

July 24, 2017

TSTF-17-09
PROJ0753

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


SUBJECT: TSTF Comments on Draft Safety Evaluation for Traveler TSTF-546, Revision 0, "Revise APRM Channel Adjustment Surveillance Requirement"

REFERENCE: Letter from Jennifer Whitman (NRC) to the TSTF, "Draft Safety Evaluation of Technical Specifications Task Force Traveler TSTF-546, Revision 0, 'Revise APRM Channel Adjustment Surveillance Requirement'," dated June 20, 2017 (ADAMS Accession No. ML17163A367).

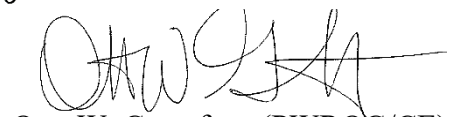
On April 21, 2016, the TSTF submitted traveler TSTF-546, Revision 0, "Revise APRM Channel Adjustment Surveillance Requirement," to the Nuclear Regulatory Commission (NRC) for review (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16112A208). In the referenced letter, the NRC provided the draft Safety Evaluations for comment.

Attachment 1 contains a summary table providing the TSTF's comments on the draft Safety Evaluations. Attachment 2 contains a mark-up reflecting the TSTF's comments.


Should you have any questions, please contact us.




James R. Morris (PWROG/W)



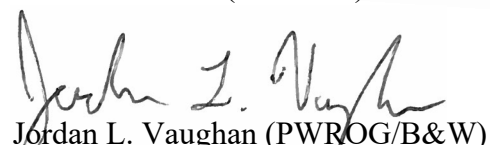
Otto W. Gustafson (PWROG/CE)



Jason P. Redd (APOG)



Lisa L. Williams (BWROG)



Jordan L. Vaughan (PWROG/B&W)

Attachment 1 TSTF Comments on the TSTF-546 Draft Safety Evaluations
Attachment 2 TSTF Markup of Draft Safety Evaluations

cc: Michelle Honcharik, Technical Specifications Branch, NRC
Robert Tjader, Technical Specifications Branch, NRC
Jennifer Whitman, Technical Specifications Branch, NRC

Attachment 1
TSTF Comments on the TSTF-546 Draft Safety Evaluations

Page(s)	Line(s) ¹	Comment
Traveler Draft Safety Evaluation		
1	28-31	This paragraph should be moved to a note in the model plant-specific safety evaluation. There is no plant-specific information to be provided in the traveler SE and brackets are not used for the described purpose in the traveler SE.
Draft Model Safety Evaluation for Plant-Specific Adoption		
1	16	The bolded phrase "Month, Day, 2017 (ADAMS Accession No. MLXXXX)" should be placed in brackets, consistent with similar information in the paragraph.
1 2	43-46 1-30	Recommend that these paragraphs be removed. A description of generic analog and digital neutron monitoring systems and various methods of stability protection are not needed or applicable to a plant-specific SE. It is not necessary to describe the plant-specific neutron monitoring system or stability protection system as the traveler SE concluded that the change is appropriate for any of the designs.
2	39-43	The existing SR language should be placed in brackets and the plant-specific SR language should be included in the issued plant-specific SE.
3	45-48	The description of the existing SR requirement should be placed in brackets.
4	12-22	It is unclear why the bracketed Note describing stability solutions is included in the model plant-specific SE. The presentation implies that the information is not to be included in an issued plant-specific SE and the information is available to the NRC reviewer in the traveler SE. We recommend that it be removed for clarity.
4	36-37	To simplify the NRC review, we recommend including bracketed example discussions of the three variations included in the TSTF-546 model application.

¹ Line numbers correspond to the documents provided by the NRC and not to the attached proposed revision.

Attachment 2
TSTF Markup of Draft Safety Evaluations

June 20, 2017

Technical Specifications Task Force
11921 Rockville Pike, Suite 100
Rockville, MD 20852

SUBJECT: DRAFT SAFETY EVALUATION OF TECHNICAL SPECIFICATIONS TASK FORCE TRAVELER TSTF-546, REVISION 0, "REVISE APRM CHANNEL ADJUSTMENT SURVEILLANCE REQUIREMENT" (CAC NO. MF7622)

Dear Members of the Technical Specifications Task Force:

By letter dated April 21, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16112A208), the Technical Specifications Task Force (TSTF) submitted to the U.S. Nuclear Regulatory Commission (NRC) for review and approval traveler TSTF-546, Revision 0, "Revise APRM [Average Power Range Monitor] Channel Adjustment Surveillance Requirement." The NRC staff's draft safety evaluation (SE) of the traveler and a draft model SE are enclosed.

Thirty calendar days are provided to you to comment on any factual errors or clarity concerns contained in the enclosed draft SEs. The final SEs will be issued after making any necessary changes. The NRC staff's disposition of your comments on the draft SEs will be discussed in the final SEs. To facilitate the NRC staff's review of your comments, please provide a marked-up copy of the draft SEs showing proposed changes and provide a summary table of the proposed changes.

If you have any questions, please contact Michelle Honcharik at 301-415-1774 or via e-mail at Michelle.Honcharik@nrc.gov.

