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JUN 19 1978

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

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

THIS DOCUMENT CONTAINS  
POOR QUALITY PAGES

Gentlemen:

Thank you for your interim reports dated May 30 and 31, 1978, pursuant to 10 CFR 50.55(e) regarding a deficiency in the design of the NI/RPS system and pipe support fillet welds respectively. We will complete our review of these matters upon receipt of your final reports.

Your cooperation with us is appreciated.

Sincerely,

R. F. Heishman, Chief  
Reactor Construction and  
Engineering Support Branch

- ✓ cc w/ltrs dtd 5/30 & 31/78:
- Central Files
- Reproduction Unit NRC 20b
- PDR
- Local PDR
- NSIC
- TIC
- Ronald Callen, Michigan Public Service Commission
- Dr. Wayne E. North
- Myron M. Cherry, Chicago

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Stephen H. Howell  
Vice President



Consumers  
Power  
Company

General Offices: 212 West Michigan Avenue, Jackson, Michigan 49201

May 30, 1978  
Howe-85-78

Mr J. G. Keppler, Regional Director  
Office of Inspection & Enforcement  
Region III  
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  
NI/RPS GROUNDING CONCERN

Reference: Letter, S. H. Howell to J. G. Keppler, Midland Nuclear Plant -  
Unit No. 1, Docket No. 50-329; Unit No. 2, Docket No. 50-330;  
NI/RPS Grounding Concern, Howe-48-78, dated April 6, 1978.

The referenced letter was an interim report. This letter is also an interim report, since analysis to determine the appropriate corrective action is continuing. The review of the condition, as reported by B&W, supported the conclusion that the significant deficiency is applicable to Midland.

The schedule for procedure preparation for the Midland NI/RPS is being revised to include development of a procedure to test for a "loss of ground condition" in anticipation that this will be the appropriate corrective action. Consumers Power will follow the actions of B&W and the other utilities to benefit from their experience in implementing corrective action on the affected plants.

Another interim report will be supplied by August 31, 1978.

*Stephen H. Howell*

CC: Dr Ernst Volgenau, USNRC (15)

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

JUN 1 1978

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*Dupe*  
8006120771

Stephen H. Howell  
Vice President



Consumers  
Power  
Company

General Offices: 212 West Michigan Avenue, Jackson, Michigan 49201

May 31, 1978  
Howe-86-78

Mr J. G. Keppler, Regional Director  
Office of Inspection & Enforcement  
Region III  
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  
PIPE SUPPORT FILLET WELDS

- Reference: 1) Letter, S. H. Howell to J. G. Keppler, Midland Nuclear Plant -  
Unit No. 1, Docket No. 50-329; Unit No. 2, Docket No. 50-330;  
Pipe Support Fillet Welds, Serial Howe-197-77, dated November 21,  
1977
- 2) Letter, S. H. Howell to J. G. Keppler, Midland Nuclear Plant -  
Unit No. 1, Docket No. 50-329; Unit No. 2, Docket No. 50-330;  
Pipe Support Fillet Welds, Serial Howe-214-77, dated December 22,  
1977
- 3) Letter, S. H. Howell to J. G. Keppler, Midland Nuclear Plant -  
Unit No. 1, Docket No. 50-329; Unit No. 2, Docket No. 50-330;  
Pipe Support Fillet Welds, Serial Howe-11-78, dated February 10,  
1978
- 4) Letter, S. H. Howell to J. G. Keppler, Midland Nuclear Plant -  
Unit No. 1, Docket No. 50-329; Unit No. 2, Docket No. 50-330;  
Pipe Support Fillet Welds, Serial Howe-36-78, dated March 30, 1978

The referenced letters were interim reports. This letter is also an interim report.

Enclosures 1 and 2 provide Bechtel Associates' Interim Report No. 5 and the Final Report to MCAR-18 dealing with underspecified fillet welds on pipe supports. The final report concludes that a safety problem does not exist and recommends that the welds be used "as is".

