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December 16, 1980

Mr J G Keppler, Regional Director
Office of Inspection and Enforcement
US Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, IL 60137

MIDLAND NUCLEAR PLANT
UNIT NO 1, DOCKET NO 50-329
UNIT NO 2, DOCKET NO 50-330
UNIT NO 1, REACTOR VESSEL BROKEN ANCHOR BOLT
FILE: 0.4.9.35, 0.4.2 UFI: 73*60*13, 73*10*01, 21175(E), 02110(S),
21110(E) SERIAL: 10078

Reference: Letter, J G Keppler to S H Howell, Docket Nos 50-329 and
50-330, dated August 18, 1980

The referenced letter transmitted to Consumers Power Company a copy of the investigation report (Report No 50-329/80-13 and 50-330/80-14) regarding the procurement and manufacture of the Midland Unit 1 reactor vessel anchor bolts. The referenced letter contained three items of noncompliance and an unresolved item. Although the referenced letter stated "no response to the specific items of noncompliance is required," Consumers Power Company is transmitting the enclosed response in order to formally document our position with regard to the inspection report. We feel obligated to do this based on our concern that certain subjective conclusions have been incorporated in the report as statements of fact. We can understand how the lack of specificity in some of the project design documents and records contributed to confusion and lack of agreement on what was and what was not intended. However, it is our opinion that a considerable amount of information relevant to the investigation was not made part of the inspection report; and, therefore, we are availing ourselves of the opportunity to augment the record for this investigation.

This response is not intended to be an appeal of the enforcement action taken on this matter. We agree that the failure of three reactor vessel anchor bolts was indicative of a quality problem, that a detailed investigation of all aspects of the problem was merited, and that the remedial actions initiated and still ongoing are necessary to fully correct the problems encountered.

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The referenced NRC inspection report also contained one unresolved item. The enclosure to this letter also provides information as a partial response to that unresolved item.

James W. Cook

JWC/JLW/lr

Enclosure: Response to USNRC Letter (Keppler to Howell), Docket Nos 50-329 and 50-330, Dated August 18, 1980, and Its Attachments (Appendix A- Notice of Violation and Investigation Report Nos 50-329/80-13 and 50-330/80-14)

CC: Director of Office of Inspection & Enforcement
Att Mr Victor Stello, USNRC (38)

✓ Director, Office of Management
Information and Program Control, USNRC (1)

RJCook, USNRC Resident Inspector
Midland Nuclear Plant (1)

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RESPONSE TO USNRC LETTER (KEPPLER TO HOWELL),
DOCKET NOS 50-329 AND 50-330, DATED AUGUST 18, 1980
AND ITS ATTACHMENTS (APPENDIX A - NOTICE OF VIOLATION AND
INVESTIGATION REPORT NOS 50-329/80-13 AND 50-330/80-14)

The purpose of this response is to formally document CP Co's position on the subject report, including new information, which explains why CP Co believes that some incorrect assumptions and interpretations were made in the report. The substantial points of disagreement with the investigation report and associated findings are addressed below as they relate to the specific infractions from the report. In addition, discussions are presented regarding the root cause of the problem and of the single unresolved item from the investigation. These discussions are not an appeal of the enforcement action, but rather an enhancement of record in some of the interpretative matters in the report. CP Co acknowledges the following: (a) three reactor pressure vessel (RPV) anchor bolts failed; (b) the wording of some sections of the procurement specification and applicable FSAR sections caused confusion; (c) certain subsuppliers used poor fabrication/processing practices; and (d) communications between the various parties did not lead to recognition and correction of the problem in its early stages.

