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April 11, 1996

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U. S. Nuclear Regulatory Commission
Document Control Desk
Mail Station P1-137
Washington, DC 20555

Subject: Arkansas Nuclear One - Unit 2
Docket No. 50-368
License No. NPF-6
Proposed Technical Specification Change Regarding ANO-2 Low Temperature Overpressure Protection and Request for Exemption to 10CFR50.60 for ASME Code Case N-514

Gentlemen:

Generic Letter (GL) 90-06 was issued on June 25, 1990, regarding resolution of Generic Issue 70 "Power-Operated Relief Valve and Block Valve Reliability" and Generic Issue 94, "Additional Low-Temperature Overpressure Protection". Attachment A-1 to Enclosure A of the generic letter proposed modified Standard Technical Specifications on Combustion Engineering (CE) plants for power-operated relief valves (PORVs) in Modes 1, 2 and 3. Attachment B-1 to Enclosure B of the generic letter, likewise, proposed modified Technical Specifications on CE plants for low-temperature overpressure protection (LTOP) in Modes 4, 5 and 6.

By letter dated June 18, 1991, Entergy Operations proposed a new ANO-2 Technical Specification Section 3/4.4.12 for LTOP, utilizing the modified Standard Technical Specifications contained in the generic letter for the ANO-2 LTOP system design. The submittal included new setpoints and analyses based on the Combustion Engineering Owners Group report CEN-381-P. This report provided a modified approach to analyzing LTOP conditions for establishing enable temperatures and relief valve setpoints. At the time of submittal, ANO and the CEOG was under the belief that NRC review of the topical report was in progress and would be found acceptable. On June 14, 1995, the NRC notified ANO that the calculations using CEN-381-P would not be acceptable and that ANO should resubmit using methodology accepted by the NRC. Entergy Operations committed in letter dated December 5, 1995, to submit a revised LTOP technical specification change request to the NRC by April 15, 1996. Entergy Operations proposed to use ASME Code Case N-514, "Low Temperature Overpressure Protection Section XI, Division 1", as the basis for

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calculating the ANO-2 LTOP operating conditions and that the use of the code case would be provided under an exemption request.

ASME Code Case N-514 was prepared to provide an alternate approach to ASME Section XI Appendix G for determining loads and temperature conditions during reactor startup and shutdown. NRC Regulatory Guides 1.84, 1.85, and 1.147 list the ASME Code Cases that have been approved by the NRC. Code Case N-514 has not been added to these Regulatory Guides to date, although it has been previously approved for use at other facilities. Code Case N-514 is discussed in the attachment to SECY-94-267, Section 4.5.2, "Status of Low-Temperature Overpressure Protection Limits Issue." That discussion concludes with the statement, "The content of Code Case N-514 has been incorporated into Appendix G of Section XI of the ASME Code and published in the 1993 Addenda to Section XI. The NRC Staff is currently developing a revision to 10CFR50.55a that will endorse the 1993 Addenda and Appendix G of Section XI into the regulations." 10CFR50.60 allows licensees to use proposed alternatives to the requirements of 10CFR50, Appendix G when an exemption is granted by the Commission under 10CFR50.12. Therefore, pursuant to 10CFR50.12 an exemption to 10CFR50.60 is requested to use Code Case N-514 for ANO-2. Specific justification for the exemption using Code Case N-514 is contained in Attachment 1.

Based on the above request for exemption, ANO is proposing revised ANO-2 Technical Specifications utilizing the Code Case N-514 methodology for calculating the LTOP enable temperature given the existing relief valve setpoint. The proposed Technical Specification including surveillance requirements and Bases is contained in Attachment 1. A summary of the analyses are contained in Attachment 2. The attached analyses utilize the current ANO-2 Technical Specification pressure-temperature operating limits.

The proposed change has been evaluated in accordance with 10CFR50.91(a)(1) using criteria in 10CFR50.92(c) and it has been determined that this change involves no significant hazards considerations. The bases for these determinations are included in the attached submittal.

Entergy Operations requests that the effective date for this change be within 30 days of NRC issuance of the amendment to allow for distribution and procedural revisions necessary to implement the change. Although this request is neither exigent nor emergency, your prompt review is requested.

Very truly yours,

J W Yelverton

JWY/sab
Attachments

To the best of my knowledge and belief, the statements contained in this submittal are true.

