

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of

CONSUMERS POWER COMPANY

(Midland Plant, Units 1 and 2)

}
}
}
Docket Nos. 50-329 OM & OL
50-330 OM & OL

NRC STAFF TESTIMONY WITH RESPECT TO
INTERVENOR STAMIRIS CONTENTION NUMBER 3

Q.1. Please state your name and position with the NRC.

A. My name is Eugene J. Gallagher. I am a civil engineer with the U.S. Nuclear Regulatory Commission. Since February, 1981, I have been assigned to the Reactor Engineering Branch, Division of Resident and Regional Reactor Inspection, Office of Inspection and Enforcement. Prior to February, 1981, I was a reactor inspector assigned to the Region III, Reactor Construction and Engineering Support Branch, Office of Inspection and Enforcement. I was assigned to the Midland Plant (among others) from October, 1978 until January, 1981.

Since October of 1978, I have spent approximately one year of effort performing inspections, reviewing quality control records and procedures, observing work activities, reviewing Consumers Power Company (hereafter Consumers) responses to 50.54(f) questions 1 and 23, attending meetings and presentations by Consumers and Bechtel regarding the soil settlement matter at the Midland Plant.

Q.2. Have you prepared a statement of professional qualifications?

A. Yes, a copy of this statement is attachment No. 1.

Q.3. Please state the nature of the responsibilities that you had with respect to the Midland Plant, Units 1 and 2.

A. As a civil engineer inspector for the Region III Office of Inspection and Enforcement I conducted five inspections prior to December 6, 1979 in order to (1) ascertain whether adequate quality assurance plans, instructions and procedures had been established for the construction of the foundation of safety related structures, (2) provide an independent evaluation of the performance, work in progress and completed work to ascertain whether activities relative to foundation construction were accomplished in accordance with NRC requirements, and (3) review the quality related records to ascertain whether these records reflected work accomplished consistent with NRC requirements and license commitments.

Q.4. What is the NRC Staff response to Intervenor Stamiris Contention 3?

A. Intervenor Stamiris Contention 3 reads as follows:

Consumers Power Company has not implemented its Quality Assurance Program regarding soil settlement issues according to 10 CFR Part 50, Appendix B regulations, and this represents a repeated pattern of quality assurance deficiency reflecting a managerial attitude inconsistent with implementation of Quality Assurance Regulations with respect to soil settlement problems, since reasonable assurance was given in past cases (ALAB-100, ALAB-106 and LBP-74-71) that proper quality assurance would ensue and it has not.

The Quality Assurance deficiencies regarding soil settlement include:

a) 10 CFR Part 50, Appendix B, Criteria III, V, X and XVI as set forth in the Order of Modification;

b) 10 CFR Part 50, Appendix B, additional criteria denoted by roman numerals below:

I. The Applicant has failed to assume responsibility for execution of the QA program through its failure to verify and review FSAR statements (pp. 6-8 and p. 21, Keppler Report) and through its reliance on final test results not in accordance with specified requirements (p. 16, Keppler Report);

II. The QA program was not carried out according to written policies, procedures and instructions, in that oral directions were relied upon and repeated deviations from policies occurred regarding compaction procedures (p. 9-14, Keppler Report);

VII. Control of purchases material has not been maintained, in that examination and testing of backfill materials did not occur in accordance with regulations (NCR QF29, NCR QF147);

IX. Control of non-destructive testing was not accomplished by qualified personnel using qualified procedures regarding

a) moisture control (Keppler Report p. 14-16; QA Request SD40, NCRQFS52, 172, 174 and 199);

b) compaction procedures (Keppler Report, p. 9, NCR QFS 68, 120 and 130); and

c) plant fill work (pp. 24 and 25, Keppler Report);

XI. Test programs did not incorporate requirements and acceptance limits adequately in the areas referenced in a, b and c above, and do not meet these requirements regarding soil settlement remedial actions;

XIII. Measures were not adequately established to prevent damage or deterioration of material regarding frost effects on compacted fill (pp. 16 and 17, Keppler Report);

XV. Measures were not taken to control non-conforming material in order to prevent the inadvertent use (NCR QF29 and QF127);

c) the settlement of the Administration Building in 1977 should have served as a quality indicator, preventing the same inadequate procedures from occurring in the 1978 construction

of the diesel generator building causing its eventual settlement.

Before responding to the main allegation of Intervenor Stamiris Contention 3 I will address the specific deficiencies she lists in support of the contention.

The Staff agrees with the allegation in paragraph 3(a) which merely relies on facts alleged originally by the Staff in Appendix A to the December 6, 1979 Order and in Investigation Report 78-20 (attachment 2).

With regard to Contention 3(b), the facts set forth describe violations of Criteria III, V, X and XVI as set forth in Appendix A to the Order. However, Ms. Stamiris using these same facts, has designated violations of other criteria. The Staff does not agree with these designations supplied by Ms. Stamiris in her contention 3(b). The Staff's view is that: item 3(b) I and 3(b) XIII are examples of violations of criterion III; items 3(b) II and 3(b) IX (c) are examples of violations of criterion V; items 3(b) VII and 3(b) IX (a) and (b) and 3(b) XV are examples of violations of criterion XVI; and item 3(b) XI is an example of violations of criterion V and XVI.

As discussed on pages 21 through 23 of the attached NRC Investigation Report (attachment 2) the Staff agrees with the allegations in Contention 3(c).

Ms. Stamiris also references additional Q.A. deficiencies reported in NRC I&E reports 80-32 and 81-01 and SALP assessment of 11-24-80, CPCo Report 18.4.3.6 and NCR 3401 without any other specification. I authorized NRC I&E Reports 80-32 (attachment 3) and 81-01 (attachment 4). My observations of quality assurance implementation prior to December 6, 1979

led me to believe that managerial attitude was inconsistent with implementation of quality assurance regulations with respect to soil settlement problems.

My present opinion is that managerial attitude is consistent with implementation of quality assurance regulations with respect to soil settlement problems. The basis of this opinion is set forth in the NRC Staff testimony assessing present implementation of quality assurance at the Midland Plant.

EUGENE J. GALLAGHER

OFFICE OF INSPECTION AND ENFORCEMENT
U.S. NUCLEAR REGULATORY COMMISSION

PROFESSIONAL QUALIFICATIONS

I am a Civil Engineer in the Division of Resident and Regional Reactor Inspection, Reactor Engineering Branch, Office of Inspection and Enforcement.

I received a Bachelor of Engineering Degree in Civil Engineering from Villanova University in 1973 and a Master of Science Degree in Civil/Structural Engineering from Polytechnical Institute of New York in 1974. I am a registered Professional Engineer in the States of Illinois (#37828), Florida (#29114) and Louisiana (#16376). I am a member of the American Society of Civil Engineers, American Concrete Institute and Tau Beta Pi National Engineering Honor Society.

In my present work at the NRC, I provide technical assistance in the area of civil engineering to Regional offices and resident inspectors with particular emphasis on the design and construction of reinforced and prestressed concrete structures, foundations, structural steel buildings and in structural testing and surveillance. In addition, I provide technical input for the development and interpretation of industry codes, standards and regulatory requirements relating to inspection activities.

From 1978 to 1981 I was a member of the NRC Region 3 inspection staff responsible for the inspections of civil engineering aspects of plants under construction and in operation. This included the inspection of laboratory and field testing of concrete, steel and soils materials, earth embankments and dams, material sources, piping systems and reinforced and prestressed concrete structures. In addition, a review of management controls and quality assurance programs were performed at plants under construction. I participated in approximately 90 inspections of reactor facilities.

Prior to joining the NRC Staff I was employed by EBASCO Services, Inc. in New York City from 1973 to 1978. I performed designs of reinforced concrete and steel structures, design of hydraulic and water supply systems and preparation of specifications for construction. From 1976 to 1978, I was the civil resident engineer at the Waterford 3 Nuclear Plant site responsible for providing technical assistance to construction.

During 1972 and 1973 I was employed by Valley Forge Laboratory in Devon, PA performing inspection and testing on concrete, steel and soil materials.

ADDITIONAL NRC TRAINING

Fundamentals of Inspection, NRC, February 1978 (40 hours)
BWR Fundamentals Course, NRC, March 1978 (40 hours)
Concrete Technology and Codes, Portland Cement Assoc., May 1978 (80
hours)
Quality Assurance Course, NRC, August 1978 (40 hours)
Nondestructive Examination and Codes, Rockwell Int'l., August 1978 (120
hours)
PWR Fundamentals Course, NRC, November 1978 (40 hours)
Welding Metallurgy, Ohio State University, September 1980 (80 hours)

MAR 22 1979

Docket No. 50-329-7500
 Docket No. 50-330

Consumers Power Company
 ATTN: Mr. Stephen H. Howell
 Vice President
 1945 West Parnall Road
 Jackson, MI 49201

Gentlemen:

This refers to the investigation conducted by Messrs. G. A. Phillip, E. G. Gallagher and G. F. Maxwell of this office on December 11-13, 13-20, 1978, and January 4-5, 9-11 and 22-25, 1979, of activities at the Midland Nuclear Plant, Units 1 and 2, authorized by NRC Construction Permits No. CPPR-81 and No. CPPR-82. The investigation related to the settlement of the diesel generator building at Midland and the adequacy of the plant area fill. The preliminary results of this investigation were discussed with Consumers Power Company and Bechtel Corporation representatives in our office on February 23 and March 5, 1979. The report on the matters discussed during those meetings were included with my letter to you dated March 15, 1979. That letter also set forth the principal matters of our concern as a result of this investigation.

Enclosed is a copy of the report of this investigation. In accordance with Section 2.790 of the NRC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations, a copy of this letter and the enclosed investigation report will be placed in the NRC's Public Document Room, except as follows. If this report contains information that you or your contractors believe to be proprietary, you must apply in writing to this office within twenty days of your receipt of this notice, to withhold such information from public disclosure. The application must include a full statement of the reasons for which the information is considered proprietary, and should be prepared so that proprietary information identified in the application is contained in an enclosure to the application.

DUPE OF 7906020166

OFFICE

SURNAME

DATE

APR 22 1979

Consumers Power Company - 2 -

The results of this investigation continue to be under review by the NRC staff. Upon completion of this review you will be advised of any enforcement action to be taken by the Commission.

Should you have any questions concerning this investigation, we would be pleased to discuss them with you.

Sincerely,

James G. Keppler
Director

Enclosure: IE Investigation
Reports No. 50-329/73-20
and No. 50-330/73-20

cc w/encl:
Central Files
Reproduction Unit NRC 20b
PDR
Local PDR
NSIC
TIC
Ronald Callen, Michigan Public
Service Commission
Dr. Wayne E. North
Myron M. Cherry, Chicago

OFFICE	RIII	RIII	RIII	RIII	RIII	RIII
SURNAME	Phillip/bk	Maxwell/bk	Hayes J	Fiorelli	Nichols	Keppler
DATE	3/19/79	Callahan/bk	3/19/79		3/19/79	3/19/79

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

REGION III

Report No. 050-329/78-20; 050-330/78-20

Subject: Consumers Power Company
Midland Nuclear Power Plant, Units 1 and 2
Midland, Michigan

Settlement of the Diesel Generator Building

Period of Investigation: December 11-13, 18-20, 1978 and January 4-5,
9-11, 22-25, February 23, March 5, 1979

Investigators: *G. A. Phillip*
G. A. Phillip

3-19-79

E. J. Gallagher
E. J. Gallagher

3-19-79

G. F. Maxwell
G. F. Maxwell

3-19-79

Reviewed By: *D. W. Hayes*
D. W. Hayes, Chief
Engineering Support Section 1

3/19/79

G. F. Fibrilli
G. Fibrilli, Chief
Reactor Construction and
Engineering Support Branch

3/19/79

C. E. Norelius
C. E. Norelius
Assistant to the Director

3/19/79

DUPE OF 7905020172

REASON FOR INVESTIGATION

On September 7, 1978, the licensee notified Region III, by telephone, that the settlement of the Diesel Generator Building and foundations experienced constituted a matter reportable under the requirements of 10 CFR 50.55(e). Written interim reports were subsequently submitted by the licensee by letters dated September 29 and November 7, 1978. An investigation was initiated to obtain information concerning the circumstances of this occurrence to determine whether: a breakdown in the Quality Assurance program had occurred; the occurrence had been properly reported; and, whether the FSAR statements were consistent with the design and construction of the plant.

SCOPE

This investigation was performed to obtain information relating to design and construction activities affecting the Diesel Generator Building foundations and the activities involved in the identification and reporting of unusual settlement of the building. The investigation consisted of an examination of pertinent records and procedures and interviews with personnel at the Midland site, the Consumers Power Company offices in Jackson, Michigan, and the Bechtel Power Corporation offices in Ann Arbor, Michigan.

SUMMARY OF FACTS

By letter dated September 29, 1978, the licensee submitted a report as required by 10 CFR 50.55(e) concerning an unusual degree of settlement of the Diesel Generator Building (DCB). This report confirmed information provided during earlier telephone conversations on or about August 22, 1978, with the NRC Resident Inspector and on September 7, 1978, with the Region III office. This report was an interim report and was followed by periodic interim reports providing additional information concerning actions being taken to resolve the problem. Further testing and monitoring programs and an evaluation of the resulting data have been undertaken by the licensee to determine the cause of the settlement and the adequacy of the corrective action being taken. The results of these efforts will be submitted in a final report to the NRC.

Information obtained during this investigation indicates: (1) A lack of control and supervision of plant fill activities contributed to the inadequate compaction of foundation material; (2) corrective action regarding nonconformances related to plant fill was insufficient or

inadequate as evidenced by the repeated deviations from specification requirements; (3) certain design bases and construction specifications related to foundation type, material properties and compaction requirements were not followed; (4) there was a lack of clear direction and support between the contractors engineering office and construction site as well as within the contractors engineering office; and, (5) the FSAR contains inconsistent, incorrect and unsupported statements with respect to foundation type, soil properties and settlement values.

DETAILS

Persons Contacted

During this investigation approximately 50 individuals were contacted. Twelve CPCo personnel which included corporate engineering and quality assurance personnel as well as site management, quality assurance and quality control personnel. Thirty-two Bechtel personnel were contacted. These largely consisted of site engineering, quality assurance, quality control, survey and labor supervisors and personnel in project engineering, quality assurance and Geotech at the Ann Arbor, Michigan office. Three individuals employed by U.S. Testing Company were also interviewed.

Introduction

On August 22, 1978, the licensee informed the NRC Resident Inspector at the Midland site that unusual settlement of the Diesel Generator Building (DGB) had been detected through the established Foundation Data Survey Program. While the licensee regarded the matter as serious it was not considered to be reportable under the provisions of 10 CFR 50.55(e) until further data was obtained.

Following the acquisition of additional data from further surveys and a core boring program which was initiated on August 25, 1978, the licensee concluded the matter was reportable and so telephonically notified Region III on September 7, 1978. The notification was followed up by a series of interim reports the first of which was submitted to Region III by letter dated September 29, 1978. Subsequent interim reports were transmitted by letters dated November 7, 1978 and January 5, 1979.

An inspection was conducted by Region III during the period October 24-27, 1978, to review the data then available; to observe the current condition of the structure; and, to review current activities. Information regarding the inspection is contained in NRC Inspection Report No. 50-329/78-12; 50-330/78-12.

On December 3-4, 1978, a meeting with NRR and Region III representatives was held at the Midland site to review the status of the problem, to discuss open items identified in the aforementioned inspection report and possible corrective actions.

Identification and Reporting of Diesel Generator Building Settlement

Surveys to establish a baseline elevation for the DGB were completed by Bechtel on May 9, 1978. As a result of these surveys, the Chief of Survey Parties noted what he considered to be unusual settlement. He

indicated that from his experience he would have expected about 1/8" settlement. The July 22 data showed a differential settlement between various locations ranging from 1/4" to a maximum of 1 5/8". He promptly instructed his survey personnel to resurvey to determine whether the data was accurate. The resurvey confirmed the accuracy of the survey data. The Chief of Survey Parties reported the survey results to the Bechtel lead civil field engineer.

The lead civil field engineer said that in July 1978 the settlement of a pedestal in the DGB was noted from surveys and about a week later a 1" discrepancy was noted when scribes on the DGB were being moved up. He said that at that time he was uncertain as to whether actual settlement had occurred, the survey was in error or the apparent discrepancy was a construction error. He instructed the Chief of Survey Parties to check his survey results and to perform surveys more frequently than the 60-day intervals required by the survey program as a means of determining whether actual settlement had occurred and whether settlement continued.

The Field Project Engineer was also informed of the apparent settlement and concurred with the lead civil field engineer's actions. He said he had toured the building at that time and he saw no visible indications of stress which could be expected when unusual settlement occurs.

The lead civil field engineer said the DGB was monitored for about a month. He compared the amount of settlement being experienced with the settlement values reflected in Figure 2.5-48 of the FSAR and did not consider it reportable until those values were exceeded. When the settlement did exceed those values as indicated by survey data obtained on about August 18, 1978, he prepared a nonconformance report with the assistance of QC personnel.

The July 22 survey data was transmitted by the site to the Bechtel Project Engineering office in Ann Arbor by a routine transmittal memo dated July 26, 1978. The data was received at Ann Arbor, processed through document control on August 9, 1978, and was routinely routed to the Civil Engineering Group Supervisor. He stated he did not review the data but placed a route slip on it indicating those members of his group who should review it.

The engineer in the Civil Group, who had established the survey program and who was responsible for assuring it was being carried out, stated he reviewed the data and did not regard it as unusual. For that reason he did not bring the matter to anyone's attention but merely routed it to other personnel in the civil group. The engineer responsible for the DGB said he did not see the data before the settlement problem was identified by the field in a nonconformance report.

With the issuance of the noncompliance report, No. 1482, on August 18, 1978, CPCo was also informed of this condition. On or about August 21, 1978, the NRC Resident Inspector was orally informed of the matter by CPCo. It was indicated at that time that although CPCo regarded the matter as serious, they did not consider it to be reportable under 10 CFR 50.55(e).

Construction on the DGB was placed on hold on August 23, 1978 and a test boring program was initiated on August 25, 1978. After preliminary evaluation of soil boring data, a Management Corrective Action Report (MCAR), No. 24, was issued by Bechtel on September 7, 1978. The MCAR stated that based on a preliminary evaluation of the data, the matter was reportable under 10 CFR 50.55(e), 1, iii and Region III was so notified by telephone on that date.

The telephone notification was subsequently followed up by a letter dated September 29, 1978, from CPCo enclosing a copy of MCAR 24 and Interim Report 1 prepared by Bechtel.

On the basis of the above, it is concluded that in this instance the licensee complied with the reporting requirements of 10 CFR 50.55(e).

