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1CAN021004

February 28, 2010

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

SUBJECT: Response to Request for Additional Information
Application for Technical Specification Improvement to Adopt TSTF-490,
Revision 0, "Deletion of E Bar Definition and Revision to RCS Specific Activity
Tech Spec"
Arkansas Nuclear One, Unit 1
Docket No. 50-313
License No. DPR-51

REFERENCES: 1. Entergy letter to the NRC, dated March 13, 2008, "Application for
Technical Specification Improvement to Adopt TSTF-490, Revision 0,
"Deletion of E Bar Definition and Revision to RCS Specific Activity Tech
Spec"" (1CAN030802)

Dear Sir or Madam:

In Reference 1, Entergy Operations, Inc. (Entergy) requested an amendment to Arkansas Nuclear One, Unit 1 (ANO-1) Technical Specifications (TS) to adopt TS Task Force traveler 490 (TSTF-490).

Subsequent to the submittal, the NRC determined that additional information was required to complete their review and provided a request for additional information (RAI) in email dated December 22, 2009. Attachment 1 of this letter contains the RAI and associated responses. As a result of responding to the RAI Question 1, the attachment to the original letter (Reference 1) is being replaced in its entirety in order to effectively remove a reference that was not necessary. The replacement attachment is included in Attachment 2 of this letter. Entergy requests the NRC remove the attachment contained in Reference 1 above and replace it with the content of Attachment 2 of this letter. Finally, in support of the response to RAI Question 3, a new markup of the affected TS page, a revised or "clean" TS page, and markup of affected TS Bases pages (for information only) is included in Attachments 3, 4, and 5 of this letter, respectively.

Changes resulting from Entergy's response to this RAI has no impact on the original No Significant Hazards Consideration (NSHC) determination performed by Entergy.

This letter contains no new commitments.

If you have any questions or require additional information, please contact David Bice at 479-858-5338.

I declare under penalty of perjury that the foregoing is true and correct. Executed on February 28, 2010.

Sincerely,

Original signed by K. T. Walsh

KTW/dbb

Attachments: 1. Response to Requests for Additional Information (RAI)
2. Revised Attachment to Entergy Letter 1CAN030802
3. Revised Technical Specification Page (mark-up)
4. Revised Technical Specification Page (clean)
5. Revised Technical Specification Bases Pages Mark-up (for information only)

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Attachment 1 to

1CAN021004

Response to Requests for Additional Information (RAI)

RESPONSE TO REQUESTS FOR ADDITIONAL INFORMATION (RAI)

By letter dated March 13, 2008, (Agencywide Documents Access & Management System (ADAMS) ML080850906), Entergy Operations, Inc. (the licensee), submitted a license amendment request regarding proposed changes to the technical specifications (TSs) for Arkansas Nuclear One, Unit 1 (ANO-1). The proposed amendment would replace the current ANO-1 TS limit on Reactor Coolant System (RCS) gross specific activity with a new limit on RCS noble gas specific activity. The noble gas specific activity limit would be based on a new dose equivalent Xenon-133 (DEX) definition that would replace the current E Bar average disintegration energy definition. In addition, the current dose equivalent Iodine-131 definition would be revised. The amendment request is consistent with TS Task Force Traveler TSTF-490-A.

The US Nuclear Regulatory Commission (NRC) staff has determined that the following additional information is needed to complete its review of the subject license amendment request for ANO-1. This request was discussed with David Bice of your staff on December 16, 2009, and it was agreed that a response would be provided within 30 days of receipt of this email.

Entergy Response

With regard to the NRC 30-day response request, the NRC later stated in email to David Bice dated January 8, 2010, that the standard "30 days" would not be applied to this response in light of NRC concerns with TSTF-490 surveillance "notes" that limit RCS sampling requirements to Mode 1 only. Therefore, additional time was required to resolve this concern, with the NRC accepting a draft resolution via email to David Bice dated February 17, 2010. The resolution is discussed in response to RAI Question 3 of this attachment.

