Omaha Public Power District
444 South 16th Street Mall
Omaha, NE 68102-2247

10 CFR 50.55a

LIC-14-0106

August 15, 2014

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Fort Calhoun Station, Unit No. 1
Renewed Facility Operating License No. DPR-40
NRC Docket No. 50-285

Subject: Fort Calhoun Station Relief Request RR-14, Proposed Alternative, Request for Relief for Temporary Acceptance of a Pin Hole Leak in Raw Water (RW) System 20-inch Elbow Located in Room 19 of Auxiliary Building

Pursuant to 10 CFR 50.55a(a)(3)(ii), the Omaha Public Power District (OPPD) hereby requests NRC approval of the Request for Relief for a Proposed Alternative for Fort Calhoun Station, Unit No. 1. This alternative is for the current fourth 10-year inservice inspection interval.

This Request for Relief is submitted because a pin hole leak was discovered in a safety class 3 Raw Water (RW) System 20-inch carbon steel elbow. OPPD has performed an operability evaluation of the pin hole leak and determined that the elbow and associated piping continues to be capable of performing its required safety function and is not susceptible to sudden or catastrophic failure. Immediate repair or replacement of the piping spool piece would require a plant shutdown and result in a hardship or unusual difficulty without a compensating increase in the level of quality and safety.

The requested Relief Request maintains the quality and safety considerations of structures, systems, and components required for safe operation of Fort Calhoun Station.

Section 5 of the relief request contains the actions that OPPD commits to perform for the duration of the relief request.

We request your review and approval of this request by 2130 hours on August 15, 2014.

Respectfully,

Louis P. Cortopassi
Site Vice President and CNO

LPC/KGM/mle

Attachments:

1. Fort Calhoun Station Relief Request RR-14, Proposed Alternative, Request for Relief for Temporary Acceptance of a Pin Hole Leak in Raw Water (RW) System 20-inch Elbow Located in Room 19 of Auxiliary Building
2. Supporting Data

Fort Calhoun Station Relief Request RR-14, Proposed Alternative, Request for Relief for Temporary Acceptance of a Pin Hole Leak in Raw Water (RW) System 20-inch Elbow Located in Room 19 of Auxiliary Building

1. **ASME Code Component(s) Affected:**

ASME III – Class 3, 90° Elbow in East Raw Water Header
Piping class 152
20" Standard wall (3/8" thick)
Design Code B31.7 CL I
Design Pressure: 150 psi @ 500°F

2. **Applicable Code Edition and Addenda:**

Fort Calhoun Station (FCS) is currently in the fourth 10-year Inservice Inspection (ISI) interval, which as noted in Reference 1, ends on June 6, 2016. The code of record for the fourth 10-year ISI interval is American Society of Mechanical Engineers (ASME) Code for Operation and Maintenance of Nuclear Power Plants (ASME OM Code), 1998 Edition through 2000 Addenda (Reference 2).

3. **Applicable Code Requirement:**

ASME Code, Section XI, IWD-3120(b) requires that components exceeding the acceptance standards of IWD-3400 be subject to supplemental examination, or to a repair/replacement activity.

4. **Reason for Request:**

A leak in an elbow on the east raw water (RW) piping in Room 19 of the auxiliary building was discovered at 1928 hours on August 14, 2014, which required entry into TS 2.4(2)d. The lagging was removed and a pinhole leak of approximately 600 milliliters per hour was discovered on the inside of the elbow towards the middle of the pipe. An ultrasonic test (UT) of the area around the leak was conducted, which found no additional areas of significant thinning. On August 15, 2014 at 0851 hours, the leak rate had decreased to 500 ml/hour. When measured again at 1400 hours, the leak rate had increased to 1100 ml/hour.

Performing a code repair/replacement activity now to correct the flaw discovered in the RW elbow would require the plant to shut down (i.e., entry into a 24 hour hot shutdown Technical Specification requirement) and create a hardship based on the potential risks associated with unit cycling and emergent equipment issues incurred during shutdown and startup evolutions.

No compensating increase in the level of quality and safety would be gained by immediate repair of the flaw. The RW system continues to be capable of performing its required safety functions and is not susceptible to sudden or catastrophic failure. Attachment 2 contains data supporting this request.

5. **Proposed Alternative and Basis for Use:**

The request for relief applies to the requirements of ASME Code Section XI, 1998 Edition through 2000 Addenda. Article IWD-3000 establishes flaw size acceptance standards (IWD-3500) and provides analytical evaluation criteria (IWD-3600) for flaws identified during performance of in-service inspections and tests. However, the Code does not include

analytical evaluation criteria for acceptance of through-wall flaws in pressure retaining base material of ferritic pipe or fittings. Code Case N-513-3, "Evaluation Criteria for Temporary Acceptance of Flaws in Moderate Energy Class 2 or 3 Piping, Section XI, Division 1," which has been conditionally approved by the NRC in Regulatory Guide 1.147, "In-service Inspection Code Case Acceptability, ASME Section XI, Division 1," provides analytical evaluation rules for temporary acceptance of flaws in piping. Code Case N-513-3 however does not apply to through-wall flaws located in the pressure retaining base material of pipe fittings such as elbows.