Review of PSAR/FSAR Commitments on Compacted Fill Material

In a previous NRC Inspection Report, No. 329/78-12; 330/78-12, an apparent inconsistency was identified between FSAR Table 2.5-14 (Summary of Foundations Supporting Seismic Category I and II Structures), Table 2.5-9 (Minimum Compaction Criteria) and the site construction drawing C-45 (Class I Fill Material Areas) regarding the type of foundation material to be used for plant area fill. Table 2.5-14 identifies the supporting soil materials for the Auxiliary Building D, E, F, and G, Radwaste Building, Diesel Generator Building and Borated Water Storage Tanks to be "controlled compacted cohesive fill." Table 2.5-9 also indicates the soil type for "support of structures" to be clay. Contrary to these FSAR commitments, drawing C-45 indicates Zone 2 (random fill) material, defined in Table 2.5-10 as "any material free of humus, organic or other deleterious material," is to be used with "no restrictions on gradation." Boring samples substantiated that Zone 2 (random fill) material was in fact used.

During this investigation a review of documentation showed that the commitment to use cohesive soils was also made in response to PSAR question 5.1.11 and submitted in PSAR Amendment 6, dated December 12, 1969, which states, "Soils above Elevation 603 will be cohesive soils in an engineered backfill." This response also indicated that certain class 1 components such as, emergency diesel generators, borated water storage tanks and associated piping and electrical conduit would be founded on this material.

CPCo quality assurance issued a nonconformance report QF-66, dated October 10, 1975, which stated that contrary to the PSAR statement (quoted above) Specification C-211 being implemented at the site required cohesionless (sand) material to be used within 3 feet of the walls of the plant area structures. The corrective action taken was for Bechtel to issue SAR Change Notice No. 0097 which stated, "The FSAR will clarify the use of cohesive and cohesionless soils for support of Class 1 structures." As noted above, the FSAR tables 2.5-14 and 2.5-9 once again stated that cohesive (clay) material was used for support of structures while the construction drawing continued to permit the use of random fill material.

This investigation included efforts to ascertain whether procedures were established and implemented for the preparation, control and review of the technical criteria set forth in the safety analysis report (SAR). This included the role of both Bechtel and CPCo in the review of the SAR. Bechtel had established control of the SAR in procedure MED 4.22 (Preparation and Control of Safety Analysis Report Revision 1, dated June 20, 1974). The SAR preparation and review flow chart requires the Engineering Group Supervisor (EGS) to review the originator's draft for technical accuracy and compliance with the standard format guide. Records indicated that Section 2.5.4 was originated by the Bechtel Geotech group on January 3, 1977. It was reviewed and approved for technical accuracy by an engineer in the civil project group on April 29, 1977. No technical inaccuracies were noted in the documentation. The Civil EGS advised that he did not personally review Section 2.5.4.

The designated engineer stated that in his review of the section he was primarily concerned with the Auxiliary Building not the Diesel Generator Building. He said the review of FSAR material was performed by members of a group set up for this purpose. Not all of the content was checked since they relied to some extent on the originator. The author of Section 2.5.4 said he was not aware that changes regarding fill material had occurred since the preparation of the PSAR. It was ascertained that Field Engineering did not review the FSAR prior to its submittal.

A partial review of the FSAR revealed that although Figure 2.5-48 indicates anticipated settlement of the Diesel Generator Building during the life of the plant to be on the order of 3 inches. Section 3.8.3.5 (Structural Acceptance Criteria) contains the following statement: "Settlements on shallow spread footings founded on compacted fills are estimated to be on the order of 1/2" or less."

Section 3.8 was prepared by Project Engineering. Geotech, who prepared Section 2.5, said they were unaware of the presence of the statement regarding 1/2" settlement in Section 3.8. The originator of Section 3.8

said that the above statement was taken from the Dames and Moore report submitted as part of the FSAR. Since the FSAR did not show any change in this regard, he assumed the statement was valid for inclusion in the FSAR. He said there was no other basis to support this statement.

CPCo also has an established procedure for the review and final approval of the SAR by procedure MPPM-13 dated June 23, 1976. Section 5.6 states that "CPCo shall approve all final draft sections of the FSAR prior to final printing." Discussion with the responsible licensee representatives for review of Section 2.5.4 indicated that a limited amount of cross-reference verification of technical content of the FSAR is performed by CPCo.

The CPCo Project Engineer in Jackson stated that the review of drawings and specifications was an owner's preference kind of thing. No attempt was made to review all drawings and specifications since they did not have the manpower or expertise for that type of review. The staff engineers of the various disciplines were asked to indicate the drawings and specifications they wanted to review.

Regarding the review of the FSAR, he said that he had prepared a memorandum to the staff engineers stating the procedure that would be followed in performing the review. An examination of this memo, dated July 28, 1976, showed that prime reviewers would perform a technical review, resolve comments made by other reviewers and perform the CPCo licensing review to assure compliance with required FSAR format and content.

As portions of the FSAR were received from Bechtel, CPCo sent comments to Bechtel. Following this review, meetings between Bechtel and CPCo were held to clearup any unresolved matters before each section was released for printing. A review of the files at CPCo relating to Section 2.5 and 3.8 showed that no comments were made concerning the above inconsistent and incorrect content. The apparent inconsistent and incorrect statements were not identified during the review of the FSAR prior to submittal and the review procedures did not provide any mechanism to identify apparent inconsistencies between sections of the FSAR.

Based on the above, measures did not assure that design basis included in design drawings and specifications were translated into the license application which resulted as an inconsistency between the design drawings and the FSAR. This is considered an item of noncompliance with 10 CFR 30, Appendix B, Criterion III. (329/73-20-01; 330/73-20-01)

Effect of Ground Water in Plant Area Fill

Final plant grade will be established at elevation 634. The normal ground water was assumed to be at ground surface prior to construction, approximately elevation 603. The surface of the water in the cooling water pond will be at a maximum of approximately elevation 627.

The Dames and Moore report on Foundation Investigation submitted with PSAR Amendment No. 1, dated February 3, 1969, stated that, "The effect of raising the water level to elevation 625 in the reservoirs will cause the normal ground water level in the general plant area to eventually rise to approximately elevation 625. However, a drainage system will be provided to maintain the ground water level in the plant fill at elevation 603."

A supplement to Dames and Moore report was submitted in PSAR Amendment No. 3, dated August 13, 1969, which changed the above planning of a drainage system to control the ground water. The supplement states, "The underdrainage system considered in the initial report has been eliminated; consequently it is assumed that the ground water level in the plant area will rise concurrently to approximately elevation 625."

A Bechtel soils consultant theorized in a December 4, 1978, site meeting that if soils beneath the diesel generator building had been compacted too dry of optimum, changes in moisture after placement could cause the soils to settle significantly. Therefore, the total effect of the ground water being permitted to saturate the plant fill material is undetermined at this time. An evaluation of this condition is under review by the licensee. This item is considered unresolved. (329/78-20-02; 330/78-20-02)

Review of Compaction Requirements for Plant Area Fill

During the investigation a review of the history of the compaction requirements was performed in order to determine whether the compaction of the plant fill was implemented in compliance with the commitments in the PSAR and in site construction specifications.

PSAR, Amendment 1, dated February 3, 1969, presented the Dames and Moore report "Foundation Investigation and Preliminary Exploration for Borrow Materials." The recommended minimum compaction criteria for support of critical structures is stated on page 15. It indicates 95% of maximum density for "cohesive soils" as determined by ASTM D-1557-66T and 100% for "granular soils."

PSAR, Amendment 3, dated August 13, 1969, included a supplement to the Dames and Moore report entitled, "Foundation Investigation and Preliminary

Exploration for Borrow Materials." Page 16 of this report lists the recommended minimum compaction criteria for sand soils and cohesive soils. For the fill material for supporting structures the minimum compaction is 85% relative density for sand and 100% of maximum density for clay as determined by ASTM D-698 modified to require 20,000 ft-lbs. of compactive energy (equivalent to 95% of ASTM D-1557, Method D which provides 56,000 ft-lbs of compactive energy). Subsequent to the filing of Amendment 3, no amendments were made to the PSAR to indicate that the recommendations contained in the Dames and Moore report would not be followed or would be further modified.

Bechtel Specification C-210, Section 13.0 (Plant Area Backfill and Berm Backfill) indicates the compaction requirements for cohesive soil (13.7.1) to be "not less than 95% of maximum density as determined by ASTM D-1557, Method D" and for cohesionless soils (sand) (13.7.2) to be compacted "to not less than 80% relative density as determined by ASTM D-2049."

A comparison of the PSAR commitments to the specification requirements shows that the compaction commitments for cohesive soil (clay) were translated into the construction specification i.e. 95% of maximum density using ASTM D-1557, Method D (compactive energy of 56,000 ft-lbs). However, the compaction commitment in the PSAR for cohesionless soil (sand) was not the same as in the construction specification, i.e. 85% relative density versus the 80% relative density, translated in the construction specification.

The compaction requirements actually implemented were as follows:

- a. Cohesive soil (clay): 95% of maximum density as determined by the "Bechtel Modified Test," a compactive energy of 20,000 ft-lbs was used instead of 56,000 ft-lbs of compactive energy as committed to in the PSAR and required by the construction specification C-210, Section 13.7.1.
- b. Cohesionless soil (sand): 80% relative density as determined by ASTM D-2049 was used instead of 85% as committed to in the PSAR. However, this is consistent with construction specification C-210, Section 13.7.2.

The compaction requirements implemented during construction of the plant area fill between elevations 603 and 604 feet, therefore, less than the commitments made in the PSAR for cohesive and cohesionless fill material. In addition, the cohesive clay material was also compacted to less than that required by the Bechtel specification. (Construction C-210, Section 13.7.1).

A review of Specification C-210 (specification controlling earthwork contract) beginning with Revision 2, dated July 27, 1973, which was issued for subcontract showed that it contained conflicting sections relating to the plant area backfill compaction requirements.

Section 13.7, Compaction Requirements, from revision 2 to the latest revision of specification C-210 consistently specified that the backfill in the plant area shall be compacted to 95% of maximum density as determined by ASTM 1557, Method D.

Section 13.4, Testing Plant Area Backfill, of specification C-210 contained the statement that tests would be performed as set forth in Section 12.4.3, Laboratory Maximum Density and Optimum Moisture Content, which in turn specified a lesser standard, 20,000 foot-pounds per cubic foot, which is commonly referred to as the Bechtel Modified Proctor Density Test (BMP). This is contrary to the requirements of Section 13.7. Section 12 of the specification applies to Dike and Railroad Embankment Construction.

It was also noted that this control inconsistency was reflected in the applicable Midland QA Inspection Criteria, SC-1.10, Item 2.3(d) Compaction which states "Backfill material for the specified zones has been compacted to the required density as determined by Bechtel Modified Proctor Method" and yet references C-210, Section 13.7 as the inspection criteria.

The inconsistency in control is further indicated in Specification C-208 which defined the testing contract requirements of subgrade materials, Section 9.1 (Testing) required compaction tests to be in accordance with ASTM D-1557 and only when directed was the BMP compaction criteria to be used. It was determined contrary to this U.S. Testing was only orally advised that the BMP was the standard to be applied to the tests they performed of plant area fill.

Through interviews and an examination of internal documents it was ascertained that because of these inconsistencies, the question of the applicable compaction standard for cohesive materials in the plant area was a recurring one.

The following is a summary of the documentation resulting the confusion of the compaction requirements for plant area fill:

1. Letter "210-C-210-77" dated June 10, 1974, (subcontract to Field Engineering) states "there has been some confusion as to the interpretation of the following item: 13.7 Compaction Requirements: All backfill in the plant area and berm shall be compacted to not less than 95% of maximum density as determined by modified Proctor Method

(ASTM 1357, Method D), with the exception that Zones 4, 4A, 5, 5A, and 6 Materials need no special compactive effort other than as described in Section 12.8.1 (emphasis included in specification). Quality Control questioned whether the exception stated above applies only to Zones 4, 4A, 5, 5A, and 6 or did construction have to abide by Section 12.8.1 for Zones 1 and 2. Section 12.8.1 clearly requires Zone 2 material to be placed with a 50 ton rubber tired roller with a minimum of four roller passes per lift. QC's interpretation was that the field needed "to obtain 95% of maximum density by the modified Proctor method (ASTM 1357, Method D), with no restrictions as to the method used to obtain these results."

2. Letter 7220-C-210-23, dated June 24, 1974, (field Engineering to construction) responded to Item 1 above. It states, "We have reviewed your June 10, 1974, IOM concerning compactive effort required on Zones 1 and 2 in the plant and berm backfill areas. We agree with your interpretation; i.e. a 95% of maximum density is the acceptance criteria, and the number of roller passes listed in Paragraph 12.8.1 does not apply to plant and berm backfill. We feel the specification is now clear and no FCR is required."
3. Letter BCBE-370, dated July 25, 1974, (field construction to project engineering) lists outstanding items requiring Project Engineering's action. This includes the question, "Is the 95% compaction required in the plant area to be 95% of Bechtel Modified or 95% of ASTM-1557, Method D."
4. Letter BEBC-456, dated August 1, 1974, (Project Engineering to Field Construction) states that Geotech is addressing the question posed in BCBE-370 (Item 3 above).
5. Memorandum from Geotech to Bechtel Field, dated September 18, 1974, responds to the question raised in BCBE-370 (Item 3 above). It states, "It is our opinion that all the compaction requirements that are needed for Zone II material in the plant fill is as stated in 13.7 with the exception that Zones 4, 4A, 5, 5A, and 6 materials need no special compactive effort other than described in Section 12.8.1." Geotech reiterates the specification requirement of 95% of ASTM 1357, Method D. This was confirmed with the Geotech personnel.
6. Telecon dated September 9, 1974, from R. Grote (Field Engineering) to Rixford (Project Engineering) states, "I made an analogy (an exaggeration admittedly but applicable) that if the compaction could be achieved with a herd of mules walking over the fill it would be acceptable as long as it got the required 95% compaction. Rixford agreed."

7. Telecon Consumers to Bechtel Engineering dated September 19, 1974, expressed Consumers Power Company concern about what they felt was a lack of control of compaction in the plant area fill. CPCo addressed the added responsibility this lack of control places on the inspector. Bechtel told CPCo that it "was the inspector's job to make sure we got proper placement, compaction, etc."
8. Telecon dated September 18, 1974, by Bechtel Field Engineering to Bechtel Project Engineering discussed compaction requirements for specification C-210. It stated, "Compaction acceptance is based on meeting an 'end product' requirement, i.e. 95% of maximum density only. No method of achieving this 'end product' is specified or is required. Rixford fully agrees with the above."
9. Telecon dated October 7, 1977, from Bechtel Field Engineering to Bechtel Project Engineering states, "QA has asked for clarification of subject specification (C-210), Section 13 for plant area and berm backfill. Section 13.4 for testing of materials refers to Section 12.4 and therefore, requires the Bechtel Modified Proctor Density Test for Compaction of cohesive backfill. Section 13.7 for compaction of the same materials refers to testing in accordance with ASTM D-1557, Method D Proctor, without specific reference to Bechtel Modification." Bechtel Engineering responded to this question as follows: "This apparent conflict is clarified by Specification C-208, Section 9.1.a, direction to the testing subcontractor, which calls for ASTM D 1557 test for these materials and also allows Bechtel Field (the contractor) to call for the Bechtel Modification of that test. Either method is therefore acceptable to project engineering."
10. Telecon dated October 7, 1977, from Bechtel QA to Bechtel Project Engineering questions, "Is the intent of Paragraph 13.7 of Specification C-210 that the test be run to the 'Bechtel' modified proctor test as is indicated in the FSAR Paragraph 2.3.4.5.3 and in response to NCR 88." Engineering's response was "yes."

Various interviews were held with Bechtel construction field engineers, U. S. Testing personnel and Bechtel Ann Arbor Geotech and Project Engineering personnel to ascertain their understanding of the compaction requirements. Four predominant versions of the understood compaction requirements were stated by various individuals within the Bechtel organization. They are as follows:

- a. Specification C-210 required the contractor to perform compaction to the ASTM 1557, Method D, however, the testing requirements would be performed to the less stringent "Bechtel Modified Test Method."

- b. The required compaction and testing was always understood to be based on the "Bechtel Modified Test Method."
- c. The required compaction and testing was always understood to be based on the standard ASTM 1557, Method D requirements.
- d. A tacit understanding had been established to use the Bechtel Modified Method, but to exceed this requirement by enough to also satisfy the requirement of ASTM 1557, Method D.

It is apparent from the above four distinctly different understandings of the compaction requirements, that the apparent confusion was not resolved. A member of the Bechtel QA staff in Ann Arbor who had previously been a QA Engineer at the Midland site said that QA audits of QC inspection criteria did not identify the above inconsistencies.

This failure to accomplish activities affecting the quality of the plant area fill in accordance with procedures is considered an item of noncompliance with 10 CFR 50, Appendix B, Criterion V. (329/78-20-03; 330/78-20-03;

Review of Moisture Control Requirements for Plant Area Fill

Specification C-210, Section 13.6 (Moisture Control) requires moisture control of the plant area fill material to conform to Section 12.6. The moisture control requirement in Section 12.6.1 states, in part, "Zone 1, 1A and 2 material which require moisture control, shall be moisture conditioned in the borrow areas," and that "water content during compaction shall not be more than two percentage points below optimum moisture content and shall not be more than two percentage points above optimum moisture content."

Contrary to the above, Bechtel QA identified in SD-40 dated July 22, 1977, that "the field does not take moisture control tests prior to and during placement of the backfill, but rather rely on the moisture results taken from the in-place soil density tests."

The following is a summary of the documentation that followed the identification of the above deviation from specification C-210.

1. Letter BCBE-1333R (dated August 13, 1977) field to project engineering states, "it was found that densities meeting specification requirements could be attained, irrespective of the use of moisture tests," and that "moisture tests were not used to control backfill moisture." The field requested "that project engineering agree to acceptance of backfill materials installed in the past, along with the records thereof, irrespective of the use of the moisture tests."

