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Ref: 10CFR50.90

CPSES-200600390
Log # TXX-06038
File # 00236

February 21, 2006

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

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION (CPSES)
DOCKET NOS. 50-445 AND 50-446
LICENSE AMENDMENT REQUEST (LAR) 06-001
REVISION TO TECHNICAL SPECIFICATION 1.1, "DEFINITIONS" and 3.4.16, "RCS SPECIFIC ACTIVITY"

Dear Sir or Madam:

Pursuant to 10CFR50.90, TXU Generation Company LP (TXU Power) hereby requests an amendment to the CPSES Unit 1 Operating License (NPF-87) and CPSES Unit 2 Operating License (NPF-89) by incorporating the attached change into the CPSES Unit 1 and 2 Technical Specifications (TS). This change request applies to both Units.

The proposed change will revise TS 1.1 entitled "Definitions" and TS 3.4.16 entitled "RCS Specific Activity". This License Amendment Request proposes to replace the current TS 3.4.16 limits 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 (corresponding to the Xenon 133 isotope) that would replace the current $\bar{E}$ - AVERAGE DISINTEGRATION ENERGY definition. In addition, the current DOSE EQUIVALENT I-131 definition (corresponding to the Iodine-131 isotope) would be revised to allow the use of alternate, NRC-approved thyroid dose conversion factors.

This change is being proposed in order to implement an RCS specific activity Limiting Condition for Operation (LCO) that reflects the whole body radiological consequence analysis assumptions. Those assumptions are sensitive to the noble gas activity in the primary coolant, but not to the other, non-gaseous activity currently captured in the current definition. The current $\bar{E}$ definition includes radioisotopes

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that decay by the emission of both gamma and beta radiation. Current Condition B of LCO 3.4.16 would rarely, if ever, be entered for exceeding 100/Ē since that value is very high (the denominator is very low) if beta emitters such as H-3 and F-18 are included in that value, as required by the Ē definition. In addition, SR 3.4.16.1 requires the measurement of the degassed gamma activities and the gaseous gamma activities in the sample taken for the surveillance, resulting in a questionable determination of operability when the result is compared to 100/Ē with its beta-emitting isotopes. This has led to confusion over what to do with the beta-emitters when performing SR 3.4.16.1 and deciding whether Condition B entry is required. Satisfying LCO 3.4.16 should be incumbent upon satisfying the radiological consequence analysis assumptions, an objective which is not attained with the current construct of the LCO.

TXU Power is submitting this LAR in conjunction with an industry consortium of six plants as a result of a mutual agreement known as Strategic Teaming and Resource Sharing (STARS). The STARS group consists of the six plants operated by TXU Power, AmerenUE, Wolf Creek Nuclear Operating Corporation, PG&E, STP Nuclear Operating Company, and Arizona Public Service Company.

PG&E's Diablo Canyon Power Plant is the lead STARS plant for this amendment request. Other members of the STARS group can also be expected to submit a license amendment request similar to this one. The other license amendment requests will be submitted on a parallel basis within a short period of time of each other, with plant-specific information presented within brackets (i.e., within []) in Attachment 1 (other than TS LCO numbers which vary between the TS of NUREG-0452, NUREG-1431, and NUREG-1432). All other Attachments are plant specific in nature.

The TS developed for the Westinghouse AP600 and AP1000 advanced reactor designs utilize an LCO for RCS DOSE EQUIVALENT XE-133 specific activity in place of the LCO on gross specific activity based on Ē. This approach was approved by the NRC for the AP600 in NUREG-1512, "Final Safety Evaluation Report Related to the Certification of the AP600 Standard Design, Docket No. 52-003," dated August 1998 and for the AP1000 in the NRC letter to Westinghouse Electric Company dated September 13, 2004.

Attachment 1 provides a detailed description of the proposed changes, a technical analysis of the proposed changes, TXU Power's determination that the proposed changes do not involve a significant hazard consideration, a regulatory analysis of the proposed changes and an environmental evaluation. Attachment 2 provides the affected Technical Specification (TS) pages marked-up to reflect the proposed changes. Attachment 3 provides proposed changes to the Technical Specification Bases for information only. These changes will be processed per CPSES site procedures. Attachment 4 provides retyped Technical Specification pages which incorporate the requested changes. Attachment 5 provides retyped Technical Specification Bases pages which incorporate the proposed changes.

TXU Power requests approval of the proposed License Amendment coincident with or after the approval of LAR 05-005 (TAC No. MC8163/8164), submitted via TXX-05127 on 08/22/05, to be implemented within 120 days of the issuance of the license amendment. LAR 05-005 contains the revised CPSES radiological consequence analyses referenced in Attachment 1. The approval date was administratively selected to allow for NRC review but the plant does not require this amendment to allow continued safe full power operations.

In accordance with 10CFR50.91(b), TXU Power is providing the State of Texas with a copy of this proposed amendment.

Should you have any questions, please contact Mr. Robert A. Slough at (254) 897-5727

I state under penalty of perjury that the foregoing is true and correct.

Executed on February 21, 2006

Sincerely,

TXU Generation Company LP

By: TXU Generation Management Company LLC
Its General Partner

Mike Blevins

By: ______________________
Fred W. Madden
Director, Regulatory Affairs

RAS

Attachments
1. Description and Assessment
2. Proposed Technical Specifications Changes
3. Proposed Technical Specifications Bases Changes (for information)
4. Retyped Technical Specification Pages
5. Retyped Technical Specification Bases Pages (for information)

c - B. S. Mallet, Region IV
M. Thadani, NRR
Resident Inspectors, CPSES

Ms. Alice K. Rogers
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ATTACHMENT 1 to TXX-06038

DESCRIPTION AND ASSESSMENT

LICENSEES EVALUATION

1.0 DESCRIPTION

By this letter, TXU Generation Company LP (TXU Power) requests an amendment to the CPSES Unit 1 Operating License (NPF-87) and CPSES Unit 2 Operating License (NPF-89) by incorporating the attached change into the CPSES Unit 1 and 2 Technical Specifications. Proposed change LAR 06-001 is a request to revise Technical Specifications (TS) 1.1, "Definitions" and 3.4.16 "RCS Specific Activity" for Comanche Peak Steam Electric Station (CPSES) Units 1 and 2. The proposed changes would replace the current TS limits 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 (DEX) definition that would replace the current Ē - AVERAGE DISINTEGRATION ENERGY definition. In addition, the current DOSE EQUIVALENT I-131 (DEI) definition would be revised to allow alternate, NRC-approved thyroid dose conversion factors.

No changes to the CPSES Final Safety Analysis Report are anticipated at this time as a result of this License Amendment Request.

2.0 PROPOSED CHANGE

The proposed change would:

2.1 Revise the definition of DOSE EQUIVALENT I-131 in TS 1.1 as follows:

"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 thyroid dose conversion factors from [Table III of TID-14844, AEC, 1962, "Calculation of Distance Factors for Power and Test Reactor Sites," or from Table E-7 of Regulatory Guide 1.109, Revision 1, NRC, 1977, or from ICRP-30, 1979, Supplement to Part 1, page 192-212, Table titled "Committed Dose Equivalent in Target Organs or Tissues per Intake of Unit Activity," or from Table 2.1 of EPA Federal Guidance Report No. 11, 1988, "Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion]."

2.2 Replace the TS Section 1.1 definition for Ē - AVERAGE DISINTEGRATION ENERGY with the following new definition for DEX:

"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 [Ar-41, Kr-83m, 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", or using the dose conversion factors from Table B-1 of Regulatory Guide 1.109, Revision 1, NRC, 1977.]

2.3 Revise TS Limiting Condition for Operation (LCO) 3.4.16, "RCS Specific Activity," from:

"The specific activity of the reactor coolant shall be within limits."

to

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

2.4 Delete the current TS Figure 3.4.16-1, "Reactor Coolant DOSE EQUIVALENT I-131 Specific Activity Limit Versus Percent of RATED THERMAL POWER".

2.5 Revise the Applicability of TS 3.4.16 from:

"MODES 1 and 2, MODE 3 with RCS average temperature (T_{avg}) ≥ 500°F"

to

"MODES 1, 2, 3, and 4."

2.6 Revise TS 3.4.16 Condition A from:

"DOSE EQUIVALENT I-131 > 0.45 μCi/gm."

to

"DOSE EQUIVALENT I-131 not within limit."

2.7 Revise TS 3.4.16 Required Action A.1 from:

"Verify DOSE EQUIVALENT I-131 within the acceptable region of Figure 3.4.16-1."

to

"Verify DOSE EQUIVALENT I-131 ≤ 60 μCi/gm."

2.8 Revise TS 3.4.16 Condition B from:

"Gross specific activity of the reactor coolant ≥ 100/Ē μCi/gm."

to

"DOSE EQUIVALENT XE-133 not within limit."

