

February 22, 2013

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Serial No. 13-029
NL&OS/RAP
Docket Nos. 50-338/339
License Nos. NPF-4/7

VIRGINIA ELECTRIC AND POWER COMPANY (DOMINION)
NORTH ANNA POWER STATION UNITS 1 AND 2
PROPOSED LICENSE AMENDMENT REQUEST(LAR)
CONTROL BANK SEQUENCE AND OVERLAP LIMIT ACTION

Pursuant to 10 CFR 50.90, Dominion requests amendments, in the form of changes to the Technical Specifications (TS) to Facility Operating License Numbers NPF-4 and NPF-7 for North Anna Power Station Units 1 and 2, respectively. TS 3.1.6 establishes the control rod insertion limits as well as the sequence and overlap limits. The proposed change will allow the sequence and overlap limits to be exceeded and TS 3.1.6.C Action entered if a failure is identified during the performance of Surveillance Requirement (SR) 3.1.4.2, which verifies control rod freedom of movement. This will align the sequence and overlap limit of Condition A with the control bank insertion limit Condition B. The control bank insertion limit of Condition B was modified with this same change in Amendments 179 and 160. The subsequent change to Improved Technical Specifications (ITS) added the Condition for sequence and overlap limits but failed to include the exception if a failure is identified during control rod freedom of movement testing.

A discussion of the proposed changes is in Attachment 1. The marked-up and typed pages are included in Attachments 2 and 3, respectively. A mark-up of the Bases is provided in Attachment 4, for information only.

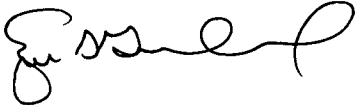
We have evaluated the proposed amendment and have determined that it does not involve a significant hazards consideration as defined in 10CFR50.92. The basis for our determination is included in Attachment 1. We have also determined that operation with the proposed change will not result in any significant increase in the amount of effluents that may be released offsite and no significant increase in individual or cumulative occupational radiation exposure. Therefore, the proposed amendment is eligible for categorical exclusion from an environmental assessment as set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment is needed in connection with the approval of the proposed change. The basis for our determination is also included in Attachment 1. The proposed amendment has been reviewed and approved by the Facility Safety Review Committee.

A001
MLR

Dominion requests approval of the proposed amendments by March 01, 2014. Once approved, the amendments will be implemented within 60 days.

If you have any questions or require additional information, please contact Mr. Thomas Shaub at (804) 273-2763.

Very truly yours,



E. S. Grecheck
Vice President – Nuclear Engineering and Development

Commitments made in this letter: None

Attachments:

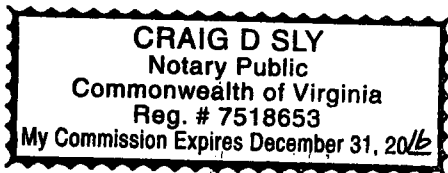
1. Discussion of Change
2. Marked-up Technical Specifications Pages
3. Proposed Technical Specification Pages
4. Bases Changes (For Information Only)

COMMONWEALTH OF VIRGINIA)
)
COUNTY OF HENRICO)

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by E.S. Grecheck, who is Vice President – Nuclear Engineering and Development of Virginia Electric and Power Company. He has affirmed before me that he is duly authorized to execute and file the foregoing document in behalf of that Company, and that the statements in the document are true to the best of his knowledge and belief.

Acknowledged before me this 22nd day of February, 2013.

My Commission Expires: December 31, 2016.



