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September 24, 1976

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 November 14, 1973 regarding regulatory guides applicable to your facility. Subsequently, the enclosure contains comments on regulatory guides [illegible]

The enclosed comments result from our review of your letters of September [illegible], 1975, October 2, 1975, and December 17, 1975; 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,

S. A. Varga, Chief
Light Water Reactors Branch No. 4
Division of Project Management

Enclosure:
Regulatory Guide Review

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DATE	9/15/76	9/12/76	9/15/76	9/22/76		

Form AEC-318 (Rev. 9-53) AECM 0240

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MIDLAND PLANT UNITS 1 AND 2
REGULATORY GUIDE REVIEW

1. Regulatory Guide 1.2 - "Thermal Shock to Reactor Pressure Vessels" - (Safety Guide 2, 11/2/70)

This guide describes a suitable program which may be used to implement General Design Criterion 35 to assure that the reactor pressure vessel will behave in a nonbrittle manner under loss of coolant accident conditions.

From the information provided by the applicant, the NRC staff concludes that the Midland design conforms to Regulatory Guide 1.2.

However, while not addressed by the Regulatory Guide, the staff notes that the residual elements (i.e., copper and phosphorus) of the Midland reactor vessel materials were not controlled during manufacture. Therefore, there is a possibility that irradiation will cause larger than average increases in the ductile to brittle transition temperature of the vessel beltline materials. Should high values of transition temperature occur in the materials, the probability of crack propagation during a thermal shock transient would be increased.

Degradation of the material toughness properties of the Midland reactor vessels due to irradiation will be monitored throughout the service life of each vessel by surveillance programs that conform to ASTM E 185-66 and meet the important requirements of Appendix H, 10 CFR Part 50. If the data from the surveillance programs indicate that material toughness properties of a Midland vessel are marginal, we will require that the vessel be annealed to restore the toughness properties to acceptable values.

2. Regulatory Guide 1.14 - "Reactor Coolant Pump Flywheel Integrity" - (Safety Guide 14, 10/27/71)

This guide describes an acceptable method of implementing General Design Criterion 4 as it applies to protection against the effects of possible missiles originating from the reactor coolant pump flywheel.

The reactor coolant pump flywheels for Midland 1 and 2 have already been procured in conformance with Regulatory Guide 1.14 Positions C.1 and C.2, which pertain to design, materials, fabrication, material testing, and flywheel inspection. However, the overspeed spin testing of each flywheel assembly, recommended by Position C.3 of the Guide, was not done. The applicant claims that the two additional analyses performed for the flywheels show that they are satisfactory for use at speeds far in excess of the required 125% of normal speed, and therefore an overspeed test would provide little or no additional confidence that the flywheels are satisfactory. In addition, the applicant states that by removal of covers and some motor hardware, the upper surface and rim of each pump flywheel can be accessible for ultransonic testing. The NRC staff concludes that the flywheels can conform to Position C.4 of the Regulatory Guide, which pertains to future inservice inspection by ultransonic examination. A full volumetric ultrasonic inspection was performed initially on each flywheel.

The NRC staff requires that the overspeed test of Position C.3 of the Regulatory Guide be given each of the flywheels that has not already been mounted on a pump motor shaft. It is not recommended that flywheels be removed from motor shafts. Based on satisfactory experience to date with flywheels of other nuclear plants, conformance with Regulatory Guide 1.14 in regard to design, materials, fabrication, material testing, flywheel inspection, and access for inservice inspection is sufficient to assure safe operation of the Midland flywheels. A spin test would provide additional assurance of flywheel integrity, but it is not mandatory.

3. Regulatory Guide 1.31 - "Control of Stainless Steel Welding" - (Revision 1, June 1973)

This guide describes an acceptable method of assuring control of welding when fabricating and joining austenitic stainless steel components and systems, in conformance with the requirements of General Design Criterion 1 and Appendix B to 10 CFR Part 50. On April 11, 1974, an Interim position on control of stainless steel welding was issued by the staff, to be used until such time as Revision 2 to Regulatory Guide 1.31 was issued. This interim position is incorporated in the Standard Review Plan as Branch Technical Position MTEB 5-1.

