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10 CFR 50.90

RS-08-117

December 4, 2008

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

Braidwood Station, Units 1 and 2
Facility Operating License Nos. NPF-72 and NPF-77
NRC Docket Nos. STN 50-456 and STN 50-457

Byron Station, Units 1 and 2
Facility Operating License Nos. NPF-37 and NPF-66
NRC Docket Nos. STN 50-454 and STN 50-455

Subject: License Amendment Request to Adopt TSTF-490 Deletion of E Bar Definition and Revision to RCS Specific Activity Technical Specification

In accordance with 10 CFR 50.90, "Application for amendment of license, construction permit or early site permit," Exelon Generation Company, LLC (EGC) requests an amendment to Facility Operating License Nos. NPF-72 and NPF-77 for Braidwood Station, Units 1 and 2, and Facility Operating License Nos. NPF-37 and NPF-66 for Byron Station, Units 1 and 2. The proposed change revises Technical Specifications (TS) 1.1, "Definitions," and 3.4.16, "RCS Specific Activity," and Surveillance Requirements (SR) 3.4.16.1, and SR 3.4.16.3. The proposed changes would replace the current TS 3.4.16 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 Xe-133 definition that would replace the current E Bar average disintegration energy definition. In addition, the current dose equivalent I-131 definition will be reformatted.

The changes are consistent with NRC-approved 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 TS improvement was announced in the Federal Register on March 15, 2007, 72 FR 12217 as part of the consolidated line item improvement process (CLIIP).

This request is subdivided as follows.

- Attachment 1 provides a description and evaluation of the proposed change.
- Attachment 2 provides a markup of the affected TS pages for Braidwood Station.
- Attachment 3 provides a markup of the affected TS pages for Byron Station.
- Attachments 4 and 5 provide revisions of the affected TS Bases page for Braidwood Station and Byron Station, respectively. The TS Bases pages are provided for information only and do not require NRC approval.

The proposed change has been reviewed by the Plant Operations Review Committees at each of the stations and approved by the Nuclear Safety Review Board in accordance with the requirements of the EGC Quality Assurance Program.

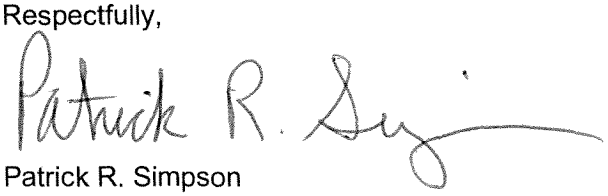
EGC requests approval of the proposed change by December 4, 2009. Once approved, the amendment will be implemented within 90 days. This implementation period will provide adequate time for the affected station documents to be revised using the appropriate change control mechanisms.

In accordance with 10 CFR 50.91, "Notice for public comment; State consultation," paragraph (b), EGC is notifying the State of Illinois of this application for license amendment by transmitting a copy of this letter and its attachments to the designated State Official.

There are no regulatory commitments contained in this letter. Should you have any questions concerning this letter, please contact Ms. Tricia Mattson at (630) 657-2813.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 4th day of December 2008.

Respectfully,



Patrick R. Simpson
Manager - Licensing

Attachments:

1. Evaluation of Proposed Change
2. Markup of Proposed Technical Specifications Pages for Braidwood Station
3. Markup of Proposed Technical Specifications Pages for Byron Station
4. Revised Technical Specifications Bases Pages for Braidwood Station
5. Revised Technical Specifications Bases Pages for Byron Station

ATTACHMENT 1
Evaluation of Proposed Change

ATTACHMENT 1
Evaluation of Proposed Change

1.0 SUMMARY DESCRIPTION

The proposed change will replace the current limits on primary coolant gross specific activity with limits on primary coolant noble gas activity. The noble gas activity will be based on DOSE EQUIVALENT XE-133 and will take into account only the noble gas activity in the primary coolant. The change was approved by the NRC Safety Evaluation (SE) dated September 27, 2006 (Reference 1). 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 3) as part of the Consolidated Line Item Improvement Process (CLIIP).