2.9 Add a Note to state that LCO 3.0.4.c is applicable to TS 3.4.16 Required Action B.1 and revise TS 3.4.16 Required Action B.1 from:

"Be in MODE 3 with T_{avg} < 500°F"

to

"----------------NOTE--------------
LCO 3.0.4.c is applicable.

Restore DOSE EQUIVALENT XE-133 to within limit."

2.10 Revise TS 3.4.16 Required Action B.1 Completion Time from "6 hours" to "48 hours".

2.11 Revise TS 3.4.16 Condition C from:

"Required Action and associated Completion Time of Condition A not met <u>OR</u> DOSE EQUIVALENT I-131 in the unacceptable region of Figure 3.4.16-1."

to

"Required Action and associated Completion Time of Condition A or B not met. <u>OR</u> DOSE EQUIVALENT I-131 > 60 μCi/gm."

2.12 TS 3.4.16 Required Action for Condition C would be revised from:

"C.1 Be in MODE 3 with T_{avg} < 500°F."

to

"C.1 Be in MODE 3."

AND

C.2 Be in MODE 5."

2.13 TS 3.4.16 Condition C would be revised to add a Completion Time for new Required Action C.2 of "36 hours". The completion time for Required Action C.1 would remain 6 hours.

2.14 Add a Note to state that Surveillance Requirement (SR) 3.4.16.1 is only required to be performed in MODE 1 and revise SR 3.4.16.1 from:

"Verify reactor coolant gross specific activity ≤ 100/Ē μCi/gm."

to

"-------------------------------NOTE----------------------------
Only required to be performed in MODE 1.

Verify reactor coolant DOSE EQUIVALENT XE-133 specific activity ≤ [500] μCi/gm."

2.15 Delete the current SR 3.4.16.3.

In summary, the proposed changes will revise the definition of DEI, delete the definition of Ē - AVERAGE DISINTEGRATION ENERGY, add a new definition for DEX, revise TS 3.4.16 to specify an LCO limit on DEI, add a new LCO 3.4.16 limit for DEX, increase the completion time of Required Action B.1, delete TS Figure 3.4.16-1, and revise the Conditions and Required Actions accordingly. Also, the Applicability of LCO 3.4.16 is extended to reflect the modes during which pertinent accidents (SGTR or MSLB) could be postulated to occur, SR 3.4.16.1 is revised to verify DEX prior to MODE 1 entry, and SR 3.4.16.3 is deleted.

The TS Bases for LCO 3.4.16 would be revised to reflect the proposed changes and to incorporate the bases for the proposed changes. The proposed TS Bases changes are included for information only in Attachment 5. The proposed TS change is noted on the marked up TS pages provided in Attachment 2. The proposed retyped TS pages are provided in Attachment 4.

3.0 BACKGROUND

3.1 Radiological consequence analyses

Radiological consequence analyses are performed for the steam generator tube rupture (SGTR) accident and for the main steam line break (MSLB) [outside containment] accident since these events involve the release of primary coolant activity [outside containment]. For events that also result in fuel damage (such as locked rotor, rod ejection, and loss-of-coolant accident) as a result of the accident, the dose contribution from the initial activity in the RCS is insignificant. The maximum dose to the whole body and the thyroid that an individual at the exclusion area boundary can receive for the 2 hours immediately following an accident, or at the low population zone outer boundary for the duration of a radiological release, is specified in 10CFR100.11. The limits on RCS specific activity ensure that the offsite doses are appropriately limited, as required by NUREG-0800, "U.S. Nuclear Regulatory Commission Standard Review Plan," Section 15.1.5, "Steam System Piping Failures Inside and Outside of Containment (PWR)," Appendix A, "Radiological Consequences of Main Steam Line Failures Outside Containment," Revision 2, for MSLB accidents and NUREG-0800, "U.S. Nuclear Regulatory Commission Standard Review Plan," Section 15.6.3, "Radiological Consequences of Steam Generator Tube Failure (PWR)," Revision 2, for SGTR accidents.

The maximum dose to the whole body, or its equivalent to any part of the body, that an individual can receive in the plant control room for the duration of an accident is specified in General Design Criterion 19 (GDC 19) contained in Appendix A to 10 CFR 50. The limits on RCS specific activity ensure that the doses are less than the GDC 19 limits during analyzed transients and accidents, as required by NUREG-0800, Section 6.4, "Control Room Habitability System," Revision 2, and Regulatory Position C.4.5 of NRC Regulatory Guide 1.195, "Methods and Assumptions for Evaluating Radiological Consequences of Design Basis Accidents at Light-Water Nuclear Power Reactors."

The SGTR and MSLB radiological consequence analyses establish the acceptance limits for the TS 3.4.16 limits on RCS specific activity. These analyses consider two cases of RCS iodine specific activity. Case 1 assumes that an accident-initiated iodine spike occurs which results in an increase in the rate of iodine release from those fuel rods containing [preexisting] cladding defects to the primary coolant immediately after [the postulated] MSLB or SGTR. Case 2 assumes that a pre-accident iodine spike occurs due to a transient prior to the MSLB or SGTR. The results of the SGTR radiological consequence analyses are described in [FSAR Chapter 15.6.3]. The results of the MSLB radiological consequence analyses are described in [FSAR Chapter 15.1.5].

[The Case 1 radiological consequence analyses for SGTR and MSLB assume that the initial reactor coolant iodine specific activity corresponds to an isotope mixture that bounds the proposed LCO 3.4.16 limit. The initial isotopic mix is taken from FSAR Table 15.1-4, for the SGTR analyses, and from FSAR Table 15.1-4A, for the MSLB analyses. Note that FSAR Tables 15.1-4 and 15.1-4A will be combined in new FSAR Table 15.1-4 upon approval and subsequent implementation of LAR 05-005 (Reference 8.13, TAC No. MC8163/8164) which was submitted via TXX-05127 on 08/22/05.]

This analysis assumption provides the basis for the iodine specific activity limit of 0.45 μCi/gm contained in current TS 3.4.16 Condition A and SR 3.4.16.2. Thyroid dose conversion factors based on [Table III of TID-14844, AEC, 1962, "Calculation of Distance Factors for Power and Test Reactor Sites,"] have been used in radiological consequence analyses performed to date. Any of the NRC-approved thyroid dose conversion factor references cited in the revised definition of DOSE EQUIVALENT I-131 may be used in future analyses after this amendment is approved. The radiological consequence analyses submitted with LAR 05-005 (Reference 8.13) has been updated to use the Thyroid Dose Conversion Factors in ICRP Publication 30, "Limits for Intakes of Radionuclides by Workers", 1979.

Case 1 also assumes an accident-initiated iodine spike that increases the rate of iodine release from the fuel rods containing [preexisting] cladding defects to the primary coolant immediately after [the postulated] MSLB or SGTR. The iodine spiking factor is assumed to be 500 for the Case 1 radiological consequence evaluations for MSLB. The iodine spiking factor is assumed to be 335 for the Case 1 radiological consequence evaluation for the SGTR.

The Case 2 radiological consequence analyses for SGTR and MSLB assume the initial reactor coolant iodine specific activity is a factor of 60 higher than Case 1 due to a pre-accident iodine spike caused by a transient prior the accident. This bounds the allowable RCS specific activity value of 60 μCi/gm contained in current TS Figure 3.4.16-1 for RATED THERMAL POWER (RTP) between 80% and 100% RTP. TS Figure 3.4.16-1 provides DEI concentration limits during short periods in which iodine spiking may occur due to a power transient.

In both Cases 1 and 2 radiological consequence evaluations for SGTR and MSLB, the noble gas specific activity in the reactor coolant is assumed to be that associated with 1% fuel defects (increased by 10% for conservatism). This Noble Gas isotopic mix is equivalent to [715] μCi/gm DEX. The initial DEX concentrations were calculated using [whole body dose conversion factors for air submersion based on Table III.1 of EPA Federal Guidance Report No. 12, "External Exposure to Radionuclides in Air, Water, and Soil"].

3.2 RCS Specific Activity

The RCS specific activity level is used in design basis accident analyses to determine the thyroid and whole body radiological consequences of accidents that involve the release of RCS activity. For events that also include fuel damage, the dose contribution from the initial activity in the RCS is insignificant.
The current definition for DEI is based on thyroid dose conversion factors and reflects a licensing model in which the radiological consequences of iodine releases for accidents are reported as thyroid and whole body doses. [Two] additional NRC-approved source[s] of thyroid dose conversion factors [are] being added to the revised definition.

LCO 3.4.16 specifies the limit for RCS gross specific activity as 100/Ē μCi/gm. Ē is defined as:

> "Ē 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 > [10] minutes, making up at least 95% of the total non-iodine activity in the coolant."

In performing accident dose analyses in which primary coolant is released, the concentration of noble gas activity in the coolant is assumed to be that level associated with [1% failed fuel], which closely approximates the TS 3.4.16 limit of 100/Ē μCi/gm under accident conditions.

