Bechtel Associates Professional Corporation

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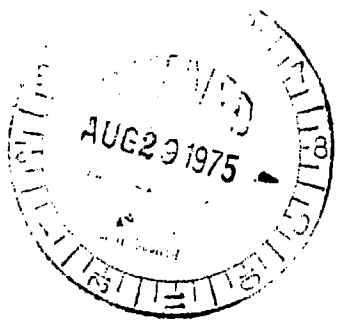
Ann Arbor, Michigan 48106



August 28, 1975

U. S. Nuclear Regulatory Commission
Light Water Reactor Branch 2-3
Washington, D. C. 20555

Attention: Mr. S. Mackay

Subject: Consumers Power Company
Midland Plant - Job 7220
Civil Regulatory Guide
Responses
File: 0505.6, M-0173

Gentlemen:

Per R. Bauman's request, attached are ten copies of the Consumers Power Company Midland Units 1 & 2 Responses to Civl Regulatory Guides 1.10, 1.15, 1.18, 1.19, 1.27, 1.35, 1.55, 1.57, 1.59, 1.60, 1.61, 1.90 and 1.92.

Very truly yours,

R. L. Castleberry
Project Engineer

RLB/alf

Attachment

cc: R. C. Bauman
Consumers Power Company

8006090 573

REGULATORY GUIDE 1.10

MECHANICAL (CADWELD) SPLICES IN REINFORCING BARS OF CATEGORY 1 CONCRETE STRUCTURES

RESPONSE TO REGULATORY POSITION

The Midland Plant complies with R.G. 1.10 as interpreted by the AEC's "MEMO TO ATTENDEES, Summary of Meeting with Erico Products Inc." May 8, 1973, with the following exception:

Reference: R.G. 1.10 C.5.a third paragraph

The referenced section states: "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." In conformance with the intent of item 16 of the "MEMO TO ATTENDEES," more flexibility is allowed by the project specification which states: "If two or more splices fail to meet the tensile test . . . the Project Engineer will evaluate and assess the acceptability of the reduced average tensile strength at the location from which the samples were taken."

REGULATORY GUIDE 1.15, REVISION 1 (12/20/72)

TESTING OF REINFORCING BARS FOR
CATEGORY 1 CONCRETE STRUCTURES

RESPONSE TO REGULATORY POSITION

The Midland Plant complies with R.G. 1.15 with the following exception:

Reference: Regulatory Position C.1.a

This paragraph 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 R.G. 1.15 was issued) had a testing frequency of 100 ton. Category 1 structures constructed in 1969-1970 include the auxiliary building base mat and some exterior walls.

Reference: Regulatory Position C.1.c

In addition, we propose the following exception. 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 fails to meet the specified strength requirements, the material represented by the tests shall be rejected for the specified use. Alternative use of rejected material under strict control may be made subject to evaluation by the Project Engineer.

REGULATORY GUIDE 1.18, REVISION 1 (12/28/72)

STRUCTURAL ACCEPTANCE TEST FOR CONCRETE PRIMARY REACTOR CONTAINMENTS

RESPONSE TO REGULATORY POSITION

The Midland Plant complies with R.G. 1.18 with the following exceptions:

1. Reference: Paragraph C.1 of R.G. 1.18

   A continuous increase in containment pressure, rather than incremental pressure increases, is considered acceptable providing data observations are made rapidly at each pressure datum. Rapidly is defined as requiring a time interval for the data point sample sufficiently short so that the change in pressure during the observation would cause a change in structural response of less than five percent of the total anticipated change. For example, assume a pressure increment of fifteen psi, a test pressure of sixty psi, and a total expected strain of two hundred microstrain (microinches per inch). The period of a data observation, therefore, would be required to be equal to or less than the time during which pressurization would create a ten microstrain change.