Sincerely,

Jennifer M. Whitman, Acting Chief */RA/*
Technical Specifications Branch
Division of Safety Systems
Office of Nuclear Reactor Regulation

Project No. 753

Enclosures:

1. NRC staff's draft Safety Evaluation of the traveler
2. Draft model Safety Evaluation

cc: See next page

Technical Specifications Task Force

Project No. 753

cc:

Technical Specifications Task Force
c/o EXCEL Services Corporation
11921 Rockville Pike, Suite 100
Rockville, MD 20852
Attention: Brian D. Mann
E-mail: brian.mann@excelservices.com

James R. Morris
Diablo Canyon Power Plant
Building 104/5/21A
P.O. Box 56
Avila Beach, CA 93424
E-mail: james.morris@pge.com

Lisa L. Williams
Energy Northwest
Columbia Generating Station
PO Box 968
Mail Drop PE20
Richland, WA 99352-0968
E-mail: llwilliams@energy-northwest.com

Otto W. Gustafson
Entergy Nuclear Operations, Inc.
Palisades Nuclear Power Plant
27780 Blue Star Memorial Highway
Covert, MI 49043
E-mail: ogustaf@entergy.com

Jordan L. Vaughan
Duke Energy
EC2ZF / P.O. Box 1006
Charlotte, NC 28202
Email: jordan.vaughan@duke-energy.com

Jason P. Redd
Southern Nuclear Operating Company
42 Inverness Center Parkway
Bin B234
Birmingham, AL 35242-4809
E-mail: jpredd@southernco.com

Technical Specifications Task Force

SUBJECT: DRAFT SAFETY EVALUATION OF TECHNICAL SPECIFICATIONS TASK FORCE TRAVELER TSTF-546, REVISION 0, "REVISE APRM CHANNEL ADJUSTMENT SURVEILLANCE REQUIREMENT" (CAC NO. MF7622) Dated: June 20, 2017

DISTRIBUTION:

PUBLIC	RidsOpaMail	RidsNrrDssSrx	RStattel
RidsNrrOd	RidsACRS_MailCTR	RidsNrrDssStsb	RKuntz
RidsNrrDpr	RidsNrrPMMHoncharik	MChernoff	KGreene
RidsOgcMailCenter	RidsNrrDeEicb	GSingh	RidsResOd

ADAMS Accession No.: Package: Cover letter and Draft traveler SE: ML17135A188, draft Model SE: ML17135A189;

***concurrence from internal memo (ML17040A085)**

****concurred via e-mail**

NRR-106

OFFICE	DSS/STSB	DSS/EICB*	DSS/SRXB**	DORL/BC**
NAME	MHoncharik	MWaters	EOesterle	DWrona
DATE	5/15/2017	3/9/2017	5/17/2017	5/25/2017
OFFICE	OGC (NLO)	DSS/STSB	DSS/STSB**	
NAME	JWachutka	MHoncharik (TTjader for)	JMWhitman	
DATE	6/9/17	06/20/17	06/20/17	

OFFICIAL RECORD COPY

1 **DRAFT SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION**

2 **TECHNICAL SPECIFICATIONS TASK FORCE TRAVELER**

3 **TSTF-546, REVISION 0,**

4 **“REVISE APRM CHANNEL ADJUSTMENT SURVEILLANCE REQUIREMENT”**

5
6
7 **1.0 INTRODUCTION**

8
9 By letter dated April 21, 2016 (Agencywide Documents Access and Management System
10 (ADAMS) Accession No. ML16112A208), the Technical Specifications (TS) Task Force (TSTF)
11 submitted Traveler TSTF-546, “Revise APRM [Average Power Range Monitor] Channel
12 Adjustment Surveillance Requirement [SR],” Revision 0, for U.S. Nuclear Regulatory
13 Commission (NRC) review and approval. By letter dated February 2, 2017 (ADAMS Accession
14 No. ML17033A264), the TSTF submitted a response to the NRC staff’s request for additional
15 information (RAI). The RAI response did not result in any changes to TSTF-546.
16

17 Traveler TSTF-546 proposes changes to the Standard Technical Specifications (STS) and
18 Bases for boiling water reactor (BWR) designs BWR/4 and BWR/6.¹ The changes would be
19 incorporated into future revisions of NUREG-1433, Volumes 1 and 2, and NUREG-1434,
20 Volumes 1 and 2. NUREG-1433 is based on the BWR/4 plant design, and is representative of
21 the BWR/2, BWR/3, and, in some cases, BWR/5 designs. NUREG-1434 is based on the
22 BWR/6 plant design, and is representative of, in many cases, the BWR/5 design.
23

24 The proposed changes would revise SR 3.3.1.1.2 in NUREGs-1433 and -1434 to only require
25 adjustment of the APRM channels if the calculated power exceeds the APRM output by more
26 than 2 percent rated thermal power (RTP).
27

28 ~~Throughout this safety evaluation (SE), items that are enclosed in square brackets signify~~
29 ~~plant-specific nomenclature or values. Individual licensees would furnish site-specific~~
30 ~~nomenclature or values for bracketed items when submitting a license amendment request~~
31 ~~(LAR) to adopt the changes described in this SE.~~
32

33 **2.0 REGULATORY EVALUATION**

34
35 **2.1 SYSTEM DESCRIPTION**

36
37 The APRMs monitor neutron flux within the core to provide an indication of core power. As
38 stated in the STS Bases, the APRM channels receive input signals from the local power range

¹ U.S. Nuclear Regulatory Commission, “Standard Technical Specifications, General Electric BWR/4 Plants,”
NUREG-1433, Vol. 1, “Specifications,” Rev. 4.0, April 2012, ADAMS Accession No. ML12104A192.

U.S. Nuclear Regulatory Commission, “Standard Technical Specifications, General Electric BWR/4 Plants,” NUREG-
1433, Vol. 2, “Bases,” Rev. 4.0, April 2012, ADAMS Accession No. ML12104A193.

U.S. Nuclear Regulatory Commission, “Standard Technical Specifications, General Electric BWR/6 Plants,” NUREG-
1434, Vol. 1, “Specifications,” Rev. 4.0, April 2012, ADAMS Accession No. ML12104A195.

U.S. Nuclear Regulatory Commission, “Standard Technical Specifications, General Electric BWR/6 Plants,” NUREG-
1434, Vol. 2, “Bases,” Rev. 4.0, April 2012, ADAMS Accession No. ML12104A196.