1. **The application dated March 13, 2008, refers to an NRC staff Safety Evaluation (SE), described as Reference 1, dated September 27, 2006 (ADAMS Accession No. ML062700612). This document is not publicly available. The NRC acknowledges that reference to ADAMS Accession No. ML062700612 was mistakenly contained in the notice of availability of model application for this TS improvement that was published in the Federal Register (72 FR 12217). However, since the submittal states that the methodology described in this NRC staff's SE was applied to develop the proposed TS changes, it is not clear how this was accomplished. In order to make the application complete, the NRC staff requests that Entergy supplement the application to provide a corrected reference for the methodology used to develop this proposed TS change as well as a correct reference to the public version of the NRC's SE for this Technical Specification Task Force Traveler (TSTF-490).**

Entergy Response

Entergy Operations, Inc. (Entergy) concurs that the subject reference should be deleted. As stated in Attachment 1 of the original submittal, Sections 1.0, 3.0, 4.0, 5.0, 6.0, and 7.0, Entergy verified the ANO-1 relationship to applicable regulatory requirements and guidance provided in the NRC Notice of Availability (NOA) published on March 15, 2007 (72FR12217). Therefore, deletion of any and all reference to the September 27, 2006 NRC SE has no impact on Entergy's original assessment that the adoption of TSTF-490 is appropriate for ANO-1. Attachment 2 of this letter contains a new "attachment" to the

original ANO-1 submittal, dated March 13, 2008, with any reference to the aforementioned September 27, 2006 NRC SE deleted (one occurrence in Section 1.0 and once by reference in Sections 4.0 and 8.0 of the original letter attachment). Entergy requests the NRC replace the attachment to the original letter in its entirety with the pages contained in Attachment 2 of this letter.

2. **Consistent with the SE for TSTF-490, please confirm that the site-specific limits for both dose equivalent iodine (DEI) and DEX, and the dose conversion factors (DCFs) used for the determination of DEI and DEX surveillances, are consistent with the current design bases radiological dose consequence analyses (for example, steam generator tube rupture and main steam line break). For DEX, the licensee states a reactor coolant DEX specific activity of $\leq 2200 \mu\text{Ci/gm}$. Please provide the information necessary (dose conversion factors and RCS radioisotopic concentrations) for the NRC to verify the proposed value in the limiting condition for operation (LCO).**

Entergy Response

As stated in Section 4.0 of the original submittal, the adoption of TSTF-490 was tied to the adoption of an Alternate Source Term (AST) for ANO-1. Entergy's original submittal referenced the AST submittal, dated October 22, 2007 (1CAN100703), for information relating to the development of the DEI and DEX values because the DEI and DEX values selected were based on the adoption of the AST. However, given the size of the AST submittal, Entergy understands the difficulty in ascertaining only the DEI and DEX related information from the AST submittal. Therefore, the relevant information is included below. Note that the NRC has approved the AST for ANO-1 in letter dated October 21, 2009 (TAC No. MD7178). The DCFs are associated with the respective NRC Federal Guidance Report (FGR) effective dose equivalent (EDE) and committed dose equivalent (CEDE) used to translate activities into equivalent Xe-133 and I-131 activities.

Primary Coolant Source Term, DCF, and DEX Activity

<u>ISOTOPE</u>	<u>CURIES</u>	<u>FGR-12</u>	<u>Xe-133 EQUIVALENT</u>
Kr-85	4.80E+02	1.19E-16	3.66E+01
Kr-85m	1.31E+03	7.48E-15	6.28E+03
Kr-87	2.09E+03	4.12E-14	5.52E+04
Kr-88	2.93E+03	1.02E-13	1.92E+05
Xe-131m	3.78E+02	3.89E-16	9.43E+01
Xe-133	3.02E+04	1.56E-15	3.02E+04
Xe-133m	7.64E+02	1.37E-15	6.71E+02
Xe-135	1.30E+04	1.19E-14	9.92E+04
Xe-135m	1.18E+03	2.04E-14	1.54E+04
Xe-138	3.46E+03	5.77E-14	<u>1.28E+05</u>
		TOTAL	5.2663E+05