Pursuant to 10CFR50.55a(a)(3)(ii), OPPD proposes the following alternative to the paragraph 1 (c) provision of Code Case N-513-3 that prohibits its application to pipe fittings such as moderate energy class 3 elbows.

OPPD is proposing an alternative to the flaw evaluation methodology of Code Case N-513-3. The Code Case N-513-3 flaw evaluation methodology is applicable to straight pipe. The OPPD proposed alternative methodology is based upon and consistent with a pending revision to Code Case N-513-3 and is used to evaluate the flaw in the RW elbow. The evaluation criteria provided in Code Case N-513-3 are only for straight pipe since the technical approach relies on ASME Section XI, Appendix C methods. The pending revision of Code Case N-513-3 referenced above includes rules for the evaluation of piping components such as elbows, branch tees, and reducers. Flaws in these components may be evaluated as if in straight pipe provided the stresses used in the evaluation are adjusted to account for geometric differences. For elbows, hoop stress is adjusted by considering flaw location and primary stress due to elbow ovalization from axial loads. For axial stresses, the stress scaling follows the same approach given in ASME Section III, ND-3600 [5] design by rule using stress indices and stress intensification factors for the adjustment. Details are provided in the pending revision to Code Case N-513-3 for determining these adjusted stresses.

Entergy also sought NRC review and approval for the pending revision to Code Case N-513-3 to evaluate a similar flaw at Pilgrim Station (Reference 4), which the NRC subsequently approved. The ASME committee also recognizes that the technical approach is very conservative. Simple treatment of piping component flaw evaluation using hand calculations was an important objective in the development of the approach recognizing the trade-off being conservative results. The methodology in the pending revision allows for more sophisticated analysis by the user.

OPPD evaluated the as-found condition of the RW elbow and proposes temporary acceptance of the condition of the pipe to allow continued operation in lieu of performing an immediate code repair/replacement activity. The as-found condition was evaluated using the proposed alternative methodology discussed herein. The evaluation concluded, in part, that the allowable through-wall flaw sizes are greater than 10" in the axial and 4" in the circumferential direction, that the through-wall flaw is stable and the pipe will not fail catastrophically under design loading conditions.

As stated above, performing a code repair/replacement activity now to correct the flaw discovered in the RW elbow would require the plant to shut down (i.e., entry into a 24 hour hot shutdown Technical Specification requirement) and create a hardship based on the potential risks associated with unit cycling and emergent equipment issues incurred during shutdown and startup evolutions.

No compensating increase in the level of quality and safety would be gained by immediate repair of the flaw. The RW system continues to be capable of performing its required safety functions and is not susceptible to sudden or catastrophic failure. Attachment 2 contains data supporting this request.

The proposed alternative methodology includes OPPD performing the following actions:

- OPPD will perform a daily visual walk down and measurement of leakage from the RW elbow in Room 19, with the insulation removed, to confirm that the analysis supported by ultrasonic testing (UT) examinations remains valid (i.e., no new significant leakage).

- A sample size of at least five of the most susceptible and accessible locations, or, if fewer than five, all susceptible and accessible locations shall be examined within 30 days of detecting the flaw in accordance with the requirements (including scope expansion) of the pending revision to Code Case N-513-3.

- OPPD will repair the RW elbow no later than when either the predicted flaw size from periodic inspection exceeds the acceptance criteria, or by September 5, 2014.

6. Duration of Proposed Alternative:

The requested relief shall be used until Code repair activities are perfomed on the RW elbow which will be completed by September 5, 2014.

7. Precedent:

Letter from Entergy (J. A. Dent) to NRC (Document Control Desk), "Pilgrim Relief Request PRR-25 Rev 1, Proposed Alternative, Request for Relief for Temporary Acceptance of a Flaw in Salt Service Water (SSW) System Pipe Spool JF29-8-4," dated March 25, 2014 (ML14091A407)

8. References:

1. Letter from OPPD (L. P. Cortopassi) to NRC (Document Control Desk), "Revised In-service Inspection (ISI) and In-service Test (IST) Interval End Dates as a Result of Extended Refueling Outage," dated January 21, 2014 (ML14022A258) (LIC-14-0002)
2. ASME Code for Operation and Maintenance of Nuclear Power Plants (ASME OM Code), 1998 Edition through 2000 Addenda
3. NRC Generic Letter 90-05, "Guidance for Performing Temporary Non-Code Repair of ASME Code Class 1, 2, and 3 Piping"
4. Letter from Entergy (J. A. Dent) to NRC (Document Control Desk), "Pilgrim Relief Request PRR-25 Rev 1, Proposed Alternative, Request for Relief for Temporary Acceptance of a Flaw in Salt Service Water (SSW) System Pipe Spool JF29-8-4," dated March 25, 2014 (ML14091A407)

Supporting Data

360 degree UT data around leak is a follows:

Raw Water Pipe, Rm.19, 90 degree Elbow, inside on curve:

0.266"

0.131"

0.171"

0.364" 0.314" 0.060" X 0.091" 0.178" 0.270"

0.077"

0.266"

0.352"

X – Pinhole Leak

Blue Numbers, 3/16" away from leak (transducer dia.)