2.0 DETAILED DESCRIPTION

Consistent with NRC-approved TSTF-490, Revision 0, EGC proposes the following Technical Specifications (TS) changes:

1. Reformat the definition of DOSE EQUIVALENT I-131
2. Delete the definition of Ē-AVERAGE DISINTEGRATION ENERGY
3. Add a new definition for DOSE EQUIVALENT XE-133
4. Revise LCO 3.4.16, "RCS Specific Activity," to delete references to gross specific activity; add limits for DOSE EQUIVALENT 1-131 and DOSE EQUIVALENT Xe-133; and delete Figure 3.4.16-1, "Reactor Coolant DOSE EQUIVALENT 1-131 Specific Activity Limit versus Percent of RATED THERMAL POWER."
5. Revise LCO 3.4.16 "APPLICABILITY" to specify the LCO is applicable in MODES 1, 2, 3, and 4.
6. Modify ACTIONS Table as follows:
    A. Condition A is modified to delete the reference to Figure 3.4.16-1, and define an upper limit that is applicable at all power levels.
    B. ACTIONS are reordered, moving Condition C to Condition B to be consistent with the Writer's Guide.
    C. Condition B (was Condition C) is modified to provide a Condition and Required Action for DOSE EQUIVALENT XE-133 instead of gross specific activity. The Completion Time is changed from 6 hours to 48 hours. A Note allowing the applicability of LCO 3.0.4.c is added, consistent with the Note to Required Action A.1.
    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.
7. Modify SURVEILLANCE REQUIREMENTS (SR) Table as follows:
    A. Revise SR 3.4.16.1 to verify the limit for DOSE EQUIVALENT XE-133. A Note is added, consistent with SR 3.4.16.2 to allow entry into MODES 2, 3, and 4 prior to performance of the SR.
    B. Delete SR 3.4.16.3.

3.0 BACKGROUND

The background for this application is as stated in the model SE in NRC's Notice of Availability dated March 15, 2007 (Reference 3), the NRC Notice for Comment published on November 20, 2006 (Reference 2), and TSTF-490, Revision 0.

Note: In Reference 4, the NRC approved a license amendment to fully implement an Alternative Source Term (AST), pursuant to 10 CFR 50.67, "Accident source term," and make related changes to TS. With the application of AST methodology to Braidwood Station and Byron Station, bounding design basis accidents analyzed in the Updated Final Safety Analysis Report (UFSAR) specify maximum dose in TEDE criteria specified in 10 CFR 50.67 using the radiological source term criteria in RG 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Plants." For non-bounding transients and other accidents analyzed in the UFSAR that have not been converted to use AST, the maximum dose to the whole body and the thyroid that an individual at the site boundary can receive for 2 hours during an accident is specified in 10 CFR 100. Doses to control room operators are as described in GDC 19, "Control Room."

The deletion of Figure 3.4.16-1 from the Table of Contents is redundant to a change proposed in Reference 5, which would delete the list of figures from the Table of Contents.

4.0 TECHNICAL EVALUATION

EGC has reviewed References 1, 2 and 3. EGC has applied the methodology in Reference 1 to develop the proposed TS changes. EGC has also concluded that the justifications presented in TSTF-490, Revision 0 and the model SE prepared by the NRC are applicable to Braidwood Units 1 and 2 and Byron Units 1 and 2 and justify this amendment for the incorporation of the changes to the Braidwood and Byron TS.

5.0 REGULATORY EVALUATION

5.1 Applicable Regulatory Requirements

A description of this proposed change and its relationship to applicable regulatory requirements and guidance was provided in the NRC Notice of Availability dated March 15, 2007 (Reference 3), the NRC Notice for Comment published in November 20, 2006 (Reference 2), and TSTF-490, Revision 0.

5.2 Precedent

This application is being made in accordance with the CLIIP. EGC is not proposing significant variations or deviations from the TS changes described in TSTF-490 or in the content of the NRC's model SE published in Reference 2. The NRC has previously approved similar amendment requests to the TS for Point Beach Nuclear Plant, Units 1 and 2, Indian Point Nuclear Generating Units 2 and 3, Diablo Canyon Power Plant, Units. 1 and 2, Callaway Plant, Unit 1, Wolf Creek Generating Station, and Comanche Peak Steam Electric Station, Units 1 and

2. The subject License Amendment Request proposes to adopt surveillance testing requirements similar to those discussed in the previously approved amendments.

5.3 No Significant Hazards Consideration

EGC has reviewed the proposed no significant hazards consideration determination published in the Federal Register on March 15, 2007 (Reference 3), as part of the CLIIP. EGC has concluded that the proposed determination presented in the notice is applicable to Braidwood and Byron and the determination is hereby incorporated by reference to satisfy the requirements of 10 CFR 50.91(a).

