Region III
H. Singh, COE, Chicago
J. Kane

Main Subject of Call: Remedial Underpinning of Auxiliary Building and Feedwater Isolation Valve Pits

Items Discussed:

1. Enclosure 3 to CPCo September 30, 1981 submittal from J. W. Cook to H. R. Denton entitled "Technical Report on Underpinning the Auxiliary Building and Feedwater Isolation Valve Pits". During the October 30, 1981 conference call CPCo was requested to respond to the following questions which had been developed in the COE/NRC review of Enclosure 3, relative to geotechnical engineering aspects in underpinning the Auxiliary Building.

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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: CORRECTIONS TO LICENSING CONDITIONS FOR AUXILIARY BUILDING AND FW PIT UNDERPINNING - MIDLAND UNITS 1 & 2

The attached Table A.20 from "Testimony of Darl Hood, Joseph Kane and Hari Singh concerning the Remedial Underpinning of the Auxiliary Building Area" is marked to reflect changes made during the OM-OL hearing on 12/03/81.

During the hearing Mr. Ted Johnson of Bechtel committed on behalf of the applicant to abide by the conditions of Table A.20, as amended, and not to proceed with the construction milestones in Table A.20 without staff approval.

The ASLB asked to be notified by NRR in the event that:

(1) Appeals reaching the Director of NRR should result in an impass or

(2) Consumers Power should decide to proceed with any of the construction milestones in Table A.20 without first receiving NRC approval.

The ASLB clarified that its desire to be notified did not include dates in the Table for supplying information or dates for starting construction. The staff stated that these dates were not intended to be licensing conditions, per se.

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

Enclosure:
As stated

cc: G.Lear
W. Paton
J. Keppler
J. Kane
F. Rinaldi
R. Landsman
R. Tedesco
D. Eisenhut
R. Herman

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OFFICE		DL:LB#4	DL:LB#4	BL:LB#4	AD:L/DL	D:DL
SURNAME		DHood:lb	EAdensam	RHerman	RTedesco	DEisenhut
DATE		12/11/81	12/13/81	12/ /81	12/ /81	12/ /81

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Table A.20

Construction Milestone	Date Information Available for Staff Review	Requested Starting Date of Construction Milestone
1. Install Vertical Access Shaft to El. 609 and Complete Freeze Wall Installation.	No submittal required	12/29/81
Proposed Special License Condition: None		
2. Activate Freezing of Soil along Freeze Wall Alignment	12/15/81	2/1/82

Proposed Special License Conditions:

2a. Provide documentation demonstrating the Freeze Wall, when activiated, will not adversely affect seismic Category I structures, conduits and pipes by causing ground heave or resettlement upon unfreezing.

2b. Provide a plan, with established criteria and basis, for field monitoring of the effects of the Freeze Wall. The required plan will include a commitment to monitor both vertical and lateral movements at a minimum of four locations where safety related structures and utilities could potentially be affected. This plan is to be provided by 1/15/82.

2c. Provide responses for questions 3 and 4 identified in Attachment 21 ~~except for Questions 9, 18, 20, 25, 28 and 30~~.

2d. Provide responses for review concerns identified in answers to questions 14 and 17 of this testimony.

Construction Milestone	Date Information Available for Staff Review	Requested Starting Date of Construction Milestone
3. Extend Vertical Access Shaft below El. 609 and begin to remove soil foundation support from beneath Feedwater Isolation Valve Pit.	1/15/82	2/15/82

Proposed Special License Conditions:

3a. Provide design analysis for temporarily supporting the Feedwater Isolation Valve Pits (FIVP) on beams extending from the Buttress Access Shaft to the Turbine Building. The design will identify actual loads and displacements and demonstrate the adequacy and safety of the temporary support system.

3b. Provide an acceptable monitoring program with criteria for avoiding adverse impact on FIVP.

3c. Provide responses to questions 5, 8, 10, 11, 12, 13, 24, 26, 27 and 29 identified in Attachment 21.

