DRAFT 1

J. Kane
Rec'd. 3/11/82
34/86

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

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

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

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

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

BACKGROUND

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

SUMMARY

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

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

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

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

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

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

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

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

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

CONCLUSION

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

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

Enclosures:
As stated

cc: See next page

ENCLOSURE 1

ATTENDEES

March 4, 1982

Consumers

D. Budzik
J. Brunner, Esq.

NRC

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

ENCLOSURE 2

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

Imminent - Start construction of BWST new ring beam

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

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

March 23 - Activation of freezewall

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

April 15 - Start SWPS access shaft and submit final design

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

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

May 20 - Reset BWST

June 1 - Cut and replace 36" SWS piping

ENCLOSURE 3

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

Priorities

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

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AUXILIARY BUILDING AND FIVP CONFIRMATORY ISSUES

- Provide redesign of stiffened bulkhead against earth pressures during drift excavation to install needle beam assembly.
- **Provide revised details of deep duct bank isolation at freezewall crossing**
- **Provide piezometer locations, and depth for construction dewatering** and depths and locations of wells.
- **Perform ~~a parametric~~ on analysis of the construction condition using a subgrade modulus of 70 kcf and provide results**
- **Provide allowable differential settlements for Phase 3 (based on above)**
- **Perform an analysis for reduced support along the EPA due to tunneling under the turbine building and provide results** for critical zones in the Main Auxiliary Building and Control Tower.
- **Provide load test procedures for verification of hard clay modulus ~~test~~** and for correlating with the cone penetrometer.
- **Provide horizontal movement acceptance criteria prior to Phase 3 for instruments at top of EPAs and control tower**
- Provide as-built report with confirmatory data ~~in FSAR~~ on underpinning in FSAR upon completion of construction.
- **Provide acceptance criteria for strain monitors prior to Phase 3** and details of strain gage installation
- **Review study of 1.5 FSAR SSE versus SSRS (NRC action)**
- Provide method to be followed for transfer of jacking load into permament wall.
- **Provide a report on crack repair**
- **Audit of permanent underpinning wall design ~~(NRC action)~~.**
- **Reinspection of instrumentation installation (NRC action)** ?
- Provide updated construction sequence for Phases 3 and 4.
- Document the remedial actions to be taken if allowable settlement limit on FIVP movement is reached.
- Provide change in locations for instruments DSB-AS1 and DSB-AS2.
- Provide settlement monitoring program to be required during years of plant operation with action levels and remedial measures identified (Tech Spec)
- Provide plans and details for permanently backfilling underpinning excavations including compaction specifications for granular fill under FIVP.
- Provide Procedure to be required for detecting extent of planar openings uncovered in drift excavations and controls to minimize their effects.

SERVICE WATER PUMP STRUCTURE
CONFIRMATORY ISSUES

- Provide basis for establishing existing structural stresses
- Provide justification for use of a subgrade modulus of 4000 KCF during final jacking or alternately, complete analysis using subgrade modulus of 400 KCF.
- Provide acceptance criteria for allowable differential settlement
- Review 1.5 FSAR SSE versus SSRS study (NRC action)
- Recheck tendon anchor analysis for shear at plate and wall and provide results
- Re-evaluate use of drilled-in dowels regarding embedment or use of rock bolts
- Perform sliding calculation using site-specific response spectra (SSRS) seismic loads and provide results with basis for assumed soil input parameters
- Complete the calculation for an empty forebay cell and provide results

SERVICE WATER PUMP STRUCTURE CONFIRMATORY ISSUES (cont'd)

- Provide maximum rebar stress in all elements of the base slab at elevation 620'
- Provide maximum rebar stress in elements adjacent to identified critical elements and other areas of potential high stress
- Complete calculations for out-of-plane shear and provide results
- Provide more information as to stress condition for existing parts of structure
  - Maximum stresses
  - Critical combinations
  - Identify true critical elements based on actual rebar
- Provide evaluation of interaction of the SWPS with the circulating water pump structure and retaining wall and electrical duct banks
- Provide procedures for acceptance of the bearing stratum
  - Maximum thickness of lean concrete
  - Maximum differential elevation between adjacent pier bottoms
- Provide pier load test procedure
- Provide strain monitoring criteria - instrumentation matrix

SERVICE WATER PUMP STRUCTURE
CONFIRMATORY ISSUES (cont'd)

- Provide drawings on strain monitoring and Carlson meters, including locations and details
- Identify critical construction stages and critical measurements
- Provide contingency plan and discussion of possible remedial actions
- Provide summary submittal of specification or drawing notes to cover frequency for checking and adjusting jacking loads
- Provide method to be followed for transfer of jacking load into permanent wall
- Provide decision on tunnel location prior to hearing and report on modified construction procedure.
- Provide a report on crack repair
- Perform a limit analysis on a wall considering the effects of cracking
- Provide a commitment for monitoring fines from construction wells in Q-listed areas using a five micron filter (informational test)
- Provide calculation for determining lateral earth pressures under dynamic loading (Mar. 16-19 Audit)
- Provide settlement monitoring program to be required during years of plant operation with action levels and remedial measures identified (Tech Spec.)
- Provide as-built report with confirmatory data on underpinning in FSAR upon completion of construction.

