February 13, 2008

Mr. Gordon Bischoff, Manager
Owners Group Program Management Office
Westinghouse Electric Company
P.O. Box 355
Pittsburgh, PA 15230-0355

SUBJECT: FINAL SAFETY EVALUATION (SE) FOR WESTINGHOUSE OWNERS GROUP (WOG) TOPICAL REPORT (TR) WCAP-15791-P, REVISION 2, "RISK-INFORMED EVALUATION OF EXTENSIONS TO CONTAINMENT ISOLATION VALVE COMPLETION TIMES" (TAC NO. MD3834)

Dear Mr. Bischoff:

By letter dated May 25, 2007, the Pressurized Water Reactor Owners Group (PWROG), submitted TR WCAP-15791-P, "Risk-Informed Evaluation of Extensions to Containment Isolation Valve Completion Times," Revision 2, to the U.S. Nuclear Regulatory Commission (NRC) for review and approval. By letter dated December 21, 2007, the PWROG commented on the draft SE for WCAP-15791-P, Revision 2, dated November 1, 2007, and the NRC staff's resolutions to the comments are addressed in Attachment 2 of the final SE.

TR WCAP-15791-P, Revision 2 incorporates in TR WCAP-15791-P, Revision 1, the resolution of the issue on how to address separate condition entry of containment isolation valves in the Technical Specification Task Force (TSTF), TSTF-446. This issue was resolved through an amendment issued to Wolf Creek Generating Station on April 26, 2006. However, the amendment for Wolf Creek Generating Station was issued after approval of Revision 1 of WCAP-15791-P dated March 10, 2006, therefore, the SE did not reflect those changes.

The NRC staff has found that WCAP-15791-P, Revision 2, is acceptable for referencing in licensing applications for Westinghouse pressurized water reactors to the extent specified and under the limitations delineated in the TR and in the enclosed final SE. The final SE defines the basis for our acceptance of the TR.

Our acceptance applies only to material provided in the subject TR. We do not intend to repeat our review of the acceptable material described in the TR. When the TR appears as a reference in license applications, our review will ensure that the material presented applies to the specific plant involved. License amendment requests that deviate from this TR will be subject to a plant-specific review in accordance with applicable review standards.

In accordance with the guidance provided on the NRC website, we request that the PWROG publishes the accepted proprietary and non-proprietary versions of this TR within three months of receipt of this letter. The accepted versions shall incorporate this letter and the enclosed final SE after the title page. Also, they must contain historical review information, including NRC requests for additional information and your responses. The accepted version shall include an "-A" (designating accepted) following the TR identification symbol.

If future changes to the NRC's regulatory requirements affect the acceptability of this TR, the PWROG and/or licensees referencing it will be expected to revise the TR appropriately, or justify its continued applicability for subsequent referencing.

Sincerely,

/RA/

Ho K. Nieh, Deputy Director
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Project No. 694

Enclosure: Final SE

cc w/encl:
Mr. James A. Gresham, Manager
Regulatory Compliance and Plant Licensing
Westinghouse Electric Company
P.O. Box 355
Pittsburgh, PA 15230-0355

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SAFETY EVALUATION BY THE

OFFICE OF NUCLEAR REACTOR REGULATION

TOPICAL REPORT WCAP-15791-P, REVISION 2, "RISK-INFORMED EVALUATION OF

EXTENSIONS TO CONTAINMENT ISOLATION VALVE COMPLETION TIMES"

WESTINGHOUSE OWNERS GROUP

PROJECT NO. 694

1.0 INTRODUCTION

Licensees of nuclear power plants have Technical Specifications (TSs) in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.36, "Technical specifications," that govern the operation of the plants. These TSs have limiting conditions for operation (LCOs) that state the primary containment isolation valves (CIVs) must be operable and the applicable reactor modes of operation in which CIVs are required to be operable. If any of the CIVs are inoperable, the TSs specify the required actions to address the inoperability and the completion times (CTs) for such actions. The U.S. Nuclear Regulatory Commission's (NRC) improved standard TSs (ISTS) for Westinghouse plants are in NUREG-1431, "Standard Technical Specifications Westinghouse Plants," Revision 3, dated June 2004 (NUREG-1431).

