

NUCLEAR REGULATORY COMMISSION  
Notice of Availability of Model Application Concerning  
Technical Specification Improvement Regarding  
Deletion of E Bar Definition and Revision to Reactor Coolant  
System Specific Activity Technical Specification  
Using the Consolidated Line Item Improvement Process

AGENCY: Nuclear Regulatory Commission.

ACTION: Notice of Availability

SUMMARY: Notice is hereby given that the staff of the U. S. Nuclear Regulatory Commission (NRC) has prepared a model license amendment request (LAR), model safety evaluation (SE), and model proposed no significant hazards consideration (NSHC) determination related to deletion of the E Bar definition and revision to reactor coolant system (RCS) specific activity technical specification. This request revises the RCS specific activity specification for pressurized water reactors to utilize a new indicator, Dose Equivalent Xenon-133 instead of the current indicator known as E Bar.

The purpose of these models is to permit the NRC staff to efficiently process amendments to incorporate these changes into plant-specific technical specifications (TS) for Babcock and Wilcox, Westinghouse, and Combustion Engineering pressurized water reactors (PWRs). Licensees of nuclear power reactors to which the models apply can request amendments conforming to the models. In such a request, a licensee should confirm the applicability of the model LAR, model SE and NSHC determination to its plant.

DATES: The NRC staff issued a Federal Register Notice (71 FR 67170, November 20, 2006) which provided a model LAR, model SE, and model NSHC related to deletion of E Bar definition and revision to RCS specific activity technical specification; similarly the NRC staff herein provides a revised model LAR, a revised model SE, and a revised model NSHC. The NRC staff can most efficiently consider applications based upon the model LAR, which references the model SE, if the application is submitted within one year of this Federal Register Notice.

FOR FURTHER INFORMATION CONTACT: Trent Wertz, Mail Stop: O-12H2, Division of Inspection and Regional Support, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, telephone (301) 415-1568.

SUPPLEMENTARY INFORMATION:

Background

Regulatory Issue Summary 2000-06, "Consolidated Line Item Improvement Process (CLIIP) for Adopting Standard Technical Specifications Changes for Power Reactors," was issued on March 20, 2000. The CLIIP is intended to improve the efficiency and transparency of NRC licensing processes. This is accomplished by processing proposed changes to the Standard Technical Specifications (STS) in a manner that supports subsequent license amendment applications. The CLIIP includes an opportunity for the public to comment on proposed changes to the STS following a preliminary assessment by the NRC staff and finding that the change will likely be offered for adoption by licensees. The CLIIP directs the NRC staff to evaluate any comments received for a proposed change to the STS and to either reconsider the change or proceed with announcing the availability of the change for proposed adoption by licensees. Those licensees opting to apply for the subject change to TSs are responsible for reviewing the NRC staff's evaluation, referencing the applicable technical justifications, and providing any necessary plant-specific information. Each amendment application made in response to the notice of availability will be processed and noticed in accordance with

applicable NRC rules and procedures.

This notice involves replacement of the current PWR TS 3.4.16 limit on 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 E Bar average disintegration energy definition. In addition, the current dose equivalent I-131 (DEI) definition would be revised to allow the use of additional thyroid dose conversion factors (DCFs). By letter dated September 13, 2005, the Technical Specification Task Force (TSTF) proposed these changes for incorporation into the STS as TSTF-490, Revision 0, which was referenced in the Federal Register Notice (FRN) 71 FR 67170, of November 20, 2006, and can be viewed on the NRC's web page at <http://www.nrc.gov/reactors/operating/licensing/techspecs.html>

#### Applicability

These proposed changes will revise the definition of DOSE EQUIVALENT I-131, delete the definition of "E Bar," AVERAGE DISINTEGRATION ENERGY, add a new definition for DOSE EQUIVALENT XE-133, and revise LCO 3.4.16 for Babcock and Wilcox, Westinghouse, and Combustion Engineering PWRs.

To efficiently process the incoming license amendment applications, the NRC staff requests that each licensee applying for the changes addressed by TSTF-490, Revision 0, using the CLIP submit an LAR that adheres to the following model. Any variations from the model LAR should be explained in the licensee's submittal. Variations from the approach recommended in this notice may require additional review by the NRC staff, and may increase the time and resources needed for the review. Significant variations from the approach, or inclusion of additional changes to the license, will result in staff rejection of the submittal. Instead, licensees desiring significant variations and/or additional changes should submit a LAR that does not claim to adopt TSTF-490.

## Public Notices

The staff issued a Federal Register Notice (71 FR 67170, November 20, 2006) that requested public comment on the NRC's pending action to delete the E Bar definition and revise the RCS specific activity technical specification. In particular, following an assessment and draft safety evaluation by the NRC staff, the staff sought public comment on proposed changes to the STS, designated TSTF-490 Revision 0. The TSTF-490 Revision 0 can be viewed on the NRC's web page at

<http://www.nrc.gov/reactors/operating/licensing/techspecs.html>. TSTF-490 Revision 0 may be examined, and/or copied for a fee, at the NRC Public Document Room, located at One White Flint North, 11555 Rockville Pike (first floor), Rockville, Maryland. Publicly available records are accessible electronically from the ADAMS Public Library component on the NRC Web site, (the Electronic Reading Room) at <http://www.nrc.gov/reading-rm/adams.html>.

