



CONSUMERS POWER COMPANY

MIDLAND PLANT

UNITS 1 & 2

BECHTEL JOB 7220

DESIGN DOCUMENT REQUIREMENTS PROCEDURE

SB123190

REV	DATE	DESCRIPTION	BY	APPROVALS
△				
△				
△				
①	11/30/73	Issued for Use	RAB	AK
②	11/27/73	Issued for Trial Use and Comment	DH/22	CR-S

DESIGN DOCUMENT REQUIREMENTS

1.0 PURPOSE

1.1 The purpose of this procedure is to define the system to be used for assuring inclusion of all design and quality requirements in design documents and to provide documentation of this activity.

2.0 SCOPE

2.1 This procedure is applicable to all design work and significant revision issued after December 15, 1973, on the Consumer Power Company's Midland Plant Units 1 & 2. This design documentation procedure applies to all drawings or blocks of drawings and specifications.

3.0 PROCEDURE

3.1 The engineer responsible for the origination of a design document shall fill out the attached design requirement check list as he develops the design document. The purpose is to assure all applicable design and quality criteria contained in each applicable document have been incorporated into the subject design and to verify that no omission or conflict exists. The engineer shall initial the applicable blocks provided.

What about other items in DCC? Such as Calculations

*Significant items
Drawings
Specifications
SAR*

*mech
Equip
List
SAR
Amel*

3.2 If there is conflict between any of the documents containing design or quality criteria, the originator shall so indicate on the check list and initiate any action required to resolve conflict and route the check list with the subject design document to the checker. Criteria contained in the SAR or other licensing documents will prevail.

Upon approval of the project engineer, design and quality criteria differing from the SAR may be employed, provided such differences are documented by a SAR change notice. Fabrication or construction of items differing in design or quality from the SAR shall not commence until the SAR change notice is approved by Consumers Power Company.

3.3 The checker shall verify the design and originator's comments and then forward the check list and the subject design to the group leader for review prior to submission to the group supervisor.

3.4 The group supervisor will be responsible for assuring that all of the design requirements have been met and will approve that check list by noting his approval prior to issuance of that design document for client review and/or construction.

SB123191



"Q" LISTED _____
 NON "Q" LISTED _____

MIDLAND PROJECT

DESIGN REQUIREMENTS VERIFICATION CHECKLIST

Document Title _____
 Document No. _____

Job No. 7220

Date _____

ITEM NO.	APPLICABLE SECTIONS	DESCRIPTION OF REQUIREMENTS	ENGINEERS INITIALS	CHECKER'S INITIALS	ACT. REQ'D *YES/NO	DATE AC COMPLET
1	_____	Commitment List (PSAR/FSAR and Licensing)	_____	_____	_____	_____
2	_____	Environmental Report	_____	_____	_____	_____
3	_____	DRL Safety Evaluation	_____	_____	_____	_____
4	_____	Public Hearings	_____	_____	_____	_____
5	_____	Correspondence (Letters to/from Bechtel, Telephone Memos, TWX'S and Interoffice Memos)	_____	_____	_____	_____
6	_____	Bechtel General Standards	_____	_____	_____	_____
7	_____	Bechtel Discipline Standards	_____	_____	_____	_____
8	_____	Bechtel Topical Reports	_____	_____	_____	_____
9	_____	MED'S, EDF'S, and EDI'S	_____	_____	_____	_____
10	_____	Consumers Power Company Standards	_____	_____	_____	_____
11	_____	Midland Project Procedures Manual	_____	_____	_____	_____
12	_____	Midland Internal Procedures Manual	_____	_____	_____	_____

ACTION REQUIRED
 (If yes, explain - Use attachments if needed)

SB123192

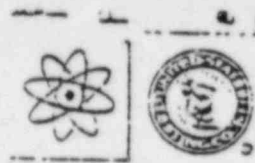
QUALITY ENGINEER'S APPROVAL _____ DATE _____
 GROUP SUPERVISOR'S APPROVAL _____

All of the above applicable requirements have been checked and any action required resolved to assure documentation compliance.

DATE _____

United States Testing Company, Inc.

Power Generation Services Division
1415 PARK AVENUE
ROCKEN, NEW JERSEY 07030 (201) 792-2400 (212) 943-0488



concrete testing
on-site inspection
nondestructive testing
environmental evaluation
training programs

*This letter is response
to our letter on the grade beam
situation.*

C-208

March 13, 1978

RECEIVED

BECHTEL POWER CORPORATION
Post Office Box 2167
Midland, Michigan 48640

ATTN: Mr. J. F. Newgen

4540 C-208
No Response

Job 7220 Midland Project
Subcontract 7220-C-208
C-208-B-286
USTCO C-208-141

Gentlemen:

File covering the captioned Project, including your letter of February 1, 1978 addressed to Mr. David Edley of this Company and your telex dated December 30, 1977, have been referred to this office. From our extensive review of the files and investigation it is clear that the work in question was under the direction and control of Bechtel Power Corporation (Bechtel) rather than United States Testing Company, Inc. It is also clear that the identification of test locations, selection of sites, and elevations for the work in question were made by Bechtel and not by the United States Testing Company.

It is also apparent from the contractual documents that acceptance or rejection of the tasks performed thereunder was neither to be made by the United States Testing Company nor was it the responsibility of this Company to do so.

Based on the facts disclosed in our review and investigation we must deny that United States Testing Company is liable for the costs of \$134,600 referred to in your letter of February 1, 1978.

Very truly yours,

UNITED STATES TESTING COMPANY, INC.

BY: *Jack B. Joel*
Jack B. Joel
Counsel

JBW/ran

cc: D. Edley

SB123176

memo
from | TERRY C. VALENZANO

TO: Admin Bldg

Borings showed
Admin Bldg. problem was
localized.

SB123071

BECHTEL CORPORATION
POWER DIVISION



Telephone call

CC. J. BETTS
Route J. CHURCH
G. THURSON
J. WANZELIK

By FG. TEAGUE Of SITE

To J. WANZELIK Of A²

Date 1/11/78 19__ Time 1:30

Subject: ADMIN BLDG GRADE BEAM Job No. 7220
FAILURE @ COL. LINE 0.4

TEAGUE BASED ON YOUR OBSERVATIONS BEFORE AND DURING REMOVAL OF THE MATERIAL UNDER THE SUBJECT BEAM BETWEEN ELEVATIONS 614± AND 622'-6", HOW WOULD YOU CHARACTERIZE THE MATERIAL WITH RESPECT TO CONSISTENCY?

WANZELIK THAT MATERIAL COULD BE DESCRIBED AS HAVING A UNIFORM APPEARANCE WITH MINIMAL VARIATION IN SOIL CHARACTERISTICS (IE. COLOR AND PLASTICITY) OVER THE FULL EXTENT OF THIS MATERIAL

FG Teague

SB123072

BECHTEL

C. A. BOOS

MEMORANDUM

FILE

LOCATION MIDLAND

FG TRAGUE

DATE 10/5/77

ADMIN BLDG FOOTING

DR NO 7220

@ COL LINE 0.4

CONFIRMING TELECON THIS DATE WITH G. TUVESON, PROJECT ENGINEERING IS SATISFIED FROM BLOWCOUNT RESULTS AND OTHER INFORMATION COMPILED DURING THE 2 RECENT BORINGS TAKEN AT SUBJECT FOOTING LOCATION, THAT THE MATERIAL BELOW THE BOTTOM OF THE STEEL TUNNEL SLAB (APPROX EL 614) IS SUITABLE FOR REPLACEMENT OF BACKFILL CONCRETE AND THE SUBJECT FOOTINGS. PROJECT ENGINEERING DOES NOT REQUIRE FURTHER ACTION FROM FLD. ENGINEERING WITH RESPECT TO THE ~~FAILURE~~ OF INVESTIGATION OF THE FAILURE OF THE ORIGINAL FOOTINGS @ 0.4 IN THE ADMIN. BLDG. TUVESON WAS INFORMED THAT AS SOON AS THE DESIGN PROVISION IS RECEIVED, FIELD FORCES WILL BEGIN WORK ON SUBJECT REPLACEMENT AS THERE ARE NO HOLDS IN EFFECT ON THAT WORK.

Lucas J. J...