1 monitors (LPRM) within the reactor core to provide an indication of the power distribution and
2 local power changes. The APRM channels average these LPRM signals to provide a
3 continuous indication of average reactor power from a few percent to greater than RTP.
4

5 The APRM system is a safety-related system with two purposes. One purpose is to monitor the
6 core thermal power level. The other purpose is to provide reactor scram and control rod block
7 signals to preserve the fuel cladding integrity. The APRM system consists of a number of
8 APRM channels that each receive input signals from LPRMs located in the reactor core. The
9 APRM channels average the LPRM inputs and because the LPRMs assigned to specific APRM
10 channels are located in diverse axial and radial locations throughout the reactor core, each
11 APRM provides a continuous indication of average reactor power. A gain adjustment can be
12 made to each APRM channel output allowing it to be calibrated to the calculated core thermal
13 power. The typical allowable absolute difference between calculated core thermal power and
14 the APRM channel output is 2 percent.
15

16 Both analog and digital neutron monitoring systems (NMS) are installed in BWRs and have
17 different APRM system designs. Additionally, there are several different methodologies for
18 addressing BWR instability protection including: Option I-D, Option II, Enhanced Option I-
19 A (E1A), Option III, and Detect and Suppress Solution–Confirmation Density (DSS-CD) and the
20 automatic backup stability protection (ABSP) for DSS-CD. The APRMs only provide input for
21 Option I-D, Option II, Enhanced Option I-A, and the ABSP for DSS-CD.
22

23 A typical analog NMS has two groups of channels with three APRM inputs to each reactor
24 protection system (RPS) trip system. Three channels per group allow one channel in each
25 group to be bypassed because any one channel trip signal in each system can cause the
26 associated trip system to be actuated. Power Range Monitor Flow Biased Simulated Thermal
27 Power - High and the APRM Fixed Neutron Flux - High functions, four channels, with two
28 channels in each trip system, are typically required to be operable by Limiting Condition for
29 Operation (LCO) 3.3.1.1 to ensure that no single instrument failure will preclude a trip of the
30 APRM system on a valid signal. If one or more required channels are inoperable, Condition A
31 requires the channel or trip system be placed in the tripped condition within 12 hours. If one or
32 more functions with one or more required channels are inoperable in both RPS trip systems,
33 Condition B requires that the channel(s) or trip system(s) be placed in the tripped condition
34 within six hours.
35

36 A typical digital NMS is divided into four APRM channels and four 2-out-of-4 voter channels with
37 each channel providing input to each of the four 2-out-of-4 voter channels. The four voter
38 channels are divided into two groups of two each; each group of two voter channels provides
39 input to one RPS trip system. One APRM channel is allowed to be bypassed, but no voter
40 channels are allowed to be bypassed. A trip from any one APRM channel that is not bypassed
41 will result in a "half-trip" in all four of the voter channels, but no trip inputs to either RPS trip
42 system. A trip of any two channels of APRM flow biased or neutron flux trip that are not
43 bypassed will result in a full trip in each of the four voter channels, which in turn results in two
44 trip inputs to each RPS trip system logic channel. To ensure that no single instrument failure
45 will preclude a trip on a valid signal for the APRM Flow Biased Simulated Thermal Power - High
46 and the APRM Fixed Neutron Flux - High functions, three of the four APRM channels and all
47 four voter channels are typically required to be operable by TS LCO 3.3.1.1. If one or more
48 required channels are inoperable, Condition A requires the channel be placed in the tripped
49 condition within 12 hours.
50
51

1 2.2 PROPOSED CHANGES TO THE STS

2
3 The proposed changes would revise SR 3.3.1.1.2, which is associated with LCO 3.3.1.1A,
4 “Reactor Protection System (RPS) Instrumentation (Without Setpoint Control Program)” and
5 LCO 3.3.1.1B, “Reactor Protection System (RPS) Instrumentation (With Setpoint Control
6 Program).”

7
8 SR 3.3.1.1.2 currently states:

9
10 Verify the absolute difference between the average power range
11 monitor (APRM) channels and the calculated power is $\leq 2\%$ RTP
12 [plus any gain adjustment required by LCO 3.2.4, “Average Power
13 Range Monitor (APRM) Setpoints”] while operating at $\geq 25\%$ RTP
14

15 The proposed SR 3.3.1.1.2 would state:

16
17 Compare the average power range monitor (APRM) channels to
18 the calculated power. Adjust the APRM channels if the calculated
19 power exceeds the APRM output by more than 2% RTP while
20 operating at $\geq 25\%$ RTP
21

22 Corresponding changes are proposed to the STS Bases. A summary of the revised STS Bases
23 and the NRC staff’s evaluation of the revised Bases are provided in an attachment to this SE.
24

25 2.3 APPLICABLE REGULATORY REQUIREMENTS AND GUIDANCE

26
27 Section IV, “The Commission Policy,” of the “Final Policy Statement on Technical Specifications
28 Improvements for Nuclear Power Reactors” (58 *Federal Register* 39132), dated July 22, 1993,
29 states in part:

30
31 The purpose of Technical Specifications is to impose those
32 conditions or limitations upon reactor operation necessary to
33 obviate the possibility of an abnormal situation or event giving rise
34 to an immediate threat to the public health and safety by
35 identifying those features that are of controlling importance to
36 safety and establishing on them certain conditions of operation
37 which cannot be changed without prior Commission approval.
38

39 ...[T]he Commission will also entertain requests to adopt portions
40 of the improved STS [(e.g., TSTF-546)], even if the licensee does
41 not adopt all STS improvements.
42

43 ...The Commission encourages all licensees who submit
44 Technical Specification related submittals based on this Policy
45 Statement to emphasize human factors principles.
46

47 ...In accordance with this Policy Statement, improved STS have
48 been developed and will be maintained for [BWR designs]. The
49 Commission encourages licensees to use the improved STS as
50 the basis for plant-specific Technical Specifications.

1 ...[I]t is the Commission intent that the wording and Bases of the
2 improved STS be used ... to the extent practicable.
3

4 As described in the Commission's "Final Policy Statement on Technical Specifications
5 Improvements for Nuclear Power Reactors," recommendations were made by NRC and industry
6 task groups for new STS that include greater emphasis on human factors principles in order to
7 add clarity and understanding to the text of the STS, and provide improvements to the Bases of
8 STS, which provides the purpose for each requirement in the specification. Improved vendor-
9 specific STS were developed and issued by the NRC in September 1992.