2. Letter BEBC-1839 (dated September 30, 1977) responded to the fields request in BCBE-1533R. Engineering states, "It should be noted that it is ideal to control the moisture of backfill material at the borrow areas by conditioning" and that "the procedure used to take moisture content tests after compaction would not have direct impact on the quality of work." Engineering then agreed with the field request that "backfill placed prior to modification of testing methods to be accepted as is."
3. Telecon October 10, 1977, (Bechtel QA Site to Bechtel Engineering, Ann Arbor) indicated that, "there are no moisture requirements at the time of density testing, only density requirement. The moisture requirement is prior to compaction."
4. Telecon October 13, 1977, (Bechtel Engineering to Bechtel QA Site) changed what was indicated in the telecon on October 10, 1977, (Item 3 above). Engineering then stated, "The moisture requirement (\pm 2% of optimum) is mandatory and must be implemented at the time of placement and testing." This is contrary to what was stated on October 10, 1977.
5. Letter BCBE-1669R (dated November 18, 1977) once again is a field request to Bechtel engineering requesting, "written clarification of the 2% tolerance on backfill moisture content during compaction."
6. Letter BEBC-1998 (dated December 15, 1977) provides engineering's response to BCBE-1669R requesting clarification of the moisture requirement. Engineering stated, "The moisture content of the soil should be within 2% of optimum during placement and compaction. However, this property of the soil is not necessarily a measure of its adequacy after compaction."
7. Letter O-1631 (dated December 21, 1977) closes QA Action Request SD-40 (dated July 22, 1977) which first identified the moisture control deficiency.
8. Telecon (dated April 7, 1978) from Field Engineering and Quality Control to Project Engineering once again requests them "to clarify BEBC-1998" (December 15, 1977), Item 6 above. Two situations were presented to engineering as follows: (a) The moisture sample taken from the borrow area at the start of the shift is acceptable, however, the moisture test taken in conjunction with the density test fails while compaction was attained; and (b) The moisture sample taken from the borrow area at the start of the shift fails and the material is conditioned to meet moisture content required,

however, the moisture test later fails at the time the passing compaction test is taken. Engineering responded, "the above two situations are acceptable as is." This response is contrary to the direction previously given in telecon dated October 13, 1977 (see Item 4 above).

9. Letter GLR-249 (April 16, 1978) is a Bechtel Site QA request to Project Engineering to resolve the moisture content situation and "to provide clear direction for the control of moisture content." QA recommends "one possible solution would be to delete the requirement to control the moisture content and rely on the compaction requirement only for completion of soils work."
10. Letter BEBC-2236 (June 1, 1978) was Project Engineering's response to GLR-249 (Item 9 above). It states, "moisture content is not necessarily a measure of a soil's adequacy to act as a foundation or backfill material," and that "soil with the specified density following compaction would not be rejected on the basis that its moisture content was not controlled in the borrow area."

Based on the reviews of documentation, moisture control had not been implemented as the specification required. In addition, the matter had not been resolved for the period of time from the issuance of QA Action Request SD-40 on July 22, 1977, until June, 1978, during which time soils safety-related work continued.

According to the licensee, although moisture control was not strictly followed in accordance with specification requirements, final density tests were used as a basis for acceptance of soil placement.

As pointed out to the licensee, moisture control is a required control point to assure attainment of percent compaction specified in specification C-210.

This failure to assure that conditions adverse to quality are promptly identified and corrected to preclude repetition is considered an item of noncompliance with 10 CFR 50, Appendix B, Criterion XVI. (319/78-20-04; 330/78-20-04)

Review of Subgrade Preparation for Plant Area Fill

The Dames and Moore report on foundation investigation submitted with PSAR Amendment 3, dated August 13, 1969, states, "the clay soils are susceptible to loss of strength due to frost action, disturbance and/or the presence of water. If the construction schedule requires that foundation excavation be left open during the winter, it is recommended that excavation operations be performed such that at least

3 1/2 feet of natural soil or similar cover remain in place over the final subgrade or overlying the mud mat. This layer of protective material is necessary to prevent the softening and disturbance of subgrade soils due to frost action." The licensee indicated that instructions for winter protection of foundation excavations were transmitted by sketch C-271.

The Dames and Moore report also stated, "If filling and backfilling operations are discontinued during periods of cold weather, it is recommended that all frozen soils be removed or recompacted prior to the resumption of operations."

After review of the applicable sections of specification C-210 (i.e. Sections 12.5.1, 12.10, 10.1 and 11) the inspector has determined that the Bechtel specification did not provide specific instructions for removal or recompaction of frozen/thawed soils upon resumption of work after the winter period to preclude the effects of frost action on the compacted subgrade materials.

This failure to assure that regulatory commitments as specified in the license application are translated into specification, drawings or instructions is considered an item of noncompliance with 10 CFR 50, Appendix B, Criterion III. (329/78-20-05; 330/78-20-05)

Review of Nonconformance Reports Identified for Plant Area Fill

The following examples of nonconformance and audit reports regarding the plant area fill were reviewed relative to the cause of the nonconformance and the engineering evaluation and corrective action:

<u>No.</u>	<u>Nonconforming Condition</u>	<u>Engineering Evaluation</u>
(1) CPCo QF-29 (10/14/74)	Failure to perform inspection and testing of structural backfill (sand) delivered to jobsite 29 of 30 day in Aug. and Sept. 74. Bechtel QC not informed of deliveries.	"Use as is" based on samples taken from stock pile.
(2) CPCo QF-32 (3/7/75)	Moisture control out of tolerance of specification C-210, Section 13.6.	Accepted in place material with low moisture.
(3) CPCo QF-68 (10/17/75)	Compaction test had been calculated using incorrect maximum lab density. Test recorded as passing was actually a failure.	Failing tests were cleared by subsequent passing tests.

- | | | | |
|-----|--------------------------------|---|---|
| (4) | Bechtel
NCR 421
(5/5/76) | Material placed did not meet moisture requirements. | Engineering stated that this ramp area is temporary and would be removed. This was removed based on note added to NCR 421 on 3/18/77. |
|-----|--------------------------------|---|---|

Note: In the vicinity of this ramp a Geotech engineer determined the material to be "soft" and directed a test pit to be dug for investigation in September 1978 after the D. G. Bldg. settlement was identified.

- | | | | |
|-----|------------------------------|--|---|
| (5) | CPCo
QF-120
(9/21/76) | Lift thickness exceeded maximum of 4" in areas not accessible to roller equipment. Insufficient monitoring of placing crews. Laborer foreman not familiar with requirements. | Material was removed and recompact. |
| (6) | CPCo
QF-130
(10/18/76) | Inspection plan C-210-4, Rev. 0, permits 12" lift thickness for areas inaccessible to rollers caused by "misinterpretation of specification requirements. Spec. permitted 4" lift thickness. | Corrected inspection plan requirements. |
| (7) | CPCo
QF-147
(2/2/77) | Failure to perform inspection and testing of structural backfill (sand) on 12/1/76, 12/14/76 and 1/11/77 (same as QF-29 dated 10/14/74) material lacked gradation test requirements. | Engineering accepted the material in place "use as is." |
| (8) | CPCo
QF-172
(7/8/77) | Moisture control out-of-tolerance and compaction criteria not met. | Engineering accepted materials. |
| (9) | CPCo
QF-174
(7/15/77) | Gradation requirements for Zone 1 materials not met. | Engineering accepted materials. |

- | | | | |
|------|--|--|--|
| (10) | CPCo
QF-199
(11/4/77) | Moisture content not met; compaction requirements for cohesive and cohesionless soil not met. Materials had been accepted using incorrect testing data. | Issued Bechtel NCR's No. 1004 and 1005; No. 1004 still open; No. 1005 "accepted as is." |
| (11) | CPCo
QF-203
(11/22/77) | Gradation requirement not met yet materials accepted. | Engineering "accepted as is." |
| (12) | CPCo
Audit
F-77-21
(3/77 &
6/77) | Moisture content requirements not met; test frequency not met. | Bechtel QC to inform foreman <u>directing</u> soils work of requirements. |
| (13) | CPCo
Audit
F-77-32
(10/3/77) | Compaction requirement for both cohesive and cohesionless materials not met; moisture requirements not met; tests had been accepted yet failed requirements. | Project Engineering to justify the materials these failing tests represent. NCR QF-199 still open. |
| (14) | Bechtel
NCR 686
(2/1/77) | Same deficiency as NCR 698. | Accepted, "use as is." |
| (15) | Bechtel
NCR 698
(2/9/77) | Structural backfill (sand) was delivered without acceptance tests on Oct. 26, 29, Nov. 12, 1976 and Jan. 11, 12, 1977. | Engineering accepted "use as is." |
| (16) | Bechtel
NCR 1003
(10/26/77) | Moisture content requirements not met. | "Accepted as is" based on density test only. |

Based on a review of the above nonconformances and audit reports covering five action reports, nonconformances related to quality control were identified. None of the nonconformances evidenced by the audit or inspection reports were related to the quality requirements.

The purpose of this report is to provide the owner with a summary of the quality control activities and to provide the owner with a summary of the quality control activities and to provide the owner with a summary of the quality control activities.

repetition is considered an item of noncompliance with 10 CFR 50, Appendix B, Criterion XVI. (329/78-20-06; 330/78-20-06)

Review of Calculations of Settlement for Plant Area

A review of the settlement calculations for the structures in the plant area was performed during a visit to the Bechtel, Ann Arbor Engineering office. Specific attention was given to structures founded on plant area "compacted fill." The following specific findings were made:

1. FSAR, Section 3.8.4.1.2 (Diesel Generator Building) indicates the foundation of the DGB to be continuous footings with independent pedestals for each of the Diesel Generators. Contrary to the structural arrangement described in the FSAR, the settlement calculations for the DGB were performed on the premise that the building and equipment loads would be uniformly distributed to the foundation material by a 134' x 70' foundation mat. The settlement calculations were performed between August 1976 and October 1976 by Bechtel Geotech Division.

Discussion with the Geotech Engineer who performed the settlement calculations indicated that he had not been informed of the design change of the foundation until late August 1978 when the excessive settlements of the DGB and pedestal became apparent.

2. FSAR Figure 2.5-47 indicates the load intensity for the DGB to be 4 KSF (4000 lbs. per sq. ft.); however, the settlement calculations reviewed indicate a uniform load of 3 KSF (3000 PSF). This appears to be a conflict between the FSAR and settlement calculations.
3. The settlement calculations for the borated water storage tanks were performed assuming a 54' diameter circular foundation mat with an assumed uniform load of 2500 PSF. Instead, the tanks are supported on a continuous circular spread footing and compacted structural backfill as detailed on the construction drawings. The Geotech engineer was also not made aware of the revised foundation detail.

FSAR Figure 2.5-48 (Estimated Ultimate Settlements) indicates the anticipated ultimate settlement for Unit 1 and 2 plant structures. The values indicated for the Diesel Generator Building and Borated Water Storage Tanks are the values developed assuming uniformly distributed loads founded on mat foundations as was indicated in the settlement calculations reviewed even though the actual design and construction utilizes spread footings. The FSAR does not indicate the foundation

type assumed in the settlement calculations and therefore the values in the FSAR figure appear to represent the settlements estimated for the as-constructed spread footing foundation.

4. During a review of the settlement calculations, it was observed that the compression index (C_c) for the compacted fill between elevations 603 and 634 in the plant area was assumed to be 0.001 (estimate based on experience). FSAR Section 2.5.4.10.3.3 (Soil Parameters) indicates the soil compressibility parameters used in the settlement calculation are presented in Table 2.5-16. This table indicates that for the plant fill elevations 603 to 634, the compression index used was 0.003. Contrary to the FSAR value, 0.001 was used in the settlement calculations reviewed. This value is directly used to determine the estimated ultimate settlement of structure supported by plant fill material.

Based on the above examples, measures did not assure that specific design bases, included in design documents, were translated into the license application resulting in inconsistencies between design documents and the FSAR. This is considered an item of noncompliance with 10 CFR 50, Appendix B, Criterion III. (329/78-20-07; 330/78-20-07)

Discussions with CPCo personnel responsible for the technical review and format indicated that a comparison between the design documents and FSAR had not been performed. Likewise, Bechtel personnel indicated that a detailed comparison for the technical accuracy of design documents to the FSAR statements had not been performed; instead reliance was placed on the originator's input.

According to the Civil Engineering Group Supervisor, a mat foundation was considered for the DCB only during the conceptual stage. All drawings generated show a spread footing foundation. The supervisor stated that the Geotech engineer apparently based his calculations on the conceptual stage information. He went on to say that an individual in Geotech was responsible for checking the calculations and the first thing he is supposed to do is determine that the basis for the calculations is correct. He said that apparently this was not done.

Review of Settlement of Administration Building Footings

During the investigation, it was disclosed that the Administration Building at the Midland Site had experienced excessive settlement of the foundation footings. Although the Administration Building is a non-safety-related structure, it is supported by plant area fill material compacted and tested to the same requirements as material

supporting safety-related structures and therefore pertinent to the current settlements being experienced by the Diesel Generator Building. The following are the events relating to the settlement of the Administration Building footings.

During the end of August, 1977, a Bechtel field engineer observed a gap between a slab and the grade beam of the Administration Building. On August 23, 1977, a survey was taken of the settlement. The results indicated that the footings supporting the grade beam had experienced settlement ranging from 1.32" (north side) to 3.48" (south side). This settlement took place between July 1977, and the end of August 1977. The footings were supported by "random fill" (Zone 2 material).

The concrete footings on the order of 7' 6" by 7' 6" by 1' 9" deep were removed along with the grade beam. The random fill material was also removed. According to U. S. Testing personnel, it was observed during excavation of the fill material that there were voids of 1/4" to 2" or 3" within the fill and these were associated with large lumps of unbroken clay measuring up to 3 feet in diameter.

The Civil Field Engineer assigned responsibility for plant fill work said that, although he was no soils expert, it was his opinion that the problem was caused by the presence of pockets of water due to drainage from the steam tunnel. The Lead Civil Field Engineer also indicated a drainage problem caused the Administration Building footings settlement. They were, however, unclear as to how the water pockets were formed, i.e. whether they were formed as the fill was being placed or how they could develop after the fill was compacted.

The excavated fill was replaced with concrete and the design of individual footings was changed to a continuous spread footing design for support of the building.

As a result of the settlement of the Administration Building footings a total of seven borings were taken of which five were in the Administration Building area, one in the Evaporator Building area and one south of the Diesel Generator Building. In the Administration Building area the foundation material was found to be "soft" with "spongy characteristics." The two other borings did not indicate unusual material properties in that the blow counts were reasonable. These borings were taken in September 1977.

The licensee indicated that reports from Bechtel concluded that the primary cause of the settlement in the Administration Building area was insufficient compaction of the fill. Bechtel also concluded that "deviations from specific compaction requirements was the result of

(

© 2000 Blackwell Science Ltd *Journal of Internal Medicine* 247: 105–111

1



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	5
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	---

This failure to prescribe adequate instructions for activities affecting the quality of safety-related structures is considered an item of noncompliance with 10 CFR 50, Appendix B, Criterion V. (329/78-20-08; 330/78-20-08)

Review of Soils Placement and Inspection Activities for Plant Area Fill

A subcontractor, Canonic Construction Company, South Haven, Michigan, performed the major portion of the earthwork at the Midland site. Although Canonic was primarily engaged to construct the cooling pond dike, they also performed most of the plant area fill work. Bechtel, however, also performed plant fill work prior to and after Canonic left the site in mid-October 1977. The last Canonic daily QA/QC fill placement report is dated October 16, 1977.

According to Canonic QA/QC records the first fill in the DGB area was placed in late October and early November 1975. No further fill was placed in the area until July 1976. After that time, fill work in the area was interspersed with soils work in other areas.

While it would be difficult to identify the soil work performed by Bechtel versus that performed by Canonic, records reviewed indicated that most of the Bechtel work was done during the latter part of 1976 and continued through 1977 and 1978. Although most of the Bechtel work related to placing sand around piping and ducts after they were laid and placing sand adjacent to walls, some motorized work compacting clay fill was also done by Bechtel.

Regarding the plant fill work performed by Bechtel, CFCo Audit Report No. F-77-21 dated June 10, 1977, identified a number of deficiencies which recommended the corrective action to be as follows: (1) "the foremen directing the soils work should be instructed as to the required moisture content limits" and (2) "the foreman directing the soils work should be instructed as to the correct test frequency requirements." Interviews with two such Bechtel foremen confirmed the fact that they were directing soil operations. They indicated they received their instruction regarding lift thicknesses and testing requirements verbally from field engineering through a general foreman.

Bechtel design criteria C-301 (Page 8) and PSAR Amendment No. 3 (Dames and Moore Report, Page 16) states that, "Filling operations should be performed under the continuous technical supervision of a qualified soils engineer who would perform in-place density tests in the compacted fill to verify that all materials are placed and compacted in accordance with the recommended criteria."

Based on the above, the soils activities were not accomplished under the continuous technical supervision in accordance with Bechtel design criteria. This failure to provide a qualified soils engineer to perform technical supervision for activities affecting quality as required by specifications and the PSAR is considered an item of noncompliance with 10 CFR 50, Appendix B, Criterion V. (329/78-20-09; 330/78-20-09)

The foremen indicated that Bechtel Field Engineers and QC inspectors were rarely in the areas where soils activities were going on. The foremen decided when and where tests were taken. The locations of tests were approximated by pacing or visually estimating distances from columns or building walls. Lift thicknesses were determined visually, usually without the use of grade stakes.

Soils testing services are provided by U. S. Testing Company based on the requirements of Specification C-208. The two U. S. Testing technicians who said they performed an estimated 90% of the soil testing during the years 1976-77 indicated that they rarely saw a Bechtel field engineer or QC inspector in the areas where plant fill activities were going on. One technician said he could recall only one occasion when a QC inspector was present when he took an in-place density test. The other technician estimated he had contact with a QC inspector in the field about once a month. A Bechtel QC inspector, however, was assigned to the testing laboratory on a full-time basis.

U.S. Testing personnel stated that erroneous test locations were a chronic problem regarding the Bechtel placed fill. The location of a test was usually given at the time of the test by a labor foreman or a laborer if the foreman wasn't there. Sometimes, however, a foreman was not familiar with the area in which he was working and the location was not provided until sometime after the test. It became necessary on occasion to withhold test results as a means of getting the test location. Test elevations were approximated sequentially.

The technicians further advised that rarely did a Bechtel QC inspector request a test. Normally, labor foremen requested them. On occasion a technician passing through an area would be asked by a foreman if a test should be taken. Upon completion of in-place tests, the results were usually communicated to the foreman directing the work. Test failures were also reported by telephone to QC or Field Engineering. A weekly report of test was provided to Bechtel QC and Field Engineering who reviewed any test failures and resolved them.

U. S. Testing personnel advised that they were requested to take tests of clay fill while it was raining and in order to do so, plastic was held over them to protect their equipment while the test was made. Even though it was raining, the fill placement work was not stopped on

some occasions. A Bechtel foreman confirmed that density tests were on occasion taken while it was raining. While this is not contrary to the specification instructions, it is contrary to standard practice.

U. S. Testing personnel indicated that when moisture was added, the procedure did not include blending the material which resulted in mushy seams. It is commonly accepted good practice to disc the fill after spraying it with water to add needed moisture. A Bechtel foreman stated that if moisture was needed they compacted 6" then sprinkled it and then added another 6".

The field engineer who was assigned responsibility for plant fill work stated he did not spend full time on soils work since he also had responsibility for two structures, the steam tunnel and general yard work. He said he tried to get out to the area where fill work was being done once a day. Some times he did and sometimes he did not. He indicated it was his impression that the QC Inspector responsible for the soils work on the day shift visited those work areas once or twice a week. He confirmed that only oral instructions were furnished to the foremen whom he felt were conscientious. The main problem he experienced with the foreman was maintaining proper lift thickness.

