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STONE & WEBSTER MICHIGAN, INC.

P.O. Box 2325, BOSTON, MASSACHUSETTS 02107

United States Nuclear Regulatory Commission
Midland Site Resident Office
Route 7,
Midland, Michigan

May 17, 1984

J.O. No. 14358
Ref. MPF 86

Attention: Mr. R. Cook

DOCKET NO. 50-339/330
MIDLAND PLANT UNITS 1 & 2
INDEPENDENT ASSESSMENT OF UNDERPINNING
REPORT NO. 86

PRINCIPAL STAFF			
RA	<i>Law</i>	DRPP	<i>Wright 3</i>
D/RA		DE	
A/RA		DRMSP	
RC		DRMA	
PAO		SCS	
SGA		ML	
ENF		File	<i>Law</i>

A copy of the Independent Assessment of Underpinning Weekly Report No. 86 for the period of May 6, 1984 through May 12, 1984 is enclosed with this letter. Included as attachments are the minutes of the daily meetings held during the week between members of the Assessment Team and Site Engineering, Construction, and Quality Assurance personnel.

If you have any questions with respect to this report please contact me at (617) 589-2067.

D.A. Benvia for A.S. Lucks

A. Stanley Lucks
Project Manager

Enclosures
ASL/pd

- cc:
- JJHarrison (enc), US NRC Glen Ellyn, IL
- Grace Dow Memorial Library (enc)
- DQuamme (enc) CPCo Midland (site)
- JMooney (enc) CPCo Jackson
- JMeisenheimer (enc) CPCo Midland (site)

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 Midland Plant
 Units 1 & 2
 Independent Assessment of Underpinning

Weekly Report No. 86
May 6, 1984 through May 12, 1984

Personnel on Site

Stone & Webster Michigan, Inc.

P. Majeski	5/8 - 5/12
D. Benvie	5/7 - 5/12
D. Zito	5/7 - 5/11
W. Kilker	5/6 - 5/10
L. Rouen	5/6 - 5/8
A. Lucks	5/9 - 5/10
D. O'Nan	5/9 - 5/10
G. Palmer	5/9 - 5/10

Parsons Brinckerhoff Michigan, Inc.

J. Oliveira	5/9 - 5/12
B. Metros	5/6 - 5/8
J. Ratner	5/10 - 5/11

Meetings Attended

<u>Date</u>	<u>Represented</u>	<u>Purpose</u>
5/7 - 5/9 5/11	Stone & Webster Bechtel Consumers Power Parsons	Daily Assessment Team Meeting
5/7	Consumers Power Bechtel MPQAD Stone & Webster	Project Soils Meeting
5/7	Bechtel Consumers Power MPQAD Stone & Webster	Constructability Review Meeting
5/8	NRC Consumers Power MPQAD Stone & Webster	CCP/Soils Interface Meeting
5/10	NRC Consumers Power Stone & Webster	Monthly NRC Meeting

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<u>Date</u>	<u>Represented</u>	<u>Purpose</u>
5/11	Consumers Power Bechtel MPQAD Stone & Webster	Weekly Interorganizational Meeting
5/11	Consumers Power Bechtel MPQAD Stone & Webster	Document Control Information Meeting

Underpinning and Remedial Soils - Construction

Pier E5: Concrete placement for the pier bell and the shear key between the pier and the containment drop pit was completed. Installation of the pier shaft reinforcing steel and the grillage support columns in the containment drop pit is in progress.

Pier Kc8: Excavation of the finger drift to the pier continued.

Pier E17: Placement of concrete for the middle portion of the enlarged shaft was completed.

Piers CT3/10: Pier excavations are in progress.

Pier W5: Concrete placement for the pier bell and the shear key between the pier and the containment drop pit was completed. Installation of the pier shaft reinforcing steel is nearing completion. Grillage support column installation in the containment drop pit continued.

Pier W17: No further activity was performed pending fabrication of lagging materials to support an enlarged straight shafted pier.

Pier Kc5: Excavation of the pier is in progress.