2. Reference: Paragraph C.1 of R.G. 1.18

   It is intended to provide either a hold period for at least one hour at maximum test pressure or for such time as is necessary for recording crack patterns. ⚠

3. Reference: Paragraph C.3 of R.G. 1.18

   Measurement of tangential deflections is not planned. ⚠

4. Reference: Paragraph C.5 of R.G. 1.18

   Triaxial strain distribution measurements will not be attempted at the present state of the art. Any strain measurements will be limited to areas considered to be affected by a prototypal feature.

August 11, 1975

5. Reference: Paragraph C.5 of R.G. 1.18

Shear strain measurements under end anchor bearing plates are not planned at the present state of the art. Experimental evidence contained in BC-TOP-7 and BC-TOP-8 is submitted in lieu of measurement of the vertical and horizontal strains under a vertical tendon end anchor bearing plate. For measurements of vertical and horizontal strains under vertical tendon end anchor bearing plates, experimental evidence indicates that a gauge location within approximately one quarter of the bearing plate width from the exposed face of the bearing plate must be used. 4

6 Reference: Paragraph C.9 of R.G. 1.18

It is intended to schedule structural integrity testing for periods when extremely inclement weather is not forecast. Should, despite the forecast, snow, heavy rain, or strong wind occur during the test, the test results will be considered valid unless there is evidence to indicate otherwise.

7. Reference: Paragraph C.10 of R.G. 1.18

It is intended to continue any test, without a restart at atmospheric pressure, unless the structural response deviates significantly from that expected.

8. Reference: Paragraph C.12 of R.G. 1.18

In addition to the preliminary information contained in the PSAR, a complete description of structural tests will be submitted for review prior to the actual tests. 1

REGULATORY GUIDE 1.19, REVISION 1 (8/11/72)

NONDESTRUCTIVE EXAMINATION OF PRIMARY CONTAINMENT LINER WELDS (8-11-72)

RESPONSE TO REGULATORY POSITION

The requirements for nondestructive examination of liner plate welds comply with R.G. 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.

The AEC approved the Midland Plant position 1-8-74 in a letter to CPCo (attached).

August 11, 1975

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

JAN 8 1974

Dkt Nos. 50-329
and 50-330

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

Gentlemen:

We have reviewed Amendment No. 23 to your application for construction permits and operating licenses for Units 1 and 2 of your Midland Plant. This amendment consists of revisions to the Preliminary Safety Analysis Report that more clearly define the requirements for nondestructive examination of the seam welds on the reactor building containment liner plate and penetrations.

We have found that these requirements for nondestructive examination of the seam welds compare favorably with: the ASME Pressure Vessel Code, Division 1, Section VIII (1971) UW-52(b); the proposed ACI/ASME Sect. III, Division 2 Section CC 5520; and Regulatory Guide 1.19. Based on the considerations: (a) that all welds will at least satisfy the requirements of the proposed 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, we have concluded that satisfactory assurance exists that the welds will be able to carry all postulated loads. Therefore, the requirements for nondestructive examination of the seam welds of the reactor building containment liner plate and penetrations are acceptable as set forth in Amendment No. 23.

Sincerely,

A. Schwencer, Chief
Light Water Reactors Br. 2-3
Directorate of Licensing

cc: See Next Page

cc: DEH
TJC
PAM Boebel
NJB/CAH

JAN 11 1974

REGULATORY GUIDE 1.27
(REV. 1 3/74)

ULTIMATE HEAT SINK FOR NUCLEAR POWER PLANTS

RESPONSE TO REGULATORY POSITION

1. Analysis of the Midland emergency pond for thermal performance and water loss in accordance with the current Regulatory Guide criteria results in a peak pond temperature 3.5°F above our present service water design temperature. Considering the conservatism in the Regulatory Guide meteorological assumptions we do not believe that a 3.5°F difference is significant enough to warrant any system modifications. The emergency pond construction is completed with a majority of the system equipment in the process of fabrication. The emergency pond complies with the Regulatory Guide criteria for water loss analysis.

