Duke Energy®
Carolinas

JAMES R. MORRIS, VICE PRESIDENT

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December 15, 2009

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

Subject: Duke Energy Carolinas, LLC (Duke Energy)

Catawba Nuclear Station (CNS), Units 1, and 2
CNS Docket Nos. 50-413, 50-414

McGuire Nuclear Station (MNS), Units 1, and 2
MNS Docket Nos.50-369, 50-370

Oconee Nuclear Station (ONS), Units 1,2, and 3
ONS Docket Nos.50-269, 50-270, 50-287

Technical Specifications Revision Request to Adopt TSTF-490, Rev. 0
"Deletion of E Bar Definition and Revision to RCS Specific Activity"

In accordance with the provisions of Section 50.90 of Title 10 of the Code of Federal Regulations, Duke Energy Carolinas, LLC is submitting a request for amendment to the Technical Specifications (TS) for Catawba Nuclear Station (CNS) Units 1 and 2, McGuire Nuclear Station (MNS) Units 1 and 2, and Oconee Nuclear Station (ONS) Units 1, 2, and 3, respectively. The proposed changes would revise TS Section 1.1, "Definitions," and TS Section 3.4.16, "RCS Specific Activity" for CNS and MNS and TS Section 1.1, "Definitions" and TS Section 3.4.11, "RCS Specific Activity" for ONS. This License Amendment Request (LAR) revises the definition of Dose Equivalent Iodine I-131 and replaces the gross gamma activity limit with a Dose Equivalent Xenon-133 limit.

The changes are consistent with NRC approved Industry Technical Specification Task Force (TSTF) Standard Technical Specification Change Traveler, TSTF-490, Revision 0, "Deletion of E Bar Definition and Revision to RCS Specific Activity Tech Spec." The availability of this Technical Specification improvement was announced in the Federal Register on March 15, 2007 as part of the Consolidated Line Item Improvement Process.

Enclosure 1 provides a description and assessment of the proposed changes, as well as confirmation of applicability.

A001
NRR

Additional contents of the proposal package include the following:

Attachment 1: CNS Facility Operating Licenses (FOL), Appendix B (Mark- Up)
Attachment 2: CNS, MNS, and ONS TS Changes (Mark-Up)
Attachment 3: CNS, MNS, and ONS TS Bases Changes (Mark-Up)

Supporting changes will be made to the Technical Specification Bases in accordance with CNS and MNS TS 5.5.14, and ONS TS 5.5.15, "Technical Specifications (TS) Bases Control Program." The affected TS Bases markup is included in Attachment 3. These pages are being submitted for information only and do not require issuance by the NRC.

Duke Energy requests approval of the proposed license amendment within one calendar year of the LAR submittal date. Duke Energy is requesting a 60-day implementation grace period for this license amendment.

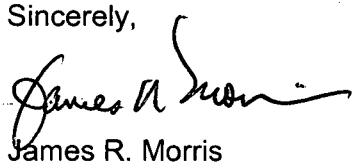
Implementation of this proposed license amendment will impact the CNS and MNS Updated Final Safety Analysis Report (UFSAR), ONS will not be impacted. It will be necessary to revise various sections of the CNS and MNS UFSARs in accordance with 10 CFR 50.71(e).

This LAR has been reviewed and approved by the respective CNS, MNS, and ONS Plant Operations Review Committees and the Duke Energy Corporate Nuclear Safety Review Board.

In accordance with 10 CFR 50.91 a copy of this application with enclosure and attachments, is being provided to the designated South Carolina and North Carolina state officials.

There are no new regulatory commitments contained in this LAR. Inquiries on this matter should be directed to Adrienne F. Driver at 803-701-3445.

Sincerely,



James R. Morris
Site Vice President, Catawba Nuclear Station

Enclosure 1: Basis for Proposed Changes
Attachment 1: CNS Appendix B FOL (Mark-Up)
Attachment 2: CNS, MNS, and ONS TS Changes (Mark-Up)
Attachment 3: CNS, MNS, and ONS TS Bases Changes (Mark-Up)

Mr. James R. Morris affirms that he is the person who subscribed his name to the foregoing statement, and that all the matters and facts set forth herein are true and correct to the best of his knowledge.

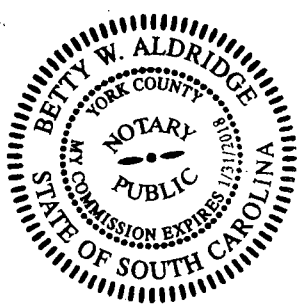
James R. Morris, CNS Site Vice President

Subscribed and sworn to me: 12/15/09
Date

Notary Public

My Commission Expires: 1/31/2018
Date

SEAL



xc w/Enclosures and Attachments:

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NCMPA-1, CNS Owner
NCEMC, CNS Owner
PMPA, CNS Owner
R.L. Gill, NRI&IA Manager (EC05P)
ELL-EC050
RGC Date File
Document Control File 801.01

Duke Energy Fleet-Wide Licensing Amendment Request

December

2009

The proposed changes would revise TS Section 1.1, "Definitions" and TS Section 3.4.16, "RCS Specific Activity" for MNS and CNS and TS Section 1.1, "Definitions" and TS Section 3.4.11, "RCS Specific Activity"for ONS.

Catawba Nuclear Station, Regulatory Compliance

Basis for Proposed Changes

1.0 DESCRIPTION

This is a request to amend Facility Operating Licenses NPF-35, NPF-52, NPF-9, NPF-17, DPR-38, DPR-47, and DPR-55 for Catawba Nuclear Station (CNS) Units 1 and 2, McGuire Nuclear Station (MNS) Units 1 and 2, and Oconee Nuclear Station (ONS) Units 1, 2, and 3, respectively. The proposed changes would revise the Technical Specification (TS) Section 1.1, "Definitions" and TS Section 3.4.16, "RCS Specific Activity" for MNS and CNS and TS Section 1.1, "Definitions" and T.S. Section 3.4.11, "RCS Specific Activity" for ONS. This License Amendment Request (LAR) revises the definition of Dose Equivalent Iodine I-131 (DEI) and replaces the gross gamma activity limit with a Dose Equivalent Xenon-133 (DEX) limit.

Upon review of the changes proposed in the Industry Technical Specification Task Force (TSTF) Change Traveler (TSTF-490), Revision 0, its supporting material(s), and the model NRC Safety Evaluation Report (SER), it has been determined and documented that the proposed changes are applicable to CNS, MNS, and ONS.

These changes are consistent with Nuclear Regulatory Commission (NRC) approved TSTF-490, Revision 0, "Deletion of E Bar Definition and Revision to RCS Specific Activity Tech Spec." The availability of this TS improvement was published in the Federal Register on March 15, 2007 as part of the Consolidated Line Item Improvement Process (CLIIP).

2.0 PROPOSED CHANGES

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

- Revise the definition of DOSE EQUIVALENT I-131.
- Delete the definition of "E-Bar, AVERAGE DISINTEGRATION ENERGY."
- Add a new TS definition for DOSE EQUIVALENT XE-133.
- Revise LCO 3.4.16 (CNS, MNS) and LCO 3.4.11 (ONS), "RCS Specific Activity," to delete references to gross specific activity; add limits for DOSE EQUIVALENT I-131 and DOSE EQUIVALENT XE-133; and delete Figure 3.4.16-1 (CNS, MNS) and Figure 3.4.11-1 (ONS), "Reactor Coolant DOSE EQUIVALENT I-131 Specific Activity Limit versus Percent of RATED THERMAL POWER."
- Revise LCO 3.4.16 (CNS and MNS) and LCO 3.4.11 (ONS) "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 delete the reference to Figure 3.4.16-1 (CNS, MNS), Figure 3.4.11-1 (ONS), and define an upper limit that is applicable at all power levels.

  B. NUREG-1430 applicable to ONS, ACTIONS are reordered, moving Condition C to Condition B to be consistent with the Writer's Guide.

  C. Condition B (was Condition C in NUREG-1430, applicable to ONS) is modified to provide a Condition and Required Action for DOSE EQUIVALENT XE-133 instead of gross specific activity. A Note allowing the applicability of LCO 3.0.4.c is added, consistent with the Note to Required Action A.1 (CNS and MNS only).

There is no LCO 3.0.4.c for ONS TS; the Note added will be consistent with the Note for Required Action A.1 for ONS TS.

D. Condition C (was Condition B in NUREG-1430, applicable to ONS) is modified based on the changes to Conditions A and B and to reflect the changes in the LCO Applicability.

- Revise SR 3.4.16.1 (CNS, MNS) and SR 3.4.11.1 (ONS) to verify the limit for DOSE EQUIVALENT XE-133. A note is added, consistent with SR 3.4.16.2 (CNS, MNS) and SR 3.4.11.2 (ONS), to allow entry into MODES 2, 3, and 4 prior to performance of the SR.
- Delete SR 3.4.16.3 (CNS, MNS) and SR 3.4.11.3 (ONS).

2.1 Optional Changes and Variations

For CNS
On October 30, 2009 the NRC approved an amendment removing several obsolete footnotes, references, and various sections within the TS. Within the submittal, editorial changes to the references for the additional conditions pertaining to the administrative controls of dose-equivalent iodine were requested.