Primary Coolant Source Term, DCF, and DEI Activity

<u>ISOTOPE</u>	<u>CURIES</u>	<u>FGR-11</u>	<u>I-131 EQUIVALENT</u>
I-131	7.33E+01	8.89E-09	7.33E+01
I-132	1.00E+03	1.03E-10	1.16E+01
I-133	6.91E+02	1.58E-09	1.23E+02
I-134	1.48E+03	3.55E-11	5.91E+00
I-135	1.22E+03	3.32E-10	<u>4.56E+01</u>
		TOTAL	2.5917E+02

The ANO-1 RCS mass is ~5.2395E+05 lbm at maximum pressurizer level. This mass translates into 2.3766E+08 grams (a "rounded" RCS mass of 2.38E+08 grams was provided in letter 1CAN030803). Thus, the dose equivalent Xe-133 (DEX) concentration in the RCS is $(5.2663E+05 \text{ Ci} / 2.3766E+08 \text{ g}) \times 1E+06 \text{ } \mu\text{Ci/Ci} = \sim 2216 \text{ } \mu\text{Ci/g}$. The dose equivalent I-131 (DEI) concentration in the RCS is $(2.5917E+02 \text{ Ci} / 2.3766E+08 \text{ g}) \times 1E+06 \text{ } \mu\text{Ci/Ci} = 1.09 \text{ } \mu\text{Ci/g}$. A DEX value of 2200 $\mu\text{Ci/g}$ and a DEI value of 1.0 $\mu\text{Ci/g}$ have been conservatively chosen for the proposed TS change.

Significant detail is provided in the aforementioned Entergy letter (1CAN100703) and amplified in Entergy letter dated March 13, 2008 (1CAN030803), both associated with adoption of the now NRC approved AST for ANO-1.

- In the subject license amendment request, the licensee proposed TS changes to revise LCO 3.4.12, "RCS Specific Activity," APPLICABILITY requirements to specify that the LCO is applicable in MODES 1, 2, 3, and 4. In accordance with this proposal, the licensee also proposed to add the NOTE that states, "Only required to be performed in MODE 1," to the surveillance requirements (SR) of the TS, thus removing the applicability of the SR to other MODES.**

The proposed change revises the conditions for sampling, and may exclude sampling during the plant conditions where LCO 3.4.12 may be exceeded. After transient conditions (i.e. reactor trip, plant depressurization, shutdown or startup) that end in MODES 2, 3, or 4, the SR is not required to be performed. Isotopic spiking and fuel failures are more likely during transient conditions than during steady state plant operations.

Because LCO 3.4.12 could potentially be exceeded after plant transient or power changes, please justify why sampling is no longer needed in the plant MODES that are proposed to be eliminated and justify how the LCO 3.4.12 remains consistent with the design bases analysis from which the LCO limits are derived (i.e. main steamline break, steam generator tube rupture, etc.). Furthermore, please justify why there is an apparent disparity between the modes of applicability (MODES 1, 2, 3, and 4) and the limited mode (MODE 1) under which the surveillance is required.

Entergy Response

For ANO-1, the total gas value and a separate radiogas sample (collected via an inverted funnel) are required to determine DEX. The radiogas sample may be obtained from system piping other than the high pressure RCS Purification (or Letdown) system; however, the results from alternate sample points are meaningless without the ability to correlate the amount of radioactivity in the radiogas sample to total radioactivity within the RCS. The total gas value allows for this correlation. The total gas value is important because it allows radioactivity in the radiogas sample to be proportioned to radioactivity within the total RCS volume.

The ANO-1 reactor coolant sample system is not designed to accommodate a total gas sample in lower Modes of operation. This is due to the total gas sample bomb being hard-piped to the RCS Purification system. In lower modes of operation, the Purification system is either not in-service or there is insufficient pressure to obtain necessary sample flow from this sample point. At 500 °F RCS temperature (current TS applicability for sampling) and assuming a minimum of 30 °F margin-to-saturation is maintained (equivalent to 530 °F), RCS pressure can be as low as 900 psia. At the entry condition to Mode 4 (300 °F), RCS pressure, while maintaining a 30 °F margin to saturation, can be as low as 70 psia. Given the heat exchangers, isolation valves, flow control valves, and long sample piping run that RCS fluid must pass through to reach the sample bomb, sufficient flow cannot be maintained to continue sampling as RCS cool down proceeds. This is due to significant pressure breakdown as sample flow travels through these various components and paths.