BORATED WATER STORAGE TANKS
LIST OF CONFIRMATORY ISSUES

- Evaluation of composite ring beam (NRC action)
- Provide detailed releveling procedure for Unit 1 tank
- Review calculations for governing load combinations (NRC action)
- Provide strain monitoring details, procedures, and acceptance criteria for new ring beam
- Review 1.5 FSAR SSE versus SSRS study (NRC action)
- Provide settlement monitoring program, to be required during years of plant operation with action levels and remedial measures identified (Tech Spec)
- Provide as-built report with confirmatory data in FSAR on completed construction.

UNDERGROUND UTILITIES
CONFIRMATORY ISSUES

- Resolution of seismic analysis considering motion in two directions (NRC action)
- Resolution of whether settlement of reinstalled pipe includes differential settlement (NRC action)
- Provide a tabulation of stress values for reinstalled pipe. Tabulation to be a summation of primary and secondary stresses including 1-½ inches of settlement
- Provide further details of safety related 48-inch diameter cooling tower line referenced in the reinstallation program
- Provide a table defining correlation of strain/ovality for the monitoring program
- Provide further definition of number, orientation, and spacing of strain gages at each monitoring station
- Provide definition of how 1.5 factor of safety is applied in the monitoring program
- Provide documentation ~~Response~~ on diesel oil tank borings confirming scope of local sand pocket and results of ~~(NRC action)~~ analysis demonstrating stability against liquefaction failure.
- Provide documentation for 3-inch prediction of maximum future settlement.
- Provide controls to be required during years of plant operation to prevent placement of heavy loads over buried piping and conduits.
- Resolve differences on the magnitude of soil loading on buried piping. ~~identified in the~~
- Review settlement monitoring and reinstallation program for 26-inch and 36-inch diameter pipes (NRC action)
- Provide as-built report with confirmatory data in FSAR on completed construction.

DIESEL GENERATOR BUILDING
CONFIRMATORY ISSUES

- Perform a structural reanalysis considering:
  - Presurcharge conditions
  - Conditions during the surcharge
  - 40-year settlement effects
  - The combined effects of above
- Perform a structural reanalysis assuming reduction in ~~removal of~~ soil springs stiffnesses ~~at the corner~~ between bays 3 and 4 on the south side and beneath adjacent cross wall.
- Perform a statistical evaluation of settlements to evaluate impact of survey inaccuracies versus actual differential settlements which have been experienced.
- Perform a comparison of 1.5 X SSE (FSAR) versus SSSR loading effects
- Provide criteria relating crack width and spacing to reinforcing steel stress
- Provide a report on crack repair for the building
- Provide settlement monitoring program to be required during years of plant operation with action levels and remedial measures identified (Tech Spec

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Additional Safety Review Issues

Provide settlement monitoring program to be required during years of plant operation with action levels and remedial measures identified (Tech Spec) for Reactor Buildings, Diesel Fuel Oil Tanks and Railroad Bay.

Provide Tech Spec requirements on permanent dewatering system.

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AUXILIARY BUILDING AND FIVP
REMAINING ISSUES

GES • PROVIDE REVISED DETAILS OF DEEP DUCT BANK ISOLATION AT FREEZEWALL CROSSING.

GES • PROVIDE PIEZOMETER LOCATIONS AND DEPTH FOR CONSTRUCTION DEWATERING AND DEPTHS AND LOCATIONS OF WELLS.

I&E • REINSPECTION OF INSTRUMENTATION INSTALLATION (NRC ACTION).

GES • PROVIDE REDESIGN OF STIFFENED BULKHEAD AGAINST EARTH PRESSURES DURING DRIFT EXCAVATION TO INSTALL NEEDLE BEAM ASSEMBLY. Will remove suppor. from edge of EPA @this time - may influence up to 40'

GES • PROVIDE CHANGE IN LOCATIONS FOR INSTRUMENTS DSB-AS1 AND DSB-AS2.

GES • DOCUMENT THE REMEDIAL ACTIONS TO BE TAKEN IF ALLOWABLE SETTLEMENT LIMIT ON FIVP MOVEMENT IS REACHED.

GES • PROVIDE PROCEDURE TO BE REQUIRED FOR DETECTING EXTENT OF PLANAR OPENINGS UNCOVERED IN DRIFT EXCAVATIONS AND CONTROLS TO MINIMIZE THEIR EFFECTS. Impt. for Turbine Bldg. since other structures are being monitored

GES & SEB • PROVIDE UPDATED CONSTRUCTION SEQUENCE FOR PHASES 3 AND 4.

GES • PERFORM AN ANALYSIS OF THE CONSTRUCTION CONDITION USING A SUBGRADE MODULUS OF 70 KCF AND PROVIDE RESULTS. Believe reasonable - appropriate to check 70KCF may indicate other areas of high stress where monitoring may be warrunted

AUXILIARY BUILDING AND FIVP
REMAINING ISSUES (CONT'D)

GES • PROVIDE ALLOWABLE DIFFERENTIAL SETTLEMENTS FOR PHASE 3 (BASED ON ABOVE).