With the adoption of TSTF-490, the approved amended change to the referenced figure 3.4.16-1 will be deleted. This LAR will request changes to reference the respective TS Limiting Condition of Operation 3.4.16.A and 3.4.16.C. This inconsistency only exists based upon the current additional condition of operations for CNS Units 1 and 2 included in Appendix B of their respective Facility Operating Licenses (FOL).

For ONS
On December 16, 1998, ONS received issuance of amendments to reflect full conversion from its current TS to a set of TSs based on NUREG-1430, "Standard Technical Specifications Babcock and Wilcox Plants," Revision 1, dated April 1995. Within the amendments, ONS received approval for its current LCO 3.0.4 as written. The current LCO does not include an LCO 3.0.4.c, therefore to be consistent with the intent of the TSTF as stated,

A Note for LCO 3.0.4 Required Action B has been added, consistent with the Note to Required Action A. The Note states:

"LCO 3.0.4 is not applicable." This inconsistency exists due to the ONS description of LCO 3.0.4 differing from the current NUREG-1430 LCO 3.0.4.

ONS TS 3.4.11 currently requires the plant(s) to be placed in MODE 3 within 12 hours if the Required Action and its associated Completion Time for TS 3.4.11 Condition A is not met. In approval for conversion to ITS by letter from the NRC dated December 16, 1998 ONS was granted a deviation from the Standard Technical Specifications (STS) by retaining the 12-hour Completion Time for MODE 3 for RCS Operational Leakage included in TS 3.4.13. For consistency with the shutdown requirement of 12 hours in TS 3.4.13, Condition B, and similar shutdown requirements throughout the ONS TS, Duke Energy requests the Completion Time for Condition C of TS 3.4.11 to remain 12 hours. As excerpted from the ONS submittal to the NRC dated October 28, 1997 requesting similar deviation, ONS stated:

Basis for Proposed Changes

"The current licensing basis (CLB) generally permits 12 hours to place a unit in Hot Shutdown when an LCO is not met. To maintain consistency with current procedures, training and staffing requirements, the 12 hours, which are generally permitted to place a unit in Hot Shutdown, is retained in the ITS. CTS Hot Shutdown is comparable to ITS MODE 3."

The NRC approved this request for deviation based upon the conclusion that conversion of the ONS licensing basis to those based on STS, as modified by plant-specific changes, was consistent with the ONS CLBs and the requirements for the Title 10 Code of Federal Regulation 50.36. ONS requests the Completion Time for Condition C of TS 3.4.11 to remain at 12 hours given previous precedents of approval received from the NRC. The change proposed by TSTF-490 to the TS 3.4.11 TS Condition C to include, *"or Condition B not met"* will not affect the plant(s) ability to achieve the desired MODE 3 within the associated Completion Time.

With respect to the above mentioned variations and based upon the plant specifics, Duke Energy requests the NRCs approval of TSTF-490, Revision 0 with the proposed variations as described above.

3.0 BACKGROUND

The background for this application is as stated in the model SE in the Federal Register (FR) published on November 20, 2006 (71 FR 67170), FR published on March 15, 2007 (72 FR 12217), and TSTF 490, Revision 0.

Note: All units at CNS, MNS, and ONS have received license amendments for full implementation of Alternative Source Term (AST) methodology, pursuant to 10 CFR 50.67, "Accident Source Term." As specified in Regulatory Guide 1.183, the license amendment applications to implement AST methodology for all three stations included the Design Basis Loss of Coolant Accident as a minimum and evaluated offsite and control room doses against the TEDE criteria specified in 10 CFR 50.67. Design basis radiological analyses that have not been converted to AST methodology evaluate offsite dose against whole body and thyroid dose criteria of 10 CFR 100.11 and control room dose against General Design Criterion 19 of Appendix 10 CFR 50, "Control Room."

Catawba Appendix B, Additional Conditions for Units 1 and 2 as excerpted:

"requires the licensee to use administrative controls as described in the licensee's letter of March 7, 1997, and evaluated in the staff's safety evaluation dated April 29, 1997, to restrict the dose-equivalent iodine levels to 0.46 microCurie per gram (in lieu of the TS Section 3.4.16a), and to 26 microCurie per gram (in lieu of the limit of TS Figure 3.4.16-1), until this license condition is removed by a future amendment."

The adoption of TSTF-490 will not change the additional condition limits of the dose-equivalent iodine levels in Appendix B of NPF-35 and NPF-52 for CNS.

Basis for Proposed Changes

4.0 TECHNICAL ANALYSIS

Duke Energy has reviewed References 1, 2, and 3 and the model SER published on November 20, 2006. Duke Energy has applied the methodology in Reference 1 to develop the proposed TS changes. Duke Energy has also concluded that the justifications presented in TSTF-490, Revision 0 and the model SER prepared by the NRC staff are applicable to CNS Units 1 and 2, MNS Units 1 and 2, and ONS Units 1, 2, and 3 therefore justify this amendment for the incorporation of the changes to the CNS, MNS, and ONS TS.

5.0 REGULATORY ANALYSIS

A description of the proposed changes and its relationship to applicable regulatory requirements and guidance was provided in the FR published on November 20, 2006 (71 FR 67170), and TSTF-490, Revision 0.

There are no new regulatory commitments contained in this LAR.

6.0 NO SIGNIFICANT HAZARDS CONSIDERATION

Duke Energy has reviewed the proposed no significant hazards consideration determination published in the FR on November 20, 2006. Duke Energy has also concluded that the proposed determination presented in the notice is applicable to CNS, MNS, and ONS, and the determination of availability of TSTF-490, Rev. 0 published in the FR on March, 15, 2007 is hereby incorporated by reference to satisfy the requirements of 10 CFR 50.91(a).

7.0 ENVIRONMENTAL EVALUATION

Duke Energy has reviewed the environmental consideration included in the model SER published in the Federal Register on November 20, 2006. Based on Duke Energy's review of the published model SER (Ref. 1) and notice of availability of TSTF-490, Revision 0 (Ref. 2), Duke Energy has concluded that the staff's findings presented therein are applicable to CNS, MNS, and ONS and the determination is hereby incorporated by reference for this application.

Basis for Proposed Changes

8.0 REFERENCES

1. Federal Notice for Comment, Federal Register Volume 71, No. 233 published on November 20, 2006.

2. Federal Notice of Availability, Federal Register Volume 72, No. 50 published on March, 15, 2007.

3. Technical Specification Task Force (TSTF) Improved Standard Technical Specification Change Traveler, TSTF-490, Revision 0.

4. David E. LaBarge (NRC) to Oconee Nuclear Station, "ISSUANCE OF AMENDMENTS-OCONEE NUCEAR STATION, UNITS 1, 2, AND 3," December 16, 1998.

5. John F. Stang (NRC) to McGuire Nuclear Station, "ISSUANCE OF AMENDMENTS REGARDING ADOPTION OF ALTERNATE SOURCE TERM RADIOLOGIAL ANALYSIS METHODOLOGY," MARCH 31, 2009 (TAC Nos. MD8400 and MD8401).

6. Chandel P. Patel (NRC) to Catawba Nuclear Station, "CATAWBA NUCLEAR STATION, UNITS 1, 2 RE: ISSUANCE OF AMENDMENTS," September 30, 2005 (TAC NOS. MB7014 AND MB7015).

7. Leonard N. Olshan (NRC) to Oconee Nuclear Station, "OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3 RE: ISSUANCE OF AMENDMENTS," JUNE 1, 2004 (TAC NOS. MB3537, MB3538, MB3539).

ATTACHMENT 1:

CNS FACILITY OPERATING LICENSES APPENDIX B

(MARK UP)

APPENDIX B

ADDITIONAL CONDITIONS

FACILITY OPERATING LICENSE NO. NPF-35

Duke Energy Carolinas, LLC shall comply with the following conditions on the schedules noted below:

Amendment . Number	Additional Condition		Implementation Date
159	This amendment requires the licensee to use administrative controls, as described in the licensee's letter of March 7, 1997, and evaluated in the staff's safety evaluation dated April 29, 1997, to restrict the dose-equivalent iodine levels to 0.46 microCurie per gram (in lieu of the limit in TS Section 3.4.16.~~a~~A), and to 26 microCurie per gram (in lieu of the limit of TS ~~Figure~~ 3.4.16.-~~1~~C), until this license condition is removed by a future amendment.		Immediately upon issuance of the amendment
173	The licensee is authorized to relocate certain requirements included in appendix A to licensee-controlled documents. Implementation of this amendment shall include the relocation of these requirements to the appropriate documents as described in the licensee's letters dated May 27, 1997, as amended by letters dated March 9, March 20, April 20, June 3, June 24, July 7, July 21, August 5, September 8, and September 15, 1998, and evaluated in the NRC staff's Safety Evaluation associated with this amendment.		All relocation to be completed by January 31, 1999.

APPENDIX B

ADDITIONAL CONDITIONS

FACILITY OPERATING LICENSE NO. NPF-52

Duke Energy Carolinas, LLC shall comply with the following conditions on the schedules noted below:

Amendment Number	Additional Condition		Implementation Date
151	This amendment requires the licensee to use administrative controls, as described in the licensee's letter of March 7, 1997, and evaluated in the staff's safety evaluation dated April 29, 1997, to restrict the dose-equivalent iodine levels to 0.46 microCurie per gram (in lieu of the limit in TS Section 3.4.16.a~~.~~A), and to 26 microCurie per gram (in lieu of the limit of TS Figure 3.4.16-~~1~~.C), until this license condition is removed by a future amendment.		Immediately upon issuance of the amendment.
165	The licensee is authorized to relocate certain requirements included in appendix A to licensee-controlled documents. Implementation of this amendment shall include the relocation of these requirements to the appropriate documents, as described in the licensee's letters dated May 27, 1997, as amended by letters dated March 9, March 20, April 20, June 3, June 24, July 7, July 21, August 5, September 8, and September 15, 1998, and evaluated in the NRC staff's Safety Evaluation associated with this amendment.		All relocation to be completed by January 31, 1999.