Access Shaft Level C Wales: Installation of the Level C Wales was completed.

SWPS: Installation of the upper level wales continued on the north and west sides. Excavation and lagging installation was completed to El. 623 ' along the east side of the excavation.

BWSTs: Reinforcing steel, formwork installation, and concrete placement continued.

Cathodic Protection: Trench excavation work continued.

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Assessment Team Observations - Construction

Water seepage was effectively controlled in the E5 pier bell prior to placement of concrete for the working mat. The Contractor installed a perimeter trench around the bell periphery to intercept seepage along the side of the bell. Intermittent lateral trenches were excavated to divert any possible seepage away from the founding area of the bell. Subgrade soil which had been softened prior to excavation of the drainage trenches was removed in accordance with the procedures. The effectiveness of seepage control for the foundation of the E5 pier bell was judged to be satisfactory.

Concrete placement was observed at the E17 pier and the E/W5 bells. Key items noted included placement technique, consolidation and curing of concrete. Placement methodology and consolidation were judged to be satisfactory. The concrete was wet cured in accordance with the procedures.

The Assessment Team attended a constructability review for the FIVP load transfer. The purpose of the review was to discuss design requirements and finalize the logic and construction sequence associated with the FIVP load transfer. Items reviewed included intent and clarity of drawings, sequence of loading, procedure preparation requirements, proper sequencing of construction operations, interfacing between engineering, construction and quality organizations and allowances for contingencies. The Assessment Team believes that the constructability review was very thorough. The various organizations involved with the review were knowledgeable of the design and engineering requirements for the FIVP load transfer. Pertinent engineering and construction input was provided by all the organizations involved in the review. Additionally, the review was scheduled in a timely manner ensuring enough lead time for incorporation of applicable comments into the design drawings, and preparation of the required procedures and inspection plans prior to the scheduled construction dates.

The Assessment Team observed cadwelding of rebar and repair of 1.0 in. exploration holes at the BWST Unit 1 valve pit. The cadweld, packing and clamps were properly installed. The assembly was then preheated in accordance with the procedures. The crucible was installed and the filler metal was fired. The hardware was removed after initial solidification and the slag removed from the completed cadweld. The resulting quality of the completed cadweld was indicative of the satisfactory workmanship observed during the cadwelding process. Drypack was used to repair the 1.0 in. exploratory holes. The holes were presoaked in accordance with procedures. Drypack was mixed in small quantities appropriate for the size of this operation, ensuring that freshly mixed material was used at all placement locations. The drypack was rammed into the holes with a tamping rod and hammer, resulting in a well compacted and sound repair.

The Assessment Team inspected the condition of the backpacking completed to date for the SWPS east access shaft. In several locations the backpacking had fallen out from behind the lagging. This condition is attributable to the type of backpacking material and level of effort being implemented to install the backpacking. The situation is aggravated by vibration caused during flyash concrete removal around the soldier piles. The Assessment Team has previously expressed concern with this backpacking material and method of installation. The Assessment Team does not believe that the problems experienced to date have affected the overall stability of the excavation. However, the continuing problems associated with maintaining the backpacking in place indicates more diligence is required by the

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Contractor to correct this situation before the excavation is significantly extended below the present levels. The Assessment Team has had further discussions with the Contractor concerning this situation. One modification being implemented involves the use of clay at the bottom of every second or third lagging board to prevent the sand backpacking from falling out. The Contractor is implementing the use of clay to upgrade the backpacking placed to date. It is planned to continue this backpacking method at least until excavation of the access shaft proceeds below the sand fill and into the clay fill. Once the excavation is in clay, it is anticipated the excavation can be maintained closer to design lines, thereby ensuring more contact between the lagging and in-situ soil. As an additional preventive measure, where necessary, the Contractor also plans to place excelsior in the spaces between the lagging. The Assessment Team will continue to monitor backpacking at the SWPS to ensure the stability of the in-situ soil support is maintained.