In response to the notice soliciting comments from the interested members of the public about NRC's pending action to delete the E Bar definition and revise the RCS specific activity technical specification, the staff received four sets of comments (from licensees and the TSTF Owners Groups, representing the licensees). Specific comments on the model SE, model LAR, and the model NSHC were offered, and are summarized and discussed below:

1. Comment: In Sections 3.1.4 and 3.1.7 the model safety evaluation states: "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." However, using the Westinghouse Standard Technical Specifications as an example, NUREG-1431, Vol. 2, Rev. 3.0, Bases 3.4.7 (RCS Loops-Mode 5, Loops Filled) states "In MODE 5 with the RCS loops filled, the primary function of the reactor coolant is the removal of decay heat and transfer this heat either to the steam generator(SG) secondary side coolant via natural circulation (Ref. 1) or the component cooling water via the residual heat removal (RHR) heat exchangers." Therefore, the steam generators are taken credit for as a means of removing decay heat during MODE 5. Additionally,

the RCS may be pressurized during MODE 5. The statement as written in the model safety evaluation may prevent licensees from stating that their application is consistent with the model technical evaluation.

Response: The comment addresses the MODES for which the LCO would be applicable. The NRC staff agrees that the statement in sections 3.1.4 and 3.1.7 does not acknowledge the condition of MODE 5 with the RCS loops filled. The Model SE will be modified to account for this condition.

2. Comment: There is currently one Technical Specification (TS) 3.4.16 limit on RCS gross specific activity, not "limits". The single limit is 100/E Bar in all 3 affected STS NUREGs. There are two places that refer to limits (plural).

Response: This editorial comment is correct, and the Supplemental Information section and the Model LAR will be revised accordingly.

3. Comment: In the Model SE, Section 2.0: Correct the title of TID 14844. "Reactor" is singular in the title.

Response: This editorial comment is correct, and the Model SE will be revised accordingly.

4. Comment: In the Model SE, Section 3.1.1: The list of Dose Conversion Factor (DCF) references should be bracketed since this change will be subject to plant specific considerations. The optional DCF reference included in TSTF-490, and discussed in the traveler's justification section 3.0 (paragraph 2, lines 4-9), for alternate source term plants should be included here as follows:

"] or [Committed Dose Equivalent (CDE) or Committed Effective Dose Equivalent (CEDE) dose conversion factors from Table 2.1 of EPA Federal Guidance Report No. 11.]"

Response: The Model SE endorsed the use of DCFs from Table 2.1 of FGR-11, 1988, "Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion." As stated in the model SE, it is

incumbent on the licensee to ensure that the DCFs used in the determination of DEI are consistent with the DCFs used in the applicable dose consequence analyses. As such, the references for the applicable DCFs would indeed be plant specific and the model SE has been changed accordingly.

5. Comment: In the model SE, Section 3.1.2: All noble gas isotope lists and DCF citations should be bracketed since these changes are subject to plant specific considerations. The 2<sup>nd</sup> paragraph is missing a forward slash mark between the words “and” and “or” in the text “by tritium and corrosion and activation products...”

Response: This editorial comment is correct, and the Model SE will be corrected.

- 6 Comment: In the Model SE, Section 3.1.3: The discussion on revised Required Action A.1 should be relocated to Model SE Section 3.1.5 that discusses the changes to TS 3.4.16 condition A.

Response: The NRC staff agrees that the discussion on revised Required Action A.1 should be relocated. The Model SE will be updated to reflect the change.

7. Comment: In the Model SE Section 3.1.6: This section states that Condition “C” is replaced with a new Condition “B”. This is only true for the B&W and CE STS NUREGs (1430 and 1432). It is not true for the Westinghouse STS NUREG-1431, and it should also be noted that the Westinghouse plants developed this traveler for submittal to the NRC. This section should state that “TS 3.4.16 Condition B [in NUREG-1431; C in NUREG-1430 and NUREG-1432] is replaced with a new Condition B for DEX not within limits.”

Section 3.1.6 should also discuss the addition of the LCO 3.0.4.c Note to revised Required Action B.1, consistent with the Model Application, Enclosure 1, Section 2.0, item C. Suggested wording that could be used for this purpose is:

“A Note is also added to the revised Required Action B.1 that states LCO 3.0.4.c is applicable. This Note would allow entry into a Mode or other specified condition in the LCO Applicability when LCO 3.4.16 is not being met and is the

same Note that is currently stated for Required Actions A.1 and A.2. The proposed Note would allow entry into the applicable Modes when the DEX is not within its limit; in other words, the plant could go up in the Modes from Mode 4 to Mode 1 (power operation) while the DEX limit is exceeded and the DEX is being restored to within its limit. This Mode change allowance is acceptable due to the significant conservatism incorporated into the DEX specific activity limit, and the ability to restore transient specific activity excursions while the plant remains at, or proceeds to, power operation.”

Response: The NRC staff agrees with the wording with this editorial comment and the Model SE will be updated to reflect the differences in the NUREGs. Also, a discussion concerning the LCO 3.0.4.c note to required Action B.1 will be added to the Model SE Section 3.1.6.