ATTACHMENT 2:

CNS, MNS, ONS TECHNICAL SPECIFICATIONS

(MARK UP)

CHANNEL CHECK	A CHANNEL CHECK shall be the qualitative assessment, by observation, of channel behavior during operation. This determination shall include, where possible, comparison of the channel indication and status to other indications or status derived from independent instrument channels measuring the same parameter.
CHANNEL OPERATIONAL TEST (COT)	A COT shall be the injection of a simulated or actual signal into the channel as close to the sensor as practicable to verify the OPERABILITY of required alarm, interlock, and trip functions. The COT shall include adjustments, as necessary, of the required alarm, interlock, and trip setpoints so that the setpoints are within the required range and accuracy.
CORE ALTERATION	CORE ALTERATION shall be the movement of any fuel, sources, or reactivity control components, within the reactor vessel with the vessel head removed and fuel in the vessel. Suspension of CORE ALTERATIONS shall not preclude completion of movement of a component to a safe position.
CORE OPERATING LIMITS REPORT (COLR)	The COLR is the unit specific document that provides cycle specific parameter limits for the current reload cycle. These cycle specific parameter limits shall be determined for each reload cycle in accordance with Specification 5.6.5. Unit operation within these limits is addressed in individual Specifications.
DOSE EQUIVALENT I-131	~~DOSE EQUIVALENT I-131 shall be that concentration of I-131 (microcuries/gram) that alone would produce the same thyroid dose as the quantity and isotopic mixture of I-131, I-132, I-133, I-134, and I-135 actually present. The thyroid dose conversion factors used for this calculation shall be those listed in Table III of TID-14844, AEC, 1962, "Calculation of Distance Factors for Power and Test Reactor Sites."~~ DOSE EQUIVALENT I-131 shall be that concentration of I-131 (microcuries per gram) that alone would produce the same dose when inhaled as the combined activities of iodine isotopes I-131, I-132, I-133, I-134, and I-135 actually present. The determination of DOSE EQUIVALENT I-131 shall be performed using Committed Dose Equivalent (CDE) or Committed Effective Dose Equivalent (CEDE) dose conversion factors from Table 2.1 of the Environmental Protection Agency (EPA) Federal Guidance Report No. 11.
DOSE EQUIVALENT XE-133	DOSE EQUIVALENT XE-133 shall be that concentration of Xe-133 (microcuries per gram) that alone would produce the same acute dose to the whole body as the combined

(continued)

	activities of noble gas nuclides Kr-85m, Kr-85, Kr-87, Kr-88, Xe-131m, Xe-133m, Xe-133, Xe-135m, Xe-135, and Xe-138 actually present. If a specific noble gas nuclide is not detected, it should be assumed to be present at the minimum detectable activity. The determination of DOSE EQUIVALENT XE-133 shall be performed using effective dose conversion factors for air submersion listed in Table III.1 of EPA Federal Guidance Report No.12, "External Exposure to Radionuclides in Air, Water, and Soil."
~~$\bar{E}$ — AVERAGE DISINTEGRATION ENERGY~~	~~$\bar{E}$ shall be the average (weighted in proportion to the concentration of each radionuclide in the reactor coolant at the time of sampling) of the sum of the average beta and gamma energies per disintegration (in MeV/d) for isotopes, other than iodines, with half lives > 10 minutes, making up at least 95% of the total noniodine activity in the coolant.~~

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3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.16 RCS Specific Activity

LCO 3.4.16 ~~The specific activity of the reactor coolant shall be within limits.~~ RCS DOSE EQUIVALENT I-131 and DOSE EQUIVALENT XE-133 specific activity shall be within limits.

APPLICABILITY: MODES 1, ~~and~~ 2, 3, and 4.
~~MODE 3 with RCS average temperature (T_{avg}) ≥ 500°F.~~

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. DOSE EQUIVALENT I-131 not within limit. ~~> 1.0 µCi/gm.~~	----------Note---------- LCO 3.0.4.c is applicable. ---------- A.1 Verify DOSE EQUIVALENT I-131 ~~within the acceptable region of Figure 3.4.16-1.~~ ≤ 60µCi/gm. AND A.2 Restore DOSE EQUIVALENT I-131 to within limit.	Once per 4 hours 48 hours
B. ~~Gross specific activity of the reactor coolant not within limit.~~ DOSE EQUIVALENT XE-133 not within limit.	----------Note---------- LCO 3.0.4.c is applicable. ---------- B.1 ~~Be in MODE 3 with T_{avg} < 500°F.~~ Restore DOSE EQUIVALENT XE-133 to within limit.	~~6~~ 48 hours

(continued)

SURVEILLANCE REQUIREMENTS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Required Action and associated Completion Time of Condition A ~~not~~ or B not met. OR DOSE EQUIVALENT I-131 > 60 µCi/gm ~~in the unacceptable region of Figure 3.4.16-1.~~	C.1 Be in MODE 3. ~~with T_{avg} < 500°F.~~ AND C.2 Be in MODE 5.	6 hours 36 hours

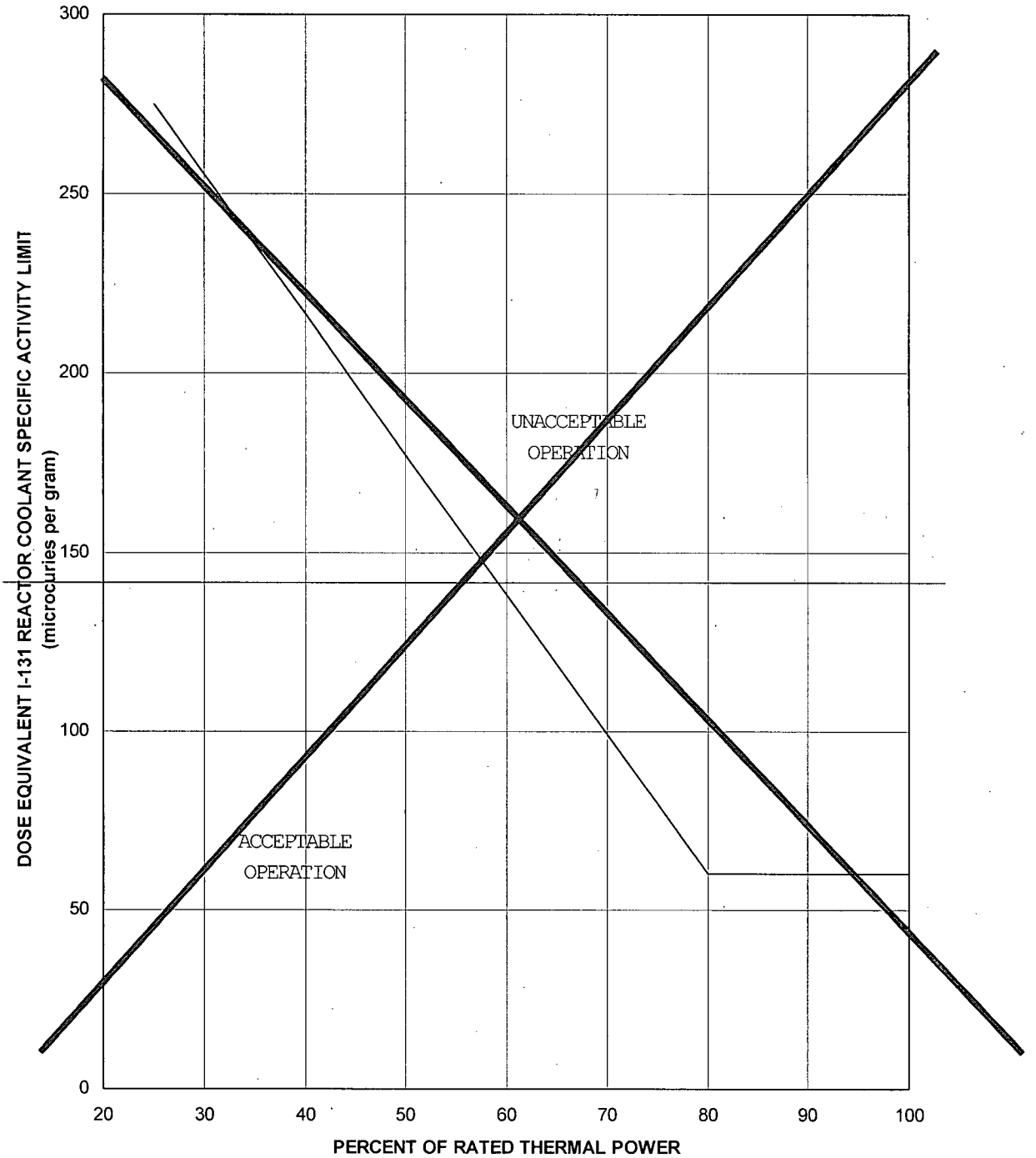
SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.4.16.1 ~~Verify reactor coolant gross specific activity ≤ 100/$\bar{E}$ µCi/gm.~~ ----------NOTE---------- Only required to be performed in MODE 1. ---------- Verify reactor coolant DOSE EQUIVALENT XE-133 specific activity ≤ 280 µCi/gm.	7 days
SR 3.4.16.2 ----------NOTE---------- Only required to be performed in MODE 1. ---------- Verify reactor coolant DOSE EQUIVALENT I-131 specific activity ≤1.0 µCi/gm.	14 days AND Between 2 and 6 hours after a THERMAL POWER change of ≥ 15% RTP within a 1 hour period