The existing LCO applicability requirements are limited to Modes 1, 2 and Mode 3 with RCS average temperature ≥ 500 °F. The ANO-1 Steam Generator Tube Rupture (SGTR) and Main Steam Line Break (MSLB) analyses are based on power operating conditions, which are bounding for lower modes of operation. The analyses assume RCS activity at TS limits. The TSs recognize that operation above TS RCS activity limits is a condition beyond that assumed in the plant safety analysis and, therefore, severely limits the time the licensee has to restore activity to within limits before a plant shutdown is required. Once RCS activity limits are exceeded, further sample results that continue to indicate elevated activity will have no bearing on the TS requirement to perform a plant shutdown or actions the licensee is required to take. In addition, the next follow-up sample would not be required for 7 days, well after the unit would reach Mode 5 conditions. This is not to imply more frequent sampling will not be performed, since it is the interest of the licensee to track RCS activity limits in order to assess the source and more quickly determine corrective actions to repair. Because the current analyses are bounding for lower modes of operation and because further sampling will not change the TS requirements to restore activity to within limits or perform a plant shutdown, the safety significance of not obtaining a DEX below an RCS temperature of 500 °F is negligible.

The DEX sample is also not safety significant in these lower modes from the aspect of a SGTR or MSLB that might initiate while operating in lower mode. The MSLB is only of concern due to the stress it may place on the Steam Generator (SG) tubes or if a SG tube is already exhibiting significant leakage. However, the SG tubes are designed against the thermodynamic and other stresses placed upon them at full power operations. TSs require that SG tubes be verified acceptable to remain in service following each inspection until the next inspection outage. This evaluation must assume worse case conditions. If a SG tube

cannot be shown to remain below TS allowed flaw limits prior to reaching the next inspection outage, it must be removed from service prior to plant startup. Because the SG tube integrity program controls are based on full power operation, it is extremely unlikely that the stresses placed on SG tubes during low pressure, temperature, and flow operations would result in a SG tube leak in these lower modes of operation. The RCS activity TS is intended to limit the amount of activity that could be released to the public should a SGTR occur. Since a SGTR is not expected during lower modes of operation, the significance of performing samples to determine DEX activity in the RCS below 500 °F is negligible.

In addition to the above, Emergency Operating Procedures require Operators to rapidly reduce RCS pressure in any SG tube leak event that requires a unit shutdown (this is administratively required for SG tube leakage well below TS limits). The goal of the procedures is to reduce RCS pressure to be equal to or slightly less than SG pressure so that RCS fluid will cease to enter the secondary side of the SG through the leaking tube. These actions aid in preventing or limiting any release to the environment, regardless of RCS activity levels.

Other than a SG tube leak, RCS fluid is contained within the reactor building except as processed through the aforementioned Purification system or sample piping. The Purification system is removed from service during cool down of the RCS when pressure is no longer sufficient to maintain adequate flow. While in service, any leakage from the Purification system or sample system is collected in tanks or sumps contained within the Auxiliary Building. In addition, building air is filtered through ventilation systems, which include a charcoal filter, prior to release to the atmosphere. Therefore, sufficient design is provided to minimize any possibility of RCS fluid from inadvertently reaching the environment due to leakage from the Purification or sample system.

Note also that the source of a high RCS activity must be eliminated or otherwise resolved before unit restart. This includes replacement of fuel rods if the source was due to a pinhole leak in fuel cladding.

Based on the above, Entergy proposes to modify the SR 3.4.12.1 Note associated with DEX from "Only required to be performed in Mode 1" to "Only required to be performed in Modes 1, 2, and Mode 3 with RCS cold leg temperature \geq 500 °F." This is consistent with the current TS applicability and the current licensing basis for ANO. However, to provide continued assessment of RCS activity conditions during plant shutdown and startup, the SR 3.4.12.2 Note associated with DEI will be deleted in its entirety. Therefore, DEI samples will no longer be limited to only Mode 1 operation.