GES & SEB • PERFORM AN ANALYSIS FOR REDUCED SUPPORT ALONG THE EPA DUE TO TUNNELING UNDER THE TURBINE BUILDING AND PROVIDE RESULTS FOR CRITICAL ZONES IN THE MAIN AUXILIARY BUILDING AND CONTROL TOWER.
2nd critical stage in underpinning. Also other analysis (w/K=50) assumed E.T. was rigid. May influence location of addit if stresses too high.

GES • PROVIDE LOAD TEST PROCEDURES FOR VERIFICATION OF HARD CLAY MODULUS AND FOR CORRELATING WITH THE CONE PENETROMETER. Available standards are too general - do not address skin friction

GES & SEB • PROVIDE HORIZONTAL MOVEMENT ACCEPTANCE CRITERIA PRIOR TO PHASE 3 FOR INSTRUMENTS AT TOP OF EPAS AND CONTROL TOWER.

GES & SEB • PROVIDE ACCEPTANCE CRITERIA FOR STRAIN MONITORS PRIOR TO PHASE 3 AND DETAILS OF STRAIN GAGE INSTALLATION. — may be submitted on Mar. 31 submittal

GES • PROVIDE METHOD TO BE FOLLOWED FOR TRANSFER OF JACKING LOAD INTO PERMANENT WALL.
EPAs on temp. Jacks
Next jack on perm wall
Critical stage - Impt to know sequence of load transfer

SEB • PROVIDE A REPORT ON CRACK REPAIR.

GES & SEB • AUDIT OF PERMANENT UNDERPINNING WALL DESIGN.

SEB • REVIEW STUDY OF 1.5 FSAR SSE VERSUS SSRS (NRC ACTION).

AUXILIARY BUILDING AND FIVP
REMAINING ISSUES (CONT'D)

GES ITE • PROVIDE PLANS AND DETAILS FOR PERMANENTLY BACKFILLING UNDERPINNING EXCAVATIONS INCLUDING COMPACTION SPECIFICATIONS FOR GRANULAR FILL UNDER FIVP.

GES • PROVIDE SETTLEMENT MONITORING PROGRAM TO BE REQUIRED DURING YEARS OF PLANT OPERATION WITH ACTION LEVELS AND REMEDIAL MEASURES IDENTIFIED (TECH SPEC). OL Issue

GES RSEB • PROVIDE AS-BUILT REPORT WITH CONFIRMATORY DATA ON UNDERPINNING IN FSAR UPON COMPLETION OF CONSTRUCTION. OL Issue

SERVICE WATER PUMP STRUCTURE

REMAINING ISSUES

SEB • PROVIDE BASIS FOR ESTABLISHING EXISTING STRUCTURAL STRESSES.

Related to effect of Jacking

GES & SEB • PROVIDE JUSTIFICATION FOR USE OF A SUBGRADE MODULUS OF 4000 KCF for till DURING FINAL JACKING OR ALTERNATELY, COMPLETE ANALYSIS USING SUBGRADE MODULUS OF 400 KCF. Problem w/ 4000 KCF is whether mat on glacial till is very rigid or not

GES & SEB • PROVIDE ACCEPTANCE CRITERIA FOR ALLOWABLE DIFFERENTIAL SETTLEMENT.

SEB • REVIEW 1.5 FSAR SSE VERSUS SSRS STUDY (NRC ACTION).

SEB • RECHECK TENDON ANCHOR ANALYSIS FOR SHEAR AT PLATE AND WALL AND PROVIDE RESULTS.

SEB • RE-EVALUATE USE OF DRILLED-IN DOWELS REGARDING EMBEDMENT OR USE OF ROCK BOLTS.

GES & SEB • PERFORM SLIDING CALCULATION USING SITE-SPECIFIC RESPONSE SPECTRA (SSRS) SEISMIC LOADS AND PROVIDE RESULTS WITH BASIS FOR ASSUMED SOIL INPUT PARAMETERS.

SEB • COMPLETE THE CALCULATION FOR AN EMPTY FOREBAY CELL AND PROVIDE RESULTS.

SERVICE WATER PUMP STRUCTURE
REMAINING ISSUES (CONT'D)

SEB • PROVIDE MAXIMUM REBAR STRESS IN ALL ELEMENTS OF THE BASE SLAB AT ELEVATION 620'.

SEB • PROVIDE MAXIMUM REBAR STRESS IN ELEMENTS ADJACENT TO IDENTIFIED CRITICAL ELEMENTS AND OTHER AREAS OF POTENTIAL HIGH STRESS.

SEB • COMPLETE CALCULATIONS FOR OUT-OF-PLANE SHEAR AND PROVIDE RESULTS.

SEB • PROVIDE MORE INFORMATION AS TO STRESS CONDITION FOR EXISTING PARTS OF STRUCTURE

- MAXIMUM STRESSES
- CRITICAL COMBINATIONS
- IDENTIFY TRUE CRITICAL ELEMENTS BASED ON ACTUAL REBAR

SEB • PROVIDE EVALUATION OF INTERACTION OF THE SWPS WITH THE CIRCULATING WATER PUMP STRUCTURE AND RETAINING WALL AND ELECTRICAL DUCT BANKS.