LCO 3.4.16 specifies a limit for RCS iodine concentration during equilibrium operation. In recognition of the potential for exceeding the equilibrium iodine concentration due to iodine spiking following power transients, the LCO also permits the equilibrium value to be exceeded for a period of less than or equal to 48 hours. As currently presented, the value for the maximum allowable iodine concentration during the 48-hour period of elevated activity is a function of power level as provided in TS Figure [3.4.16-1]. In accordance with the figure, as power is reduced below 80% RTP, the allowable RCS iodine concentration increases from 60 μCi/gm DEI to as high as [300] μCi/gm DEI at [20]% RTP. Below [20]% RTP, no further increase is defined.

The curve contained in TS Figure [3.4.16-1] was initiated by the Atomic Energy Commission (AEC) in a June 12, 1974 letter from the AEC on the subject, "Proposed Standard Technical Specifications for Primary Coolant Activity." This letter does not provide any technical basis for the curve.

3.3 Purpose of Proposed Amendments

The addition of the new DEX limit and TS 3.4.16 changes are being proposed in order to implement an RCS specific activity LCO that better reflects the whole body radiological consequence analyses which are sensitive to the noble gas activity in the primary coolant but not to the other, non-gaseous activity currently captured in the Ē definition. The Ē definition includes radioisotopes that decay by the emission of both gamma and beta radiation. Current Condition B of LCO 3.4.16 would rarely, if ever, be entered for exceeding 100/Ē since that value is very high (the denominator is very low) if beta emitters such as tritium (H-3) and Fluorine-18 (F-18) are included in that value, as required by the Ē definition. [In addition, SR 3.4.16.1 requires the measurement of the degassed gamma activities and the gaseous gamma activities in the sample taken for the surveillance, resulting in a questionable determination of operability when the result is compared to 100/Ē with its beta-emitting isotopes. This has led to confusion over what to do with the beta-emitters when performing SR 3.4.16.1 and deciding whether Condition B entry is required. Satisfying LCO 3.4.16 should be incumbent upon satisfying the radiological consequence analysis assumptions, [an objective which] is not attained with the current construct of the LCO.]

4.0 TECHNICAL ANALYSIS

4.1 TS Changes

Revision to Definition of DEI

The current TS 1.1 definition for DEI is revised to add new reference[s] for acceptable thyroid dose conversion factors. Also, the word "thyroid" is deleted from the first sentence.

[Two] new thyroid dose conversion factor reference[s are] added to the definition. The new reference[s are] ICRP-30, 1979, Supplement to Part 1, page 192-212, Table titled "Committed Dose Equivalent in Target Organs or Tissues per Intake of Unit Activity," and 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. EPA Federal Guidance Report No. 11 is referenced in Regulatory Guide 1.195, "Methods and Assumptions for Evaluating Radiological Consequences of Design Basis Accidents at Light-Water Nuclear Power Reactors," May 2003, Section C, "Regulatory Position," Subsection 4, "Dose Calculational Methodology," Subsection 4.1, "Offsite Dose Consequences," assumption 4.1.2 as acceptable for determining thyroid dose from inhalation. [The thyroid dose conversion factor values contained in Table 2.1 of EPA Federal Guidance Report No. 11 are provided to three significant digits. The thyroid dose conversion factor values contained in ICRP 30 Supplement to Part 1, pages 192-212, and Table 2.1 of EPA Federal Guidance Report No. 11 are the same when the EPA Federal Guidance Report No. 11 values are rounded to two significant digits.]

The deletion of the word "thyroid" from the first sentence is an editorial change only.

Deletion of Definition for Ē - AVERAGE DISINTEGRATION ENERGY and Addition of New Definition for DEX

The current TS 1.1 definition for Ē - AVERAGE DISINTEGRATION ENERGY is deleted and replaced with a new definition for DEX.

When Ē is determined using a design basis approach in which it is assumed that 1% of the power is generated by fuel rods having cladding defects and there is no removal of fission gases from the RCS letdown flow, the value of Ē is dominated by the Xe-133 isotope. The other nuclides have relatively small contributions. However, during normal plant operation there are typically only a small number of fuel defects and the radioactive nuclide inventory can become dominated by tritium and corrosion and/or activation products, resulting in the determination of a value of Ē that is very different from that which would be calculated using the design basis approach. Therefore the radiological consequence analyses for accidents become disconnected from normal plant operation and the current TS 3.4.16 limit on gross specific activity is essentially meaningless. The use of Ē also results in a TS limit that can vary during operation as different values for Ē are determined resulting in different values for the gross specific activity limit (100/Ē μCi/gm).

Additionally, since the concern associated with the RCS noble gas activity is the acute whole body dose that the operators and the general public might receive in the event of a postulated accident, the manner in which Ē is calculated gives undue importance to nuclides that are primarily beta radiation emitters. Beta radiation will contribute to a skin dose, but not to the whole body dose. Dose limits for the general population do not include consideration of the beta skin dose.

Therefore the deletion of the current TS 1.1 Definition for Ē - AVERAGE DISINTEGRATION ENERGY and addition of a new definition for DEX will result in TS 3.4.16 requirements for RCS specific activity which are consistent with the assumptions contained in the radiological consequence analyses.

The new definition for DEX is similar to the definition for DEI. The determination of DEX will be performed in a similar manner to that currently used in determining DEI, except that the calculation of DEX is based on the acute dose to the whole body and considers the noble gases [Kr-85m, Kr-87, Kr-88, Xe-133m, Xe-133, Xe-135m, Xe-135, and Xe-138] which are significant in terms of contribution to whole body dose. [Some noble gas isotopes are not included due to low concentration, short half life, or small dose conversion factor.] If a specific noble gas nuclide is not detected, the new definition states that it should be assumed the nuclide is present at the minimum detectable activity. This will result in a conservative calculation of DEX.

The new definition of DEX states that the determination of DEX shall be performed using the 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," 1993 [or using the dose conversion factors from Table B-1 of Regulatory Guide 1.109, Revision 1, NRC, 1977]. These dose conversion factors are applicable for determination of DEX. The use of the dose conversion factors for air submersion listed in Table III.1 of EPA Federal Guidance Report No. 12 is endorsed by Regulatory Guide 1.195, Subsection 4.1, assumption 4.1.4 as acceptable for determining whole body doses because of the uniform body exposure associated with semi-infinite cloud dose modeling.

TS 3.4.16 LCO Revision

The TS 3.4.16 LCO is modified to specify that the iodine specific activity, in terms of DEI, and noble gas specific activity, in terms of DEX, shall be within limits.

Currently TS 3.4.16 states that the specific activity of the reactor coolant shall be within limits. The limits are currently not explicitly identified in the LCO but are instead defined in current Condition B and SR 3.4.16.1 for gross specific activity and in current Condition A and SR 3.4.16.2 for iodine specific activity.
The proposed change states "RCS DOSE EQUIVALENT I-131 and DOSE EQUIVALENT XE-133 specific activity shall be within limits". The DEI limit of ≤ [0.45] μCi/gm is contained in current Condition A and SR 3.4.16.2. In addition, the limit of [0.45] μCi/gm is consistent with the current SGTR and MSLB radiological consequence analyses discussed in Section 3.1 above.

The DEX limit of [500] μCi/gm is contained in revised SR 3.4.16.1 and is [consistent with the current SGTR and MSLB radiological consequences analyses discussed in Section 3.1 above.]

The primary purpose of the TS 3.4.16 LCO on RCS specific activity is to support the dose analyses for design basis accidents. Whole body doses are primarily dependent on the noble gas concentration, not the non-gaseous activity currently captured in the Ē definition. It is appropriate to have the TS 3.4.16 LCO apply to the noble gas specific activity in the RCS. Thus, it is acceptable that the current TS 3.4.16 limit on gross specific activity can be replaced by an LCO limit based on RCS noble gas specific activity in the form of DEX. The limit on the amount of noble gas activity in the RCS remains consistent with design basis accident radiological consequences analyses and would not fluctuate with variations in the calculated value of Ē during normal operation as is currently the case.

TS 3.4.16 Applicability Revision

The TS 3.4.16 Applicability is modified to include all of Mode 3 and Mode 4. It is necessary for the LCO to apply during all of Modes 1 through 4 to limit the potential radiological consequences of an SGTR or MSLB that may occur during these modes. In Modes 5 and 6, the steam generators are not used for decay heat removal, the RCS and steam generators are depressurized, and primary to secondary leakage is minimal [or non-existent]. Therefore, the monitoring of RCS specific activity during Modes 5 and 6 is not required.

TS 3.4.16 Condition A Revision

TS 3.4.16 Condition A is revised by replacing the limit "> 0.45 μCi/gm" with the words "not within limit" to be consistent with the revised TS 3.4.16 LCO format. The DEI limit of ≤ 0.45 μCi/gm is contained in SR 3.4.16.2.