SBI23073

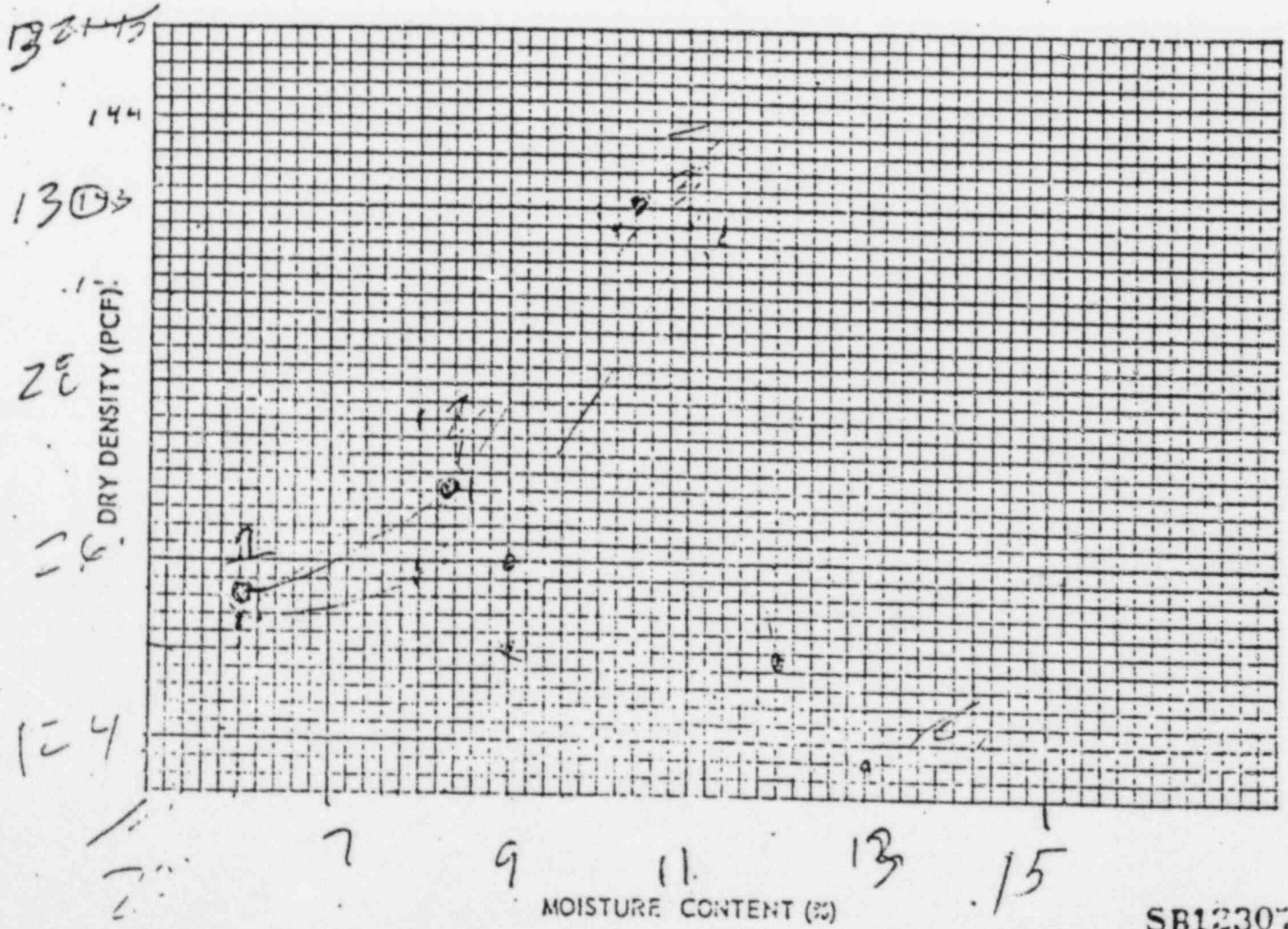
source U-7-12
 Hammer weight 10th
 Drop distance 6"
 No. Layers 4
 No. Blows 25



Initials RS
 Type of test BMP
 Mold size 6"

(2) (3) (4) (5) (1)

	TEST DATA				
	9	11	13	15	6.8
Mold No.	PM1	PM1			
Wt. wet sample + Mold (LBS)	11.305	11.538	11.294	11.262	11.187
Wt. of Mold (LBS)	6.633	6.633	6.633	6.633	6.632
Wt. of wet sample (LBS)	4.672	4.905	4.661	4.629	4.554
Vol. of sample (CF)	2.124	2.075	2.075	2.075	2.075
Wet Unit Weight (lb. /cu.ft.)	137.3	147.1	134.4	136.0	133.8
Can No.	57	14	71	7084	73
Wt. wet sample + Can (gm.)	190.3	205.0	216.1	222.6	225.8
Wt. Dry sample + Can (gm.)	181.5	194.7	201.6	206.7	216.8
Wt. water (gm.)	8.8	10.3	14.5	17.1	9.0
Wt. can (gm.)	76.81	90.7	80.5	74.8	79.3
Moisture Content %	105.4	104.2	121.1	126.7	137.5
Average Moisture Content %	8.3	10.4	12.0	13.5	6.5
Dry Unit Weight (lb. /cu.ft.)	126.6	130.5	124.9	119.8	125.6



WU INFOMASTER

BECHTEL MIDL

003468C364 0937EST
2071 MIDLAND, MI 12/30/77

TLX 12-6493 U.S. TESTING HBKN
ATTN: DAVE EDLEY

SUBJECT: JOB 7220 MIDLAND PROJECT
SUBCONTRACT 7220-C-208
FAILURE OF ADMINISTRATION
BUILDING GRADE BEAM AT 0.4 LINE
C-208-B-283

ON AUGUST 23, 1977 WE NOTED A FAILURE OF THE SOIL SUPPORTING THE SUBJECT GRADE BEAM. THIS GRADE BEAM WAS PLACED ON FILL FOR WHICH U.S. TESTING PROVIDED SOIL COMPACTION TESTING DURING THE INSTALLATION PERIOD. OUR ENGINEERING ANALYSIS INDICATES THAT THERE MAY HAVE BEEN AN ERROR ON THE PART OF U.S. TESTING COMPANY IN THE SELECTION OF THE PROCTOR FOR THIS WORK. WE ARE EVALUATING ALL OF THE CIRCUMSTANCES (INCLUDING SUBSEQUENT TESTS THAT HAVE BEEN PERFORMED) AND WILL ADVISE YOU IN THE NEAR FUTURE AS TO ANY LIABILITY WE FEEL U.S. TESTING COMPANY MAY HAVE PER ARTICLE 14, "INDEMNITY" OF EXHIBIT "A", "GENERAL TERMS AND CONDITIONS" OF TECHNICAL SUBCONTRACT 7220-C-208.

QUESTIONS ON THIS MATTER SHOULD BE REFERRED TO MR. J. C. CHURCH, FIELD CONTRACTS ADMINISTRATOR.

J. F. NEWGEN
BECHTEL MIDL

JFN/JCC/AJB/KM

CC: JOHN SPELTS, UST CO
P. A. MARTINEZ
R. HERMESTON
P. A. BECNEL, SFHO
J. C. CHURCH

ACCEPTED
02071

1-PC

SB123075

Inter-office Memorandum

BEBC- 2045

To J. F. Newgen

Subject Midland Plant Units 1 & 2
Job 7220
Nonconformance Report
NCR-1004

Copies to File: 0274, C-0465

Date January 13, 1978

From R. L. Castleberry

Of Engineering

At Ann Arbor

G. L. Richardson
S. S. Afifi
F. E. Meyer
W. Barclay

We have reviewed NCR 1004 along with the other test reports furnished by field QC. At this time we are not able to make an evaluation based on the available information. Therefore, it is requested that standard penetration test borings in accordance with ASTM D1586-67 be obtained at the following locations. Visual classification of soils should be done at 5-foot intervals unless directed otherwise by the soils engineer.

I. In the Vicinity of the Diesel Generator Building

The following locations are approximate.

- 1) S-5040; E-250
- 2) S-5040; E-300

These borings shall be extended to an elevation of 610 feet.

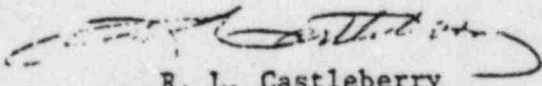
II. In the Vicinity of the Service Water Pump Structure

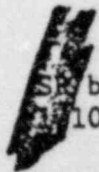
- 1) S-5000; E-750
- 2) S-4980; E-780

These borings shall extend to an elevation of 580 feet.

Please note that the disposition of NCR 1004 will be delayed until we receive the results of the penetration tests mentioned above.

Please inform us of the boring schedule so that we can arrange to have a soils engineer present during the tests.


R. L. Castleberry


bkp
10/1

SB123095



QUALITY CONTROL INSTRUCTION

JOB NO. 7220

1. MASTER QC INSTRUCTION TITLE

EARTHWORK SUBCONTRACT SURVEILLANCE

2. MASTER QC INSTRUCTION NO.

None

REV.