SERVICE WATER PUMP STRUCTURE
REMAINING ISSUES (CONT'D)

GES • PROVIDE PROCEDURES FOR ACCEPTANCE OF THE BEARING STRATUM

- MAXIMUM THICKNESS OF LEAN CONCRETE
- MAXIMUM DIFFERENTIAL ELEVATION BETWEEN ADJACENT PIER BOTTOMS

GES • PROVIDE PIER LOAD TEST PROCEDURE.

GES/SEB • PROVIDE STRAIN MONITORING CRITERIA - INSTRUMENTATION MATRIX.

GES/SEB • PROVIDE DRAWINGS ON STRAIN MONITORING AND CARLSON METERS, INCLUDING LOCATIONS AND DETAILS. (NRC Action)

GES/SEB • IDENTIFY CRITICAL CONSTRUCTION STAGES AND CRITICAL MEASUREMENTS.

GES • PROVIDE CONTINGENCY PLAN AND DISCUSSION OF POSSIBLE REMEDIAL ACTIONS.

GES • PROVIDE SUMMARY SUBMITTAL OF SPECIFICATION OR DRAWING NOTES TO COVER FREQUENCY FOR CHECKING AND ADJUSTING JACKING LOADS.

GES • PROVIDE METHOD TO BE FOLLOWED FOR TRANSFER OF JACKING LOAD INTO PERMANENT WALL.

SERVICE WATER PUMP STRUCTURE
REMAINING ISSUES (CONT'D)

GES & SEB • PROVIDE DECISION ON TUNNEL LOCATION PRIOR TO HEARING AND REPORT ON MODIFIED CONSTRUCTION PROCEDURE.

SEB • PROVIDE A REPORT ON CRACK REPAIR.

SEB • PERFORM A LIMIT ANALYSIS ON A WALL CONSIDERING THE EFFECTS OF CRACKING.

GES • PROVIDE A COMMITMENT FOR MONITORING FINES FROM CONSTRUCTION WELLS IN Q-LISTED AREAS USING A FIVE MICRON FILTER (INFORMATIONAL TEST).

GES • PROVIDE CALCULATION FOR DETERMINING LATERAL EARTH PRESSURES UNDER DYNAMIC LOADING (MARCH 16 - 19 AUDIT).

GES • PROVIDE SETTLEMENT MONITORING PROGRAM TO BE REQUIRED DURING YEARS OF PLANT OPERATION WITH ACTION LEVELS AND REMEDIAL MEASURES IDENTIFIED (TECH SPEC). OL

GES • PROVIDE AS-BUILT REPORT WITH CONFIRMATORY DATA ON UNDERPINNING IN FSAR UPON COMPLETION OF CONSTRUCTION. OL

BORATED WATER STORAGE TANKS
REMAINING ISSUES

SEB • EVALUATION OF COMPOSITE RING BEAM (NRC ACTION).

SEB • PROVIDE DETAILED RELEVELING PROCEDURE FOR UNIT 1 TANK.

SEB • REVIEW CALCULATIONS FOR GOVERNING LOAD COMBINATIONS (NRC ACTION).

SEB • PROVIDE STRAIN MONITORING DETAILS, PROCEDURES, AND ACCEPTANCE CRITERIA FOR NEW RING BEAM.

SEB • REVIEW 1.5 FSAR SSE VERSUS SSRS STUDY (NRC ACTION).

GES • PROVIDE SETTLEMENT MONITORING PROGRAM TO BE REQUIRED DURING YEARS OF PLANT OPERATION WITH ACTION LEVELS AND REMEDIAL MEASURES IDENTIFIED (TECH SPEC).

GES • PROVIDE AS-BUILT REPORT WITH CONFIRMATORY DATA IN FSAR ON COMPLETED CONSTRUCTION.

UNDERGROUND UTILITIES
REMAINING ISSUES

- RESOLUTION OF SEISMIC ANALYSIS CONSIDERING MOTION IN TWO DIRECTIONS (NRC ACTION).
- RESOLUTION OF WHETHER SETTLEMENT OF REINSTALLED PIPE INCLUDES DIFFERENTIAL SETTLEMENT (NRC ACTION).
- PROVIDE A TABULATION OF STRESS VALUES FOR REINSTALLED PIPE. TABULATION TO BE A SUMMATION OF PRIMARY AND SECONDARY STRESSES INCLUDING 1-1/2 INCHES OF SETTLEMENT.
- PROVIDE FURTHER DETAILS OF SAFETY RELATED 48-INCH DIAMETER COOLING TOWER LINE REFERENCED IN THE REINSTALLATION PROGRAM.
- PROVIDE A TABLE DEFINING CORRELATION OF STRAIN/OVALITY FOR THE MONITORING PROGRAM.
- PROVIDE FURTHER DEFINITION OF NUMBER, ORIENTATION, AND SPACING OF STRAIN GAGES AT EACH MONITORING STATION.
- PROVIDE DEFINITION OF HOW 1.5 FACTOR OF SAFETY IS APPLIED IN THE MONITORING PROGRAM.