The QC inspector who was primarily responsible for the plant fill work is no longer employed by Bechtel. The QC inspector who was responsible for the plant fill work on the night shift stated that he tried to devote about one hour a night to the plant fill activities. He indicated that during 1976-1977 there was much emphasis being placed on cadwelding and rebar work and it was necessary to spend the majority of his time on those activities. He maintained that he did have fairly frequent contacts with the technicians who performed the in-place density tests, particularly when test failures occurred. He indicated it was his impression that the labor foremen were directing fill placement adequately.

Review of Inspection Procedures

The following procedures which are relative to backfill operations at Midland Units 1 and 2 between August 1974 through December 1977 were reviewed.

- a. Bechtel Master Project QC Instruction for Compacted Backfill - C-1.01 was issued for construction October 18, 1976, and it is presently the current instruction which is used by Bechtel QC (when Bechtel is the inspection agency, providing first level inspections during backfill operations). Further, this instruction was used by Bechtel QC when monitoring the activities of

other inspection agencies (Canonie) when such agencies were performing the first level inspections of backfill operations during the time periods of October 18, 1976, until June 28, 1977.

- b. Bechtel Quality Control Master Inspection plan for Plant Foundation Excavation and Cooling Pond Dikes (Plant Area Backfill and Berm Backfill) - Procedure No. C-210-4 was the instruction utilized by Bechtel QC when monitoring the activities of other inspection agencies that were providing the first level inspections of backfill operations (this instruction was utilized during time periods prior to October 18, 1976).
- c. Bechtel Quality Control Master Inspection Plan for Structural Backfill Placement - No. C-211-1 is an instruction utilized by Bechtel QC when performing first level inspection of backfill activities prior to October 18, 1976.

Bechtel Procedure C-1.02, listed above, was written as a replacement for both Procedures C-210-4 and C-211-1. The inspection activities which were delineated in Procedures C-210-4 and C-211-1 were compared with those described in Procedure C-1.02. The following are some of those activities which were compared:

Activities/Task Description	Inspection Code for--		
	C-210-4	C-211-1	C-1.02
<u>Backfill Material</u>			
(*) 1. Free of brush, roots, sod, snow, ice or frozen soil.		I	S(V)
(*) 2. Material moisture conditioned to required moisture content.	S	I	S(V)
3. Structural backfill used with 3" of plant structure, shall be cohesionless and free-draining.		I	
(*) 4. Material not placed upon frozen surface.		I	S(V)
5. Foundation approved prior to backfill placement.	H	H	S/H
6. Prior to start of work, area free of debris, trash and unsuitable material.			I(V)

Compaction Requirements

1.	Cohesionless material compacted not less than 80% relative density.	S	S	S(V)
(*) 2.	Cohesive material compacted to not less than 95% max. density.	W	S	S(V)
(*) 3.	Zones 1, 1A, 2 and 3 material in uncompacted lifts not exceeding 12"; areas not accessible to roller equipment the material placed in uncompacted lifts no exceeding 4".	W	I	S(V)

Material Testing

1.	Verify testing and test results are as per engineering requirements.			
a.	Materials	S	S	S(V)
b.	Moisture	S	S	S(V)
c.	Compaction	S	S	S(V)
2.	Review lab test report verifying:			
a.	Proper test method.	R	R	R
b.	Proper test frequency.	R	R	R
c.	Technical adequacy.	R	R	R

I - Inspection point
H - Hold point
W - Witness point
S - Surveillance (V) - visual
R - Review records

Those activities identified by an (*) asterisk indicate inspection requirements which have been relaxed from the original procedural requirements.

It is considered that the relaxation of actions relating to the confirmation that soils placement activities were conducted according to

specifications contributed to inadequate compaction of foundation and fill material and the increase incidence of deviations from specifications regarding lift thickness, moisture control and frequency of testing.

This failure to provide adequate inspection of activities affecting quality is considered an item of noncompliance with 10 CFR 50, Appendix B, Criterion X. (329/78-20-10; 330/78-20-10)

Exit Meetings

Members of the NRC staff met with Consumers Power Company and Bechtel Corporation at the NRC Region III office on February 23, 1979 to present the scope, purpose, and preliminary findings of the investigation. That meeting was subsequently followed by a second meeting held on March 5, 1979, during which Consumers Power Company responded to the preliminary investigation findings. The documents used during these meetings were transmitted to Consumers Power Company by NRC letter dated March 15, 1979.



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
799 ROOSEVELT ROAD
GLEN ELLYN, ILLINOIS 60137

ATTACHMENT 3

JAN 12

Docket No. 50-329
Docket No. 50-330

Consumers Power Company
ATTN: Mr. James W. Cook
Vice President
Midland Project
1945 West Parnall Road
Jackson, MI 49201

Gentlemen:

This refers to a special announced inspection conducted by Messrs. E. J. Gallagher and R. B. Landsman of this office and Mr. J. W. Gilray of the Office of Nuclear Reactor Regulation, Quality Assurance Branch on December 8-11, 1980, of activities at the Midland Nuclear Power Plant, Units 1 and 2, authorized by NRC Construction Permits No. CPPR-81 and No. CPPR-82 and to the discussion of our findings with you and others of your staff at the conclusion of the inspection.

The enclosed copy of our inspection report identifies areas examined during the inspection. The inspection consisted of a review of the Consumers Power Company response and implementation of corrective actions regarding the 10 CFR 50.54(f), Question 1 of NRC letter dated March 21, 1979 and Question 23, request for additional information dated September 11, 1979.

During this inspection, certain of your activities appeared to be in non-compliance with NRC requirements, as described in the enclosed Appendix A, and a written response is required.

In addition to the above, the unresolved items described in Paragraph 3(c) and 3(d) requires your attention. Please provide a written response to each individual part of the unresolved items for our review along with your response to the identified items of noncompliance.

In accordance with Section 2.790 of the NRC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations, a copy of this letter, the enclosures, and your response to this letter will be placed in the NRC's Public Document Room, except as follows. If the enclosures contain information that you or

DUPE OF

8102230132

your contractors believe to be proprietary, you must apply in writing to this office, within twenty-five days of the date of this letter, to withhold such information from public disclosure. The application must include a full statement of the reasons for which the information is considered proprietary, and should be prepared so that proprietary information identified in the application is contained in an enclosure to the application.

We will gladly discuss any questions you have concerning this inspection.

Sincerely,

James G. Keppler
Director

Enclosures:

1. Appendix A, Notice of Violation
2. IE Inspection Reports
No. 50-329/80-32
and No. 50-330/80-33

cc w/encls:

Central Files
Reproduction Unit NRC 20b
PDR
Local PDR
NSIC
TIC
Ronald Callen, Michigan
Public Service Commission
Myron M. Cherry

RIII

Gallagher/jp
1/5/80

RIII

Landsman
1-5-81

RIII

Hayes

RIII

Knop

RIII

Sutphin
1/5/81

RIII

Fiofelli

RIII

Nofelios
1/13/81

RIII

Keppler
1/12/81

Appendix A

NOTICE OF VIOLATION

Consumers Power Co.

Docket No. 50-329

Docket No. 50-330

As a result of the inspection conducted on December 8 - 11, 1980, and in accordance with the Interim Enforcement Policy, 45 FR 66754 (October 7, 1980), the following violations were identified:

1. 10 CFR 50, Appendix B, Criterion XVI states, in part, that "Measures shall be established to assure that conditions adverse to quality such as...deficiencies...are promptly ...corrected. The measures shall assure that the cause...is determined and corrective action taken to preclude repetition."

Consumers Power Co. QA Program, Policy No. 16, corrective action states, in part, that "corrective action is that action taken to correct and preclude recurrence of significant recurrence of significant conditions adverse to the quality of items...Conditions or trends observed or identified which are adverse to quality are considered for corrective action..."

The "FSAR Re-review Procedure" instructions for Block 8 requires that "the engineering design documents against which the FSAR review package is to be reviewed are listed by the primary review engineer."

CPCO Audit No. M-01-53-0 states, in part, "the following significant items were revealed by this audit...in many instances not all of the design documents were listed as required by the instructions for performing the re-review."

Contrary to the above, CPCO did not initiate preventive action to preclude repetition of not identifying design documents for the remaining re-review packages as evidenced by the inspectors review of other FSAR re-review packages which did not include all of the design documents. In addition, interviews with some of the primary reviewers indicated that they were not reviewing the FSAR for technical accuracy against references at the end of the FSAR chapter as required by the procedure. Based on the above, the adequacy of the FSAR re-review is in question.

This is a Severity Level IV violation (Supplement II).

2. 10 CFR 50, Appendix B, Criteria III, states, in part, that "Measures shall be established to assure that...design bases ...are correctly translated into specifications...and for the identification and control of design interfaces...these measures shall include the establishment of procedures...for the review of documents involving design interfaces."

DUPE OF

8/02230143

Consumers Power Co. QA Program, Policy No. 3 states, in part that "Each group...performing detailed design translates the applicable regulatory requirements...design criteria into design documents, such as specifications...procedures. The design organization...establishes and controls the interface with other design organizations.

- a. Bechtel EDPI 4.25-1, Section 6.1, states, in part "Each originating design group shall maintain a log of all documents which are routed to personnel external to the design group. These logs shall be retained...providing visibility of the projects design interface control.

Contrary to the above, Bechtel Civil Project Engineering group did not maintain a coordination log of specification and specification change notices as evidenced by our review of soils related specifications C-211 and C-210.

- b. ANSI N45.2.11, Paragraph 4.1 requires that applicable design inputs are correctly translated into specifications drawings, procedures or instructions. In addition, Paragraph 7.0 requires that documents including changes are reviewed for adequacy.

Consumers Power Co.'s 50.54(f) response, Page I-17, Paragraph 4(a) required that specification change notice (SCN)-9004 be issued to require a laboratory compaction test to be performed for each field density test. SCN-9004 was initiated on 4/13/79.

Contrary to the above, Revision 16, dated 8/24/79, to the present Revision 20 of specification C-208 did not correctly translate SCN-9004 as a requirement into the specification. Revision 16 permitted laboratory density tests to be performed at a frequency as determined by the geotechnical engineer rather than for each field density test performed.

- c. ANSI N45.2.11, Paragraph 8.2 requires that design changes be reviewed and approved by the same groups or organizations which reviewed and approved the original design documents.

Consumers Power Co. 50.54(f) response, Page 23-11 committed to revise existing design control measures and require design interfaces on design changes. EDPI 4.25.1, Revision 7 added Section 4.2 which states, "It is the responsibility of the originator of a design change to effect coordination of the change with all groups which reviewed and/or used the original or subsequent revisions of that design document."

Contrary to the above, Revision 8 to EDPI 4.25.1 permits the group supervisor to waive the design interface requirement by adding to Section 4.2, "as determined by the group supervisor of the discipline which originated the document." Revision 8 does not establish adequate measures as required by ANSI N45.2.11 or as committed per 50.54(f) response.

This is a Severity Level IV violation (Supplement II).

Pursuant to the provisions of 10 CFR 2.201, you are required to submit to this office within twenty-five days of the date of this Notice a written statement or explanation in reply, including for each item of noncompliance: (1) corrective action taken and the results achieved; (2) corrective action to be taken to avoid further noncompliance; and (3) the date when full compliance will be achieved. Under the authority of Section 182 of the Atomic Energy Act of 1954, as amended, this response shall be submitted under oath or affirmation.

Dated January 12, 1981

James G. Keppler
James G. Keppler
Director

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

REGION III

Reports No. 50-329/80-32; 50-330/80-33

Docket Nos. 50-329; 50-330

Licenses No. CPPR-81; CPPR-82

Licensee: Consumers Power Company
1945 West Parnall Road
Jackson, MI 49201

Facility Name: Midland Nuclear Power Plant, Units 1 and 2

Inspection At: Bechtel Power Co., Ann Arbor, Michigan

Inspection Conducted: December 8-11, 1980

Inspectors: *E. J. Gallagher*
E. J. Gallagher, Region III

1/5/81

R. B. Landsman
R. B. Landsman, Region III

1-5-81

R. C. Knop
J. Gilray, NRR, Quality Assurance Branch

1-7-81

Reviewed By: *R. C. Knop*
R. C. Knop, Chief
Projects Section No. 1

1-7-81

Approved By: G. Fiorelli, Chief
Reactor Construction and
Engineering Support Branch

Inspection Summary

Inspection on December 8-11, 1980 (Reports No. 50-329/80-32; 50-330/80-33)

Areas Inspected: Consumers Power Company response and implementation of corrective actions regarding the 10 CFR 50.54(f) request of Question 1 of NRC letter dated March 21, 1979 and Question 23, request for additional information dated September 11, 1979. The inspection involved 106 inspector-hours at the Bechtel Ann Arbor office by three NRC staff. In addition, approximately 120 hours of review of the licensee response was performed prior to the inspection.

Results: Two items of noncompliance were identified in the above areas inspected - Severity Level IV, Inadequate Design Control with three examples; Severity Level IV, Inadequate Corrective Action; and Unresolved Items identified in Paragraph 3(c) and 3(d).

DUPE OF

810223 0150

DETAILS

Exit Meeting Attendees at Ann Arbor, Michigan, December 11, 1980

Nuclear Regulatory Commission

E. J. Gallagher, Civil Engineer Inspector, IE:Region III
R. B. Landsman, Civil Engineer Inspector, IE:Region III
J. W. Gilray, Quality Assurance Branch, NRR

Consumers Power Company

J. W. Cook, Vice President, Projects, Engineering and Construction
B. W. Marguglio, Director, Environmental Services and Quality Assurance
W. R. Bird, Quality Assurance Manager, Midland Project
D. M. Turnbull, Site Quality Assurance Superintendent
G. R. Eagle, Supervising Quality Assurance Engineer
G. S. Keeley, Midland Project Manager
G. E. Clyde, Licensing Engineer
H. P. Leonard, Section Head, Quality Assurance Engineer
D. E. Horn, Group Civil Supervisor, Quality Assurance Engineer

Bechtel, Ann Arbor Office

J. Rutgers, Midland Project Manager
J. Milandin, Manager of Quality Assurance
L. A. Dreisbach, Assistant Project Manager
V. J. Manta, Project Quality Engineer
N. Swanberg, Assistant Project Engineer
G. L. Richardson, Quality Assurance Manager, Midland Project
D. F. Lewis, Licensing Engineer
R. E. Sevo, Quality Assurance Engineer
A. E. Bico, Quality Assurance Engineer
R. L. Rixford, Quality Assurance Engineer
J. R. McBride, Quality Engineer
R. C. Hollar, Quality Engineer

1. Background

Meetings were held on February 23, 1979 and March 5, 1979 at the NRC Region III office in Glen Ellyn, Illinois to discuss the circumstances associated with the settlement of the diesel generator building at the Midland facility. This discussion was part of the investigation conducted by Region III as documented in NRC Investigation Report No. 50-329/78-20; 50-330/78-20, dated March 22, 1979. Representatives of the NRC staff from headquarters attended the meeting on March 5, 1979. The staff stated that it's concern was not limited to the narrow scope of the settlement of the diesel generator building, but extended to various buildings, utilities and other structures located in and on the plant area fill. In addition, the staff expressed concern with the Consumers Power Company Quality Assurance Program.

Under the authority of Section 182 of the Atomic Energy Act of 1954, as amended, and Section 50.54(f) of 10 CFR Part 50, additional information was requested regarding the adequacy of the fill and the quality assurance program for the Midland site in order for the Commission to determine whether enforcement action such as license modification, suspension or revocation should be taken. Question 1 of the 50.54(f) letter dated March 21, 1979 requested information regarding the quality assurance program. On April 24, 1979, Consumers Power Company submitted the initial response to the 50.54(f) request, Questions 1 through 22. As a result of the NRC staff review of Question 1, the NRC concluded that the information provided was not sufficient for a complete review. Subsequently, on September 11, 1979 the NRC issued a request for additional quality assurance information (Question 23). On November 13, 1979, Consumers Power Company submitted revision 4 to the 50.54(f) responses which included response to Question 23. As a result of the Region III investigation report and CPCO responses, the NRC issued an Order modifying construction Permits No. CPPR-81 and No. CPPR-82, dated December 6, 1979. The latest revision to Consumers Power Company response to the 50.54(f) request is revision 10, dated November 21, 1980.

2. Purpose of Inspection

The inspection was conducted at the Bechtel Power Company Ann Arbor, Michigan offices on December 8-11, 1980 to verify implementation of the specific commitments and action items reflected in Consumers Power Company response to 10 CFR 50.54(f) Questions 1 and 23 with the exception of those areas where completion of commitments has not been satisfied as of this time.

The inspection was divided into the following areas:

- a. A review of CPCo response to Question 1, Part (a) and Question 23, Part (1) regarding the identification of the specific quality assurance deficiencies that contributed to the soils problem, including the root cause of the deficiency, remedial action in the soils area, the programmatic and generic corrective actions as committed to in the response.
- b. A review of CPCo response to Question 1, Part (b) and Question 23, Part (2) regarding the provisions to be implemented to preclude areas of contradictions between the PSAR, FSAR and design documents.
- c. A review of CPCo response to Question 1, Part (c) and Question 23, Part (3) regarding the programmatic and generic corrective actions to provide confidence that quality assurance deficiencies do not (or will not) exist in other areas.

The following sections of this report discuss the results of the review of the above areas of CPCo response to Questions 1 and 23.

3. Review of Question 1, Part (a) and Question 23, Part (1)

The identification of quality assurance deficiencies that contributed to the soils problem was discussed in Question 1, Part (a) and Question 23, Part (1). Consumers Power Company identified the root cause of the deficiencies, the remedial measures in the soils area, and the programmatic and generic corrective action to preclude further recurrence of the deficiencies. CPCo compiled a list of specific action items that would have to be accomplished in order to satisfy the commitments made in response to Questions 1 and 23 of the 50.54(f) request.

Attachment No. 1 provides an action item tracking system which includes the action item description and reference and the status and documentation verified by the NRC during this inspection.

Those action items for which CPCo commitments have been accomplished are identified as being "closed"; items identified as "open" either have not been completed by CPCo or the action taken was considered insufficient.

Question 1 provided 26 action items of which the NRC verified 18 had been satisfactorily accomplished while 8 remain open. Question 23 provided 57 action items of which 34 were determined to be satisfactorily accomplished while 23 remain open.

The following are NRC findings regarding the implementation of certain CPCo commitments.

- a. Action items 23-5 and 23-38 as identified in Attachment No. 1 provided commitments to examine current procedures and practices for the preparation and control of the FSAR in view of past experiences. CPCo committed to procedural changes to existing engineering department procedures.

Seven Bechtel procedures were examined and revised to clarify design control procedures for the FSAR. Engineering Department Procedure Instruction (EDPI) 4.25.1, Design Interface Control, was revised by Revision 7 by including section 4.2 which states, "It is the responsibility of the originator of a design document change to effect coordination of the change with all groups which reviewed and/or used the original or subsequent revisions of that design document."