3. PROJECT QC INSTRUCTION NO.

7220/SC-1.10

4. LOG NO.

INSPECTION CRITERIA

REVISION

5. TYPE	6. IDENTIFICATION NO	7. REV.	8. TITLE	9. REV	10. DATE	11. DESCRIPTION	12. BY	13. CHK'D	14. APP'D
Spec.	C-210	* 4	Plant Foundation Excavation and Cooling Pond Dikes						
Spec.	C-208	*10	Material Testing Services						
<p>*NOTE: Rev. No.'s shown in Block 7 only identify the applicable revisions of inspection criteria documents used to prepare Rev. 0 of this QCI. Subsequent revisions to the inspection criteria documents that require revision to this QCI shall be noted appropriately in Block 11, i.e., "PQCI revised to incorporate changes as required by Rev. _____." In addition current revisions of specific engineering and vendor drawings, sketches, specification, procedures and instructions shall be entered on the applicable Inspection Record.</p>				2	2-13-78	Add "Moisture Content Control Log" to Activity/Task 2.2, Block 7.	<i>me</i>	<i>me</i>	<i>me</i>
				1	10/4/77	Incorporated Client Comments	<i>me</i>	<i>me</i>	<i>me</i>

SB123142



QUALITY CONTROL INSTRUCTION

JOB NO. 7220

1. MASTER QC INSTRUCTION NO.	REV
None	
2. PROJECT QC INSTRUCTION NO.	REV
7220/SC-1.10	2

3. ACT NO.	4. ACTIVITY DESCRIPTION	5. INSPECTION CRITERIA	6. INSP ACT. CODE	7. SUPPLEMENTARY RECORD
	<p align="center"><u>GENERAL INSTRUCTIONS</u></p> <p><u>Purpose</u> The purpose of this PQCI is to provide instructions to QCE's for surveillance inspection of on-site construction activities performed by the Earthwork Subcontractor.</p> <p><u>Scope</u> This PQCI covers surveillance inspection of the plant area and beam backfill as described in the subcontractor for placement, moisture control, compaction and quality documentation. The individual subcontract surveillance inspection record(s) (SSIR's) may be scoped for each application at a specific work area or other definable parameter. The SSIR is to be initiated at least weekly, but may be initiated more frequently at the discretion of the QCE.</p> <p><u>Special Instructions</u></p> <p>1. The instructions contained herein are based upon the general policy that the subcontractor retains full responsibility for the quality of his work and that of his subcontractors and that the Bechtel Field Quality Control Engineers (QCE) are responsible for performing surveillance inspection of the on-site construction activities performed by the subcontractor. Surveillance inspection consists of a review, observation, and/or inspection of the subcontractor's: certification of personnel; installation, inspection, examination and test control; use of calibrated measuring and test equipment; material control; control of nonconforming items; documentation of inspection activities and special process controls to determine that the subcontractor's activities are in accordance with his QC program and the requirements of the contract documents. It does not mean that all subcontractor activities, items or documentation will be continuously observed for the purpose of determining compliance.</p>			

SB123143



QUALITY CONTROL INSTRUCTION

JOB NO. 7220

1. MASTER QC INSTRUCTION NO.	REV
None	
2. PROJECT QC INSTRUCTION NO.	REV
7220/SC-1.10	2

3. ACT NO.	4. ACTIVITY DESCRIPTION	5. INSPECTION CRITERIA	6. INSP ACT. CODE	7. SUPPLEMENTARY RECORD
	<p align="center"><u>GENERAL INSTRUCTIONS</u></p> <p>Special Instructions (continued)</p> <p>2. After the subcontractor has moved on-site, and prior to the start of on-site work, the Project Field Quality Control Engineer shall contact the Subcontract Administrator or Project Superintendent to arrange a pre-construction meeting with the subcontractor's field construction quality control personnel and construction supervision for the purpose of discussing the requirements for subcontractor's performance as delineated in the Summary Report of Preconstruction Meeting. (See Exhibit 1 of SF/PSP G-9.1). At this meeting witness and hold points will be established mutually between the Subcontractor's QC personnel and Bechtel Quality Control. Bechtel QC will also review the subcontractor's inspection procedures for compatibility with this QCI.</p> <p>3. The QCE shall use the IR to describe those inspection activities he has performed during the scoped period. When the QCE has observed a certain piece of equipment, work operation, procedure or special process being performed he shall identify those items, procedures and processes on the IR. Items and location shall be described in Section 6, and procedures and reference criteria shall be listed in Section 7. The QCE shall describe what activities he observed or performed in Section 9. The QCE shall also note exceptions, unusual occurrences or noteworthy items in Section 10. Additional remarks for any of the IR sections shall be made on a continuation sheet.</p> <p>4. When preparing Block Number 7 on the IR the QCE shall enter the documents necessary to perform the designated inspections. These documents shall include: (1) the primary specification(s) revision number(s) all specification change notices and applicable Field Change Requests (2) Project Engineering approved drawings, all DCN's and applicable Field Change Requests. The primary specifications are those identified in Block Number 6 of this QCI cover sheet.</p> <p>5. All documents used as inspection criteria for quality verification shall be "controlled" documents.</p>			

SB123144



QUALITY CONTROL INSTRUCTION

JOB NO. 7220

1. MASTER QC INSTRUCTION NO	REV
None	
2. PROJECT QC INSTRUCTION NO	REV
7220/SC-1.10	2

3. ACT NO.	4. ACTIVITY DESCRIPTION	5. INSPECTION CRITERIA	6. INSP ACT CODE	7. SUPPLEMENTARY RECORD
	<p>6. Where Project Engineering approved documents exist within the scope of work to be performed, the Project Engineering approved document shall be used.</p> <p>7. If during the review of the inspection criteria documents or at any time later during the performance of these inspections, the QCE determines the inspection criteria documents are not adequate to perform the required inspections (i.e., incomplete or omitted details, lack of cross-referencing between drawings, documents require clarity) he shall notify the Lead Discipline QCE. The Lead Discipline QCE shall discuss the problem with the PFQCE who will take the necessary action for resolution. The Inspection and sign off shall not be completed until the QCE is satisfied that the document problem, if any has been satisfactorily resolved.</p> <p>8. The inspection codes in Column 6 of the QCI for in-process and final inspection activities are supplemented by one of three different symbols to further define the type of inspection required: 1. (V) visual inspection, 2. (M) measurements, and 3. (V&M) visual inspection and measurement. (V) is to inspect by visual examination, (M) is to inspect by physical measurement of dimensions or count of required quantity. (V&M) is to visually examine to detect the apparent worst condition, take a measurement to verify acceptance and visually compare the other items based on this measurement.</p>			

SBI23145



QUALITY CONTROL INSTRUCTION

JOB NO. 7220

1. MASTER QC INSTRUCTION NO.	REV
None	
2. PROJECT QC INSTRUCTION NO.	REV
7220/SC-1.10	2

3. ACT NO.	4. ACTIVITY DESCRIPTION	5. INSPECTION CRITERIA	6. INSP ACT. CODE	7. SUPPLEMENTARY RECORD
9.	The QCE shall surveillance inspect subcontract quality verification documentation that has been generated during the scoped period. He shall review this documentation for availability, traceability, legibility, completeness, acceptance and that it is prepared and controlled in accordance with the Subcontractor's QC program. Upon completion of the subcontractor's work activities or portions thereof, the QCE shall review the Subcontract quality verification documentation turned over to Bechtel QC for availability, traceability, legibility, completeness and acceptance. Additionally the QCE shall review the completed SSIR's for any open exceptions and shall verify that any subcontract release documents have been prepared and signed.			
10.	Exceptions noted during the scoped period shall be reported in accordance with SF/PSP G-9.1. Quality Control shall monitor these outstanding exceptions for satisfactory resolution prior to completion of turnover of subcontractor activities for that portion of work scoped on the IR.			

SB123146



QUALITY CONTROL INSTRUCTION

JOB NO. 7220

1. MASTER QC INSTRUCTION NO	REV
None	
2. PROJECT QC INSTRUCTION NO	REV
7220/SC-1.10	2

3. ACT NO.	4. ACTIVITY DESCRIPTION	5. INSPECTION CRITERIA	6. INSP ACT CODE	7. SUPPLEMENTARY RECORD
1.0	<u>PREREQUISITES</u> The following activities shall be accomplished prior to or during the actual performance of any of the in-process surveillance inspection activities:			
1.1	Review of the latest applicable drawings, specifications, procedures and subcontract documents, listed under Column 6 "Inspection Criteria" on the PQCI for familiarity and to assure:			
	a. The inspection and reference criteria documents, including the applicable codes and standards are the correct revision and are available for reference when performing the surveillance inspection activities required by this PQCI.	None	R	
	b. Field engineering and subcontract documents have the correct approval status.	None	R	
	c. Preconstruction Meeting witness and hold points and any other outstanding items needing resolution prior to implementation, have been incorporated into the PQCI.	None	R	
1.2	Review for open "Noted Exceptions" on previous SSIR's which affect the scoped work.	None	R	
1.3	Review the "Inspection Criteria" on the QCI under Block 5 and the "Drawings/ Specifications/Procedures" on the SSIR under Block 7 to assure the criteria is understood.	None	R	

