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2CAN111401

November 1, 2014

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

Subject: Supplement to Relief Request ANO2-ISI-017, "Emergency Request Alternative to Utilize the Flaw Evaluation Methodology of ASME Code Case N-513-4, "Evaluation Criteria for Temporary Acceptance of Flaws in Moderate Energy Class 2 or 3 Piping Section XI, Division 1" Arkansas Nuclear One – Unit 2  
Docket No. 50-368  
License No. NPF-6

Reference: Entergy letter dated October 31, 2014, "Emergency Request Alternative to Utilize ASME Code Case N-513-4, "Evaluation Criteria for Temporary Acceptance of Flaws in Moderate Energy Class 2 or 3 Piping Section XI, Division 1", Relief Request ANO2-ISI-017

Dear Sir or Madam:

By letter dated October 31, 2014, Entergy Operations, Inc. (Entergy) requested emergency NRC approval of a proposed alternative to the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI for Arkansas Nuclear One, Unit 2 (ANO-2), in accordance with 10 CFR 50.55a(a)(3)(ii). The alternative is for the current fourth 10-year inservice inspection interval. This interval began on March 26, 2010.

As a result of a teleconference held between ANO and NRC staff at 1900 on October 31, 2014, the NRC determined changes to the Entergy request were required in order to fully meet NRC acceptance criteria. This letter therefore supersedes the reference letter and includes the additional information required.

Specifically, Entergy is requesting relief to apply the flaw evaluation methodology of N-513-4, to structurally evaluate Class 2 and 3 moderate energy piping including elbows, bent pipe, reducers, expanders, and branch tees. Although the flaw evaluation methodology of N-513-4 is requested, ANO-2 will continue to apply all other requirements contained within Code Case N-513-3, "Evaluation Criteria for Temporary Acceptance of Flaws in Moderate Energy Class 2 or 3 Piping Section XI, Division 1", as associated with the subject flaw.

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This methodology is to be used to evaluate a through-wall flaw that was identified in a 6-inch branch connection from the Service Water (SW) supply header to the suction of the "B" Emergency Feedwater Pump. This line was determined to be inoperable and the unit entered a Technical Specification 72-hour allowable outage time (AOT) in accordance with Limited Condition of Operation (LCO) 3.7.3.1 on October 30, 2014, at 2118. Immediate repair or replacement of the pipe is not feasible during this LCO. Without approval of this relief, ANO-2 will be required to shutdown following expiration of the AOT and result in a hardship or unusual difficulty without a compensating increase in the level of quality and safety.

It has been determined that the root cause of the flaw is microbiological induced corrosion (MIC). The majority of leaks in ANO-2 SW piping in the past have been MIC-induced. The associated piping system continues to be capable of performing its required safety function and is not susceptible to sudden or catastrophic failure.

The attached request maintains the quality and safety considerations of structures, systems, and components required for safe operation of ANO-2.

Entergy requests the use of the Code Case N-513-4 flaw evaluation methodology until a Section XI compliant repair / replacement can be completed prior to startup from the next refueling outage (fall of 2015) or exceeding the temporary acceptance criteria of Code Case N-513-3 and this relief request, whichever comes first.

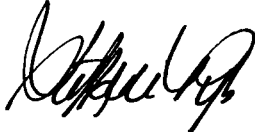
Attachment 1 contains the request for alternative. The stress analysis is provided in Attachment 2 with the NDE Data Sheet provided in Attachment 3.

Entergy requests approval of this relief prior to the expiration of the LCO AOT which will end at 2018 on November 2, 2014.

This letter contains new commitments included in Attachment 4.

Should you have any questions regarding this submittal, please contact me.

Sincerely,



SLP/rwc

Attachments:

1. Relief Request ANO2-ISI-017
2. Structural Integrity Associates Calculation 1401289.301
3. UT Thickness Examination - Report 2-BOP-UT-14-040
4. List of Regulatory Commitments

cc: Mr. Marc L. Dapas  
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**ATTACHMENT 1 TO**  
**2CAN111401**  
**RELIEF REQUEST ANO2-ISI-017**

## RELIEF REQUEST

### ANO2-ISI-017

Component / Number: 2HCC-2003 (elbow) and 2HBC-33 (sweep-o-let)

Code Class: American Society of Mechanical Engineers (ASME Section III) Class 3

References: ASME Code, Section XI, 2001 Edition with the 2003 Addenda Code Case N-513-4

Description: Service Water (SW) to 2P-7B, Emergency Feed Water (EFW) Pump Suction

Unit / Inspection Interval Applicability: Arkansas Nuclear One, Unit 2 (ANO-2) / Fourth (4th) 10-year interval, 2R24 Refueling Outage