A. INFRACTION (50-329/80-13-01 AND 50-330/80-14-01)

The NRC investigation report states that "The investigation findings indicate that the root cause of the anchor stud failures was a failure to characterize the studs as American Society of Mechanical Engineers (ASME) Section III, Class 1, Component Supports (Division NF)." The NRC report then contends that the Bechtel Purchase Specification No 7220-C-233(Q) intended to use ASME Section III, Subsection NF to govern the procurement of the RPV anchor bolts. The report references some internal Bechtel Ann Arbor engineering memos which are considered, by the investigators, to support this interpretation. The result is that CP Co was then cited with an infraction (50-329/80-13-01 and 50-330/80-14-01) on the basis that contrary to 10 CFR 50, Appendix B, Criterion IV and Bechtel Purchase Specification 7220-C-233(Q), "...Subsection NF was not made the requirement for the reactor vessel anchor bolts..." This response provides evidence that: (1) establishes that, per ASME Code requirements, Subsection NF was not a mandatory code for these bolts, and (2) Bechtel engineering never intended Specification 7220-C-233(Q) to require these bolts to be procured to NF requirements.

1. Applicability of ASME Section III Subsection NF to Midland RPV Anchor Bolts as the Design Code

For ASME Section III components, the responsibility to define the jurisdictional boundaries of component supports is given in N152, NA-3254 or NCA-3254 (depending on code year/addenda). This responsibility was further clarified by ASME interpretation III-1-78-47 (see Attachment 1 for complete text) which states in part "...The Owner is responsible for designating whether or not metallic supports for Section III components, which are attached to items defined as part of the building structure, are required to be constructed in accordance with the provisions of Section III, Subsection NF..." For

the Midland nuclear plant, this decision was that the RPV anchor bolts would not be NF. Evidence of this decision is contained in the Midland FSAR.

Table 3.2-1, FSAR Section 3.2, gives a summary of design criteria. Under "Containment Internal Structures, NSSS Supports," the "Design Code/Standard" is shown as "ACI-318/AISC." FSAR Section 3.8.3 is referenced for details. It should be noted that for pressure vessels, (eg, the RPV), ASME III is shown as the "Design Code/Standard." It is significant that the title of FSAR Section 3.8 is "DESIGN OF CATEGORY I STRUCTURES" whereas, the title of Section 3.9 is "MECHANICAL SYSTEMS AND COMPONENTS." Section 3.8 "provides information on the containment building, its internal structures, other Seismic Category I structures, and their foundations and supports." As further evidence that the RPV anchor bolts were intended to be classified as civil/structural, FSAR Section 3.8.1.6.4.1 (Page 3.8-36a) lists the RPV anchor bolt material as one of the containment liner plate materials. The material required for the RPV anchor bolts is "ASTM-A-354, Grade BD (modified)." FSAR Section 3.8.3, referenced by the above-mentioned Table 3.2-1, is titled "CONCRETE AND STEEL INTERNAL STRUCTURES OF STEEL OR CONCRETE CONTAINMENTS." Section 3.8.3.1 summarizes the internal structures, which include "...reactor support system, steam generator support system, reactor coolant pump support system, reactor coolant pipe restraints,..." In Section 3.8.3.1.1, the RPV anchor bolts are specifically described as part of the reactor vessel support system.

FSAR Section 3.8.3.4.1 states "The design standards used for the design of bolts, baseplates, and embedments for the seismic Category I structural supports were the AISC (Seventh Edition), ACI 318-71, Appendix XVII of ASME Section III and Code Case 1644-5." The references to Appendix XVII of ASME Section III and Code 1644-5 are to enhance the civil/structural design and are not a commitment to provide ASME Section III supports. This section does reference ASME Section III, Subsection NF twice, but each time specifically refers to hangers (piping). For mechanical properties of bolting materials, this section refers to FSAR Table 3.8-32 (entitled "STRUCTURAL BOLT PROPERTIES") which lists ASTM-A-354, Grade BD.

Under FSAR Section 3.9, "MECHANICAL SYSTEMS AND COMPONENTS," Section 3.9.3.4.1 discusses supports not furnished with the NSSS. The section refers to ASME Section III, Subsection NF for the design, but specifically states "...These requirements (NF) are applied for piping systems only..." This agrees with the above-mentioned reference to NF in FSAR Section 3.8.3.4.1, which limited the application to hangers.