SURVEILLANCE REQUIREMENTS (continued)

(continued)

SURVEILLANCE	FREQUENCY
~~SR 3.4.16.3~~ ~~NOTE~~ ~~Not required to be performed until 31 days after a minimum of 2 effective full power days and 20 days of MODE 1 operation have elapsed since the reactor was last subcritical for ≥ 48 hours.~~ ~~Determine $\bar{E}$ from a sample taken in MODE 1 after a minimum of 2 effective full power days and 20 days of MODE 1 operation have elapsed since the reactor was last subcritical for ≥ 48 hours.~~	~~184 days~~



~~Figure 3.4.16-1 (page 1 of 1)~~
~~Reactor Coolant DOSE EQUIVALENT I-131 Specific Activity~~
~~Limit Versus Percent of RATED THERMAL POWER~~

1.1 Definitions (continued)

CHANNEL CHECK	A CHANNEL CHECK shall be the qualitative assessment, by observation, of channel behavior during operation. This determination shall include, where possible, comparison of the channel indication and status to other indications or status derived from independent instrument channels measuring the same parameter.
CHANNEL OPERATIONAL TEST (COT)	A COT shall be the injection of a simulated or actual signal into the channel as close to the sensor as practicable to verify the OPERABILITY of required alarm, interlock, and trip functions. The COT shall include adjustments, as necessary, of the required alarm, interlock, and trip setpoints so that the setpoints are within the required range and accuracy.
CORE ALTERATION	CORE ALTERATION shall be the movement of any fuel, sources, or reactivity control components, within the reactor vessel with the vessel head removed and fuel in the vessel. Suspension of CORE ALTERATIONS shall not preclude completion of movement of a component to a safe position.
CORE OPERATING LIMITS REPORT (COLR)	The COLR is the unit specific document that provides cycle specific parameter limits for the current reload cycle. These cycle specific parameter limits shall be determined for each reload cycle in accordance with Specification 5.6.5. Unit operation within these limits is addressed in individual Specifications.
DOSE EQUIVALENT I-131	~~DOSE EQUIVALENT I-131 shall be that concentration of I-131 (microcuries/gram) that alone would produce the same thyroid dose as the quantity and isotopic mixture of I-131, I-132, I-133, I-134, and I-135 actually present. The thyroid dose conversion factors used for this calculation shall be those listed in Table III of TID-14844, AEC, 1962, "Calculation of Distance Factors for Power and Test Reactor Sites."~~ DOSE EQUIVALENT I-131 shall be that concentration of I-131 (microcuries per gram) that alone would produce the same dose when inhaled as the combined activities of iodine isotopes I-131, I-132, I-133, I-134, and I-135 actually present. The determination of DOSE EQUIVALENT I-131 shall be performed using Committed Dose Equivalent (CDE) or Committed Effective Dose Equivalent (CEDE) dose conversion factors from Table 2.1 of the Environmental Protection Agency (EPA) Federal Guidance Report No. 11.

(continued)

1.1 Definitions (continued)

DOSE EQUIVALENT XE-133	DOSE EQUIVALENT XE-133 shall be that concentration of Xe-133 (microcuries per gram) that alone would produce the same acute dose to the whole body as the combined activities of noble gas nuclides Kr-85m, Kr-85, Kr-87, Kr-88, Xe-131m, Xe-133m, Xe-133, Xe-135m, Xe-135, and Xe-138 actually present. If a specific noble gas nuclide is not detected, it should be assumed to be present at the minimum detectable activity. The determination of DOSE EQUIVALENT XE-133 shall be performed using effective dose conversion factors 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."
~~$\bar{E}$ — AVERAGE DISINTEGRATION ENERGY~~	~~$\bar{E}$ shall be the average (weighted in proportion to the concentration of each radionuclide in the reactor coolant at the time of sampling) of the sum of the average beta and gamma energies per disintegration (in MeV/d) for isotopes, other than iodines, with half lives > 10 minutes, making up at least 95% of the total noniodine activity in the coolant.~~

(continued)

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.16 RCS Specific Activity

LCO 3.4.16 ~~The specific activity of the reactor coolant shall be within limits.~~ RCS DOSE EQUIVALENT I-131 and DOSE EQUIVALENT XE-133 specific activity shall be within limits.

APPLICABILITY: MODES ~~1 and~~ 1, 2, 3, and 4.
~~MODE 3 with RCS average temperature (T_{avg}) $\geq$ 500°F.~~

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. DOSE EQUIVALENT I-131 not within limit. ~~> 1.0 µCi/gm.~~	----------Note---------- LCO 3.0.4.c is applicable. ---------- A.1 Verify DOSE EQUIVALENT I-131 ~~within the acceptable region of Figure 3.4.16-1.~~ ≤ 60µCi/gm. AND A.2 Restore DOSE EQUIVALENT I-131 to within limit.	Once per 4 hours 48 hours
B. ~~Gross specific activity of the reactor coolant not within limit.~~ DOSE EQUIVALENT XE-133 not within limit.	----------Note---------- LCO 3.0.4.c is applicable. ---------- B.1 ~~Be in MODE 3 with T_{avg} < 500°F.~~ Restore DOSE EQUIVALENT XE-133 to within limit.	~~6~~ 48 hours

(continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Required Action and associated Completion Time of Condition A or B not met. OR DOSE EQUIVALENT I-131 ~~in the unacceptable region of Figure 3.4.16-1.~~ > 60 µCi/gm.	C.1 Be in MODE 3. ~~with T_{avg} < 500°F.~~ C.2 Be in MODE 5.	6 hours 36 hours

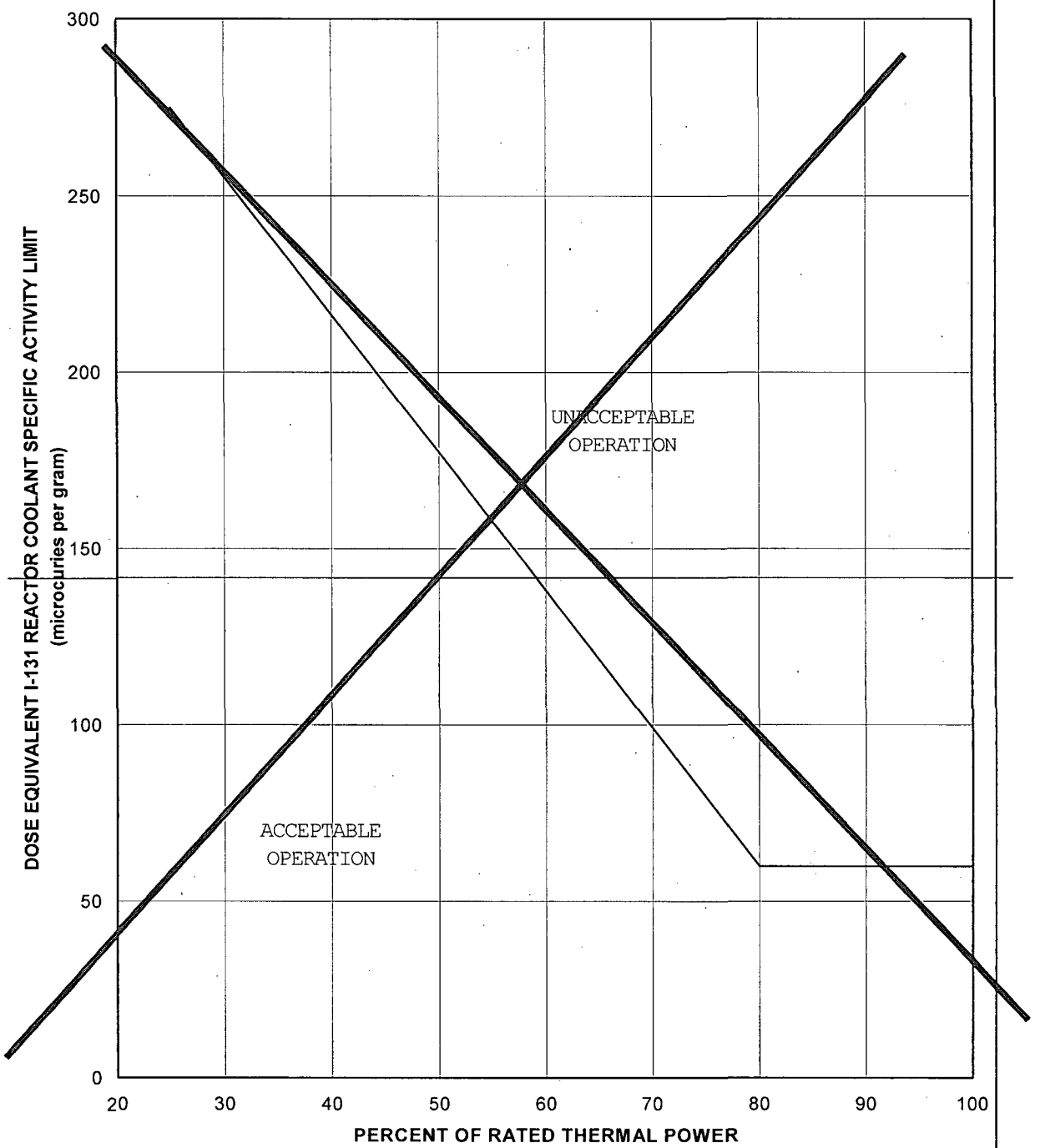
SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.4.16.1	~~Verify reactor coolant gross specific activity $\leq \frac{100}{\bar{E}}$ µCi/gm.~~ ----------NOTE---------- Only required to be performed in MODE 1. ---------- Verify reactor coolant DOSE EQUIVALENT XE-133 specific activity ≤ 280 µCi/gm.	7 days
SR 3.4.16.2	----------NOTE---------- Only required to be performed in MODE 1. ---------- Verify reactor coolant DOSE EQUIVALENT I-131 specific activity ≤ 1.0 µCi/gm.	14 days AND Between 2 and 6 hours after a THERMAL POWER change of ≥ 15% RTP within a 1 hour period