8. Comment: In the Model SE, Section 3.1.8: This section incorrectly states that revised SR 3.4.16.1 has a new LCO 3.0.4.c Note. It should state that SR 3.4.16.1 has a new performance modifying Note that reads: “Only required to be performed in Mode 1.” The application of this style of Note is discussed in Example 1.4-5 in the latest revision of the STS NUREGs. The LCO 3.0.4.c Note addition applies only to revised Required Action B.1

Response: The NRC staff believes that the new Note for SR 3.4.16.1 is consistent with Example 1.4-5 and the Note in SR 3.4.16.2 and therefore does not need to be changed.

9. Comment: In the Model SE, Section 3.1.2 states “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 or the average gamma disintegration energies as provided in ICRP Publication 38, “Radionuclide Transformations” or similar source.” What exactly is “similar source”? Does “similar source” apply to average gamma energies or to the DCFs such as published in Reg. Guide 1.109?

Response: The selection of the dose conversion factors used in the definition of DEX should be consistent with the dose conversion factors currently employed in the licensee's dose consequence analyses and as such the reference for the dose conversion factors or the source of the gamma energies used in the definition will be site specific. Brackets will be placed around the references to indicate where site specific information should be included.

10. Comment: In the Model SE, Section 3.1.2 states "...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-133...". Under the same Section two additional nuclides are added to the new definition for E-AVERAGE DISINTEGRATION ENERGY; Kr-85 and XE-131M. The addition of the additional nuclides appears to conflict with the preceding technical Evaluation. Is it the expectation that these two nuclides be added to the DEX calculation in addition to those listed in the preceding section?

Response: The selection of the isotopes used in the definition of DEX will be site specific and based on the dose significant noble gas isotopes identified in the appropriate DBA dose consequence analyses. The list of noble gas isotopes will be placed in brackets to indicate that the actual list will be site specific.

11. Comment: The title of TSTF-490 is not capitalized consistently and is not consistent with the submitted Traveler. The title of TSTF-490 is "Deletion of E Bar Definition and Revision to RCS Specific Activity Tech Spec." Note that there is no hyphen used in the term "E Bar."

Response: This editorial comment is correct, and the Model SE will be corrected.

12. Comment: In the proposed NSHC, to be consistent with 10 CFR 50.92(c)(2), the title of Criterion 2 should be revised to add the word "Accident" before "Previously Evaluated." Specifically, it should state, "The Proposed Change Does Not Create the Possibility of a New or Different Kind of Accident from any Accident Previously Evaluated."



Response: This editorial comment is correct, and the proposed NSHC will be corrected.

13. Comment: In the Model LAR it states, "I declare under penalty of perjury under the laws of the United States of America that I am authorized by [LICENSEE] to make this request and that the foregoing is true and correct." This statement is not consistent with the recommended statement given in RIS 2001-18, "Requirements for Oath and Affirmation." RIS 2001-18 recommends the statement, "I declare [or certify, verify, state] under penalty of perjury that the foregoing is true and correct." Note that RIS 2001-18 states that this statement must be used verbatim. We recommend that the Model Application be revised to be consistent with RIS 2001-18.

Response: The statement in the Model LAR is consistent with RIS 2001-18. The purpose of RIS 2001-18 was to inform licensees that there is an alternative to the oath or affirmation statement contained in 28 U.S.C. 1746. Both are considered acceptable. The NRC staff includes only the first option listed in 28 U.S.C. 1746 for brevity.

14. Comment: In the Model LAR , Section 8.0 the second reference should be numbered. Note that Section 4.0 refers to References 1 and 2.

Response: The references in Section 8.0 are numbered, however, for clarification, the Notice for Comment and the Notice for Availability will be listed as separate references.

Dated at Rockville, Maryland this 8<sup>th</sup> day of March, 2007.

FOR THE NUCLEAR REGULATORY COMMISSION

*/RA/*

Timothy J. Kobetz, Chief  
Technical Specifications Branch  
Division of Inspection and Regional Support  
Office of Nuclear Reactor Regulation

Response: The references in Section 8.0 are numbered, however, for clarification, the Notice for Comment and the Notice for Availability will be listed as separate references.

Dated at Rockville, Maryland this 8<sup>th</sup> day of March, 2007.

FOR THE NUCLEAR REGULATORY COMMISSION

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**FOR INCLUSION ON THE TECHNICAL SPECIFICATION WEB PAGE  
THE FOLLOWING EXAMPLE OF AN APPLICATION WAS PREPARED BY THE NRC STAFF  
TO FACILITATE THE ADOPTION OF TECHNICAL SPECIFICATION TASK FORCE (TSTF)  
TRAVELER TSTF-490, REVISION 0 "DELETION OF E BAR DEFINITION AND REVISION TO  
RCS SPECIFIC ACTIVITY TECH SPEC." THE MODEL PROVIDES THE EXPECTED LEVEL  
OF DETAIL AND CONTENT FOR AN APPLICATION TO ADOPT TSTF-490, REVISION 0.  
LICENSEES REMAIN RESPONSIBLE FOR ENSURING THAT THEIR ACTUAL  
APPLICATION FULFILLS THEIR ADMINISTRATIVE REQUIREMENTS AS WELL AS NRC  
REGULATIONS.**

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U. S. Nuclear Regulatory Commission