SB123147



QUALITY CONTROL INSTRUCTION

JOB NO. 7220

1. MASTER QC INSTRUCTION NO	REV
None	
2. PROJECT QC INSTRUCTION NO	REV
7220/SC-1.10	2

3. ACT NO.	4. ACTIVITY DESCRIPTION	5. INSPECTION CRITERIA	6. INSP ACT CODE	7. SUPPLEMENTARY RECORD
2.0	<p><u>PROGRESSIVE SURVEILLANCE INSPECTION</u></p> <p>The following progressive inspection activities shall be performed by the inspection method shown in Column 6 and identified on the SSIR to verify that the in-process work is performed in accordance with the applicable inspection and reference criteria shown on the PQCI and SSIR.</p>			
2.1	<p><u>Placement of Backfill Material</u></p> <p>Prior to and during the placement of backfill material verify that:</p> <p>a. Foundations have been approved by Bechtel Field Engineering prior to backfill.</p> <p>b. Bechtel Field Engineering has approved the placing of backfill materials during freezing conditions (32°F and falling).</p> <p>c. Backfill material is spread in horizontal uncompacted lifts not to exceed the specified thickness for the zone being placed.</p> <p>d. Backfill zones being placed are raised simultaneously with the top surface of the embankment to form an approximately horizontal plane extending transversely to the final slopes and longitudinally to the abutments.</p> <p>e. Backfill placement shall be maintained at all times in such a condition that the surfaces will readily drain. Ruts in the surface of any layer shall be satisfactorily filled before compacting.</p> <p>f. Placed backfill material that becomes soft or yielding due to subsequent moisture intrusion shall be removed and replaced by suitable material.</p>	<p>C-210</p> <p>12.5 13.5</p> <p>12.5 13.5</p> <p>12.5 13.5</p> <p>12.5 13.5</p> <p>12.5 13.5</p>	<p>HP</p> <p>HP</p> <p>SI (V)</p> <p>SI (V)</p> <p>SI (V)</p> <p>SI (V)</p>	
2.2	<p><u>Moisture Control</u></p> <p>For backfill requiring moisture control verify that the moisture is within the limits required by the Engineering specifications for compaction.</p>	<p>12.6 13.6</p>	<p>SI (V)</p>	<p>Moisure Conten Control Log</p>

2

SB123148



QUALITY CONTROL INSTRUCTION

JOB NO. 7220

1. MASTER QC INSTRUCTION NO	RE
None	
2. PROJECT QC INSTRUCTION NO	RE
7220/SC-1.10	

3. ACT NO.	4. ACTIVITY DESCRIPTION	5. INSPECTION CRITERIA	6. INSP ACT CODE	7. SUPPLEMENTARY RECORD
2.3	<p><u>Compaction</u> Verify the compaction of backfill material for the specified zones for the following:</p> <p>a. All roller passes for the specified zones shall be made in a systematic manner and overlap the adjacent pass to assure the entire area is compacted uniformly.</p> <p>b. Backfill material when compacted shall form a homogeneous mass, with any voids between stones completely filled with compacted material.</p> <p>c. Compaction equipment shall conform to the specified requirements for the zoned material being placed and compacted. If equipment other than that specified is used, it shall be demonstrated that the substitute equipment can meet or exceed the degrees of compaction achieved by the equipment specified, as determined by Bechtel Field Engineering.</p> <p>d. Backfill material for the specified zones has been compacted to the required density as determined by the Bechtel Modified Proctor Method.</p>	<p>C-210 12.8</p> <p>12.5</p> <p>12.7 12.8</p> <p>13.7</p>	<p>SI (V)</p> <p>SI (V)</p> <p>SI (V)</p> <p>SI (V)</p>	
2.4	<p><u>Testing</u> The location of the tests will be as directed by the Subcontractor's QC representative.</p> <p>a. Verify that the field density moisture content tests have been performed in accordance with engineering requirements.</p>	<p>13.7 13.6 12.6.1 12.4 C-208 9.1</p>	<p>SI (V)</p>	
2.5	<p>During in-process surveillance activities, verify the following:</p> <p>a. Subcontractor QC personnel are qualified.</p> <p>b. Subcontractor QC personnel are properly preparing their QC documentation</p> <p>c. Subcontractor is properly identifying and recording nonconforming conditions.</p>	<p>C-210 16.1 16.5 16.7</p>	<p>SI (V) SI (V) SI (V)</p>	
SB123149				



QUALITY CONTROL INSTRUCTION

JOB NO. 7220

1. MASTER QC INSTRUCTION NO.

None

RE

2. PROJECT QC INSTRUCTION NO.

7220/SC-1.10

RE1

2

3 ACT NO.	4 ACTIVITY DESCRIPTION	5 INSPECTION CRITERIA	6 INSP ACT. CODE	7 SUPPLEMENTARY RECORD
3.0	<u>FINAL QUALITY VERIFICATION ACTIVITIES</u> Prior to closing Quality Verification for a scope/location the following activities will be accomplished:			
3.1	Review the pre-established hold and witness points and any other required activities necessary to complete surveillance inspection assignment for each completed work item.	None	R	
3.2	Verify that the Subcontractor's Quality Verification Documentation has been submitted, reviewed for availability, traceability, completeness and acceptance by Construction Quality Control.	None	R	
3.3	Verify that all outstanding exceptions identified for the scope/locations of the SSIR are resolved prior to completion or turnover of subcontractor activities.	None	R	
3.4	At the completion of Tasks 3.1, 3.2 and 3.3 submit the Construction Quality Control Release Form to the PFQCE for his signature, when the subcontract or portions thereof has (have) been completed.	None	R	
		SB123150		

Bechtel Associates Professional Corporation

Inter-office Memorandum

RECEIVED

MAY 17 1980

KARL WIEDNER

RM

To Distribution Date May 16, 1980

Subject Midland Plant Units 1 and 2 From L.H. Curtis
Bechtel Job 7220 Responses to NRC Questions on Of Engineering
Plant Fill

Copies to At Ann Arbor Office

K. Bailey S. Lo File 0670.2
S. Blue J. Rutgers
D. Riat
E. Rumbaugh

This is to confirm that the highest priority activity by Midland Project Engineering at this time is the close-out of NRC 10CFR 50.54 (f) questions associated with or stemming from plant fill problems. This priority is based on several reasons, including but not limited to the following:

1. It is essential to project schedule to start public hearings on this issue as soon as possible, hopefully no later than late summer 1980. As a prerequisite, it is necessary to close out the open items quickly, completely, and accurately.
2. Many of the previous commitment dates for responses have been missed, for various reasons. It is important to Consumers Power Company to maintain credibility with NRC on their commitments; therefore, improvements in our responsiveness are needed.

On or about June 5, 1980, Consumers Power Company will submit to NRC an updated master list of all commitments made and responses due to NRC relative to the plant fill issue. This list is being prepared by Bechtel under the leadership of Shing Lo. Please cooperate with him on a top priority basis in closing open action items as soon as possible and in giving him firm scheduled completion dates for inclusion in the master list being prepared by Bechtel.

L.H. Curtis
L.H. Curtis

LHC/db

Distribution:

All APE's
All Group Supervisors
All Chief Engineers

53170637

Response Requested: No

SOILS PLACEMENT REQUIREMENTS - DIESEL GENERATOR BUILDING

<p>Material excavated from designated borrow areas and placed in embankments (fills) as indicated on project drawings and specifications</p> <p>Spec 7220-C-210 DWG 7220-C-4085</p>	<p>Quality Control Surveillance at Subcontractor operations</p> <ul style="list-style-type: none"> Foundation Preparation 1st point - Approval 1E. required (Spec 210 para 12.5.1) Hold point 110 C-210-4 (N) " " Q2 C-102 (R/N) " " Q2 5C-110 (N) 	<p>Testing performed by Test Lab</p> <ul style="list-style-type: none"> Spec 7220-C-200 Spec 7220-C-210 Spec 7220-C-211 <p>↓</p> <p>Compressive Requirements</p> <ul style="list-style-type: none"> Relative Density Minimum Density Subcontractor Sub - 80% Relative Density 	<p>BA Audit Surveillance of:</p> <ul style="list-style-type: none"> Placement operations Complete BA program Testing Operations USF BA program Records Quality Control <p>↓</p> <p>Circuit Audits / Surveillance</p>
<p>Subcontractor responsible for excavation, placement and compaction per Spec C-210</p>	<p>12" Max. loose fill</p>	<p>USF</p>	<p>↓</p>
<p>Concrete QA manual</p> <ul style="list-style-type: none"> 10 thickness checks A-1-2-2-14 (12/11) Daily report (12/12) 	<p>Subcontractor Admin. relative Engineering assigned to 7220-C-210 To administer 7AC subcontractor Daily Reports prepared by Subcontractor Rep.</p>	<p>Technical support To Subcontractor and Bechtel supervision</p>	<p>↓</p>
<p>Structural Backfill Material placed by Bechtel - Spec 7220-C-210</p> <ul style="list-style-type: none"> Material from alternate source - stamped on site 	<p>Receipt Inspected by Quality Control. Tested at receipt by USF</p>	<p>↓</p>	<p>↓</p>
<p>Note: Flow chart based on Specifications 7220-C-208, 7220-C-210; drawings 7220-C-99 and 7220-C-45; Quality Control and Quality Assurance procedures.</p>	<p>7220-C-210; 7220-C-211; drawings 7220-C-99 and 7220-C-45; Quality Control</p>	<p>↓</p>	<p>↓</p>

Bechtel Power Corporation
Inter-office Memorandum

To J. Milandin
Subject Soils Placement Records
Midland Job 7220
Copies to S. Heisler L. Dreisbach
W. Barclay J. Newgen
P. Martinez E. Rumbaugh
R. Castleberry H. Wahl

Date November 3, 1978
From G. L. Richardson
Of Quality Assurance Staff
At Ann Arbor

In accordance with your request, I have reviewed Midland jobsite records related to the placement of backfill materials in the area of the Diesel Generator Building to assure that the project requirements were properly implemented during the work operations.

The attached report summarizes the information reviewed. No areas of improper implementation or program noncompliances were noted during this review.