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Notary Public

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Attachment 1

Discussion of Change

**North Anna Power Station
Units 1 and 2
Virginia Electric and Power Company
(Dominion)**

Introduction

Dominion proposes revisions to Technical Specification (TS) 3.1.6, Control Rod Insertion Limits, for North Anna Power Station (NAPS), Units 1 and 2. This proposed change addresses operation with a rod control urgent failure condition (control rods out of service due to failures external to the individual rod drive mechanism, e.g, programming circuitry, but remaining operable, i.e., trippable), including limited operation with one control bank not within the sequence or overlap limits. A discussion of this proposed change is provided in the following:

TS 3.1.6 defines the control bank insertion, sequence, and overlap limits. The proposed change to TS 3.1.6 Condition A (via the use of Condition C) provides for up to 72 hours of continued power operation for diagnosis and repair of the Rod Control System with a maximum of one control bank not within sequence or overlap limits provided that:

- Control bank A, B, or C is inserted no more than 18 steps below the insertion limit and immovable,
- Each control and shutdown rod within limits of LCO 3.1.4,
- Each shutdown bank within the insertion limits of LCO 3.1.5, and
- The shutdown margin requirement of LCO 3.1.1 is determined to be met at least once per 12 hours.

The affected control bank must be restored to operable status within the 72 hours or the unit must be in Mode 2 with $K_{\text{eff}} < 1$ within the following 6 hours. Control Bank D is excluded from the 72 hour provision since insertion of D Bank below the insertion limit is not required for rod surveillance testing and the sequence and overlap limits will not be exceeded.

Technical Specification bases changes reflecting the proposed changes discussed above are included in Attachment 4 for information only. The Technical Specification bases will be revised in accordance with the Technical Specification Bases Control Program, TS 5.5.13, following approval of the Technical Specification changes.

Background

NAPS Technical Specifications require periodic testing of the control and shutdown rods in the core during power operation to ensure that the rods are trippable, i.e., able to fall into the core upon receipt of a reactor trip signal. This testing involves moving each rod not fully inserted into the core at least 10 steps in either direction at least once per quarter. This is typically done at or near full power, one bank at a time. Current procedures call for insertion and withdrawal of 18 steps for the bank being tested. Since all of the control and shutdown banks except control bank D are required to be fully withdrawn from the core at full power, special test exceptions are included in the insertion limit Technical Specifications for the case of control rod surveillance testing. The current Specifications are not prescriptive concerning the allowed duration of the test mode. NAPS has occasionally experienced some difficulty during rod surveillance testing. Specifically,

control rod urgent failure alarms are sometimes received during the test. The urgent failure alarm is indicative of an internal failure in the rod control equipment that has affected the ability of the system to move rods. Automatic rod motion and overlapped rod motion are stopped on an urgent failure. The failure may be in either the system logic cabinet or in the power cabinet and may take some time to diagnose.

A power cabinet urgent failure can be caused by coil current regulator failure, a phase failure (excessive ripple in coil voltage), a logic error (simultaneous zero current order to the stationary and movable grippers) or a multiplex error (current sensed in the movable or lift coils for a rod or group of rods not selected by the multiplex function). The system responds to these conditions via failure detection logic which overrides the existing current orders from the logic cabinet with a low current order to all control rod gripper coils powered by that cabinet. This is done to prevent spurious rod drops due to the failure. Also an "inhibit" signal is sent to the logic cabinet pulser unit to stop all rod motion, in or out, in auto or manual. Movement of individual banks which are not associated with an alarmed cabinet may still be accomplished by selection of individual bank operation on the control board. An urgent failure in the logic cabinet can be caused by pulser failure, slave cycle failure or loose circuit cards. An "inhibit" signal is sent to the pulser which stops auto and manual rod motion but still allows individual banks to move. An urgent failure condition during rod surveillance testing may result in an immovable (but still trippable) group or bank up to 18 steps below the insertion limits. In addition, there is a potential that an immovable (but still trippable) group or bank may occur during power maneuvers (e.g. during turbine valve freedom testing) where the insertion, sequence and overlap limits are fully met.