By letter dated June 6, 2002, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML021720004), as supplemented by letters dated February 13 and May 6, 2004, and March 10, 2005 (ADAMS Accession Numbers ML052010500, ML051940476, and ML050740020, respectively), the Westinghouse Owners Group (WOG) submitted proprietary and non-proprietary versions of topical report (TR) WCAP-15791-P, "Risk-Informed Evaluation of Extensions to Containment Isolation Valve Completion Times," for NRC staff review. The WOG letters dated February 13, 2004, and March 10, 2005, provided responses to the NRC staff's request for additional information (RAI) and other clarifications. The supplemental letter dated May 6, 2004, provided the proprietary and non-proprietary versions of TR WCAP-15791, Revision 1, that incorporated changes delineated in the WOG RAI responses. The TR provides technical justification for extending CIV CTs in ISTS LCO 3.6.3, "Containment Isolation Valves," and would be referenced in plant-specific license amendment requests to extend CIV CTs. The WOG also provided comments on the NRC staff's draft safety evaluation (SE) in its letter dated October 19, 2005 (ADAMS Accession No. ML052940248).

On March 10, 2006 (ADAMS Accession No. ML060330330), the NRC issued its final SE on TR WCAP-15791-P, Revision 1, and stated that the TR is acceptable for referencing in licensing applications regarding extended CIV CTs. The SE contains conditions on licensees adopting this TR and identifies additional information needed to be submitted in plant-specific applications adopting the TR in Sections 3.5 and 3.6, respectively, of that SE. The NRC also

ENCLOSURE

concluded (1) that the TR provides guidance, and generic and plant-specific analyses, to assist licensees in evaluating changes to CIV CTs and (2) this guidance is complementary to NRC staff guidance provided in Regulatory Guides (RGs) 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," and 1.177, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications," and in Chapter 19, Section 19.2 of the NRC Standard Review Plan (SRP), NUREG-0800, June 2007. As such, the NRC stated that TR WCAP-15791-P, Revision 1, provides an acceptable basis to evaluate the proposed CIV CTs, when used in conjunction with the RGs. The NRC final SE also had an attached table that addressed the disposition of the WOG's comments in the WOG letter dated October 19, 2005, on the NRC draft SE on the TR.

On November 21, 2006, the WOG, now the Pressurized Water Reactor Owners Group (PWROG), requested a meeting with the NRC staff to address the PWROG's remaining comments on the final SE to topical report WCAP-15791. The main point made in the meeting was that the issue on how to address separate condition entry of containment isolation valves in the Technical Specification Task Force (TSTF), TSTF-446, Revision 1, "Risk-Informed Evaluation of Extensions to Containment Isolation Valve Completion Times (WCAP-15791)," had been resolved through the amendment issued to Wolf Creek Generating Station on April 26, 2006. Because the amendment for Wolf Creek Generating Station was issued after the final SE for WCAP-15791 dated March 10, 2006, the final SE to WCAP-15791 did not reflect those changes. Therefore, the PWROG suggested incorporating the changes into WCAP-15791 as well as a few other changes the PWROG identified for the final SE to WCAP-15791. The NRC staff agreed to revise the final SE to WCAP-15791, based on an additional submittal by the PWROG that revised WCAP-15791 to include the resolution of TSTF-446, Revision 1.

In support of TR WCAP-15791, TSTF submitted to the NRC TSTF-446, Revision 1, "Risk-Informed Evaluation of Extensions to Containment Isolation Valve Completion Times (WCAP-15791)," by letter dated January 31, 2005 (ADAMS Accession No. ML050460293). By letter dated January 11, 2007 (ADAMS Accession No. ML070110620), as updated by letter dated June 12, 2007 (ADAMS Accession No. ML071630408), TSTF submitted a Revision 2 to TSTF-446 to the NRC. Although TSTF-446 is not addressed in the SE, it is referred to in Sections 3.1 and 3.3.3 of the SE because the PWROG referenced TSTF-446 in its response to an NRC RAI. The acceptability of the technical specifications in the proposed TSTF-446 will be addressed in a separate evaluation.