2. The emergency pond, will maintain the 70 acre-feet of water necessary for its function through and after the most severe natural phenomena credible for the site. This includes the DBE, the probably maximum flood, and the failure of the main cooling pond dikes. Pond seepage has been included in the sizing of pond capacity and a thorough program of well sealing has been initiated to maintain emergency pond integrity. The pond is so designed and located that a single failure of a man-made structure will not affect it's capability. All essential lines to and from the emergency pond are redundant.

3. Because of the extremely low probability of failure of the emergency pond, no other Class I ultimate heat sink is provided for the Midland units. Two full-capacity suction and discharge lines connect the pond with the plant service water system. These lines are separated and protected such that a failure of one will not cause the failure of the other.

4. Technical specifications consistent with paragraph C.4 will be included if necessary.

REGULATORY GUIDE 1.35, REVISION 1 (6/74)

INSERVICE INSPECTION OF UNGROUTED
TENDONS IN PRESTRESSED CONCRETE
CONTAINMENT STRUCTURES

RESPONSE TO REGULATORY POSITION

The Midland Plant will comply with the requirements of R.G. 1.35 as described in Bechtel topical report BC-TOP-5A, Revision 3 (2/75) approved by the NRC.

The Regulatory Guide requires that the sample size be 21 tendons for the first three surveillances (i.e., 1, 3, and 5 years after SIT). Thereafter, the sample size reverts to 9 tendons. Also, para. C.2 of the Regulatory Guide requires only a visual examination (i.e., no lift-off) for the second containment structure.

This differs from the information presently contained in the PSAR. The appropriate sections of the SAR will be updated at a later date.

August 11, 1975

REGULATORY GUIDE 1.55

CONCRETE PLACEMENT IN CATEGORY I STRUCTURES (JUNE, 1973)

RESPONSE TO REGULATORY POSITION

Except as discussed below, concrete was placed in Category 1 structures in accordance with Regulatory Guide 1.55.

Regulatory positions 2 and 3 of the regulatory guide state the presumed functional responsibilities of the "Designer" and the "Constructor." Under the designer's role are listed the responsibilities for checking shop drawings and locations of construction joints. On this job, the former is fully delegated to the Bechtel field, although the design engineering office may check significant portions and may advise the field accordingly. The responsibility for construction joint location is partly delegated to the field in the sense that the field has to follow the guidelines set out in the design drawings prepared by "Engineering." In interface areas, a delegation of the design engineering office's responsibility to the field office is within the definition of the terms "responsibility" and "delegated responsibility" as discussed in Paragraph 1.3 of the proposed ANSI N 45.2.5 - 1974. Delegation of the responsibilities for checking the reinforcing drawings to the field engineering group is justified by the following:

1. The Bechtel field engineering group is segregated from the field supervision group, although both are located at the jobsite and eventually report to the project superintendent.

2. The field engineering group is staffed for the most part by graduate engineers who have been trained in the use of the ACI code and understand the design implication of the proper location, splicing and embedment of reinforcing steel.

3. The field inspection of the actual rebar as placed in the forms is conducted using the engineering drawings as the primary source document. This assures a check on any errors which may have passed the critical eye of the field engineer in checking the shop detail or erection drawings.

4. It is standard practice in the Civil engineering profession that engineering requirement drawings for reinforcing are converted to shop detail and erection drawings in accordance with ACI standards applied by steel detailers at the reinforcing steel vendor's shop. Most contractors installing reinforcing steel rely upon their superintendent and foreman for correct interpretation of these detail drawings in erecting the reinforcing steel. While this is also true of Bechtel field operation, we do have the additional help and guidance of the field engineers both during the installation phase and finally at the inspection phase prior to final sign off on the report card.

5. The field engineers have the added benefit of being able to plan and witness the actual installation and can, therefore, better foresee any difficulties in meeting the intended design requirements. Their assessment of the situation is further assisted by regular telephone communication with the design engineers who also periodically visit the jobsite.

It is submitted that the above procedure of delegation of the design engineering office's responsibility to the field personnel and periodic monitoring by the engineering office provides an assurance of correctness and conformance of the shop drawings to the design drawings, and therefore, meets the intent of Regulatory Guide 1.55.

