



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 8, 2009

Mr. David A. Heacock
President and Chief Nuclear Officer
Dominion Nuclear Connecticut, Inc.
Innsbrook Technical Center
5000 Dominion Boulevard
Glen Allen, VA 23060-6711

SUBJECT: MILLSTONE POWER STATION, UNIT NO. 2: RELIEF REQUESTS FOR
TEMPORARY NON-CODE REPAIR OF EMERGENCY DIESEL GENERATOR
HEAT EXCHANGERS (TAC NOS. ME0440 AND ME0441)

Dear Mr. Heacock:

By letters dated January 20, 2009 (Agencywide Documents Access Management System (ADAMS) Accession No. ML090210296), as supplemented by letter dated May 5, 2009 (ADAMS Accession No. ML091250240), Dominion Nuclear Connecticut, Inc. (DNC) submitted relief requests regarding temporary non-code repair of pre-existing flaws. Specifically, the pre-existing flaws are present in the outlet channel head of the Jacket Water Heat Exchanger for the 'A' emergency diesel generator (EDG) and the inlet channel head of the Air Cooler Heat Exchanger for the 'B' EDG at Millstone Power Station, Unit No. 2 (MPS2).

The Nuclear Regulatory Commission (NRC) staff has reviewed DNC's submittal and concludes the following: (1) A weld repair of flaws in cast aluminum-bronze channel heads is not considered to be prudent because the repair makes the base metal in the vicinity susceptible to dealloying; and (2) there is a long lead time in procurement of the channel heads for replacement which would result in an extended plant shutdown for the replacement. Therefore, replacement of channel heads is impractical within the allowed outage time permitted by the action statement for the EDGs in the plant Technical Specifications.

Therefore, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Paragraph 50.55a(g)(6)(i), the NRC staff grants the proposed relief request until entry into mode 2 after shut down for the next refueling outage, on the basis that the code imposes impractical requirements. The next scheduled refueling outage at MPS2 is Fall 2009.

Granting relief pursuant to 10 CFR 50.55a(g)(6)(i) is authorized by law and will not endanger the life or property or the common defense and security, and is otherwise in the public interest giving due consideration to the burden upon the licenses that could result if the requirements were imposed on the facility.

The NRC staff also concluded that the provisions of NRC approved Code Case N-513-2, "Evaluation Criteria for Temporary Acceptance of Flaws in Modern Energy Class 2 or 3 Piping, Section XI, Division 1," were met.

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Further details on the bases for the NRC staff's conclusion are contained in the enclosed safety evaluation. If you have any questions, please contact Carleen Sanders at 301-415-1603.

Sincerely,

A handwritten signature in black ink, appearing to read "Harold K. Chernoff". The signature is fluid and cursive, with a long, sweeping tail that extends to the right.

Harold K. Chernoff, Chief
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-336

Enclosure: As Stated

cc w/ encl: Distribution via Listserv



UNITED STATES
NUCLEAR REGULATORY COMMISSION
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF REQUEST RELATED TO TEMPORARY NON-CODE REPAIR

DOMINION NUCLEAR CONNECTICUT, INC.

MILLSTONE POWER STATION, UNIT 2

DOCKET NO. 50-336

1.0 INTRODUCTION

By letters dated January 20, 2009 (Agencywide Documents Access Management System (ADAMS) Accession No. ML090210296), as supplemented by letter dated May 5, 2009 (ADAMS Accession No. ML091250240), Dominion Nuclear Connecticut, Inc. (DNC) submitted relief requests regarding temporary non-code repair of pre-existing flaws. Specifically, the pre-existing flaws are present in the outlet channel head of the Jacket Water Heat Exchanger for the 'A' emergency diesel generator (EDG) and the inlet channel head of the Air Cooler Heat Exchanger for the 'B' EDG at Millstone Power Station, Unit No. 2 (MPS2). DNC's assessment of both flaws is indicative of minor imperfections in the original aluminum bronze channel head castings.

DNC has stated that it is impractical to perform a repair in accordance with the American Society of Mechanical Engineers (ASME) *Boiler and Pressure Vessel Code* (Code) while the unit is at power and that there is reasonable assurance of structural integrity with the existing indications for MPS2 to continue power operation until the Fall 2009 refueling outage, subject to a proposed augmented inspection program for the channel heads.

2.0 REGULATORY EVALUATION

Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Paragraph 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice Inspection [ISI] of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components.

10 CFR 50.55a(g) requires that ISI of ASME Code Class 1, 2, and 3 components be performed in accordance with Section XI of the ASME Code and applicable addenda, except where specific written relief has been granted by the NRC pursuant to 10 CFR 50.55a(g)(6)(i). According to 10 CFR 50.55a(a)(3), alternatives to the requirements of paragraph 50.55a(g) may be used, when authorized by the NRC, if an applicant demonstrates that the proposed alternatives would provide an acceptable level of quality and safety or if the specified

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requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

The regulations require that ISI of components and system pressure tests conducted during the first 10-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b) 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The ISI Code of Record for the third 10-year inspection interval for MPS2 is the 1998 Edition of the ASME Code, Section XI, with No Addenda.