By letter dated December 15, 2006 (ADAMS Accession No. ML063530292), the PWROG submitted hand-written markup revisions to TR WCAP-15791-P, Revision 1, as well as comments on the NRC final SE issued on March 10, 2006. By letter dated January 16, 2007 (ADAMS Accession No. ML070260213), the PWROG submitted non-proprietary hand-written markup revisions to TR WCAP-15791, Revision 1. Per NRC request, the PWROG agreed to resubmit TR WCAP-15791-P, Revision 1, with the hand-written comments integrated in a printed version of the topical report, as TR WCAP-15791-P Revision 2. By letter dated May 25, 2007 (ADAMS Accession No. ML071550225), the PWROG submitted proprietary and non-proprietary versions of TR WCAP-15791-P, Revision 2, to the NRC staff for review and approval. It is this version of TR WCAP-15791 that is addressed in this SE.

The TR provides a risk-informed justification for extending the CIV CTs from four hours to 168 hours (i.e., seven days) for Westinghouse pressurized water reactors. The approach taken

in TR WCAP-15791 in grouping plant CIVs and determining the CTs for the CIVs is addressed in Appendix A to this SE.

For CIVs that did not demonstrate acceptable results for 168 hours, shorter CTs were evaluated in TR WCAP-15791. The WOG analysis includes a generic-bounding risk assessment of the impact of adopting the proposed CTs. A deterministic approach was used to determine the minimum-containment hole size that would result in a large release from the containment atmosphere. Penetration flow paths connected to the containment atmosphere smaller than the minimum hole size are screened out of the total list of penetration flow paths (i.e., no further evaluation is made), and are assigned the maximum CT of seven days. Penetrations larger than the minimum-containment hole size were evaluated using a probabilistic evaluation to verify what CT (i.e., a seven-day or shorter CT) is justified by the evaluation.

The WOG stated that the CIV CT extension methodology in TR WCAP-15791 is consistent with the guidance of RG 1.174, Revision 1, dated November 2002, and RG 1.177, dated August 1998. However, to be within these guidelines, the seven-day CT had to be reduced for some CIVs. Thus, plant-specific applications of the proposed generic results will lead to some CIV CTs that are less than seven days.

The WOG stated in WCAP-15791 that the proposed CT extensions will provide flexibility by increasing the time to perform on-line CIV testing, maintenance, or repair. The proposed CTs were selected to provide sufficient time for plant personnel to both address CIV inoperability and to perform preventive maintenance activities on the CIVs during power operation.

2.0 REGULATORY EVALUATION

CIVs ensure that adequate primary containment boundaries are maintained during and after accidents by minimizing potential flow paths to the environment and ensure that the primary containment function assumed in the plant-specific safety analysis is maintained. The associated CIV LCO in the plant TSs ensures that the CIVs will perform their design safety functions to minimize the loss of reactor coolant inventory and establish an adequate containment boundary during an accident.

NUREG-1431 states that CIVs form part of the containment pressure boundary and provides a means for fluid penetrations not serving accident consequence limiting systems to be provided with two isolation barriers that are closed on a containment isolation signal. These isolation devices are either passive or active (i.e., automatic). Manual valves, deactivated automatic valves secured in their closed position (including check valves with flow through the valve secured), blind flanges, and closed systems are considered passive devices. Two barriers (one may be a closed system) in a series are provided for each penetration so that no single credible failure or malfunction of an active component can result in a loss of isolation or leakage that exceeds limits assumed in the safety analysis. CIVs help ensure that the containment atmosphere will be isolated from the environment in the event of a release of fission product radioactivity to the containment atmosphere as a result of a design-basis accident (DBA). The DBAs that result in a release of radioactive material within containment are a loss-of-coolant accident (LOCA) and a rod ejection accident. The operability requirements for CIVs help ensure that containment is isolated within the time limits assumed in the safety analysis.

