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Docket Nos. 50-329
and 50-330

Consumers Power Company
ATTN: Mr. S. H. Howell
Vice President
212 West Michigan Avenue
Jackson, Michigan 49201

Gentlemen:

This letter is in partial response to your request for a review of the implementation of regulatory guides on the Midland Plant. The enclosed comments pertain to your letter of August 19, 1975 regarding regulatory guides dealing with structural engineering.

The enclosure contains specific comments on Regulatory Guides 1.10, 1.12, 1.15, 1.18, 1.19, 1.35, 1.60, 1.61 and 1.92. We did not comment at this time regarding Regulatory Guides 1.27, 1.55 and 1.59. We will forward our comments on Regulatory Guides 1.27 and 1.59 with those on the miscellaneous group of guides. Our comments on Regulatory Guide 1.55 will be forwarded with those of the Quality Assurance group.

We agree that Regulatory Guide 1.57, dealing with metal containment systems, and Regulatory Guide 1.90, dealing with grouted tendons, are not applicable to the Midland Plant.

The enclosed comments result from our review of your letters of July 21, 1975, August 19, 1975, December 1, 1975 and February 3, 1976; review of pertinent parts of your Preliminary Safety Analysis Report and license application; consideration of the discussions we have had with you on this matter; and the application of appropriate regulations, codes and standards. Based on this review, we have concluded that the implementation of regulatory guides and acceptable alternatives indicated by our enclosed comments does not constitute a change to the principal architectural and engineering criteria which formed the basis for issuance of the construction permits for the Midland Plant, and that such implementation does conform to the General Design Criteria of Appendix A to 10 CFR 50.

It is requested that you document the degree to which you will implement the regulatory guides and acceptable alternatives, indicated in the enclosed comments by appropriate amendments to the Midland application and revisions to the Preliminary Safety Analysis Report.

Sincerely,

Original Signed by
Karl Kniel

Karl Kniel, Chief
Light Water Reactors Branch No. 2
Division of Project Management

Enclosure:
Regulatory Guide Review

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MIDLAND PLANT UNITS 1 AND 2
REGULATORY GUIDE REVIEW

1. Regulatory Guide 1.10 - "Mechanical (Cadweld) Splices in Reinforcing Bars of Category I Concrete Structures" - (Rev. 1, 1/2/73)

a) Guide Recommendation:

This guide describes an acceptable method of implementing the criteria of Appendix A to 10 CFR Part 50 with regard to the testing and sampling of mechanical splices in reinforcing bars used on Category I concrete structures. Paragraph C.5.a stipulates that if two or more splices fail to meet the tensile test, the balance of the 100 production splices under investigation should be rejected and replaced.

The applicant proposed that if two or more splices fail to meet the tensile test, the condition would be handled in the following manner. First of all, Bechtel Quality Control would document the event by issuing a Non-Conformance Report (NCR) addressing the situation. Quality Control would also physically identify the questionable cadwelds and notify Bechtel Quality Assurance that a situation existed which might be reportable in accordance with 10 CFR 50.55(e). Bechtel Quality Assurance would forward this notification to CPCo Quality Assurance for their possible notification to the NRC.

After review in the Field, the NCR would be transmitted to the Design Office for dispositioning along with appropriate data to allow the Design Office to evaluate the condition. This evaluation would be performed in accordance with approved procedures leading to an Engineering direction to accept or reject the questionable cadwelds. This direction would be transmitted back to the Field on the NCR. Should this direction be to accept the cadwelds, Engineering must provide the engineering rationale for their decision.

Upon receipt of the Engineering disposition of the NCR, its completion by Construction, and its acceptance by Quality Control, a copy of the complete NCR is:

1) Transmitted to CPCo Field Quality Assurance, if the Bechtel decision is to accept the cadwelds.
2) Routed to Construction to initiate appropriate action to prevent recurrence.
3) Routed to Bechtel site Quality Assurance for evaluation and use in determining the need for corrective action to prevent recurrence.

The entire process described above is monitored throughout by Bechtel Quality Assurance. They review the various steps as necessary, and may request additional actions or clarifications at any step. They also audit the entire cadwelding process at periodic intervals.

Criterion No. 1 of Appendix A to 10 CFR 50 states: "Structures, systems and components important to safety shall be designed fabricated, erected and tested to quality standards commensurate with the importance of the safety functions to be performed ...". It is the opinion of the staff that although the proposed procedure may be acceptable for application to areas of little safety significance, it should not be approved beforehand for general use.

Furthermore, the proposed procedure would not provide a level of quality assurance equivalent to that of the regulatory guide. The staff therefore recommends that Midland construction practices conform fully to Regulatory Guide No. 1.10.