REGULATORY GUIDE 1.57 JUNE 1973

DESIGN LIMITS AND LOADING COMBINATIONS FOR METAL PRIMARY REACTOR CONTAINMENT SYSTEM COMPONENTS

RESPONSE TO REGULATORY POSITIONS

Regulatory Guide 1.57 is not applicable to Midland since Midland does not have a metal primary reactor containment. △

August 11, 1975

REGULATORY GUIDE 1.59, REVISION 0 (8/73)

DESIGN BASIS FLOODS FOR
NUCLEAR POWER PLANTS

RESPONSE TO REGULATORY POSITION

1. The Midland Project believes that it now complies with Regulatory Position C.1. It is planned to discuss the calculational techniques and results in a SAR Amendment scheduled for submittal by January 1, 1976.

2. Upon acceptance by the Staff of the final PMF report, the Project intends to perform the analyses indicated in Position C.2. Performance of these analyses is necessitated by the Project's past commitment to a plant grade at elevation 634', complied with our expected conclusion that PMF stillwater height will be 631 feet and PMF wave overtopping will be 635.5 feet ±. General reviews of the requirements of Position C.2 indicate that the Project should be in conformity with sections C.2.a, C.2.b, and C.2.c, but that sandbagging will be necessary for cold shutdown and maintenance thereof. This probable exception to position C...d, is necessitated by the advanced state of Project design and construction.

August 11, 1975

REGULATORY GUIDE 1.60, REVISION 1, (12/73)

DESIGN RESPONSE SPECTRA FOR SEISMIC DESIGN OF NUCLEAR POWER PLANTS

RESPONSE TO REGULATORY POSITION

The Midland design response spectra for the bulk of the plant differs from R.G. 1.60 requirements, and was established and in use before issuance of the 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.

Vertical response spectra are linearly scaled from figures 5-A-1 and 5-A-2 in proportion to maximum vertical ground acceleration which equals 2/3 the maximum horizontal ground acceleration. The response spectra recommended for the Midland site are the average response spectrum developed by normalizing and averaging both components of the strong-motion ground accelerations from four earthquakes (El. Centro, Calif., Dec. 30, 1934; El Centro, Calif., May 18, 1940; Olympia, Wash., April 13, 1943; and Taft, Calif., July 21, 1952). This spectrum is intended to envelope large magnitude earthquakes at moderate distances from the epicenter; refer to AEC publication TID-7024.

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

August 11, 1975

REGULATORY GUIDE 1.61, REVISION 0 (10/73)

DAMPING VALUES FOR SEISMIC DESIGN OF NUCLEAR POWER PLANTS

RESPONSE TO REGULATORY POSITION

The damping values for design of the bulk of the plant differ from R.G. 161 requirements, and were established and in use before issuance of the guide.

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." The table below summarizes the damping values used as percent of the critical damping.

The percent critical damping for structures and systems is as follows:

	Design* Earthquake	Max.* Earthquake
Welded Steel Plate Assemblies	1	1
Welded Framed Structures	2	2
Bolted or Riveted Steel Structures	2.5	2.5
Reinforced Concrete Equipment Supports	2	3
Reinforced Concrete Frames & Buildings	3	5
Prestressed Concrete Structures	2	5
Critical Piping	0.5	0.5

The percent critical damping for equipment is determined by the characteristics of individual equipment.

A value of 5% of critical damping was assigned to soil for both the design and maximum earthquakes.

The composite modal damping is calculated based on the materials and mode shapes.

Response to R.G. 1.61 (cont.)

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

*The term "Design Earthquake" used in the PSAR is also commonly called "Operating Basis Earthquake" and is equivalent to one-half of "Safe Shutdown Earthquake" (SSE). The term "Maximum Earthquake" used in the PSAR and sometimes referred to as "Design Basis Earthquake," is equivalent to "Safe Shutdown Earthquake."