Specific Changes

The proposed TS 3.1.6 Condition A includes the same exclusion as in Condition B. This exclusion provides for up to 72 hours of continued power operation with a maximum of one control bank not within sequence or overlap limits provided that the control bank is inserted no more than 18 steps below the insertion limit, the affected bank is trippable, and the shutdown and control rod alignment limits of specification 3.1.4 are met. The specification also requires that no shutdown bank is concurrently below its insertion limit, and the shutdown margin requirement is determined to be met at least once per 12 hours. The affected control bank must be restored to operable status within 72 hours or the unit must be in Mode 2 with $K_{eff} < 1$ within the following 6 hours. Control Bank D is excluded from the 72 hour provision since insertion of D Bank below the insertion limit is not required for rod surveillance testing and sequence and overlap limits will not be exceeded. The following phrase will be added to TS 3.1.6 Condition A:

Control bank sequence or overlap limits not met, for reasons other than Condition C.

Technical Basis

During the time when the rods are immovable and do not meet the sequence and overlap limits, the shutdown and control rods will remain fully trippable and therefore capable of performing their intended safety function. The radial peaking factor ($F_{\Delta H}$) will be checked for the allowed conditions for each reload core by modeling the testing of each control and shutdown bank using the NRC approved methods discussed in Reference 1. Based on the results of these calculations, verification will be made that the DNBR criterion for ANS condition II (UFSAR Chapter 15.2) transients initiated from the test condition will continue to be met. Through this reload design process, it will be verified that the test controls for test bank and controlling bank (i.e., Bank D) insertion are appropriate to ensure that this criterion is met for all rod surveillance tests throughout the cycle. During the proposed 72 hour repair period, insertion below the insertion limit is restricted to one control or shutdown bank at a time. The insertion of the affected bank below the limit is constrained by the peaking factor requirements discussed above and is no more than 18 steps. Because of these constraints, the impact on core reactivity and power distribution is very small. The shutdown margin requirement is specifically reconfirmed every 12 hours during the repair period. Explicit analytical checks on the radial power distribution during the surveillance test/repair period are performed as part of the reload safety evaluation process.

Regulatory Evaluation

The proposed changes are consistent with General Design Criteria (GDC) listed in 10 CFR 50 Appendix A. Criteria that are relevant to the changes regarding the sequence and overlap limits include GDC-10 – Reactor Design, GDC-26 – Reactivity Control System Redundancy and Capability, and GDC-28 – Reactivity Limits.

Operation with the sequence and overlap limits being exceeded upon receipt of a rod urgent failure, i.e., immovable but trippable rod, with a maximum of one control bank inserted up to 18 steps below the insertion limit for a period of time up to 72 hours will not cause core radial peaking factors which result in violation of the applicable DNB limits for ANS Condition II events. Therefore, Criterion 10 is satisfied.

Criterion 26 is satisfied by the fact that operation with the sequence and overlap limits being exceeded upon receipt of a rod urgent failure (RUF) with a maximum of one control bank inserted up to 18 steps below the insertion limit, excluding D Bank, for a period of time up to 72 hours, will not result in a reduction in shutdown margin to lower than those assumed in the accident analyses and required by NAPS Technical Specifications. Reactivity control is also provided by the chemical volume and control system, which regulates the concentration of boric acid solution neutron absorber in the reactor coolant system.

Criterion 28 is satisfied by the following:

As 1 and 2 (below) apply and the control rod assemblies remain fully trippable during the repair period, the results and conclusion of the UFSAR for anticipated (i.e., ANS Condition II) transients remain unchanged.

1. The duration of operation with the RUF is limited to 72 hours in TS 3.1.6 Condition C. Therefore, the risk of a higher severity (i.e., ANS Condition III or IV) transient during this interval is negligibly small. Due to the negligible risk, the impact of the proposed TS changes on the UFSAR results for these classes of accidents has not been explicitly evaluated. This is a similar approach to the existing Technical Specification treatment of a single misaligned rod in TS 3.1.4; Condition B. TS 3.1.4 Condition B requires evaluation of core peaking factors within 72 hours and an evaluation of UFSAR safety analysis transients within 5 days of the identification of the misaligned rod. A similar requirement for power reduction in response to a control rod assembly urgent failure alarm with a single bank up to 18 steps below the insertion limits is not warranted because:

- 1) The perturbation to the normal operation power distribution will be much less severe than that of a fully misaligned single control rod,
- 2) By design, steady state and ANS Condition II transient criteria will be met for full power conditions, and full power conditions are the most limiting conditions for $F\Delta H$.
- 3) The rod urgent failure condition may render the capability to manually insert control banks unavailable, which could severely restrict the operator's ability to control axial power distribution swings to within the TS limits during a subsequent power reduction.