2. Regulatory Guide 1.12 - "Instrumentation for Earthquakes" - (Rev. 1, April 1974)

For the Midland Plant, a response spectrum analyzer will be included as part of the control room seismic instrumentation in lieu of discrete response spectrum recorders. This analyzer would calculate the response spectrum, at specific damping valves, for comparison to the plant design criteria and evaluation of the earthquake effects.

A response spectrum analyzer, permanently installed in the control room will present more complete information than that presented by response spectrum recorders. Data from the strong motion accelerometers will be recorded on magnetic tape and then fed into a playback unit that is cable-connected to the response spectrum analyzer to produce earthquake response spectra immediately following an earthquake. All locations where response spectrum recorders are required by the Regulatory Guide will be monitored in 3 directions by strong motion accelerometers. This system will provide all information required by Regulatory Guide 1.12.

The staff has concluded that the information provided by this instrumentation will be at least equivalent to that called for by the regulatory guide and is acceptable to the staff.

3. Regulatory Guide 1.15 - "Testing of Reinforcing Bars for Category I Concrete Structures" - (Rev. 1, 12/28/72)

This guide describes an acceptable method for implementing general design criteria relating to tests and inspection of reinforcing bars for Category I concrete structures.

Paragraph C.1.a requires a testing frequency of one specimen of each bar size for each 50 tons of material produced. Reinforcing steel procured and used in 1969 and 1970 (before Regulatory Guide 1.15 was issued) had a testing frequency of 100 ton. Category I structures constructed in 1969-1970 include the auxiliary building base mat and some exterior walls. Upon reactivation of the Midland Project in 1973, project specifications were revised to specify a frequency of testing such that one full-diameter specimen is tested from each bar size for each 50 tons or fraction thereof. These requirements have been implemented since that time.

The staff has concluded that this degree of conformance with this regulatory guide is satisfactory.

Paragraph C.1.c of this guide states that the acceptance standards should be in accordance with the ASTM A-615-72, "Standard Specification for Deformed Billet-Steel Bars for Concrete Reinforcement", American Society for Testing Materials, including supplemental Requirement (S-1) using full sections of the bars as rolled.

The applicant proposed that the acceptance criteria for any failed test (Qualification as well as In-Process) shall be the same as that for tensile tests specified in Subarticle CC-2331.2 of ASME Section III, Div. 2 Code. This means that if a test specimen fails to meet the specified strength requirements, two (2) additional specimens from the same heat and of the same bar size shall be tested, and if either of the two additional specimens fail to meet the specified strength requirements, the material represented by the tests shall be rejected for the specified use.

The applicant also proposed that alternative use of rejected material under strict control may be made subject to evaluation by the Project Engineer.

The staff has found that the proposed acceptance criteria are identical with those of the Standard Review Plan and are described in paragraph CC-2331.2 of ACI/ASME (ACI-359) "Standard Code for Concrete Reactor Vessels and Containment", April 1973, and are acceptable. However, the staff considers the alternate use of rejected material to be beyond the scope of this regulatory guide.

4. Regulatory Guide 1.18 - "Structural Acceptance Test for Concrete Primary Reactor Containments" - (Rev. 1, 12/28/72)

a) Guide Recommendation:

This guide describes an acceptable method of performing the initial structural acceptance test which demonstrates the capability of a concrete primary containment to withstand postulated pressure loads. Paragraph C.5 refers to the measurements which would be recommended for a prototype containment, i.e., a containment that incorporates new or unusual design features. These include strain measurements in the concrete sufficient to permit a complete evaluation of strain distribution in the walls of the containment building.

The applicant submits that both Turkey Point and Palisades were instrumented for strain measurements and data gathered during their Structural Integrity Tests (SIT). Although not completely identical to Midland, the applicant considers Turkey Point and Palisades to adequately represent Midland as its prototype, based on this data. Furthermore, the Midland containments are similar to the Bechtel designed containments at Arkansas Nuclear One, Units 1 and 2. The Arkansas' units are a three buttress system with 1,000 ton capacity tendons, as is Midland. Unit 1 containment has undergone SIT but was not instrumented for strain measurements. The displacements measured at selected points during this SIT agreed well within acceptable limits with the predicted response. In addition, no unusual response, either in terms of displacements or cracking, was noted.

Based on this satisfactory performance of these similar containment buildings, the staff has concluded that the Midland containment building need not be subject to prototype testing and strain measurements are not necessary. However, the staff

recommends full conformance to the other provisions of this guide including submittal of a test plan prior to performance of the test and in accordance with section C.12 of this guide.

5. Regulatory Guide 1.19 - "Nondestructive Examination of Primary Containment Liner Welds" - (Rev. 1, 8/11/72)

This guide describes acceptable procedures for implementing the criteria for leaktightness of the primary containment liner and its penetrations. Frequency and methods of testing of welds in a liner are based upon ASME Boiler and Pressure Vessel Code Sections III and V to assure a uniform quality level consistent with the safety function of containment liners.