TS 3.4.16 Required Action[] A.1 [] Revision

TS 3.4.16 Required Action A.1 is modified to remove the reference to Figure [3.4.16-1] and insert a limit of less than or equal to 60 μCi/gm for DEI.

The curve contained in Figure [3.4.16-1] was initiated by the AEC in a June 12, 1974 letter from the AEC on the subject, "Proposed Standard Technical Specifications for Primary Coolant Activity." However, this letter does not provide any technical basis for the curve.

The Case 2 radiological consequence analyses for SGTR and MSLB accidents that take into account the pre-accident iodine spike do not consider the elevated RCS iodine specific activities permitted by current TS Figure [3.4.16-1] for operation at power levels below 80% RTP (i.e., DEI of 60 μCi/gm at 80% RTP increasing linearly to [300] μCi/gm at [20]% RTP). Instead, the Case 2 analyses assume a DEI concentration 60 times higher than the corresponding accident's Case 1 analysis assumption, [which corresponds to the 60 μCi/gm specific activity limit associated with 100% RTP operation as discussed in Section 3.1 above.] Therefore, TS 3.4.16 Required Action A.1 should be based on a limit of 60 μCi/gm to be consistent with the assumptions contained in the radiological consequence analyses. It is not expected that plant operation at reduced power levels would result in iodine specific activity levels that exceed the 60 μCi/gm upper limit defined for full power operation.

TS 3.4.16 Condition B Revision to Include Action for DEX Limit

Current TS 3.4.16 Condition B is replaced with a new Condition B for DEX not within limits. This change is made to be consistent with the change to TS 3.4.16 LCO which requires the DEX specific activity to be within limits as discussed above. The DEX limit of [500] μCi/gm is contained in the revised SR 3.4.16.1. The limit of [500] μCi/gm is [consistent with the current SGTR and MSLB radiological consequence analyses which assume the steady state initial RCS noble gas specific activity is that associated with 1% fuel defects for both the Case 1 and Case 2 analyses.] The primary purpose of the TS 3.4.16 LCO on RCS specific activity and its associated Conditions is to support the dose analyses for design basis accidents. The whole body dose is primarily dependent on the noble gas activity, not the non-gaseous activity currently captured in the $\bar{E}$ definition and limited by current TS 3.4.16 Condition B.

The completion time for the revised TS 3.4.16 Required Action B.1 will require restoration of DEX to within limit within 48 hours. This is consistent with the completion time for current Required Action A.2 for DEI. [Since the radiological consequences reported for MSLB and SGTR demonstrate that thyroid doses are a greater percentage of the applicable SRP acceptance criteria than whole body doses, it then follows that the Completion Time for noble gas activity being out of specification in the revised Required Action B.1 should be at least as great as the Completion Time for iodine specific activity being out of specification in current Required Action A.2]. The completion time of 48 hours for the revised Required Action B.1 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 an MSLB or SGTR occurring during this time period.

A NOTE is added which states that LCO 3.0.4.c is applicable. This is consistent with the NOTE applicable to current Required Actions A.1 and A.2 for DEI. This NOTE permits entry into the applicable modes(s), relying on Required Action B.1 while the DEX LCO limit is not met. This mode change 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.

TS 3.4.16 Condition C Revision

TS 3.4.16 Condition C is revised to include Condition B if the Required Action and associated Completion Time of Condition B is not met. This is consistent with the changes made to Condition B which will no longer specify a shutdown track. Condition C is also revised to replace the limit on DEI from Figure 3.4.16-1 with a value of > 60 μCi/gm. This change makes Condition C consistent with the changes made to TS 3.4.16 Required Action A.1.

TS 3.4.16 Required Action C.1 is changed to require the plant to be in Mode 3 within 6 hours and a new Required Action C.2 is added which requires the plant to be in Mode 5 within 36 hours. These changes are consistent with the changes made to the TS 3.4.16 Applicability. The revised LCO is applicable throughout all of Modes 1 through 4 to limit the potential radiological consequences of an SGTR or MSLB that may occur during these Modes. Therefore, Condition C needs to default to a Mode 5 end state for TS 3.4.16 to no longer be applicable.

A new TS 3.4.16 Required Action C.2 Completion Time of 36 hours is added for the plant to reach Mode 5. This Completion Time is reasonable, based on operating experience, to reach Mode 5 from full power conditions in an orderly manner and without challenging plant systems. The value of 36 hours is consistent with other TS which have a Completion Time to reach Mode 5.

SR 3.4.16.1 Revision to Include Surveillance for DEX

The current SR 3.4.16.1 surveillance for RCS gross specific activity is deleted and replaced with a surveillance to verify that the reactor coolant DEX specific activity is ≤ [500] μCi/gm. This change provides a surveillance for the new LCO limit added to TS 3.4.16 for DEX.

The revised SR 3.4.16.1 surveillance 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. The surveillance provides an indication of any increase in the noble gas specific activity.
The results of the surveillance on DEX allow proper remedial action to be taken before reaching the LCO limit under normal operating conditions. The 7 day Frequency considers the unlikelihood of a gross fuel failure during this time.

If a specific noble gas nuclide listed in the new definition for DEX in Specification 1.1 is not detected, it should be assumed to be present at the minimum detectable activity. This is consistent with the new TS 1.1 Definition for DEX and will ensure a conservative calculation of DEX when noble gas nuclides are not detected.

The SR is modified by a NOTE which allows entry into Mode 4, Mode 3, and Mode 2 prior to performing the surveillance. This allows the surveillance to be performed in those modes, prior to entering Mode 1, similar to the current surveillance SR 3.4.16.2 for DEI.

SR 3.4.16.3 Deletion

Current SR 3.4.16.3 is deleted. The TS 3.4.16 LCO on RCS specific activity supports the dose analyses for design basis accidents, in which the whole body dose is primarily dependent on the noble gas concentration, not the non-gaseous activity currently captured in the $\bar{E}$ definition. Therefore, with the elimination of the limit for RCS gross specific activity and the addition of the new LCO limit for noble gas specific activity, this SR to determine $\bar{E}$ is no longer required.

4.2 Impact on Radiological Consequence Analyses

The proposed changes do not impact the radiological consequences of any design basis accident. Replacing the limit on $\bar{E}$ with a limit on DEX based on the value used in the current radiological consequence analyses will limit the RCS noble gas concentrations to values which are consistent with the radiological consequence analyses, for those noble gases which are significant in terms of contribution to dose. These changes will also limit any potential RCS iodine specific activity excursion to the value currently associated with full power operation (i.e., 60 μCi/gm DEI). This concentration is more restrictive on plant operation than the current LCO which allows operation up to [300] μCi/gm DEI as indicated in Figure 3.4.16-1. The proposed changes eliminate the potential for the radiological consequences of a postulated accident to exceed those previously calculated.

4.3 Summary

In summary, the proposed changes will revise the definition of DOSE EQUIVALENT I-131, delete the definition of $\bar{E}$ - AVERAGE DISINTEGRATION ENERGY, add a new definition for DOSE EQUIVALENT XE-133, revise TS 3.4.16 to specify an LCO limit on DOSE EQUIVALENT I-131, add a new LCO limit to TS 3.4.16 for DOSE EQUIVALENT XE-133, increase the Completion Time of Required Action B.1, delete TS Figure 3.4.16-1, and revise the TS 3.4.16 Conditions and Required Actions accordingly. Also, the Applicability of LCO 3.4.16 is extended to reflect the Modes during which pertinent accidents (SGTR and MSLB) could be postulated to occur, SR 3.4.16.1 is revised to verify DOSE EQUIVALENT XE-133 is within the prescribed limit, and SR 3.4.16.3 is deleted.

The revised definition of DOSE EQUIVALENT I-131 allows the use of thyroid dose conversion factors which are acceptable for determining thyroid dose. The above changes will result in TS 3.4.16 requirements for RCS specific activity which are consistent with the assumptions contained in the radiological consequence analyses. The primary purpose of the TS 3.4.16 LCO on RCS specific activity is to support the dose analyses for design basis accidents, in which the whole body dose is primarily dependent on the noble gas specific activity, not the non-gaseous activity currently captured in the Ē definition. The TS 3.4.16 Conditions, Required Actions, and Surveillance Requirements are revised accordingly to support the deletion of the requirements for gross specific activity based on Ē and the addition of the new LCO limit for DOSE EQUIVALENT XE-133. The proposed changes do not impact the radiological consequences of any design basis accident.

5.0 REGULATORY ANALYSIS

5.1 No Significant Hazards Consideration

[TXU Power] has evaluated whether or not a significant hazards consideration is involved with the proposed amendment(s) by focusing on the three standards set forth in 10CFR50.92, "Issuance of amendment," as discussed below:

1. Do the proposed changes involve a significant increase in the probability or consequences of an accident previously evaluated?