G. L. Richardson

G. L. Richardson

GLR/1e
GLR-78-10

attachment

SB123374

REPORT OF REVIEW OF SOILS PLACEMENT/INSPECTION RECORDS RELATED TO
EMBANKMENT IN THE AREA OF THE DIESEL GENERATOR BUILDING

I. PURPOSE:

To provide assurance that records for installation of plant fill and structural backfill are complete and provide evidence the work was accomplished in accordance with the program requirements.

II. CONTROLLING DOCUMENTS:

Technical Specifications 7220-C-210 and 7220-C-211

Project Drawings - Specifically 7220-C-44 and C-45

Cononie's QA Manual (Earthwork Subcontractors)

Quality Control Inspection Plan C-210-4

Quality Control Instructions C-1.02 & SC-1.10

Note: Revisions to these documents vary through 1975 - 1977.

III. METHOD OF VERIFICATION:

Program requirements were determined from the controlling documents. Attachment 1 summarizes the pertinent requirements for placement by the subcontractor or Bechtel, Inspection and Testing. Using these requirements, quality documents were reviewed to assure that necessary inspections and tests were carried out during the time of placement in the area of the Diesel Generator Building. Attachments list the actual documents reviewed. The results of this review is summarized in the following paragraphs.

IV. SUMMARY OF RESULTS:

1. The approximate dates of backfill operations in the areas of the Diesel Generator Building was determined from a summary of testing prepared by Quality Control (attached). This summary list the test results for this area and also provides plots of the location of the tests. Based on this data, the material was placed during the periods of:

October - November, 1975	- limited work in area
June - September, 1976	- most work was building ramp south of turbine building
July - December, 1977	- Majority of fill placed during this period.
April - July, 1978	- Bechtel placement*

A review of the subcontractor's daily report confirmed that these dates are appropriate.

*Earthwork Subcontractor (Cononie) operations ended about 11/10/77.

SB123375

2. Quality Control files were reviewed to assure that Quality Control Inspection Plans or inspection records were prepared to cover the scope of work and were properly implemented. Forty-two (42) FIP's and QCIR's were reviewed. This review indicates that QCIR's/FIP's were prepared to cover the work as it was in progress. These plans/records were properly scoped, prepared and completed which indicates the required surveillances and inspections were properly signed off on the records checked.
3. The Earthwork Subcontractors QA Program requires their QC Engineer to produce certain records which include daily reports and lift thickness checks. All of the records for 1975, 1976 and 1977 were quickly reviewed to assure their availability. 18 of the records were reviewed for proper implementation and completeness and found satisfactory. The lift thickness checks on these records indicate lifts less than the maximum (12") allowed by the specification. It was noted that the lift thickness checks for the 1976 are not in the QC files. Quality Control has identified this item and has requested subcontracts administration to obtain the missing documentation. Quality Assurance conducted an audit on 9/17/76 (25-11-2) which included a review of lift thickness checks. Five lift thickness check records were reviewed for 7-14-76, 8-11-76, 8-20-76, 8-27-76 and 8-31-76 and found acceptable. This verifies the lift thickness checks were being taken and recorded.
4. Test Records for the Diesel Generator were checked by review of the tests summarized by Quality Control. (Copies attached) These tests results summarized were compared with the test "Compaction Fill Density Test Reports" (QC File C-210.3) produced by U. S. Testing and found to be accurate. The test results [percent compaction and relative density) reviewed complied with the requirements of the technical specification. The frequency of testing for the area within the limits of coordinates S 5036 to S 5185 and E 150 to E 490 is in the approximate area of one field density test for each 300 cubic yard placed. This figure is lower than the required frequency of one test for each 500 cubic yards placed. The figure based on an assumed placement depth of 30 feet and 157 density tests taken.
5. Twelve (12) QC Receiving records were reviewed for structural backfilling along with seven (7) user gradation tests and found acceptable.
6. Quality Assurance audits were reviewed for the period of construction. Eleven (11) audits were conducted covering the areas of Test Laboratory Operations, In-process Soils Placement and implementation of the Earthwork Subcontractors QA Program.

SB123376

V. CONCLUSIONS

The records reviewed indicate the backfill materials placed by Cononie and Bechtel were placed on approved foundations, in a manner consistent with the project requirements, and compacted to the densities required by the project documents. This is evidenced by the completed records produced by:

1. Cononie Quality Control Engineer
2. Bechtel Quality Control
3. U. S. Testing Laboratory
4. Bechtel Quality Assurance

The records included in this review also indicate the quality programs approved for use by Cononie and Bechtel were properly implemented as related to the backfill operations in the area of the Diesel Generator Building.

SB123377

SOILS RECORDS REVIEW

LIST OF ATTACHMENTS

- No. 1. Soil Placement Requirements - A flow chart of pertinent requirement for placing soil which was used to determine types of documents to sample.
- No. 2. Review Record - Record of Quality Control and Subcontractor Records Reviewed.
- No. 3. QA Audits - Record of QA Audits reviewed and results of audits.
- No. 4. Structural Backfill - List of QC records reviewed for receipt of structural backfill.
- No. 5. Compaction Tests - Summary of Compaction Tests prepared by QC and reviewed during this check.

SB123378

Bechtel Power Corporation

Inter-office Memorandum

To Distribution
Subject Midland Project Job 7220
External Audit Report - NRC
File: Q 1100
LAD: 514

Date November 2, 1978
From L. A. Dreisbach
Of Quality Assurance
At Midland, MI 48640

Copies to

P. Martinez
J. Newgen
R. Castleberry
W. Barclay
J. Milandin
S. Heisler

The attached memo issued by CPCo QA presents the results of the NRC inspection at the jobsite in the period October 24 to 27, 1978.

I essentially agree with the attached record as written.

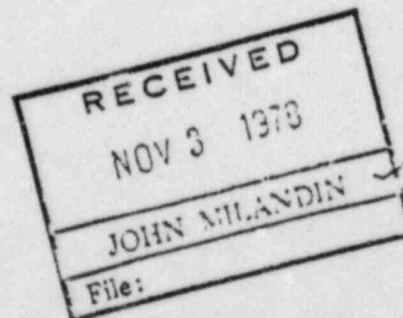
Note in the first paragraph that no items were identified as non-compliances in the exit meeting however, they could become non-compliances on review by the inspectors management.

L.A. Dreisbach

L. A. Dreisbach
Project Quality Assurance Engineer

LAD/re

Attachment



2/11
SB123358

6. B. Bechtel Quality Control Instruction C-1.02 section 2.4 testing identifies the applicable inspection criteria and includes Specification C-210, section 13.7 and 12.4 which includes the apparent conflict as described in detail in Part A above.
 - C. A further review of the original subsurface investigation performed by Dames and Moore and documented in report supplement dated March 15, 1969 page 16 indicates that the recommended minimum compaction criteria for support of structures be 100% of maximum density using a compactive effort of 20,000 foot-pounds (resulting from Bechtel Modified Proctor determination). However, this 100% of Bechtel Modified Proctor corresponds to 95% compaction according to the standard ASTM D1557 method D and not 95% compaction according to Bechtel Modified Proctor method which has been utilized for the entire plant fill area to date. Furthermore, Dames and Moore Report, page 15 states that all fill and backfill material should be placed at or near the optimum moisture content in near horizontal lifts approximately 6-8" in loose thickness. Bechtel specification permits a maximum of 12 inches which affects the compactability of the material.
7. Piping, condensate lines, duct banks, and other utilities under the diesel generator building may also be affected and must be evaluated.
8. Mr. Gallagher stated he was leaving not having seen design calculations and will be discussing design calculations, assumptions made, and conflicts with the FSAR with Licensing.
9. The inspector observed the structural concrete crack that has developed in the east exterior wall. The crack was observed with members from Bechtel Geo-Tech and Consumers Power Company. The crack extended full height of the wall and continued down through the spread footing as seen from the inside of the building. The crack is expected to have been induced flexurally caused by differential settlement. Discussion with Bechtel design staff has indicated that this crack is under study and is currently being evaluated. ACI-318-71 in the commentary section 10.6.4 limits flexural crack exposed to the outside to 0.013". Corrective action may be required if this limit is exceeded.
10. The following tests were observed to be performed in accordance with the applicable tests standards by U.S. Testing:
 - A. Lab Test ASTM D1557-70
 - B. Field Test ASTM D/1556-64
11. Calculations should be evaluated on the increase and the rate of increase of the pond fill and the effects of the water in other areas.
12. Mr. Gallagher stated that the NRC does not view preloading of the structure to be a fix or resolution of the problem at this time.
13. Seismic loading calculations should be determined for the type of material existing in its present condition.