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
~~SR 3.4.16.3~~ ~~NOTE~~ ~~Not required to be performed until 31 days after a minimum of 2 effective full power days and 20 days of MODE 1 operation have elapsed since the reactor was last subcritical for ≥ 48 hours.~~ ~~Determine $\bar{E}$ from a sample taken in MODE 1 after a minimum of 2 effective full power days and 20 days of MODE 1 operation have elapsed since the reactor was last subcritical for ≥ 48 hours.~~	~~184 days~~



~~Figure 3.4.16-1 (page 1 of 1)~~
~~Reactor Coolant DOSE EQUIVALENT I-131 Specific Activity~~
~~Limit Versus Percent of RATED THERMAL POWER~~

1.1 Definitions

CHANNEL CALIBRATION (continued)	The CHANNEL CALIBRATION may be performed by means of any series of sequential, overlapping, or total channel steps so that the entire channel is calibrated.
CHANNEL CHECK	A CHANNEL CHECK shall be the qualitative assessment, by observation, of channel behavior during operation. This determination shall include, where possible, comparison of the channel indication and status to other indications or status derived from independent instrument channels measuring the same parameter.
CHANNEL FUNCTIONAL TEST	A CHANNEL FUNCTIONAL TEST shall be the injection of a simulated or actual signal into the channel as close to the sensor as practicable to verify OPERABILITY, including required alarms, interlocks, display, and trip functions.
CONTROL RODS	CONTROL RODS shall be all full length safety and regulating rods that are used to shut down the reactor and control power level during maneuvering operations.
CORE ALTERATION	CORE ALTERATION shall be the movement of any fuel, sources, or reactivity control components, within the reactor vessel with the vessel head removed and fuel in the vessel. Suspension of CORE ALTERATIONS shall not preclude completion of movement of a component to a safe position.
CORE OPERATING LIMITS REPORT (COLR)	The COLR is the unit specific document that provides cycle specific parameter limits for the current reload cycle. These cycle specific limits shall be determined for each reload cycle in accordance with Specification 5.6.5. Plant operation within these limits is addressed in individual Specifications.
DOSE EQUIVALENT I-131	~~DOSE EQUIVALENT I-131 shall be that concentration of I-131 (microcuries/gram) that alone would produce the same thyroid dose as the quantity and isotopic mixture of I-131, I-132, I-133, I-134, and I-135 actually present. The thyroid dose conversion factors used for this calculation shall be those listed in Table III of TID-14844, AEC, 1962, "Calculation of Distance Factors for Power and Test Reactor Sites."~~ DOSE EQUIVALENT I-131 shall be that concentration of I-131 (microcuries per gram) that alone would produce the same dose when inhaled as the combined activities of iodine isotopes I-131, I-132, I-133, I-134, and I-135 actually present. The determination of DOSE EQUIVALENT I-131 shall be performed using Committed Dose Equivalent (CDE) or Committed Effective Dose Equivalent (CEDE) dose conversion factors from

1.1 Definitions (continued)

	Table 2.1 of the Environmental Protection Agency (EPA) Federal Guidance Report No. 11.
DOSE EQUIVALENT XE-133	DOSE EQUIVALENT XE-133 shall be that concentration of Xe-133 (microcuries per gram) that alone would produce the same acute dose to the whole body as the combined activities of noble gas nuclides Kr-85m, Kr-85, Kr-87, Kr-88, Xe-131m, Xe-133m, Xe-133, Xe-135m, Xe-135, and Xe-138 actually present. If a specific noble gas nuclide is not detected, it should be assumed to be present at the minimum detectable activity. The determination of DOSE EQUIVALENT XE-133 shall be performed using effective dose conversion factors 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."
~~$\bar{E}$ — AVERAGE DISINTEGRATION ENERGY~~	~~$\bar{E}$ shall be the average (weighted in proportion to the concentration of each radionuclide in the reactor coolant at the time of sampling) of the sum of the average beta and gamma energies per disintegration (in MeV) for isotopes, other than iodines, with half lives > 30 minutes, making up at least 95% of the total noniodine activity in the coolant.~~
LEAKAGE	LEAKAGE shall be: a. Identified LEAKAGE 1. LEAKAGE, such as that from pump seals or valve packing (except RCP seal water injection or leakoff), that is captured and conducted to collection systems or a sump or collecting tank; 2. LEAKAGE into the containment atmosphere from sources that are both specifically located and known either not to interfere with the operation of leakage detection systems or not to be pressure boundary LEAKAGE; or 3. Reactor Coolant System (RCS) LEAKAGE through a steam generator to the Secondary System (primary to secondary LEAKAGE);

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.11 RCS Specific Activity

LCO 3.4.11 ~~The specific activity of the reactor coolant shall be within limits.~~ RCS DOSE EQUIVALENT I-131 and DOSE EQUIVALENT XE-133 specific activity shall be within limits.

APPLICABILITY: MODES 1, ~~and~~ 2, 3, and 4.
~~MODE 3 with RCS average temperature ≥ 500°F.~~

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. DOSE EQUIVALENT I-131 ~~> 1.0 µCi/gm.~~ not within limit.	----------NOTE---------- LCO 3.0.4 is not applicable. ---------- A.1 Verify DOSE EQUIVALENT I-131 ~~within the acceptable region of Figure 3.4.11-1.~~ ≤ 50 µCi/gm. AND A.2 Restore DOSE EQUIVALENT I-131 to within limit.	Once per 4 hours 48 hours
B. DOSE EQUIVALENT XE-133 not within limit.	----------Note---------- LCO 3.0.4 is not applicable. ---------- B.1 Restore DOSE EQUIVALENT XE-133 to within limit.	~~12 hours~~ 48 hours
~~B. Required Action and associated Completion Time of Condition A not met.~~ ~~OR~~	~~B.1 Be in MODE 3 with RCS average temperature < 500°F.~~	

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~DOSE EQUIVALENT I-131 in unacceptable region of Figure 3.4.11-1.~~		