Subsequently, Revision 8 to EDPI 4.25.1, changes the above by adding to the end of the statement, "as determined by the group supervisor of the discipline which originated the document." The originator of Revision 8 stated that the intent was that only technical changes have to be interfaced while editorial changes would not necessarily require this interface control. The procedural change, however, does not reflect the intent and permits

the group supervisor to waive interface control for any changes as evidenced by inspection finding in Paragraph 3(b) of this report. The engineering procedures EDPI 4.25.1 does not satisfy CPCo commitment made to the NRC in response to Question 23, subsection 3.3, page 11 and identified as action item 23-5 of Attachment No. 1.

This failure to provide adequate design interface control is considered contrary to 10 CFR 50, Appendix B, Criterion III as described in the Notice of Violation. (50-329/80-32-01; 50-330/80-33-01).

- b. Engineering Department Procedure Instruction, EDPI 4.25.1, Section 6.1 requires that, "each originating design group shall maintain a log of all documents which are routed to personnel external to the design group. These logs shall be retained . . . providing visibility of the projects design interface control." It was determined based on a review of specification C-208, Revision 20, Materials Testing Services, Section 9, Soils Testing and C-211, Revision 12, Technical Specification for Backfill, that the civil project engineering group is not maintaining a complete coordination log of specifications and specification change notices.

Interviews with cognizant Bechtel personnel indicated that it is up to the originator of the document to transmit the design document to the coordinator clerk to log it in as being interfaced with the appropriate groups. It was determined from reviewing the interface log that the originator of the documents are not aware of this requirement and documents are not being interfaced with other design groups as required by the procedure. In addition, Regulatory Guide 1.64, Quality Assurance Requirements for the Design of Nuclear Power Plants and ANSI N.45.2.11-1974, Section 10 requires design interface records to be maintained.

This failure to maintain design interface and coordinator control is considered contrary to 10 CFR 50, Appendix B, Criterion III as described in the Notice of Violation. (50-329/80-32-02; 50-330/80-33-02).

- c. Specification C-208, Revision 10, Section 9 regarding soil testing requirements was reviewed for technical content. It was determined that the specification was not adequate as written. The following specific findings were identified.

- (1) CPCo was identified in Question 1, Appendix I, Page I-13, Paragraph A.4(a) that the subcontractors test procedures for soil testing service were inadequate; specifically, U. S. Testing procedures did not provide for developing and updating a family of proctor curves used to compare in-place field density tests to maximum laboratory standards. CPCo committed to the remedial action on Page I-17, Paragraph 4(a)

which states, "Selection of proctor curves will no longer be a problem because each field density test will be accompanied by a separate laboratory standard compaction test which will provide a direct comparison." It was also stated that SCN-9004, dated April 13, 1979 was issued to require the above.

It was determined that SCN-9004 was issued as committed; however, during Revision 16, dated August 24, 1979, of specification C-208, the civil project engineer failed to include the above requirement and instead revised Table 9-1 to permit the frequency of the laboratory test to be "as directed by the on-site geotechnical engineer" rather than for each field density test.

This does not comply with the commitment made in 50.54(f) response to Question 1. This occurred because adequate design interface controls had not been implemented as required by ANSI N 45.2.11. There was no evidence that the geotechnical group had reviewed or approved the revision to the specification.

This failure to provide adequate design interface control is considered contrary to 10 CFR 50, Appendix B, Criterion III as described in the Notice of Violation. (50-329/80-32-03; 50-330/80-33-03).

- (2) Specification C-208, Section 9.1.1 should be reworded to remove confusion which exists about the word "compaction". This section should read: Modified proctor tests on cohesive material shall be performed in accordance with ASTM D 1557, Method D.
- (3) Section 9.1.3 (first paragraph) does not specifically indicate how ASTM D 1566 has been modified by USBR DES E-24. In addition, why does the specification prohibit the use of the nuclear density device for measuring in-place field density? This device is an industry accepted method with a standard ASTM designation.
- (4) Section 9.1.3 (second paragraph) assumes a specific gravity of 2.75. The actual specific gravity should be known and used as is the industry practice.
- (5) Section 9.1.3(c) should also include: if the results still plot to the right of the ZAV curve the test should be rejected and a new density test performed.
- (6) Section 9.1.3(d) uses the phrase 101% compaction. This should read 101% of maximum proctor density. This section also permits the on-site geotechnical engineer "to evaluate" the results of tests that exceed 101% proctor density for cohesive material and

105% for cohesionless material. This section should include the qualitative acceptance criteria and/or instructions to be used for the basis of this evaluation.

The above items 3(c) 2, 3, 4, 5 and 6 are considered unresolved items pending a review of CPCo response to each item. (50-329/80-32-04; 50-330/80-33-04).

d. Specification C-211, Revision 12 regarding backfill work activities was reviewed for technical content. It was determined that the specification was not adequate as written. The following specific items were identified.

- (1) Section 8.1 does not specify the type of material to be used beneath Category I, safety related structures. This should be included in this specification.
- (2) Section 8.1.1 does not specify the type of material to be used around pipes and duct banks. The specification should specify or refer to appropriate instructions.
- (3) Section 8.3.2 (third paragraph) states, "the uncompacted lift thickness of the backfill material shall be determined by the on-site geotechnical soils engineer . . ." The on-site soils engineer should not have to determine the lift thickness when Attachment No. 1 to specification C-211 specifies the requirement for each type of equipment based on equipment qualification tests.
- (4) Section 8.5.2 permits the use of rubber-tired rollers to compact structural backfill and sand. Attachment No. 1 to specification C-211 does not indicate rubber-tired rollers as having been qualified and rubber-tired rollers should not be used to compact structural backfill and sand.

The above items 3(d) 1, 2, 3 and 4 are considered unresolved items pending a review of CPCo response to each item. (50-329/80-32-05; 50-330/80-33-05).

4. Review of Question 1, Part (b) and Question 23, Part (2)

The provisions and the procedures to be implemented to preclude conflicts between PSAR, FSAR and design documents was discussed in response to Question 1, Part (b) and Question 23, Part (2). Consumers Power Company included in their response a procedure entitled, "FSAR Rereview Procedure" to be implemented to accomplish this commitment.

Action items 23-1, 23-44 and 23-44(a) as identified in Attachment No. 1 provided the commitments to be implemented to assure FSAR accuracy. The following are the NRC findings regarding the implementation of these commitments.

It was determined that, in general, consultant reports were not attached to the FSAR. However, the complete text of a consultant report prepared by Weston Geophysical Engineering Company was found as an attachment to the FSAR and included in the FSAR, as Appendix 2C. Therefore, the CPCo response which states, "Consultant reports were not attached to the FSAR, but portions of consultant reports were extracted and incorporated into the FSAR text itself" (re: Question 23, Page 23-7) is not correct.

CPCo also stated that the FSAR was rereviewed against design documents such as consultant reports for conflicts.

It was determined that verification of portions of consultant reports incorporated into the FSAR have been adequately reflected in design documents has not been satisfactorily accomplished. FSAR Rereview Procedure, Revision 1, dated March 13, 1980, Subsection 2.1.3 states that each FSAR section should be carefully reviewed against design documents . . . as a minimum, the following should be checked . . . references at the end of the FSAR chapter. The procedure also requires in Item 8 that engineering design documents against which the FSAR review package is to be reviewed are to be listed by the primary review engineer in Block 8 of the FSAR rereview form. A review of FSAR packages Nos. 9474, 9473, 9472, 9471, 9096, 9097 and 9098 indicates that no design documents other than a few drawings were identified and listed. Numerous reports were referenced throughout the FSAR text of these sections, however, they were not recorded as required in Block 8 as being reviewed for consistency with the FSAR text.

An interview with a Bechtel cognizant primary review engineer indicated that he physically checked the references to make sure that they agreed with the FSAR text. Subsequently, after the NRC inspector found an apparent discrepancy between the FSAR text and one of the references, the Bechtel reviewer indicated that he did not check the text of the references, but merely checked the reference for consistency of subject matter, i.e., title vs. sentence content not technical substance vs. FSAR statements. Another cognizant Bechtel primary review engineer indicated he could not check references in his section because he was not qualified to review the technical matter in this area. He indicated that he relied on the Bechtel Geotech group (the interface reviewer in Block 11) to verify the references. Discussions with a Geotech reviewer indicated he did check reports for consistency with the FSAR, but did not list them in Block 8 as required.

After this was determined, the inspector was informed that a CPCo interim audit No. M-01-53-0, dated March 1980, identified the same problem concerning the lack of identifying design documents in Block 8 of the FSAR review form. At this time approximately 600 of a total of 900 FSAR rereview packages had been completed. However, no corrective action was taken. CPCo final audit of this activity, audit No. M-03-202-0, dated November 1980, once again identified an unresolved item, URI-3, regarding this same problem. The FSAR rereview is now complete and the unresolved item was pending resolution as of the date of this inspection.

Cognizant individuals indicated that one of the reasons why documents were not listed in Block 8 was because there was not sufficient space. An interview with the preparer of the FSAR rereview document indicated that the intent of Block 8, and its instructions, was to list all of the design documents to which the FSAR section was reviewed against in order to assure there were no more conflicts between design documents and the FSAR text.

Based on the above, it was determined the CPCo failed to provide adequate corrective action with regard to the identified audit results. This is considered contrary to 10 CFR 50, Appendix B, Criterion XVI, as described in the Notice of Violation. (50-329/80-32-06; 50-330/80-33-06).

Due to this finding, CPCo implementation of the specific commitment as discussed in response to Question 23, Part (2) has not been accomplished and the adequacy of the FSAR rereview which has been completed is questionable.

5. Review of Question 1, Part (c) and Question 23, Part (3)

CPCo and Bechtel have performed a detailed re-review of specifications, installations, and construction inspection plans, procurement documents, inspection and test procedures, including the results of inspections and tests to determine the completeness and accuracy of documents and the acceptability of hardware. In this regard, the I&E inspection activities involved a review and evaluation of activities associated with the above re-review actions and included discussions with main participants in the re-review effort. The following is a summary of this inspection.

- a. CPCo and Bechtel were able to demonstrate that an extensive re-review of specification, inspections and test procedures, and documents associated with procurements were conducted with meaningful results. The documents were evaluated by CPCo and Bechtel to assure that the necessary tolerance call outs and quality requirements were specified; that the qualification requirements were adequately called out and met; that there were sufficient specificity provided in the documents; and that there were the necessary inspection requirements specified. In addition, the completed documentation was evaluated to determine that technical and quality requirements were met in an acceptable manner.

Areas that were found deficient resulted in revision and improvement to procedural controls and specifications. Hardware suspected of not meeting quality requirements were re-evaluated by engineering and quality assurance to determine their accept, repair, or reject status.

Throughout this particular I&E inspection effort, specifications, procedures, and instructions were reviewed and a determination made that revisions and improvements were accomplished.

- b. The improved trend analysis and corrective action program established by CPCo and Bechtel was evaluated and found acceptable. It is expected that this program will prove effective in detecting major weaknesses in the early stages such that meaningful, prompt corrective actions can be initiated during the design and construction phase.
- c. The "flag program," which provides assurance that problems, similar to those experienced with reactor vessels holddown anchor bolts, do not exist in other similar procurement actions where in-process source inspection activities are involved, was evaluated. Purchase orders and receiving documentation were reviewed by Bechtel to determine that critical design and specification requirements were properly carried out and where questions were raised concerning product function, a "flag" was identified to the concern requiring further evaluation, discussions, and resolution by engineering and quality assurance. Evidence showed this activity to be productive and in accordance with documented instructions.
- d. The 1978 and 1980 independent audit results performed by the Management Analysis Corporation on CPCo and Bechtel were evaluated and found in accordance with program requirements.

Overall, the personnel contacted conveyed their QA knowledge and their sincerity and dedication towards performing the activities described above. However, as a result of the findings identified during this inspection, it is clear that more emphasis must be placed on the attention to detail in the preparation and review of documents. In order to accomplish this, upper management must play a more active role in conveying this principle to the working staff and observing attitudes and activities to assure QA principles and attention to detail are being properly carried out.

Unresolved Item

Unresolved items disclosed during the inspection are discussed in Paragraph 3(c) and 3(d) of the report.

Exit Meeting

The inspector met with licensee and contractor representatives at the conclusion of the inspection on December 11, 1980 and summarized the inspection scope and findings. The items of noncompliance identified during the inspection were discussed in detail. The licensee acknowledged the inspection results.

Attachment:
Attachment No. 1

ACTION ITEMS

PROGRAMMATIC AND GENERIC CORRECTIVE ACTIONS
 COMMITTED TO IN THE RESPONSE TO QUESTION 1, PART (a)
 AND IN THE RESPONSE TO QUESTION 23, PARTS (1) AND (2)

Action Item Number	Action Item Description and Reference	Actions Verified (Status) During NRC Inspection
23-1	<p>Consultant reports other than Dames & Moore were considered in accordance with the guidelines provided in NRC Regulatory Guide 1.70, Revision 2. Consultant reports were not attached to the FSAR, but portions of consultant reports were extracted and incorporated into the FSAR text itself. Those portions incorporated into the FSAR become commitments. Therefore, disposition of recommendations in consulting reports has been adequately accounted for in the preparation of the FSAR.</p> <p>Verification that those portions of consultant reports determined to be commitments and incorporated into the FSAR have been adequately reflected in project design documents is being accomplished via the FSAR rereview program described in the response to Question 23, Part (2).</p>	<p>(Open) Refer to Action Item 44 for Review of FSAR Re-review</p>
23-1(a) and 1 - 11	<p>The two Bechtel QA audit findings reported in our April 24, 1979, response (Paragraph D.1, Page I-8) have been closed out. The results of this audit are being utilized in the FSAR control system study committed to in Subsection 3.3 of this response to Part (1).</p> <p>(Question 1, Appendix I, Section D.1, Page I-8 Question 23, Subsection 3.1, Page 7)</p>	<p>(Closed) Reviewed quality assurance audit 4.0-special 1, "SAR change control", & audit findings A-34 & A-35. The audit was performed to assure that there is a system to assure design changes are reflected in the FSAR. Audit findings identified cases where design changes were not reflected in the FSAR. Corrective action resulted in a review of all design requirement verification checklists (DRVCL's) for groups identified with problems. This review is documented in QE monitoring report DRVC-8.</p>

Action Item Number	Action Item Description and Reference	(Status)
23-2	On April 3, 1979, Midland Project Engineering Group Supervisors in all disciplines were reinstructed that the only procedurally correct methods of implementing specification changes are through the use of specification revisions or Specification Change Notices. This was followed by an interoffice memorandum from the Project Engineer to all Engineering Group Supervisors on April 12, 1979. (Question 23, Subsection 3.2, Page 8; and Subsection 3.9, Page 24)	(Closed) Reviewed & verified memos & letters instructing proj. engr. field eng, & QC of procedure for implementing clarification or change to approved drawings or specifications: (1) Bechtel memo to QCE's, dtd 5/30/79. (2) Bechtel memo to Field Engr's, dtd 3/28/79. (3) CPCo letter to Bechtel, dtd 3/12/79. (4) Bechtel memo to Proj. Engr, dtd 3/21/79. (5) Bechtel memo to Group Suprv, dtd 3/12/79. (6) Bechtel letter to CPCo, dtd 6/5/79.
23-3 and 1 - 12	Engineering Department Project Instruction 4.49.1 was revised in Revision 2 to state, "Under no circumstances will interoffice memoranda, memoranda, telexes, TWXs, etc be used to change the requirements of a specification." (Question 1, Appendix I, Section 0.2.d, Page I-8 Question 23, Subsection 3.2, Page 9, and Subsection 3.9, Page 24)	(Closed) Reviewed & verified EDPI 4.49.1, Rev. 4, "specification change notice" to include requirement that ICM's, memo's, telex's, TWS's, etc. can not be used to change spec. requirements. A spec. change notice must be issued in order to change spec. requirements.

Action Item Number	Action Item Description and Reference	(Status)
23-4	<p>A review of interoffice memoranda, memoranda, telexes, TWXs, and other correspondence relating to specifications for construction and selected procurements of Q-listed items will be initiated.</p> <p>The purpose of the review will be to identify any clarifications which might reasonably have been interpreted as modifying a specification requirement and for which the specification itself was not formally changed. An evaluation will be made to determine the effect on the technical acceptability, safety implications of the potential specification modification, and any work that has been or may be affected. If it is determined that the interpretation may have affected any completed work or future work, a formal change will be issued and remedial action necessary for product quality will be taken in accordance with approved procedures.</p> <p>The foregoing procedure will be followed for all specifications applying to construction of Q-Listed items.</p> <p>For specifications concerning the procurement of Q-Listed items, the foregoing procedure will be implemented on a random sampling basis. The sample size has been established and the specification selection has been made.</p>	<p>(Closed) Verified Bechtel memo dated 12/20/79 (File 0455) which provides the procedure for review of all (100%) Q-listed construction type spec's. and sampling plan procedure for procurement type spec's.</p>
(21)	<p>Review and acceptance criteria for the specifications have been defined.</p>	<p>(Open) Review criteria has been established (see above action item 4); acceptance criteria was not defined. Audit report MOI-200-9 also identified this as an unresolved item.</p>
(47)	<p>The review of construction and selected procurement specifications is scheduled to be completed by April 1, 1981.</p>	<p>(Open) File had no review data for construction type or procurement type spec's.</p>

Action Item Number	Action Item Description and Reference	(Status)
(47) (cont'd)	If the acceptance criteria are not met, the review will be expanded to include other specifications for Q-listed items. At that time, a revised completion date will be established. (Question 23, Subsection 3.2, Page 9, and Subsection 3.9, Page 25)	(Open) Preliminary indication per Bechtel Representative indicated that the review will be required to be expanded to include other spec's than sampling plan identified.
23-5 (23-35)	A study was completed which examined current procedures and practices for the preparation and control of the FSAR in view of these experiences. Procedural changes have been initiated by the revision of or addition to the Engineering Department Procedures. (Question 23, Subsection 3.3, Page 11)	
23-6	An interoffice memorandum dated April 12, 1979, was issued by Geotechnical Services to alert personnel of the need to revise or annotate calculations to reflect current design status. (Question 23, Subsection 3.4, Page 13)	(Closed) Reviewed & verified inter-office memo from S. Blue to Geotech personnel, dated 4/12/79 which requires that changes in design be reflected in the original calculations & to reflect proper interdepartmental coordination has been achieved.
23-7	Field Instruction FIC 1.100, "Q-Listed Soils Placement Job Responsibilities Matrix," has been prepared and establishes responsibilities for performing soils placement and compaction. (Question 23, Subsection 3.6, Page 18; Subsection 3.7, Page 20; and Subsection 3.11, Page 30)	(Closed) Reviewed & verified, field instruction FIC1.100, Rev. 3, dated 8/15/80 to include daily job responsibilities of the onsite geotechnical engineer.