2. Occasional operation without manual rod insertion capability will not invalidate any of the accident analyses in UFSAR Chapter 15 because no credit is taken for this control mode in the analyses, Reference 3. It is noted that manual rod insertion is a contingency action for an Anticipated Transient without SCRAM (ATWS). However, the major contributor to limiting ATWS risk is the ATWS Mitigation System Actuation Circuitry (AMSAC), which provides a turbine trip, auxiliary feedwater initiation and control rod drive motor generator set breaker trip, which is diverse from the reactor protection system. Therefore, operation without manual rod insertion capability will have a negligible impact on ATWS risk.

No Significant Hazards Consideration

- 1. Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?**

Response: No

The proposed amendment would modify the North Anna Power Station current licensing basis by increasing the time that a single rod bank may be permitted to be outside of sequence and overlap limits. The new allowance only applies to minor sequence and overlap limit differences. The proposed change will result in a small increase in the probability that, at any given time, a control bank will be inserted outside of sequence and overlap limits. However, the probability of occurrence of previously evaluated accidents is not affected, since the existing TS already permit a similar deviation with respect to insertion limit. Only the allowed duration of the sequence and overlap limits' exceedance is being changed.

The allowed misalignment is not a malfunction of equipment important to safety; therefore, the probability of such a malfunction is not increased. A single rod bank's position within 18 steps of its sequence and overlap limits does not significantly increase the probability of a malfunction of a component important to safety. This change does not impact the requirement that the rod bank shall be operable (i.e., trippable); as such, it remains able to fulfill its safety function. Therefore, the proposed amendment does not involve a significant increase in the consequences of a previously evaluated accident.

- 2. Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?**

Response: No

The proposed amendment does not create any new allowances for operating the plant. Only the duration of an existing allowance is being lengthened, with additional restrictions being applied during the extended allowance. No physical changes are being made to any portion of the plant, so no new accident causal mechanisms are being introduced. The proposed change does not result in any new mechanisms that could initiate damage to the reactor or its principal safety barriers (i.e., fuel cladding, reactor coolant system, or primary containment).

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

3. Does the proposed amendment involve a significant reduction in a margin of safety?

Response: No

The proposed amendment does not affect the inputs or assumptions of any of the design basis analyses that demonstrate the integrity of the fuel cladding, reactor coolant system, or containment during accident conditions. Operation within the proposed limits will not cause unacceptable core radial peaking factors that could result in exceeding departure from nucleate boiling (DNB) limits. Operation within the sequence and overlap limit differences will not result in shutdown margins lower than assumed in the accident analyses. Control and Shutdown rods will remain fully operable (i.e., trippable) during the duration of the proposed extended allowance.

Therefore, the proposed amendment does not involve a significant reduction in a margin of safety because the current design limits continue to be met for the accidents of concern.

Based on the above, NAPS concludes that the proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

Environmental Considerations

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

Conclusion

This assessment of the proposed changes has demonstrated that the probability and consequences of the design basis accidents analyzed in the UFSAR are not increased with a 72 hour allowance for operation with one inoperable but trippable control bank outside of its sequence or overlap limits. The proposed change will result in a small increase in the probability that, at any given time, a control bank will be outside of sequence or overlap limits. However, by design, the control and shutdown banks will continue to meet the safety analysis criterion for steady state and ANS Condition II (moderate frequency) transients. The allowed sequence or overlap limit violation is not a

malfunction of equipment important to safety in this case and therefore the probability of such a malfunction is not increased. Limiting the allowed time for operation with rods out of service but trippable with a control bank outside of its sequence or overlap limits eliminates the need for consideration of this condition coincident with any of the low frequency (ANS Condition III or IV) design basis accidents. In addition, the margin of safety as defined in the basis of the technical specifications has not been reduced because current core design limits continue to be met for the accidents of concern. Therefore, it is concluded that the proposed changes to the Technical Specifications do not create an unreviewed safety question as defined in 10 CFR 50.59.