REGULATORY GUIDE 1.90

INSERVICE INSPECTION OF PRESTRESSED CONCRETE CONTAINMENT STRUCTURES WITH GROUTED TENDONS

RESPONSE TO REGULATORY POSITION

This regulatory guide is not applicable to the Midland Plants since we do not have grouted tendons.

August 11, 1975

REGULATORY GUIDE 1.92 (DECEMBER 1974)

COMBINATIONS OF MODES AND SPATIAL COMPONENTS
IN SEISMIC RESPONSE ANALYSIS

RESPONSE TO REGULATORY POSITION

The Midland Plant design is in conformance with R.G. 1.92 requirements with the following exception:

Combining the values of the response of individual modes in the response spectrum modal dynamic analysis:

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

REGULATORY GUIDE 1.10

MECHANICAL (CADWELD) SPLICES IN REINFORCING BARS OF CATEGORY 1 CONCRETE STRUCTURES

RESPONSE TO REGULATORY POSITION

The Midland Plant complies with R.G. 1.10 as interpreted by the AEC's "MEMO TO ATTENDEES, Summary of Meeting with Erico Products Inc." May 8, 1973, with the following exception:

Reference: R.G. 1.10 C.5.a third paragraph

The referenced section states: "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." In conformance with the intent of item 16 of the "MEMO TO ATTENDEES," more flexibility is allowed by the project specification which states: "If two or more splices fail to meet the tensile test . . . the Project Engineer will evaluate and assess the acceptability of the reduced average tensile strength at the location from which the samples were taken."

REGULATORY GUIDE 1.15, REVISION 1 (12/20/72)

TESTING OF REINFORCING BARS FOR
CATEGORY 1 CONCRETE STRUCTURES

RESPONSE TO REGULATORY POSITION

The Midland Plant complies with R.G. 1.15 with the following exception:

Reference: Regulatory Position C.1.a

This paragraph 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 R.G. 1.15 was issued) had a testing frequency of 100 ton. Category 1 structures constructed in 1969-1970 include the auxiliary building base mat and some exterior walls.

Reference: Regulatory Position C.1.c

In addition, we propose the following exception. 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 fails to meet the specified strength requirements, the material represented by the tests shall be rejected for the specified use. Alternative use of rejected material under strict control may be made subject to evaluation by the Project Engineer.

REGULATORY GUIDE 1.18, REVISION 1 (12/28/72)

STRUCTURAL ACCEPTANCE TEST FOR CONCRETE PRIMARY REACTOR CONTAINMENTS

RESPONSE TO REGULATORY POSITION

The Midland Plant complies with R.G. 1.18 with the following exceptions:

1. Reference: Paragraph C.1 of R.G. 1.18

   A continuous increase in containment pressure, rather than incremental pressure increases, is considered acceptable providing data observations are made rapidly at each pressure datum. Rapidly is defined as requiring a time interval for the data point sample sufficiently short so that the change in pressure during the observation would cause a change in structural response of less than five percent of the total anticipated change. For example, assume a pressure increment of fifteen psi, a test pressure of sixty psi, and a total expected strain of two hundred microstrain (microinches per inch). The period of a data observation, therefore, would be required to be equal to or less than the time during which pressurization would create a ten microstrain change.

2. Reference: Paragraph C.1 of R.G. 1.18

   It is intended to provide either a hold period for at least one hour at maximum test pressure or for such time as is necessary for recording crack patterns.

3. Reference: Paragraph C.3 of R.G. 1.18

   Measurement of tangential deflections is not planned.

4. Reference: Paragraph C.5 of R.G. 1.18 

   Triaxial strain distribution measurements will not be attempted at the present state of the art. Any strain measurements will be limited to areas considered to be affected by a prototypal feature.

5. Reference: Paragraph C.5 of R.G. 1.18

Shear strain measurements under end anchor bearing plates are not planned at the present state of the art. Experimental evidence contained in BC-TOP-7 and BC-TOP-8 is submitted in lieu of measurement of the vertical and horizontal strains under a vertical tendon end anchor bearing plate. For measurements of vertical and horizontal strains under vertical tendon end anchor bearing plates, experimental evidence indicates that a gauge location within approximately one quarter of the bearing plate width from the exposed face of the bearing plate must be used.