Action Item Number	Action Item Description and Reference	(Status)
23-7A and 1 - 17	Review Field Procedure FPG-3.000 to ensure clarity and completeness (Question 1, Appendix I, Section 0.2, Page I-11)	(Closed) Verified that FPG-3,000, Rev. 0, "Job responsibilities for field engineers" was reviewed as a result of this review FIC 1.100, "Job responsibilities for the onsite geotechnical engineer" was established.
23-8 and 1 - 16	Construction specifications, instructions, and procedures were reviewed to identify any other equipment requiring qualification which had not yet been qualified. No such equipment was identified. (Question 1, Appendix I, Section D.1, Page I-11 Question 23, Subsection 3.6, Page 18)	(Open) CPCo commitment not completed.
23-9	A dimensional tolerance study was completed using the reactor building spray pump and ancillary system as the study mechanism. (Question 1, Appendix I, Section D.2.b, Page I-8)	(Closed) Verified that dimensional tolerance study was performed on the reactor building spray pump system.
23-10 and 1-5	Engineering reviewed specifications not previously reviewed for the specificity or tolerance studies. (Question 1, Appendix I, Section D.2.c, Page I-8)	(Closed) verified that a review of spec's A-17, C-67, M-342, C-208, C-231 & A-41 was performed for specificity & tolerances. Revisions were made to spec. as needed.
23-11	A specific review of the FSAR and specification requirements for the qualification of electrical and mechanical components has been made as part of the corrective action relating to CPCo's 50.55(e) report on component qualification. (Question 1, Appendix I, Section D.2.e, Page I-8)	(Closed) Verified a review of FSAR & SpecI requirements for qualification of electrical and mechanical components has been performed & documented in CPCo letter to NRC, Region III dated December 5, 1980, as required by 50.55(e) reporting requirements.
23-12	Quality Assurance will schedule yearly audits of the design calculational process for techniques and actual analysis in each of the design disciplines. (Question 1, Appendix I, Section D.4, Page I-8)	(Open) CPCo commitment not completed.

1/5/81

Action Item Number	Action Item Description and Reference	(Status)
23-13	Audits of ITT Grinnell hanger design and CPCo relay setting calculation have been conducted. (Question 1, Appendix I, Section D.4, Page I-8)	(Closed) Verified that audit OT-ITT Grinnell (April 5, 1979) and audit of electrical and I&C calculations (June 26, 1979) was performed.
23-14 and 1 - 10	Bechtel Project Engineering will review design drawings for cases where ducts penetrate vertically through foundations. The possibility of the duct being enlarged over the design requirements and the effect this enlargement may have upon the structure's behavior will be evaluated by June 1, 1979. Proper remedial measures will be taken if the investigation shows potential problems. (Question 1, Appendix I, Section C.5.b, Page I-7)	(Closed) Reviewed file No. 54601-54618 (calc #41-1) dated 9/5/78 which identifies each duct bank in the plant and interface with any buildings. Results of study were documented in memo from L. Curtis to R. Rixford dated 5/27/80 which indicates no other safety-related structure except D. G. Bldg was effected by an interface with duct banks. Provisions were made to allow independent vertical movement between the diesel generator bldg and duct banks.
23-15 and 1 - 20	An in-depth audit of U.S. Testing operations, covering testing and implementation of their QA program will be conducted in late April or early May 1979, by Bechtel Project QA and Engineering. (Question 1, Appendix I, Section C.4.b, Page I-18; Section D.3.c, Page I-18)	(Closed) Reviewed and verified audit 25-2-7 of U.S. Testing Company was performed on April 25-26, 1979.
23-16 and 1 - 25	An in-depth training session will be given to Midland QA Engineers covering the settlement problem and methods to identify similar conditions in the future. (Question 1, Appendix I, Section D.1.b, Page I-22)	(Open) See review of Action Item 23-17

Action Item Number	Action Item Description and Reference	(Status)
23-17 and 1 - 25	An in-depth training session will be given to all CPCo and Bechtel QA Engineers and Auditors to increase their awareness of the settlement problem and to discuss auditing and monitoring techniques to increase audit effectiveness. (Question 1, Appendix I, Section D.2, Page I-22)	<u>(Open)</u> Reviewed IOM dated July 27, 1979 and June 4, 1979 documenting training to CPCo and Bechtel QA personnel on Midland plant fill experiences. The file does not contain documentation of the contents or detail of the training nor any material handed out to participants for their future reference.
23-18 and 1 - 24	An in-depth review of the Bechtel trend program data will be undertaken by Bechtel QA management to ensure the identification of any other similar areas that were not analyzed in sufficient depth in the past reviews. (Question 1, Appendix I, Section D.1.a, Page I-22)	<u>(Open)</u> CPCo commitment not completed.
23-19 and 1 - 21 1 - 22	Quality Control Instructions have been evaluated to ensure that the documentation characteristics which are to be inspected (i.e., surveillance and review callouts) are clearly specified.	<u>(Closed)</u> Verified the QCI's were reviewed and items requiring further action and resolution identified (See Action Item 23-19A).
23-19A and 1 - 21A	(This action modified to include necessary revision to QCIs resulting from evaluation of surveillance and review callouts.) (Question 1, Appendix I, Section D.3.a, Page I-18 and Section D.1, Page I-18)	<u>(Open)</u> Completion of required changes to QCI's per Action Item 23-19 have not been completed.
23-20	Field Instruction 1.100 has been supplemented by establishing requirements for demonstrating equipment capability, including responsibility for equipment approval, and providing records identifying this capability. (Question 23, Subsection 3.6, Page 18)	<u>(Open)</u> CPCo commitment not completed. Records identifying equip. capability not documented in Action Item file.
23-21	See Action Item Number 4 (21)	<u>(Open)</u> Acceptance criteria not defined (See Action Item 4 for review).

Action Item Number	Action Item Description and Reference	(Status)
23-22	Guidelines for surveillance of testing operations have been developed and included in Field Instructions for the onsite Soils Engineer. Engineering/Geotechnical Services has developed the guidelines. (Question 23, Subsection 3.10, Page 27)	(Closed) Responsibilities for on-site Geotechnical Engineer have been established per FIC 1.100, Rev. 3 which include requirements.
23-23 and 1 - 3	Engineering has revised Engineering Department Procedure 4.22 to clarify that Engineering personnel preparing the FSAR will follow the requirements of Regulatory Guide 1.70, Revision 2, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants" (September 1975). Specifically, Regulatory Guide 1.70 (Pages iv and v of the Introduction) requires that such consultant reports only be referenced with the applicable commitments and supporting information included in the test (third paragraph, Page v). Such a requirement precludes repetition of this circumstance. (Question 23, Subsection 3.1, Page 7 and Subsection 3.3d, Page 46)	(Closed) Verified EDP 4.22 has been revised by issuance of MED 4.22, Rev. 6 to include Regulatory Guide 1.70 which requires consultant reports to be referred with specific commitments included in text of the FSAR.
23-24	To preclude any future inconsistencies between the FSAR and specifications, Engineering Department Project Instruction 4.1.1 has been revised to state that all specification changes, rather than just "major changes," will be reviewed for consistency with the FSAR. (Question 23, Subsection 3.3, Page 11)	(Closed) Verified EDP 4.1.1, Rev. 2, "Preparation of the design requirement verification checklist", Para. 3.1 requires the discipline engineer who originates a design change document to fill out a DRVC as the change is developed. The DRVC include verification of consistency with the FSAR for design changes.

Action Item Number	Action Item Description and Reference	(Status)
23-25	Quality Assurance has issued a Nuclear Quality Assurance Manual amendment to clarify the requirement that procedures include measures for qualifying equipment under specified conditions. (Question 23, Subsection 3.6, Page 18)	(Closed) Quality Assurance policy, Section II, No. 2, "design control procedures," Para. 3.1.4, Rev. 2B states, engineering department procedure shall include criteria for specifying equip. qualification requirements. Also construction quality program, Section IV, No. 1, Rev. 2B Para. 3.2.3(P) requires instructions for qualifications of equip.
23-26	In view of Action Item 6, Geotechnical Services has revised Procedure FP-6437 to require that calculations be annotated to reflect current design status. (Question 23, Subsection 3.4; Page 13)	(Closed) Reviewed and verified procedure FP-6437-A2 was issued (See ref. letter from S. Blue to R. Rixford dated 4/10/80).
23-27	Engineering Department Procedure 4.37 has also been revised to require that calculations be annotated to reflect current design status. (Question 23, Subsection 3.4, Page 13)	(Closed) Verified procedure MED 4.37, Rev. 11, "Design Calculation" and EDPI 4.25.1, Rev. 7, "Design Interface Control" was issued to require the originator of a design change to notify all groups which used the original design document and to check the latest design info prior to revising calculations.
23-28	Civil/Structural Design Criteria 7220-C-501 has been modified to contain the requirements that a duct bank penetration shall be designed to eliminate the possibility of the nonspecific size duct interacting with the structures. (Question 23, Subsection 3.5, Page 15)	(Closed) Verified civil design criteria C-501, Rev. 11, Para. 6.6 has been added which states, "All interfaces between bldg's or foundations and duct banks designed after Jan. 1, 1980 shall be included on civil design drawings and shall indicate clearances or const. restrictions as required to account for differential settlement, seismic movement, etc.
23-29	The civil standard detail drawings have been revised to include a detail showing horizontal and vertical clearance requirements for duct bank penetrations. The detail addresses any mud mat restrictions. (Question 23, Subsection 3.5, Page 15)	(Closed) Verified civil standards and misc. concrete details, sheet 2, dwg C-141, Rev. 6 detail 12 provides duct bank clearance criteria.

Action Item Number	Action Item Description and Reference	(Status)
23-30 (39)	Engineering clarified specifications and Construction prepared procedures (governing the soils compaction equipment) to implement the requirements of the Nuclear Quality Assurance Manual as stated in Action Item 25. (Question 23, Subsection 3.6, Page 18)	<u>(Closed)</u> Verified spec C-211, Rev. 12, Para. 8.5.1 (compaction equipment) now requires proposed compaction equipment to be qualified to demonstrate compaction can be achieved at a specified lift thickness, number of passes, speed of equipment and frequency of vibration for vibrating equip.
23-31	Design documents, instructions, and procedures for those activities requiring inprocess controls have been reviewed to assess the adequacy of existing procedural controls and technical direction. Engineering review has been completed. (Question 1, Appendix I, Section D.2, Page I-11; and Question 23, Subsection 3.7, Page 20; and Subsection 3.11, Page 30)	<u>(Open)</u> CPCo commitment not completed.
23-32	Guidelines for surveillance of testing operations have been developed and included in Field Instructions for the onsite Soils Engineer. Engineering/Geotechnical Services has developed the guidelines and Field Engineering has prepared the instructions. (Question 23, Subsection 3.10, Page 27)	<u>(Closed)</u> See Action Item 23-22.
23-33	The Quality Assurance audit and monitoring program will be revised to emphasize and increase attention to the need for evaluating policy and procedural adequacy and assessment of product quality. A specialized audit training program will be developed and implemented to ensure guidance for this revised approach. (Question 23, Subsection 3.13, Page 35)	<u>(Open)</u> CPCo commitment not completed.

Action Item Number	Action Item Description and Reference	(Status)
23-34 and 1 - 23	Control Document SF/PSP G-6.1 has been revised to provide requirements for inspection planning specificity and for the utilization of scientific sampling rather than percentage sampling. (Question 1, Appendix I, Section D.5.f, Page I-20; and Question 23, Subsection 3.8, Page 22; Subsection 3.9, Page 24; Subsection 4.2.2, Page 59)	(Closed) Verified Procedure G-6.1, Rev. 5 has been revised to include requirements for planning, specificity (Para. 3.3.2) and utilization of scientific sampling (Para. 3.3.3.a.8). This deleted surveillance type inspection and now requires inspection by witness or test.
23-35 23-36 and 1 - 24 1 - 25	Control Documents SF/PSP G-3.2, "Control of Nonconforming Items," and QADP C-101, "Project Quality Assurance Trend Analysis" have been revised to provide an improved definition of implementing requirements for identifying repetitive nonconforming conditions. (Question 23, Subsection 3.12, Page 33)	(Closed) Verified G-3.2, Rev. 6, "Control of Nonconforming Items" and QAPP C-101 "QA Trend Analysis" have been modified to provide for identifying repetitive nonconforming conditions. Interviewed Mr. T. K. Subramanian.
23-37	Consistent with the intent of Action Item Numbers 35 and 36, Quality Assurance will review nonconformance reports which were open as of November 13, 1979, or became open prior to implementation of the improved Project Quality Assurance Trend Analysis program as stated in Action Item 36. This review will be to identify any repetitive nonconforming conditions pertaining to product type or activity, or pertaining to nonconformance cause. (Question 23, Subsection 3.12, Page 33)	(Open) CPCo commitment not completed.

Action Item Number	Action Item Description and Reference	(Status)
23-38 (23-5)	A study was completed which examined current procedures and practices for the preparation and control of the FSAR in view of these experiences. Procedural changes have been initiated by the revision of or addition to the Engineering Department Procedures. (Question 23, Subsection 3.3, Page 11)	(Open) See Action Item 23-5
23-39 (30)	Engineering clarified specifications and Construction prepared procedures (governing the soils compaction equipment) to implement the requirements of the Nuclear Quality Assurance Manual as stated in Action Item 25. (Question 23, Subsection 3.6, Page 18)	(Closed) Verified FIC 1.100, Rev. 3 requires on-site geotechnical engineer to ensure compaction equipment is qualified and listed in the spec and can deliver required degree of compaction.
23-40 (31)	Design documents, instructions, and procedures for those activities requiring inprocess controls will be reviewed to assess the adequacy of existing procedural controls and technical direction. Engineering review has been completed, and Field Engineering and quality control review is scheduled for completion by February 27, 1981. (Question 1, Appendix I, Section D.2, Page I-11; Question 23, Subsection 3.7, Page 20, and Subsection 3.11, Page 30)	(Open) CPCo commitment not completed.

Action Item Number	Action Item Description and Reference	(Status)
23-41	<p>QCIs in use will be reviewed to ascertain that provisions have been included consistent with the revised control document, SF/PSP G-6.1, "Quality Control Inspection Plans."</p> <p>(Question 1, Appendix I, Section D.1, Page I-18; Question 23, Subsection 3.8, Page 22; and Subsection 3.9, Page 24)</p>	(Open) CPCo commitment not completed.
23-42	<p>Design documents, instructions, and procedures for those activities requiring inprocess controls will be reviewed to assess the adequacy of existing procedural controls and technical direction. Engineering review has been completed, and Field Engineering and quality control review is scheduled for completion by February 27, 1981. Any revisions required will be completed by April 17, 1981.</p> <p>(Question 1, Appendix I, Section D.2, Page I-11; Question 23, Subsection 3.7, Page 20; and Subsection 3.11, Page 30)</p>	(Open) CPCo commitment not completed.
23-43	<p>The impact of Action I 11 on completed work will be evaluated, and appropriate actions will be taken as necessary.</p> <p>(Question 23, Subsection 3.8, Page 22; and Subsection 3.9, Page 25)</p>	(Open) CPCo commitment not completed.
23-44	<p>FSAR sections have been rereviewed as discussed in the Response to Question 23, Part (2).</p> <p>(Question 23, Subsection 3.1, Page 7; Subsection 3.3, Page 11; Subsection 3.2, Page 41; and Section 4.0, Page 47)</p>	<p>(Open) 9 re-review packages were reviewed by the NRC. Not all of the design documents were listed in Block 8 of required form per procedure for performing review issued 3/13/80. This was identified as an item of noncompliance as discussed in Paragraph 4 of this report.</p>

Action Item Number	Action Item Description and Reference	
23- 44A	The audit committed to in our response to Question 1, Part b, and described in Part (2), Section 5.0 was conducted once during the course of the FSAR rereview (commencing March 17, 1980) and again after completion of the rereview (commencing November 3, 1980).	(Open) (1) CPCo Audit not completed & (2) Existing Audit findings (MO1-53-0) not satisfactorily resolve; i.e., inadequate corrective action. This item has been identified as an item of noncompliance as discussed in paragraph 4 of this report.
	(Question 23, Part (2), Section 5.0, Page 48)	

Action Item Number	Action Item Description and Reference	
23-45	U.S. Testing was required to demonstrate to cognizant Engineering Representatives that testing procedures, equipment, and personnel used for quality verification testing (for other than NDE and soils) were capable of providing accurate test results in accordance with the requirements of applicable design documents. (Question 1, Appendix I, Section D.3.b, Page I-18; Question 23, Subsection 3.10, Page 27; and Subsection 3.11, Page 31)	(Open) CPCo commitment not completed.
23-46	A sampling of U.S. Testing's test reports (for other than NDE and soils) were reviewed by cognizant Engineering Representatives to ascertain that results evidence conformance to testing requirements and design document limits. (Question 23, Subsection 3.10, Page 28; and Subsection 3.11, Page 31)	(Open) CPCo commitment not completed.
23-47	See Action Item Number 4 (47)	(Open) CPCo commitment not completed.
23-48	CPCo performs overinspection for soils placement, utilizing a specific overinspection plan. (Question 1, Appendix I, Section C.2.b, Page I-11; Section C.1.c, Page I-16)	(Closed) Verified CPCo overinspection plan. 01-C-3A, Rev. 1 for soil placement and reviewed completed overinspection results performed on weekly basis. This overinspection program is an ongoing activity by Midland QA group.
23-49	CPCo performs overinspection of the U.S. Testing soils testing activities and reports, utilizing a specific overinspection plan. (Question 1, Appendix I, Section C.3.c, Page I-17)	(Closed) Verified CPCo overinspection plan 01-C-4A, Revision 3, for soil testing and review completed overinspections performed on U. S. Testing.

Action Item Number	Action Item Description and Reference	
23-50	CPCo Project Management and QA review field procedures (new and revised) and CPCo QA reviews QCIs (new and revised) in line with Bechtel before release. (Question 1, Appendix I, Section D.5.b, Page I-19)	(Closed) Verified CPCo reviews of field procedures and quality control instruction in addition to Bechtel prior to release.
23-51	In 1978, CPCo implemented an overinspection plan struction and the Bechtel inspection process, with the exception of civil activities. Reinforcing steel and embeds were covered in the overinspection. (Question 1, Appendix I, Section D.5.c, Page I-19)	(Closed) Verified CPCo has overinspection plans in the civil, electrical, mechanical, and welding/NDE work activities.
23-52	CPCo reviews onsite subcontractor QA manuals and covers their work in the audit process. (Question 1, Appendix I, Section D.5.d, Page I-19)	(Closed) Verified CPCo reviews subcontractor QA manuals and audits subcontractor work.
23-53	An ongoing effort is improving the "surveillance" mode called for in the QCIs by causing more specific accountability as to what characteristics are inspected on what specific hardware and in some cases changing "surveillance" to "inspection." (Question 1, Appendix I, Section D.5.e, Page I-19)	(Closed) Verified that SF/PSP G-6.1, Rev. 5 "procedure for Quality Control inspection plans" have deleted surveillance method and new requirements direct inspection by witness or test to be performed by Quality Control surveillance method has been deleted in para 3.3.3.a.3 of G-6.1, Rev. 5.