#### I. CODE REQUIREMENTS

The applicable ASME Section XI Code Edition and Addenda for ANO-2 is the ASME Code, Section XI, 2001 Edition with the 2003 Addenda. Articles IWD-3120 and IWD-3130 require that flaws exceeding the defined acceptance criteria be corrected by repair / replacement activities or be evaluated and accepted by analytical evaluation. 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:

#### II. PROPOSED ALTERNATIVE

##### Background

On October 20, 2014, as documented in condition report CR-ANO-2-2014-02970, Operations personnel identified leakage in a dissimilar metal weld between an 18" std wall x 6" schedule 40 carbon steel sweepolet, and a 6" schedule 40 stainless steel 45° elbow on the SW piping to the suction of the "B" EFW pump. This leak is located in the Arkansas Nuclear One, Unit 2 (ANO-2) Auxiliary Building. The insulation around the subject line was wet; however, the leak rate at the time of discovery was 1 to 2 drops per hour. According to Operations, the current leak rate is 32 drops per hour. The piping in question forms a branch connection, via a sweepolet, with the main SW header.

NDE Report 2-BOP-UT-14-040 (Attachment 3) provides a detailed UT mapping of the area immediately around the leak. The UT data characterized the flaw at the leak location and verified that the flaw could be treated as a single flaw with respect to the proximity of other thinned regions. The UT report noted that the flaw could be characterized as a nonplanar flaw. The report states that the flaw is located in the toe of the weld on the sweepolet (carbon steel) side of the weld. The size of the pinhole is too small to measure (32 drops per hour). Based on the results of the report, the remaining

piping beyond the flaw is sufficient to maintain a pressure-retaining boundary and postulated leakage does not exceed operability margins. The nonplanar indication is the result of microbiological induced corrosion (MIC). Such corrosion indications are historically limited to localized areas on ANO-2 SW piping and piping components and do not manifest in general thinning, cracking, or other prompt structural failure precursors. This isolated corrosion area can be reliably monitored to ensure flow and structural integrity are maintained.

The weld material is ER309/E309. ER309 yield strength is 57 ksi with an ultimate tensile strength of 86 ksi.

ASME Code Case N-513-3 is conditionally acceptable to the NRC (per Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1," Revision 17). However, N-513-3 does not allow evaluation of flaws located away from attaching circumferential piping welds that are in elbows, bent pipe, reducers, expanders, and branch tees. ASME Code Case N-513-4 provides guidance for evaluation of flaws in these locations. This code case was recently endorsed by ASME on May 7, 2014. This code case has not been generically approved by the NRC.

#### SW System Description

Briefly, the SW system for ANO-2 consists of two independent full capacity 100 percent redundant loops. Each SW loop is capable of supplying cooling water to the required components during normal and emergency conditions. This redundancy allows continued plant operation when a single component failure occurs. System crosstie valves provide additional redundancy by allowing one of the three SW pumps to be removed from service for maintenance. The remaining two pumps provide total system flow for both SW loops.

In the event of an emergency, the SW system can be the supply source for the EFW system (ANO-2 Technical Specification (TS) 3.7.1.3).

The design pressure for the ANO-2 SW system is 150 psig and the design temperature is 130 °F.

ANO-2 TS 3.7.3 requires that two SW loops shall be operable and powered from independent essential buses to provide redundant and independent flow paths in Modes 1, 2, 3, and 4. ANO-2 TS 3.7.4 requires the Emergency Cooling Pond (ECP) to be operable in Modes 1, 2, 3, and 4. Two EFW pumps and associated flow paths are to remain operable in Modes 1, 2, and 3 (ANO-2 TS 3.7.1.2).

On October 30, 2014, at 2118, Loop 1 of SW and EFW pump 2P-7B were declared inoperable and the appropriate TS actions entered. Immediate repair or replacement of the pipe is not feasible during this LCO. The inoperable loop is required to be restored within 72 hours or the unit must be placed in Hot Shutdown within 6 hours and Cold Shutdown within the following 30 hours per ANO-2 TS 3.7.3. Based on the insignificance of the flaw, it appears inappropriate to challenge the operation of the plant.

Due to the fact that the original flaw is MIC-induced, and ANO-2 has extensive experience with similar flaws in this system and it is well understood by ANO-2 staff, consideration of flaw growth is not a significant concern. Therefore, it has been concluded that the overall condition and the continued operation of the associated SW loop until the next ANO-2 refueling outage is acceptable.