10
11 The regulation at Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.36(a)(1)
12 requires an applicant for an operating license to include in the application proposed TS in
13 accordance with the requirements of 10 CFR 50.36. The applicant must include in the
14 application a "summary statement of the bases or reasons for such specifications, other than
15 those covering administrative controls...." However, per 10 CFR 50.36(a)(1), these technical
16 specification bases "shall not become part of the technical specifications."
17

18 Additionally, 10 CFR 50.36(b) requires:

19
20 Each license authorizing operation of a ... utilization facility ... will
21 include technical specifications. The technical specifications will
22 be derived from the analyses and evaluation included in the safety
23 analysis report, and amendments thereto, submitted pursuant to
24 [10 CFR] 50.34 ["Contents of applications; technical information"].
25 The Commission may include such additional technical
26 specifications as the Commission finds appropriate.
27

28 The categories of items required to be in the TSs are provided in 10 CFR 50.36(c). As required
29 by 10 CFR 50.36(c)(2)(i), the TSs will include LCOs, which are the lowest functional capability
30 or performance levels of equipment required for safe operation of the facility. Per 10 CFR
31 50.36(c)(2)(i), when an LCO of a nuclear reactor is not met, the licensee shall shut down the
32 reactor or follow any remedial action permitted by the TSs until the condition can be met.
33

34 The regulation at 10 CFR 50.36(c)(3) requires TSs to include items in the category of SRs,
35 which are requirements relating to test, calibration, or inspection to assure that the necessary
36 quality of systems and components is maintained, that facility operation will be within safety
37 limits, and that the LCOs will be met.
38

39 Per 10 CFR 50.90, whenever a holder of a license desires to amend the license, application for
40 an amendment must be filed with the Commission, fully describing the changes desired, and
41 following as far as applicable, the form prescribed for original applications.
42

43 Per 10 CFR 50.92(a), in determining whether an amendment to a license will be issued to the
44 applicant, the Commission will be guided by the considerations which govern the issuance of
45 initial licenses to the extent applicable and appropriate.
46

47 The NRC staff's guidance for the review of TSs is in Chapter 16, "Technical Specifications," of
48 NUREG-0800, Revision 3, "Standard Review Plan for the Review of Safety Analysis Reports for
49 Nuclear Power Plants" (SRP), dated March 2010 (ADAMS Accession No. ML100351425). As
50 described therein, as part of the regulatory standardization effort, the NRC staff has prepared
51 STS for each of the light-water reactor nuclear designs.

1 **3.0 TECHNICAL EVALUATION**
2

3 The existing TS SR 3.3.1.1.2 requires verification that the absolute difference between the
4 APRM channels and the calculated power is ≤ 2 percent RTP [plus any gain adjustment
5 required by LCO 3.2.4, "Average Power Range Monitor (APRM) Setpoints"] while operating at
6 ≥ 25 percent RTP. If the absolute difference is greater than 2 percent, the APRM channel is
7 declared inoperable. An acceptable way to restore operability is to adjust the gain for the APRM
8 channel to restore the absolute difference to ≤ 2 percent. If the APRM channel is reading higher
9 than the calculated thermal power, this adjustment would be non-conservative with respect to
10 the RPS trip setpoint. If the APRM channel is reading lower than the calculated thermal power,
11 this adjustment would be conservative with respect to the RPS trip setpoint.
12

13 The proposed change would require adjustment of the APRM channel only if the APRM is
14 non-conservative with respect to calculated thermal power (i.e., reading lower than calculated
15 thermal power). In this situation, the adjustment of the APRM channel is permitted, but not
16 required, if the APRM channel is conservative with respect to the calculated thermal power.
17

18 The NRC staff requested additional information on whether this proposed change would affect
19 the effectiveness of any of the stability solutions for BWRs. In the response dated February 2,
20 2017, the TSTF stated that stability solutions (e.g., Option III and DSS-CD) that rely on the
21 LPRMs are not affected by this change. For stability solutions that rely on the APRMs for the
22 main licensing basis protection (e.g., Option I-D, Option II, Enhanced Option I-A, and the ABSP
23 for DSS-CD), this change would result in earlier (i.e., conservative) RPS actuation. The NRC
24 staff reviewed this response and determined that it is not clear that a high APRM signal is
25 always conservative for the ABSP. However, this backup solution is only used when the normal
26 stability protection is inoperable and its use is limited to 120 days. Therefore, the proposed
27 change would negligibly affect the ABSP and is acceptable to the NRC staff.
28

29 The regulation at 10 CFR 50.36(c)(3) requires that the TS contain SRs, which are requirements
30 relating to test, calibration, or inspection to assure that the necessary quality of systems and
31 components is maintained, that facility operation will be within safety limits, and that the limiting
32 conditions for operation will be met. The NRC staff reviewed the changes proposed to SR
33 3.3.1.1.2 as described in this SE. The NRC staff determined that the SR, as modified,
34 continues to provide appropriate controls and acceptance criteria for adjustment of the APRMs
35 to ensure that the APRMs appropriately reflect actual reactor power. The NRC staff determined
36 that the SR continues to verify the operability of the APRMs and provide assurance that the
37 necessary quality of systems and components is maintained.
38

39 **4.0 CONCLUSION**
40

41 The NRC staff reviewed traveler TSTF-546, Revision 0, which proposed changes to
42 NUREG-1433, Volumes 1 (STS) and 2 (Bases), and NUREG-1434, Volumes 1 (STS) and
43 2 (Bases). The NRC staff determined that the proposed changes to the STS meet the
44 standards for TS in 10 CFR 50.36(b). The proposed changes to the SR assure that the
45 necessary quality of systems and components is maintained, that facility operation will be within
46 safety limits, and that the LCOs will be met, and satisfy 10 CFR 50.36(c)(3). Additionally, the
47 changes to the STS were reviewed for technical clarity and consistency with customary
48 terminology and format in accordance with SRP Chapter 16.
49

50 The proposed Bases, which will be added to future revisions to NUREG-1433, Volume 2, and
51 NUREG-1434, Volume 2, satisfy the Commission's Policy Statement by addressing the

1 questions specified in the policy statement, and cite references to appropriate licensing
2 documentation to support the Bases.