Action Item Number	Action Item Description and Reference	(Status)
1 - 1	Perform a final review & update of PSAR commitment list.	(Open) Action item not reviewed by NRC during the inspection.
1 - 2	Review sections of FSAR determined to be inactive.	(Open) See Action Item 23-44 for NRC review & results.
1 - 3	Review EDP 4.22.	(Closed) See Action Item 23-23 for NRC review.
1 - 4	Audit Action Items 1-3	(Open) See / Item 23-44A for NRC review & results.
1 - 5	Review specifications not included in specificity study initially.	(Closed) See Action Item 23-10 for NRC review and results.
1 - 6	Dames and Moore Report was reviewed and recommendations identified and dispositioned.	(Open) File indicated review was complete, however, no details of the recommendations identified or the dispositions were available.
	(Question 23, Subsection 3.1, Page 23-6)	
	(Question 1, Apx, I, Page I-6, Para C.1.(b))	
1 - 7	Complete review of pertinent portions of FSAR sections 2.5 and 3.8.	(Closed) Verified FSAR, Revision 18 to have corrected: (1) inconsistency between FSAR 3.8.5.5 and 2.5.4, Figure 2.5-48, settlement values, (2) Table 2.5-9 and Table 2.5-14 regarding soil type supporting structures from clay to (Zone 2) random fill, (3) Table 2.5-16, index of compressibility factors to be determined from fill studies. (4) Table 2.5-21 compaction requirements.
	Inconsistencies between FSAR subsection 2.5.4. and 3.8.5 have been corrected via FSAR Amendment 18 (Feb 28, 1979) the same revision also corrected inconsistency between 2.5.4 and drawing C-45.	Reviews of Section 2.5.4. are on "Hold" until resolution of soils issue. NRC office of NRR Geotechnical Branch will review FSAR section when final.
	(Question 23, Subsection 3.3, Page 23-11)	
	(Question 1, Apx I, Page I-6, Para 3)	

Action Item Number	Action Item Description and Reference	
1 - 8	<p>Correct Settlement Calculations</p> <p>Settlement calculations will be revised after completion of diesel generator building surcharge operations.</p> <p>(Question 23, Subsection 3.4, Para 23-13)</p> <p>(Question 1, Apx I, Page I-6, Para C.4.a)</p>	<p>(Closed) Verified settlement calculations have been made subsequent to surcharge operations (RE: calculation No. S-105 File 8230, dated February 14, 1980), results of these calculations have been included in response to question 27 of 50.54(f) requests. Review of this response and results of calculations are being made by NRC office of NRR Geotechnical Branch.</p>
1 - 9	<p>Schedule audits of the Geotechnical Section on a six month basis.</p> <p>A recent Bechtel QA audit of Bechtel Geotech Section was conducted in February 1979. Additional audits will be performed in this area on a six month cycle until completion of soil work.</p> <p>(Question 1, Apx I, Page I-7, Para C.4.c)</p>	<p>(Closed) Review audits of Bechtel Geotechnical dated February 26-28, 1979, and August 29-31, 1979, and February 26-28, 1980.</p> <p>Audits are scheduled for every six months.</p>
1 - 10	<p>Review drawings for possible effect of vertical duct bank restrictions.</p>	<p>(Closed) See Action Item 23-14 for NRC review.</p>
1 - 11	<p>Complete actions in response to DRUCL audit.</p>	<p>(Closed) See Action Item 23-1 for NRC review.</p>
1 - 12	<p>Revise EDP 4-49 to incorporate clarifications and instructions for use of specification change notices.</p>	<p>(Closed) See Action Item 23-3 for NRC review.</p>
1 - 13	<p>Schedule audits of each design discipline calculations on a yearly basis.</p>	<p>(Open) CPCo commitment not completed.</p>
1 - 14	<p>Re-evaluate construction equipment used for compaction.</p> <p>Compaction equipment currently in use has been qualified and construction notified of parameters governing use of equipment.</p> <p>(Question 23, Subsection 3.6., Page 23-18)</p> <p>(Question 1, Apx I, Page I-11, Para C.1)</p>	<p>(Closed) Verified 50.54(f) submittal, "Report on Test Fill Program" which provides documentation for qualification of compaction equipment currently in use, Spec. C-211, attachment 1, provides a list of equipment to be used and compaction requirements.</p>

Action Item Number	Action Item Description and Reference	
1 - 15	Assign Field Soils Engineer and Soils Engineer from design section. One full time and one part time onsite Geotechnical Soils Engineer has been assigned. (Question 23, Subsection 3.7., Page 23-20) (Question 1, Apx I, Page I-11, Para C.2.a)	(Closed) Verified Spec. C-211 Para 8.3.5. requires soil work to be performed under direction of qualified onsite soils engineer.
1 - 16	Review construction specifications and procedures to identify equipment requiring qualifications.	(Open) See Action Item 23-8 , CPCo Commitment not completed.
1 - 17	Review field procedure FPG-3.00 to ensure clarify and completeness.	(Closed) See Action Item 23-7a for NRC review.
1 - 18	PQCI 1.02 has been revised to incorporate the specific characteristics to be verified by Quality Control. (Question 23, Subsection 3.8, Page 23-22) (Question 1, Apx I, Page I-16, Para C.1.a) Project Quality Control Instructions C-1.02 was revised to include verification of use of qualified equipment & compliance with qualified procedures. (Question 23, Subsection 3.6, Page 23-18) (Question 1, Apx I, Page I-16, Para C.1.a) (Question 1, Apx I, Page I-17, Para C.4.a)	(Closed) Verified PQCI 1.02 (Rev. 5) has been revised to include specific characteristics to be inspected. (Closed) Verified C-1.02, Rev. 5 requires compaction equipment to be qualified and will adequately compact the material being placed and provides for a daily soil placement report.

Action Item Number	Action Item Description and Reference	
1 - 18 Cont'	PQCI 1.02 was revised to provide specific inspection requirements for verifying soil moisture contents, rather than surveillance. (Question 23, Subsection 3.9, Para 23-24)	(Closed) Verified PQCI 1.02 (Rev. 5) Para 2.3 has been revised to provide inspection of moisture testing.
1 - 19	Complete in depth review of soil test results Geotechnical Services has completed an investigation which includes an in depth review of testing performed by U. S. Testing and reported test results. (Question 23, Subsection 3.10, Page 23-27) (Question 1, Apx I, Page I-17, Para C.3.a) An in depth soils investigation program provides verification of the acceptability of the soils or identified any nonconformances requiring further remedial action. (Question 23, Subsection 3.8, Page 23-23) (Question 1, Apx I, Page I-17, Para 3.a)	(Closed) Reviewed and verified report entitled, "Review of U. S. Testing Field and Laboratory Construction Test Data on Soil Uses as Fill", dated July, 1979 was performed. (Closed) Verified that borings, test pits, laboratory tests, analysis of past test results and plots of all tests have been performed as part of the investigation of the subsurface materials. This information has been submitted to the NRC and is currently under review by NRC office of NRR, Geotechnical Branch.
1 - 20	Perform in depth audits of U. S. Testing.	(Closed) See Action Item 23-15 for NRC review.
1 - 21	Review of QCI's for surveillance call outs.	(Closed) See Action Item 23-19 for NRC review.
1 - 21A	Modify QCI's Based on Item 1-21.	(Open) CPCo commitment not completed.
1 - 22	Evaluate documentation call outs on QCI's	(Closed) See Action Item 23-19 for NRC review.
1 - 23	Incorporate scientific sampling plans for inspection.	(Closed) See Action Item 23-34 for NRC review.
1 - 24	Complete in depth review of Bechtel trend program.	(Closed) See Action Items 23-35 and 23-36 for NRC review.

Action Item Number	Action Item Description and Reference
--------------------	---------------------------------------

1 - 25	Conduct QA Training.
--------	----------------------

(Unnumbered) Selection of proctor curves will no longer be a problem because each field density test will be accompanied by a separate laboratory standard which will provide a direct comparison. This was directed by a letter to U. S. Testing and reflected in specification change notice C-208-9004, dated April 13, 1979.

(Question 23, Subsection 3.10, Page 23-27)

(Question 1, Apx I, Page I-17, Para C.4a)

(Unnumbered) Specifications were revised to provide more definition requirement for soil moisture testing.

(Question 1, Apx I, Page I-16, Para C.2.a.)

(Unnumbered) Spec. C-210 and 211 were revised to incorporate interpretations that affected specification requirements.

(Question 23, Subsection 3.2., Page 23-8)

(Question 1, Apx I, Page I-6, Page C.1.a)

(Unnumbered) The requirements for the control of testing were adjusted, requiring the testing subcontractor to check all field density tests for cohesive material against the zero-air-voids curve.

(Question 23, Subsection 3.10, Page 23-27)

(Unnumbered) PQCI SC-1.05 was revised to add more stringent requirements for in process inspections of U. S. Testing.

(Question 23, Subsection 3.10, Page 23-27)

(Open) See Action Items 23-16 and 23-17 for NRC review.

(Open) A review of this commitment resulted in an item of noncompliance as discussed in paragraph 3.(c) of this report.

(Closed) Verified spec. C-211, Rev. 12, Para 8.4 (moisture control) has been revised to provide specific requirements for moisture testing.

(Open) Interpretations had not been identified or evidence of being incorporated into specifications.

(Closed) Reviewed and verified Spec. C-208, Rev. 20 20, Para 9.1.3. to require all field density tests to be checked to the zero-air voids curve.

(Closed) Verified PQCI 1.05, Rev. 11 was revised to include requirements for inspecting in process testing activities.



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
760 ROOSEVELT ROAD
GLEN ELLYN, ILLINOIS 60137

ATTACHMENT 4

FEB - 2 1981

Docket No. 50-329
Docket No. 50-330

Consumers Power Company
ATTN: Mr. James W. Cook
Vice President, Midland Project
1945 West Parnall Road
Jackson, MI 49201

Gentlemen:

This refers to the routine inspection conducted by Messrs. E. J. Gallagher, R. B. Landsman, and R. Sutphin of this office on January 7-9, 1981 of activities at the Midland Nuclear Power Plant, Units 1 and 2 authorized by NRC Construction Permits No. CPPR-81 and No. CPPR-82 and to the discussion of our findings with Mr. W. R. Bird at the conclusion of the inspection.

The enclosed copy of our inspection report identifies areas examined during the inspection. Within these areas, the inspection consisted of a selective examination of procedures and representative records, observations, and interviews with personnel.

During this inspection, certain of your activities appeared to be in non-compliance with NRC requirements, as described in the enclosed Appendix A, and a written response is required.

Certain other activities, set forth in Appendix B to this letter, appear to be a deviation from commitments which you have made in previous correspondence with the Commission. Please advise us in writing within twenty-five days of the date of this letter of the corrective action you have taken or plan to take, showing the estimated date of completion with regard to this deviation.

In accordance with Section 2.790 of the NRC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations, a copy of this letter, the enclosures, and your response to this letter will be placed in the NRC's Public Document Room, except as follows. If the enclosures contain information that you or your contractors believe to be proprietary, you must apply in writing to this office, within twenty-five days of the date of this letter, to withhold

DUPE OF

8103180198

FEB 2 1981

such information from public disclosure. The application must include a full statement of the reasons for which the information is considered proprietary, and should be prepared so that proprietary information identified in the application is contained in an enclosure to the application.

We will gladly discuss any questions you have concerning this inspection.

Sincerely,

James G. Keppler
Director

Enclosures:

1. Appendix A, Notice of Violation
2. Appendix B, Notice of Deviation
3. IE Inspection Reports
No. 50-329/81-01 and
No. 50-330/81-01

cc w/encls:

Central Files

Reproduction Unit NRC 20b

PDR

Local PDR

NSIC

TIC

Ronald Callen, Michigan

Public Service Commission

Myron M. Cherry, Chicago

RIII

Callen/JP
1/26/81

RIII

Lundman
1-26-81

RIII

Sutphin
1/26/81

RIII

Knop

RIII

Fiorelli

RIII

1/3/81

RIII

2/2/81

RIII 6634
Davis 2/30

Appendix A

NOTICE OF VIOLATION

Consumers Power Company

Docket No. 50-329

Docket No. 50-330

As a result of the inspection conducted on January 7-9, 1981, and in accordance with the Interim Enforcement Policy, 45 FR 66754 (October 7, 1980), the following violations were identified.

1. 10 CFR 50, Appendix B, Criterion V, requires in part "Activities affecting quality shall be prescribed by documented instructions, procedures, or drawings".

CP QA Program Policy No. 5 states in part, "Prior to performing...inspection on a safety related item, suppliers are required to develop written procedures for . . . performing required inspection and tests. These procedures reference applicable drawings, specifications, codes and standards. CPCo QA Departments review field... inspection procedures prior to implementation".

Contrary to the above, the inspector determined that U. S. Testing Company has not established test procedures for soils work activities. The specification for testing, C-208, references ASTM standards for performing specific tests, but does not include procedural controls or instructions for implementing the tests.

This is Severity Level V violation.

2. 10 CFR 50, Appendix B, Criterion VI requires in part, "Measures shall be established to control the issuance of documents . . ."

CP QA Program Policy No. 6 states in part, "Documents which prescribe activities affecting quality . . . are . . . controlled according to written procedures. . . . The document control system provides for: Identifying the proper documents to be used in performing a quality related. . . activity; establishing current and updated distribution lists".

Contrary to the above, the inspector determined that U. S. Testing Company test result forms are not controlled. The proper documents to be used for a specific test are not defined. There is no distribution list for the forms. The latest revision of the forms are not controlled.

This is a Severity Level V violation.

3. 10 CFR 50, Appendix B, Criterion XVII, requires in part, "Sufficient records shall be maintained to furnish evidence of activities affecting quality".

ANSI N45.2.9, Section 3.2.1. requires in part, "Quality assurance records shall be considered valid only if stamped initialed, signed, or otherwise authenticated and dated by authorized personnel".

DUPE OF 8103180203

CP QA Program Policy No. 17 states in part, "Compile records as specified in applicable procedures, codes . . ."

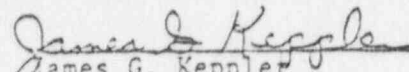
Bechtel Field Instruction FIC-1.100, Appendix A under Daily FER, paragraph No. 18 states in part, "Review and initial all acceptable test report sheets from U.S. Testing . . ."

Contrary to the above, the inspector observed that numerous U.S. Testing report sheets were rubber stamped with the name of the onsite geotech engineer and not initialed and dated as required. In addition, there were no procedural controls for the use of the signature stamp.

This is a Severtiy Level VI violation.

Pursuant to the provisions of 10 CFR 2.201, you are required to submit to this office within twenty-five days of the date of this Notice a written statement or explanation in reply, including for each item of noncompliance: (1) corrective action taken and the results achieved; (2) corrective action to be taken to avoid further noncompliance; and (3) the date when full compliance will be achieved. Under the authority of Section 182 of the Atomic Energy Act of 1954, as amended, this response shall be submitted under oath or affirmation.

Dated February 2, 1981


James G. Keppler
Director

Appendix B

NOTICE OF DEVIATION

Consumers Power Company

Docket No. 50-329

Docket No. 50-330

As a result of the inspection conducted on January 7-9, 1981, the following was cited as a deviation.

10 CFR 50, Section 50.54(f) response from CPCo to Question 23, Subsection 3.7 states in part, "One full time and one part time onsite geotechnical engineer have been assigned. These engineers provide technical direction and monitoring of the process."

Contrary to the above it was determined that the assigned engineering technician does not satisfy the commitment made in 10 CFR 50.54(f) submitted to provide an onsite geotechnical engineer and to implement the duties and responsibilities of FIC 1.100, Appendix A, "Duties & Responsibilities of the Onsite Geotechnical Engineer".

DUPE OF 8103180208

U. S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

REGION III

Report No. 50-329/81-01; 50-330/81-01

Docket No. 50-329; 50-330

License No. CPPR-81; CPPR-82

Licensee: Consumers Power Company
1945 Parnall Road
Jackson, MI 49201

Facility Name: Midland Nuclear Power Plant, Units 1 and 2

Inspection At: Midland Site

Inspection Conducted: January 7-9, 1981

Inspectors: E. J. Gallagher

EJ Gallagher

1-26-81

R. B. Landsman

R. B. Landsman

1-26-81

R. N. Sutphin, Jr.

R. N. Sutphin, Jr.

1-26-81

R C Knop

Reviewed By: R. C. Knop, Chief,
Projection Section

1-27-81

Approved By: *G. Fiorelli*
G. Fiorelli, Chief,
Reactor Construction and
Engineering Support Branch

1/28/81

Inspection Summary

Inspection on January 7-9, 1981 (Report No. 50-329/81-01; 50-330/81-01)

Areas Inspected: Consumers Power Company response and implementation of corrective actions regarding the 10 CFR 50.54(f) request of question 1 of NRC letter dated March 21, 1979 and question 23, request for additional information dated September 11, 1979; procedures, quality records and observation of work related soils work activity; quality assurance organization status, construction schedule; and status of personnel air locks. The inspection involved a total of 60 inspector-hours on site by three NRC inspectors.

DUPE OF

8103180215

Results: Three items of noncompliance and one deviation were identified in the above inspected areas - Severity Level IV, Inadequate Procedures; Severity Level IV - Inadequate document control; Severity VI - Inadequate Quality Assurance Records; Deviation from commitment to provide Geotechnical Engineer.

DETAILS

Persons Contacted

Consumers Power Company

D. Miller, Site Manager
*W. Bird, Quality Assurance Manager
*T. Cooke, Project Superintendent
*R. Davis, Quality Engineer
*R. Wheeler, Staff Engineer
*D. Horn, Civil Group Supervisor
*H. Leonard, Section Head, Quality Engineering
*D. Turnbull, Site Quality Assurance Superintendent
D. Keating, Section Head IE and TV

Bechtel Power Company

*J. Russel, Assistant Project Field Quality Control Engineer
*E. Smith, Project Field Quality Control Engineer
*P. Corcoran, Resident Assistant Project Engineer
*P. Goguen, Lead Civil Field Engineer
*J. Betts, Assistant Field Project Engineer
*M. Deitrich, Project Quality Assurance Engineer
*L. Snyder, Resident Quality Engineer

U. S. Testing Company

J. Speltz, Lab. Manager

The inspectors also contacted other licensee and contractor personnel during the course of the inspection.

*Denotes those in attendance at the exit meeting on January 9, 1981.