Document Control Desk

Washington, D. C. 20555

SUBJECT: PLANT NAME, DOCKET NO. 50-[xxx,] RE: APPLICATION FOR TECHNICAL  
SPECIFICATION IMPROVEMENT TO ADOPT TSTF-490, REVISION 0,  
"DELETION OF E BAR DEFINITION AND REVISION TO RCS SPECIFIC  
ACTIVITY TECH SPEC"

Dear Sir or Madam:

In accordance with the provisions of Section 50.90 of Title 10 of the Code of Federal Regulations (10 CFR), [LICENSEE] is submitting a request for an amendment to the technical specifications (TS) for [PLANT NAME, UNIT NOS.]. The proposed changes would replace the current pressurized water reactor (PWR) Technical Specification (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 (DEX) definition that would replace the current E Bar average disintegration energy definition. In addition, the current dose equivalent I-131 (DEI) definition would be revised to allow the use of additional thyroid dose conversion factors (DCFs).

The changes are consistent with NRC-approved Industry Technical Specification Task Force (TSTF) Standard Technical Specification Change Traveler, TSTF-490, Revision 0, "Deletion of E Bar Definition and Revision to RCS Specific Activity Tech Spec." The availability of this TS improvement was announced in the *Federal Register* on [DATE] ([ ]FR[ ]) as part of the consolidated line item improvement process (CLIP).

Enclosure 1 provides a description and assessment of the proposed changes, as well as confirmation of applicability. Enclosure 2 provides the existing TS pages and TS Bases marked-up to show the proposed changes. Enclosure 3 provides final TS pages and TS Bases pages.

[LICENSEE] requests approval of the proposed license amendment by [DATE], with the amendment being implemented [BY DATE OR WITHIN X DAYS]. In accordance with 10 CFR 50.91, a copy of this application, with enclosures, is being provided to the designated [STATE] Official.

I declare under penalty of perjury under the laws of the United States of America that I am authorized by [LICENSEE] to make this request and that the foregoing is true and correct. [Note that request may be notarized in lieu of using this oath or affirmation statement]. If you should have any questions regarding this submittal, please contact [ ].

Sincerely,

Name, Title

Enclosures:

1. Description and Assessment of Proposed Changes
2. Proposed Technical Specification Changes and Technical Specification Bases Changes
3. Final Technical Specification and Bases pages

cc: NRR Project Manager

Regional Office

Resident Inspector

State Contact

ITSB Branch Chief

## 1.0 DESCRIPTION

This letter is a request to amend Operating License(s) [LICENSE NUMBER(S)] for [PLANT/UNIT NAME(S)].

The proposed changes would replace the current limits on primary coolant gross specific activity with limits on primary coolant noble gas activity. The noble gas activity would be based on DOSE EQUIVALENT XE-133 and would take into account only the noble gas activity in the primary coolant. The changes were approved by the NRC staff Safety Evaluation (SE) dated September 27, 2006 (ADAMS ML062700612) (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 [DATE] as part of the consolidated line item improvement process (CLIP).

## 2.0 PROPOSED CHANGES

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

- Revise the definition of DOSE EQUIVALENT I-131.
- Delete the definition of "E Bar, AVERAGE DISINTEGRATION ENERGY.
- Add a new TS definition for DOSE EQUIVALENT XE-133.
- Revise LCO 3.4.16, "RCS Specific Activity" to delete references to gross specific activity; add limits for DOSE EQUIVALENT I-131 and DOSE EQUIVALENT XE-133; and delete Figure 3.4.16-1, "Reactor Coolant DOSE EQUIVALENT I-131 Specific Activity Limit versus Percent of RATED THERMAL POWER."
- Revise LCO 3.4.16 "Applicability" to specify the LCO is applicable in MODES 1, 2, 3, and 4.
- Modify ACTIONS Table as follows:
  - A. Condition A is modified to delete the reference to Figure 3.4.16-1, and define an upper limit that is applicable at all power levels.
  - B. NUREG-1430 and NUREG-1432 ACTIONS are reordered, moving Condition C to Condition B to be consistent with the Writer's Guide.
  - C. Condition B (was Condition C in NUREG-1430 and NUREG 1432) 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 in NUREG-1430 and NUREG-1432) is modified based on the changes to Conditions A and B and to reflect the change in the LCO Applicability.
- 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.
- 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 published on [DATE] ([ ] FR [ ]), the NRC Notice for Comment published on [DATE] ([ ] FR [ ]), and TSTF-490, Revision 0.

### 4.0 TECHNICAL ANALYSIS

[LICENSEE] has reviewed References 1, 2 and 3, and the model SE published on [DATE] ([ ] FR [ ]) as part of the CLIIP Notice for Comment. [LICENSEE] has applied the methodology in Reference 1 to develop the proposed TS changes. [LICENSEE] has also concluded that the justifications presented in TSTF-490, Revision 0 and the model SE prepared by the NRC staff are applicable to [PLANT, UNIT NOS.], and justify this amendment for the incorporation of the changes to the [PLANT] TS.

### 5.0 REGULATORY ANALYSIS

A description of this proposed change and its relationship to applicable regulatory requirements and guidance was provided in the NRC Notice of Availability published on [DATE] ([ ] FR [ ]), the NRC Notice for Comment published on [DATE] ([ ] FR [ ]), and TSTF-490, Revision 0.