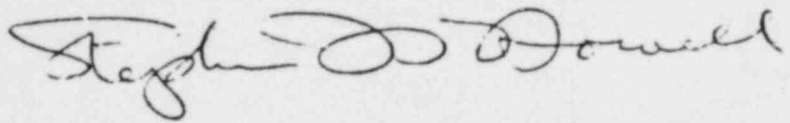
Enclosures 3 and 4 provide Bechtel Associates' Interim Report No. 5 and the Final Report to MCAR-19 dealing with underfabricated shop fillet welds on pipe supports. The final report concludes a safety problem does not exist and recommends that hangers with existing discrepant shop welds be used "as is".

*Dupe*  
8006120769

Enclosure No 5 provides Bechtel Associates' Interim Report No 1 to MCAR-21 dealing with underfabricated field fillet welds.

As received from Bechtel, enclosures 2 and 4 had as attachments two IIT Grinnell reports and a document entitled, "Review of Underspecified Fillet Weld Callouts". We are not forwarding these attachments to you at this time as they are undergoing minor revisions to accommodate CPCo comments. These reports and the Bechtel final report for MCAR-1 Report No 21 will be provided as part of our final 50.55(e) report.

A final, or another interim, report will be sent on or before July 10, 1978.



- Enclosures:
- 1) Interim Report No. 5 dated March 27, 1978, MCAR-18
  - 2) Letter P. A. Martinez to G. S. Keeley, MCAR-18 Final Report, Apparent Undersized Hanger Welds, BLC-5935; with MCAR-18 Final Report attached.
  - 3) Interim Report No. 5 dated March 27, 1978, MCAR-19
  - 4) Letter, P. A. Martinez to G. S. Keeley, MCAR-19 Final Report, Undersized Hanger Welds Per Vendor Drawing Requirements, BLC-5936, dated May 9, 1978; with MCAR-19 Final Report attached.
  - 5) Interim Report No. 1 dated March 24, 1978, MCAR-21

CC: Dr Ernst Volgensau, USNRC (15)

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

BECHTEL ASSOCIATES PROFESSIONAL CORPORATION  
Attachment to BLC-5778

SUBJECT: NCAR # 18 (Issue: 10/28/77)

INTERIM REPORT # 5

DATE: March 27, 1978

PROJECT: Consumers Power Company  
Midland Plant Units 1 & 2  
Bechtel Job 7220

Status of Corrective Action and Investigation

The preliminary draft of Grinnell's report on justifying their weld designs to the ASME code committee and other jurisdictional authorities has been received and is currently being reviewed. The three additional test reports noted in Interim Report 4, were not included in this preliminary draft. Bechtel will confer with Grinnell in Providence, R.I. during the week of March 27, 1978 to resolve Bechtel comments on the Grinnell report.

Bechtel completed the survey of underspecified fillet weld callouts on ASME hangers designed prior to June 1977.

Forecast Date on Corrective Action

The final draft of Grinnell's report on justifying their weld design callouts will be submitted after the Bechtel/Grinnell meeting which will take place in Providence, R.I. during the week of March 27, 1978.

Submitted by: T.W. Warwick

Approved by: [Signature]

Concurrence by: Karl Wiedner 3/24/78

# Bechtel Power Corporation

777 East Eisenhower Parkway  
Ann Arbor, Michigan

Mail Address: P.O. Box 1000, Ann Arbor, Michigan 48106



May 9, 1978

BLC-5935

Consumers Power Company  
Mr. G. S. Keeley,  
Project Manager  
1945 West Parnall Road  
Jackson, Michigan 49201

Midland Units 1 and 2  
Consumers Power Company  
Bechtel Job 7220  
MCAR-18 FINAL REPORT  
APPARENT UNDERSIZED HANGER WELDS  
Files 2417/2801

Dear Mr. Keeley:

Attached is the Final Report covering the deficiency described in MCAR-18. The Final Report includes a description of the deficiency with a review of underspecified hanger fillet weld callouts, a statement of safety implications, corrective actions to prevent repetition; conclusions, and recommendations.