   Response: No

   The proposed changes to add new thyroid dose conversion factor reference[s] to the definition of DOSE EQUIVALENT I-131, eliminate the definition of Ē - AVERAGE DISINTEGRATION ENERGY, add a new definition of DOSE EQUIVALENT XE-133, replace the Technical Specification (TS) 3.4.16 limit on reactor coolant system (RCS) gross specific activity with a limit on noble gas specific activity in the form of a Limiting Condition for Operation (LCO) on DOSE EQUIVALENT XE-133, replace TS Figure 3.4.16-1 with a maximum limit on DOSE EQUIVALENT I-131, extend the Applicability of LCO 3.4.16, and make corresponding changes to TS 3.4.16 to reflect all of the above are not accident initiators and have no impact on the probability of occurrence for any design basis accidents.

   The proposed changes will have no impact on the consequences of a design basis accident because they will limit the RCS noble gas specific activity to be consistent with the values assumed in the radiological consequence analyses. The changes will also limit the potential RCS iodine concentration excursion to the value currently associated with full power operation, which is more restrictive on plant operation than the existing allowable RCS iodine specific activity at lower power levels.

Therefore, the proposed changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Do the proposed changes create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No

The proposed changes do not alter any physical part of the plant nor do they affect any plant operating parameters besides the allowable specific activity in the RCS. The changes which impact the allowable specific activity in the RCS are consistent with the assumptions assumed in the current radiological consequence analyses.

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

3. Do the proposed changes involve a significant reduction in a margin of safety?

Response: No

The acceptance criteria related to the proposed changes involve the allowable Control Room and offsite radiological consequences following a design basis accident. The proposed changes will have no impact on the radiological consequences of a design basis accident because they will limit the RCS noble gas specific activity to be consistent with the values assumed in the radiological consequence analyses. The changes will also limit the potential RCS iodine specific activity excursion to the value currently associated with full power operation, which is more restrictive on plant operation than the existing allowable RCS iodine specific activity at lower power levels.

Therefore the proposed change does not involve a reduction in a margin of safety.

Based on the above evaluations, [TXU Power] concludes that the proposed amendment(s) present no significant hazards under the standards set forth in 10CFR50.92(c) and, accordingly, a finding of "no significant hazards consideration" is justified.

5.2 Applicable Regulatory Requirements/Criteria

The regulatory guidance documents associated with this LAR include:

- NUREG-0800, "U.S. Nuclear Regulatory Commission Standard Review Plan," Section 15.1.5, "Steam System Piping Failures Inside and Outside of Containment (PWR)," Appendix A, "Radiological Consequence of Main Steam Line Failures Outside Containment," Revision 2, that identifies the thyroid and whole body offsite radiological consequence acceptance criteria for main steam line break accidents.

- NUREG-0800, "U.S. Nuclear Regulatory Commission Standard Review Plan," Section 15.6.3, "Radiological Consequences of Steam Generator Tube Failure (PWR)," Revision 2, that identifies the thyroid and whole body offsite radiological consequence acceptance criteria for steam generator tube rupture accidents.

- NUREG-0800, "U.S. Nuclear Regulatory Commission Standard Review Plan," Section 6.4, "Control Room Habitability System," Revision 2, that identifies the thyroid, whole body, and beta skin radiological consequence acceptance criteria for control room occupants.

- Regulatory Guide 1.195, "Methods and Assumptions for Evaluating Radiological Consequences of Design Basis Accidents at Light-Water Nuclear Power Reactors," that provides acceptable dose conversion factors, radiological consequence acceptance criteria, and other dose analysis methodology parameters.

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

[TXU Power] has determined that the proposed amendment would change requirements with respect to the installation or use of a facility component located within the restricted area, as defined in 10CFR20, or would change an inspection or surveillance requirement. [TXU Power] has evaluated the proposed changes and has determined that the changes do not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amount of effluent that may be released offsite, or (iii) a significant increase in the individual or cumulative occupational radiation exposure.

Accordingly, the proposed change meets the eligibility criterion for categorical exclusion set forth in 10CFR51.22 (c)(9). Therefore, pursuant to 10CFR51.22 (b), [an environmental assessment of the proposed change is not required.]

7.0 PRECEDENT

The Technical Specifications developed for the Westinghouse AP600 and AP1000 advanced reactor designs utilize an LCO for RCS DEX activity in place of the LCO on gross specific activity based on Ē. This approach was approved by the NRC for the AP600 in NUREG-1512, "Final Safety Evaluation Report Related to the Certification of the AP600 Standard Design, Docket No. 52-003," dated August 1998, and for the AP1000 in the NRC letter to Westinghouse Electric Company dated September 13, 2004. The curve in current TS Figure 3.4.16-1 was not included in the TS approved for the AP600 and AP1000 advanced reactor designs.

8.0. REFERENCES

8.1 Environmental Protection Agency (EPA) Federal Guidance Report No. 11, EPA-520/1-88-020,"Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion," September 1988.

8.2 Environmental Protection Agency (EPA) Federal Guidance Report No. 12, EPA-402-R-93-081, "External Exposure to Radionuclides in Air, Water, and Soil," 1993.

8.3 International Commission on Radiological Protection (ICRP) Publication 30, "Limits for Intakes of Radionuclides by Workers," ICRP, 1979.

8.4 Atomic Energy Commission (AEC) letter "Proposed Standard Technical Specifications for Primary Coolant Activity," dated June 12, 1974.

8.5 Regulatory Guide 1.195, "Methods and Assumptions for Evaluating Radiological Consequences of Design Basis Accidents at Light-Water Nuclear Power Reactors," May 2003.

8.6 Regulatory Guide 1.109, Revision 1, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," October 1977.

8.7 Atomic Energy Commission (AEC) Report TID-14844, "Calculation of Distance Factors for Power and Test Reactor Sites," March 1962.

8.8 NUREG-0800, "U.S. Nuclear Regulatory Commission Standard Review Plan," Section 15.1.5, "Steam System Piping Failures Inside and Outside of Containment (PWR)," Appendix A, "Radiological Consequences of Main Steam Line Failures Outside Containment," Revision 2, July 1981.

8.9 NUREG-0800, "U.S. Nuclear Regulatory Commission Standard Review Plan," Section 15.6.3, "Radiological Consequences of a Steam Generator Tube Failure (PWR)," Revision 2, July 1981.

8.10 NUREG-0800, "U.S. Nuclear Regulatory Commission Standard Review Plan," Section 6.4, "Control Room Habitability System," Revision 2, July 1981.

8.11 NUREG-1512, "Final Safety Evaluation Report Related to the Certification of the AP600 Standard Design, Docket No. 52-003," August 1998.

8.12 NUREG-1431, Volume 1, Revision 3, "Standard Technical Specifications Westinghouse Plants," dated June 2004.

8.13 TXU Power letter, logged TXX-05127, "License Amendment Request (LAR) 05-005, Revision to Technical Specification 3.7.10, Control Room Emergency Filtration/Pressurization System (CREFS)", from Mike Blevins to USNRC, dated August 22, 2005.

ATTACHMENT 2 to TXX-06038

PROPOSED TECHNICAL SPECIFICATION CHANGES (MARK-UP)

1.1 Definitions (continued)

DOSE EQUIVALENT I-131

INSERT 1

~~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," or those listed in Table E-7 of Regulatory Guide 1.109, Rev. 1, NRC, 1977~~

INSERT 2

~~Ē – AVERAGE DISINTEGRATION ENERGY~~

~~Ē 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 >10 minutes, making up at least 95% of the total noniodine 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.