5.4 Conclusion

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

6.0 ENVIRONMENTAL CONSIDERATION

EGC has reviewed the environmental consideration included in the model SE published in the Federal Register on March 15, 2007 (Reference 3), as part of the CLIIP. EGC has concluded that the NRC's findings presented therein are applicable to Braidwood and Byron and the determination is hereby incorporated by reference for this application.

7.0 REFERENCES

1. NRC Safety Evaluation (SE) approving TSTF-490, Revision 0, dated September 27, 2006

2. Federal Resister Notice for Comment published on November 20, 2006, 71 FR 67170, "Notice of Opportunity To Comment on Model Safety Evaluation and Model License Amendment Request on Technical Specification Improvement Regarding Deletion of E Bar Definition and Revision to Reactor Coolant System Specific Activity Technical Specification; Babcock and Wilcox Pressurized Water Reactors, Westinghouse Pressurized Water Reactors, Combustion Engineering Pressurized Water Reactors Using the Consolidated Line Item Improvement Process"

3. Federal Register Notice of Availability dated March 15, 2007, 72 FR 12217, Model Safety Evaluation, U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Technical Specification Task Force TSTF-490, Revision 0, "Deletion of E Bar Definition and Revision to RCS Specific Activity Technical Specification"

4. Letter from Robert F. Kuntz (NRC) to Christopher M. Crane (Exelon Generation Company, LLC), "Byron Station, Unit Nos. 1 and 2, and Braidwood Station, Unit Nos. 1 and 2 – Issuance of Amendments Re: Alternative Source Term," dated September 8, 2006

5. Letter from Patrick Simpson (Exelon Generation Company, LLC) to the NRC, "License Amendment Request to Administratively Clarify the Operating Licenses and Technical Specifications," dated July 29, 2008

ATTACHMENT 2

Markup of Technical Specifications Pages

Braidwood Station Units 1 and 2

Facility Operating License No. NPF-72 and NPF-77

REVISED TECHNICAL SPECIFICATIONS PAGES

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3.4.16 - 2
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3.4.16 - 4

TABLE OF CONTENTS - TECHNICAL SPECIFICATION FIGURES

1.1 Definitions

~~DOSE EQUIVALENT I-131~~	~~DOSE EQUIVALENT I-131 shall be that concentration of I-131 (microcuries/gram) that alone would produce the same dose as the quantity and isotopic mixture of I-131, I-132, I-133, I-134, and I-135 actually present. The 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," or those listed in Table E-7 of Regulatory Guide 1.109, Rev. 1, NRC, 1977, or ICRP 30, Supplement to Part 1, page 192-212, Table titled, "Committed Dose Equivalent in Target Organs or Tissues per Intake of Unit Activity," or Federal Guidance Report 11, "Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion and Ingestion," 1988; (Table 2.1, Exposure-To-Dose Conversion Factors for Inhalation).~~
~~$\bar{E}$ 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 (in MeV) per disintegration for non-iodine isotopes, with half lives > 10 minutes, making up at least 95% of the total non-iodine activity in the coolant.~~
ENGINEERED SAFETY FEATURE (ESF) RESPONSE TIME	The ESF RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its ESF actuation setpoint at the channel sensor until the ESF equipment is capable of performing its safety function (i.e., the valves travel to their required positions, pump discharge pressures reach their required values, etc.). Times shall include diesel generator starting and sequence loading delays, where applicable. The response time may be measured by means of any series of sequential, overlapping, or total steps so that the entire response time is measured. In lieu of measurement, response time may be verified for selected components provided that the components and methodology for verification have been previously reviewed and approved by the NRC.

INSERT A

INSERT B

INSERT A:

DOSE EQUIVALENT I-131

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 the dose conversion factors from:

a. 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," or

b. Table III of TID-14844, AEC, 1962, "Calculation of Distance Factors for Power and Test Reactor Sites," or

c. Table E-7 of Regulatory Guide 1.109, Rev. 1, NRC, 1977, or

d. ICRP-30, 1979, Supplement to Part 1, page 192-212, Table titled, "Committed Does Equivalent in Target Organs or Tissues per Intake of Unit Activity."

INSERT B:

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."

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.16 RCS Specific Activity

RCS DOSE EQUIVALENT I-131 AND DOSE EQUIVALENT XE-133 specific activity shall be within limits.