Position 1 of the Interim Position specifies that weld deposits contain between 5 and 20 percent delta ferrite; Position 2 requires that delta ferrite determinations be included in the Certified Materials Test Report; and Position 3a specifies testing of production welds for delta ferrite content. Because most of the austenitic steel components supplied by B&W were ordered prior to the issuance of the April 11, 1974, Interim Position, Position 1 of the Interim Position was not conformed to for procurement of certain of the B&W procured components (i.e., tanks, heat exchangers, demineralizers, and valves). Also, Position 2 was not conformed to for procurement of most B&W procured components. Position 3a of the Interim Position was not conformed to for procurement of either the equipment in the B&W scope of supply or the B&W procured components.

The procurement status of the austenitic stainless steel components in the NSSS, supplied by B&W and for the balance of plant is shown in the applicant's letter of December 17, 1975. No installation welding of the NSSS has been started and less than 5% of the installation welding for the balance of plant has been done.

Procurement and welding installation of the balance of plant components, and welding installation of the NSSS, was and will be in conformance with Positions 1 and 2 of the Interim Position but will not be in conformance with Position 3a. The applicant claims that magnetic measurement of production welds is unnecessary when austenitic stainless steel welding materials are controlled to deposit 8 to 25 percent delta ferrite.

Non-conformance with Position 3a of the Interim Position is acceptable to the NRC staff because Position 3a is being eliminated. Studies of production welds have shown that when welding materials are procured to deposit 5 to 20 percent delta ferrite, the production welds contain the required 3 percent minimum delta ferrite.

The NRC staff recommends that Positions 1 and 2 of the Interim Position be conformed with: (1) for procurement of the remaining austenitic stainless steel components of B&W and of the balance of plant, (2) for welding installation of the B&W components, and (3) for the remaining welding installation of the balance of plant components. The NRC staff does not recommend conformance with Position 3a for the component procurement and welding installation that remains to be done.

The basis for the NRC staff not recommending conformance with Positions 1 and 2 of the Interim Position for the austenitic stainless steel components already supplied by B&W is that these components were manufactured in accordance with applicable editions of the ASME Code in effect at the time of procurement of these components. Adherence to these code requirements provided welds of acceptable quality. Procurement of the remaining B&W components in conformance with Positions 1 and 2 of the Interim Position will provide additional assurance of quality welds.

4. Regulatory Guide 1.34 - "Control of Electroslag Weld Properties" - (12/28/72)

This guide describes an acceptable method of implementing the requirements of General Design Criterion 1 and Appendix B to 10 CFR Part 50 with regard to the control of weld properties when fabricating electroslag welds made of ferritic or austenitic materials.

Some electroslag welding was used by B&W in the fabrication of the steam generators and pressurizers, and fabrication is complete. No electroslag welding has been done and none will be permitted on the balance of plant components to which Regulatory Guide 1.34 applies. Because the contracts for the B&W electroslag welding were made prior to the issue of Regulatory Guide 1.34, B&W did not comply with the specification to requalify procedures and to test weld prolongations of each production weld. However, B&W has conducted all weld metal tensile and impact tests on prolongations of production electroslag welds on approximately 25% of the electroslag welds made on NSSS steam generators and pressurizers. This included tests of two electroslag welds on one of the Midland steam generators. In addition, each weld was subjected to radiographic, ultrasonic, and magnetic particle inspection after heat treatment.

The staff concludes that the production controls, tests, and inspections performed by B&W on the electroslag welding of the Midland steam generators were sufficient to assure an acceptable quality of weld, even though the welding was not performed fully in conformance with the recommendations of Regulatory Guide 1.34.

5. Regulatory Guide 1.36 - "Nonmetallic Thermal Insulation for Austenitic Stainless Steel" - (2/23/73)

This guide describes an acceptable method for implementing the requirements of General Design Criteria 1, 14, and 31 as they apply to the selection and use of nonmetallic thermal insulation to minimize any contamination that could promote stress corrosion cracking in the stainless steel portions of the reactor coolant pressure boundary and other systems important to safety.