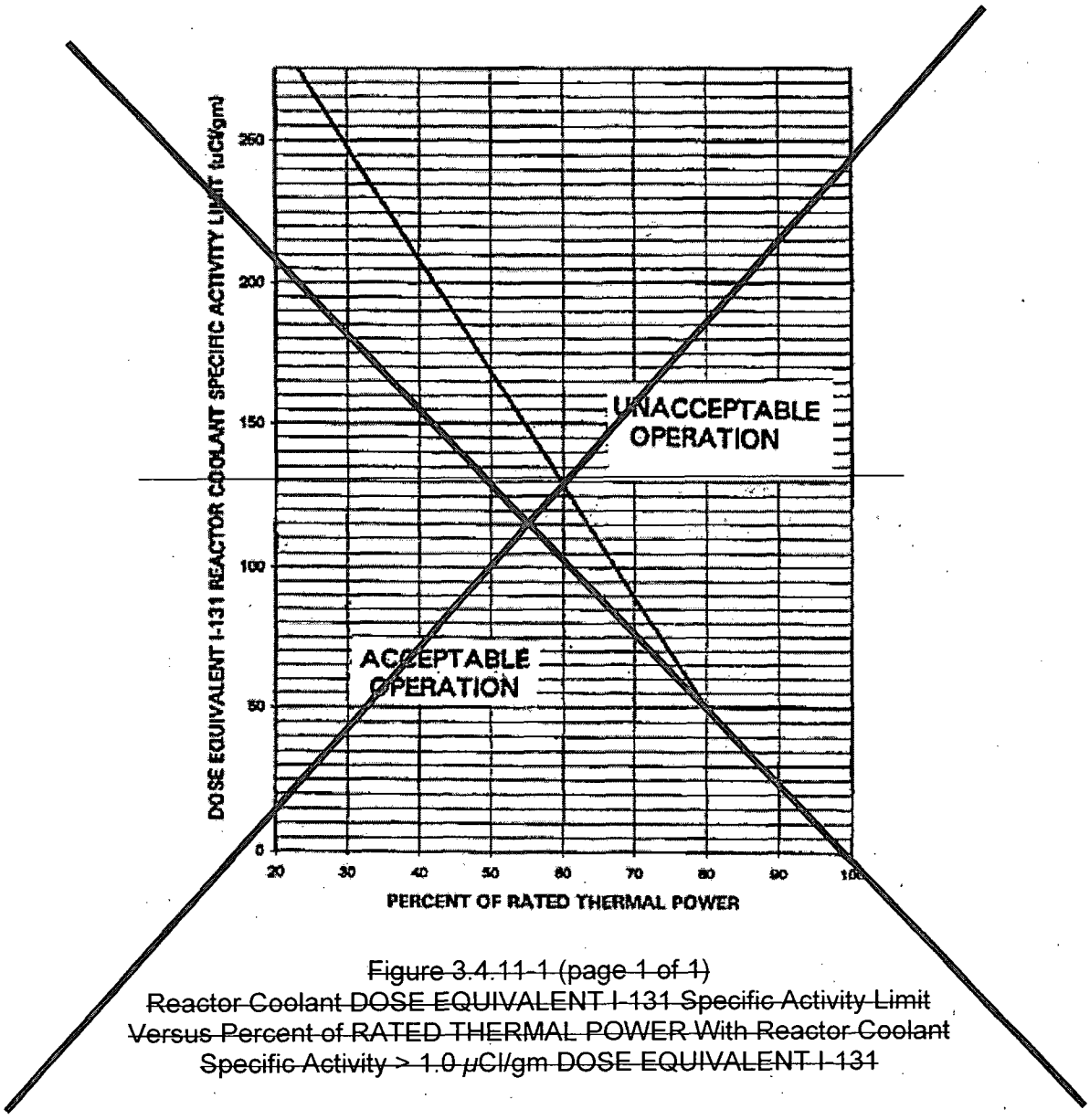
(continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Required Action and associated Completion Time of Condition A or B not met. OR DOSE EQUIVALENT I-131 ~~in unacceptable region of Figure 3.4.11-1.~~ > 50 µCi/gm. ~~C. Gross specific activity of the coolant not within limit.~~	C.1 Be in MODE 3 AND C.2 Be in MODE 5 ~~C.1 Be in MODE 3 with RCS Average Temperature < 500°F.~~	12 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.11.1	~~Verify reactor coolant gross specific activity ≤ 100/$\bar{E}$ µCi/gm.~~ ----------NOTE---------- Only required to be performed in MODE 1. ---------- Verify reactor coolant DOSE EQUIVALENT XE-133 specific activity ≤ 280 µCi/gm.	~~7 days~~ 7 days
SR 3.4.11.2	----------NOTE---------- Only required to be performed in MODE 1. ---------- Verify reactor coolant DOSE EQUIVALENT I-131 specific activity ≤ 1.0 µCi/gm.	14 days AND Between 2 and 6 hours after THERMAL POWER change of ≥ 15% RTP within a 1 hour period

SURVEILLANCE	FREQUENCY
~~SR 3.4.11.3~~ ~~NOTE~~ ~~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.~~ ~~Determine $\bar{E}$.~~	~~184 days~~



~~Figure 3.4.11-1 (page 1 of 1)~~
~~Reactor Coolant DOSE EQUIVALENT I-131 Specific Activity Limit Versus Percent of RATED THERMAL POWER With Reactor Coolant Specific Activity > 1.0 µCi/gm DOSE EQUIVALENT I-131~~

ATTACHMENT 3:

CNS, MNS, ONS TECHNICAL SPECIFICATIONS BASES

(MARK UP)

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.16 RCS Specific Activity

BASES

BACKGROUND

The maximum dose that an individual at the exclusion area boundary can receive for 2 hours following an accident, or at the low population zone outer boundary for the radiological release duration, is specified in 10 CFR 50.67 (Ref. 1). Doses to control room operators must be limited per GDC 19. The limits on specific activity ensure that the offsite and control room doses are appropriately limited during analyzed transients and accidents.

The RCS specific activity LCO limits the allowable concentration level of radionuclides in the reactor coolant. The LCO limits are established to minimize the dose consequences in the event of a steam line break (SLB) or steam generator tube rupture (SGTR) accident.

The LCO contains specific activity limits for both DOSE EQUIVALENT I-131 and DOSE EQUIVALENT XE-133. The allowable levels are intended to ensure that offsite and control room doses meet the appropriate acceptance criteria in the Standard Review Plan (Ref. 2).

APPLICABLE SAFETY ANALYSES t

The LCO limits on the specific activity of the reactor coolant ensure that the resulting offsite and control room doses meet the appropriate SRP acceptance criteria following a SLB or SGTR accident. The safety analyses (Refs. 3 and 4) assume the specific activity of the reactor coolant is at the LCO limits, and an existing reactor coolant steam generator (SG) tube leakage rate of 150 gpd per SG exists. The safety analyses assume the specific activity of the secondary coolant is at its limit of 0.1 μCi/gm DOSE EQUIVALENT I-131 from LCO 3.7.17, "Secondary Specific Activity."

The analyses for the SLB and SGTR accidents establish the acceptance limits for RCS specific activity. Reference to these analyses is used to assess changes to the unit that could affect RCS specific activity, as they relate to the acceptance limits.

The safety analyses consider two cases of reactor coolant iodine specific

activity. One case assumes specific activity at 1.0 μCi/gm DOSE EQUIVALENT I-131 with a concurrent large iodine spike that increases the rate of release of iodine from the fuel rods containing cladding defects to the primary coolant immediately after a SLB (by a factor of 500), or SGTR (by a factor of 335), respectively. The second case assumes the initial reactor coolant iodine activity at 60 μCi/gm DOSE EQUIVALENT I-131 due to an iodine spike caused by a reactor or an RCS transient prior to the accident. In both cases, the noble gas specific activity is assumed to be 280 μCi/gm DOSE EQUIVALENT XE-133.

The SGTR analysis also assumes a loss of offsite power at the same time as the reactor trip. The SGTR causes a reduction in reactor coolant inventory.

The loss of offsite power causes the steam dump valves to close to protect the condenser. The rise in pressure in the ruptured SG discharges radioactively contaminated steam to the atmosphere through the SG power operated relief valves and the main steam safety valves. The unaffected SGs remove core decay heat by venting steam to the atmosphere until the cooldown ends and the Residual Heat Removal (RHR) system is placed in service.

The SLB radiological analysis assumes that offsite power is lost at the same time as the pipe break occurs outside containment. The affected SG blows down completely and steam is vented directly to the atmosphere. The unaffected SGs remove core decay heat by venting steam to the atmosphere until the cooldown ends and the RHR system is placed in service.

Operation with iodine specific activity levels greater than the LCO limit is permissible for 48 hours, if the activity levels do not exceed 60.0 μCi/gm.

The limits on RCS specific activity are also used for establishing standardization in radiation shielding and plant personnel radiation protection practices.

RCS specific activity satisfies Criterion 2 of 10 CFR 50.36(c)(2)(ii).

LCO

The iodine specific activity in the reactor coolant is limited to 1.0 μCi/gm DOSE EQUIVALENT I-131, and the noble gas specific activity in the reactor coolant is limited to 280 μCi/gm DOSE EQUIVALENT XE-133. The limits on specific activity ensure that offsite and control room doses will meet the appropriate SRP acceptance criteria (Ref. 2).

The SLB and SGTR accident analyses (Refs. 3 and 4) show that the calculated doses are within acceptable limits. Violation of the LCO may result in reactor coolant radioactivity levels that could, in the event of a SLB or SGTR, lead to doses that exceed the SRP acceptance criteria (Ref. 2).

APPLICABILITY

In MODES 1, 2, 3, and 4, operation within the LCO limits for DOSE EQUIVALENT I-131 and DOSE EQUIVALENT XE-133 is necessary to limit the potential consequences of a SLB or SGTR to within the SRP acceptance criteria (Ref. 2).

In MODES 5 and 6, the steam generators are not being used for decay heat removal, the RCS and steam generators are depressurized, and primary to secondary leakage is minimal. Therefore, the monitoring of RCS specific activity is not required.

ACTIONS

A.1 and A.2

With the DOSE EQUIVALENT I-131 greater than the LCO limit, samples at intervals of 4 hours must be taken to demonstrate that the specific activity is $\leq$ 60.0 µCi/gm. The Completion Time of 4 hours is required to obtain and analyze a sample. Sampling is continued every 4 hours to provide a trend.

The DOSE EQUIVALENT I-131 must be restored to within limit within 48 hours. The Completion Time of 48 hours is acceptable since it is expected that, if there were an iodine spike, the normal coolant iodine concentration would be restored within this time period. Also, there is a low probability of a SLB or SGTR occurring during this time period.

A Note permits the use of the provisions of LCO 3.0.4.c. This allowance permits entry into the applicable MODE(S), relying on Required Actions A.1 and A.2 while the DOSE EQUIVALENT I-131 LCO limit is not met. This allowance is acceptable due to the significant conservatism incorporated into the specific activity limit, the low probability of an event which is limiting due to exceeding this limit, and the ability to restore transient-specific activity excursions while the plant remains at, or proceeds to, power operation.