Assessment Team Observations QA/QC

The Assessment Team attended a quality awareness session held during a Subcontractor's toolbox meeting. At this meeting, the requirements for belling and excavation of piers were discussed. During the discussion, the importance of predetermined hold points and quality criterion was reviewed. This session was judged to be adequate in providing the craftsmen with an awareness of quality requirements associated with the belling and excavation of piers.

MPQAD calibration of vibrators and US Testing inspection and testing of concrete placed for the E17 pier was overviewed by the Assessment Team. Vibrators were inserted into fresh concrete and the required minimum frequency of vibration was verified. Preparation of concrete cylinders and air, slump and temperature testing conformed with ASTM procedures.

The Assessment Team attended a training session conducted by the SWPS underpinning subcontractor to familiarize their field engineers with quality requirements for jacking equipment. The discussion reviewed quality procurement requirements, manufacturers' equipment documentation, and calibration data needed prior to installation of the jacks. The content of the training session was judged to be thorough, detailing all the necessary documentation requirements to be met prior to jack installation.

Work Activity Packages

No work activity packages were overviewed or active during the past week.

Nonconformance Identification Reports

<u>NIR No.</u>	<u>Description</u>	<u>Status</u>
		(Opened)(Closed).
25	Compressive Strength Testing of Concrete Cylinders	3/30/84 5/9/84

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Open Items

OPEN ITEM - An item for which an action is required. The item will remain open until the required action has been taken. Tracking is required.

CLOSED ITEM - An item usually brought forward by the Assessment Team that is discussed and adequately responded to. No tracking is required.

INFORMATION ITEM - An item brought forward to provide general background information regarding work, such as work status or an upcoming design change. No tracking is required.

OPINION ITEM - An opinion or suggestion given by the Assessment Team expressing an alternate construction or quality assurance technique. The opinion or suggestion is given as a possible alternate that may facilitate an operation.

CLOSES ITEM -XX-XX - This notation identifies an action that closes a previously identified open item. Tracking of the open item stops.

The following listing of all Open items from the Daily Meeting Notes with Bechtel and the text of the Weekly Reports. Carry-over items from past weeks which have been Closed this week are also listed.

<u>Item No.</u>	<u>Description</u>	<u>Closure</u>
64-10	Trend Analysis	Open
71-17	Computerized Civil Drawing Register	Open
74-21	US Testing Corrective Action	Open
79-26	Upper Leveling Plates	Open
79-28	SWPS Backpacking Material	Open
79-34	SWPS Backpacking Placement	Open
81-24	BOP Construction Verification of Soils Work	Open
82-9	Trend Analysis	Open
84-20	Design Drawing Requirements for BWST Ring Beam Addition	86-6

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<u>Item No.</u>	<u>Description</u>	<u>Closure</u>
85-5	SWPS North Wall Concrete	86-18
85-29	Auxiliary Building Access Shaft Grout Shims	Open
86-4	Auxiliary Building Crackmapping	Open
86-16	Vibration of BWST Concrete	Open

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Project Engineer

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Project Manager

Notes of Daily Meeting
Independent Assessment of Underpinning
Midland Plant, Units 1 & 2
Consumers Power Company

Held at Midland Site
Midland, Michigan
May 7, 1984

Present For:

<u>Consumers Power</u>	<u>Bechtel</u>	<u>MPQAD</u>	<u>Stone & Webster</u>
G. Murray	J. Fisher J. Kelleher E. Cvikl	J. McMaster R. Sevo	L. Rouen W. Kilker D. Benvie
			<u>Parsons Brinckerhoff</u>
			B. Metros

PURPOSE

This meeting is held each day to discuss items regarding the Independent Soils Assessment at the Midland Plant, Units 1 & 2.

DISCUSSION

Status Items

Item 86-1 - Auxiliary Building Underpinning Activities

Excavation of the pier CT 3/10 drop pits continued.

Bell excavation and bracing installation is in progress for piers E/W5.

Excavation of the finger drifts has begun for piers Kc 5/8.

Installation of the Level C Wales is nearing completion for both access shafts.