Although the design differs from the code requirements, Grinnell has demonstrated that the welds are adequate to support the design loads and that a safety problem does not exist. This deficiency is now considered nonreportable.

This Final Report is responsive to the five recommended actions included in MCAR-18, modified as follows:

Item I-3: In lieu of a 1 percent sample of hangers, a complete survey, i.e., 100 percent, of Grinnell detail drawings was performed. Results of this survey which identified approximately 330 underspecified welds, are included in the Report.

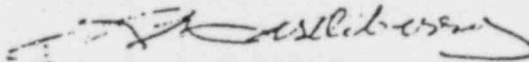
BLC-5935  
Consumers Power Company  
May 9, 1978  
Page 2

# Bechtel Power Corporation

Item I-4: The inspection of some hangers to compare actual versus design weld size was done. Results of this reinspection are included in MCAR-19.

This Report completes all scheduled action on the subject MCAR.

Very truly yours,



for P. A. Martinez  
Project Manager

PAM/WGM/pp

- Attachments (1) Final Report by Bechtel, May 3, 1978.  
(2) Review of Underspecified Fillet Weld Callouts  
on ASME Pipe Support Drawings Designed by ITT Grinnell, Jan. 1978.  
(3) ITT Grinnell's Report of Investigation of Fillet Welds  
in Hanger Assemblies, Report No. 2035, dated April 20, 1978.

cc: Mr. R. C. Bauman w/o  
Mr. W. R. Bird w/16  
Mr. J. L. Corley w/o  
Mr. B. W. Marguglio w/o

SUBJECT: MCAR #11: (Issued 10/28/77)

FINAL REPORT

DATE: 5/3/78

PROJECT: Consumers Power Company  
Midland Plant Units 1 & 2  
Bechtel Job 7220

#### Description of Discrepancy

Approximately 330 of a group of 2,500 ASME pipe support designs supplied by ITT-Grinnell had underspecified fillet weld callouts when compared to the ASME Table XVII-2452.1-1, Appendix XVII of Section III, Subsection NA, as required by ASME, Section III, Subsection NF, Paragraphs NF3292, NF3392, and NF3400. A summary of Bechtel's review of Grinnell hanger designs is attached to this report.

Paragraph XVII-2452.1 of Subsection NA states that the minimum size design requirements of fillet welds for joining linear members are to be in compliance with Table XVII-2452.1-1. This paragraph also states "weld size is determined by the thicker of the two parts joined, except that the weld size need not exceed the thickness of the thinner part unless a larger size is required by calculated stress." The discrepancy is the result of Grinnell's interpreting the phrase "...the weld size need not exceed the thickness of the thinner part joined..." as permitting any size fillet weld, properly stressed, that does not "exceed" thickness of the thinner part joined. As a result of this interpretation, Grinnell designed all fillet welds for linear members in terms of the code allowable weld stress levels. This fillet weld sizing procedure is identical to the code requirements for the more stringent plate and shell classified pipe supports.

An informal request was made for a code clarification of Paragraph XVII-2452.1 at the ASME code committee meeting of November 1, 1977. The code committee chairperson stated that if a formal inquiry were presented, he would support a code interpretation that the minimum fillet weld size must be at least the thickness of the thinnest member joined where the code minimum weld size Table XVII-2452.1-1 calls for a fillet weld equal or greater than the thickness of the thinner member. Based on this response by the ASME committee, a formal code clarification of Paragraph XVII 2452.1 will not be pursued.

#### Safety Implications

Initially, this discrepancy was considered a potentially reportable discrepancy because a safety problem could exist if a Q-listed pipe support should fail because of a fillet weld being underspecified. However, based on the results of followup analysis, the design conservatism



of the support designs that has been established, and the results of the full size destructive tests (details of which are attached to this report), we conclude a safety problem does not exist.

Grinnell states that although some of the fillet weld sizes do not meet the requirements of Table XVII-2452.1-1, there is not a safety problem because all the welds were sized according to the calculated weld stress levels and utilized weld stress allowables of only half that allowed by the codes.