The above changes have no adverse impact to nuclear or public safety since the adoption of TSTF-490 will remain conservative to existing requirements (neither DEI or DEX is currently required to be sampled when RCS temperature is below 500 °F. The changes affect TS Page 3.4.12-2 (marked-up and revised page) and TS Bases Pages 3.4.12-6 and 3.4.12-7 (submitted for information only). A new markup of the affected TS page, a revised or "clean" TS page, and markup of affected TS Bases pages (for information only) is included in Attachments 3, 4, and 5 of this letter, respectively.

Attachment 2 to

1CAN021004

Revised Attachment to Entergy Letter 1CAN030802

1.0 DESCRIPTION

This letter is a request to amend Operating License DPR-51 for Arkansas Nuclear One, Unit 1 (ANO-1).

The proposed changes would replace the current limits on primary coolant gross specific activity with limits on primary coolant noble gas activity. The noble gas activity would be based on DOSE EQUIVALENT XE-133 and would take into account only the noble gas activity in the primary coolant. Technical Specification Task Force (TSTF) change traveler TSTF-490, Revision 0, "Deletion of E Bar Definition and Revision to RCS Specific Activity Tech Spec" was announced for availability in the Federal Register on March 15, 2007 (Reference 2) as part of the consolidated line item improvement process (CLIP).

2.0 PROPOSED CHANGE

Consistent with NRC-approved TSTF-490, Revision 0, the proposed TS changes:

- Revise the definition of DOSE EQUIVALENT I-131.
- Delete the definition of \bar{E} -AVERAGE DISINTEGRATION ENERGY.
- Add a new TS definition for DOSE EQUIVALENT XE-133.
- Revise LCO 3.4.12, "RCS Specific Activity" to delete references to gross specific activity and add limits for DOSE EQUIVALENT I-131 and DOSE EQUIVALENT XE-133. (Note that ANO-1 TSs do not contain a *DOSE EQUIVALENT I-131 versus percent power* figure noted for deletion in TSTF 490)
- Revise LCO 3.4.12 "Applicability" to specify the LCO is applicable in MODES 1, 2, 3, and 4.
- Modify ACTIONS Table as follows:
 - A. Condition A is modified to replace "specific activity" with "DOSE EQUIVALENT I-131" and define an upper limit for DOSE EQUIVALENT I-131 that is applicable at all power levels.
 - B. ACTIONS are reordered, moving Condition B to Condition C to be consistent with the Writer's Guide for the improved TSs of NUREG 1430.
 - C. A new Condition B is added to provide a Condition and Required Action for DOSE EQUIVALENT XE-133 with a Completion Time of 48 hours. A Note allowing the applicability of LCO 3.0.4.c is added, consistent with the Note to Required Action A.1 described above.
 - D. Condition C (was Condition B) is modified based on the changes to Conditions A and B and to reflect the change in the LCO Applicability.
- Revise SR 3.4.12.1 to verify the limit for DOSE EQUIVALENT XE-133. A Note is added to allow entry into MODES 2, 3, and 4 prior to performance of the SR.
- Delete SR 3.4.12.3.

Attachment 2 provides a markup of the affected TSs delineated above. Attachment 3 provides the final (clean) TS pages associated with these changes.

Attachment 4 includes a markup of the impacted TS Bases pages for information only. The TS Bases will be revised in accordance with the TS Bases Control Program (TS 5.5.14) during implementation of TSTF-490 once approved by the NRC. Also note that the TS Bases markup captures the information necessary to support the ANO-1 Alternate Source Term (AST) submittal discussed below. Therefore, the wording deviates from that proposed in TSTF-490, but is consistent with the Licensing Basis assuming approval of AST for ANO-1.

Note that TSTF-490 was written and approved considering the most current version of the Improved Technical Specifications (ITS) with approved TSTFs at the time. As described above, this included reference to Limiting Condition for Operation (LCO) 3.0.4.c, which was incorporated in the ITS under TSTF-359, Mode Change Limitations. Entergy has submitted a proposal to adopt TSTF-359, which is currently under review by the NRC (Reference 3). Therefore, the above changes associated with LCO 3.0.4 are dependent on the NRC approval of Entergy's TSTF-359 adoption proposal.