The applicant has stated that the nonmetallic thermal insulation for the austenitic stainless steel of Midland 1 and 2 will be procured under a subcontract that will require conformance with the recommendations of Regulatory Guide 1.36 for both insulation design and installation.

6. Regulatory Guide 1.43 - "Control of Stainless Steel Weld Cladding of Low-Alloy Steel Components" - (May 1973)

This guide describes acceptable methods of implementing the requirements of General Design Criterion 1 and Appendix B to 10 CFR Part 50 with regard to the selection and control of welding processes used for cladding ferritic steel components with austenitic stainless steel to restrict practices that could result in underclad cracking. This guide is limited to forgings and plate material and does not apply to other product forms such as castings and pipe.

Procurement of the B&W low-alloy steel components involving stainless steel weld cladding has been completed. This includes some components of SA-508 Class 2 material that were clad with low heat input processes, and for these components, Position C.1.b of Regulatory Guide 1.43 was not followed.

Manufacturing of balance of plant low-alloy steel components involving stainless steel weld cladding and installation welding of the NSSS have not been started. For the work done by Bechtel, no cladding will be done on SA-508 Class 2 material. Therefore, Regulatory Guide 1.43 does not pertain to the balance of plant.

Since procurement of the B&W pertinent components has been completed, conformance with Position C.1.b of the guide is not possible. However, the weld cladding was performed with a low heat input process and in accordance with ASME codes and standards in effect at the time, which assures that the welds are of acceptable quality. Based on past experience with low heat input welds, underclad cracking is not a problem. Thus, the staff concludes that the degree of conformance to Regulatory Guide 1.43 is acceptable.

7. Regulatory Guide 1.44 - "Control of the Use of Sensitized Stainless Steel" - (May 1973)

This guide describes acceptable methods of implementing the requirements of General Design Criteria 1 and 4 and Appendix B to 10 CFR Part 50 with regard to control of the application and processing of stainless steel to avoid severe sensitization that could lead to stress corrosion cracking.

The procurement status of the austenitic stainless steel components in the NSSS, supplied by B&W, and for the balance of plant is shown in the applicants' letter of December 17, 1975. No installation welding of the NSSS has been started, and less that 5% of the welding installation of the balance of plant has been done. For the above components and installation welding, there was only partial conformance with Positions C.3 and C.6 of the Guide.

The NRC staff recommends that Positions C.3 and C.6 of Regulatory Guide 1.44 be conformed with by B&W and Bechtel: (1) for procurement of the remaining austenitic stainless steel components of B&W and of the balance of plant, (2) for welding installation of the B&W components, and (3) for the remaining welding installation of the balance of plant components. In regard to Position C.3, nonsensitization of the material should be verified by using ASTM A262-70 or the Strauss Test whenever the materials specification does not require water quenching from the solution temperature. In regard to Position C.6, both B&W and Bechtel should perform intergranular corrosion tests for sufficient welding procedures to cover the complete ranges of the welding parameters (i.e., material thickness, etc.) that will be involved in component fabrication and installation.

The basis for the NRC staff not recommending conformance with Positions C.3 and C.6 of Regulatory Guide 1.44 for the components

already procured and for the balance of plant welding installation accomplished to date is that the procurement and construction of Midland 1 and 2 to date was done in accordance with applicable editions of the ASME code in effect at the time. Adherence to these code requirements provided an acceptable quality weld, as is attested by the satisfactory service experience of similar welds. Conformance with Positions C.3 and C.6 of Regulatory Guide 1.44 for the remaining welds will provide additional assurance of weld quality.

8. Regulatory Guide 1.50 - "Control of Preheat Temperature for Welding of Low-Alloy Steel" - (May 1973)

This guide describes an acceptable method of implementing General Design Criterion 1 and Appendix B to 10 CFR Part 50 with regard to the control of welding for low-alloy steel components during initial fabrication.