### 6.0 NO SIGNIFICANT HAZARDS CONSIDERATION

[LICENSEE] has reviewed the proposed no significant hazards consideration determination published in the *Federal Register* on [DATE] ([ ] FR [ ]) as part of the CLIIP. [LICENSEE] has concluded that the proposed determination presented in the notice is applicable to [PLANT] and the determination is hereby incorporated by reference to satisfy the requirements of 10 CFR 50.91(a).

### 7.0 ENVIRONMENTAL EVALUATION

[LICENSEE] has reviewed the environmental consideration included in the model SE published in the *Federal Register* on [DATE] ([ ] FR [ ]) as part of the CLIIP. [LICENSEE] has concluded that the staff's findings presented therein are applicable to [PLANT] and the determination is hereby incorporated by reference for this application.

### 8.0 REFERENCES

1. NRC Safety Evaluation (SE) approving TSTF-490, Revision 0 dated September 27, 2006
2. Federal Notice for Comment published on [DATE] ([ ] FR [ ])
3. Federal Notice of Availability published on [DATE] ([ ] FR [ ])



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 Tech Spec"

## 1.0 INTRODUCTION

By letter dated [\_\_\_\_\_, 20\_\_], [LICENSEE] (the licensee) proposed changes to the technical specifications (TS) for [PLANT NAME]. The requested changes are the adoption of TSTF-490, Revision 0, "Deletion of E Bar Definition and Revision to RCS Specific Activity Tech Spec" for pressurized water reactor (PWR) Standard Technical Specifications (STS). By letter dated September 13, 2005, the Technical Specification Task Force (TSTF) submitted TSTF-490 for Nuclear Regulatory Commission (NRC) staff review. This TSTF involves changes to NUREG-1430, NUREG-1431, and NUREG-1432 STS Section 3.4.16 reactor coolant system (RCS) gross specific activity limits with the addition of a new limit for noble gas specific activity. The noble gas specific activity limit would be based on a new dose equivalent Xe-133 (DEX) definition that replaces the current E Bar average disintegration energy definition. In addition, the current dose equivalent I-131 (DEI) definition would be revised to allow the use of additional thyroid dose conversion factors (DCFs).

## 2.0 REGULATORY EVALUATION

The NRC staff evaluated the impact of the proposed changes as they relate to the radiological consequences of affected design basis accidents (DBAs) that use the RCS inventory as the source term. The source term assumed in radiological analyses should be based on the activity associated with the projected fuel damage or the maximum RCS technical specifications (TS) values, whichever maximizes the radiological consequences. The limits on RCS specific activity ensure that the offsite doses are appropriately limited for accidents that are based on releases from the RCS with no significant amount of fuel damage.

The Steam Generator Tube Rupture (SGTR) accident and the Main Steam Line Break (MSLB) accident typically do not result in fuel damage and therefore the radiological consequence analyses are based on the release of primary coolant activity at maximum TS limits. For accidents that result in fuel damage, the additional dose contribution from the initial activity in the RCS is not normally evaluated and is considered to be insignificant in relation to the dose resulting from the release of fission products from the damaged fuel.

For licensees that incorporate the source term as defined in Technical Information Document (TID) 14844, AEC, 1962, "Calculation of Distance Factors for Power and Test Reactors Sites," in their dose consequence analyses, the NRC staff uses the regulatory guidance provided in NUREG-0800, "Standard Review Plan (SRP) for the Review of Safety Analysis Reports for Nuclear Power Plants," 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 the evaluation of MSLB accident analyses and NUREG-0800, SRP Section 15.6.3, "Radiological Consequences of Steam Generator Tube Failure (PWR)," Revision 2, for evaluating SGTR accidents analyses. In addition, the NRC staff uses the guidance from RG 1.195, "Methods and Assumptions for Evaluating Radiological Consequences of Design Basis Accidents at Light Water Nuclear Power Reactors," May 2003, for those licensees that chose to use its guidance for dose consequence analyses using the TID 14844 source term.

For licensees using the alternative source term (AST) in their dose consequence analyses, the

NRC staff uses the regulatory guidance provided in NUREG-0800, SRP Section 15.0.1, "Radiological Consequence Analyses Using Alternative Source Terms," Revision 0, July 2000, and the methodology and assumptions stated in Regulatory Guide (RG) 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors", July 2000.

The applicable dose criteria for the evaluation of DBAs depends on the source term incorporated in the dose consequence analyses. For licensees using the TID 14844 source term, the maximum dose criteria to the whole body and the thyroid that an individual at the exclusion area boundary (EAB) can receive for the first 2 hours following an accident, and at the low population zone (LPZ) outer boundary for the duration of the radiological release, are specified in Title 10 of the Code of Federal Regulations (10 CFR) Part 100.11. These criteria are 25 roentgen equivalent man (rem) total whole body dose and 300 rem thyroid dose from iodine exposure. The accident dose criteria in 10 CFR 100.11 is supplemented by accident specific dose acceptance criteria in SRP 15.1.5, Appendix A, SRP 15.6.3 or Table 4 of RG 1.195, "Methods and Assumptions for Evaluating Radiological Consequences of Design Basis Accidents at Light Water Nuclear Power Reactors," May 2003.