To confirm Grinnell's contention that no safety problem exists because of noncompliance with Table XVII-2452.1-1, Grinnell performed full size destructive loading tests on hanger designs with the "worst case" deviations from the requirements of Table XVII-2452.1-1. On December 12 and 13, 1977 Grinnell conducted the initial full size destructive loading tests on two "worst case" and one control hanger (one without discrepant welds) with observers from Consumers Power Company and Bechtel in attendance. Grinnell subsequently repeated the tests with the nonconforming fillet welds being further reduced in size by 1/16-inch. The results of all the testing indicate that the minimum resulting weld safety factor was 6.38. The complete details of the testing are set forth in Grinnell's Report of Investigation of Fillet Welds in Hanger Assemblies, Midland Units 1 & 2, Consumers Power Company, dated April 20, 1978, which is an attachment to this report.

The full size destructive load testing of the "worst case" deviations from Table XVII-2452.1-1 confirm the analytical conservatism of the hanger designs and the safety of the plant operation is not jeopardized by the weld callouts on existing designs. This deficiency is now considered a nonreportable deficiency.

#### Corrective Action

While most of Grinnell's designs complied with Table XVII-2452.1-1 because of conservative design practices, Grinnell has, since May 1977, conformed to the ASME code committee's clarification of the requirements of Paragraph XVII-2452.1, Appendix XVII of Section III, Subsection NA. Grinnell's compliance with Paragraph XVII-2452.1 has been confirmed by the review of subsequent hanger designs.

Conclusions and Recommendations

The results of Grinnell's analysis, the results of the "worst case" full size destructive load tests, and the established design conservatism confirm that no safety problem exists because of underspecified fillet welds cited under this MCAR. The plant safety is not jeopardized by the discrepant fillet weld designs on existing hangers. It is recommended that the hangers and their designs having discrepant fillet weld callout be used "as is."

Submitted by DR Anderson

Approved by JH Grinnell

Concurrence by Karl Wiedner

RNT/cap  
5/3/5

Attachments:

- 1) Review of underspecified fillet weld callouts, January, 1978
- 2) Report of investigation of fillet welds in hanger assemblies, Midland Units 1 & 2 Consumers Power Company (Report 2035) April 20, 1978.

SUBJECT: NCAR # 19 (Issued 11/7/77)

INTERIM REPORT # 5

DATE: March 27, 1978

PROJECT: Consumers Power Company  
Midland Plant Units 1 & 2  
Bechtel Job 7220

Status of Corrective Action and Investigation

On March 17, 1978, Bechtel completed its review of Grinnell's analytical analysis report on underfabricated shop welds with comments on items requiring further analysis, justification, and development. There will be a Bechtel/Grinnell meeting in Providence, RI during the week of March 27, 1978 to resolve Bechtel comments on the report.

Bechtel completed the estimate of the number of underfabricated shop welds existing on ASME hangers shipped by Grinnell to the jobsite through August 1977. The estimate was sent to CPCo on March 7, 1978.

Forecast Date on Corrective Action

The report on the analytical analysis of underfabricated shop fillet welds will be submitted after the Bechtel/Grinnell meeting in Providence, RI, which is to be held during the week of March 27, 1978.

Submitted by: F. W. Warwick

Approved by: [Signature]

Concurrence by: Karl W. Pedersen 3/24/78

# Bechtel Power Corporation

777 East Eisenhower Parkway  
Ann Arbor, Michigan

Mail Address: P.O. Box 1000, Ann Arbor, Michigan 48106



May 9, 1978

BLC-5936

Consumers Power Company  
Mr. G. S. Keeley,  
Project Manager  
1945 West Parnall Road  
Jackson, Michigan 49201

Midland Units 1 and 2  
Consumers Power Company  
Bechtel Job 7220  
MCAR-19 FINAL REPORT  
UNDERSIZED HANGER WEILDS PER  
VENDOR DRAWING REQUIREMENTS  
Files 2417/2801

Dear Mr. Keeley:

Attached is the Final Report covering the deficiency described in MCAR-19. The Final Report includes a description of the discrepancy, a statement of the safety implications, corrective actions to prevent repetition; conclusions, and recommendations.