LCO 3.4.16 ~~The specific activity of the reactor coolant shall be within the following limits:~~

~~a. Dose Equivalent I-131 specific activity ≤ 1.0 µCi/gm; and~~

~~b. Gross specific activity ≤ 100/$\bar{E}$ µCi/gm.~~

APPLICABILITY: MODES ~~1 and 2,~~ 1, 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 ~~specific activity > 1.0 µCi/gm.~~ not within limit.	----------NOTE---------- LCO 3.0.4.c is applicable. ----------	
	A.1 Verify DOSE EQUIVALENT I-131 ~~specific activity within the acceptable region of Figure 3.4.16-1.~~ ≤ 60 µCi/gm.	Once per 4 hours
	AND	
	A.2 Restore DOSE EQUIVALENT I-131 specific activity to within limit.	48 hours

(continued)

INSERT C

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Required Action and associated Completion Time of Condition A not met. OR DOSE EQUIVALENT I-131 specific activity in the unacceptable region of Figure 3.4.16-1.	B.1 Be in MODE 3 with T_{avg} < 500°F.	6 hours
C. Gross specific activity not within limit.	C.1 Be in MODE 3 with T_{avg} < 500°F.	6 hours

INSERT D

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.4.16.1 Verify reactor coolant gross specific activity ≤ 100/$\bar{E}$ µCi/gm.	7 days

(continued)

INSERT E

INSERT C:

B. DOSE EQUIVALENT XE-133 not within limit.	----------NOTE---------- LCO 3.0.4.c is applicable ----------		
	B.1	Restore DOSE EQUIVALENT XE-133 to within limit.	48 hours

INSERT D:

C. Required Action and associated Completion Time of Condition A or B not met.	C.1	Be in MODE 3.	6 hours
OR	AND		
DOSE EQUIVALENT I-131 > 60 µCi/gm.	C.2	Be in MODE 5.	36 hours

INSERT E:

SR 3.4.16.1	----------NOTE---------- Only required to be performed in MODE 1. ----------	
	Verify reactor coolant DOSE EQUIVALENT XE-133 specific activity ≤ 603 µCi/gm.	7 days

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
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
~~SR 3.4.16.3~~	~~NOTE~~ ~~Not required to be performed until 31 days after a minimum of 2 Effective Full Power Days (EFPD) and 20 days of MODE 1 operation have elapsed since the reactor was last subcritical for ≥ 48 hours.~~	
	~~Determine $\overline{E}$ from a reactor coolant sample taken in MODE 1 after a minimum of 2 EFPD and 20 days of MODE 1 operation have elapsed since the reactor was last subcritical for ≥ 48 hours.~~	~~184 days~~