6 Reference: Paragraph C.9 of R.G. 1.18

It is intended to schedule structural integrity testing for periods when extremely inclement weather is not forecast. Should, despite the forecast, snow, heavy rain, or strong wind occur during the test, the test results will be considered valid unless there is evidence to indicate otherwise.

7. Reference: Paragraph C.10 of R.G. 1.18

It is intended to continue any test, without a restart at atmospheric pressure, unless the structural response deviates significantly from that expected.

8. Reference: Paragraph C.12 of R.G. 1.18

In addition to the preliminary information contained in the PSAR, a complete description of structural tests will be submitted for review prior to the actual tests.

REGULATORY GUIDE 1.19, REVISION 1 (8/11/72)

NONDESTRUCTIVE EXAMINATION OF PRIMARY CONTAINMENT LINER WELDS (8-11-72)

RESPONSE TO REGULATORY POSITION

The requirements for nondestructive examination of liner plate welds comply with R.G. 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.

The AEC approved the Midland Plant position 1-8-74 in a letter to CPCo (attached).

August 11, 1975

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

JAN 8 1974

Dos. 50-329
and 50-330

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

Gentlemen:

We have reviewed Amendment No. 23 to your application for construction permits and operating licenses for Units 1 and 2 of your Midland Plant. This amendment consists of revisions to the Preliminary Safety Analysis Report that more clearly define the requirements for nondestructive examination of the seam welds on the reactor building containment liner plate and penetrations.

We have found that these requirements for nondestructive examination of the seam welds compare favorably with: the ASME Pressure Vessel Code, Division 1, Section VIII (1971) UW-52(b); the proposed ACI/ASME Sect. III, Division 2 Section CC 5520; and Regulatory Guide 1.19. Based on the considerations: (a) that all welds will at least satisfy the requirements of the proposed 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, we have concluded that satisfactory assurance exists that the welds will be able to carry all postulated loads. Therefore, the requirements for nondestructive examination of the seam welds of the reactor building containment liner plate and penetrations are acceptable as set forth in Amendment No. 23.

Sincerely,

A. Schwencer, Chief
Light Water Reactors Br. 2-3
Directorate of Licensing

cc: See Next Page

cc: DEU
TJC
PAM Baebler
ADB/CAH

JAN 11 1974

REGULATORY GUIDE 1.27
(REV. 1 3/74)

ULTIMATE HEAT SINK FOR NUCLEAR POWER PLANTS

RESPONSE TO REGULATORY POSITION

1. Analysis of the Midland emergency pond for thermal performance and water loss in accordance with the current Regulatory Guide criteria results in a peak pond temperature 3.5°F above our present service water design temperature. Considering the conservatism in the Regulatory Guide meteorological assumptions we do not believe that a 3.5°F difference is significant enough to warrant any system modifications. The emergency pond construction is completed with a majority of the system equipment in the process of fabrication. The emergency pond complies with the Regulatory Guide criteria for water loss analysis.

2. The emergency pond, will maintain the 70 acre-feet of water necessary for its function through and after the most severe natural phenomena credible for the site. This includes the DBE, the probably maximum flood, and the failure of the main cooling pond dikes. Pond seepage has been included in the sizing of pond capacity and a thorough program of well sealing has been initiated to maintain emergency pond integrity. The pond is so designed and located that a single failure of a man-made structure will not affect its capability. All essential lines to and from the emergency pond are redundant.

3. Because of the extremely low probability of failure of the emergency pond, no other Class I ultimate heat sink is provided for the Midland units. Two full-capacity suction and discharge lines connect the pond with the plant service water system. These lines are separated and protected such that a failure of one will not cause the failure of the other.