#### Proposed Alternative

The NRC issued Generic Letter 90-05, "Guidance for Performing Temporary Non-Code Repair of ASME Code Class 1, 2, and 3 Piping (Generic Letter 90-05)," to address the acceptability of limited degradation in moderate energy piping. The generic letter defines conditions that would be acceptable to utilize temporary non-code repairs with NRC approval. The ASME recognized that relatively small flaws could remain in service without risk to the structural integrity of a piping system and developed Code Case N-513. NRC approval of Code Case N-513 versions in Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1," allows acceptance of partial through-wall or through-wall leaks for an operating cycle provided all conditions of the Code Case and NRC conditions are met. The Code Case also requires the Owner to demonstrate system operability due to leakage and any implied / potential spray.

ASME recognized that Code Case N-513-3 did not include flaw evaluation for piping components such as elbows, bent pipe, reducers, expanders, and branch tees. Code Case N-513-4 was recently approved by the ASME to expand the flaw evaluation methodology for use on these locations and to revise several other areas of the Code Case. It should be noted that Code Case N-513-4 is not listed in the latest revision of Regulatory Guide 1.147 (Revision 17, August 2014). Thus, there is no approved current methodology for ANO to evaluate the through-wall flaw.

ANO-2 will invoke all the requirements commensurate with Code Case N-513-3 associated with the identified condition, with the exception that ANO-2 will use the methodology from Code Case N-513-4 for flaw evaluations of piping components such as elbows, bent pipe, reducers, expanders, and branch tees.

### **III. BASIS FOR ALTERNATIVE**

#### Flaw Evaluation (N-513-4)

A structural evaluation using the methodology presented in Code Case N-513-4 was performed for the affected piping components. The evaluation used conservative allowable stress values based upon carbon steel materials with the highest moments applied. The basis for the evaluation includes Structural Integrity Associates (SIA) calculation number 1401289.301 (ANO calculation CALC-14-E-0200-01, Attachment 2). The evaluation provides an allowable flaw size which assures a safety factor, compared to the critical crack size, in accordance with ASME Section XI, Appendix C.

#### Flooding / Spray Concerns (N-513-3)

The results of these evaluations are presented below.

#### Flooding / Spray Concerns

The leakage at present is insignificant and does not present a flooding concern. No equipment susceptible to water damage is under or adjacent to the leakage site. The magnitude of the water loss can easily be accommodated by the room drainage system and does not pose a flooding concern. The leak is located in a well-lighted area (ANO-2 Auxiliary Building) that is frequented by Operations personnel on rounds. Thus if the leak rate experienced a rapid increase it would be quickly identified and addressed. A floor drain is located approximately 3 feet from the leak and is sized to remove normal leakage from this area of the plant. However, based on the structural assessment and engineering experience with respect to flaw growth, no significant leak rate increase is expected to occur.

#### Reduction in Flow to SW Supplied Components (N-513-3)

Due to the small leak magnitude there is no appreciable impact on flow to other components in the ANO-2 SW System. The flow margin above that required for the minimum margin component is bounded, assuming all leakage in this condition were taken from that component, per the latest SW flow test.

#### ECP Inventory Concerns (N-513-3)

The current leak is essentially imperceptible relative to ECP inventory and thus has no impact on ECP inventory.

#### Periodic Inspections (N-513-3)

Frequent periodic inspections of intervals of no more than 30 days. In addition, daily walkdowns shall be used to confirm analysis conditions remain valid.

#### Extent of Condition (N-513-3)

Augmented volumetric examinations will be performed at five of the most susceptible and accessible locations based upon similar geometry and similar material properties. Additional inspections will be in accordance with the requirements of N-513-3.



#### **IV. DURATION OF PROPOSED ALTERNATIVE**

The proposed alternative is for use of Code Case N-513-4 in the evaluation of the flaw identified in ANO-2 SW piping components. A Section XI compliant repair / replacement must be completed prior to startup from the next refueling outage (fall of 2015) or prior to exceeding the structural limits identified by the evaluation as approved by this relief request, or prior to a leak rate greater than 5 gpm, whichever comes first.

#### **V. PRECEDENT**

By letter dated March 5, 2014 (ML14073A059), as supplemented by letter dated March 25, 2014 (ML14091A407), Entergy Nuclear Operations, requested authorization of a proposed alternative to certain requirements of the ASME Code, Section XI, Article IWD-3000 for the Pilgrim Station. Specifically, it was proposed to use alternate analytical evaluation criteria for acceptance of through-wall flaws. The alternate analytical evaluation criteria were based on the draft Code Case N-513-4. The NRC granted verbal authorization of the proposed alternative on March 26, 2014. The safety evaluation associated with the authorization was provided via letter dated September 30, 2014 (ML14240A603).