2.1 Applicable Regulations

The applicable regulations governing CIVs are the following:

The regulation at 10 CFR 50.36, “Technical specifications,” requires that all operating licenses for nuclear reactors must include TSs for the subject plant. The LCOs, along with the required CTs, are specified for each system in the TSs, which includes the CIVs. With the LCOs, there are surveillance requirements specified to check that the system LCO is being met, and conditions, required actions, and CTs specified for when the LCO is not being met and how long the plant can take to restore the LCO or shut down. Although CTs are not specifically stated in 10 CFR 50.36, LCOs are addressed and 10 CFR 50.36(c)(2) states that when an LCO is not met, the licensee shall "shut down the reactor or follow any remedial action permitted by the technical specifications until the condition can be met." The action conditions and required actions in the TSs are the remedial actions and the CTs are allowed time for the specified remedial actions before the licensee shall shut down the reactor. If the basis for extending the CTs is acceptable, then the requirements of 10 CFR 50.36 are met. The basis for the CTs specified in the TSs can be deterministic and/or risk-informed.

The regulation at 10 CFR 50.65, “Requirements for monitoring the effectiveness of maintenance at nuclear power plants,” as it relates to the proposed CIV CT configuration, requires the assessment and management of the increase in risk that may result from the proposed maintenance activity.

General Design Criterion (GDC)-35, "Emergency core cooling," of Appendix A to 10 CFR Part 50, requires suitable redundancy in components and features, and suitable interconnections, leak detection, isolation, and containment capabilities to assure that the system safety function can be accomplished assuming a single failure.

GDC-54, "Piping systems penetrating containment," requires that those piping systems penetrating primary containment shall be provided with leak detection, isolation, containment capabilities having redundancy, reliability, and performance capabilities that reflect the importance to safety of isolating these piping systems.

GDC-55, "Reactor coolant pressure boundary penetrating containment," requires that each line that is part of the reactor coolant pressure boundary and that penetrates primary containment shall be provided with CIVs.

GDC-56, "Primary containment isolation," requires that each line that connects directly to the containment atmosphere and penetrates primary reactor containment shall be provided with CIVs.

GDC-57, "Closed system isolation valves," requires that each line that penetrates primary reactor containment and is neither part of the reactor coolant pressure boundary nor connected directly to the containment atmosphere shall have at least one CIV that shall be either automatic, or locked closed, or capable of remote manual operation.

The proposed CIV CTs do not affect the design or function of these valves; therefore, compliance with the above GDC is not changed by the proposed CTs. Also, if the basis for

extending the CTs is acceptable, then 10 CFR 50.36 will be met. The basis in WCAP-15791 for extending the CIV CTs is risk-informed and the criteria for accepting changes to plants utilizing risk information are discussed in the next section.

2.2 Applicable Regulatory Criteria/Guidelines

General guidance for evaluating the technical basis of proposed risk-informed changes is provided in Chapter 19, Section 19.2 of the NRC SRP, June 2007. More specific guidance related to risk-informed TS changes is provided in SRP Section 16.1, "Risk-Informed Decisionmaking: Technical Specifications," Revision 1, March 2007, which includes CT changes as part of risk-informed decisionmaking. Chapter 19, Section 19.2 of the SRP states that a risk-informed application should be evaluated to ensure that the proposed changes meet the following key principles:

- The proposed change meets the current regulations, unless it explicitly relates to a requested exemption or rule change.

- The proposed change is consistent with the defense-in-depth philosophy.

- The proposed change maintains sufficient safety margins.

- When proposed changes increase risk (i.e., core damage frequency (CDF) or large early release frequency (LERF)), the increase(s) should be small and consistent with the intent of the Commission's Safety Goal Policy Statement.