Licensee Action on Previously Identified Items

(Closed) CPCo Action Item: S100D, NRC Inspector E. W. K. Lee's concern regarding "unreadable documents" in one of the document packages for a shop weld, as expressed by the inspector during his October 9-10, 1979 inspection, and item "D" of J. L. Corley October 12, 1979, Midland Memo No. 344FQA79. CPCo determined that documents of concern applied to spool piece 2CCA-61-S611-2-6 wherein parts of two radiograph reports were not legible due to copy machine problems. Legible copies were secured for this file. In addition Bechtel QC reviewed 20 other M-104-A data packages and found 9 out of 298 pages in similar condition. Legible copies were made of all discrepant pages and filed, as recorded in L. A. Dreisbach Memo LAD168S of August 8, 1980, to J. L. Corley. This item of NRC concern is closed.

(Closed) 329/79-12-01; 330/79-12-01 "Work Prints in use were not current revision", CPCo Action Item S500. CPCo advised inspector that incorrect issue (Rev. 11) of print was removed and correct issue (Rev. 12) provided to the work area at the time of the original inspection. Current issue of the drawing is Revision 14, issued September 14, 1979, title of the drawing in Question is "Decay Heat Removal, Core Flooding System Unit 2 Hangers, Location and Identification". Three audits have been performed since the original inspection. One was reported in May 1979, one reported September 9, 1980, and another reported on November 24, 1980, the results of which indicate a significant improvement in the revision control of work prints. Based on this corrective action and commitments by CPCo to maintain a continuing program of audits in this area of activity, the referenced item of noncompliance is closed.

(Closed) Unresolved Item 329/80-11-03; 330/80-12-03, "Snubber Missing Required Spacer". Two snubbers were found to have one missing spacer washer each, however, they had not gone through the regular inspection and acceptance by Quality Control at the time 24 pipe supports in various stages of inspection and installation were observed by the NRC inspector. As a result of the express concern of the NRC inspector training was planned and conducted on June 10, 1980, construction corrected the condition of the two snubbers, and documented the inspection on a QC-G1-1 form, and activity 3.1.c in the P-2.10 PQCI has been added to verify future configurations and orientations are correct, per M. A. Dietrich Memo No. LAD1754 of November 12, 1980. Based on this documented corrective action, this unresolved item is considered closed.

(Closed) CPCo Action Item: S479, NRC inspector R. N. Sutphins concern regarding lack of update of EDPIS per comments in NRC reports No. 50-329/80-30; 50-330/80-31, Page 11. The inspector checked the two items in the Bechtel Power Corporation Engineering Department procedures manual and found them to be in proper order. This concern is closed. However, additional technical review of the Engineering Department procedures manual will be conducted at subsequent inspections.

Section I

Prepared by R. N. Sutphin

Reviewed by R. C. Knop, Chief
Projects Section 1

1. Functional or Program Areas Inspected

a. CPCo Quality Assurance Organization

The inspector reviewed the organization chart of the combined CPCo - Bechtel Quality Assurance Organization, issue date January 1, 1981. Mr. M. A. Dietrich is (Acting) PQAE replacing Mr. L. A. Dreisbach who has been reassigned. Mr. D. M. Turnbull had reported to the site in the position of Site Project QA Superintendent. The combined Midland project Quality Assurance organization now has 40 persons assigned compared to 36 as of mid October 1980. The supervisor of the administration Group reporting to the site project Quality Assurance Superintendent will be announced in January 1981. Additional information was requested on the person who has been selected to fill an open position as Civil Quality Control Engineer in the Bechtel Quality Control Organization.

b. Construction Schedule

The inspector checked the status of construction and construction schedules for the overall project, and received a copy of the January 8, 1981 CPCo report memo to NRC on the current yellow book schedule.

c. Onsite Design Activity

The inspector checked the status of the ongoing onsite design activity and continued his review of the engineering department procedures manual. The inspector toured the site to observe the status of the work.

No items of noncompliance or deviations were identified.

2. Other Inspection Areas

a. 50.55(e) Personnel Air Locks

The inspector checked on the status of the activity to resolve the remaining open questions on the personnel air locks. The manufacturer is working on the completion of the as-built record, revised drawings, and updated stress report. Bechtel will review these items when they are completed. The manufacturer will advise if any further repair or rework is recommended. This item will remain open and additional review will be conducted at subsequent inspections.

Section II

Prepared by E. J. Gallagher
R. B. Landsman

Reviewed by R. C. Knop, Chief
Projects Section 1

1. Review of Onsite Soils Works Activities

As a followup to NRC Inspection Report No. 50-329/80-32; No. 50-330/80-33 the region III inspectors performed an inspection of the current onsite soils work activities to verify whether adequate corrective actions have been implemented as described in Consumers Power Company response to questions 1 and 23 of 10 CFR 50.54(f) submittals. The following are the specific findings.

a. Procedural Controls for Soils Work

It was determined that U. S. Testing Company (UST) have not established written procedures for implementing the requirements of Testing Specification C-208. This specification references numerous ASTM standards for performing specific tests but does not include procedural control or instructions for the implementation of such tests.

- (1) While observing a laboratory relative density test (ASTM2049) it was observed that the variable rheostat on the testing apparatus was set at maximum setting. The lab technician stated that ASTM D2049 requires the setting of the machine at maximum amplitude. It was determined that UST did not previously determine the rheostat setting that produced the maximum density for the material being used onsite. It was assumed by UST that maximum setting produced maximum density. Relative density tests are used to assure that the in-place field density meets the specification requirements.

Corps of Engineers Manual EM 1110-2-1906 dated November 30, 1970, Appendix XII, Page XII-8 states the following:

"It has been determined that for a particular vibrating table, mold, and surcharge assembly, the maximum dry density of a specimen may be obtained at a displacement amplitude (rheostat setting) less than the maximum amplitude of which the apparatus is capable; i.e. dry density may increase with increase in rheostat setting to a setting, beyond which the dry density decreases, therefore each laboratory should determine for it's apparatus the rheostat setting at which maximum density is produced and use this setting for subsequent maximum density testing."

Footnote on Page XII-8 states:

"It may be desirable to redetermine the optimum rheostat setting at the inception of testing for each major project."

U. S. Testing had not determined this setting nor did a procedural control exist for the determination of the rheostat setting.

- (2) While observing limited field soils work being performed at the metering pits south of the essential service water intake structure at elevation 630' it was determined that samples used to perform relative density tests have been taken after the material has been compacted. These samples should be taken prior to compaction since grain size and gradations can be altered during compaction. The relative density test should be performed on as received material used prior to compaction. Grain size is one of the important characteristics of how soil behaves. The inspector determined from a review of the available grain size analysis that there appears to be a gradation change of the material comparing before and after compaction.

A procedural control specifying where and when to taken soil samples should have been established. UST does not have procedural instructions specifying the field technique where and when to take samples for density tests.

- (3) It was determined from discussions with the cognizant UST personnel that they have been performing in place density tests "at the direction of the onsite geotechnical engineer." However, there are no procedural instructions as to what depth below the lift being compacted the test should be performed. A review of the density test reports indicate that they are not correlating the density test depth to the lift being compacted.

Based on the above, it has been determined that CPCo is in noncompliance with 10 CFR 50, Criterion V (Procedures) in that adequate laboratory and field test procedures have not been established for the control of soil testing activities. (50-325/81-01-01; 50-330/81-01-01).

CPCo response to 50.54(f) question 23, subsection 3.11, page 23-31 states that "U. S. Testing was required to demonstrate to cognizant engineering representatives that testing procedures, equipment, and personnel used for quality verification testing were capable of providing accurate test results. . . ." This commitment has not been satisfied based on the above findings.

Subsequent to the inspection CPCo informed the RIII offices on January 16, 1981, by telephone that U. S. Testing Corporation would develop and issue implementing procedures for soil work activities. These procedures will be reviewed during subsequent inspections.

b. Document Control For Soils Work

It was determined that U. S. Testing was using uncontrolled forms to record quality control test results. A binder was observed in the U.S. Testing lab which contained QC forms used to record test results. On the inside cover it stated that the index does not reflect the latest revision of each form. The cognizant lab personnel were not able to demonstrate that the latest revision of QC test forms were being used since there were no document control provisions established to control these forms. An undated U.S. Testing inter-office memo was presented to the NRC inspector as the procedure to follow when receiving revised forms. It states in part, "log into controlled forms index". The inspector requested such a form index but did not receive it. There was no documentation onsite as to what forms are to be used for what test as well as what are the latest revisions of the forms.

Based on the above, it was determined that CPCo is in noncompliance with 10 CFR 50, Appendix B, Criterion VI, (Document Control) in that measures have not been established to control the issuance of documents which affect quality activities. (50-329/81-01-02; 50-330/81-01-02)

Subsequent to the inspection CPCo informed the RIII office that quality control verification forms would be controlled by the implementing procedures. This will be verified during subsequent NRC inspections.

c. Soils Test Records

- (1) Quality assurance records for backfill work activities were reviewed for completeness and compliance with licensee specifications, procedures, and commitments.

Bechtel field instruction FIC.1.100, Appendix A, duties and responsibilities of the onsite geotechnical engineer, Paragraph 18, requires that the onsite geotechnical engineer review and initial all acceptable UST test report forms.

ANSI N45.2.9 (Quality Assurance Records), Section 3.2.1, requires that "quality assurance records shall be considered valid only if stamped, initialed, signed, or otherwise authenticated and dated by authorized personnel".

Numerous UST density test reports were rubber stamped by the geotechnical engineer, however, none were dated. In addition no procedural controls were established for the use or control of the rubber signature stamp of the geotechnical engineer.

Based on the above it was determined that CPCo is in noncompliance with 10 CFR 50, Appendix B, Criterion XVII (Quality Assurance Records) in that the soil test reports are not initialed or dated and there were no established controls on the use of a rubber signature stamp. (50-329/81-01-03; 50-330/81-01-03)

Subsequent to the inspection CPCo informed the RIII office that soil test reports would be initialed and dated as required. This will be verified during subsequent inspections.

- (2) Specification C-208, Section 9.1.3(d) requires the geotechnical engineer to review and evaluate test results when densities exceed certain values. From discussions with the previous geotechnical engineer, it was determined that the evaluation consisted only of a check of the numerical calculations for numerical errors. If the calculations were correct the disposition was "use as is", this review does not meet the requirement to evaluate test results.

Subsequent to the inspection CPCo informed the RIII office that documented evaluations of the above would be performed. This is an unresolved item pending review of the evaluation (50-329/81-01-04; 50-330/81-01-04).

d. Review of Nonconformance Reports

The NRC inspector requested all nonconformance reports regarding soil work activities since March of 1979. The following reports were made available.

<u>Bechtel NRC No.</u>	<u>Date</u>	<u>Description of NRC</u>	<u>Status</u>
2294	6/23/79	Failing density tests	Closed
2307	6/25/79	Failing density tests	Closed
2350	7/16/79	Failing gradation test	Closed
2492	8/30/79	Qual. of compaction equip.	Closed
3041	6/25/80	Failing density tests	re-Opened
3159	10/07/80	Failing gradation test	Closed
3165	10/09/80	Lift thickness exceeded	Closed

<u>CPCo NRC No.</u>	<u>Date</u>	<u>Description of NRC</u>	<u>Status</u>
M-01-4-0-005	1/18/80	No spec. requirement for backfil around piping	Open
M-01-2-9-060	7/19/80	Spec & purchase order for sand gradation not the same.	Closed
M-01-9-0-038	5/15/80	Final report on qualification of compaction equipment.	Open

The above closed NCR's were determined to be adequately resolved, those open or reopened will be reviewed during subsequent inspections.

e. Qualifications of Onsite Geotechnical Engineer

CPCo response to 50.54(f) question 23, subsection 3.7, page 23-20, states that, "one full time and one part time onsite geotechnical soils engineer have been assigned." The inspector requested the qualifications of the onsite geotechnical engineer. A resume was presented to the inspector as representing the assigned individual to implement the commitment in order to preclude future soils problems. This engineer is to provide the technical direction and monitoring of the entire earthwork process.

The resume that was presented was of an "Engineering Technician" with no previous formal education in engineering or geotechnical engineering. The engineering technician had nominally 15 years of field and laboratory testing of soils.

This information was discussed with representatives of the NRC geotechnical branch. It was determined that CPCo committed to provide technical direction from a geotechnical engineer capable of being recognized and licensed by a state board of registration of professional engineering or equivalent.

In view of the fact that adequate technical direction had not been provided per the commitment by CPCo in the 50.54(f) response it has been determined that CPCo is in deviation from a NRC commitment as described in Appendix B of the transmittal letter of this report. (50-329/81-01-05; 50-330/81-01-05)

Subsequent to the inspection, CPCo informed the RIII office that a geotechnical engineer would be onsite beginning January 19, 1981 and that job descriptions and qualifications for the geotechnical engineer for the speciality remedial work to follow would be developed. This action will be verified during subsequent inspection.

2. Borated Water Storage Tank Reanalysis

During the inspection, the licensee informed the inspector that the preliminary structural reanalysis of the borated water storage tank ring foundation yielded results that indicated the foundation to be overstressed. The inspector inquired to the quality assurance group if this condition had been considered for reportability. After this inquiry, the Manager of Quality Assurance produced the CPCo form entitled, "Safety concern and reportability evaluation" for the BWST ring foundation.

This document indicates that a finite element analysis results in forces and moments in excess of FSAR allowables. The reportability evaluation indicated the event was "not reportable" with further evaluation necessary. The planned actions included retaining a consultant to review the results obtained by the analysis and/or perform an independent check and excavate and inspect the foundation for signs of overstressing (i.e., cracking).

On January 23, 1981, CEPO informed the RIII office the excavation around the Unit 1 tank was complete and that cracks were observed in the areas of over-stress. CPCo identified this item as a 50.55(e), significant construction deficiency. This item is under review by the NRC staff.

The inspector informed the Region III office and NRR project manager on January 9, 1981. The licensee's evaluations of the matter are included as Attachment No. 1 of this report.

Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items or items of noncompliance or deviations. Unresolved items disclosed during this inspection are discussed in Section II, Paragraph 1.c.(2).

Exit Meeting

The inspectors met with licensee and contractor representatives at the conclusion of the inspection on January 9, 1981 and summarized the inspection scope and findings. The licensee acknowledged the inspection findings. Subsequent to the exit meeting the inspectors and RIII management telephoned on January 14, 1981 the Quality Assurance Manager in order to verify what corrective action would be taken based on the inspection findings. On January 16, 1981, CPCo informed the RIII office of the actions to be taken which are contained in the report Section II, Paragraph 1a, 1b, 1c, and 1e.

Attachment:
Attachment No. 1

SAFETY CONCERN AND REPORTABILITY EVALUATION

PROJECTS, ENGINEERING
AND CONSTRUCTION
QUALITY ASSURANCE DEPT.

PAGE 1

CONCERN IDENTIFIED, WHEN, WHERE?
As a result of the 50.54(f) commitments to do a structural reanalysis of Category I Structures (See Items 14-7 and 48-2), the BWST ring foundation was reanalyzed and values were obtained which were inconsistent with previous values, and inconsistent with FSAR requirements. The results of the analysis were obtained 1-4-81 and discussed in a 1-5-81 CPCo/Bechtel meeting. The Project Manager attended this meeting and subsequently briefed the Manager of Quality Assurance.

TO MANAGER-MF

1. FROM: R L Rixford
ORGANIZATION: MPQAD -

SCORE NO: 5
FILE NO: 15.1
DATE RECEIVED:

2. IS CONCERN A PART 212
WHEN? ☐ YES ☒ NO
BY WHOM? N/A

3. IS NRC AWARE OF THIS?
WHEN? ☐ YES ☒ NO
BY WHOM? N/A

(CONTINUE ON NEXT PAGE)

5. BRIEF DESCRIPTION OF CONCERN - SYSTEM, COMPONENT, ACTIVITY, POSSIBLE SAFETY IMPACT - (ATTACH SUPPORTING DOCUMENTS).

The BWST ring foundation was analyzed for several loading combinations including the load plus live load which was determined to be the most severe. The analysis was first performed using the methods of BC-TOP-4A, Rev. 3 (this method uses springs for soil/structure interaction during a seismic event), but gave displacement values inconsistent with anticipated and measured values. The analysis was then done using a finite element technique which gave consistent displacement values but forces and moments in excess of FSAR allowables. The values obtained from the reanalyses which have been done indicate an overstressing and, hence, a potential for failure of the foundation of the Category BWST.

(CONTINUE ON NEXT PAGE)

6. IMMEDIATE REPORTABILITY EVALUATION:
a. ☐ REPORTABLE - GO TO 13
b. ☐ POTENTIALLY REPORTABLE - GO TO 13
c. ☒ NOT REPORTABLE, FURTHER EVALUATION
d. ☐ NOT REPORTABLE

7. ORGANIZATION RESPONSIBLE FOR FURTHER EVALUATION:
Bechtel Engineering - Civil

8. FINAL REPORTABILITY EVALUATION (IF 6.c. CHECKED):
a. ☐ REPORTABLE b. ☐ NOT REPORTABLE

9. QA APPROVAL OF EVALUATION OF BLOCKS 1 TO 7:

W R Bird

MANAGER - MPQA

1/7/81

DATE

10. JUSTIFICATION OF EVALUATION - (ATTACH SUPPORTING DOCUMENTS)

The first reanalysis gave displacement values which were inconsistent with measured settlement and anticipated values. This cast doubt upon the spring values used in the analysis. The subsequent finite element analysis gave displacement values which were consistent with the other values available for comparison, but gave forces and moments which exceeded the FSAR allowables by an amount sufficient to warrant an additional check of these values also.

Two actions planned to check these values are:

1. Retain a consultant to review the results obtained by analyses done, and/or do an independent check.
2. Excavate and inspect the foundation for signs of overstressing (i.e., cracking). It was considered premature to judge this a reportable condition prior to confirming the values obtained by the finite element analysis.

(CONTINUE ON NEXT PAGE)

11. SIGNATURE/DATE:

W R Bird 1-5-81

12. FINAL QA APPROVAL - MANAGER MPQA/DATE:

13. DATE RECEIVED: N/A

N/A

N/A

14. DATE IDENTIFIED:

15. DATE:

FEB 0 8

SAFETY CONCERN AND
REPORTABILITY EVALUATION

AND CONSTRUCTION-
QUALITY ASSURANCE CONTROL
SCHE NO: 5
PAGE 2

ED

5. CONTINUED

10. CONTINUED

14. MINIMUM DISTRIBUTION:

VICE PRESIDENT - PEMC
VICE PRESIDENT - MIDLAND PROJECT
DIRECTOR - ENVIRONMENTAL SERVICES & QA
MIDLAND SITE MANAGER
VICE PRESIDENT
DIRECTOR - SAFETY & LICENSING
MIDLAND FILE NO 15.1

15. ADDITIONAL DISTRIBUTION:

MRQAD - LQAE Supervisor