In summary, the owner, per N152/NA-3254/NCA-3254 of ASME Section III defines the code jurisdictional boundary in component supports. This is specifically discussed in ASME Interpretation III-1-78-47. CP Co made this determination of the applicable design code in the FSAR, and the design of the RPV anchor bolts is civil/structural, not NF.

This decision that the RPV anchor bolts are not NF is not unique to the Midland units. Many nuclear plants, both constructed and under construction, have classified their embedment anchor bolts as part of the building structure - civil/structural design.

2. Code Requirements of Bechtel Specification 7220-C-233(C)

The NRC investigation report contends that the actual Bechtel purchase specification, 7220-C-233(Q), Revision 3, December 5, 1974, required the bolts be NF. There is no requirement in the subject specification to meet ASME, much less Section III, Subsection NF. All references to Codes are either American Institute of Steel Construction (AISC), American Society for Testing and Materials (ASTM) or American Welding Society (AWS). The entire basis for the NRC investigator's conclusion that this specification intended ASME Section III, Subsection NF to govern procurement of the RPV anchor bolts appears to be based on a note to Section 5.10 of the specification which says "(NOTE. These anchor bolts and nuts will be utilized as ASME Section III, Division 1, Class 1 component supports.)" (It should be noted that the NRC report incorrectly capitalized the words "component supports" when it quoted the specification.) The purpose of this note was to provide the supplier with the information that these anchor bolts would be part of a support for a Class 1 component, not to invoke the requirements of ASME Section III, Subsection NF on the procurement, as indicated by the NRC report. The entire remaining NRC discussion of the specification, NF, and code applicable dates is based on the incorrect interpretation that 7220-C-233(Q) meant to require Section III, Subsection NF. As backup data to this interpretation, the NRC report references a combination of five telephone memos, unsigned notes and internal memos as being further proof that NF was required. First, the referenced documents are not, nor could they ever be construed to be, design basis documents. One memo and one unsigned note incorrectly assume that ASME Section III, Subsection NF, applies. These two items were in error; however, as written, they do confuse the facts of the NF/non-NF decision. Two of the documents simply reference the same words that the NRC investigator misinterpreted in Section 5.10 of the specification. The fifth memo (Tuveson to Castleberry) does not support the NRC investigator's contention, but does support the CP Co/Bechtel position (see Attachment 2) in that it specifically indicates that for component support structures, the design is not ASME, though there are modifications to utilize specific ASME requirements. A decision by engineering to selectively upgrade a design, above the minimum requirements, to obtain a better product, does not make the code, from which these extra requirements were taken, mandatory.

As further evidence that Bechtel would never have intended to invoke the requirements of NF, CP Co and Bechtel pointed out to the NRC investigators that FSAR Figure 3.8-77, "Reactor Vessel Details," see Attachment 3, contains a note that states "All material of the support skirt below this point is beyond limit of code jurisdiction." The NRC investigators indicated their belief that the note was meant to apply only to materials used to fabricate the skirt. A recently received

letter from Babcock and Wilcox, see Attachment 4, indicates that CP Co and Bechtel were correct in their interpretation that the note defined the absolute limit of ASME Section III. This interpretation is important as it demonstrates that the RPV anchor bolts are utilized to transmit the loading from one non-ASME structure to another.

The NRC Report, under "Summary of Facts," makes a very controversial statement that "...the root cause of the anchor stud failures was the failure to characterize the studs as American Society of Mechanical Engineers (ASME) Section III, Class 1, Component Supports (Division NF)." As indicated during the investigation, CP Co does not agree with this statement. It is erroneous logic to classify the absence of a design standard as a root cause when the application of that standard is not a requirement. Root cause determination must address the non-conforming aspects that lead to a failure. The non-use of measures which in retrospect can be demonstrated to preclude the failure, can only be classified as a root cause if such measures were a requirement.