3

4 Technical contacts: Jennifer M. Whitman, NRR/DSS/SRXB
5 Gursharan Singh, NRR/DE/EICB

6

7 Attachment: Basis for Accepting the Proposed Changes to the Standard Technical
8 Specification Bases, Volume 2 of NUREGs-1433 and -1434

9

10 Date: June 20, 2017

11

12

13

14

1 **ATTACHMENT**

2
3 **BASIS FOR ACCEPTING THE PROPOSED CHANGES TO THE STANDARD TECHNICAL**
4 **SPECIFICATION BASES, VOLUME 2 OF NUREGS-1433 AND -1434**

5
6
7 **1.0 INTRODUCTION**

8
9 Traveler Technical Specifications (TS) Task Force (TSTF) TSTF-546, "Revise APRM [Average
10 Power Range Monitor] Channel Adjustment Surveillance Requirement [SR]," Revision 0,
11 proposes changes to the Standard Technical Specifications (STS) and Bases for boiling water
12 reactor (BWR) designs BWR/4 and BWR/6.² The changes would be incorporated into future
13 revisions of NUREG-1433, Volumes 1 and 2, and NUREG-1434, Volumes 1 and 2.
14 NUREG-1433 is based on the BWR/4 plant design, and is representative of the BWR/2, BWR/3,
15 and, in some cases, BWR/5 designs. NUREG-1434 is based on the BWR/6 plant design, and is
16 representative of, in many cases, the BWR/5 design.

17
18 The proposed changes would revise SR 3.3.1.1.2 in NUREGs-1433 and -1434 to only require
19 adjustment of the APRM channels if the calculated power exceeds the APRM output by more
20 than 2 percent rated thermal power (RTP). The Bases for SR 3.3.1.1.2 in NUREGs-1433 and -
21 1434 would also be revised. A summary of the revised Bases and the U.S. Nuclear Regulatory
22 Commission (NRC) staff's evaluation of the revised Bases are presented in this attachment.

23
24 **2.0 REGULATORY EVALUATION**

25
26 **2.1 Applicable Regulations and Guidance**

27
28 The regulation at Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.36(a)(1)
29 states that each applicant for a license authorizing operation of a production or utilization facility
30 shall include in his application proposed technical specifications in accordance with the
31 requirements of this section. A summary statement of the bases or reasons for such
32 specifications, other than those covering administrative controls, shall also be included in the
33 application, but shall not become part of the technical specifications.

34
35 In its "Final Policy Statement on Technical Specifications Improvements for Nuclear Power
36 Reactors," dated July 22, 1993 (58 *Federal Register* 39132), the Commission presented its
37 policy on the scope and purpose of the TS. The Commission explained how implementation of
38 the policy statement through implementation of the improved STS is expected to produce an
39 improvement in the safety of nuclear power plants through the use of more operator-oriented

² U.S. Nuclear Regulatory Commission, "Standard Technical Specifications, General Electric BWR/4 Plants,"
NUREG-1433, Vol. 1, "Specifications," Rev. 4.0, April 2012, ADAMS Accession No. ML12104A192.

U.S. Nuclear Regulatory Commission, "Standard Technical Specifications, General Electric BWR/4 Plants,"
NUREG-1433, Vol. 2, "Bases," Rev. 4.0, April 2012, ADAMS Accession No. ML12104A193.

U.S. Nuclear Regulatory Commission, "Standard Technical Specifications, General Electric BWR/6 Plants,"
NUREG-1434, Vol. 1, "Specifications," Rev. 4.0, April 2012, ADAMS Accession No. ML12104A195.

U.S. Nuclear Regulatory Commission, "Standard Technical Specifications, General Electric BWR/6 Plants,"
NUREG-1434, Vol. 2, "Bases," Rev. 4.0, April 2012, ADAMS Accession No. ML12104A196.

1 TS, improved TS Bases, reduced action-statement-induced plant transients, and more efficient
2 use of NRC and industry resources.

3
4 The Final Policy Statement provides the following description of the scope and the purpose of
5 the Technical Specification Bases:

6
7 Appropriate Surveillance Requirements and Actions should be
8 retained for each LCO [limiting condition for operation] which
9 remains or is included in the Technical Specifications. Each LCO,
10 Action, and Surveillance Requirement should have supporting
11 Bases. The Bases should at a minimum address the following
12 questions and cite references to appropriate licensing
13 documentation (e.g., FSAR, Topical Report) to support the Bases.

- 14
15 1. What is the justification for the Technical Specification, i.e., which
16 Policy Statement criterion requires it to be in the Technical
17 Specifications?
18
19 2. What are the Bases for each LCO, i.e., why was it determined to
20 be the lowest functional capability or performance level for the
21 system or component in question necessary for safe operation of
22 the facility and, what are the reasons for the Applicability of the
23 LCO?
24
25 3. What are the Bases for each Action, i.e., why should this remedial
26 action be taken if the associated LCO cannot be met; how does
27 this Action relate to other Actions associated with the LCO; and
28 what justifies continued operation of the system or component at
29 the reduced state from the state specified in the LCO for the
30 allowed time period?
31
32 4. What are the Bases for each Safety Limit?
33
34 5. What are the Bases for each Surveillance Requirement and
35 Surveillance Frequency; i.e., what specific functional requirement
36 is the surveillance designed to verify? Why is this surveillance
37 necessary at the specified frequency to assure that the system or
38 component function is maintained, that facility operation will be
39 within the Safety Limits, and that the LCO will be met?
40