The Midland requirements for nondestructive examination of liner plate welds comply with Regulatory Guide 1.19, except for the testing frequencies, which are in accordance with proposed ASME Pressure Vessel Code Section III Div. 2 as issued for trial use and comment in 1973.

In Amendment No. 23 to the application for construction permits for Units 1 and 2 of Midland Plant the applicant described the proposed requirements for non-destructive examination of seam welds on the reactor building containment liner plate and penetrations. These requirements have been reviewed by the Regulatory staff and it has been found that they compare favorably with: ASME Pressure Vessel Code, Division 1, Section VIII, the ACI/ASME Section III, Division 2, Sub-sub Article CC 5520 5520 and Regulatory Guide 1.19.

Based on the considerations: (a) that all welds will at least satisfy the requirements of the ACI/ASME Code and exceed the requirements of the ASME Pressure Vessel Code, (b) that all seams will be individually tested, and (c) that an integrated leak rate test will be performed in the finished containment, it has been concluded that satisfactory assurance exists that the welds will be able to carry all postulated loads. Therefore, the requirements for non-destructive examination of the seam welds of the reactor building containment liner plate and penetrations are acceptable as set forth in Amendment No. 23.

6. Regulatory Guide 1.35 - "Inservice Inspection of Ungrouted Tendons in Prestressed Concrete Containment Structures" - (Rev. 2, Jan. 1976)

This guide describes a basis for developing an appropriate inservice inspection and surveillance program for ungrouted tendons in prestressed concrete containment structures of light-water-cooled reactors.

The applicant stated that the Midland Plant will conform to the recommendations of this guide as described in Bechtel topical report BC-TOP-5A, Rev. 3 (2/75). However, that report allows individual plants to take exception to the procedures given therein. Such an exception was presented in the applicant's PSAR with respect to the number of tendons tested during the 1, 3 and 5 year inspections. However, the applicant stated that the test schedule in the PSAR will be revised to agree with the regulatory guide.

Bechtel topical report BC-TOP-5A, (February 1975) has been reviewed and approved by the Regulatory staff for use on a number of other nuclear plants with characteristics similar to those of the Midland Plant.

The staff has concluded that the inspection program defined by BC-TOP-5A and Regulatory Guide 1.35 is suitable for the Midland Plant.

8. Regulatory Guide 1.60 "Design Response Spectra for Seismic Design of Nuclear Power Plants" - (Rev. 1, December 1973) and Regulatory Guide 1.61 - "Damping Values for Seismic Design of Nuclear Power Plants" - (October 19..

These guides provide response spectra and damping values as given in a paper by Newark, Blume and Kapur entitled "Seismic Spectra for Nuclear Power Plants" published in the Journal of the Power Division, November, 1973.

The Midland design response spectra differs from that of Regulatory Guide 1.60 and was established and in use on Midland and other nuclear power plants before issuance of this guide.

The Midland Plant Design Response Spectra are shown in figures 5-A-1 and 5-A-2, Section 5 (Appendix 5A) of the PSAR for the design and maximum earthquakes, respectively. These spectra correspond to maximum horizontal ground acceleration of .06g for the design earthquake and 0.12g for the maximum earthquake.

The damping factors utilized in the Midland Plant design are those recommended by Newmark & Hall as presented at the Fourth World Earthquake Conference, February, 1969 in the paper entitled "Seismic Design Criteria for Nuclear Reactor Facilities".

Furthermore, the applicant has stated that the seismic analysis of buried pipe lines will be based on the principles contained in the Bechtel topical report BC-TOP-4A Rev. 3, "Seismic Analysis of Structures and Equipment for Nuclear Power Plants," Bechtel Power Corporation, November 1974.

The staff has found that although the Midland response spectra are less conservative than those of Regulatory Guide 1.60, the damping values are more conservative than those of Regulatory Guide 1.61. The combined effect results in design values for the Midland Plant that are comparable to those that would be obtained from use of the regulatory guides.

The staff has concluded that the seismic design of the Midland Plant is conservative and is acceptable to the staff. Furthermore, the staff has reviewed the Bechtel topical report BC-TOP-4A and has found the design criteria and procedures acceptable for use on the Midland Plant.

9. Regulatory Guide 1.92 - "Combinations of Modes and Spatial Components in Seismic Response Analysis" - (December 1974)

This guide indicates that if individual mechanical response modes are not closely spaced, the square root of the sum of the squares procedure should be used for combining individual mode responses but if their individual frequencies differ by less than 10 percent, then they should be combined by their absolute sum.

The applicant has stated that the sum of the absolute values from the modes which correspond to natural frequencies below 33 cps was used.

The staff has concluded that the procedure used by the applicant is more conservative than that recommended by this guide and is acceptable to the staff.