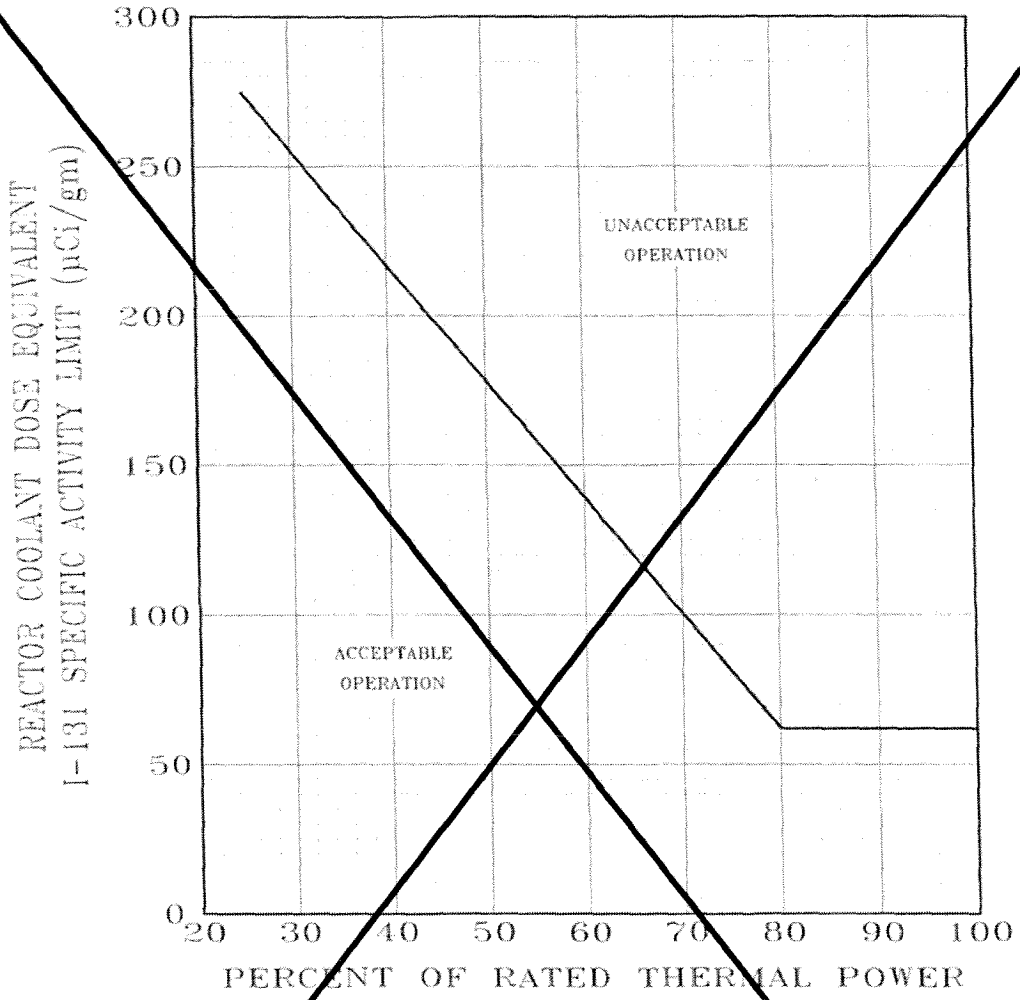

Figure 3.4.16-1 (page 1 of 1)
Reactor Coolant DOSE EQUIVALENT I-131 Specific Activity
Limit Versus Percent of RATED THERMAL POWER

ATTACHMENT 3

Markup of Technical Specifications Pages

Byron Station Units 1 and 2

Facility Operating License No. NPF-37 and NPF-66

REVISED TECHNICAL SPECIFICATIONS PAGES

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1.1 Definitions

~~DOSE EQUIVALENT I-131~~

INSERT A

~~DOSE EQUIVALENT I-131 shall be that concentration of I-131 (microcuries/gram) that alone would produce the same dose as the quantity and isotopic mixture of I-131, I-132, I-133, I-134, and I-135 actually present. The 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," or those listed in Table E-7 of Regulatory Guide 1.109, Rev. 1, NRC, 1977, or ICRP-30, Supplement to Part 1, page 192-212, Table titled, "Committed Dose Equivalent in Target Organs or Tissues per Intake of Unit Activity," or Federal Guidance Report 11 "Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion and Ingestion", 1988; (Table 2.1, Exposure-To-Dose Conversion Factors for Inhalation).~~

INSERT B

~~$\bar{E}$ 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 (in MeV) per disintegration for non-iodine isotopes, with half-lives > 10 minutes, making up at least 95% of the total non-iodine activity in the coolant.~~

ENGINEERED SAFETY FEATURE (ESF) RESPONSE TIME

The ESF RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its ESF actuation setpoint at the channel sensor until the ESF equipment is capable of performing its safety function (i.e., the valves travel to their required positions, pump discharge pressures reach their required values, etc.). Times shall include diesel generator starting and sequence loading delays, where applicable. The response time may be measured by means of any series of sequential, overlapping, or total steps so that the entire response time is measured. In lieu of measurement, response time may be verified for selected components provided that the components and methodology for verification have been previously reviewed and approved by the NRC.

INSERT A:

DOSE EQUIVALENT I-131

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 the dose conversion factors from:

a. 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," or

b. Table III of TID-14844, AEC, 1962, "Calculation of Distance Factors for Power and Test Reactor Sites," or

c. Table E-7 of Regulatory Guide 1.109, Rev. 1, NRC, 1977, or

d. ICRP-30, 1979, Supplement to Part 1, page 192-212, Table titled, "Committed Does Equivalent in Target Organs or Tissues per Intake of Unit Activity."

INSERT B:

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."

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.16 RCS Specific Activity

RCS DOSE EQUIVALENT I-131 AND DOSE EQUIVALENT XE-133 specific activity shall be within limits.