B.1

With the DOSE EQUIVALENT XE-133 greater than the LCO limit, DOSE EQUIVALENT XE-133 must be restored to within limit within 48 hours. The allowed Completion Time of 48 hours is acceptable since it is expected that, if there were a noble gas spike, the normal coolant noble gas concentration would be restored within this time period. Also, there is a low probability of a SLB or SGTR occurring during this time period.

A Note permits the use of the provisions of LCO 3.0.4.c. This allowance permits entry into the applicable MODE(S), relying on Required Action B.1 while the DOSE EQUIVALENT XE-133 LCO limit is not met. This

allowance is acceptable due to the significant conservatism incorporated into the specific activity limit, the low probability of an event which is limiting due to exceeding this limit, and the ability to restore transient-specific activity excursions while the plant remains at, or proceeds to, power operation.

C.1 and C.2

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 µCi/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.

SURVEILLANCE REQUIREMENTS

SR 3.4.16.1

SR 3.4.16.1 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.

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.

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.

A Note modifies the SR to allow entry into and operation in MODE 4, MODE 3, and MODE 2 prior to performing the SR. This allows the option of performing the Surveillance in those MODES to ensure Surveillance met, prior to entering MODE 1.

SR 3.4.16.2

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. The Frequency, between 2 and 6 hours after a power change $\geq$ 15% RTP within a 1 hour period, is established because the iodine levels peak during this time following iodine spike initiation; samples at other times would provide inaccurate results.

The Note modifies this SR to allow entry into and operation in MODE 4, MODE 3, and MODE 2 prior to performing the SR. This allows the Surveillance to be performed in those MODES, prior to entering MODE 1.

REFERENCES

1. 10 CFR 50.67.
2. Standard Review Plan (SRP) Section 15.0.1 "Radiological Consequence Analyses Using Alternative Source Terms."
3. FSAR, Section 15.1.5.
4. FSAR, Section 15.6.3.

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.16 RCS Specific Activity

BASES

BACKGROUND

The maximum dose that an individual at the exclusion area boundary can receive for 2 hours following an accident, or at the low population zone outer boundary for the radiological release duration, is specified in 10 CFR 100.11 (Ref 4) or 10 CFR 50.67 (Ref.1). Doses to control room operators must be limited per GDC 19. The limits on specific activity ensure that the offsite and control room doses are appropriately limited during analyzed transients and accidents.

The RCS specific activity LCO limits the allowable concentration level of radionuclides in the reactor coolant. The LCO limits are established to minimize the dose consequences in the event of a steam line break (SLB) or steam generator tube rupture (SGTR) accident.

The LCO contains specific activity limits for both DOSE EQUIVALENT I-131 and DOSE EQUIVALENT XE-133. The allowable levels are intended to ensure that offsite and control room doses meet the appropriate acceptance criteria.

APPLICABLE
SAFETY ANALYSES t

The LCO limits on the specific activity of the reactor coolant ensure that the resulting offsite and control room doses meet the appropriate acceptance criteria following a SLB or SGTR accident. The safety analyses (Refs. 2 and 3) assume the specific activity of the reactor coolant is at the LCO limits, and an existing reactor coolant total steam generator (SG) tube leakage rate of 389 gpd exists. The safety analyses assume the specific activity of the secondary coolant is at its limit of 0.1 μCi/gm DOSE EQUIVALENT I-131 from LCO 3.7.16, "Secondary Specific Activity."

The analyses for the SLB and SGTR accidents establish the acceptance limits for RCS specific activity. Reference to these analyses is used to assess changes to the unit that could affect RCS specific activity, as they relate to the acceptance limits.

The safety analyses consider two cases of reactor coolant iodine specific

activity. One case assumes specific activity at 1.0μCi/gm DOSE EQUIVALENT I-131 with a concurrent large iodine spike that increases the rate of release of iodine from the fuel rods containing cladding defects to the primary coolant immediately after a SLB (by a factor of 500), or SGTR (by a factor of 335), respectively. The second case assumes the initial reactor coolant iodine activity at 60 μCi/gm DOSE EQUIVALENT I-131 due to an iodine spike caused by a reactor or an RCS transient prior to the accident. In both cases, the noble gas specific activity is assumed to be 280μCi/gm DOSE EQUIVALENT XE-133.

The SGTR analysis also assumes a loss of offsite power at the same time as the reactor trip. The SGTR causes a reduction in reactor coolant inventory.

The loss of offsite power causes the steam dump valves to close to protect the condenser. The rise in pressure in the ruptured SG discharges radioactively contaminated steam to the atmosphere through the SG power operated relief valves and the main steam safety valves. The unaffected SGs remove core decay heat by venting steam to the atmosphere until the cooldown ends and the Residual Heat Removal (RHR) system is placed in service.

The SLB radiological analysis assumes that offsite power is lost at the same time as the pipe break occurs outside containment. The affected SG blows down completely and steam is vented directly to the atmosphere. The unaffected SGs remove core decay heat by venting steam to the atmosphere until the cooldown ends and the RHR system is placed in service.

Operation with iodine specific activity levels greater than the LCO limit is permissible for 48 hours, if the activity levels do not exceed 60.0 μCi/gm.

The limits on RCS specific activity are also used for establishing standardization in radiation shielding and plant personnel radiation protection practices.

RCS specific activity satisfies Criterion 2 of 10 CFR 50.36(c)(2)(ii).

LCO

The iodine specific activity in the reactor coolant is limited to 1.0 μCi/gm DOSE EQUIVALENT I-131, and the noble gas specific activity in the reactor coolant is limited to 280 μCi/gm DOSE EQUIVALENT XE-133. The limits on specific activity ensure that offsite and control room doses will meet the appropriate acceptance criteria.

The SLB and SGTR accident analyses (Refs. 2 and 3) show that the calculated doses are within acceptable limits. Violation of the LCO may result in reactor coolant radioactivity levels that could, in the event of a SLB or SGTR, lead to doses that exceed the acceptance criteria.

APPLICABILITY

In MODES 1, 2, 3, and 4, operation within the LCO limits for DOSE EQUIVALENT I-131 and DOSE EQUIVALENT XE-133 is necessary to limit the potential consequences of a SLB or SGTR to within the acceptance criteria.

In MODES 5 and 6, the steam generators are not being used for decay heat removal, the RCS and steam generators are depressurized, and primary to secondary leakage is minimal. Therefore, the monitoring of RCS specific activity is not required.

ACTIONS

A.1 and A.2

With the DOSE EQUIVALENT I-131 greater than the LCO limit, samples at intervals of 4 hours must be taken to demonstrate that the specific activity is $\leq$ 60.0 µCi/gm. The Completion Time of 4 hours is required to obtain and analyze a sample. Sampling is continued every 4 hours to provide a trend.

The DOSE EQUIVALENT I-131 must be restored to within limit within 48 hours. The Completion Time of 48 hours is acceptable since it is expected that, if there were an iodine spike, the normal coolant iodine concentration would be restored within this time period. Also, there is a low probability of a SLB or SGTR occurring during this time period.

A Note permits the use of the provisions of LCO 3.0.4.c. This allowance permits entry into the applicable MODE(S), relying on Required Actions A.1 and A.2 while the DOSE EQUIVALENT I-131 LCO limit is not met. This allowance is acceptable due to the significant conservatism incorporated into the specific activity limit, the low probability of an event which is limiting due to exceeding this limit, and the ability to restore transient-specific activity excursions while the plant remains at, or proceeds to, power operation.

B.1

With the DOSE EQUIVALENT XE-133 greater than the LCO limit, DOSE EQUIVALENT XE-133 must be restored to within limit within 48 hours. The allowed Completion Time of 48 hours is acceptable since it is expected that, if there was a noble gas spike, the normal coolant noble gas concentration would be restored within this time period. Also, there is a low probability of a SLB or SGTR occurring during this time period.

A Note permits the use of the provisions of LCO 3.0.4.c. This allowance permits entry into the applicable MODE(S), relying on Required Action B.1 while the DOSE EQUIVALENT XE-133 LCO limit is not met. This allowance is acceptable due to the significant conservatism incorporated

into the specific activity limit, the low probability of an event which is limiting due to exceeding this limit, and the ability to restore transient-specific activity excursions while the plant remains at, or proceeds to, power operation.

C.1 and C.2

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 µCi/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.

SURVEILLANCE REQUIREMENTS

SR 3.4.16.1

SR 3.4.16.1 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.

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.

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.

A Note modifies the SR to allow entry into and operation in MODE 4, MODE 3, and MODE 2 prior to performing the SR. This allows the option of performing the Surveillance those MODES,to ensure Surveillance met, prior to entering MODE 1.

SR 3.4.16.2

This Surveillance is performed to ensure iodine specific activity remains

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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. The Frequency, between 2 and 6 hours after a power change $\geq$ 15% RTP within a 1 hour period, is established because the iodine levels peak during this time following iodine spike initiation; samples at other times would provide inaccurate results.

The Note modifies this SR to allow entry into and operation in MODE 4, MODE 3, and MODE 2 prior to performing the SR. This allows the Surveillance to be performed in those MODES, prior to entering MODE 1.

REFERENCES

1. 10 CFR 50.67.
2. FSAR, Section15.1.5
3. FSAR, Section 15.6.3.
4. 10 CFR 100.11

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.11 RCS Specific Activity

BASES

BACKGROUND

The Code of Federal Regulations, 10 CFR 100 (Ref. 1), specifies the maximum dose to the whole body and the thyroid an individual at the site boundary can receive for 2 hours during an accident. The limits on specific activity ensure that the doses are held to within the 10 CFR 100 limits during analyzed transients and accidents.