- The impact of the proposed change should be monitored using performance measurement strategies.

RG 1.174 and RG 1.177 provide specific guidance and acceptance guidelines for assessing the nature and impact of licensing-basis changes, including proposed permanent TS changes in CTs by considering engineering issues and applying risk insights. RG 1.177 identifies an acceptable risk-informed approach, including additional guidance specifically geared toward the assessment of proposed TS CT changes. Specifically, RG 1.177 identifies a three-tiered approach for the evaluation of the risk associated with a proposed TS CT change as identified below:

- Tier 1 is an evaluation of the plant-specific risk associated with the proposed TS change, as shown by the change in core damage frequency (ΔCDF) and incremental conditional core damage probability (ICCDP), change in large early release frequency (ΔLERF), and incremental conditional large early release probability (ICLERP). This tier also addresses the technical adequacy of the licensee's plant-specific probabilistic risk assessment (PRA) for the subject application.

- Tier 2 identifies and evaluates, with respect to defense-in-depth, any potential risk-significant plant equipment outage configurations associated with the proposed change. The licensee should provide reasonable assurance that the risk-significant plant equipment outage configurations will not occur when equipment associated with the proposed TS change is out of service.

- Tier 3 provides for the establishment of an overall configuration risk management program (CRMP) and confirmation that its insights are incorporated into the decisionmaking process before taking equipment out of service prior to or during the CT. Compared with Tier 2, Tier 3 provides additional coverage to ensure risk-significant plant equipment outage configurations are identified in a timely manner and that the risk impact of out-of-service equipment during planned and unplanned maintenance activities is appropriately evaluated prior to performing any maintenance activity over extended periods of plant operation. Tier 3 guidance can be satisfied by the Maintenance Rule (i.e., 10 CFR 50.65(a)(4)), where that program provides an adequate quality basis which requires a licensee to assess and manage the increase in risk that may result from activities such as surveillance, post-maintenance testing, and corrective and preventive maintenance.

If the approach in WCAP-15791 for the evaluation of the risk associated with the proposed CIV CTs addresses Tier 1, Tier 2, and Tier 3 requirements, as described above, and meets the specific guidance and acceptance guidelines in RGs 1.174 and 1.177, for assessing the nature and impact of licensing-basis changes, then the proposed CIV CTs meet 10 CFR 50.36 and are, therefore, acceptable. For WCAP-15791, Tier 1 and Tier 2 are addressed in the TR. Tier 3 is not addressed in the TR, and, therefore, must be addressed in the plant-specific applications. Sections 4.0 and 5.0 of this SE address the conditions and additional information, including Tier 3, that should be submitted by licensees in their plant-specific applications.

3.0 TECHNICAL EVALUATION

3.1 NUREG-1431 TSs Affected

Based on WCAP-15791, the following requirements in ISTS LCO 3.6.3 are affected:

- Condition A - One or more penetration flow paths with one CIV inoperable (only applicable to penetration flow paths with two [or more] CIVs). Required Action A1: Isolate the affected penetration flow path by the use of at least one closed and deactivated automatic valve, closed manual valve, blind flange, or check valve with flow through the valve secured. In WCAP-15791, this condition was split into two conditions, Condition A for CIV pressure boundary intact and Condition B for CIV pressure boundary not intact. This creates TS conditions to address maintenance activities that impact the CIV and the penetration pressure boundary: one when the pressure boundary is intact and one when it is not intact.

- Condition B - One or more penetration flow paths with two [or more] CIVs inoperable, where the required action is to isolate the affected flow path by a closed and deactivated automatic valve, closed manual valve, or blind flange in a CT of one hour, is not being changed, but this condition is renumbered.

- Condition C - One or more penetration flow paths with one CIV inoperable (only applicable to penetration flow paths with only one CIV and a closed system). Required Action C1: Isolate the affected penetration flow path by use of at least one closed and deactivated automatic valve, closed manual valve, or blind flange. In WCAP-15791, Condition C is deleted to eliminate this condition.