SUBSCRIBED AND SWORN TO before me, a Notary Public in and for Hinds **County and the State of Mississippi, this** 12 **day of** April **, 1996.**

Janis L. Lee

Notary Public
My Commission Expires NOTARY PUBLIC STATE OF MISSISSIPPI AT LARGE MY COMMISSION EXPIRES: August 10, 1997 BONDED THRU HEIDEN-MARCHETTI, INC.

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ATTACHMENT 1

TO

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PROPOSED TECHNICAL SPECIFICATION

AND EXEMPTION REQUEST

INCLUDING

RESPECTIVE SAFETY ANALYSES

IN THE MATTER OF AMENDING

LICENSE NO. NPF-6

ENTERGY OPERATIONS, INC.

ARKANSAS NUCLEAR ONE, UNIT TWO

DOCKET NO. 50-368

DESCRIPTION OF PROPOSED CHANGES

This proposed change to the Arkansas Nuclear One, Unit 2 (ANO-2) Technical Specifications (TS) incorporates a new section 3/4.4.12 for low-temperature overpressure protection (LTOP) including a new Bases Section 3/4.4.12. These changes are a result of the ANO-2 actions for Generic Letter 90-06 for LTOP in light of the [Revised] Standard Technical Specification in NUREG-1432.

DISCUSSION OF CHANGE

The ANO-2 LTOP system consists of two redundant pressure relief valves (2PSV-4732 and 2PSV-4742) which relieve from a single discharge header on the pressurizer (See ANO-2 SAR, Figure 5.1-3). Each LTOP relief valve is preceded by two motor operated isolation valves (2CV-4730-1, 2CV-4731-2 and 2CV-4740-2, 2CV-4741-1) and connecting piping. The LTOP relief valves are operator enabled (by opening the isolation valves) during cooldown when the reactor coolant system (RCS) temperature corresponds to the temperature condition where LTOP is required. Conversely, the LTOP relief valves are isolated from the RCS during heatup when the RCS is above the LTOP temperature. An alarm circuit is provided to alert the operator if any isolation valve is not properly aligned under required RCS LTOP temperature conditions. The design only requires that the operator open the relief valves during cooldown and isolate them during heatup using the motor operated isolation valves.

In operating Modes 1, 2 and 3, the isolation valves to the LTOP relief valves are maintained closed and perform no active safety function for LTOP. The only design condition where an LTOP isolation valve would be opened in Mode 1, 2 or 3, would be in Mode 3 where isolation valve, 2CV-4740-2, which provides an ECCS vent path for RCS depressurization is opened in the event of a total loss of feedwater. The discharge of the ECCS vent does not pass through the LTOP relief valves and utilizes an additional motor operated isolation valve separate from the LTOP system. Otherwise, the LTOP isolation valves provide for RCS pressure boundary integrity in Modes 1, 2 and 3.

The low temperature transient pressure-temperature (P-T) limits provide pressure restrictions for the protection against non-ductile failure of the RCS under transient conditions. The low temperature transient P-T limits are the limits protected by the LTOP system given a design basis event. The design basis event is a the spurious safety injection of two High Pressure Safety Injection (HPSI) pumps and all three charging pumps to a water-solid RCS. Each LTOP relief valve provides a 6.38 square inch opening, which has the capacity to accommodate a worst case full safety injection initiation from a water solid RCS condition.

To address the LTOP protection for Enclosure B to the generic letter, new analyses were conducted by ABB Combustion Engineering (ABB-CE) for Entergy Operations on ANO-2. The ANO-2 LTOP transient P-T limits have been calculated in accordance with the methodology described in ASME Section XI Code Case N-514. The resulting alternate limits are less restrictive than those used in the ASME Code, Section XI, Appendix G. Specifically, the code

case limits the maximum pressure in the vessel to 110% of the pressure determined to satisfy Appendix G, paragraph G-2215 of ASME Section XI, Division 1. The analyses used the existing ANO-2 RCS P-T limits in Technical Specification 3/4.4.9 for 21 effective full power years (EFPY). The results of these analyses are contained in Attachment 2, "Low-Temperature Overpressure Protection Pressure-Temperature Limits for 21 Effective Full Power Years" (ABB-CE Engineering Report A-PENG-ER-004, Revision 00). This attachment provides an assessment of the ability of the ANO-2 LTOP system to adequately accommodate the LTOP design basis transient with the current relief valve setpoint of 430 psig and a relief valve orifice of 6.38 square inches. Code Case N-514 defines the enable temperature as the greater of the coolant temperature corresponding to a metal temperature of RT_{NDT} +50°F or a minimum of 200°F. The ANO-2 analysis resulted in a cold leg enable temperature of 189.1°F. Therefore, using a minimum enable temperature of 200°F including an instrument uncertainty of 20°F, the resulting ANO-2 LTOP enable temperature was established at 220°F. The calculated peak transient pressurizer pressure from the design basis event with one LTOP relief valve operable is 517.7 psia.

