

DUKE POWER COMPANY

POWER BUILDING

422 SOUTH CHURCH STREET, CHARLOTTE, N.C. 28242

81 DEC 18

WILLIAM O. PARKER, JR.  
VICE PRESIDENT  
STEAM PRODUCTION

December 15, 1981

TELEPHONE: AREA 704  
373-4083

Mr. James P. O'Reilly, Director  
U. S. Nuclear Regulatory Commission  
Region II  
101 Marietta Street, Suite 3100  
Atlanta, Georgia 30303



Re: Catawba Nuclear Station  
Unit 1  
Docket No. 50-413 / H

Dear Mr. O'Reilly:

Pursuant to 10 CFR 50.5je, please find attached the final response to Significant Deficiency Report SD-413/81-12. This report was previously submitted on December 8, 1981, inadvertently, as Significant Deficiency Report SD-413/81-28. Please disregard the December 8, 1981 submittal. A corrected Significant Deficiency Report SD-413/81-28 will be submitted by December 17, 1981.

Very truly yours,

*William O. Parker, Jr.*  
William O. Parker, Jr.

RWO/php  
Attachment

cc: Director  
Office of Inspection and Enforcement  
U. S. Nuclear Regulatory Commission  
Washington, D. C. 20555

NRC Resident Inspector  
Catawba Nuclear Station

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Columbia, South Carolina 29205

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DUKE POWER COMPANY  
CATAWBA NUCLEAR STATION

Report Number: SD-413/81-12

Report Date: December 15, 1981

Facility: Catawba Nuclear Station Unit 1

Identification of Deficiency: Radiographic film for reactor vessel CRDM housing welds supplied by Westinghouse does not meet the requirements of ASME Section III, Appendix IX. (CA-81-19)

Description of Deficiency: On June 3, 1981, Messrs. W. O. Henry, J. K. Berry, and J. E. Cavender advised Mr. J. Bryant of NRC, Region II, of this deficiency.

On June 24, 1981, Westinghouse determined that thirteen (13) RT films at Catawba exceeded the film density requirement.

Evaluation of Deficiency: Westinghouse fabricated a mock-up of the CRDM housing welds and radiographed the mock-up using the same RT technique that was used originally. Artificial discontinuities were introduced in the mock-up which consisted of a 1/32 inch (0.032 inch) groove and a 1/16 inch (0.063 inch) diameter hole.

The essential features of the IQI (penetrameter) and the artificial flaws were clearly discernable in the radiographs of the mock-up.

Westinghouse radiographed the thirteen (13) CRDM housing welds at Catawba. No rejectable indications were detected by this examination.

Indications of porosity of approximately 1/65 inch (0.016 inch) were discernable in some instances on some of the film. This information verified that the radiographic technique is sufficiently sensitive to detect discontinuities which would be considered rejectable for these welds even though all the essential parameters of radiography may not have been met.

In addition, Westinghouse performed a fracture mechanics evaluation of the welds which indicates that a very large flaw would be necessary to cause failure of the weld. (A copy of the Westinghouse report is attached.) Therefore, we conclude that these welds would not have failed.

Corrective Action: These radiographs were produced approximately 8 to 10 years ago. We do not anticipate receiving any other radiographs produced by this organization (RDM). All other radiographs, which were produced by RDM were reviewed and no other discrepancies were detected. No other action is planned.





Westinghouse  
Electric Corporation

Water Reactor  
Divisions

NS-DMA-2454  
REV 115  
November 15, 1981

November 15, 1981

Mr. Richard C. DeYoung, Director  
Office of Inspection and Enforcement  
U. S. Nuclear Regulatory Commission  
Washington, DC 20535

Dear Mr. DeYoung:

Subject: Reportable Item on Radiographic Testing of CREM Adapter Welds

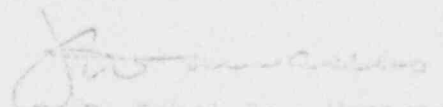
Reference: NS-DMA-2454, dated June 5, 1981

The referenced letter reported a potential significant deficiency (10CFR50.55(a) for plants under construction and an unreviewed safety question (10CFR50.59) for operating plants involving the CREM adapter welds on several plants. Attached is a report documenting the resolution of this issue.

All of the suspect radiographs on the affected plants were reviewed by Westinghouse. Of the 738 films reviewed, 35 were deemed not interpretable. Of these 35 welds, 29 were re-radiographed with acceptable results. The remaining seven welds are on two operating plants and cannot be re-radiographed. The attached report provides the basis of the Westinghouse conclusion that safe operation of these units can continue without additional testing.

If you have any question on this subject, please contact me or David Naire (telephone 412/373-6230) of my staff.

Sincerely,

  
J. P. Mohr, Jr., Manager  
Nuclear Safety Department

DG/ALS

Attachment

Dupe of  
8112070389  
PDR

During the ASME Section XI preservice inspection of Duke Power Company Catawba Unit # 1 ultrasonic test indications were noted on some of the inconel tube to stainless steel flange welds on the reactor vessel head control rod drive mechanism (CRDM) housing. Radiographic film of these welds were retrieved from archives and reviewed to assist in the interpretation of the UT indications. During this review Duke Power noted that some elements of the radiographic technique used and the resulting film did not specifically comply with all of the requirements of ASME Section III (Winter 1971). Review of the film for McGuire Unit #2 revealed that generally the same conditions existed. Subsequent to the above, Westinghouse met with Duke Power to evaluate the radiographic procedure and questionable film. As a result of this review Westinghouse concurred that various radiographic/film conditions were not in strict compliance with ASME Code requirements.