UNDERGROUND UTILITIES
REMAINING ISSUES (CONT'D)

- PROVIDE DOCUMENTATION ON DIESEL OIL TANK BORINGS CONFIRMING SCOPE OF LOCAL SAND POCKET AND RESULTS OF ANALYSIS DEMONSTRATING STABILITY AGAINST LIQUEFACTION FAILURE.
- PROVIDE DOCUMENTATION FOR 3-INCH PREDICTION OF MAXIMUM FUTURE SETTLEMENT.
- PROVIDE CONTROLS TO BE REQUIRED DURING YEARS OF PLANT OPERATION TO PREVENT PLACEMENT OF HEAVY LOADS OVER BURIED PIPING AND CONDUITS.
- RESOLVE DIFFERENCES ON THE MAGNITUDE OF SOIL LOADING ON BURIED PIPING.
- REVIEW SETTLEMENT MONITORING AND REINSTALLATION PROGRAM FOR 26-INCH AND 36-INCH DIAMETER PIPES (NRC ACTION).
- PROVIDE AS-BUILT REPORT WITH CONFIRMATORY DATA IN FSAR ON COMPLETED CONSTRUCTION.

DIESEL GENERATOR BUILDING
REMAINING ISSUES

- PERFORM A STRUCTURAL REANALYSIS CONSIDERING:
  - PRESURCHARGE CONDITIONS
  - CONDITIONS DURING THE SURCHARGE
  - 40-YEAR SETTLEMENT EFFECTS
  - THE COMBINED EFFECTS OF ABOVE
- PERFORM A STRUCTURAL REANALYSIS ASSUMING REDUCTION IN SOIL SPRING STIFFNESSES BETWEEN BAYS 3 AND 4 ON THE SOUTH SIDE AND BENEATH ADJACENT CROSS WALL.
- PERFORM A STATISTICAL EVALUATION OF SETTLEMENTS TO EVALUATE IMPACT OF SURVEY INACCURACIES VERSUS ACTUAL DIFFERENTIAL SETTLEMENTS WHICH HAVE BEEN EXPERIENCED.
- SEB PERFORM A COMPARISON OF 1.5 X SSE (FSAR) VERSUS SSSR LOADING EFFECTS.

DIESEL GENERATOR BUILDING
REMAINING ISSUES (CONT'D)

SEB • PROVIDE CRITERIA RELATING CRACK WIDTH AND SPACING TO REINFORCING STEEL STRESS.

SEB • PROVIDE A REPORT ON CRACK REPAIR FOR THE BUILDING.

GES • PROVIDE SETTLEMENT MONITORING PROGRAM TO BE REQUIRED DURING YEARS OF PLANT OPERATION WITH ACTION LEVELS AND REMEDIAL MEASURES IDENTIFIED (TECH SPEC).

REMAINING ISSUES

- PROVIDE SETTLEMENT MONITORING PROGRAM TO BE REQUIRED DURING YEARS OF PLANT OPERATION WITH ACTION LEVELS AND REMEDIAL MEASURES IDENTIFIED (TECH SPEC) FOR REACTOR BUILDINGS, DIESEL FUEL OIL TANKS AND RAILROAD BAY.

- PROVIDE TECH SPEC REQUIREMENTS ON PERMANENT DEWATERING SYSTEM.

Reviewer - J. Kane HGEB

1982

PLANT	LB# PM	June	July	August	September	October	COMMENTS
MIDLAND	D. Hood	Review recent CPC submittals; ACRS					ACRS - Jun. 4 & 7 - Respond to liquefaction questions
		Review recent submittals; A.L.					Annual Leave Jun 14-18
			Review submittals; Prepare SER Supplement				
			Site visit to view underpinning progress; Training				Procurement training July 19-23
				Prepare ASLB testimony & contention responses; Attend ASLB Hearing			
				A.L.			Annual Leave Aug. 16-27
					Review submittals & Tech Specs.		
					Site visit		
						Prepare OL-SER Supplement	
		This schedule is my best estimate. DL is expected to devise new Midland schedule in the very near future.					

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Remaining Issues for GES on AUXILIARY BUILDING

ISSUE	DUE DATE
BEFORE START OF PHASE 2a	
Review Updated Construction Sequence for Phase 2a & 2b (Provided by CPC on 3/19/82)	April 2, 1982
Review Updated Monitoring Matrix - Need to cover Phase 2a instruments including installation details of strain gages (CPC to provide by April 2, 1982) C-1493(Q)	
Review documentation on FIVP settlement to date and allowable future settlement during underpinning	
Review final locations of Deep Seated Bench Marks DSB-AS1 and DSB-AS2	
Review commitment by CPC to increase reading frequency and their evaluation during critical underpinning operations	
Prepare memo which would concur in proceeding with Phase 2a with basis for concurrence (Basis will be submitted reports and anticipated letter from CPC that defines Phase 2a scope. Have assurance that required instruments are operational)	
BEFORE START OF PHASE 2b	
Review March 10, 1982 letter (Cook to Denton) on adequacy of protection of open excavation faces during work stoppage and plans for dewatering localized water pockets (e.g. placing wells in sand fill around reactor perimeter	

Remaining Issues for GES on AUXILIARY BUILDING

BEFORE START OF PHASE 3

Review Updated Construction Sequence for Phase 3 and beyond. (CPC to provide by April 2, 1982)

Review Updated Monitoring Matrix including limiting strain values for strain gages installed in Phase 2a. C-1493(Q)

Review results of analysis that uses K=70 KCF for Main Auxiliary Building foundation (Critical stresses and allowable movements determined when EPA is undermined and before initial needle beams are in place).