(INFORMATION ITEM)

Item 86-2 - SWPS Backpacking Material

J. Fisher reported that the use of cement with sand for backpacking the soldier pile wall will be discontinued. Use of the sand and cement mix produced a backpacking which was too stiff and prevented the contractors ability to subsequently check for voids in areas other than the spaces between lagging. Clay will be used instead of cement with the sand as a means to maintain the backpacking in place. (Item 79-28 remains OPEN) (INFORMATION ITEM)

Item 86-3 - BOP Construction Verification of Soils Work

J. Fisher reported that a meeting with the Assessment Team is scheduled today to discuss interfacing between FSO and the Balance of Plant (BOP) with respect to instances when BOP verification of underpinning activities will be required. (Item 81-21 remains OPEN) (INFORMATION ITEM)

Notes of Daily Meeting
Independent Assessment of Underpinning
Midland Plant, Units 1 & 2
Consumers Power Company

Held at Midland Site
Midland, Michigan
May 7, 1984

New Items

Item 86-4 - Auxiliary Building Crackmapping

W. Kilker requested a copy of the MPQAD review of the required auxiliary building crackmapping associated with jacking of piers CT 1/12. J. McMaster will respond. (OPEN ITEM)

Item 86-5 - FIVP Crackmapping

E. Cvikl reported that FIVP crackmapping performed in April using the new grid system did not result in issuance of any NCRs. Previously, cracks in the FIVP were referenced to building column lines, resulting in differing interpretations as to the correct location of the cracks. (INFORMATION ITEM)

Response Items

Item 86-6 - Design Drawing Requirements for BWST Ring Beam Cracks

E. Cvikl provided the Assessment Team with a copy of the FCR addressing elevation inconsistencies in the top elevation of the valve pit, existing ring beam, and ring beam addition at the BWSTs. The FCR specifies that the top of the ring beam addition will be sloped as required to match the existing top elevation of the valve pit, while maintaining a minimum 2 in. of concrete cover over the reinforcing steel. The Assessment Team concludes that possible interface problems between the valve pit and ring beam addition due to elevation inconsistencies have been adequately addressed. (CLOSES ITEM 84-20)

Notes of Daily Meeting
Independent Assessment of Underpinning
Midland Plant, Units 1 & 2
Consumers Power Company

Held at Midland Site
Midland, Michigan
May 8, 1984

Present For:

<u>Consumers Power</u>	<u>Bechtel</u>	<u>MPQAD</u>	<u>Stone & Webster</u>
G. Murray	J. Fisher J. Kelleher E. Cvikl	J. McMaster R. Sevo	L. Rouen W. Kilker D. Benvie
			<u>Parsons Brinckerhoff</u>
			B. Metros

PURPOSE

This meeting is held each day to discuss items regarding the Independent Soils Assessment at the Midland Plant, Units 1 & 2.

DISCUSSION

Status Items

Item 86-7 - Auxiliary Building Underpinning Activities

Excavation of the CT 10 pier shaft has begun.

Rebar installation is in progress for pier E17.

Bell excavation and placement of the grout mudmat was completed for pier W5.

(INFORMATION ITEM)

Item 86-8 - Auxiliary Building Crackmapping

E. Cvikl reported the submittal of the auxiliary building crackmapping results performed after jacking of the CT 1/12 piers is scheduled for 5/11/84. J. McMaster stated the MPQAD should complete their review of the crackmapping results approximately 2 weeks after submittal. (Item 86-4 remains OPEN) (INFORMATION ITEM)

New Items

Item 86-9 - BWST Ring Beam Addition

J. Fisher reported that concrete will be placed today for the west segment of the Unit 2 ring beam addition. (INFORMATION ITEM)

Item 86-10 - Rejacking of the W8 Grillage

E. Cvikl reported that the W8 grillage will be rejaacked today. The W8 grillage is being rejaacked in response to a change of 20% in the grillage posts strain gage readings and an increase in the rate of building settlement