LCO 3.4.16 ~~The specific activity of the reactor coolant shall be within the following limits:~~

~~a. Dose Equivalent I-131 specific activity ≤ 1.0 µCi/gm; and~~

~~b. Gross specific activity ≤ 100/$\bar{E}$ µCi/gm.~~

APPLICABILITY: ~~MODES 1 and 2,~~ 1, 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 ~~specific activity > 1.0 µCi/gm.~~ not within limit.	----------NOTE---------- LCO 3.0.4.c is applicable. ----------	
	A.1 Verify DOSE EQUIVALENT I-131 ~~specific activity within the acceptable region of Figure 3.4.16-1.~~ ≤ 60 µCi/gm.	Once per 4 hours
	AND	
	A.2 Restore DOSE EQUIVALENT I-131 specific activity to within limit.	48 hours

(continued)

INSERT C

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Required Action and associated Completion Time of Condition A not met. OR DOSE EQUIVALENT I-131 specific activity in the unacceptable region of Figure 3.4.16-1.	B.1 Be in MODE 3 with T_{avg} < 500°F.	6 hours
C. Gross specific activity not within limit.	C.1 Be in MODE 3 with T_{avg} < 500°F.	6 hours

INSERT D

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.4.16.1 Verify reactor coolant gross specific activity ≤ 100/$\bar{E}$ µCi/gm.	7 days

(continued)

INSERT E

INSERT C:

B. DOSE EQUIVALENT XE-133 not within limit.	----------NOTE---------- LCO 3.0.4.c is applicable ----------		
	B.1	Restore DOSE EQUIVALENT XE-133 to within limit.	48 hours

INSERT D:

C. Required Action and associated Completion Time of Condition A or B not met.	C.1	Be in MODE 3.	6 hours
OR	AND		
DOSE EQUIVALENT I-131 > 60 µCi/gm.	C.2	Be in MODE 5.	36 hours

INSERT E:

SR 3.4.16.1	----------NOTE---------- Only required to be performed in MODE 1. ----------	
	Verify reactor coolant DOSE EQUIVALENT XE-133 specific activity ≤ 603 µCi/gm.	7 days

SURVEILLANCE REQUIREMENTS (continued)