For control room dose consequence analyses that use the TID 14844 source term, the regulatory requirement for which the NRC staff bases its acceptance is General Design Criterion (GDC) 19 of Appendix A to 10 CFR Part 50, "Control Room". GDC 19 requires that adequate radiation protection be provided to permit access and occupancy of the control room under accident conditions without personnel receiving radiation exposures in excess of 5 rem whole body, or its equivalent to any part of the body, for the duration of the accident. NUREG-0800, SRP Section 6.4, "Control Room Habitability System," Revision 2, July 1981, provides guidelines defining the dose equivalency of 5 rem whole body as 30 rem for both the thyroid and skin dose. For licensees adopting the guidance from RG 1.196, "Control Room Habitability at Light Water Nuclear Power Reactors," May 2003, Section C.4.5 of RG 1.195, May 2003, states that in lieu of the dose equivalency guidelines from Section 6.4 of NUREG-0800, the 10 CFR 20.1201 annual organ dose limit of 50 rem can be used for both the thyroid and skin dose equivalent of 5 rem whole body.

Licensees using the AST are evaluated against the dose criteria specified in 10 CFR Part 50.67(b)(2). The off-site dose criteria are 25 rem total effective dose equivalent (TEDE) at the EAB for any 2-hour period following the onset of the postulated fission product release and 25 rem TEDE at the outer boundary of the LPZ for the duration of the postulated fission product release. In addition, 10 CFR Part 50.67(b)(2)(iii) requires that adequate radiation protection be provided to permit access and occupancy of the control room under accident conditions without personnel receiving radiation exposures in excess of 5 rem TEDE for the duration of the accident.

### 3.0 TECHNICAL EVALUATION

#### 3.1 Technical evaluation of TSTF-490 TS changes

##### 3.1.1 Revision to the Definition of DEI

The list of acceptable DCFs for use in the determination of DEI include the following:

- [Table III of TID-14844, AEC, 1962, "Calculation of Distance Factors for Power and Test Reactor Sites."]
- [Table E-7 of Regulatory Guide 1.109, Revision 1, NRC, 1977.]
- [ICRP 30,1979, page 192-212, Table titled "Committed Dose Equivalent in Target Organs or Tissues per Intake of Unit Activity."]
- [Committed Dose Equivalent (CDE) or Committed Effective Dose Equivalent (CEDE) dose conversion factors from Table 2.1 of EPA Federal Guidance Report No. 11."]
- [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."]

NOTE: IT IS INCUMBENT ON THE LICENSEE TO ENSURE THAT THE DCFs USED IN THE DETERMINATION OF DEI ARE CONSISTENT WITH THE APPLICABLE DOSE CONSEQUENCE ANALYSES.

### 3.1.2 Deletion of the Definition of E Bar and the Addition of a New Definition for DE Xe-133

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-85, Kr-87, Kr-88, Xe-131m, 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. The calculation of DEX would use either the average gamma disintegration energies for the nuclides or the effective dose conversion factors from Table III.1 of EPA FGR No. 12. Using this approach, the limit on the amount of noble gas activity in the primary coolant would not fluctuate with variations in the calculated values of E Bar. If a specified 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.

When E Bar is determined using a design basis approach in which it is assumed that 1.0% of the power is being generated by fuel rods having cladding defects and it is also assumed that there is no removal of fission gases from the letdown flow, the value of E Bar is dominated by Xe-133. The other nuclides have relatively small contributions. However, during normal plant operation there are typically only a small amount of fuel clad 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 E Bar that is very different than would be calculated using the design basis approach. Because of this difference, the accident dose analyses become disconnected from plant operation and the limiting condition for operation (LCO) becomes essentially meaningless. It also results in a TS limit that can vary during operation as different values for E Bar are determined.

This change will implement a LCO that is consistent with the whole body radiological consequence analyses which are sensitive to the noble gas activity in the primary coolant but not to other non-gaseous activity currently captured in the E Bar definition. LCO 3.4.16 specifies the limit for primary coolant gross specific activity as 100/E Bar  $\mu\text{Ci/gm}$ . The current E Bar definition includes radioisotopes that decay by the emission of both gamma and beta radiation. The current Condition B of LCO 3.4.16 would rarely, if ever, be entered for exceeding

100/E Bar since the calculated value is very high (the denominator is very low) if beta emitters such as tritium (H-3) are included in the determination, as required by the E Bar definition.

TS Section 1.1 definition for E - AVERAGE DISINTEGRATION ENERGY (E Bar) is deleted and replaced with a new definition for DEX which states:

"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" or the average gamma disintegration energies as provided in ICRP Publication 38, "Radionuclide Transformations" or similar source.]"

The change incorporating the newly defined quantity DEX is acceptable from a radiological dose perspective since it will result in an LCO that more closely relates the non-iodine RCS activity limits to the dose consequence analyses which form their bases. NOTE: IT IS INCUMBENT ON THE LICENSEE TO ENSURE THAT THE DCFs USED IN THE DETERMINATION OF DEI AND THE NEWLY DEFINED DEX ARE CONSISTENT WITH THE DCFs USED IN THE APPLICABLE DOSE CONSEQUENCE ANALYSIS.

### 3.1.3 LCO 3.4.16, "RCS Specific Activity"

LCO 3.4.16 is modified to specify that iodine specific activity in terms of DEI and noble gas specific activity in terms of DEX shall be within limits. Currently the limiting indicators are not explicitly identified in the LCO, but are instead defined in current Condition C and Surveillance Requirement (SR) 3.4.16.1 for gross non-iodine specific activity and in current Condition A and SR 3.4.16.2 for iodine specific activity.