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(7 mils/48 hrs) in the vicinity of the W8 grillage. (INFORMATION ITEM)

Item 86-11 - Weldcrete

W. Kilker asked if the contractor planned to resume the use of Weldcrete since the NCR addressing concerns with the vendors QA program had been resolved. J. Kelleher responded that it is planned to use Weldcrete for applications related to temporary underpinning activities. Engineering is presently evaluating the use of Weldcrete for the permanent underpinning. (CLOSED ITEM)

Notes of Daily Meeting
Independent Assessment of Underpinning
Midland Plant, Units 1 & 2
Consumers Power Company

Held at Midland Site
Midland, Michigan
May 9, 1984

Present For:

<u>Consumers Power</u>	<u>Bechtel</u>	<u>MPQAD</u>	<u>Stone & Webster</u>
G. Murray	P. Goguen	J. McMaster	W. Kilker
J. Schaub	J. Fisher	R. Sevo	D. Benvie
	J. Kelleher		D. Zito
	E. Cvikl		P. Majeski
	B. Brandes		
	N. Swanberg		
			<u>Parsons Brinckerhoff</u>
			J. Oliveira

PURPOSE

This meeting is held each day to discuss items regarding the Independent Soils Assessment at the Midland Plant, Units 1 & 2.

DISCUSSION

Status Items

Item 86-12 - Auxiliary Building Underpinning Activities

Shaft excavation for pier CT 10 has proceeded to the concrete mudmat at el. 583. No perched groundwater has been encountered to date.

Excavation of the CT 3 pier shaft has started.

Bell excavation was completed for the E5 pier.

Concrete placement for the shear key between the containment drop pit and the W5 pier was completed.

Excavation of the Kc5 pier shaft has begun.

(INFORMATION ITEM)

Item 86-13 - U.S. Testing Corrective Action

J. Kelleher provided a status on the U.S. Testing upgrading process. All Quality Control Procedures (QCPs) with attached work instructions have been submitted and approved. Issuance of the QCPs is in progress. Qualification of U.S. Testing Technicians to Level I for 20 or more certifications is continuing. Five technicians remain to be cross trained to at least 20 certifications.

(INFORMATION ITEM)

Notes of Daily Meeting
Independent Assessment of Underpinning
Midland Plant, Units 1 & 2
Consumers Power Company

Held at Midland Site
Midland, Michigan
May 9, 1984

New Items

Item 86-14 - MPQAD Receipt Inspection of the E/W5 Grillages

P. Majeski asked if MPQAD receipt inspection of the E/W5 grillages was completed and if so were any NCRs issued. J. Kelleher stated that MPQAD receipt inspection had been completed. Procedural nonconformances were noted during the inspection, resulting in issuance of an NCR. No hardware deficiencies were found during the receipt inspection. (CLOSED ITEM)

Item 86-15 - Lessons Learned

J. Schaub asked if there were lessons learned from the Level C wale installations that can be applied to the remaining wale installations in the access shafts. J. Fisher responded that changes will be made to design documents to incorporate lessons learned from the Level C wale installation. (CLOSED ITEM)

Item 86-16 - Vibration of BWST Concrete

D. Zito noted that an NCR had been issued due to insufficient vibration of the concrete placed yesterday for the BWST Unit 2 ring beam addition. It was noted that heavy rebar congestion prevented the contractor from adequately vibrating the concrete. Mr. Zito asked what provisions will be taken to address this problem for the remaining BWST concrete placements where there is a high concentration of rebar. P. Goguen stated that modifications being evaluated to address this problem in the future include :

- A. Bundling of rebar to allow passage of vibrators into these heavily congested areas.
- B. Using form vibrators to provide additional consolidation of the concrete.
- C. Placing starter grout in areas where rebar congestion is extensive to ensure full penetration of concrete.