(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]

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 ~~> 0.45 μCi/gm~~. [not within limit]	-----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~~. [≤ 60 μCi/gm]	Once per 4 hours
	AND	
	A.2 Restore DOSE EQUIVALENT I-131 to within limit.	48 hours

~~109~~

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
DOSE EQUIVALENT XE-133 not within limit B. ~~Gross specific activity of the reactor coolant ≥ 100/Ē μCi/gm.~~	B.1 ~~Be in MODE 3 with T_{avg} < 500°F.~~ INSERT 3	~~6~~ 48 hours
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.~~ Be in MODE 3 AND C.2 Be in MODE 5	6 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.4.16.1 Verify reactor coolant ~~gross~~ DOSE EQUIVALENT XE-133 specific activity ≤ ~~100/Ē~~ 500 μCi/gm. - - - - - - - - - - - - - - - Only required to be performed in MODE 1. - - - - - - - - - - - - - - -	7 days

(continued)

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 ≤ 0.45 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 and 20 days of MODE 1 operation have elapsed since the reactor was last subcritical for ≥ 48 hours.~~ ---------- ~~Determine Ē 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.~~	DELETED ~~184 days~~

102

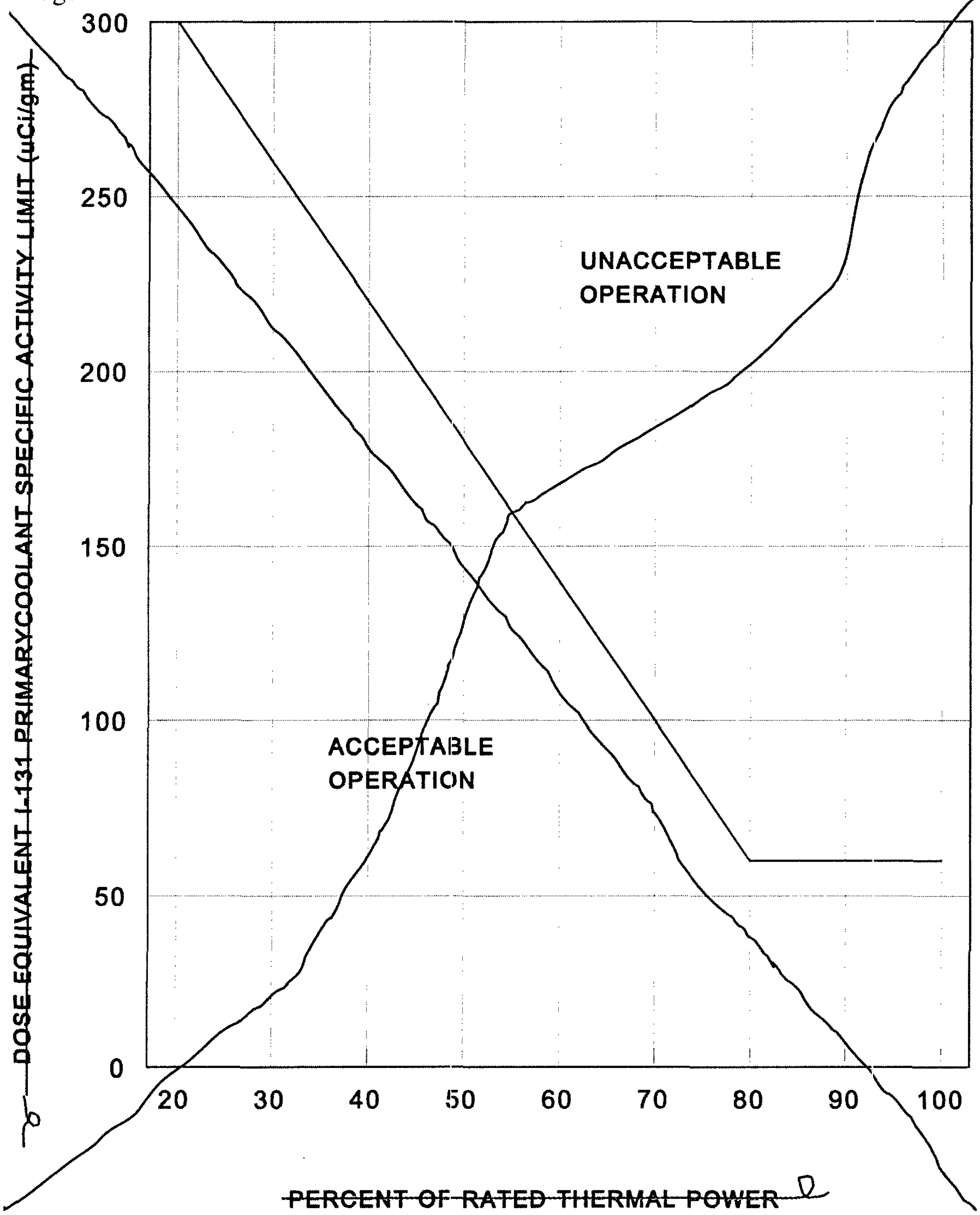

Figure 3.4.16-1 (page 1 of 1)
Reactor Coolant DOSES EQUIVALENT I-131 Specific Activity
Limit Versus Percent of RATED THERMAL POWER

INSERTS

INSERT 1

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 thyroid dose conversion factors from Table III of TID-14844, AEC, 1962, "Calculation of Distance Factors for Power and Test Reactor Sites," or from Table E-7 of Regulatory Guide 1.109, Revision 1, NRC, 1977, or from ICRP-30, 1979, Supplement to Part 1, page 192-212, Table titled "Committed Dose Equivalent in Target Organs or Tissues per Intake of Unit Activity," or from 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."

INSERT 2

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-87, Kr-88, Xe-133m, Xe-133, Xe-135m, Xe-135, and Xe-138 actually present. If a specific noble gas nuclide s 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", or using the dose conversion factors from Table B-1 of Regulatory Guide 1.109, Revision 1, NRC, 1977.

INSERT 3

--------------------NOTE-------------------
LCO 3.0.4.c is applicable.

B.1 Restore DOSE EQUIVALENT XE-133 to within limit.

ATTACHMENT 3 to TXX-06038

PROPOSED TECHNICAL SPECIFICATIONS BASES CHANGES
(Markup For Information Only)

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.16 RCS Specific Activity

INSERT 2 following INSERT 1

BASES

BACKGROUND

Exclusion Area

100.11

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. 1). The limits on specific activity ensure that the doses are ~~held to a small fraction of the 10 CFR 100 limits~~ during analyzed transients and accidents.

appropriately limited

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) or a main steam line break (MSLB) accident. 25

DOSE EQUIVALENT XE-133

INSERT 3

The ~~LCO~~ contains specific activity limits for both DOSE EQUIVALENT I-131 and ~~gross specific activity~~. The allowable levels are intended to ~~limit the 2 hour dose at the site boundary to a small fraction of the 10 CFR 100 dose guideline limits~~. The limits in the LCO are specific to CPSES due to the implementation of the alternate steam generator tube repair criteria. 25

,or more conservative than,

offsite and Control Room

INSERT 4

APPLICABLE SAFETY ANALYSES

The LCO limits on the specific activity of the reactor coolant ensures that the resulting ~~2 hour~~ doses ~~at the site boundary will not exceed a small fraction of the 10 CFR 100 dose guideline limits~~ following a SGTR or a MSLB accident. The SGTR safety analysis (Ref. 2) assumes the specific activity of the reactor coolant at the LCO limit and an existing reactor coolant steam generator (SG) tube leakage rate of 1 gpm. The MSLB safety analysis (Ref. 3) assumes the specific activity of the reactor coolant at the LCO limit and an existing reactor coolant steam generator (SG) tube leakage rate of 27.8 gpm in the affected steam generator and 450 gpm combined in the unaffected steam generators. The safety analysis for both accidents assumes the specific activity of the secondary coolant at its limit of 0.1 μCi/gm DOSE EQUIVALENT I-131 from LCO 3.7.18, "Secondary Specific Activity." 25

(continued)

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[1] The referenced safety analysis reports the doses for the SGTR assuming DEI-131 to be 1.0 μCi/gm. The doses reported using this value have been shown to be conservative relative to those that would be calculated using a DEI-131 value of 0.45 μCi/gm. 25

[2] To obtain the maximum benefit from the steam generator alternate repair criteria, the MSLB radiological consequences analysis assumes a leak rate to the faulted steam generator during the accident that results in calculated consequences approaching a small fraction (10%) of the 10 CFR 100 guideline values for the accident initiated spike. This leak rate provides a maximum primary-to-secondary leak rate limit against which the predicted end-of-cycle leakage is compared.

[and SGTR]

BASES

APPLICABLE SAFETY ANALYSES (continued)

The analysis for the MSLB accidents establishes the acceptance limits for RCS specific activity. However, the SGTR accident analysis consequences are significant. Reference to these analyses are used to assess changes to the unit that could affect RCS specific activity, as they relate to the acceptance limits. 25

Each of the above analyses must consider two cases of reactor coolant specific activity. One case assumes specific activity at 0.45 μCi/gm DOSE EQUIVALENT I-131 with a concurrent large iodine spike that increases the I-131 activity in the reactor coolant by a factor of about 500 immediately after the accident. The second case assumes the initial reactor coolant iodine activity at 60.0 μCi/gm DOSE EQUIVALENT I-131 due to a pre-accident iodine spike caused by an RCS transient. In both cases, the noble gas activity in the reactor coolant design basis radiological analyses is based on the fraction of fuel defects (0.24%) that corresponds to 1.0 μCi/gm DOSE EQUIVALENT I-131. The LCO limit of 100/Ē μCi/gm for gross specific activity, which closely equals 1% failed fuel, is not directly applicable to any CPSES radiological accident analyses. 25 39

[INSERT 5] [INSERT 6]