SB123399

2. FSAR Table 2.5-14 "Summary of Foundation Supporting Seismic Category I Structures" identifies the supporting soil materials under the diesel generator building as being controlled, compacted cohesive soils. However, construction drawing C-109, Rev. 9 and C-117, Rev. 6 identifies the material in this area as Zone 2 material. Zone 2 material is identified as random fill described as any material free of organic or other deleterious materials. In the field a variety of materials have been used for the diesel generator foundation material, in particular, sands, clay, and lean concrete, silty sands and clayey sands. The apparent conflict is that Table 2.5-14 identifies cohesive soils where, in actuality, cohesionless sands have been utilized. A review of the records indicate that sands have been used between elevation 594'-603', areas of elevation 611'-613' and areas between 616'-268'. This indicates the extent of the variability of the material placed under the diesel generator building foundation. Mr. Gallagher did not feel it was good judgement to use random material under the support of a structure.
3. FSAR Table 2.5-21 "Summary of Compaction Requirements" identify random fill to require a compaction effort of a minimum of 4 passes with the specified equipment in this table. This requirement has not been an imposed requirement of Bechtel Specification C-210 nor an inspection requirement of Bechtel Quality Control Instruction C-1.02 for backfill.
4. FSAR section 3.8.5.5 states that settlements of shallow spread footings founded on compacted fill are estimated to be on the order of $\frac{1}{2}$ " or less. Site Survey Program has identified settlements in the diesel generator building foundation on spread footings to range from 0.55 inches to 2.30 inches and in excess of 3.0 inches for the diesel generator pedestal.
5. FSAR figure 2.5-47 indicates the foundation of the diesel generator building to be at elevation 634', according to design drawings C-1001, Rev. 5 it is indicated for the diesel generator spread footings and pedestal foundation to be at 628'.
6. A. Specification C-210, section 13.7.1 requires all cohesive backfill in the plant area to be compacted to not less than 95% maximum density as determined by ASTM D1557 method D which requires an effective compactive effort of 56,000 foot-pounds of energy per cubic foot of soil. However, section 13.4 Testing requires testing of the materials placed in the plant area to be performed in accordance with tests listed in section 12.4. This section, in particular section 12.4.5.1, "Cohesive Soils," requires maximum lab densities to be determined using ASTM D1557 Method D provided a compactive energy equal to 20,000 foot-pounds per cubic foot is applied (Bechtel Modified Proctor Density). To date, the Bechtel Modified Proctor Density for determining maximum proctor density versus optimum moisture content has been utilized. This conflict results in an unconservative method of determining the maximum proctor density and method of assuring that the required percent compaction is achieved. In particular, the actual in-place compaction would be less using the Bechtel Modified Proctor Density as a reference than using the standard ASTM D1557 method D. This is due to the fact that the compactive energy exerted using the Bechtel Modified Method is less than the effort exerted by the standard method D - example: 20,000 foot-pounds versus 56,000 foot-pounds.

Bechtel Power Corporation
Inter-office Memorandum

To Distribution
Subject Midland Project Job 7220
External Audit Report - NRC
File: Q 1100
LAD: 514
Copies to
P. Martinez
J. Newgen
R. Castleberry
W. Barclay
J. Milandin
S. Heisler

Date November 2, 1978
From L. A. Dreisbach
Of Quality Assurance
At Midland, III 4S640

The attached memo issued by CPCo QA presents the results of the NRC inspection at the jobsite in the period October 24 to 27, 1978.

I essentially agree with the attached record as written.

Note in the first paragraph that no items were identified as non-compliances in the exit meeting however, they could become non-compliances on review by the inspectors management.

LADreisbach
L. A. Dreisbach
Project Quality Assurance Engineer

LAD/re

Attachment



SB123391

13/14
FROM DEHorn, Midland
DATE October 31, 1978
SUBJECT MIDLAND PROJECT - NRC EXIT
INTERVIEW OF OCTOBER 27, 1978
File: U.4.2 Serial: 280FQA78

Consumers
Power
Company

INTERNAL
CORRESPONDENCE

CC SAFifi, Bechtel - Ann Arbor JLCorley, Midland
WRBird, JSC-216B GS Keeley, P14-408B
RLCastleberry, Bechtel - Ann Arbor DBMiller, Midland
TCCooke, Midland JFNewgen, Bechtel

The following people were in attendance at the subject exit interview which was conducted at the end of G. J. Gallagher's inspection of October 24-27, 1978:

<u>CPCo</u>	<u>Bechtel</u>	<u>NRC</u>
RCBauman	WLBarclay	RJCook
TCCooke	ABoos	GJGallagher
JLCorley	RLCastleberry	
DEHorn	LADreisbach	
GS Keeley	PAMartinez	
DBMiller		
BHPeck		
RMWheeler		

7066
Mr. Gallagher stated that the visit was a follow-up on 50.55(e) report of the diesel generator settlement and that it was also a fact finding visit. The inspection consisted of a review of past data, activities in progress and planned activities for future work. Inspection was performed by review of the FSAR commitments; Specification C-210; Specification C-211; PQCI/IR C-1.02; Dames and Moore Report of Foundation Investigation and Preliminary Explorations for Borrowed Materials dated June 28, 1968 and supplement to this report dated March 15, 1969; preliminary data on diesel generator settlement problem including boring plan, cross sections of fill, blow count versus the elevation graphs, lab data, settlement data, boring logs, dutch cone logs, weather data and penetrometer readings in test pits; design drawings C-45, C-109, C-117 and C-1001; soil tests taken in the diesel generator building area during construction compiled by B. T. Cheek, Bechtel QC; observation of soil testing at the test lab and in the field; and discussions with Bechtel Geo-Tech, Project Engineering, Field Engineering, Quality Control Engineering, U.S. Testing, Consumers Power Company, PNO and QA personnel. Mr. Gallagher stated that he would not handle the findings as noncompliances, however, they could become items of noncompliance when they are reviewed by his management.

His findings/observations were as follows:

- CPCO
1. The FSAR states that during operation, settlement readings will be taken every 90 days. Because of the diesel generator settlement problem, this frequency should be re-evaluated for adequacy.

SB123245

2. FSAR Table 2.5-14 "Summary of Foundation Supporting Seismic Category I Structures" identifies the supporting soil materials under the diesel generator building as being controlled, compacted cohesive soils. However, construction drawing C-109, Rev. 9 and C-117, Rev. 6 identifies the material in this area as Zone 2 material. Zone 2 material is identified as random fill described as any material free of organic or other deleterious materials. In the field a variety of materials have been used for the diesel generator foundation material, in particular, sands, clay, and lean concrete, silty sands and clayey sands. The apparent conflict is that Table 2.5-14 identifies cohesive soils where, in actuality, cohesionless sands have been utilized. A review of the records indicate that sands have been used between elevation 594'-608', areas of elevation 611'-613' and areas between 616'-268'. This indicates the extent of the variability of the material placed under the diesel generator building foundation. Mr. Gallagher did not feel it was good judgement to use random material under the support of a structure.

3. FSAR Table 2.5-21 "Summary of Compaction Requirements" identify random fill to require a compaction effort of a minimum of 4 passes with the specified equipment in this table. This requirement has not been an imposed requirement of Bechtel Specification C-210 nor an inspection requirement of Bechtel Quality Control Instruction C-1.02 for backfill.

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5. FSAR figure 2.5-47 indicates the foundation of the diesel generator building to be at elevation 634', according to design drawings C-1001, Rev. 5 it is indicated for the diesel generator spread footings and pedestal foundation to be at 628'.

6. A. Specification C-210, section 13.7.1 requires all cohesive backfill in the plant area to be compacted to not less than 95% maximum density as determined by ASTM D1557 method D which requires an effective compactive effort of 56,000 foot-pounds of energy per cubic foot of soil. However, section 13.4 Testing requires testing of the materials placed in the plant area to be performed in accordance with tests listed in section 12.4. This section, in particular section 12.4.5.1, "Cohesive Soils," requires maximum lab densities to be determined using ASTM D1557 Method D provided a compactive energy equal to 20,000 foot-pounds per cubic foot is applied (Bechtel Modified Proctor Density). To date, the Bechtel Modified Proctor Density for determining maximum proctor density versus optimum moisture content has been utilized. This conflict results in an unconservative method of determining the maximum proctor density and method of assuring that the required percent compaction is achieved. In particular, the actual in-place compaction would be less using the Bechtel Modified Proctor Density as a reference than using the standard ASTM D1557 method D. This is due to the fact that the compactive energy exerted using the Bechtel Modified Method is less than the effort exerted by the standard method D - example: 20,000 foot-pounds versus 56,000 foot-pounds.

- 4 6. B. Bechtel Quality Control Instruction C-1.02 section 2.4 testing identifies the applicable inspection criteria and includes Specification C-210, section 13.7 and 12.4 which includes the apparent conflict as described in detail in Part A above.
- C. A further review of the original subsurface investigation performed by Dames and Moore and documented in report supplement dated March 15, 1969 page 16 indicates that the recommended minimum compaction criteria for support of structures be 100% of maximum density using a compactive effort of 20,000 foot-pounds (resulting from Bechtel Modified Proctor determination). However, this 100% of Bechtel Modified Proctor corresponds to 95% compaction according to the standard ASTM D1557 method D and not 95% compaction according to Bechtel Modified Proctor method which has been utilized for the entire plant fill area to date. Furthermore, Dames and Moore Report, page 15 states that all fill and backfill material should be placed at or near the optimum moisture content in near horizontal lifts approximately 6-8" in loose thickness. Bechtel specification permits a maximum of 12 inches which affects the compactability of the material.
- 7. Piping, condensate lines, duct banks, and other utilities under the diesel generator building may also be affected and must be evaluated.
- 8. Mr. Gallagher stated he was leaving not having seen design calculations and will be discussing design calculations, assumptions made, and conflicts with the FSAR with Licensing.
- 9. The inspector observed the structural concrete crack that has developed in the east exterior wall. The crack was observed with members from Bechtel Geo-Tech and Consumers Power Company. The crack extended full height of the wall and continued down through the spread footing as seen from the inside of the building. The crack is expected to have been induced flexurally caused by differential settlement. Discussion with Bechtel design staff has indicated that this crack is under study and is currently being evaluated. ACI-318-71 in the commentary section 10.6.4 limits flexural crack exposed to the outside to 0.013". Corrective action may be required if this limit is exceeded.
- 10. The following tests were observed to be performed in accordance with the applicable tests standards by U.S. Testing:
 - NA A. Lab Test ASTM D1557-70
 - B. Field Test ASTM D/1556-64
- 11. Calculations should be evaluated on the increase and the rate of increase of the pond fill and the effects of the water in other areas.
- NA 12. Mr. Gallagher stated that the NRC does not view preloading of the structure to be a fix or resolution of the problem at this time.
- NA 13. Seismic loading calculations should be determined for the type of material existing in its present condition.