In addition to the discussion of TSTF-359 above, Entergy has also submitted an application to adopt use of Alternate Source Term (AST) for ANO-1 (Reference 4). This application is currently under NRC review and affects the pages associated with TS 3.4.12 above. In support of both TSTF-490 and AST adoption, the DOSE EQUIVALENT I-131 Definition is modified to refer to the committed effective dose equivalent (CEDE), which is consistent with AST.

Therefore, the markup and final versions of TS 3.4.12 included in Attachments 2 and 3, and the TS 3.4.12 Bases markup included in Attachment 4 are shown as if the ANO-1 TSTF-359 and the AST applications have been approved (minus the addition of a new amendment number in the associated page footer). Entergy will submit new markup and final TS pages upon NRC request should either the TSTF-359 or AST application be revised or should the approval of either of these applications be significantly delayed. If the aforementioned applications are approved as anticipated, Entergy will submit new final TS pages that include the new amendment numbers upon request from the NRC.

3.0 BACKGROUND

The background for this application is as stated in the model safety evaluation (SE) in the NRC's Notice of Availability published on March 15, 2007 (72FR12217), the NRC Notice for Comment published on November 20, 2006 (71FR67170), and TSTF-490, Revision 0.

4.0 TECHNICAL ANALYSIS

In the model SE, the NRC included statements which would require the licensee to identify specific information in support of adopting TSTF-490. The following provides ANO-1 specific information in this regard.

1. Section 3.1.1 of the model SE includes a list of acceptable dose conversion factors (DCF) for use in the determination of dose equivalent iodine (DEI) in relation to dose consequence analyses. The ANO-1 analyses employ Table 2.1 of EPA Federal Guidance Report No. 11, 1988, "Limiting Values of Radionuclide Intake and Air Concentration and Dose conversion Factors for Inhalation, Submersion, and Ingestion."

2. In the first paragraph of Section 3.1.2 of the model SE, a bracketed list of isotopes is provided that designates the noble gases that may be used in the determination of dose equivalent xenon (DEX). All isotopes depicted within these brackets are currently considered in the ANO-1 calculation of DEX. This is captured in the proposed ANO-1 definition of DEX to be included in TS Section 1.1.
3. Section 3.1.2 of the model SE also provides two possible determination methods for DEX. ANO-1 uses the effective dose conversion factor for air submersion listed in Table III.1 of EPA Federal Guidance Report No. 12, 1993, "External Exposure to Radionuclides in Air, Water, and Soil." This is also depicted in the proposed definition of DEX in TS Section 1.1.
4. Section 3.1.3 states that it is incumbent on the licensee to ensure that the site specific limits for both DEI and DEX are consistent with the current steam generator tube rupture (SGTR) and main steam line break (MSLB) radiological consequence analyses. The ANO-1 analyses value for DEI is 1.0 $\mu\text{Ci/gm}$ as depicted in the proposed TS markup and also provided to the NRC in the aforementioned AST submittal (Reference 4). The ANO-1 analyses value for DEX is 2200 $\mu\text{Ci/gm}$, considering the adoption and use of AST discussed previously. This is also depicted in the attached TS markups.

As noted in the Section 3.0 above, the DOSE EQUIVALENT I-131 Definition depicted in TSTF-490 is modified to refer to the committed effective dose equivalent (CEDE), which is consistent with AST. This change will remove any conflict between the adoption of TSTF-490 and the adoption of AST for ANO-1. Entergy does not consider this a significant deviation from the TSTF-490 adoption under CLIP.

Entergy Operations, Inc. (Entergy) has reviewed References 1 and 2, and the model SE published on November 20, 2006 (71FR67170) as part of the CLIP Notice for Comment. Entergy has applied the methodology in these references to develop the proposed TS changes. Entergy has also concluded that the justifications presented in TSTF-490, Revision 0 and the model SE prepared by the NRC staff are applicable to ANO-1 and justify this amendment for the incorporation of the changes to the ANO-1 TS.

5.0 REGULATORY ANALYSIS

A description of this proposed change and its relationship to applicable regulatory requirements and guidance was provided in the NRC Notice of Availability published on March 15, 2007 (72FR12217), the NRC Notice for Comment published on November 20, 2006 (71FR67170), and TSTF-490, Revision 0.