These analyses also assume a loss of offsite power at the same time as the SGTR or the MSLB event. 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 N-16 signal. The MSLB causes a reduction in reactor coolant temperature and pressure. The temperature decrease causes an increase in reactor power. The power increase will trip the reactor on high neutron flux or overpower N-16. The pressure decrease will initiate a reactor trip on either low pressurizer pressure or the safety injection signal initiated by low pressurizer pressure, low steam generator pressure, or high containment pressure. 25

For the SGTR and the MSLB, the coincident loss of offsite power causes the steam dump valves to close to protect the condenser. For the SGTR, a rise in pressure in the ruptured SG discharges radioactively contaminated steam to the atmosphere through the SG atmospheric relief valves and the main steam safety valves. A failure to close of the atmospheric relief valve on the affected SG is also assumed. The unaffected SGs remove core decay heat by venting steam to the atmosphere until the cooldown ends. For the MSLB, an uncontrolled (i.e, released to atmosphere) blowdown of only one steam generator is assumed. The unaffected SGs remove core decay heat by venting steam to the atmosphere until the cooldown ends. Radioactively contaminated steam is released to the atmosphere through the faulted SG as well as the intact SGs assuming the primary to secondary leak rates shown above. 25 25

[INSERT 7]

The applicable safety analysis shows the radiological consequences of either an SGTR or an MSLB accident are within a small fraction of 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 the limits shown in Figure 3.4.16-1, in the applicable specification, for more than 48 hours. The safety analysis has concurrent and pre-accident iodine spiking levels up to 60.0 μCi/gm DOSE EQUIVALENT I-131. 25

[60.0 μCi/gm DOSE EQUIVALENT I-131]

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

~~The remainder of the above limit permissible iodine levels shown in Figure 3.4.16-1 are acceptable because of the low probability of a SGTR or MSLB accident occurring during the established 48 hour time limit. The occurrence of an SGTR or an MSLB accident at these permissible levels could increase the site boundary dose levels, but still be within 10 CFR 100 dose guideline limits.~~ 25

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 10CFR50.36(c)(2)(ii).

LCO

in the reactor coolant

The specific iodine activity is limited to 0.45 μCi/gm DOSE EQUIVALENT I-131, and ~~the gross specific activity in the reactor coolant is limited to the number of μCi/gm equal to 100 divided by Ē (average disintegration energy of the sum of the average beta and gamma energies of the coolant nuclides). The limit on DOSE EQUIVALENT I-131 ensures the 2 hour thyroid dose to an individual at the site boundary during the Design Basis Accident (DBA) will be within the allowed thyroid dose guideline. Since the noble gas activity in the reactor coolant design basis radiological analyses is based on the fraction of fuel defects (0.24%) that corresponds to 1.0 μCi/gm DOSE EQUIVALENT I-131, the limit on DOSE EQUIVALENT I-131 also ensures the 2 hour whole body dose to an individual at the site boundary during the DBA will be a small fraction of the allowed whole body dose. The limit on gross specific activity is not directly applicable to any CPSES radiological accident analyses.~~ 25 39

INSERT 8

calculated

The SGTR accident analysis (Ref. 2) and the MSLB accident analysis (Ref. 3) show 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~~. 25

SRP acceptance criteria

MSLB or

(continued)

BASES (continued)

APPLICABILITY

In MODES 1 [, 2, 3, and 4] ~~and 2, and in MODE 3 with RCS average temperature ≥ 500ºF~~, operation within the LCO limits for DOSE EQUIVALENT I-131 [and DOSE EQUIVALENT XE-133] is ~~necessary to contain~~ [limit] the potential consequences of an SGTR and an MSLB to within the [SRP acceptance criteria] ~~acceptable site boundary dose values. While not directly used in any CPSES radiological accident analyses, the applicability defined above for DOSE EQUIVALENT I-131 is also applied to the gross specific activity (100/ Ē μCi/gm) LCO~~. 39

[INSERT 9] ~~For operation in MODE 3 with RCS average temperature < 500ºF, and in MODES 4 and 5, the offsite release of radioactivity in the event of a SGTR is unlikely since the saturation pressure of the reactor coolant is below the lift pressure settings of the main steam safety and relief valves. For operation in MODE 3 with RCS average temperature < 500ºF, and in MODES 4 and 5, the offsite release of radioactivity in the event of an MSLB is unlikely. This is because the saturation pressure of the reactor coolant is sufficiently low that the primary-to-secondary pressure difference created when the affected SG depressurizes is not large enough to cause significant SG tube damage. Also, for the unaffected SGs the offsite release of radioactivity in the event of an MSLB is unlikely since the saturation pressure of the reactor coolant is below the lift pressure settings of the main steam safety and relief valves.~~ 25

ACTIONS

A.1 and A.2

[INSERT 10] A Note permits the use of the provisions of LCO 3.0.4.c. This allowance permits entry into the applicable MODE(S) while relying on ~~the ACTIONS~~. 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. 34

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] ~~limits of Figure 3.4.16-1 are not exceeded~~. The Completion Time of 4 hours is required to obtain and analyze a sample. Sampling is done to continue to provide a trend.

The DOSE EQUIVALENT I-131 must be restored to within limits within 48 hours. The Completion Time of 48 hours is [INSERT 11] ~~required, if the limit violation resulted from normal iodine spiking~~.

16
25

(continued)

BASES

ACTIONS (continued)

B.1

INSERT 12

~~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.~~

INSERT 13

~~The change within 6 hours to MODE 3 and RCS average temperature < 500ºF lowers the saturation pressure of the reactor coolant to an acceptable level. The allowed Completion Time of 6 hours is reasonable, based on operating experience, to reach MODE 3 below 500ºF from full power conditions in an orderly manner and without challenging plant systems.~~ 25

C.1 and C.2

If ~~a~~ the Required Action and the associated Completion Time of Condition A or B is not met or if the DOSE EQUIVALENT I-131 is > 60.0 μCi/gm ~~in the unacceptable region of Figure 3.4.16-1~~, the reactor must be brought to MODE 3 ~~with RCS average temperature < 500ºF~~ within 6 hours and MODE 5 within 36 hours. The allowed Completion Times ~~of 6 hours is~~ are reasonable, based on operating experience, to reach ~~MODE 3 below 500ºF~~ 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 ~~gross~~ noble gas specific activity of the reactor coolant at least once every 7 days. ~~While basically a quantitative measure of radionuclides with half lives longer than 10 minutes, excluding iodines, t~~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~~ 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 Surveillance is applicable in MODES 1 and 2, and in MODE 3 with T_{avg} greater than or equal to 500ºF.~~ The 7 day Frequency considers the unlikelihood of a gross fuel failure during the time.

INSERT 14

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.4.16.2

[iodine spiking] [noble gas] [specific activity] [the LCO] [iodine spike initiation]

This Surveillance is performed in MODE 1 only to ensure 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~~ 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 ~~fuel failure~~; samples at other times would provide inaccurate results.

[INSERT 15]

SR 3.4.16.3

[DELETED]

~~A radiochemical analysis for Ē determination is required every 184 days (6 months) with the plant operating in MODE 1 equilibrium conditions. The Ē determination directly relates to the LCO and is required to verify plant operation within the specified gross activity LCO limit. The analysis for Ē is a measurement of the average energies per disintegration for isotopes with half lives longer than 10 minutes, excluding iodines. The Frequency of 184 days recognizes Ē does not change rapidly.~~

~~This SR has been modified by a Note that indicates sampling is required to be performed within 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 at least 48 hours. This ensures that the radioactive materials are at equilibrium so the analysis for Ē is representative and not skewed by a crud burst or other similar abnormal event.~~

REFERENCES

1. 10 CFR 100.11, 1973.
2. FSAR, Section 15.6.3.
3. FSAR, Section 15.1.5 | 25

INSERTS

INSERT 1

,or at the Low Population Zone outer boundary for the radiological release duration,

INSERT 2

Doses to the Control Room operators must be limited per GDC 19.

INSERT 3

ensure that offsite and Control Room doses meet the appropriate acceptance criteria in the Standard Review Plan.

INSERT 4

meet the appropriate Standard Review Plan acceptance criteria.

INSERT 5

,by a factor of [500 or 335], the rate of release of iodine from the fuel rods containing cladding defects to the primary coolant immediately after a MSLB or SGTR, respectively.

INSERT 6

specific activity is assumed to be the equivalent of 1% fuel defects which corresponds to [715] µci/gm DOSE EQUIVALENT XE-133.

INSERT 7

RHR system is placed in service.

INSERT 8

noble gas specific activity in the reactor coolant is limited to [500] µci/gm DOSE EQUIVALENT XE-133, as contained in SR 3.4.16.2 and SR 3.4.16.1 respectively. The limits on specific activity ensure that offsite and Control Room doses will meet the appropriate Standard Review Plan acceptance criteria.

INSERT 9

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, monitoring of RCS specific activity is not required.

INSERTS

INSERT 10

Required Actions A.1 and A.2 while the DOSE EQUIVALENT I-131 LCO limit is not met.