References

1. VEP-FRD-42-A, "Reload Nuclear Design Methodology."
2. WCAP-11993, "Joint Westinghouse Owner's Group/Westinghouse Program, Assessment of Compliance with ATWS Rule Basis for Westinghouse PWR's, Westinghouse Electric Corporation," December 1988.

Attachment 2

Marked-up Technical Specifications Pages

**North Anna Power Station
Units 1 and 2
Virginia Electric and Power Company
(Dominion)**

3.1 REACTIVITY CONTROL SYSTEMS

3.1.6 Control Bank Insertion Limits


LCO 3.1.6 Control banks shall be within the insertion, sequence, and overlap limits specified in the COLR.

APPLICABILITY: MODE 1,
MODE 2 with $k_{eff} \geq 1.0$.

----- NOTE -----

This LCO is not applicable while performing SR 3.1.4.2.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>A. Control bank sequence or overlap limits not met.</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> for reasons other than Condition C. </div> 	<p>A.1.1 Verify SDM to be within the limits provided in the COLR.</p> <p style="text-align: center;"><u>OR</u></p> <p>A.1.2 Initiate boration to restore SDM to within limit.</p> <p style="text-align: center;"><u>AND</u></p> <p>A.2 Restore control bank sequence and overlap to within limits.</p>	<p>1 hour</p> <p>1 hour</p> <p>2 hours</p>
<p>B. Control bank insertion limits not met for reasons other than Condition C.</p>	<p>B.1.1 Verify SDM to be within the limits provided in the COLR.</p> <p style="text-align: center;"><u>OR</u></p> <p>B.1.2 Initiate boration to restore SDM to within limit.</p> <p style="text-align: center;"><u>AND</u></p>	<p>1 hour</p> <p>1 hour</p> <p style="text-align: right;">(continued)</p>

No Changes - For Information Only

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. (continued)	B.2 Restore control bank(s) to within limits.	2 hours
C. Control bank A, B, or C inserted ≤ 18 steps below the insertion limit and immovable. <u>AND</u> Each control and shutdown rod within limits of LCO 3.1.4. <u>AND</u> Each shutdown bank within the insertion limits of LCO 3.1.5.	C.1 Verify SDM to be within the limits provided in the COLR. <u>AND</u> C.2 Restore the control bank to within insertion limit.	Once per 12 hours 72 hours
D. Required Action and associated Completion Time not met.	D.1 Be in MODE 2 with $K_{eff} < 1.0$.	6 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.1.6.1 Verify estimated critical control bank position is within the insertion limits specified in the COLR.	Within 4 hours prior to achieving criticality

Attachment 3

Proposed Technical Specification Pages

**North Anna Power Station
Units 1 and 2
Virginia Electric and Power Company
(Dominion)**

3.1 REACTIVITY CONTROL SYSTEMS

3.1.6 Control Bank Insertion Limits

LCO 3.1.6 Control banks shall be within the insertion, sequence, and overlap limits specified in the COLR.

APPLICABILITY: MODE 1,
MODE 2 with $k_{eff} \geq 1.0$.