- In WCAP-15791, an additional ISTS LCO 3.6.3 Condition D is proposed to be added stating that for two or more penetration flow paths with one CIV inoperable [for reasons other than Condition[s] E [and F]] the CT is four hours. This new condition limits the CTs of inoperable CIVs in more than one penetration flow path as allowed by Note 2 to the Technical Specifications 3.6.3 Actions table. Condition D was addressed in the WOG's response to the NRC staff's RAI 6, in its February 13, 2004, letter in that the WOG stated that the technical specifications in TSTF-446 would be revised to be consistent with the single inoperable CIV assumed in WCAP-15791. The technical specification revision is the proposed additional ISTS LCO 3.6.3 Condition in TSTF-446, Revision 1. The licensee for Wolf Creek Generating Station also submitted this condition in its plant-specific amendment request dated July 23, 2004, to adopt WCAP-15791, Revision 1. This is discussed in Section 3.3.3 of this SE.

- Also, other ISTS LCO 3.6.3 conditions are renumbered to account for deleting Condition C and adding new Conditions B and D, which are discussed above. For example, the existing Condition B is renumbered Condition C.

WCAP-15791 provides justification for extending the CT from four hours to up to 168 hours (seven days). For isolation valves that cannot demonstrate acceptable results for 168 hours, shorter times are considered in the TR, as shown for LCO 3.6.3 below:

- Condition A - One or more penetration flow paths with one CIV inoperable, and CIV pressure boundary intact.

  Required Action A.1: Isolate the affected penetration flow path by the use of at least one closed and deactivated automatic valve, closed manual valve, blind flange, or check the valve with flow through the valve secured.

  Change the CT from four hours to one of the following seven categories, which are listed in Tables D-1 and D-2 of Appendix D to WCAP-15791, based on generic or plant specific calculated CT results of CIVs:

  1. 4 hours for Category 1 CIVs
  2. 8 hours for Category 2 CIVs
  3. 12 hours for Category 3 CIVs
  4. 24 hours for Category 4 CIVs
  5. 48 hours for Category 5 CIVs
  6. 72 hours for Category 6 CIVs
  7. 168 hours for Category 7 CIVs

- Condition B - One or more penetration flow paths with one CIV inoperable and CIV pressure boundary not intact.

  Required Action B.1: Isolate the affected penetration flow path by use of at least one closed and deactivated automatic valve, closed manual valve, blind flange, or check valve with flow through the valve secured.

Change the CT from four hours to one of the following seven categories, which are listed in Tables D-1 and D-2 of Appendix D to WCAP-15791, based on generic or plant specific calculated CT results of CIVs:

1. 4 hours for Category 8 CIVs
2. 8 hours for Category 9 CIVs
3. 12 hours for Category 10 CIVs
4. 24 hours for Category 11 CIVs
5. 48 hours for Category 12 CIVs
6. 72 hours for Category 13 CIVs
7. 168 hours for Category 14 CIVs

As shown above, NUREG-1431, LCO 3.6.3 conditions and notes, which distinguish between penetration flow paths that contain two or more CIVs and penetration flow paths that contain one CIV and a closed system, are eliminated. LCO 3.6.3 conditions are added to address maintenance activities that impact the CIV and penetration pressure boundary: one condition when the pressure boundary is intact and one condition when it is not intact. The difference between Conditions A and B above is whether (1) the CIV is not removed for maintenance and the penetration pressure boundary is intact (Condition A) or (2) the CIV is removed for maintenance and the penetration pressure boundary is not intact (Condition B). This is addressed in Section 3.2 of this SE.

Of the conditions identified in LCO 3.6.3, the risk impact of two CIVs inoperable in one or more penetration flow paths was not evaluated in WCAP-15791. The CT for this configuration is generally limited by the ISTS LCO 3.6.3 Condition B to a CT of one hour. This remains unchanged by WCAP-15791 in that the TR does not propose to change the condition, or the CT for this condition. Systems used for accident mitigation that contain CIVs that also function as containment pressure boundaries were evaluated only with regard to the valve impact on loss of containment isolation, and CT limitations with respect to accident mitigation system function remain unchanged. In response to the NRC staff's RAI, the WOG evaluated the potential impact of the CT extensions on the availability of other mitigative functions and the corresponding impact on risk. The WOG results show that this impact is very small.