The change states "RCS DOSE EQUIVALENT 1-131 and DOSE EQUIVALENT XE-133 specific activity shall be within limits." NOTE: IT IS INCUMBENT ON THE LICENSEE TO ENSURE THAT THE SITE SPECIFIC LIMITS FOR BOTH DEI AND DEX ARE CONSISTENT WITH THE CURRENT SGTR AND MSLB RADIOLOGICAL CONSEQUENCE ANALYSES.

### 3.1.4 TS 3.4.16 Applicability

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 MODES 1 through 4 to limit the potential radiological consequences of an SGTR or MSLB that may occur during these MODES. In MODE 5 with the RCS loops filled, the steam generators are specified as a backup means of decay heat removal via natural circulation. In this mode, however, due to the reduced temperature of the RCS, the probability of a DBA involving the release of significant quantities of RCS inventory is greatly reduced. Therefore, monitoring of RCS specific activity is not required. In MODE 5 with the RCS loops not filled and in MODE 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. Therefore, the monitoring of RCS specific activity is not required. The change to modify the TS 3.4.16 Applicability to include all of MODE 3 and MODE 4 is necessary to limit the potential

radiological consequences of an SGTR or MSLB that may occur during these MODES and is therefore acceptable from a radiological dose perspective.

### 3.1.5 TS 3.4.16 Condition A

TS 3.4.16 Condition A is revised by replacing the DEI site specific limit " $> [1.0] \mu\text{Ci/gm}$ " with the words "not within limit" to be consistent with the revised TS 3.4.16 LCO format. The site specific DEI limit of  $\leq [1.0] \mu\text{Ci/gm}$  is contained in SR 3.4.16.2. This proposed format change will not alter current STS requirements and is acceptable from a radiological dose perspective.

TS 3.4.16 Required Action A.1 is revised to remove the reference to Figure 3.4.16-1 "Reactor Coolant DOSE EQUIVALENT I-131 Specific Activity Limit versus Percent of RATED THERMAL POWER" and insert a limit of less than or equal to the site specific DEI spiking limit. The curve contained in Figure 3.4.16-1 was provided by the AEC in a June 12, 1974 letter from the AEC on the subject, "Proposed Standard Technical Specifications for Primary Coolant Activity." Radiological dose 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 Figure 3.4.16-1 for operation at power levels below 80% RTP. Instead, the pre-accident iodine spike analyses assume a DEI concentration [60] times higher than the corresponding long term equilibrium value, which corresponds to the specific activity limit associated with 100% RTP operation. It is acceptable that TS 3.4.16 Required Action A.1 should be based on the short term site specific DEI spiking limit to be consistent with the assumptions contained in the radiological consequence analyses.

### 3.1.6 TS 3.4.16 Condition B Revision to include Action for DEX Limit

TS 3.4.16 Condition C is replaced with a new Condition B [in NUREG-1431; C in NUREG-1430 and NUREG-1432] for DEX not within limits. This change is made to be consistent with the change to the TS 3.4.16 LCO which requires the DEX specific activity to be within limits as discussed above in Section 3.1.3. The DEX limit is site specific and the numerical value in units of  $\mu\text{Ci/gm}$  is contained in revised SR 3.4.16.1. The site specific limit of DEX in  $\mu\text{Ci/gm}$  is established based on the maximum accident analysis RCS activity corresponding to 1% fuel clad defects with sufficient margin to accommodate the exclusion of those isotopes based on low concentration, short half life, or small dose conversion factors. 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 DBAs. The whole body dose is primarily dependent on the noble gas activity, not the non-gaseous activity currently captured in the E Bar definition.

The Completion Time for revised TS 3.4.16 Required Action B.1 will require restoration of DEX to within limit in 48 hours. This is consistent with the Completion Time for current Required Action A.2 for DEI. The radiological consequences for the SGTR and the MSLB accidents demonstrate that the calculated thyroid doses are generally a greater percentage of the applicable acceptance criteria than the calculated 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. Therefore the Completion Time of 48 hours for revised Required Action B.1 is acceptable from a radiological dose perspective. A Note is also added to the revised Required Action B.1 that states LCO 3.0.4.c is applicable. This Note would allow entry into a Mode or other specified condition in the LCO Applicability when LCO 3.4.16 is not being met and is the same Note that is currently stated for Required Actions A.1 and A.2. The proposed Note would allow entry into the applicable Modes from MODE 4 to MODE 1 (power operation) while the DEX limit is exceeded and the DEX is being restored to

within its limit. This Mode change is acceptable due to the significant conservatism incorporated into the DEX specific activity limit, the low probability of an event occurring which is limiting due to exceeding the DEX specific activity limit, and the ability to restore transient specific excursions while the plant remains at, or proceeds to power operation.

### 3.1.7 TS 3.4.16 Condition C

TS 3.4.16 Condition C is revised to include Condition B (DEX not within limit) 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 now provide the same completion time for both components of RCS specific activity as discussed in the revision to Condition B. The revision to Condition C also replaces the limit on DEI from the deleted Figure 3.4.16-1, with a site specific value of  $> [60] \mu\text{Ci/gm}$ . This change makes Condition C consistent with the changes made to TS 3.4.16 Required Action A.1.