Bechtel Associates Professional Corporation

Inter-office Memorandum

TELECOPY
BEBC-2480

To J.F. Newgen

Subject Midland Plant Units 1 & 2
Job 7220
Instructions for Obtaining
Soil Samples

Copies to File: 0274, C-79-PR
N. Swanberg
 S. Afifi
 L. Basinski
 J. Betts
 A. Marshall
 W.B. Barclay
 L. Dreisbach
 Com Log

Date October 4, 1978

From R.L. Castleberry

Of Engineering

At Ann Arbor

PROJECT QA ANN ARBOR JOB 7220			
Date Received: OCT 4 78			
KEY	Info.	Act.	COPY
QA MGR			
PROJ MGR			
PROJ ENGR			
QA E <i>Wynn</i>			
QA E			
<i>REB</i>	✓		
<i>MRW</i>	✓		
<i>L.A.D.</i>			✓
FILE 200 MCR 24			

The following instructions are to be used to assist in obtaining soil samples from the diesel generator building area and other areas of soil investigations associated with ISA 7220-C-79(Q).

This program is being implemented by the Geotech soils engineering representative at the site.

Standard penetration tests, test pits, auger borings, Dutch Cone tests, undisturbed sample borings, and bag samples are performed as required. The location, depth, and selection of the type borings, tests, and samples are determined by the Geotech engineer at the jobsite with project engineering input as necessary.

The borings should be maintained at all times to prevent hole cave-in. The use of casing or drilling mud is permitted. Where drilling mud is to be used, Bentonite, Attapulgate, Revert, approved equal, or any combination thereof should be used to advance soil borings below the groundwater level. When rotary drilling methods are used, the fluid in the borings should be maintained at all times above the groundwater table.

Penetration tests and split-barrel sampling shall be taken in accordance with ASTM D 1586. The samples obtained should be placed in glass jars and sealed with vapor-seal screw lids. Each jar should be clearly identified using a waterproof marker or label that is firmly attached to the jar showing the job designation; date, boring number, sample number and depth, length of recovery, and standard penetration resistance. The samples should be protected from freezing and direct sunlight.

SB123252

Bechtel Associates Professional Corporation

IOM to J.F. Newgen

Page 2

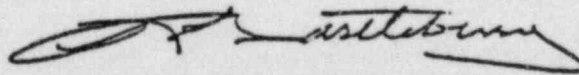
Undisturbed, thin-walled (Shelby) tube sampling shall be taken in accordance with ASTM D 1587. The minimum outside diameter of thin-walled (Shelby) tubes should be 3 inches. When obtaining undisturbed samples, Denison, Osterberg, or Pitcher samplers may be used as directed. The minimum outside diameter of Denison, Osterberg, or Pitcher samples should be 3 inches. The undisturbed sample should not be removed from the tube, but should be trimmed back from the ends of the tube, the space filled with hot microcrystalline (nonshrinking) wax, and the tube capped and sealed with hot wax and tape. The thin-walled tube should be clearly identified, using a water proof marker or label that is firmly attached to the tube showing the job designation, date, boring number, sample number, depth, length (in inches), and inches recovered.

Observation wells may be installed as directed by the Geotech representative for subsurface water level monitoring. The borings for observation wells where advanced by the rotary drilling method should use a biodegradable drilling mud such as Revert. After installation, the observation wells should be flushed and a response test should be conducted to make certain the wells are operative. The minimum outside diameter of riser pipes should be 2 inches.

Test pits for supplemental information should be made as directed by the Geotech soils engineer at the site. Density test and block samples may be taken, as directed.

To assist in the above soil investigation program, the following additional ASTM standards are recommended for use.

ASTM D 2488-69	Description of Soils (Visual Manual Procedure)
ASTM D 653-67	Terms and Symbols Relating to Soil and Rock Mechanics
ASTM D 2113-70	Diamond Core Drilling for Site Investigation
ASTM D 1452	Soil Investigation and Sampling by Auger Borings
ASTM D 3441-75T	Deep, Quasi-Static, Cone and Friction Cone Penetration Tests of Soil



R.L. Castleberry

SB123253

JH/cap
10/4/2

QA

SEP 12 1978



Telephone call

BY P. A. Martinez OF Bechtel Proj.Mgmt. E. W. Wahl
 TO G. S. Keeley OF CPCo Proj.Mgmt. P. A. Becnel
 DATE September 7 78 TIME _____ J. P. LeBlanc
 SUBJECT DIESEL GENERATOR SETTLEMENT JOB NO 7220, MIDLAND 1 R. L. Castleberry

- J. F. Newgen
- S. L. Blue
- E. A. Rumbaugh
- K. Wiedner
- F. E. Meyer
- J. Milandin
- B. R. Hubal
- P. K. Hansen
- R. Hermeston
- L. A. Dreisbach
- W. G. Moring
- W. G. Jones

Advised Keeley that our investigations show the diesel building settlement problem to be potentially serious and we feel it should be reported to the NRC under 50:55(e) requirements. Although it is not clear that any safety question would exist, the analysis is likely to be extensive and if remedial action has to be taken it could also be extensive. The diesel generator building and foundations are on engineered fill and while indications are that the fill tested out satisfactorily when placed, it is apparent that some of this fill for some reason now does not meet the specified compaction requirements. Soil testing by a firm in Boston is expected to take about two weekds. Our own top soils expert Ferris will be on-site on September 12 and in Ann Arbor on September 13 and we would be able to brief Consumers Power further after that date.

Keeley indicated he had been following this problem and at this point would ask his people to prepare a press release. He asked to meet at the Site on Thursday, September 14, at 12 noon for further briefing and addressing potential solutions. Keeley concurred with Bechtel's investigative efforts to determine if the problem exists elsewhere on-site.

P. A. Martinez
 P. A. Martinez

PAM/pp

PROJECT QA ANN ARBOR JOB 7220		Routing	Info.	Act.	Copy to
Date Received: 9/12					
QA MGR					
PROJ MGR					
PROJ ENGR					
LD AE					
OAE					
WGM					
AEB					
MRW					
FILE 2/80		MCAR 24			

SB123216

I-78-1947



**QUALITY ASSURANCE PROGRAM
MANAGEMENT CORRECTIVE ACTION REPORT
MCAR-1**

REPORT NO. 24

JOB NO. 7220

Q NO. 1.40

DATE 9/7/78

I *DESCRIPTION (Including references):

The Bechtel "Foundation Data Survey Program" has indicated that the settlement of the Diesel Generator Building has been greater than expected. This has been documented in NCR-1482 dated (8/21/78). A preliminary evaluation of soil boring data from an investigation being conducted by Project Engineering indicated that the magnitude of the investigative tests and analysis of test results makes this item reportable under 10CFR50.55 e, 1, iii.

***RECOMMENDED ACTION (Optional)**

1. Determine the amount of settlement of the Diesel Generator Building (DGB) and increase the frequency of foundation survey measurements to find if the settlement is or will be excessive.
2. Determine the cause of the settlement.
3. If the settlement is or will be excessive, determine what actions are required to correct the condition and preclude recurrence.

REFERRED TO

ENGINEERING

CONSTRUCTION

QA MANAGEMENT

ISSUED BY L. A. Dreisbach 9/7/78
Project QA Engineer Date

II REPORTABLE DISCREPANCY

NO

YES

NOTIFIED CLIENT 9/7/78
[Signature] Date 9/7/78
Project Manager Date

III CAUSE

CORRECTIVE ACTION TAKEN

SB123217

AUTHORIZED BY _____ Date

DISTRIBUTION:

Project Manager
Construction Manager
Engineering Manager
Project Engineer
Proj. Supt. / Proj. Const. Mgr.
or P & I Procurement Mgr.
Chief Field QC Engineer
or Procurement Insp. Mgr.
QA Supervisor
Client

J.B. Violette
S.I. Heisler
L.A. Dreisbach
J. Amaral (Gaithersburg)
J.E. Bashore (Norwalk)

FORMAL REPORT TO CLIENT _____ Date
(If Section II Applies)

CORRECTIVE ACTION IMPLEMENTED _____

VERIFIED BY _____ Date
Project QA Engineer

*Describe in space provided and attach reference document.