4. Technical specifications consistent with paragraph C.4 will be included if necessary.

August 11, 1975

REGULATORY GUIDE 1.35, REVISION 1 (6/74)

INSERVICE INSPECTION OF UNGROUTED TENDONS IN PRESTRESSED CONCRETE CONTAINMENT STRUCTURES

RESPONSE TO REGULATORY POSITION

The Midland Plant will comply with the requirements of R.G. 1.35 as described in Bechtel topical report BC-TOP-5A, Revision 3 (2/75) approved by the NRC.

The Regulatory Guide requires that the sample size be 21 tendons for the first three surveillances (i.e., 1, 3, and 5 years after SIT). Thereafter, the sample size reverts to 9 tendons. Also, para. C.2 of the Regulatory Guide requires only a visual examination (i.e., no lift-off) for the second containment structure.

This differs from the information presently contained in the PSAR. The appropriate sections of the SAR will be updated at a later date.

August 11, 1975

REGULATORY GUIDE 1.55

CONCRETE PLACEMENT IN CATEGORY I STRUCTURES (JUNE, 1973)

RESPONSE TO REGULATORY POSITION

Except as discussed below, concrete is placed in Category 1 structures in accordance with Regulatory Guide 1.55.

Regulatory positions 2 and 3 of the regulatory guide state the presumed functional responsibilities of the "Designer" and the "Constructor." Under the designer's role are listed the responsibilities for checking shop drawings and locations of construction joints. On this job, the former is fully delegated to the Bechtel field, although the design engineering office may check significant portions and may advise the field accordingly. The responsibility for construction joint location is partly delegated to the field in the sense that the field has to follow the guidelines set out in the design drawings prepared by "Engineering." In interface areas, a delegation of the design engineering office's responsibility to the field office is within the definition of the terms "responsibility" and "delegated responsibility" as discussed in Paragraph 1.3 of the proposed ANSI N 45.2.5 - 1974. Delegation of the responsibilities for checking the reinforcing drawings to the field engineering group is justified by the following:

1. The Bechtel field engineering group is segregated from the field supervision group, although both are located at the jobsite and eventually report to the project superintendent.

2. The field engineering group is staffed for the most part by graduate engineers who have been trained in the use of the ACI code and understand the design implication of the proper location, splicing and embedment of reinforcing steel.

3. The field inspection of the actual rebar as placed in the forms is conducted using the engineering drawings as the primary source document. This assures a check on any errors which may have passed the critical eye of the field engineer in checking the shop detail or erection drawings.

August 11, 1975

4. It is standard practice in the Civil engineering profession that engineering requirement drawings for reinforcing are converted to shop detail and erection drawings in accordance with ACI standards applied by steel detailers at the reinforcing steel vendor's shop. Most contractors installing reinforcing steel rely upon their superintendent and foreman for correct interpretation of these detail drawings in erecting the reinforcing steel. While this is also true of Bechtel field operation, we do have the additional help and guidance of the field engineers both during the installation phase and finally at the inspection phase prior to final sign off on the report card.

5. The field engineers have the added benefit of being able to plan and witness the actual installation and can, therefore, better foresee any difficulties in meeting the intended design requirements. Their assessment of the situation is further assisted by regular telephone communication with the design engineers who also periodically visit the jobsite.

It is submitted that the above procedure of delegation of the design engineering office's responsibility to the field personnel and periodic monitoring by the engineering office provides an assurance of correctness and conformance of the shop drawings to the design drawings, and therefore, meets the intent of Regulatory Guide 1.55.

REGULATORY GUIDE 1.57 JUNE 1973

DESIGN LIMITS AND LOADING COMBINATIONS FOR METAL PRIMARY REACTOR CONTAINMENT SYSTEM COMPONENTS

RESPONSE TO REGULATORY POSITIONS

Regulatory Guide 1.57 is not applicable to Midland since Midland does not have a metal primary reactor containment. ⚠

August 11, 1975

REGULATORY GUIDE 1.59, REVISION 0 (8/73)

DESIGN BASIS FLOODS FOR
NUCLEAR POWER PLANTS

RESPONSE TO REGULATORY POSITION

1. The Midland Project believes that it now complies with Regulatory Position C.1. It is planned to discuss the calculational techniques and results in a SAR Amendment scheduled for submittal by January 1, 1976.