The change to TS 3.4.16 Required Action C.1 requires the plant to be in MODE 3 within 6 hours and adds a new Required Action C.2 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. In MODE 5 with the RCS loops filled, the steam generators are specified as a backup means of decay heat removal via natural circulation. In this mode, however, due to the reduced temperature of the RCS, the probability of a DBA involving the release of significant quantities of RCS inventory is greatly reduced. Therefore, monitoring of RCS specific activity is not required. In MODE 5 with the RCS loops not filled and MODE 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. Therefore, the monitoring of RCS specific activity is not required.

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 and the value of 36 hours is consistent with other TS which have a Completion Time to reach MODE 5.

### 3.1.8 SR 3.4.16.1 DEX Surveillance

The change replaces the current SR 3.4.16.1 surveillance for RCS gross specific activity with a surveillance to verify that the site specific reactor coolant DEX specific activity is  $\leq [X] \mu\text{Ci/gm}$ . 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, which is the same frequency required under the current SR 3.4.16.1 surveillance for RCS gross non-iodine specific activity. 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.

SR 3.4.16.1 is modified by inclusion of a NOTE which 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. This allows entry into MODE 4, MODE 3, and MODE 2 prior to performing the surveillance. This allows the surveillance to be performed in any of those

MODES, prior to entering MODE 1, similar to the current surveillance SR 3.4.16.2 for DEI.

### 3.1.9 SR 3.4.16.3 Deletion

The current SR 3.4.16.3 which required the determination of E Bar is deleted. TS 3.4.16 LCO on RCS specific activity supports the dose analyses for DBAs, in which the whole body dose is primarily dependent on the noble gas concentration, not the non-gaseous activity currently captured in the E Bar definition. 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 E Bar is no longer required.

### 3.2 Precedent

The technical specifications developed for the Westinghouse AP600 and AP1000 advanced reactor designs incorporate an LCO for RCS DEX activity in place of the LCO on non-iodine gross specific activity based on E Bar. This approach was approved by the NRC staff 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. In addition, the curve describing the maximum allowable iodine concentration during the 48-hour period of elevated activity as a function of power level, was not included in the TS approved for the AP600 and AP1000 advanced reactor designs.

## 4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the [ \_\_\_\_\_ ] State official was notified of the proposed issuance of the amendment. The State official had [(1) no comments or (2) the following comments - with subsequent disposition by the staff].

## 5.0 ENVIRONMENTAL CONSIDERATION

The amendment[s] change[s] a requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 or surveillance requirements. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration and there has been no public comment on such finding published [DATE] ([ ] FR [ ]). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

## 6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that (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.

## Proposed No Significant Hazards Consideration Determination

*Description of Amendment Request:* [LICENSEE] requests adoption of an approved change to the Standard Technical Specifications (STS) for pressurized water reactor (PWR) plants (NUREG-1430, NUREG-1431, & NUREG-1432) and plant specific technical specifications (TS), to replace the current limits on primary coolant gross specific activity with limits on primary coolant noble gas activity. The noble gas activity would be based on DOSE EQUIVALENT XE-133 and would take into account only the noble gas activity in the primary coolant. The changes are consistent with NRC approved Industry/Technical Specification Task Force (TSTF) Standard Technical Specification Change Traveler, TSTF-490, Revision 0.

*Basis for proposed no-significant-hazards-consideration determination:* As required by 10 CFR 50.91(a), an analysis of the issue of no-significant-hazards-consideration is presented below:

**Criterion 1**—The Proposed Change Does Not Involve a Significant Increase in the Probability or Consequences of an Accident Previously Evaluated

Reactor coolant specific activity is not an initiator for any accident previously evaluated. The Completion Time when primary coolant gross activity is not within limit is not an initiator for any accident previously evaluated. The current variable limit on primary coolant iodine concentration is not an initiator to any accident previously evaluated. As a result, the proposed change does not significantly increase the probability of an accident. The proposed change will limit primary coolant noble gases to concentrations consistent with the accident analyses. The proposed change to the Completion Time has no impact on the consequences of any design basis accident since the consequences of an accident during the extended Completion Time are the same as the consequences of an accident during the Completion Time. As a result, the consequences of any accident previously evaluated are not significantly increased.

**Criterion 2**—The Proposed Change Does Not Create the Possibility of a New or Different Kind of Accident from any Accident Previously Evaluated

The proposed change in specific activity limits does not alter any physical part of the plant nor does it affect any plant operating parameter. The change does not create the potential for a new or different kind of accident from any previously calculated.

**Criterion 3**—The Proposed Change Does Not Involve a Significant Reduction in the Margin of Safety

The proposed change revises the limits on noble gas radioactivity in the primary coolant. The proposed change is consistent with the assumptions in the safety analyses and will ensure the monitored values protect the initial assumptions in the safety analyses.

Based upon the reasoning presented above and the previous discussion of the amendment request, the requested change does not involve a significant hazards consideration.

Dated at Rockville, Maryland this      th day of      ,      .



FOR THE NUCLEAR REGULATORY COMMISSION

Project Manager  
Plant Licensing Branch [ ]  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Dated at Rockville, Maryland this      th day of      ,      .

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