6.0 NO SIGNIFICANT HAZARDS CONSIDERATION

Entergy Operations, Inc. (Entergy) has reviewed the proposed no significant hazards consideration determination published in the *Federal Register* on March 15, 2007 (72FR12217) as part of the CLIP. Entergy has concluded that the proposed determination presented in the notice is applicable to Arkansas Nuclear One, Unit 1 (ANO-1) and the determination is hereby incorporated by reference to satisfy the requirements of 10 CFR 50.91(a).

7.0 ENVIRONMENTAL EVALUATION

Entergy Operations, Inc. (Entergy) has reviewed the environmental consideration included in the model SE published in the *Federal Register* on March 15, 2007 (72FR12217) as part of the CLIIP. Entergy has concluded that the staff's findings presented therein are applicable to Arkansas Nuclear One, Unit 1 (ANO-1) and the determination is hereby incorporated by reference for this application.

8.0 REFERENCES

1. Federal Notice for Comment published on November 20, 2006 (71FR67170)
2. Federal Notice of Availability published on March 15, 2007 (72FR12217)
3. Entergy letter to NRC dated October 22, 2007, Technical Specification Changes Regarding Mode Change Limitations and Associated Bases Using the Consolidated Line Item Improvement Process (TSTF-359), Arkansas Nuclear One, Unit 1 (1CAN100701) (TAC No. MD7179)
4. Entergy letter to NRC dated October 22, 2007, Technical Specification Changes and Analyses Relating to Use of Alternate Source Term, Arkansas Nuclear One, Unit 1 (1CAN100703) (TAC No. MD7177)

Attachment 3 to

1CAN021004

Revised Technical Specification Page (mark-up)

<p>CB. Required Action and associated Completion Time of Condition A or B not met.</p> <p><u>OR</u></p> <p>DOSE EQUIVALENT I-131 > 60 µCi/gm.</p>	<p>CB.1 Be in MODE 3 with T_{avg} < 500°F.</p> <p><u>AND</u></p>	6 hours
	<p>C.2 Be in MODE 5</p>	36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
<p>SR 3.4.12.1</p> <p>NOTE</p> <p>Only required to be performed in MODE 1 and 2, MODE 3 with RCS average temperature ≥ 500 °F.</p> <p>Verify reactor coolant DOSE EQUIVALENT XE-133 gross specific activity ≤ 220072/E µCi/gm.</p>	7 days
<p>SR 3.4.12.2</p> <p>NOTE</p> <p>Only required to be performed in MODE 1.</p> <p>Verify reactor coolant DOSE EQUIVALENT I-131 specific activity ≤ 1.0 µCi/gm.</p>	14 days
<p>SR 3.4.12.3</p> <p>NOTE</p> <p>Not required to be performed until 31 days after a minimum of 2 EFPD and 20 days of MODE 1 operation have elapsed since the reactor was last subcritical for ≥ 48 hours.</p> <p>Determine \bar{E}.</p>	184 days

Attachment 4 to

1CAN021004

Revised Technical Specification Page (clean)

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.12.1	<p>-----NOTE----- Only required to be performed in MODE 1 and 2, MODE 3 with RCS average temperature ≥ 500 °F. -----</p> <p>Verify reactor coolant DOSE EQUIVALENT XE-133 specific activity ≤ 2200 $\mu\text{Ci/gm}$.</p>	7 days
SR 3.4.12.2	Verify reactor coolant DOSE EQUIVALENT I-131 specific activity ≤ 1.0 $\mu\text{Ci/gm}$.	14 days

Attachment 5 to

1CAN021004

**Revised Technical Specification Bases Pages Mark-up
(for information only)**

If the Required Action and associated Completion Time of Condition A or B is not met, or if the DOSE EQUIVALENT I-131 is $> 60.0 \mu\text{Ci/gm}$, the reactor must be brought to MODE 3 within 6 hours and MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems. ~~If the Required Action and associated Completion Time are not met, the reactor must be brought to MODE 3 with RCS average temperature $< 500^\circ\text{F}$ within 6 hours. Placing the unit in MODE 3 and RCS average temperature $< 500^\circ\text{F}$ lowers the saturation pressure of the reactor coolant below the setpoints of the main steam safety valves, and prevents venting the SG to the environment in an SGTR event. The Completion Time of 6 hours is required to reach MODE 3 from full power conditions in an orderly manner and without challenging unit systems.~~