These LTOP P-T limits are less restrictive than the Appendix G P-T limits in LCO 3.4.9.1 for two reasons. First, the LTOP P-T limits are expressed in actual pressurizer pressure, i.e., without pressure indication uncertainty applied, for comparison with the peak transient pressure, which is also in actual pressurizer pressure. Secondly, the pressure correction factors that were applied to the LTOP P-T limits credit administrative restrictions on RCP operation, whereas the ASME Appendix G P-T limits in LCO 3.4.9.1 utilize one pressure correction factor, based upon three operating pumps, in the entire P-T limit temperature range.

The pressure correction factors that were used to adjust the LTOP P-T limits from the reactor vessel beltline to the pressurizer pressure instrument nozzle location include an elevation head term, flow induced pressure drop term, and flow induced pressure drop uncertainty. The elevation head term is pressure difference between the bottom of the core, the lower reference point, and pressurizer level, the upper reference point. The flow induced pressure drop term is the pressure difference between a reference point for the reactor-vessel beltline (bottom of the core) and the surge line nozzle in the hot leg. As this pressure drop varies with the number of operating RCPs, this term can be reduced by limiting the number of operating RCPs at low RCS temperatures.

The pressure correction factors developed for the LTOP P-T limits assumed the following limitations on RCP operation:

No. of Operating Pumps	Indicated Temperature
0	$70°F \leq t_C < 140°F$
2	$140°F \leq t_C < 220°F$

The temperature ranges are indicated cold leg temperature, with a 20° F temperature indication uncertainty applied. The above RCP operating limitations do not apply to the starting of one RCP for a short duration (~30 seconds) for a sweep of the steam generators during venting and refilling operations given a steam volume present in the pressurizer.

Since ANO-2 does not have a technical specification for LTOP, a new Technical Specification 3/4.4.12 is being proposed. The standard technical specifications in Generic Letter 90-06, and the [Revised] Standard Technical Specifications (NUREG-1432) were utilized in development of the ANO-2 proposed LTOP technical specifications. The LTOP cold leg enable temperature of 220°F established in the limiting condition for operation (LCO) ensures that the RCS will not be overpressurized during low temperature operations given an opening of 6.38 in^2 and a relief valve setpoint of ≤430 psig. Therefore, the Technical Specification Applicability section, is based on operator action to open or close the LTOP isolation valves in Mode 4 prior to reaching the LTOP relief valve enable temperature, throughout Mode 5 and in Mode 6 when the reactor vessel head is in place. The LCO includes the isolation of the safety injection tanks (SITs) to ensure that the possibility of SIT injection is restricted. The wording of the proposed ANO-2 Specification for SIT depressurization to below the RCS pressure is similar the Revised Standard Technical Specifications, but simplified for clarity.

The proposed surveillance requirements will verify that both LTOP relief isolation valves are open when they are being used for overpressure protection or to verify the vent opening when an alternate vent path is utilized. A surveillance for SIT isolation is also being added, when required.

The lift settings for the LTOP relief valves will be verified in accordance with the ANO Inservice Testing Program. ANO-2 is currently committed to the 1986 Edition of the ASME Section XI Code which invokes OM-1 for testing of relief valves. Since ANO-2 utilizes relief valves instead of PORVs for LTOP protection, the proposed surveillance is consistent with ANO-2 main steam and pressurizer safety valve surveillances and also the CE Revised Standard Technical Specifications surveillance requirements for relief valves.

The modified technical specification as recommended in Generic Letter 90-06 proposed a new specification for special report anytime that the LTOP relief system was used to mitigate a low temperature overpressure transient. Entergy Operations considers these reporting actions appropriate only for previous post-TMI data collection. The [Revised] Standard Technical Specifications no longer require that this special reporting action be provided. Therefore, Entergy Operations does not propose to add this reporting requirement into the ANO-2 Technical Specification revision.

The proposed Bases provide information regarding the calculational methodology for determining the LTOP enable temperature setpoint, and the design basis event for establishing the setpoints. The proposed technical specification wording and Bases have been tailored to the ANO-2 format.