Conformance with Regulatory Guide 1.50 is satisfactory for the equipment within the B&W scope of supply. Procurement of balance of plant low-alloy components is less than 50% complete, and the installation of the NSSS has not yet begun. Position C.1.a of the Regulatory Guide states that both a minimum preheat and a maximum interpass temperature be specified by the procedure qualification. The applicant claims that, for the balance of plant, welding procedures do not have to be qualified at maximum interpass temperature unless impact testing is required.

The main purpose of the Guide is to control preheat in order to avoid hydrogen cracking, and the applicant complies with this. The maximum interpass temperature requirement is a precaution for achieving proper mechanical properties. This is achieved by the applicant's procedure qualification requiring maximum interpass temperature when impact properties are required. In addition, the applicant complies with Position C.4 of the Guide, which nullifies noncompliance with Positions C.1, C.2, and C.3. The NRC staff therefore considers that conformance with Regulatory Guide 1.50 for the balance of plant welding is satisfactory.

The NRC staff concludes from the above that an adequate margin of safety was and will be provided for the balance of plant fabrication welding and installation welding without complete conformance with Regulatory Guide 1.50.

9. Regulatory Guide 1.65 - "Materials and Inspections for Reactor Vessel Closure Studs" - (October 1973)

This guide defines acceptable materials and testing procedures for implementing the requirements of General Design Criteria 1, 30 and 31 and Appendix B to 10 CFR Part 50 with regard to reactor vessel closure stud bolting.

All of the reactor vessel closure studs have been ordered, manufactured, and delivered to the site.

Because the studs were ordered prior to issuance of Regulatory Guide 1.65, B&W has conformed only partially with Positions C.1 and C.2 of the Guide and will perform initial inservice inspections listed in Position C.4 only to the extent permitted by the procurement status. However, ASME Code requirements were met regarding material, toughness, and inspections, which assures that the studs are of acceptable quality.

The staff concludes from the above that the reactor vessel closure studs provided by B&W are of acceptable quality even though they were not procured in full conformance to Regulatory Guide 1.65.

10. Regulatory Guide 1.66 - "Nondestructive Examination of Tubular Products" - (October 1973)

This guide describes an acceptable method of implementing the requirements of General Design Criterion 1 and Appendix B to 10 CFR Part 50 with regard to the nondestructive examination of tubular products used for components of the reactor coolant pressure boundary and other safety-related systems.

The procurement status of NSSS equipment containing tubular products and supplied by B&W is presented in the applicant's letter of December 17, 1975. This letter also gives the status of procurement of the balance of plant tubular products that fall under the scope of Regulatory Guide 1.66. Equipment within the B&W scope of supply was nondestructively examined in accordance with the ASME Code, Section III, 1968 Edition, including the Summer Addenda. The balance of plant components were nondestructively examined in accordance with the ASME Code in effect at the component purchase date. Therefore, nondestructive examination of the B&W and the balance of plant components did not conform with either Regulatory Guide 1.66 or the ASME Section III Code, Summer 1974 Addenda, which contains the most important requirements of the Guide.

The NRC staff recommends that either Regulatory Guide 1.66 or the nondestructive examination requirements of the Summer 1974 Addenda of Section III of the ASME Code be conformed with for procurement of the remaining B&W and balance of plant tubular products. This recommendation does not pertain to products that already have been incorporated into parts, piping subassemblies, or components.

The basis for the NRC staff not recommending conformance with the Regulatory Guide or the Summer 1974 Addenda for the tubular products already procured is that the procurement was done in

accordance with the ASME Code, Section III, in effect at the time of procurement, which assured that the products were of acceptable quality. Conformance to the recommendations of Regulatory Guide 1.66 or the Summer 1974 Addenda of the code for those tubular products still to be procured will provide additional assurance of the quality of these products.

11. Regulatory Guide 1.71 - "Welder Qualification for Areas of Limited Accessibility" - (December 1973)

This guide describes an acceptable method for implementing the requirements of General Design Criterion 1, Appendix B to 10 CFR Part 50, and Section 50.55a of 10 CFR Part 50 with regard to the control of welding for nuclear components.

Conformance with Regulatory Guide 1.71 is satisfactory to the NRC staff because the essential provisions of the Guide are being followed.