The addition of NF requirements would have added an accept/reject criteria to the charpy impact specimens, which would have rejected these particular heats of material. The invoking of NF would not have restricted the use of 4140/4145 as these materials are within the chemical and mechanical requirements of ASME-A-540, Grade B22, Class 2, which could have been the standard, grade and class chosen per NF for this application. CP Co has data that demonstrates that 4140/4145 base materials meet the hardness and charpy impact test requirements of NF.

CP Co is convinced that the cause of the failure was the material process controls, not design material selection. The Company is currently in the final stages of its own detailed "root cause" investigation; and this new material will be forwarded upon completion to the NRC for information and use.

B. INFRACTION (50-329/80-13-03 AND 50-330/80-14-03)

This infraction states that contrary to 10 CFR 50, Appendix B, Criterion IX "...measures did not assure that heat treating and nondestructive tests were controlled in accordance with applicable codes and specifications." Two of the four examples given for this infraction are based on incorrect assumptions as discussed below:

1. Specification of Hardness Test Location by Southern Bolt

The first example is that the Southern Bolt and Fastener (SB&F) Purchase Order does not specify the location of hardness testing by the heat treater (J W Rex) as required by the SB&F Quality Assurance Manual. Inasmuch as no copy of the purchase order to J W Rex could be found, the NRC investigators base this determination on the information contained in a similar SB&F purchase order to a different heat treater for the Unit 2 bolts. CP Co disagrees with the NRC position. The purchase order references ASTM-A-354. This standard in

turn references ASTM-A-370, "Methods and Definitions of Mechanical Testing." ASTM-A-370 adequately describes both the location and method of hardness testing. By referencing ASTM-A-354 on their purchase order, SB&F was not in violation of their QA Manual.

2. ASTM-A-370 Hardness Testing Requirements

The second incorrect NRC example is the location of the hardness testing per ASTM-A-370. The NRC investigator believes that the standard requires a surface hardness test and would allow subsurface (mid-radius) hardness testing only under specific and limited conditions. The mid-radius hardness testing performed by J W Rex was then cited as a violation of the ASTM Standard. CP Co has long expressed the opinion that it is acceptable per ASTM-A-370 to perform mid-radius hardness testing at any time, with or without any previous surface hardness testing. CP Co specifically disagreed with the NRC position that the mid-radius location was only intended to be used if there was a dispute over the hardness readings. CP Co has since contacted the Chairman of the ASTM F-16 Committee concerning the proper use of the mid-radius location. The CP Co interpretation was presented at the recent (November, 1980) meeting of the F-16 Committee. CP Co has been since informed by telephone conversation (to be followed by a written response) that its interpretation with respect to testing at the mid-radius is correct. A processor may go directly to the mid-radius location without either previous surface testing or any specific dispute over the hardness results. The Committee further stated that the standard will be revised to avoid any mis-interpretation on this again in the future. J W Rex was, therefore, not in violation of the ASTM-A-370 for using mid-radius hardness tests.

J W Rex, however, did make an error in that the mid-radius tests were not taken one bolt diameter from the end of the material as the ASTM-A-370 Standard requires.

C. UNRESOLVED ITEM (50-329/80-13-01U AND 50-330/80-14-01U)

The NRC report contains an unresolved item associated with the infraction concerning the application of ASME Section III, Subsection NF. Of concern was what other items were procured without reference to ASME Section III. The investigation to resolve this item is continuing; however, portions of the following additional supports are known to have been designed to civil/structural criteria: (1) steam generator supports; (2) reactor coolant pump supports; (3) pressurizer supports; and (4) reactor coolant pipe restraints. The proposed upper lateral support system for the reactor vessels is also being designed to civil/structural criteria.

JLW/re
12/15/80

rp1280-0082.a102

III-1-78-47, III-1-78-48

Interpretation: III-1-78-47

Subject: Section III, Division I, NF-1120

Date Issued: March 30, 1978

File: NI-78-30

Question: How are the jurisdictional boundaries between structural members fabricated and installed with the building structure and supports for Section III components to be determined?