The Assessment Team will overview upcoming concrete placements at the BWST. Implementation of the proposed modifications will be evaluated for effectiveness. (OPEN ITEM)

Response Items

Item 86-17 - NIR 25 - Compressive Strength Testing of Concrete Cylinders

The Assessment Team has reviewed the QAR response to NIR 25 detailing deficiencies associated with the use of the maximum load indicator dial on the U.S. Testing concrete compression machine. The QAR states that the use of the needle is not required by ASTM procedures. Although the concrete compression machine at the U.S. Testing Laboratory is equipped with the needle, the technicians do not use it because it affects the reading of the primary load measuring

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arm. It should be noted that the concrete compression machine has been calibrated with and without the maximum load indicator dial. Additionally, shock associated with concrete failure during testing can effect the maximum load indicator reading. Therefore, the US Testing Technicians only read the load measuring arm. The Assessment Team contacted various QA organizations involved with the nuclear industry and found that although the maximum load indicator is used during testing, the primary load measuring arm value is used to document maximum load. The Assessment Team concludes therefore that the procedure being implemented is adequate. NIR 25 is CLOSED . (INFORMATION ITEM)

Item 86-18 - SWPS North Wall Concrete Surface.

J. Fisher responded to the Assessment Team question concerning repair of honeycombing and form tie holes for the SWPS north wall. All areas of the north wall where surface imperfections such as honeycombing or form tie holes exist will be repaired in accordance with design requirements. The repair work will be completed prior to placement of concrete for the missile shield protection on the SWPS north wall. (CLOSES ITEM 85-5)

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Consumers Power Company

Held at Midland Site
Midland, Michigan
May 10, 1984

No meeting was held on this date.

Notes of Daily Meeting
Independent Assessment of Underpinning
Midland Plant, Units 1 & 2
Consumers Power Company

Held at Midland Site
Midland, Michigan
May 11, 1984

Present For:

Consumers Power

G. Murray
R. Wheeler

Bechtel

J. Fisher
J. Kelleher
E. Cviki

MPQAD

J. McMaster

Stone & Webster

D. Benvie
D. Zito
P. Majeski

Parsons Brinckerhoff

J. Oliveira
J. Ratner

PURPOSE

This meeting is held each day to discuss items regarding the Independent Soils Assessment at the Midland Plant, Units 1 & 2.

DISCUSSION

Status Items

Item 86-19 - Auxiliary Building Underpinning Activities

Concrete placement was completed for the W5 pier bell.

The first lift of concrete was placed for the middle portion of the E17 pier shaft.

Level C wale installation has been completed in the east access shaft.
(INFORMATION ITEM)

Item 86-20 - SWPS Underpinning Activities

J. Fisher reported that an FCR allowing the use of wood lagging in areas where the lagging span is less than 8 ft. was issued. Tubular steel lagging will still be used where the lagging span exceeds 8 ft. (INFORMATION ITEM)

New Items

Item 86-21 - BWST Crack Review

E. Cviki reported that Resident Engineering has reinspected the existing BWST ring beams to determine if additional cracking had occurred in areas where concrete placement is scheduled in the near term, subsequent to repair of the original cracks. No additional cracks were found. (INFORMATION ITEM)

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Item 86-22 - Independent Assessment - 270 Day Report

P. Majeski stated that the 270 Day Report summarizing the Assessment Team observations of the underpinning work performed since the 90 Day Report had been recently issued. He noted that the Assessment Team will address follow-up of the conclusions and recommendations contained in the report in the near future. (INFORMATION ITEM)

Item 86-23 - NCR Trending by FSO

P. Majeski requested an update on NCR Trending being performed by FSO. J. Fisher stated that FSO has recently revised their in-house trending method to include tracking of NCR trends for very specific work activities. FSO trending tracks the number of nonconformances for a given level of work effort. The level of work effort is expressed as a quantity (e.g., number of expansion anchors, cubic yards of concrete, etc.) which has been selected to best represent the work effort for a specific activity. (INFORMATION ITEM)

Item 86-24 - Weekly Report #85

The text of Weekly Report #85 was reviewed. It was determined that all open items had been previously identified. (INFORMATION ITEM)

Response Items

No response items were addressed.