SURVEILLANCE REQUIREMENTS

SR 3.4.12.1

SR 3.4.12.1 requires performing a gamma isotopic analysis as a measure of the noble gas specific activity of the reactor coolant at least once every 7 days. This measurement is the sum of the degassed gamma activities and the gaseous gamma activities in the sample taken. This Surveillance provides an indication of any increase in the noble gas specific activity. ~~SR 3.4.12.1 requires performing a gamma isotopic analysis as a measure of the gross specific activity of the reactor coolant at least once per 7 days. The gross specific activity analysis consists of the quantitative measurement of the total activity of the primary coolant in units of microcuries per gram ($\mu\text{Ci/gm}$). The total primary coolant activity is the sum of the degassed beta gamma activity and the total of all identified gaseous activities 15 minutes after the primary system is sampled and any identified beta emitters (i.e., tritium, SR89, SR90, etc.). This Surveillance provides an indication of any increase in gross specific activity.~~

Trending the results of this Surveillance allows proper remedial action to be taken before reaching the LCO limit under normal operating conditions. The 7 day Frequency considers the low probability of a gross fuel failure during this time. ~~Trending the results of this Surveillance allows proper remedial action to be taken before reaching the LCO limit under normal operating conditions.~~ The Surveillance is applicable in MODES 1 and 2, and in MODE 3 with RCS average temperature at least 500°F . The 7 day Frequency is based on the low probability of a gross fuel failure during that time period.

Due to the inherent difficulty in detecting Kr-85 in a reactor coolant sample due to masking from radioisotopes with similar decay energies, such as F-18 and I-134, it is acceptable to include the minimum detectable activity for Kr-85 in the SR 3.4.16.1 calculation. If a specific noble gas nuclide listed in the definition of DOSE EQUIVALENT XE-133 is not detected, it should be assumed to be present at the minimum detectable activity.

SURVEILLANCE REQUIREMENTS (continued)

SR 3.4.12.2

This Surveillance is performed to ensure iodine specific activity remains within the LCO limit during normal operation and following fast power changes when iodine spiking is more apt to occur. The 14 day Frequency is adequate to trend changes in the iodine activity level, considering noble gas activity is monitored every 7 days. ~~This Surveillance is performed in MODE 1 only to ensure the iodine remains within limit during normal operation and following fast power changes when fuel failure is more apt to occur. The 14 day Frequency is adequate to trend changes in the iodine activity level considering gross specific activity is monitored every 7 days.~~

SR 3.4.12.3

~~SR 3.4.12.3 requires radiochemical analysis for \bar{E} determination every 184 days. The \bar{E} determination directly relates to the LCO and is required to verify plant operation within the total specific activity LCO limit. The Frequency of 184 days recognizes \bar{E} does not change rapidly.~~

~~The radiochemical analysis consists of the quantitative measurement of the activity for each radionuclide which is identified in the primary coolant 15 minutes after the primary system is sampled. The activities for the individual isotopes are used in the determination of \bar{E} . The gamma energy per disintegration for those radioisotopes determined to be present shall be as given in "Table of Isotopes" (1967) (Ref. 4) and beta energy per disintegration shall be as given in USNRDL TR-802 (Part II) (Ref. 5) or other references using the equivalent values for the radioisotopes. Iodine isotopic activities are weighted to give DOSE EQUIVALENT I-131 activity.~~

~~This SR is modified by a NOTE that requires the determination be performed within 31 days after a minimum of 2 EFPD and 20 days of MODE 1 operation have elapsed since the reactor was last subcritical for at least 48 hours. This ensures the radioactive materials are at equilibrium so the analysis for \bar{E} is representative and not skewed by a crud burst or other similar abnormal event.~~

REFERENCES

1. ~~10 CFR 50.67400.11.~~
2. ~~ANO-1 Operating License Amendment 238, (1CNA1057509012), dated October 21May 9, 20091975.~~
3. ~~10 CFR 50.36.~~
4. ~~"Table of Isotopes" (1967).~~
5. ~~USNRDL TR-802 (Part II).~~