----- NOTE -----
This LCO is not applicable while performing SR 3.1.4.2.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Control bank sequence or overlap limits not met for reasons other than Condition C.	A.1.1 Verify SDM to be within the limits provided in the COLR.	1 hour
	<u>OR</u>	
	A.1.2 Initiate boration to restore SDM to within limit.	1 hour
	<u>AND</u>	
	A.2 Restore control bank sequence and overlap to within limits.	2 hours
B. Control bank insertion limits not met for reasons other than Condition C.	B.1.1 Verify SDM to be within the limits provided in the COLR.	1 hour
	<u>OR</u>	
	B.1.2 Initiate boration to restore SDM to within limit.	1 hour
	<u>AND</u>	
		(continued)

Attachment 4

Marked-up Technical Specification Bases Pages (For Information Only)

**North Anna Power Station
Units 1 and 2
Virginia Electric and Power Company
(Dominion)**

BASES

ACTIONS

A.1.1, A.1.2, A.2, B.1.1, B.1.2, and B.2 (continued)

When the control banks are outside the acceptable insertion limits, except as allowed by Condition C, they must be restored to within those limits. This restoration can occur in two ways:

- a. Reducing power to be consistent with rod position; or
- b. Moving rods to be consistent with power.

The allowed Completion Time of 2 hours for restoring the banks to within the insertion, sequence, and overlaps limits provides an acceptable time for evaluating and repairing minor problems without allowing the unit to remain in an unacceptable condition for an extended period of time.

C.1 and C.2

If Control Banks A, B, or C are inserted below the insertion limits, power operation may continue for up to 72 hours provided that the bank is not inserted more than 18 steps below the insertion limits, the control and shutdown rods are within the operability and rod group alignment requirements provided in LCO 3.1.4, and the shutdown banks are within the insertion limits provided in LCO 3.1.5. The requirement to be in compliance with LCO 3.1.4 and LCO 3.1.5 ensures that the rods are trippable, and power distribution is acceptable during the time allowed to restore the inserted rod. If any of these Conditions are not met, Condition B must be applied.

or sequencing or overlap limits are not met

The Completion Time of 72 hours is based on operating experience and provides an acceptable time for evaluating and repairing problems with the rod control system.

D.1

If Required Actions A.1 and A.2, B.1 and B.2, or C.1 and C.2 cannot be completed within the associated Completion Times, the unit must be brought to MODE 2 with $k_{eff} < 1.0$, where the LCO is not applicable. The allowed Completion Time of 6 hours is reasonable, based on operating experience, for reaching the required MODE from full power conditions in an orderly manner and without challenging unit systems.

BASES

LCO
(continued) reactivity insertion and withdrawal and is imposed to maintain acceptable power peaking during control bank motion.

APPLICABILITY The control bank sequence, overlap, and physical insertion limits shall be maintained with the reactor in MODES 1 and 2 with $k_{eff} \geq 1.0$. These limits must be maintained, since they preserve the assumed power distribution, ejected rod worth, SDM, and reactivity rate insertion assumptions. Applicability in MODE 2 with $k_{eff} < 1.0$, and MODES 3, 4, and 5 is not required, since neither the power distribution nor ejected rod worth assumptions would be exceeded in these MODES.

The applicability requirements have been modified by a Note indicating the LCO requirements are suspended during the performance of SR 3.1.4.2. This SR verifies the freedom of the rods to move, and requires the control bank to move below the LCO limits, which would violate the LCO. Should the SR testing be suspended due to equipment malfunction with a rod bank below the insertion limits, the applicable Condition should be entered.

ACTIONS A.1.1, A.1.2, A.2, B.1.1, B.1.2, and B.2

If the control banks are found to be out of sequence or in the wrong overlap configuration, they must be restored to meet the limits.

except as allowed by Condition C,

Operation beyond the LCO limits is allowed for a short time period in order to take conservative action because the simultaneous occurrence of either a LOCA, loss of flow accident, ejected rod accident, or other accident during this short time period, together with an inadequate power distribution or reactivity capability, has an acceptably low probability.

Also, verification of SDM or initiation of boration to regain SDM is required within 1 hour, since the SDM in MODES 1 and 2 normally ensured by adhering to the control and shutdown bank insertion limits (see LCO 3.1.1, "SHUTDOWN MARGIN (SDM)") has been upset. If control banks are not within their limits, then SDM will be verified by performing a reactivity balance calculation, considering the effects listed in the BASES for SR 3.1.1.1.

(continued)