The analysis of the discrepant shop welds, the results of the destructive loading tests, and the established conservatism of Grinnell's designs confirm that no safety problem exists. This deficiency is now considered nonreportable.

MCAR-19 item 3a required site inspection of the Grinnell hangers shipped on October 31, 1977. The inspection performed found this lot of hangers acceptable.

This Final Report completes scheduled action on MCAR-19.

Very truly yours,

A handwritten signature in dark ink, appearing to read "P. A. Martinez", is written over the typed name. The signature is fluid and cursive.

for P. A. Martinez  
Project Manager

PAM/WGM/pp

- Attachments (1) Final Report by Bechtel, May 3, 1978.  
(2) ITT Grinnell's Field Surveyed Welds Stress Analysis For Bechtel Associates Professional Corp., April 20, 1978.

cc: Mr. R. C. Bauman w/o  
Mr. W. R. Bird w/10

Mr. J. L. Corley w/o  
Mr. B. W. Marguglio w/o

SUBJECT: MCAR #19 (Issued 11/7/77)

FINAL REPORT

DATE: 5/3/78

PROJECT: Consumers Power Company  
Midland Plant Units 1 & 2  
Bechtel Job 7220

Description of Discrepancy

Shop welds for various pipe hanger assemblies designed and fabricated by ITT-Grinnell were noted as underfabricated when compared to the sizes required on the design drawings. A sample size of 125 shop welds was selected as representative of the total group of shop welds on the assemblies supplied by Grinnell. All 125 shop welds were examined; from review, 54 welds (i.e. 43%) were identified as underfabricated in size. Generally, this discrepant condition was 1/16-inch or less undersize.

Paragraph K-1310 of Appendix K, ASME Section III, Subsection. NA, which supplements Article NF-4000 of Subsection NF on the fabrication and installation of component supports, states that the recommended maximum tolerances for weld sizes is "plus only, no undersize permitted."

The reason for the discrepancy appears to be three-fold:

- 1) Grinnell's internal weld inspection procedure was a visual technique which allowed shop fillet welds in any single continuous weld to have an underrun from the nominal fillet weld size required by 1/16 inch without correction, provided the underrun did not exceed 10% of the weld length. This is an accepted industrial standard for welded structural members.
- 2) Only shop welds that visually appeared suspect were inspected with a gage.
- 3) Ambiguous and inconsistent criteria for measuring and sizing obtuse angle fillet weld in Grinnell's written procedures.

Safety Implications

Initially, this deficiency was considered a potentially reportable discrepancy because a safety problem could exist if a Q-listed pipe support should fail due to an underfabricated shop weld. However, based on the results of follow-up analysis which established the design conservatism of the support designs, and the results of the full size destructive loading tests with both underspecified and underfabricated welds (reference MCAR #18), we conclude a safety problem does not exist.

Grinnell states that although some of the shop welds are underfabricated from the weld sizes specified on the hanger drawings, there is no safety problem as the welds were sized using allowable weld stress levels that were conservative when compared to the Code.

To confirm Grinnell's contention that no safety problem exists, Grinnell performed a reanalysis of the 54 discrepant shop welds of the 125 shop welds noted above. The results indicate that the underfabricated shop welds reanalyzed had weld stress levels less than the maximum permitted by the ASME, Section III, Subsection NF Code. The complete details of the reanalysis is set forth in Grinnell's report entitled "Field Surveyed Welds Stress Analysis for Bechtel Associate Professional Corporation," dated April 19, 1978, which is attached to this report.

The reanalysis of the discrepant shop welds, the results of the full-size destructive loading tests conducted on underspecified and underfabricated welds associated with MCAR #18, and the established conservatism of Grinnell's designs, confirm that the safety of the plant operation is not jeopardized by underfabricated shop welds. This deficiency is now considered a nonreportable deficiency.