Review results of analysis using appropriate soil spring constants which determines critical stresses due to undermining EPA on southerly side along entire drift length (under Turbine Building) with pier W8 and needle beams in place. What are remedial actions available at this construction stage?

Review pier load test or plate load test procedures (Benefits for correlating with cone penetrometer?)

Review contingency plans with remedial actions should allowable movements be exceeded during underpinning or should planar openings beneath foundation slabs be encountered

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Remaining Issues for GES on AUXILIARY BUILDING

FOLLOWING PHASE 3	DUE DATE
Review specifications and construction controls for placing granular backfill beneath FIVP & inside permanent underpinning walls.	
Review method for transferring final load to permanent underpinning wall	
Review long term monitoring plans (settlement and deflection	

GEOTECHNICAL ENGINEERS INC.

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Client NRC Date Mar 17, 82 By SF

Subject Midland Underpinning Checked By

Punch List Geotechnical Approved By

AUX Geotechnical Audit Punch List

✓ 1. Provide updated construction sequence. Include transfer of load to pier CT 6 and details of jacking at step formerly numbered 3.13. Provide details at steps 3.12, 3.14. Document 2a, 2b.

✓ 2. Provide specifications for backfill inside walls.

✓ 3. Commit to design for higher earth pressure for needle drift north to reactor. Commit to moving needle beams more towards the ends of EPA's to prevent disturbance of support soils as much as possible.

✓ 4. Document settlement of FIVP to date and state allowable additional settlement.

✓ 5. Obtain baseline readings on the critical benchmarks and strain gages before construction below slabs. Take temperature readings at same time.

✓ 6. Commit to Ⓠ list all work at levels below slabs.

✓ 7. Commit to plate load test on bearing stratum at bottom of pier, where blow counts are lowest, in Phase 2a and development of correlation with penetrometer. Commit to mapping in piers.

✓ 8. Provide updated instrumentation Matrix including strain gages and period of baseline readings.

✓ 9. Document dewatering and water level monitoring system.

✓ 10. Document contingency plans if allowable movements are exceeded, time of reaction, how to handle planar openings beneath slab, if any.

AUX Geotechnical Audit Punch List - Cont'd.

✓ 11. Commit to looking for and documenting any planar openings under slabs.

12. Document that stresses due to differential settlement (in FIVP, EPA, CT, AUX) will be relieved or added to permanent stresses for design purposes.

✓ 13. Provide details of strain gages.

✓ 14. Compute allowable settlement with k = 70 kcf

15. Commit to increased reading and evaluation frequency within 10 ft of critical slabs during critical operations. Reduce frequency if nothing significant occurs.

✓ 16. Compute critical stresses due to undermining EPA for 6' on southerly side on entire length when pier W8 and end needle beams are in place and drift is near CT1. Document remedial actions if movements are excessive during this critical stage (See Item 10).

✓ 17. Provide more details on how face will be shored during shut down.

✓ 18. Provide an allowable movement at end of EPA and CT that will trigger action irrespective of rigid body motion.

✓ 19. Provide location of benchmark at south end of main AUX.

GEOTECHNICAL ENGINEERS INC.

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Client NRC Date Mar 17, 82 By SP

Subject Midland Underpinning Checked By

Punch List Geotechnical Approved By

Long-Term

1. Monitoring and evaluation system.

3/11/82
1 of 2
J Kane

Subject: Identification of Geotechnical Engineering Section's Review Concerns Prior to Initiating Phase 2 Underpinning Work
MIDLAND - AUXILIARY BUILDING

Phase 2a

No.	Review Concern	
1	Submittal of Updated Construction Sequence Drawing (Identified in Feb. 3-5 Audit and Feb. 26, 1982 Meeting).	Updated Phase 2a & 2b Provide this week (A. Boos) Will provide entire updated sequence by April 2, 1982
2.	Letter documenting actual work to be performed under Phase 2a (telephone record, March 8, 1982, Par. 3). Letter should provide commitment not to proceed with 2b until the analyses using NRC recommended stiffness valves are completed and results reviewed by NRC Staff.	Phase 2a - Shown in green Phase 2b - Shown in red
3.	Update drawing of "Monitoring Matrix", No. C-1493(Q) that will include tolerance criteria (Telephone record, Mar. 8, 1982, Par. 4.b).	Will provide Phase 2a by
4.	CPC commitment to have 6 deep seated bench marks with instruments installed and operational before beginning Phase 2a work. (Telephone record, March 8, 1982, Par. 4.B and Par. 5). Also instruments DMD-1W, DMD-1E, DSB-1W, DSB-1E are to be installed and operational. (Feb 3-5 Design Audit).	See notes of March 16, 1982
5.	Submittal of strain gage installation details @ El 659 with limiting strain values and basis (Feb. 26, 1982 meeting and telephone record, Mar. 8, 1982, Par 4.d).	and two other locations install & monitor for Phase 2a Establish criteria for Phase 2b
6.	Commitment to perform test load above design load (e.g., 1.30 times) on installed pier to develop load-deflection curve for verification of hard clay soil modulus. Identify pier. (Feb. 3-5 Design Audit). or Plate load test	end of CPC agrees to perform Procedures to be available before starting
7.	Submittal of measures to be required during periods of work shutdown to support faces of drifts and bottoms of pits (Feb. 3-5 Design Audit). How will it be supported	Answered by letter of Mar. 10, 1982 CPC sent letter on Mar. 10 Greater than 8 hr stoppage Details to be provided by
8.	Submittal of plans for dewatering localized water pockets (e.g., placing wells in sand fill around reactor perimeter) in advance of pit construction (Feb. 3-5 Design Audit).	Zone of influence - Spec