Reply: It is the responsibility of the Owner to define the jurisdictional boundaries of component supports in the Design Specification (NCA-3254). Items furnished as part of the building structure are normally constructed to the requirements of the appropriate portion of the building code used for the design and construction of the building structure. The Owner is responsible for designating whether or not metallic supports for Section III components, which are attached to the items defined as part of the building structure, are required to be constructed in accordance with the provisions of Section III, Subsection NF. The Owner is also responsible for the compatibility of the boundaries and corresponding loads between the building structure and the component supports constructed in accordance with Section III.

POOR ORIGINAL

Bechtel Memorandum

To: R. L. Castleberry

Location: A2-6A

From: G. Tuveson

Date: 8/30/76

Subject: Midland Units 1 & 2
application of ASME
B&PV Code Section III
Division I Subsection
NF Requirements to
Component Support
Structure

Job No. 7220
File: C-2135

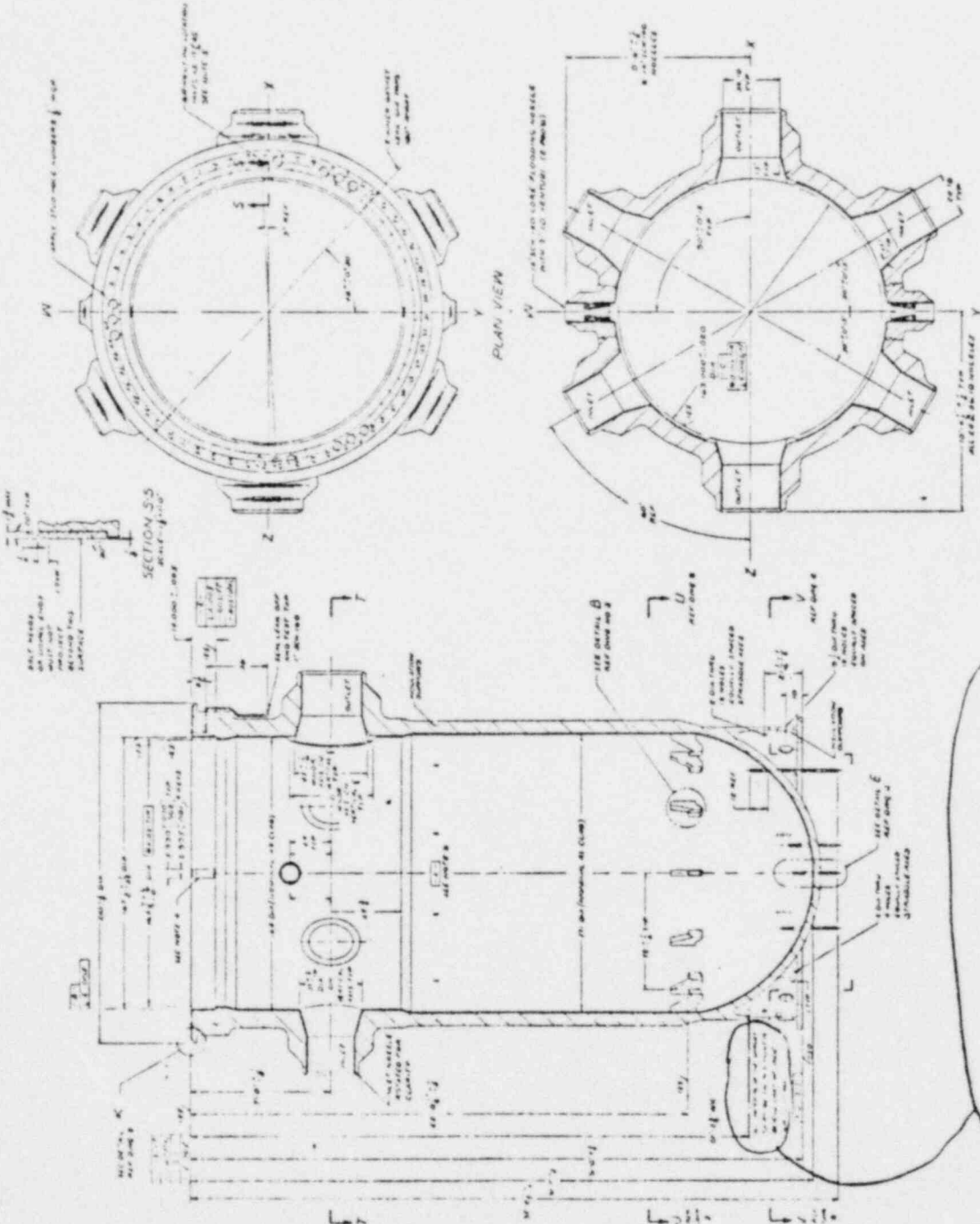
The above mentioned subject was discussed between M. Rothwell and M. Elgaaly, A. Desai and B. Dhar of civil group on August 19, 1976.