41 Note: In answering these questions the Bases for each number
42 (e.g., Allowable Value, Response Time, Completion Time,
43 Surveillance Frequency), state, condition, and definition (e.g.,
44 operability) should be clearly specified. As an example, a number
45 might be based on engineering judgment, past experience, or
46 PSA [probabilistic safety assessment] insights; but this should be
47 clearly stated.
48

49 The NRC staff used the guidance contained in the Final Policy Statement during its evaluation
50 of the proposed changes to the Bases.
51

1 2.2 Description of Changes
2

3 Volumes 2 of NUREGs-1433 and -1434 contain the Bases for each Safety Limit and each LCO
4 contained in Volumes 1 of NUREGs-1433 and -1434. The Bases for each LCO are organized
5 into the following sections:
6

7 Background;
8 Applicable Safety Analyses, LCO, and Applicability;
9 Actions;
10 Surveillance Requirements; and
11 References.
12

13 The Bases for SR 3.3.1.1.2 in NUREGs-1433 and -1434 are proposed to be revised. The
14 following discussion provides a summary of the revised Bases, followed by the NRC staff's
15 evaluation of the revised Bases.
16

17 **3.0 TECHNICAL EVALUATION**
18

19 The Bases for SR 3.3.1.1.2 are proposed to be revised by the insertion of a description of the
20 revised SR 3.3.1.1.2. The revised Bases state that the APRMs are adjusted to the reactor
21 power calculated from a heat balance if the heat balance calculated reactor power exceeds the
22 APRM channel output by more than 2 percent RTP. The Bases explain that, if the APRM
23 channel cannot be adjusted to within this tolerance, the channel is declared inoperable. The
24 revised SR 3.3.1.1.2 does not preclude adjusting the APRMs if the reactor power is less than
25 the APRM indication, but this adjustment is not required for APRM operability.
26

27 The NRC staff reviewed the revised Bases and determined that they adequately provide an
28 appropriate description of the SR, the conditions under which an APRM channel is considered
29 inoperable, and the basis for the SR.
30

31 **4.0 CONCLUSION**
32

33 The NRC staff determined that the proposed TS Bases changes are consistent with the
34 proposed TS changes and provide an explanation and supporting information for the SR.
35 Therefore, the NRC staff determined that the revised Bases are consistent with the
36 Commission's "Final Policy Statement on Technical Specifications Improvements for Nuclear
37 Power Reactors," dated July 22, 1993 (58 *Federal Register* 39132).

1 **DRAFT MODEL SAFETY EVALUATION**
2 **BY THE OFFICE OF NUCLEAR REACTOR REGULATION**
3 **TECHNICAL SPECIFICATIONS TASK FORCE TRAVELER**

4 **TSTF-546, REVISION 0,**

5 **“REVISE APRM CHANNEL ADJUSTMENT SURVEILLANCE REQUIREMENT”**

6
7 *[NOTE: Throughout this safety evaluation (SE), items that are enclosed in square brackets*
8 *signify plant-specific nomenclature or values to be taken from the licensee's submittal.]*

9
10 **1.0 INTRODUCTION**

11
12 By application dated [enter date] (Agencywide Documents Access and Management System
13 (ADAMS) Accession No. [MLXXXXXXXX]), [name of licensee] (the licensee) requested
14 changes to the technical specifications (TSs) for [name of facility]. Specifically, the licensee
15 requested changes to the TSs to adopt Technical Specifications Task Force (TSTF) traveler
16 TSTF-546, Revision 0, “Revise APRM [Average Power Range Monitor] Channel Adjustment
17 Surveillance Requirement,” dated April 21, 2016 (ADAMS Accession No. ML16112A208). The
18 NRC approved the traveler on [Month, Day, 2017 (ADAMS Accession No. MLXXXX)].

19
20 The proposed changes would revise a surveillance requirement (SR) to only require adjustment
21 of the APRM channels if the calculated power exceeds the APRM output by more than
22 2 percent rated thermal power (RTP).

23
24 **2.0 REGULATORY EVALUATION**

25
26 **2.1 SYSTEM DESCRIPTION**

27
28 The APRMs monitor neutron flux within the core to provide an indication of core power. The
29 APRM channels receive input signals from the local power range monitors (LPRM) within the
30 reactor core to provide an indication of the power distribution and local power changes. The
31 APRM channels average these LPRM signals to provide a continuous indication of average
32 reactor power from a few percent to greater than RTP.

33
34 The APRM system is a safety-related system with two purposes. One purpose is to monitor the
35 core thermal power level. The other purpose is to provide reactor scram and control rod block
36 signals to preserve the fuel cladding integrity. The APRM system consists of a number of
37 APRM channels that each receive input signals from LPRMs located in the reactor core. The
38 APRM channels average the LPRM inputs and because the LPRMs assigned to specific APRM
39 channels are located in diverse axial and radial locations throughout the reactor core, each
40 APRM provides a continuous indication of average reactor power. A gain adjustment can be
41 made to each APRM channel output allowing it to be calibrated to the calculated core thermal
42 power. The typical allowable absolute difference between calculated core thermal power and
43 the APRM channel output is 2 percent.

44
45 ~~Both analog and digital neutron monitoring systems (NMS) are installed in BWRs and have~~
46 ~~different APRM system designs. Additionally, there are several different methodologies for~~

1 ~~addressing BWR instability protection including: Option I-D, Option II, Enhanced~~
2 ~~Option I-A (E1A), Option III, and Detect and Suppress Solution Confirmation Density (DSS-CD)~~
3 ~~and the automatic backup stability protection (ABSP) for DSS-CD. The APRMs only provide~~
4 ~~input for Option I-D, Option II, Enhanced Option I-A, and the ABSP for DSS-CD.~~