Red Numbers 1" away from leak

Green Numbers 2" away from leak

All measurements are thinnest found along axis of area

360 degree UT data around elbow. The leak is between points 45 & 46

1.)	0.356"	2.)	0.335"	3.)	0.308"	4.)	0.320"
5.)	0.381"	6.)	0.355"	7.)	0.367"	8.)	0.367"
9.)	0.368"	10.)	0.385"	11.)	0.383"	12.)	0.380"
13.)	0.391"	14.)	0.392"	15.)	0.379"	16.)	0.361"
17.)	0.354"	18.)	0.340"	19.)	0.339"	20.)	0.369"
21.)	0.347"	22.)	0.388"	23.)	0.369"	24.)	0.402"
25.)	0.396"	26.)	0.395"	27.)	0.408"	28.)	0.391"
29.)	0.387"	30.)	0.380"	31.)	0.377"	32.)	0.386"
33.)	0.381"	34.)	0.370"	35.)	0.356"	36.)	0.365"

37.)	0.367"	38.)	0.371"	39.)	0.357"	40.)	0.356"
41.)	0.371"	42.)	0.363"	43.)	0.342"	44.)	0.201"
45.)	0.169"	46.)	0.252"	47.)	0.267"	48.)	0.326"
49.)	0.326"	50.)	0.316"	51.)	0.307"	52.)	0.333"
53.)	0.352"	54.)	0.352"	55.)	0.344"	56.)	0.350"
57.)	0.355"	58.)	0.342"	59.)	0.325"	60.)	0.324"
61.)	0.335"	62.)	0.343	63.)	0.343"		

Leak Rate

The flow through the east raw water header is currently 5100 gpm with the total flow of the raw water System at 11,000 gpm. The leak rate was measured at 500 ml/hour at 0851 on August 15, 2014. The leak rate as of 1400 hours on August 15, 2014 is 1100 ml/hour.

Spray Effect/dewatering

Currently, the leakage is being collected and directed via catch basin and tubing into the Room 19 floor drain, which drains to the spent regen tanks in the auxiliary building.

The only electrical component in the vicinity of the RW leak is VA-100, the Room 19 air handling unit. VA-100 is not controlled by technical specifications. It would be at risk from spray if the leak worsens. A little farther back is the air compressor that maintains pressure in the Room 19 deluge piping. However, it is not deemed to be at risk.

The motor driven auxiliary feedwater pump (FW-6) is probably 100 feet away from the leak and is not at risk from spray but could be affected by flooding. However, the leak is not anticipated to enlarge enough for that to occur before the leak is repaired.

Historical Info on Similar Leaks in RW

The history of piping leaks (not including the current event) in the Raw Water system for the last 8 years is as follows:

- CR 200605047 – pinhole leak in east Raw Water header in Room 19
- CR 2007-3273 – pinhole leak in the AC-1A sparging line and pinhole leak on AC-1C sparging line
- CR 2008-5517 – pinhole leak in the east Raw Water header in Room 19
- CR 2010-5603 – pinhole leak in east Raw Water header in penetration between Room 18 and Room 19
- CR 2011-4855 – pinhole leak in the east Raw Water header in Room 19
- CR 2013-22937 – pinhole leak downstream of HCV-2880B (AC-1A exit valve)

A 2006 report found that the leaks are primarily due to Microbial Corrosive Attack, which is the primary corrosion mechanism. A common product of microbial attack is the presence of acidic byproducts of naturally occurring bacteria. These bacteria are common in soil and water from river beds. Organic material from the river adhered to the pipe wall providing a stable environment for bacteria to live. A cluster of bacteria form a pit from a corrosion cell known as tuberculation. The organic material cathodically protects the surrounding area while the anodic core is corroded, leaving a pit.

Effect on RW operability

The flow through the East Raw Water header is currently 5100 gpm with the total flow of the Raw Water System 11,000 gpm. With the exception of the pin hole leak, the RW system is operable.

Interim plug

The plan is to prepare the surface around the leak, then weld a coupling to the pipe and insert a plug to stop the leak.

Timeline to Repair

Requesting 14 days.

Calculated min wall thickness

0.225 inch (everything below 0.225 inch should be considered to be through-wall). The allowable through-wall axial flaw is 4 inches. The allowable circumferential through-wall flaw is 10 inches.