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

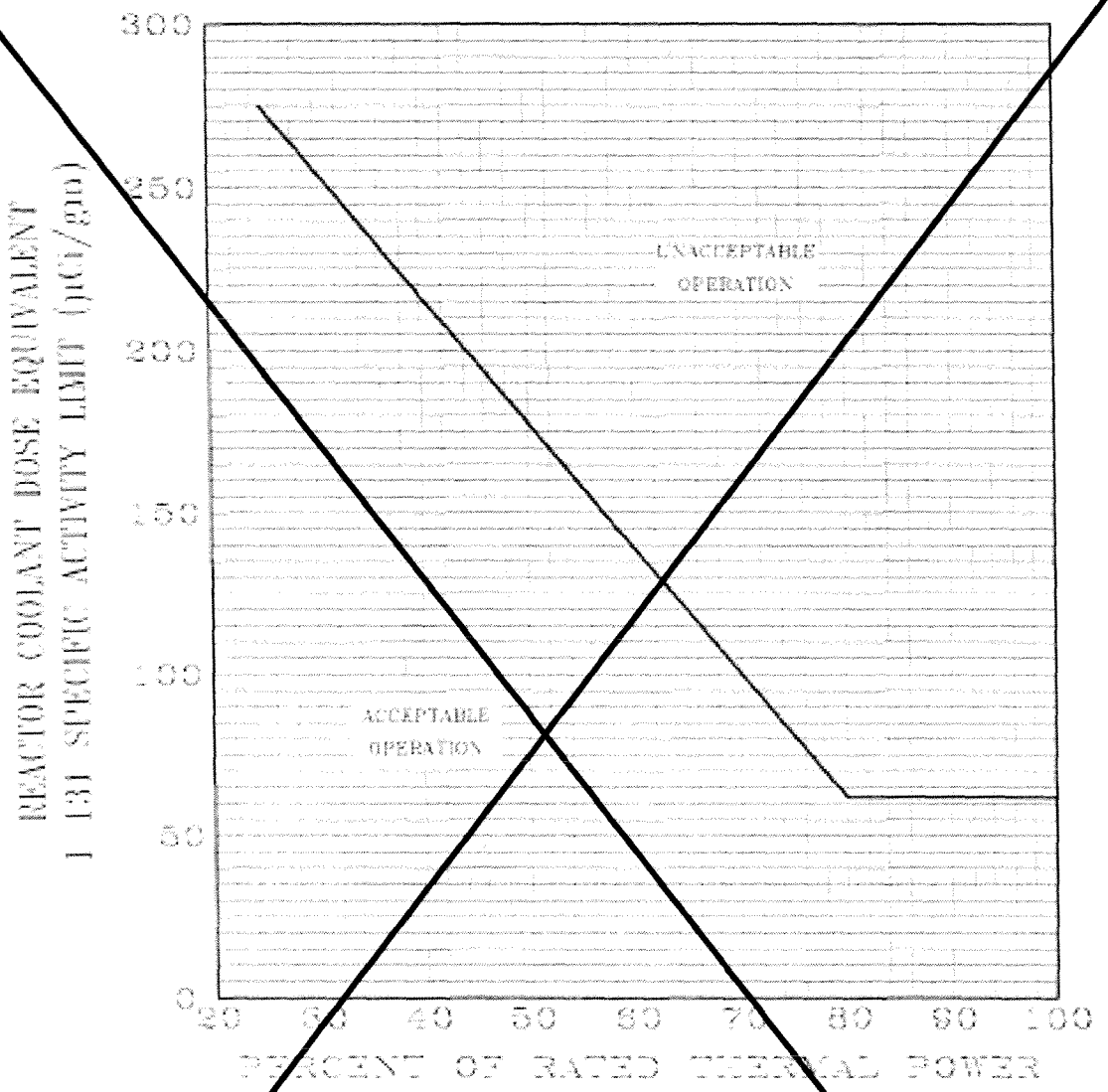

Figure 3.4.16-1 (page 1 of 1)
Reactor Coolant DOSE EQUIVALENT I-131 Specific Activity
Limit Versus Percent of RATED THERMAL POWER

ATTACHMENT 4

Markup of Technical Specifications Bases Pages

Braidwood Station Units 1 and 2

Facility Operating License No. NPF-72 and NPF-77

REVISED TECHNICAL SPECIFICATIONS BASES PAGES

Complete Replacement of B 3.4.16

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.16 RCS Specific Activity

Complete Replacement of Existing 3.4.16 Bases

BASES

BACKGROUND

For the bounding accidents specified in Regulatory Guide 1.183 (Ref. 1), 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. 2). 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.

For other non-bounding transients and accidents analyzed in the Updated Final Safety Analysis Report (UFSAR), the maximum dose to the whole body and the thyroid that an individual at the site boundary can receive for 2 hours during an accident is specified in 10 CFR 100 (Ref. 3). Any future modification to the facility design bases for these events will use source term assumptions and radiological criteria in the affected analyses that are established in RG 1.183 and 10 CFR 50.67.

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 main steam line break (MSLB) 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. 4).

APPLICABLE SAFETY ANALYSES

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 MSLB or SGTR accident. The safety analyses (Refs. 5 and 6) assume the specific activity of the reactor coolant is at the LCO limits. For the MSLB accident, the safety analysis assumes the primary to secondary LEAKAGE from the faulted steam generator (SG) is 0.5 gallon per minute and the primary to secondary LEAKAGE from the intact SGs is 0.218 gallon per minute per intact SG. The SGTR event assumes initial primary to secondary LEAKAGE is 1.0 gpm for the

BASES

APPLICABLE SAFETY ANALYSES (continued)

intact SGs plus the leakage rate associated with a double-ended rupture of a single tube. The LCO 3.4.13 requirement to limit primary to secondary LEAKAGE through any one SG to less than or equal to 150 gallons per day is significantly less than the conditions assumed in the safety analyses. 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 3.7.3, "Secondary Specific Activity."

The analyses for the MSLB 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 MSLB (by a factor of 500), or SGTR (by a factor of 335), respectively. The second case assumes the initial reactor coolant iodine activity at 60.0 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 603 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 reduction initiates a reactor trip from a low pressurizer pressure signal or an RCS overtemperature ΔT signal.

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. 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.

BASES

APPLICABLE SAFETY ANALYSES (continued)

The MSLB radiological analysis assumes that offsite power is lost at the same time as the pipe break occurs outside containment. Reactor trip occurs after the generation of an SI signal on low steam line pressure. 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, if the activity levels do not exceed 60.0 µCi/gm for more than 48 hours.