5
6 ~~A typical analog NMS has two groups of channels with three APRM inputs to each reactor~~
7 ~~protection system (RPS) trip system. Three channels per group allow one channel in each~~
8 ~~group to be bypassed because any one channel trip signal in each system can cause the~~
9 ~~associated trip system to be actuated. Power Range Monitor Flow Biased Simulated Thermal~~
10 ~~Power High and the APRM Fixed Neutron Flux High functions, four channels, with two~~
11 ~~channels in each trip system, are typically required to be operable by Limiting Condition for~~
12 ~~Operation (LCO) 3.3.1.1 to ensure that no single instrument failure will preclude a trip of the~~
13 ~~APRM system on a valid signal. If one or more required channels are inoperable, Condition A~~
14 ~~requires the channel or trip system be placed in the tripped condition within 12 hours. If one or~~
15 ~~more functions with one or more required channels are inoperable in both RPS trip systems,~~
16 ~~Condition B requires that the channel(s) or trip system(s) be placed in the tripped condition~~
17 ~~within six hours.~~

18
19 ~~A typical digital NMS is divided into four APRM channels and four 2-out-of-4 voter channels with~~
20 ~~each channel providing input to each of the four 2-out-of-4 voter channels. The four voter~~
21 ~~channels are divided into two groups of two each; each group of two voter channels provides~~
22 ~~input to one RPS trip system. One APRM channel is allowed to be bypassed, but no voter~~
23 ~~channels are allowed to be bypassed. A trip from any one APRM channel that is not bypassed~~
24 ~~will result in a “half trip” in all four of the voter channels, but no trip inputs to either RPS trip~~
25 ~~system. A trip of any two channels of APRM flow biased or neutron flux trip that are not~~
26 ~~bypassed will result in a full trip in each of the four voter channels, which in turn results in two~~
27 ~~trip inputs to each RPS trip system logic channel. To ensure that no single instrument failure~~
28 ~~will preclude a trip on a valid signal for the APRM Flow Biased Simulated Thermal Power High~~
29 ~~and the APRM Fixed Neutron Flux High functions, three of the four APRM channels and all~~
30 ~~four voter channels are typically required to be operable by TS LCO 3.3.1.1. If one or more~~
31 ~~required channels are inoperable, Condition A requires the channel be placed in the tripped~~
32 ~~condition within 12 hours.~~

33 34 2.2 PROPOSED TECHNICAL SPECIFICATION CHANGES

35
36 The proposed changes would revise SR 3.3.1.1.2, which is associated with LCO 3.3.1.1,
37 “Reactor Protection System (RPS) Instrumentation”.

38
39 SR 3.3.1.1.2 currently states:

40
41 ~~[~~Verify the absolute difference between the average power range
42 monitor (APRM) channels and the calculated power is $\leq 2\%$ RTP
43 [plus any gain adjustment required by LCO 3.2.4, “Average Power
44 Range Monitor (APRM) Setpoints”] while operating at $\geq 25\%$ RTP]
45

1 The proposed SR 3.3.1.1.2 would state:

2
3 Compare the average power range monitor (APRM) channels to
4 the calculated power. Adjust the APRM channels if the calculated
5 power exceeds the APRM output by more than 2% RTP while
6 operating at $\geq 25\%$ RTP
7

8 **2.3 REGULATORY REQUIREMENTS AND GUIDANCE**

9
10 The regulation at Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.36(a)(1)
11 requires an applicant for an operating license to include in the application proposed TS in
12 accordance with the requirements of 10 CFR 50.36. The applicant must include in the
13 application a “summary statement of the bases or reasons for such specifications, other than
14 those covering administrative controls....” However, per 10 CFR 50.36(a)(1), these technical
15 specification bases “shall not become part of the technical specifications.”
16

17 Additionally, 10 CFR 50.36(b) requires:

18
19 Each license authorizing operation of a ... utilization facility ... will
20 include technical specifications. The technical specifications will
21 be derived from the analyses and evaluation included in the safety
22 analysis report, and amendments thereto, submitted pursuant to
23 [10 CFR] 50.34 [“Contents of applications; technical information”].
24 The Commission may include such additional technical
25 specifications as the Commission finds appropriate.
26

27 The categories of items required to be in the TSs are provided in 10 CFR 50.36(c). As required
28 by 10 CFR 50.36(c)(2)(i), the TSs will include limiting conditions for operation (LCOs), which are
29 the lowest functional capability or performance levels of equipment required for safe operation
30 of the facility. Per 10 CFR 50.36(c)(2)(i), when an LCO of a nuclear reactor is not met, the
31 licensee shall shut down the reactor or follow any remedial action permitted by the TSs until the
32 condition can be met.
33

34 The regulation at 10 CFR 50.36(c)(3) requires TSs to include items in the category of SRs,
35 which are requirements relating to test, calibration, or inspection to assure that the necessary
36 quality of systems and components is maintained, that facility operation will be within safety
37 limits, and that the LCOs will be met.
38

39 The NRC staff’s guidance for the review of TSs is in Chapter 16, “Technical Specifications,” of
40 NUREG-0800, Revision 3, “Standard Review Plan for the Review of Safety Analysis Reports for
41 Nuclear Power Plants” (SRP), dated March 2010 (ADAMS Accession No. ML100351425).
42

43 **3.0 TECHNICAL EVALUATION**

44
45 The existing TS SR 3.3.1.1.2 requires [verification that the absolute difference between the
46 APRM channels and the calculated power is ≤ 2 percent RTP [plus any gain adjustment
47 required by LCO 3.2.4, “Average Power Range Monitor (APRM) Setpoints”] while operating at
48 ≥ 25 percent RTP.] If the absolute difference is greater than 2 percent, the APRM channel is

1 declared inoperable. An acceptable way to restore operability is to adjust the gain for the APRM
2 channel to restore the absolute difference to ≤ 2 percent. If the APRM channel is reading higher
3 than the calculated thermal power, this adjustment would be non-conservative with respect to
4 the RPS trip setpoint. If the APRM channel is reading lower than the calculated thermal power,
5 this adjustment would be conservative with respect to the RPS trip setpoint.

6
7 The proposed change would require adjustment of the APRM channel only if the APRM is
8 non-conservative with respect to calculated thermal power (i.e., reading lower than calculated
9 thermal power). In this situation, the adjustment of the APRM channel is permitted, but not
10 required, if the APRM channel is conservative with respect to the calculated thermal power.