Code Case N-513-2 "Evaluation Criteria for Temporary Acceptance of Flaws in Moderate Energy Class 2 or 3 Piping," accepted by the NRC in Regulatory Guide 1.147, Revision 15 "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1," is used to provide guidance in evaluating temporary non-code repairs of the subject components.

3.0 TECHNICAL EVALUATION

System/Component(s) for Which Relief is Requested

- Outlet Channel Head of Jacket Water Heat Exchanger, X-45A, for "A" EDG
- Inlet Channel Head of Air Cooler Heat Exchanger, X-83B, for "B" EDG

Description of the Flaw

Corrosion build up was found on each of the channel heads of the above heat exchangers. Following removal of the build up and application of normal system pressure, a localized area was observed to have wetness, with an estimated leakage rate of 1 drop every 15 minutes. Both flaws were located at similar locations of each heat exchangers. Visual examination did not identify any specific external defect in the localized areas. Based on ultrasonic and radiographic tests of the flawed areas, the leak was believed to be associated with conglomeration of small casting defects as indicated by the presence of a rounded indication (<1/16" diameter) and other minor imperfections.

ASME Code Requirement

The requirements of the ASME Code, 1998 Edition, Section XI Code, subsection IWA-5250(a)(3) in regard to corrective measures for the source of leakage detected during a system pressure test is that repairs or replacement of components be performed in accordance with IWA-4000 or IWA-7000, respectively. However, any repair or replacement in accordance with the Code would necessitate a plant shutdown. The ASME Code, Section XI, does not allow temporary non-code repairs on Code piping. However, temporary acceptance of flaws in moderate energy Class 2 or 3 piping is permissible subject to flaw evaluation and other conditions of Code Case N-513-2 until a permanent repair can be made.

DNC's Request for Relief

Relief is requested from the requirements of ASME Code, Section XI, Subsection IWA-5250(a)(3) so that a code repair of the through-wall flaw at the location may be deferred until the next outage of sufficient duration, but no later than the next refueling outage. The next scheduled refueling outage at MPS2 is Fall 2009.

DNC's Basis for Requesting Relief

A weld repair of the cast aluminum-bronze material would tend to make the adjacent base metal susceptible to dealloying and, therefore, is not recommended. DNC has, therefore, planned replacement of the flawed channel heads during the Fall 2009 outage of the unit. A lead time of 6 months is anticipated in procurement of the replacement channel heads from the manufacturer. In order to continue power operation of the unit until the next scheduled outage, exceeding the 30 days to perform the replacement, DNC has chosen to perform a temporary non-code repair of the subject components. The NRC has provided guidance to perform temporary non-code repairs in Generic Letter (GL) 90-05 "Guidance for Performing Temporary Non-Code Repair of ASME Code Class 1, 2, and 3 Piping." The guidance in GL 90-05, among other considerations, requires assessment of structural integrity of the flawed piping. The methodology of GL 90-05 is applicable to flaw analysis in piping as opposed to that of a channel head configuration. The NRC has subsequently approved Code Case N-513-2 which also provides applicable evaluation criteria for temporary acceptance of flaws in moderate energy Class 2 or 3 piping. Code Case N-513-2 may not be adoptable to channel head configuration but provides multiple criteria for assessment of structural integrity. DNC has chosen to use the methodology and the requirements of Code Case N-513-2 to perform evaluation of flaws in the channel heads for temporary acceptance.

DNC's Proposed Alternative

DNC has proposed to use the evaluation outlined in Code Case N-513-2 to demonstrate structural integrity of the flawed components and its justification of system operability considering the effects of leakage. In order to comply with the requirements of the code case for temporary acceptance of flaws to continue operation of MPS2 until the next outage, the following assessments have been made.

- Characterization of flaw geometry by volumetric examination.
- Classification of flaw in regard to being planar or nonplanar.
- Perform flaw evaluation in regard to its condition for acceptance.
- Perform daily inspection such as walkdown and periodic volumetric examinations to confirm validity of flaw growth analysis.
- Perform evaluation of potential system interactions due to flooding, water spray on equipment, and loss of flow to the system.

- Perform permanent Code replacement of channel heads no later than the end of the next refueling outage. It is assessed that the degraded channel heads could remain in service until the refueling outage currently scheduled for the Fall 2009.