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 603 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. 4). The MSLB and SGTR accident analyses (Refs. 5 and 6) 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 MSLB or SGTR, lead to doses that exceed the SRP acceptance criteria (Ref. 4).

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 MSLB or SGTR to within the SRP acceptance criteria (Ref. 4).

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.

BASES

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 < 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 MSLB 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 MSLB 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 MODES(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.

BASES

ACTIONS (continued)

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 Surveillance to be performed in those MODES, prior to entering MODE 1.

BASES

SURVEILLANCE REQUIREMENTS (continued)

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 ≥ 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. Regulatory Guide 1.183, dated July 2000.
2. 10 CFR 50.67.
3. 10 CFR 100.11.
4. Standard Review Plan (SRP) Section 15.0.1 "Radiological Consequence Analyses Using Alternative Source Terms," Rev. 0.
5. UFSAR, Section 15.1.5.
6. UFSAR, Section 15.6.

ATTACHMENT 5

Markup of Technical Specifications Bases Pages

Byron Station Units 1 and 2

Facility Operating License No. NPF-37 and NPF-66

REVISED TECHNICAL SPECIFICATIONS BASES PAGES

Complete Replacement of B 3.4.16

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.16 RCS Specific Activity

Complete Replacement of Existing 3.4.16 Bases

BASES

BACKGROUND

For the bounding accidents specified in Regulatory Guide 1.183 (Ref. 1), 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. 2). 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.

For other non-bounding transients and accidents analyzed in the Updated Final Safety Analysis Report (UFSAR), the maximum dose to the whole body and the thyroid that an individual at the site boundary can receive for 2 hours during an accident is specified in 10 CFR 100 (Ref. 3). Any future modification to the facility design bases for these events will use source term assumptions and radiological criteria in the affected analyses that are established in RG 1.183 and 10 CFR 50.67.

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 main steam line break (MSLB) 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. 4).

APPLICABLE SAFETY ANALYSES

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 MSLB or SGTR accident. The safety analyses (Refs. 5 and 6) assume the specific activity of the reactor coolant is at the LCO limits. For the MSLB accident, the safety analysis assumes the primary to secondary LEAKAGE from the faulted steam generator (SG) is 0.5 gallon per minute and the primary to secondary LEAKAGE from the intact SGs is 0.218 gallon per minute per intact SG. The SGTR event assumes initial primary to secondary LEAKAGE is 1.0 gpm for the

BASES

APPLICABLE SAFETY ANALYSES (continued)

intact SGs plus the leakage rate associated with a double-ended rupture of a single tube. The LCO 3.4.13 requirement to limit primary to secondary LEAKAGE through any one SG to less than or equal to 150 gallons per day is significantly less than the conditions assumed in the safety analyses. 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 3.7.3, "Secondary Specific Activity."

The analyses for the MSLB 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 MSLB (by a factor of 500), or SGTR (by a factor of 335), respectively. The second case assumes the initial reactor coolant iodine activity at 60.0 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 603 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 reduction initiates a reactor trip from a low pressurizer pressure signal or an RCS overtemperature ΔT signal.

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. 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.

BASES

APPLICABLE SAFETY ANALYSES (continued)

The MSLB radiological analysis assumes that offsite power is lost at the same time as the pipe break occurs outside containment. Reactor trip occurs after the generation of an SI signal on low steam line pressure. 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, if the activity levels do not exceed 60.0 µCi/gm for more than 48 hours.

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 603 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. 4). The MSLB and SGTR accident analyses (Refs. 5 and 6) 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 MSLB or SGTR, lead to doses that exceed the SRP acceptance criteria (Ref. 4).

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 MSLB or SGTR to within the SRP acceptance criteria (Ref. 4).

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.

BASES

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 < 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 MSLB 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 MSLB 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 MODES(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.

BASES

ACTIONS (continued)

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 Surveillance to be performed in those MODES, prior to entering MODE 1.

BASES

SURVEILLANCE REQUIREMENTS (continued)

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. Regulatory Guide 1.183, dated July 2000.
2. 10 CFR 50.67.
3. 10 CFR 100.11.
4. Standard Review Plan (SRP) Section 15.0.1 "Radiological Consequence Analyses Using Alternative Source Terms," Rev. 0.
5. UFSAR, Section 15.1.5.
6. UFSAR, Section 15.6.3.