4. Begin drift excavation beneath the Turbine Building.	1/15/82	2/15/82

Proposed Special License Conditions:

4a. Provide design analysis (including supporting calculations, drawings and specifications) which evaluates the anticipated undermining and temporary construction loading on the Turbine Building at this stage. The analysis will be required to demonstrate an acceptable margin of safety for the Turbine Building to safely carry the imposed temporary construction loads so as to avoid adverse impact on the adjacent Auxiliary Building.

4b. Provide an acceptable monitoring program for affected Category I structures, conduits and pipes with criteria and basis for this construction stage. Criteria basis should describe how movements to be measured are related to code allowable stresses and allowable strains.

4c. Provide documentation demonstrating the adequacy of the final permanent support system along the north side of the Turbine Building in safely providing long-term support for the Turbine Building without adversely impacting the Auxiliary Building.

4d. Provide responses for questions 9, 14, 15, 25 and 30 which are identified in Attachment 21.

Construction Milestone	Date Information Available for Staff Review	Requested Starting Date of Construction Milestone
5. Begin removal of soil foundation support from beneath Auxiliary Building.	2/1/82	4/1/82

Proposed Special License Conditions:

5a. Provide design analysis (including supporting calculations, drawings and specifications) which evaluates the temporary support system for the Auxiliary Building at appropriate sequential stages of excavation and jacking. The design analysis will be required to demonstrate acceptable margins of safety at the various stages of temporary construction.

5b. Provide an acceptable monitoring program with criteria and basis for temporary conditions of loading at this stage of construction.

5c. Provide responses for questions 6, 7, 12, 18, 19, 20, 21, 22, 23 and 28 which are identified in Attachment 21.

5d. Provide design analysis (including supporting calculations, drawings and specifications) demonstrating the adequacy of the installed temporary post-tensioning system.

5e. Provide an engineering evaluation of all cracks (existing and new) and propose a plan for the detailed evaluation of through cracks.

6. Begin construction of permanent underpinning wall.	5/17/82	11/1/82

Proposed Special License Conditions:

6a. Provide design analysis (including supporting calculations, drawings and specifications) which evaluates the permanent underpinning structure. The design analysis will be required to address all load combinations including stability under seismic loading.

6b. Provide results of the evaluation of through cracks.

6c. Provide an acceptable monitoring program with criteria and basis for long-term plant operation condition.

6d. Provide responses for questions 1 and 2 which are identified in Attachment 21.

ATTACHMENT 21

RECORD OF TELEPHONE CONVERSATIONS

Date: October 30, 1981 Project: Midland 50-330

Recorded by: Joseph D. Kane

Talked With:	CPCo	Bechtel	NRC	COE
	D. Budzik G. Keeley	A. Boos N. Swanberg	R. Landsman F. Rinaldi D. Hood J. Kane	H. Singh

Route To: For Information

G. Lear
L. Heller
D. Hood
W. Paton
F. Rinaldi
R. Landsman, I&E, Region III
H. Singh, COE, Chicago
J. Kane

Main Subject of Call: Remedial Underpinning of Auxiliary Building and Feedwater Isolation Valve Pits

Items Discussed:

1. Enclosure 3 to CPCo September 30, 1981 submittal from J. W. Cook to H. R. Denton entitled "Technical Report on Underpinning the Auxiliary Building and Feedwater Isolation Valve Pits". During the October 30, 1981 conference call CPCo was requested to respond to the following questions which had been developed in the COE/NRC review of Enclosure 3, relative to geotechnical engineering aspects in underpinning the Auxiliary Building.

   Q.1. (Pg. 2, Sect. 4, 2nd Para.) Please define "design jacking force," how established and the duration that it will be held?

   Q.2. (Pg. 2, Sect. 4, 3rd Para.) Discuss and provide detail of dowel connection. (Diameter, how distributed along wall, length of embedment, etc).

   Q.3. (Pg. 3, Sect. 5.1, last para) The agreed upon acceptance criteria for soil particle monitoring during dewatering requires 0.005 mm and not 0.05 mm. Correction by CPCo required.

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