NRC Staff Evaluation

The NRC staff has evaluated DNC's request for relief in accordance with the guidelines of Code Case N-513-2. The weld repair of flaws in cast aluminum bronze channel heads is not considered to be prudent because the repair makes the base metal in the vicinity susceptible to dealloying. The replacement of flawed channel heads, therefore, is the only viable option. In view of the long lead time in procurement of the channel heads, the NRC staff concurs with DNC that the replacement of channel heads would be considered impractical within the allowed outage time permitted by the action statement for the EDG in the MPS2 Technical Specifications and therefore would require an extended plant shutdown for the replacement. Pursuant to 10 CFR 50.55a(g)(6)(i), the NRC staff, therefore, evaluated the DNC's determination of impracticality and consequently, a request for relief from performing a ASME Code repair.

The NRC staff has reviewed DNC's assessment of structural integrity of the flawed channel heads. Based on the results of DNC's flaw characterization, the condition of Jacket Water Heat Exchanger, X-45A is more limiting than that of the Air Cooler Heat Exchanger, X-83B. Therefore, the NRC staff evaluation focuses on the result of analytical evaluation for X-45A channel head. In order to characterize the leak path and the condition of material surrounding the flaw, a radiographic examination was performed which did not identify any cracking at the location of the leak. The NRC staff believes that the leak was most likely the result of several small pores that linked to create a leak path from the inside to the outside surface. The maximum estimated defect diameter is less than 1/16 inch diameter. The licensee performed an ultrasonic examination of the area of leak and determined the remaining wall thickness to be 0.480 inch and the flaw to be non-planar. Based on Code Case N-513-2, the minimum wall required is 0.022 inch. Code Case N-513-2 further allows an evaluation methodology for a through-wall flaw based on an equivalent hole diameter due to wall-thinning. This methodology identified as "Branch Reinforcement Evaluation" calculates the required area of reinforcement as opposed to the available reinforcement. Based on an analytical evaluation invoked by Code Case N-513-2, the safety margins on required reinforcement area and the minimum wall thickness seem to be large, being 19.21 and 21.74, respectively. The NRC staff, therefore, finds the flaw to be acceptable with sufficient material thickness in the degraded area to provide the required reinforcement.

Code Case N-513-2 further requires that periodic inspections, at no more than 30 day intervals, be used to determine if flaws are growing and to establish the time at which the detected flaw will reach the allowable size. DNC has performed two radiographic examinations at 30 day intervals to confirm that there is no change in the size of the flaw from the original condition. Nevertheless, DNC is monitoring leakage by performing daily walkdowns at least once per 12-hour shift during normal operator rounds. DNC has stated that any increase in leakage will be evaluated for corrective action.

DNC has further evaluated the consequences of potential system interactions due to flooding, spray, and loss of flow to the system, and found them to be minimal. DNC has committed to

perform an augmented inspection of the component once a month to detect any change in the size of the flaw or leakage. If significant changes in the condition of the flawed area are observed during the augmented inspection, the structural integrity and the inspection frequency will be reassessed. There was no measurable leakage from the flawed channel heads. The trend in leak rate, thus far, showed no change in the leakage which confirmed that the flaws remained stable. Further, with DNC's verification of adequate structural integrity via flaw evaluation and implementation of augmented inspections to monitor flaws, the NRC staff finds that deferral of the code replacement to the upcoming outage as stated above under the guidelines of Code Case N-513-2 to be acceptable.

4.0 CONCLUSION

The NRC staff concludes that for the cast aluminum-bronze channel heads of X-45A and X-83B heat exchangers containing flaws, impracticality exists in performing a weld repair because the cast aluminum bronze material would tend to make the adjacent base metal susceptible to dealloying. The NRC staff also concludes that an ASME Code replacement while the unit is operating would lead to an unnecessary extended plant shutdown due to the lead time in procurement of new channel heads. DNC has assessed structural integrity of the existing channel heads containing flaws which indicate that adequate safety margins remain under various loading conditions based on a flaw evaluation in accordance with an approved Code Case N-513-2. DNC has further implemented an augmented inspection program to detect any change to the size of the flaw and leakage. In granting Relief Requests RR-89-65 and RR-89-66 under the provisions of Code Case N-513-2, the NRC staff finds that deferral of permanent replacement of the components to an outage of sufficient duration, but no later than the next refueling outage of MPS2, to be acceptable pursuant to 10 CFR 50.55a(g)(6)(i). The next scheduled refueling outage at MPS2 is Fall 2009. Granting relief pursuant to 10 CFR 50.55a(g)(6)(i) is authorized by law and will not endanger the life or property or the common defense and security, and is otherwise in the public interest giving due consideration to the burden upon the licenses that could result if the requirements were imposed on the facility.

All other requirements of the ASME Code, Section XI for which relief has not been specifically granted remain applicable, including a third party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: P. Patnaik

Date: July 8, 2009

Further details on the bases for the NRC staff's conclusion are contained in the enclosed safety evaluation. If you have any questions, please contact Carleen Sanders at 301-415-1603.

Sincerely,
/ra/
Harold K. Chernoff, Chief
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-336

Enclosure: As Stated

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