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2-12
J. Kane

Phase 2b

No.	Review Concern
1.	Provide instrumentation details and horizontal movement tolerance criteria with basis, for 3 instruments to be installed at top of EPA's and Control Tower (Telephone record, March 8, 1982, Par. 4.c and Par. 5). DMD-11, DM-12, DMD-13
2.	Submittal of results from analysis that establishes induced stresses at El 659 assuming EPA is supported by first temporary support (Pier W8) and using Existing Soil Springs under EPA and Control Tower and Auxiliary Building (Feb. 3-5 Design Audit) See commitment entitled 'Parametric Analysis for Auxil. Bldg.
3.	Commitment by CPC to have installed and operational all of the remaining instruments identified on Drwg C-1493(Q).

Establish background until end of Phase 2b
Then establish horizontal movement criteria for Phase 3

1 month time about to readings

Will be completed before start of Phase 3

CPC agrees these will be installed

Das Gupta Presentation - Feb 3-5 Audit

Propped cantilever - calculated stresses @ El. 659 on Auxil. Bldg. ?
- assume needle beam support and ~~all~~ support under EPA is removed because of drift under Turbine Bldg

Based on conversation (Gould, Dhar, Anderson, Poulos, Samuels) this a.m.

Staff handout

Recd 3/15/82 from S. Poulos

QUESTIONS RELATING TO AUXILIARY BUILDING UNDERPINNING AUDIT OF MARCH 16-19, 1982

Project 81907
March 15, 1982

Concern for extensive concrete left in place around reactor perimeter (hanging up piers and time to remove) also per on west side of EPA would minimize access to EPA & control tower

1. The removal of soil support beneath the EPA prior to support the end opposite the control tower seems to be too extensive. Is there any way to reduce the amount of removal, e.g., by placing piers directly under the end of the EPA rather than using the needle beam system?

2. The FIVP is now supported on the buttress access shaft and on the turbine building. Therefore, it will be necessary to monitor the vertical movement of the FIVP relative to the reactor containment and relative to the turbine building more frequently than every 8 hours during initial excavation stages. The vertical and horizontal movement of the buttress access shaft relative to the reactor should also be monitored more frequently than every 8 hours when soil is removed adjacent to the buttress access shaft.

Discussed yesterday (3/16/82)

3. Please review the stress changes in the main auxiliary building when the EPA acts as a propped cantilever with no soil support.

4. How far off center from the turbine building columns are the new piers near the long access drift? Is it reasonable to move the drift to the south about 8 ft thereby reducing the loss of support under the EPA and permitting these turbine building piers to be centered? Moving drift further south causes heavy crane loads to be picked up

5. What material will be used as backpacking behind lagging in the drifts and piers? ~~will be soil that has been removed~~ – rammed up 2"x6"x4" – 10" high board – 1" spacer (allow for drainage – 2 in 4' length) 2" thick lagging

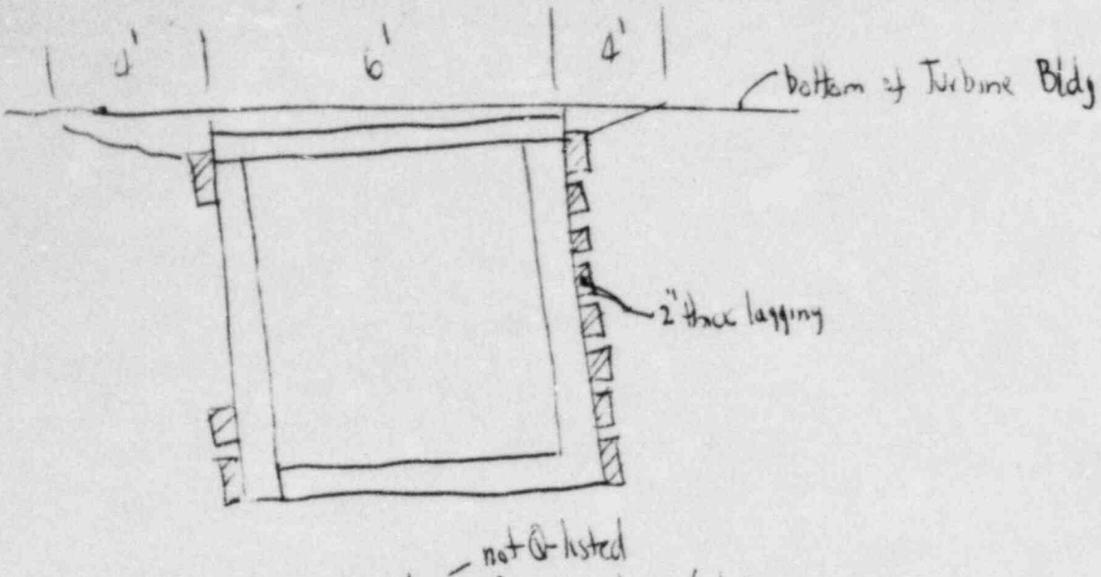
6. Describe sequence of events in placing a new set and lagging in the drift.