It was agreed that to be consistent with Midland project position, the ASME code would not be directly referred to in the design documents. But the design, fabrication and construction would meet, to the extent possible, the ASME code requirements within the applicable boundaries.

Accordingly, to meet the intent of the code, civil group will add a section to the specifications C-38 and C-233. When required, the design drawings will call out the applicability of this section for a particular structure.

typed copy of handwritten
memorandum

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All material of the support skirt below this point is beyond limit of code jurisdiction.

- NOTE:
1. THE DESIGN OF THIS VESSEL IS IN ACCORDANCE WITH THE ASME CODE FOR PRESSURE VESSELS.
 2. THE DESIGN OF THIS VESSEL IS IN ACCORDANCE WITH THE ASME CODE FOR PRESSURE VESSELS.
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CONSUMERS POWER COMPANY MIDLAND PLANT UNITS 1 & 2 FINAL SAFETY ANALYSIS REPORT	
Reactor Vessel Details (Sheet 1)	FSAR Figure 3.8-77
12/78	Revision 20

Babcock & Wilcox

Power Generation Group

P.O. Box 1260, Lynchburg, Va. 24505

Telephone: (804) 384-5111

POOR ORIGINAL

November 5, 1980

CPCO-3029

File: 12B/T1.2/12E51

Consumers Power Company
1945 Parnall Road
Jackson, MI 49201

Attention: Mr. R. C. Bauman
Manager, Design Production

Subject: Consumers Power Company
Midland Plant, Units 1 and 2
REACTOR VESSEL LIMIT OF CODE JURISDICTION

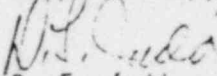
Dear Mr. Bauman:

This is to confirm our discussions of November 3, 1980 during a conference call between ourselves, H. W. Behnke, R. L. Howard, and H. W. Slager of Consumers Power Company.

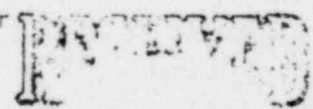
The Consumers Power Reactor Vessels were designed and manufactured to the 1968 Edition, Summer 1968 Addenda of the ASME Boiler and Pressure Vessel Code. At this time there was no section NF for support structures. Since Section III is a pressure vessel code the code boundary of jurisdiction was taken at the first circumferential weld beyond the pressure boundary. This weld is at the attached of the RV support skirt to the reactor vessel. Paragraph N-152, Section III ASME Code, defines the requirements for determining the termination points of the code jurisdiction. We have met the intent of paragraph N-152 as they pertain to the establishment of this boundary.

B&W maintains its position that the RV skirt is outside the ASME boundary of code jurisdiction.

Respectfully,



D. F. Judd
Senior Project Manager



CC: H. W. Slager

NOV 17 1980

MIDLAND PROJECT
MANAGEMENT