INSERT 11

acceptable since it is expected that, if there were no 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.

INSERT 12

With the DOSE EQUIVALENT XE-133 in excess of the allowed limit, DOSE EQUIVALENT XE-133 must be restored to within limits 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.

INSERT 13

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.

INSERT 14

If a specific noble gas nuclide listed in the definition of DOSE EQUIVALENT XE-133 in Specification 1.1, Definitions," is not detected, it should be assumed to be present at the minimum detectable activity.

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.

INSERT 15

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.

ATTACHMENT 4 to TXX-06038

RETYPED TECHNICAL SPECIFICATION PAGES

Pages 1.1-3
3.4-44
3.4-45
3.4-46

1.1 Definitions (continued)

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 thyroid dose conversion factors from Table III of TID-14844, AEC, 1962, "Calculation of Distance Factors for Power and Test Reactor Sites," or from Table E-7 of Regulatory Guide 1.109, Revision 1, NRC, 1977, or from ICRP-30, 1979, Supplement to Part 1, page 192-212, Table titled "Committed Dose Equivalent in Target Organs or Tissues per Intake of Unit Activity," or from 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."

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-87, Kr-88, 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", or using the dose conversion factors from Table B-1 of Regulatory Guide 1.109, Revision 1, NRC, 1977.

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.

(continued)

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.16 RCS Specific Activity

LCO 3.4.16 RCS DOSE EQUIVALENT I-131 and DOSE EQUIVALENT XE-133 specific activity shall be within limits.

APPLICABILITY: MODES 1, 2, 3, and 4

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. DOSE EQUIVALENT I-131 not within limit.	------------------Note------------------ LCO 3.0.4.c is applicable. --	
	A.1 Verify DOSE EQUIVALENT I-131 ≤ 60 μCi/gm. AND	Once per 4 hours
	A.2 Restore DOSE EQUIVALENT I-131 to within limit.	48 hours

~~109~~

(continued)

ACTIONS (continued)

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

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.16.1	----------------------------NOTE---------------------------- Only required to be performed in MODE 1. -- Verify reactor coolant DOSE EQUIVALENT XE-133 specific activity ≤ 500 μCi/gm.	7 days

(continued)

ACTIONS (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 ≤ 0.45 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	DELETED	DELETED

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ATTACHMENT 5 to TXX-06038

RETYPED TECHNICAL SPECIFICATION BASES PAGES

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.16 RCS Specific Activity

BASES

BACKGROUND

The maximum dose to the whole body and the thyroid 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. 1). Doses to the Control Room operators must be limited per GDC 19. The limits on specific activity ensure that the 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 offsite radioactivity dose consequences in the event of a
steam generator tube rupture (SGTR) or a main steam line break (MSLB) 25
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. The limits in 25
the LCO are specific to CPSES due to the implementation of the alternate steam generator tube repair criteria.

APPLICABLE SAFETY ANALYSES

The LCO limits on the specific activity of the reactor coolant ensures that the resulting offsite and Control Room doses meet the appropriate
Standard Review Plan acceptance criteria following a SGTR or a MSLB 25
accident. The SGTR safety analysis (Ref. 2) assumes the specific activity of the reactor coolant at, or more conservative than, the LCO limit and an existing reactor coolant steam generator (SG) tube leakage rate of 1 gpm. The MSLB safety analysis (Ref. 3) assumes the specific activity of the reactor coolant at, or more conservative than, the LCO limit and an existing reactor coolant steam generator (SG) tube leakage rate of 27.8 gpm in the affected steam generator and 450 gpm combined in the unaffected steam generators. The safety analysis for both accidents
assumes the specific activity of the secondary coolant at its limit of 25
0.1 μCi/gm DOSE EQUIVALENT I-131 from LCO 3.7.18, "Secondary Specific Activity."

(continued)

[1] The referenced safety analysis reports the doses for the SGTR assuming DEI-131 to be 1.0 μCi/gm. 25
The doses reported using this value have been shown to be conservative relative to those that would be calculated using a DEI-131 value of 0.45 μCi/gm.

[2] To obtain the maximum benefit from the steam generator alternate repair criteria, the MSLB radiological consequences analysis assumes a leak rate to the faulted steam generator during the accident that results in calculated consequences approaching a small fraction (10%) of the 10 CFR 100 guideline values for the accident initiated spike. This leak rate provides a maximum primary-to-secondary leak rate limit against which the predicted end-of-cycle leakage is compared.

BASES

APPLICABLE SAFETY ANALYSES (continued)

The analysis for the MSLB and SGTR accidents establish the acceptance 25
limits for RCS specific activity. Reference to these analyses are used to
assess changes to the unit that could affect RCS specific activity, as they
relate to the acceptance limits.

Each of the above analyses must consider two cases of reactor coolant 25
specific activity. One case assumes specific activity at 0.45 μCi/gm DOSE
EQUIVALENT I-131 with a concurrent large iodine spike that increases,
by a factor of 500 or 335, the rate of release of iodine from the fuel rods
containing cladding defects to the primary coolant immediately after a 39
MSLB or SGTR, respectively. The second case assumes the initial
reactor coolant iodine activity at 60.0 μCi/gm DOSE EQUIVALENT I-131
due to a pre-accident iodine spike caused by an RCS transient. In both
cases, the noble gas specific activity is assumed to be the equivalent of
1% fuel defects which corresponds to [715] μCi/gm DOSE EQUIVALENT
XE-133.

These analyses also assume a loss of offsite power at the same time as 25
the SGTR or the MSLB event. 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 N-16 signal. The
MSLB causes a reduction in reactor coolant temperature and pressure.
The temperature decrease causes an increase in reactor power. The
power increase will trip the reactor on high neutron flux or overpower N-16. The pressure decrease will initiate a reactor trip on either low
pressurizer pressure or the safety injection signal initiated by low
pressurizer pressure, low steam generator pressure, or high containment
pressure.

For the SGTR and the MSLB, the coincident loss of offsite power causes 25
the steam dump valves to close to protect the condenser. For the SGTR,
a rise in pressure in the ruptured SG discharges radioactively
contaminated steam to the atmosphere through the SG atmospheric relief
valves and the main steam safety valves. A failure to close of the
atmospheric relief valve on the affected SG is also assumed. The
unaffected SGs remove core decay heat by venting steam to the
atmosphere until RHR system is placed in service. For the MSLB, an
uncontrolled (i.e., released to atmosphere) blowdown of only one steam 25
generator is assumed. The unaffected SGs remove core decay heat by
venting steam to the atmosphere until RHR system is placed in service.
Radioactively contaminated steam is released to the atmosphere through
the faulted SG as well as the intact SGs assuming the primary to
secondary leak rates shown above.

The applicable safety analysis shows the radiological consequences of 25
either an SGTR or an MSLB accident are within a small fraction of 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 60 μCi/gm DOSE EQUIVALENT I-131 for more than 48 hours.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

The limits on RCS specific activity are also used for establishing standardization in radiation shielding and plant personnel radiation protection practices. 25

RCS specific activity satisfies Criterion 2 of 10CFR50.36(c)(2)(ii). 39

LCO

The iodine specific activity in the reactor coolant is limited to 0.45 μCi/gm DOSE EQUIVALENT I-131, and the noble gas specific activity in the reactor coolant is limited to [500] μCi/gm DOSE EQUIVALENT XE-133, as contained in SR 3.4.16.2 and SR 3.4.16.1 respectively. The limits on specific activity ensure that offsite and Control Room doses will meet the appropriate Standard Review Plan acceptance criteria. 25

The SGTR accident analysis (Ref. 2) and the MSLB accident analysis (Ref. 3) show that the calculated dose levels 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. 25

(continued)

BASES (continued)

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 an SGTR and an MSLB to within the SRP acceptance criteria. 39

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, monitoring of RCS specific activity is not required. 25

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 done to continue to provide a trend. 34

The DOSE EQUIVALENT I-131 must be restored to within limits within 48 hours. The Completion Time of 48 hours is acceptable since it is expected that, if there were no 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) while 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. 16
25

(continued)

BASES

ACTIONS (continued)

B.1

With the DOSE EQUIVALENT XE-133 in excess of the allowed limit, DOSE EQUIVALENT XE-133 must be restored to within limits 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 of the provisions of LCO 3.0.4.c. This
allowance permits entry into the applicable MODE(S), relying on Required 25
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 the 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 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 unlikelihood of a gross fuel failure during the time.

If a specific noble gas nuclide listed in the definition of DOSE EQUIVALENT XE-133 in Specification 1.1, Definitions," is not detected, it should be assumed to be present at the minimum detectable activity.

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.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.4.16.2

This Surveillance is performed in MODE 1 only 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 3.4.16.3

DELETED

REFERENCES

1. 10 CFR 100.11, 1973.
2. FSAR, Section 15.6.3.
3. FSAR, Section 15.1.5 25