7. How will the electrical ducts under the control tower be supported?

8. Monitor absolute vertical movement of ~~turbine building~~ control tower more frequently than every 8 hours as the drift approaches the control tower and during installation of the first few CT piers.
To be covered w/ footnote in Phase 3

Access drift – Estimate 3' advance per day (2 – 10 hr. shifts)

? Grating openings extending laterally away from access drift beneath Turbine Bldg & towards EPA



not @-listed

Determine contingent action for grouting (define areal extent to some value based on structural and commit to grouting)

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MIDLAND PROJECT

WHAT WE HAVE ACCOMPLISHED

1. Identified the specific structures and components which have been adversely affected by the inadequately compacted plant fill. This list includes the Control Tower, Electrical Penetration Areas, Feedwater Isolation Valve Pits, Diesel Generator Building, Service Water Structure, Railroad Bay Area, Diesel Fuel Oil Tanks, Borated Water Storage Tanks and Cat. I Underground Piping.

2. Essentially reached agreement with the Applicant on remedial fixes acceptable to the Staff for the affected Cat. I. structures and components. Design details and implementation of controls during construction to avoid further damage have been or are being worked out with the Applicant for the variously proposed fixes.

3. Provided support to OELD for upholding NRC's December 6, 1979 Order Modifying the Construction Permit. Consumers has given stipulations not to contest ~~that~~ the issues of the Dec. 6, 1979 Order or whether the order was properly issued for the Auxiliary Building, Underground Piping and Q/A issues. Additional stipulations are anticipated for other structures when covered in future hearing sessions.

4. Provided support to OELD in preparation of testimony and as witnesses for six ASLB hearing sessions (See attached sheet of for participation by GES and consultants).

WHAT WE HAVE ACCOMPLISHED (continued)

5. Have given Staff concurrence with the Applicant proceeding with installation of the permanent dewatering system, construction of the new ring beam foundations for the Borated Water Storage Tanks & initial stages of underpinning the Auxiliary Building area.

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MIDLAND PROJECT

GEOTECHNICAL ENGINEERING SECTION and its Consultants have participated in the following sessions directly related to the ASLB SAFETY HEARINGS:

	Hearing Topic	Dates
1.	Extensive Depositions and Preparation of Responses to Consumer's Interrogatories	Oct. 1980 thru Mar. 1981
2.	Prehearing - Identify Plant Fill Problem Hearing Issues	Jan. 28-29, 1981
3.	Testimony/Witness - Stability of Cooling Pond Dikes and Response to Contentions	Aug. 4 - 12, 1981
4.	Testimony/Witness - Soil Amplification of Earthquake Induced Ground Motions	Oct. 14-15, 1981
5.	Testimony/Witness - Remedial Underpinning of the Auxil. Bldg.	Dec. 1-3, 1981
6.	Witness - Adequacy of foundation soil input into dynamic analysis of Auxiliary Building and Service Water Structure	Dec. 14-15, 1981
7.	Testimony/Witness - Remedial Measures for Borated Water Storage Tanks and Underground Piping	Feb. 16-19, 1982

FUTURE ASLB Hearing Sessions to Cover:

1. Remedial Underpinning of Service Water Structure
2. Adequacy of Fix on Diesel Generator Building
3. Outstanding Issues Remaining on Underground Piping
4. Adequacy of Permanent Dewatering System
5. Response to ASLB Questions on Underpinning Auxil. Bldg.
6. NRC Response to Remaining Contentions

3/23/82

J Kane

MIDLAND PROJECT

LIST of CONTRACTORS assisting in geotechnical engineering review:

H. Singh, P. Hadala, U.S. Army Corps of Engineers
North Central Division
Chicago, Ill.

S. Poulos, Geotechnical Engineers, Inc.
Winchester, Mass

} Contract w/ NRC limits review efforts to underpinning the Auxil. Bldg. & Service Water Structure

3/17

L. Heller

→ J. Kane

R. Gonzales

On 3/16 R. Vollmer, J. Knight, F. Schauer and I discussed Midland and the visit with H. Denton of CPCo management (Selby & Cook). Denton advised CPCo that his perception of the licensing actions on Midland were that CPCo was being unrealistic and expecting more of the staff than other utilities. In other words, CPCo was "seeking us around". Hence, Denton wants a briefing according to Vollmer, on the following:

1) What we have accomplished on CP and OL licensing for Midland
2) Where/what remains ahead of us
3) What is a reasonable schedule to accomplish our goals
4) List of contractor support

P/S prepare above ... next week.

George L.

Briefing of Denton on ~~Thursday @ 2:00 p.m.~~ Tuesday March 30 @ 11:00 a.m.