2. Upon acceptance by the Staff of the final PMF report, the Project intends to perform the analyses indicated in Position C.2. Performance of these analyses is necessitated by the Project's past commitment to a plant grade at elevation 634', complied with our expected conclusion that PMF stillwater height will be 631 feet and PMF wave overtopping will be 635.5 feet ±. General reviews of the requirements of Position C.2 indicate that the Project should be in conformity with sections C.2.a, C.2.b, and C.2.c, but that sandbagging will be necessary for cold shutdown and maintenance thereof. This probable exception to position C.2.d, is necessitated by the advanced state of Project design and construction.

August 11, 1975

REGULATORY GUIDE 1.60, REVISION 1, (12/73)

DESIGN RESPONSE SPECTRA FOR SEISMIC DESIGN OF NUCLEAR POWER PLANTS

RESPONSE TO REGULATORY POSITION

The Midland design response spectra for the bulk of the plant differs from R.G. 1.60 requirements, and was established and in use before issuance of the 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.

Vertical response spectra are linearly scaled from figures 5-A-1 and 5-A-2 in proportion to maximum vertical ground acceleration which equals 2/3 the maximum horizontal ground acceleration. The response spectra recommended for the Midland site are the average response spectrum developed by normalizing and averaging both components of the strong-motion ground accelerations from four earthquakes (El. Centro, Calif., Dec. 30, 1934; El Centro, Calif., May 18, 1940; Olympia, Wash., April 13, 1943; and Taft, Calif., July 21, 1952). This spectrum is intended to envelope large magnitude earthquakes at moderate distances from the epicenter; refer to AEC publication TID-7024.

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

August 11, 1975

REGULATORY GUIDE 1.61, REVISION 0 (10/73)

DAMPING VALUES FOR SEISMIC DESIGN OF
NUCLEAR POWER PLANTS

RESPONSE TO REGULATORY POSITION

The damping values for design of the bulk of the plant differ from R.G. 161 requirements, and were established and in use before issuance of the guide.

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." The table below summarizes the damping values used as percent of the critical damping.

The percent critical damping for structures and systems is as follows:

	Design* Earthquake	Max.* Earthquake
Welded Steel Plate Assemblies	1	1
Welded Framed Structures	2	2
Bolted or Riveted Steel Structures	2.5	2.5
Reinforced Concrete Equipment Supports	2	3
Reinforced Concrete Frames & Buildings	3	5
Prestressed Concrete Structures	2	5
Critical Piping	0.5	0.5

The percent critical damping for equipment is determined by the characteristics of individual equipment.

A value of 5% of critical damping was assigned to soil for both the design and maximum earthquakes.

The composite modal damping is calculated based on the materials and mode shapes.

Response to R.G. 1.61 (cont.)

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

*The term "Design Earthquake" used in the PSAR is also commonly called "Operating Basis Earthquake" and is equivalent to one-half of "Safe Shutdown Earthquake" (SSE). The term "Maximum Earthquake" used in the PSAR and sometimes referred to as "Design Basis Earthquake," is equivalent to "Safe Shutdown Earthquake."

REGULATORY GUIDE 1.90

INSERVICE INSPECTION OF PRESTRESSED CONCRETE CONTAINMENT STRUCTURES WITH GROUTED TENDONS

RESPONSE TO REGULATORY POSITION

This regulatory guide is not applicable to the Midland Plants since we do not have grouted tendons.

August 11, 1975

REGULATORY GUIDE 1.92 (DECEMBER 1974)

COMBINATIONS OF MODES AND SPATIAL COMPONENTS
IN SEISMIC RESPONSE ANALYSIS

RESPONSE TO REGULATORY POSITION

The Midland Plant design is in conformance with R.G. 1.92 requirements with the following exception:

Combining the values of the response of individual modes in the response spectrum modal dynamic analysis:

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

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