11
12 ~~[NOTE: During the review of the traveler, the NRC staff requested additional information on
13 whether this proposed change would affect the effectiveness of any of the stability solutions for
14 BWRs. In the response dated February 2, 2017, the TSTF stated that stability solutions (e.g.,
15 Option III and DSS-CD) that rely on the LPRMs are not affected by this change. For stability
16 solutions that rely on the APRMs for the main licensing basis protection (e.g., Option I-D, Option
17 II, Enhanced Option I-A, and the ABSP for DSS-CD), this change would result in earlier (i.e.,
18 conservative) RPS actuation. The NRC staff reviewed this response and determined that it is
19 not clear that a high APRM signal is always conservative for the ABSP. However, this backup
20 solution is only used when the normal stability protection is inoperable and its use is limited to
21 120 days. Therefore, the proposed change would negligibly affect the ABSP and is acceptable
22 to the NRC staff.]~~

23
24 The regulation at 10 CFR 50.36(c)(3) requires that the TSs contain SRs, which are
25 requirements relating to test, calibration, or inspection to assure that the necessary quality of
26 systems and components is maintained, that facility operation will be within safety limits, and
27 that the limiting conditions for operation will be met. The NRC staff reviewed the changes
28 proposed to SR 3.3.1.1.2 as described in this SE. The NRC staff determined that the SR, as
29 modified, continues to provide appropriate controls and acceptance criteria for adjustment of the
30 APRMs to ensure that the APRMs appropriately reflect actual reactor power. The NRC staff
31 determined that the SR continues to verify the operability of the APRMs and provide assurance
32 that the necessary quality of systems and components is maintained.

33 34 3.1 VARIATIONS FROM THE APPROVED TRAVELER

35
36 ~~[NOTE: Technical reviewers and/or project manager to discuss variations from the approved
37 traveler and whether they are acceptable. Choose the applicable paragraphs based on
38 information provided in the LAR.]~~

39
40 ~~[The licensee is not proposing any variations from the TS changes described in TSTF-546 or
41 the applicable parts of the NRC staff's safety evaluation of TSTF-546.]~~

42
43 ~~[The licensee is proposing the following variations from the TS changes described in TSTF-546
44 or the applicable parts of TSTF-546 or the NRC staff's safety evaluation. These variations do
45 not affect the applicability of TSTF-546 or the NRC staff's safety evaluation to the proposed
46 license amendment.]~~

47
48 ~~[The [PLANT] TS utilize different [numbering][and][titles] than the Standard Technical
49 Specifications on which TSTF-546 was based. Specifically, [describe differences between the~~

1 *plant-specific TS numbering and/or titles and the TSTF-546 numbering and titles.] These*
2 *differences are administrative and do not affect the applicability of TSTF-546 to the [PLANT]*
3 *TS.]*

4
5 *[The Traveler discusses the applicable regulatory requirements and guidance, including the*
6 *10 CFR 50, Appendix A, General Design Criteria (GDC). [PLANT] was not licensed to the*
7 *10 CFR 50, Appendix A, GDC. The [PLANT] equivalents of the referenced GDC are [discussion*
8 *from licensee's application.] These differences do not alter the conclusion that the proposed*
9 *change is applicable to [PLANT].]*

10 11 3.2 CONCLUSION

12
13 The NRC staff reviewed the proposed changes to the TSs, and determined that they meet the
14 standards for TSs in 10 CFR 50.36(b). The proposed changes to the SR assure that the
15 necessary quality of systems and components is maintained, that facility operation will be within
16 safety limits, and that the LCOs will be met, and satisfy 10 CFR 50.36(c)(3). Additionally, the
17 changes to the TSs were reviewed for technical clarity and consistency with customary
18 terminology and format in accordance with SRP Chapter 16.

19 20 4.0 STATE CONSULTATION

21
22 *[Note: This section is to be prepared by the PM.]*

23
24 In accordance with the Commission's regulations, the **[Name of State]** State official was notified
25 of the proposed issuance of the amendment on **[enter date]**. The State official had **[no]**
26 comments. **[If comments were provided, they should be addressed here].**

27 28 5.0 ENVIRONMENTAL CONSIDERATION

29
30 *[Note: This section is to be prepared by the PM. As needed, the PM should coordinate with*
31 *NRR's Environmental Review and Projects Branch (RERP) to determine the need for an EA.*
32 *Specific guidance on preparing EAs and considering environmental issues is contained in NRR*
33 *Office Instruction LIC-203, "Procedural Guidance for Preparing Categorical Exclusions,*
34 *Environmental Assessments, and Considering Environmental Issues."]*

35
36 The amendment changes a requirement with respect to the installation or use of facility
37 components located within the restricted area as defined in 10 CFR Part 20 or changes to SRs.
38 The NRC staff has determined that the amendment involves no significant increase in the
39 amounts, and no significant change in the types, of any effluents that may be released offsite,
40 and that there is no significant increase in individual or cumulative occupational radiation
41 exposure. The Commission has previously issued a proposed finding that the amendment
42 involves no significant hazards consideration, and there has been no public comment on such
43 finding **[(XX FR XXX)]**. Accordingly, the amendment meets the eligibility criteria for categorical
44 exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental
45 impact statement or environmental assessment need be prepared in connection with the
46 issuance of the amendment.

47 48 6.0 CONCLUSION

49

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

7
8 **7.08 REFERENCES**

9
10 Optional section to be prepared by the PM and technical reviewers. If document is publicly
11 available, the ADAMS Accession No. should be listed.

12
13 *[NOTE: Replace principal contributor names with the individual(s) who prepare the plant-specific*
14 *SE.]*

15 Principal Contributors: Jennifer M. Whitman, NRR/DSS/SRXB
16 Gursharan Singh, NRR/DE/EICB

17
18 Date: June 20, 2017
19