The above reactor vessels were fabricated by Westinghouse Cryolock (RCM). A review of engineering and quality assurance records showed that all vessels manufactured by RCM for Westinghouse used essentially the same radiographic technique for these welds, although some of the vessels were fabricated to Winter 1968 or earlier editions of ASME Section III. The affected units were identified as:

TVA - Sequoyah Unit #1

TVA - Sequoyah Unit #2

TVA - Watts Bar Unit #1

TVA - Watts Bar Unit #2

VEPCO - North Anna Unit #1

VEPCO - North Anna Unit #2

VEPCO - Derry Unit #2

Duke Power - McGuire Unit #2

Duke Power - Catawba Unit #1

Swedish State Power - Ringhals Unit #2

The Surry Unit 1 vessel was fabricated by RDM, however, the CRDM housing welds were fabricated and inspected by Babcock & Wilcox.

Westinghouse notified the NRC and the above utilities of the existing conditions.

An action plan for resolution of this issue was developed and the following actions were completed.

1. Acknowledging that all ASME Code parameters may not have been met, the affected film was reviewed to ascertain interpretability. The reviews were performed by Westinghouse personnel who are highly qualified and experienced in NDE techniques. In most cases the film exhibited sensitivities such that significant flaws would be detected. Attachment 1 provides a summary of these reviews.
2. A weld mock-up duplicating the configuration of the welds in question was fabricated. The mock-up was radiographed using the RDM technique in order to determine the capabilities of the technique. Information developed from this mock-up includes:
  - A. A No. 17 (.017") penetrant placed on the I.O. of the tube (source side) can be clearly defined, including the ET hole. This was specified by all utility officials for source side penetrants.

- B. A 1/32" groove (.032") machined in the I.O. of the inconel portion of the tube is clearly discernable in the radiograph of that area.
- C. A 1/16" (.063") diameter hole in the stainless steel portion of the tube is clearly discernible through a density area of 4.52 H&D in one film.

This information verifies that the technique (and interpretable film resulting from its use) is sufficiently sensitive to detect any flaw size of concern to the design. This is consistent with results of the RCM film review wherein porosity sizes of approximately 1/54" (.016") diameter were detected in some instances.

3. Welds for which the radiographs were not interpretable on three non-operating plants were radiographed again in the field by Westinghouse. The results of these new radiographs are acceptable and are included in Attachment 1.
4. The radiographic technique utilized by other reactor vessel manufacturers for these welds was reviewed. The techniques utilized by other fabricators are different from that used by RCM and comparable problems were not present.

These actions support the conclusion that no significant defect is present in the welds under consideration. This is based on:

1. The radiographic technique used by the fabricator has been shown by mock-ups to provide adequate sensitivity levels, and with some variation from code parameters.



2. No rejectable defects are discernible in reshot film and original film found to be interpretable. This is a total of 721 welds of 762 welds reviewed. The remaining 7 films were deemed not interpretable based on film densities.

Of the seven CRM housed films which were deemed not to be interpretable, two housings are installed in North Anna Unit 1 and five are installed in North Anna Unit 2. These two units are operating plants and cannot be re-radiographed. Westinghouse has concluded that safe operation of these units can continue without additional testing based on the following.

- 1) The results of the very extensive radiographic review reported herein demonstrate that the manufacturing processes used by CRM provide a sound weld which is free of significant defects.
- 2) Other non-destructive tests performed during fabrication and pre-service inspection revealed no unacceptable indications.
- 3) A fracture mechanics evaluation of this weld indicates that a very large flaw would be necessary to cause failure of the weld. A through-wall circumferential flaw extending over 20 percent of the circumference will remain stable under the worst case loading, as would a three inch through-wall axial flaw, or a 360 degree inside surface crack extending 30 percent through the wall.
- 4) Based on previous evaluations of these materials in other applications, the leak before break mechanics would apply.
- 5) The as-built wall thickness of this weld is in excess of the minimum ASME code requirements.
- 6) The two independent hydrotests, the dry cold hydrotest, and plant operation to date have been satisfactory.

In summary, the radiography performed on the CROM adapter valves on reactor vessels fabricated by BDM does not meet all of the requirements of the ASME Code, however adequate assurance exists that the valves are sound and that safe operation of the plants can continue.

Attachment 1

STATUS AND CROM FILM REVIEW

Sedovyan #1

All films are interpretable and exhibit no significant indications.

Sedovyan #2

On film identified as EAF-302, 308 and 313 (encusings 13, 5 & 1) the weld areas could not be positively identified. Re-radiography of these seams was acceptable and all other film exhibits no significant indications.

McGuire #2

Eleven films exhibit densities such that proper weld evaluation cannot be performed. In addition film cannot be located for position number 42. These film are identified as:

EAT-116 (59)                      EAT-123 (35)

EAT-121 (60)                      EAT-113 (32)

EAT-100 (305)                      EAT-119 (47)

EAT-124 (62)                      EAT-117 (34)

EAT-113 (60)                      EAT-111 (34)

EAT-101 (27)                      (40)

Re-radiography of these seams was



STATUS ROM CROM FILM REVIEW (CONTINUED)

North Anna #2

Five films exhibit densities such that proper evaluation cannot be performed, identified as:

EAM-101 (08)          EAM-104 (04)  
EAM-102 (09)          EAM-132 (030)  
EAM-103 (06)

Remaining films exhibit no significant indications.

Sunny #2

All films exhibit no significant indications.

Ringhals #2

All films exhibit no significant indications.