Corrective Action

To prevent the reoccurrence of underfabricated shop welds Grinnell has:

- 1) Revised its QA/QC procedures O2A001-"Dimensional Tolerance Standard for Component Supports" and O2A006-"Visual and Dimensional Acceptance Criteria for Welds" to conform to Paragraph K-1310 of Appendix K, ASME, Section III, Subsection NA.
- 2) Initiated additional in-house training sessions for its weld inspectors.
- 3) Initiated a 100% weld inspection program.

An incoming inspection of all hangers at the jobsite has confirmed the effectiveness of Grinnell's corrective actions to date.

Conclusions and Recommendations

The results of Grinnell's reanalysis on underfabricated shop welds, the results on the full size destructive loading tests conducted on underspecified and underfabricated welds associated with MCAR #18, and the established conservatism of Grinnell's design confirm that no safety problem exists due to an underfabricated shop weld. It is recommended that hangers with existing discrepant shop welds be used "as-is."

Submitted by: OR Anderson  
 Approved by: John M. ...  
 Concurrence by: Karl Wiedner

SUBJECT: MCAR 0 21 (Issued 2/28/78)

Field weld size discrepancies associated with hanger fabrication

INTERIM REPORT 0 1

DATE: 3/24/78

PROJECT: Consumers Power Company  
Midland Plant Units 1 & 2  
Bechtel Job 7220

#### Description of Discrepancy

An inspection at the Midland jobsite, using a weld fillet gage, was conducted by Quality Control of a sample of 80 completed hangers consisting of 300 field welds. This sample represents 10% of the O-listed hangers with field fillet welds installed to date. The inspection was to determine the actual field weld size compared to Grinnell design and sketches. It was discovered that contrary to the specified field weld size required by Grinnell drawings, the actual field weld size for 26 hangers, representing 49 field welds, were undersize. This deficiency was discovered during the investigation of MCARs 18 and 19 which identified similar weld size deficiencies in Grinnell's shop welds.

#### Probable Cause

1. The field weld sizes shown on the Grinnell drawings do not specify a weld size tolerance. The craft welders produced field welds which were undersized compared to drawing requirements.
2. The principal reason for QC overlooking several undersize fillet welds was apparently a misinterpretation of the QC instructions regarding inspection technique. The instructions require the QCE to visually examine to detect the worst condition, (e.g., smallest weld size, take a measurement to verify acceptance, and visually compare the other items based on this measurement. Instead of the worst case, the QCE used the most representative case, and by applying past practical experience and judgment, ignored what he believed were minor and insignificant variations from the normal.

Corrective Action

1. The craft welders and field weld engineers have been instructed that there is no undersize tolerance for field welds. Welds as deposited must meet the drawing requirements.
2. For all field welds subsequent to the identification of this deficiency, the QCEs through further training and monitoring by QC supervision, have instituted a more rigorous application of the QCI instructions. They are no longer modifying the stated inspection technique by applying qualifying judgment and practical experience. Instead, all undersize welds, no matter what the extent of the undersize condition or for how short a length, are being sought and classified as unacceptable.
3. The adequacy of all field welds existing prior to the identification of this deficiency will be determined in conjunction with the resolution of MCARs 18 and 19.

Potential Safety Implication

A potential safety problem could exist if a structural failure should occur in a Q-listed hanger due to the weld size being less than specified. The acceptability of "undersized" "as-built" welds is currently being investigated by Grinnell in connection with MCARs 18 and 19. Grinnell has stated that they believe the results of their investigation will indicate that no safety problems exist since the initial design loadings had substantial safety margins. However, until a final analysis confirms the acceptability of the existing welds, this deficiency must be considered potentially reportable.

Forecast Date on Corrective Action

Final resolution of this MCAR is contingent upon resolution of MCARs 18 and 19. A final report will be submitted after resolution of those MCARs, currently forecasted for mid-1978.

Submitted by: Al B 3/29/78  
Approved by: St. Sullivan 3/29/78  
Concurrence by: Karl Wiedner 3/30/78