G. L. Richardson
9/13/78
DRAFT

FLOW CHART FOR PLACEMENT OF PLANT AREA BACKFILL/STRUCTURAL BACKFILL

SOURCE	PLACEMENT	COMPACTION	TESTS
<p><u>Plant Area Backfill (C-210)</u></p> <p>Material Excavated from Borrow or required Excavation Spec C-210 Table 12-1</p>	<p>Material moved to placement area and spread for compaction - 12" Max. loose 1. ft - moisture content adjusted to $\pm 2\%$ of optimum if necessary</p>	<p>Material compacted by approved rollers or by hand held equipment to required compaction.</p>	<p>TESTS</p>
<p>↓</p> <p>Testing performed @ Borrow to determine moisture content and gradation Spec C-210 (12.4.1) No established frequency</p>	<p>↓</p> <p>Moisture content tests taken as required C-210(12.6.1) Lift thickness checks taken by subcontractor (Subcontractor QA Manual)</p>	<p>↓</p> <p>Moisture content tests (C-2.10, para 13.6); Field density tests (C-210, Para 13.7) *Cohesive Soils (ASTM D-1557) *Cohesionless Soils (ASTM-D-2049)</p>	<p><u>Test Frequency</u></p> <p>Moisture content = 1/500 yds³ Field density - 1/500 yds³ Compaction (Labmax) (all materials) = 1/10,000 yds³ Grain Size For structural B.F. (C-211) (Field M.C. & density) *Large area 1/500 yds³ *Confined area 1/10 - 1/100 yds</p>
<p>↓</p> <p>Structural Backfill (C-211)</p> <p>Material received on site Receipt inspected and tested for gradation then released to construction</p>	<p>↓</p> <p>FE Approved Foundation</p> <p>QC Surveillance</p>	<p>↓</p> <p>Compaction requirements: *Cohesive Soils = 95% of maximum density C-210 (13.7.1), C-211 (5.5.2) *Cohesionless Soils = 80% relative density C-210 (13.7.2) C-211 (5.5.1)</p>	<p>↓</p> <p>QC Surveillance QC Review</p>

Spec C-208
Table 9-1

Possible Failure Mode/System

Material taken from unapproved borrow

Original investigation not complete.

*Compaction not uniform
*Lifts too thick
*Compaction not Effective (W Equip/Overlap/Passes)
*Moisture not adjusted

Just not sure how

*Reference curves to develop material density lab max not representative of material use (not from borrow/not from actual compacted material)
*Field test not representative of material isolated heterogeneous volume
*Material not tested at all or too low a frequency
*Test technician error
*Test techniques specified

Telephone call

*Ray -
Info - let's discuss
J 11/8*



BY P. A. Martinez OF Bechtel PM
 TO G. S. Keeley OF CPCo PM
 DATE September 26, 19 78 TIME _____
 SUBJECT RECORDS ON REMOVAL OF NATURAL SANDS

S. E. Afifi
A. Boos
R. L. Castleberry
L. A. Dreisbach
 JOB NO 7220, MIDLAND 1 &
D. R. Johnson
J. F. Newgen
J. Milandin
W. G. Moring

The call was made to update Keeley on our search for records relating to removal of the natural sands. This search had been started as a result of the April 1978 FSAR question 362.2 which asked for a discussion of the methods employed in mapping and removing the sands under Class 1 structures and beneath non-Class 1 structures if their failure could endanger the adjacent Class 1 structures.

We have records to show that the sand was removed under the main plant power block and under the service water pump structure. From the present boring program it appears that there are no natural sands under the diesel building. We have not so far been able to find records on the tank farm north of the power block or the service water piping or the Class 1 electrical duct runs. We are still reviewing Field Engineering records and expect to be complete with this in about two weeks.

Keeley indicated that Consumers Power intends to discuss this record search with the NRC today. We think that is a good idea to brief them although we do not see it as a major problem yet, since we have so far not encountered any soft natural sands under the Class 1 structures or components. The FSAR question will be answered when the present boring program results have been evaluated.

P. A. Martinez
 P. A. Martinez

PAM/pp

RECEIVED
JOHN MILANDIN
File: _____

SB123235

NRC INVESTIGATION OF
DIESEL GENERATOR BUILDING

The Nuclear Regulatory Commission, Region III conducted a special investigation to gather facts relating to the previously reported condition where the Diesel Generator Building was settled more than the amount anticipated and described in the PSAR. This problem has been described in MCR 24 and has been reported as a 50.55c item.

The inspectors were J. Phillip and G. Gallagher. The inspections consisted of interviewing personnel at Middland site and Ann Arbor Office. These interviews were carried out as closed interviews with the two inspectors interviewing one person at a time. No other persons were allowed to observe or hear the interviews. Mr. Phillip indicated at the Ann Arbor Office that this method of gathering information is allowed by their operating rules. A list of all personnel interviewed is attached. The interviews were conducted at the Middland site on December 12 and 13, 1978 and at the Ann Arbor Office on December 18, 19 and 20, 1978. No exit meeting was held. The inspectors indicated an exit will be held at a later date after they have evaluated the information obtained.

The inspectors seemed to be interested in specification 7220-C-210 (placement of embankment) as related to PSAR commitments and implementation, the relationship of Geotechnical Services with Project Design and the history of the decision to report the problem under 50.55c.

Summary

1. Specification 7220-C-210

per J. Clement The PSAR required soils to be placed under the Diesel Generator Building to a minimum compaction of 100% BMP.

Specification 7220-C-210 was interpreted by the field (F.E., QC, QA) to require a minimum density of 95% BMP. This interpretation has been repeatedly backed up by reference to 95% BMP on NCR dispositions, in FOR C-302 and telecons dated 10/77.

In the Ann Arbor Office the following points were made

- Geo Tech has always felt the intent of spec C-210, para 13.7 was to use 95% of ASTM 1557 as a minimum - this was also backed up by some Engineering personnel.
- Engineering personnel were aware that the field was using 95% of BMP but chose not to take any action to change the practice.

Specification 7220-C-210 was the subject of communication and clarification questions but was not revised by Engineering to provide clearer direction to the field.

The PSAR was written to clearly describe that the minimum compaction requirement used was 95% BMP.

2. F.S.A.R.

During review of the calculations made by Geo Tech to determine the anticipated settlements the NRC noted that the calculations for the DGB were made assuming a mat foundation. The actual design was for a spread footing. This calculation is to anticipate the settlement and has no bearing on the design but could range the question of accuracy of the PSAR and design change control methods related to off project design.

Summary - Cont.

3. 50.55e reporting.

The NRC seemed interested in the timing of the 50.55e report. Specific pertinent facts known to NRC:

July 1, 1978 - Survey Chief first suggested settlement may be more than normal - reported to PFE
PFE decided to observe building settlement for a couple of weeks to see if there is a problem.
FSAR figures not exceeded at this time.

check date

July 23, 1978 - BCBF identified potential settlement problem to Project Engineering and transmit settlement data

How?

Aug 9, 1978 Project Engineering acts upon IOM.

Aug 21, 1978 NCR 1482 written

Aug , 1978 Agreement made with Consumers power company to observe settlement for two more weeks and then make 50.55e decision

Sept 7, 1978 MCR 29 issued - NRC notified by CRC on _____

SB123224

Summary Cont

4. Based on the above it is anticipated the NRC will decide to issue one or more items of noncompliance. These could be based on any of the following:

- Failure to clearly translate into the specification, the requirements of the Oames - Moore report attached to amendment 3 to the PSAR - Criterion III
- Failure of construction to properly interpret specification 7220-C-210 and failure of inspection to identify the intent of this specification in that a control minimum of 95% BMP was used in lieu of 95% of ASTM D-1557. Criterion II and III
- Failure to revise specification 7220-C-210 since though a conflict in this specification had been identified and confusion as to the intent of the specification was apparent. Criterion III and III
- Utilization of incorrect design bases for the calculation of anticipated settlement figures. Criterion III
- Failure to report a 10CCR 50.552 condition within the 24 hour time limit.
- Failure to properly coordinate technical requirements in the PSAR with appropriate off project support groups - specifically Geo. Tech for specification 7220-C-210. Criterion III

SB123225

PERSONNEL INTERVIEW

NAME	POSITION	COMPANY	WHERE INTERVIEW
A. BOOS	PFE	BECTEL	Site
J. BETTS	Lead Civil Eng	"	"
C. Williams	Super of Surveys	"	"
B. Cheek	LBCE (Civil)	"	"
T. Lieb	QCE (Test Lab)	"	"
G. Richardson	QA-Staff	"	"
L. Driesback	PBAE	"	"
A. Marshall	Geo. Tech. Eng	"	"
J. Speltz	Lab Super	U.S. Testing Co.	"
D. Horn	QAE	Consumers Power Co	"
S. Afifi	Geo Tech. Eng	Bechtel	Ann Arbor Office
P. Chen	"	"	"
S. Rao	Civil Eng.	"	"
G. Tuveson	Civil Group Super	"	"
V. Hink	Ass't Proj. Eng.	"	"
J. Hook	Civil Eng.	"	"
B. Dahr	Civil Eng	"	"
S. Sobkowsk.			
J. Clements			
J. Wanzek	Geo. Tech. Eng	"	"

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