Based on the ANO-2 LTOP relief valve design and the conditions when LTOP is required, the proposed changes are considered to meet the requirements of Generic Letter 90-06.

JUSTIFICATION FOR ASME CODE CASE N-514 EXEMPTION REQUEST

The following provides the basis for the exemption request to 10CFR50.60 for use of ASME Section XI Code Case N-514, "Low Temperature Overpressure Protection Section XI, Division 1" in lieu of 10CFR50, Appendix G.

10CFR50.12 Requirements

10CFR50.12 states that the Commission may grant an exemption from requirements contained in 10CFR50 provided that:

1. the exemption is authorized by law,
2. the exemption will not result in an undue risk to the public health and safety,
3. the exemption is consistent with the common defense and security, and
4. special circumstance, as defined in 10CFR50.12(a)(2), are present.

The requested exemption by Entergy Operations to allow the use of ASME Code Case N-514 for determining the LTOP enable temperature meets this criteria as discussed below.

1. The requested exemption is authorized by law.
   No law exists which precludes the activities covered by this exemption request. 10CFR50.60(b) allows the use of alternatives to 10CFR50, Appendices G and H when an exemption is granted by the Commission under 10CFR50.12.

2. The requested exemption does not present an undue risk to the public health and safety
   A revised LTOP relief valve enable temperature is being proposed for ANO-2. The enable temperature has been developed to provide bounding low temperature reactor vessel integrity protection during the LTOP design basis transient. The LTOP setpoint will utilize 110% of the ASME Appendix G curve as a design limit. The validity of this approach is supported by consideration of the conditions at which overpressurization events have been demonstrated to occur, and by an analysis which has demonstrated adequate margin to reactor vessel failure for this design basis event.

   Restrictions on allowable operating conditions and equipment operability requirements have been established to ensure that operating conditions are consistent with the assumptions of the accident analysis. Specifically, RCS pressure and temperature must be maintained within the heatup and cooldown rate-dependent pressure/temperature operating limits specified in ANO-2 Technical Specification 3.4.9.1. Therefore, this exemption does not present an undue risk to the public health and safety.

3. The requested exemption will not endanger the common defense and security.
   The common defense and security are not endangered by this exemption request.

4. Special circumstances are present which necessitate the request for an exemption to the regulations of 10CFR50.60.
   Pursuant to 10CFR50.12(a)(2), the NRC will consider granting an exemption to the regulations if special circumstances are present. This exemption meets the special circumstances of paragraphs

(a)(2)(ii), demonstrates that the underlying purpose of the regulation will continue to be achieved,
(a)(2)(iii), would result in undue hardship or other cost that are significant if the regulation is enforced and,
(a)(2)(v); will provide only temporary relief from the applicable regulation and the licensee has made good faith efforts to comply with the regulations.

10CFR50.12(a)(2)(ii)

ASME Code Case N-514 recognizes the conservatism of the ASME Appendix G curves and allows setting the LTOP setpoint such that the ASME Section XI, Appendix G limits are not exceeded by more than 10%. The code case permits use of an LTOP enable temperature equal to an RT_{NDT} + 50°F or 200°F which ever is greater for the limiting material. This allows the implementation of a LTOP setpoint that preserves an acceptable margin of safety while maintaining operational margins for reactor coolant pump operation at low temperatures and pressures. The LTOP setpoint established in accordance with ASME Code Case N-514 will also minimize the unnecessary actuation of protection system pressure relieving devices. Therefore, establishing the LTOP setpoint in accordance with ASME Code Case N-514 criteria satisfies the underlying purpose of the ASME Code and the NRC regulations to ensure an acceptable level of safety.

10CFR50.12(a)(2)(iii)

The reactor coolant system pressure/temperature operating window at low temperatures is defined by the LTOP setpoint. Implementation of a LTOP setpoint without the additional margin allowed by ASME Code Case N-514 would restrict the pressure/temperature operating window and would potentially result in undesired actuation of the LTOP system. This constitutes an unnecessary burden that can be alleviated by the application of ASME Code Case N-514. Implementation of an LTOP setpoint as allowed by ASME Code Case N-514 does not significantly reduce the margin of safety associated with normal operational heatup and cooldown limits. Further, the LTOP guidelines will reduce the potential for an undesired lift of the LTOP valves.