The RCS specific activity LCO limits the allowable concentration level of radionuclides in the reactor coolant. The LCO limits are established to minimize the offsite radioactivity dose consequences in the event of a steam generator tube rupture (SGTR) accident.

The LCO contains specific activity limits for both DOSE EQUIVALENT I-131 and ~~gross specific activity~~ DOSE EQUIVALENT XE-133. The allowable levels are intended to limit the 2 hour dose at the site boundary to within the 10 CFR 100 dose guideline limits.

Analysis shows the potential offsite dose levels for an SGTR accident are within the 10 CFR 100 dose guideline limits (Ref. 1).

APPLICABLE SAFETY ANALYSES

The LCO limits on the specific activity of the reactor coolant ensure that the resulting 2 hour doses at the site boundary will not exceed the 10 CFR 100 dose guideline limits following an SGTR or a steam line break (SLB) accident. The ~~SLB~~ safety analyses~~is~~ (Ref. 2) assumptions bound the specific activity of the reactor coolant at the LCO limits and a total existing reactor coolant steam generator (SG) tube leakage rate of 300 gpd. ~~However, the 300 gpd leakage has a negligible effect on the consequences of a SLB. The analysis also assumes a reactor trip and a turbine trip as a result of the SLB event.~~

The analyse~~is~~ results ~~for the SGTR accident~~ are significantly impacted by the acceptance limits for RCS specific activity. Reference to the ~~is~~ analyses~~is is~~ are used to assess changes to the facility that could affect RCS specific activity as they relate to the acceptance limits.

BASES (continued)

APPLICABLE SAFETY ANALYSES (continued)

The safety analysis shows the radiological consequences of an SGTR accident are within the Reference 1 dose guideline limits. Operation with iodine specific activity levels greater than the LCO limit is permissible, if the activity levels do not exceed ~~50~~ 50 µCi/gm ~~the limits shown in Figure 3.4.11-1, in the applicable Specification~~, for more than 48 hours.

~~The remainder of the above limit permissible iodine levels shown in Figure 3.4.11-1 are acceptable because of the low probability of an SGTR accident occurring during the established 48 hour time limit. The occurrence of an SGTR accident at these permissible levels could increase the site boundary dose levels, but still be within 10 CFR 100 dose guideline limits.~~

RCS Specific Activity satisfies Criterion 2 of 10 CFR 50.36 (Ref. 3).

LCO

The specific iodine activity is limited to 1.0 µCi/gm DOSE EQUIVALENT I-131, and the ~~gross~~ noble gas specific activity in the primary coolant is limited to ~~the~~ 280 ~~number of~~ µCi/gm ~~equal to 100 divided by $\bar{E}$ ($\bar{E}$ is the average (mean) beta and gamma energies per disintegration, in MeV, weighted in proportion to the measured activity of the radionuclides in reactor coolant samples)~~DOSE EQUIVALENT XE-133~~.~~ The limit on DOSE EQUIVALENT I-131 ensures the 2 hour thyroid dose to an individual at the site boundary during an accident will be within the allowed thyroid dose. The limit on ~~gross~~ noble gas specific activity ensures the 2 hour whole body dose to an individual at the site boundary during an accident will be within the allowed whole body dose.

The SGTR accident analysis (Ref. 2) shows that the 2 hour site boundary dose levels are within acceptable limits. Violation of the LCO may result in reactor coolant radioactivity levels that could, in the event of an SGTR, lead to site boundary doses that exceed the 10 CFR 100 dose guideline limits.

APPLICABILITY

In MODES 1, 2, 3, and 4 ~~and 2, and in MODE 3 with RCS average temperature ≥ 500°F,~~ operation within the LCO limits for DOSE EQUIVALENT I-131 and DOSE EQUIVALENT XE-133~~gross specific activity~~ are necessary to contain the potential consequences of an SGTR to within the acceptable site boundary dose values.

In MODES 5 and 6, ~~For operation in MODE 3 with RCS average temperature < 500°F, and in MODES 4 and 5~~, the release of radioactivity in the event of an SGTR is unlikely since the saturation pressure of the reactor coolant is below the lift pressure settings of the main steam relief

BASES (continued)

valves.

ACTIONS

A.1 and A.2

With the DOSE EQUIVALENT I-131 greater than the LCO limit, samples at intervals of 4 hours must be taken to demonstrate ~~the limits of~~ that the specific activity is ≤ 50µCi/gm ~~Figure 3.4.11-1 are not exceeded~~. The Completion Time of 4 hours is required to obtain and analyze a sample. Sampling must continue for trending.

The DOSE EQUIVALENT I-131 must be restored to within limits ~~within 48~~within 48 hours. The Completion Time of 48 hours is required, if the limit violation resulted from normal iodine spiking.

A Note to RA A.1 and A.2 excludes the MODE change restriction of LCO 3.0.4. This exception allows entry into the applicable MODE(S) while relying on the ACTIONS even though the ACTIONS may eventually require unit shutdown. This exception is acceptable due to the significant conservatism incorporated into the specific activity limit, the low probability of an event which is limiting due to exceeding this limit, and the ability to restore transient specific activity excursions while the unit remains at, or proceeds to power operation.

B.1

~~If a Required Action and associated Completion Time of Condition A are not met or if the DOSE EQUIVALENT I-131 is in the unacceptable region of Figure 3.4.11-1, the reactor must be brought to MODE 3 with RCS average temperature < 500°F within 12 hours. The Completion Time of 12 hours is required to get to MODE 3 below 500°F without challenging reactor emergency systems.~~

With the DOSE EQUIVALENT XE-133 greater than the LCO limit, DOSE EQUIVALENT XE-133 must be restored to within limit within 48 hours. The allowed Completion Time of 48 hours is acceptable since it is expected that, if there were a noble gas spike, the normal coolant noble gas concentration would be restored within this time period. Also, there is a low probability of a SLB or SGTR occurring during this time period.

A Note to RA B.1 excludes the MODE change restriction of LCO 3.0.4. This exception allows entry into the applicable MODE(S) while relying on the ACTIONS even though the ACTIONS may eventually require unit shutdown. This exception is acceptable due to the significant conservatism incorporated into the specific activity limit, the low probability of an event which is limiting due to exceeding this limit, and the ability to restore

BASES (continued)

transient specific activity excursions while the unit remains at, or proceeds to power operation.

C.1 and C.2

~~With the gross specific activity in excess of the allowed limit, the unit must be placed in a MODE in which the requirement does not apply.~~

~~The allowed Completion Time of 12 hours to reach MODE 3 and RCS average temperature < 500°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 12 hours is required to reach MODE 3 with RCS average temperature ≤ 500°F from full power conditions in an orderly manner and without challenging reactor emergency systems.~~

If the Required Action and associated Completion Time of Condition A or B is not met, or if the DOSE EQUIVALENT I-131 is > 50µCi/gm, the reactor must be brought to MODE 3 within 12 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.

SURVEILLANCE REQUIREMENTS

SR 3.4.11.1

~~SR 3.4.11.1 requires performing a gamma isotopic analysis as a measure of the gross specific activity of the reactor coolant at least once per 7 days. While basically a quantitative measure of radionuclides with half lives longer than 30 minutes, excluding iodines, 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 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 Surveillance is applicable in MODES 1 and 2, and in MODE 3 with RCS average temperature at least 500°F. The 7 day Frequency considers the unlikelihood of a gross fuel failure during that time period.~~

SR 3.4.11.1 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.

Trending the results of this Surveillance allows proper remedial action to be

BASES (continued)

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.

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 3.4.11.1 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.

A Note modifies the SR to allow entry into and operation in MODE 4, MODE 3, and MODE 2 prior to performing the SR. This allows the option of performing the Surveillance in those MODES to ensure Surveillance met, prior to entering MODE 1.

SR 3.4.11.2

~~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. The Frequency, between 2 and 6 hours after a power change of $\geq$ 15% RTP within a 1 hour period, is established because the iodine levels peak during this time following fuel failure; samples at other times would provide inaccurate results.~~

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. The Frequency, between 2 and 6 hours after a power change ≥15% RTP within a 1 hour period is established because the iodine levels peak during this time following iodine spike initiation; samples at other times would provide inaccurate results.

The Note modifies this SR to allow entry into and operation in MODE 4, MODE 3, and MODE 2 prior to performing the SR. This allows the Surveillance to be performed in those MODES, prior to entering MODE 1.

~~SR 3.4.11.3~~

~~SR 3.4.11.3 requires radiochemical analysis for $\bar{E}$ determination every 184 days (6 months) with the unit operating in MODE 1 equilibrium conditions. The $\bar{E}$ determination directly relates to the LCO and is required~~

BASES (continued)

~~to verify unit operation within the specific gross activity LCO limit. The analysis for $\bar{E}$ is a measurement of the average energies per disintegration for isotopes with half lives longer than 30 minutes, excluding iodines. The Frequency of 184 days recognizes $\bar{E}$ does not change rapidly.~~

~~This SR has been modified by a Note that requires sampling to be performed 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.~~

BASES (continued)

REFERENCES

1. 10 CFR 100.11.

2. UFSAR, Section 15.9. and 15.13.

3. 10 CFR 50.36.