10CFR50.12(a)(2)(v)

The exemption provides only temporary relief from the applicable regulation and ANO has made a good faith effort to comply with the regulation. We request that the exemption be granted until such time that the NRC generically approves ASME Code Case N-514 for use by the nuclear industry. We are currently in compliance with the requirements of 10CFR50.60. However, to retain sufficient pressure/temperature operating margin to the end of the current ANO-2 Technical Specification pressure/ temperature limits, we require the exemption to use Code Case N-514.

Code Case N-514, Conclusion for Exemption Acceptability

Compliance with the specified requirements of 10CFR50.60 would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. ASME Code Case N-514 allows setting the LTOP actuation setpoint and enable temperature such that the ASME Section XI Appendix G limits are not exceeded by more than 10%. This

proposed alternative is acceptable because the Code Case recognizes the conservatism of the ASME Appendix G curves and allows establishing a LTOP setpoint which retains an acceptable margin of safety while maintaining operational margins for reactor coolant pump operation at low temperatures and pressures. As discussed above, the Code Case provides an acceptable margin of safety against flaw initiation and reactor vessel failure, and reduces the potential for an undesired LTOP actuation. Therefore, application of Code Case N-514 for ANO-2 will ensure an acceptable level of safety.

DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATION

An evaluation of the proposed change has been performed in accordance with 10CFR50.91(a)(1) regarding no significant hazards considerations using the standards in 10CFR50.92(c). A discussion of these standards as they relate to this amendment request follows:

Criterion 1 - Does Not Involve a Significant Increase in the Probability or Consequences of an Accident Previously Evaluated.

This proposed change provides additional controls in the ANO-2 Technical Specification for ensuring that LTOP protection is available when required. The limiting condition involving the simultaneous injection of two HPSI and three charging pumps to an RCS water solid condition, was used in the calculation of the ANO-2 proposed LTOP setpoints. The methodology utilized in the LTOP setpoint analysis is based on ASME Code Case N-514. The code case establishes a factor of 110% of the operating pressure temperature curves instead of 100%. The safety factor utilized by the code case provides a more reasonable vessel overpressure allowance for conditions expected under pressure loading from low temperature transients. The SITs are required to be isolated, if not depressurized, prior to entering the LTOP enable temperature and are periodically verified to be isolated when LTOP conditions exist. The LTOP setpoint of the relief valves proposed by this technical specification change is not considered to be an initiator of any transients, but is used to mitigate an overpressure condition if such a transient were to occur.

Therefore, this change does not involve a significant increase in the probability or consequences of any accident previously evaluated.

Criterion 2 - Does Not Create the Possibility of a New or Different Kind of Accident from any Previously Evaluated.

The design basis event for establishing LTOP limits is the simultaneous injection of two HPSI and three charging pumps to an RCS water solid condition. The LTOP vent size of 6.38 square inches and the valve pressure setpoint of ≤430 psig are currently used for mitigation of low temperature overpressure conditions. The change in the enable setpoint was analyzed by the application of Code Case N-514 and determined to adequately ensure that this temperature setpoint will mitigate a LTOP transient. The operator action to enable the LTOP relief valves at 220°F ensures that the RCS including the reactor vessel will not undergo system pressures at low temperature conditions beyond their design limits. Therefore, there will not be any impact to systems, structures or components beyond their design requirements.

Therefore, this change does not create the possibility of a new or different kind of accident from any previously evaluated.

Criterion 3 - Does Not Involve a Significant Reduction in the Margin of Safety.

The addition of a new specification to the ANO-2 Technical Specifications will not significantly reduce the margin of safety. The LTOP safety factors are based on reanalyzed conditions for 21 effective full power years (EFPY) of operation utilizing methodology contained in ASME Code Case N-514. The LTOP evaluation under Code Case N-514 for low temperature transients is considered more appropriate than the ASME Section XI. The code case establishes a factor of 110% of the operating pressure temperature curves instead of 100%. The safety factor utilized by the code case provides a more reasonable vessel overpressure allowance for conditions expected under pressure loading from low temperature transients. Although the proposed setpoint may involve a slight reduction in a margin of safety, the enable temperature setpoint will provide an equivalent level of safety to the reactor vessel during LTOP transients and will satisfy the purpose of 10CFR50.60 for fracture toughness. Therefore, based on the refined methodology used to calculate ANO-2 LTOP setpoints for 21 EFPY the margin of safety will not be significantly reduced.

PROPOSED TECHNICAL SPECIFICATION CHANGES

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