3.2 Detailed Description of the Proposed Changes

The emergency core cooling system (ECCS) is designed to meet the requirements of 10 CFR 50.46, and GDC-35 of Appendix A to 10 CFR Part 50. Suitable redundancy in components and features, and suitable interconnections, leak detection, isolation, and containment capabilities are provided to assure that the system safety function can be accomplished assuming a single failure. The unavailability of one ECCS train, in addition to one of the injection lines affected by the assumed break, will not compromise the ability of the ECCS to mitigate a LOCA. Thus, with the inoperability of a single ECCS isolation valve to open, the remaining ECCS train is sufficient to perform the design function of ECCS for mitigating a design-basis LOCA. The WOG also confirmed by an RAI response that the ECCS does not contain valves classified as CIVs that would close on a containment isolation signal that would compromise the safety function of the mitigation system. Therefore, the safety function of the ECCS will not be affected by the proposed changes of CIV CTs with respect to a CIV failing to open.

The TR assessment of the risk impact for the proposed changes to extend CIV CTs for up to seven days during Modes 1, 2, 3, and 4 follows the guidance of RGs 1.177 and 1.174, and includes the evaluation of the ΔCDF, ΔLERF, ICCDP, and ICLERP for valves in maintenance where the pressure boundary is or is not maintained during the proposed CT in accordance with the guidance of RGs 1.174 and 1.177. The TR evaluation also includes the interfacing system LOCA (ISLOCA) for valves connected to the reactor coolant system (RCS). The TR evaluated valves that have a dual function of containment isolation and accident consequence mitigation. The WOG considered the risk impact of CIVs installed in systems with non-seismically qualified piping. Although TS LCO 3.6.3 Note 2 allows separate condition entry for each penetration flow path, proposed Condition D addresses an inoperable CIV in more than one penetration flow path and limits the CT, for all but one inoperable CIV, to four hours. This is to say that the proposed Condition D will limit the number of CIVs in an extended CT to no more than one at any given time.

The TR uses a methodology to assess plant risk that involves the grouping of CIVs and the associated penetrations in generic classes. This is addressed in Appendix A of this SE. Each class was then further divided into subgroups of generic configurations. Although the WOG did perform a plant-specific CT risk evaluation for one plant in Chapter 10 of the TR, where Wolf Creek Generating Station (Wolf Creek) is the lead plant, it primarily selected risk parameters identified as bounding. The risk parameters selected represent a composite plant and are considered bounding values based on data from WOG-member utilities. The risk impact of each configuration was determined by applying the proposed seven-day CT and using the bounding-risk parameters for each LCO. However, for penetration flow paths that do not result in a large early release (i.e., diameters less than or equal to two inches) the screening criteria presented in WCAP-15791 provide a default CT of seven days in lieu of a risk analysis for these CIVs.

The evaluations determined the risk impact on LERF, and ICLERP with one CIV inoperable within a penetration for the seven-day CT. The resulting value represents the risk increase while in a seven-day CIV CT. These estimates were then compared to the acceptance guidelines given in RGs 1.174 and 1.177. For CIV evaluations that met the acceptance guidelines for LERF and ICLERP, a seven-day CT was proposed. For CIVs where the seven-day CT resulted in LERF and/or ICLERP estimates greater than the acceptance guidelines, alternate shorter CTs were evaluated and proposed. Based on the TR evaluation results, not all CIV CTs could be extended to the full seven-day CT; however, a basis for calculating a shorter acceptable CIV CT was presented in Chapter 8 of the TR. Plant-specific applications of the generic analysis in Chapter 8 of WCAP-15791 must show that these TR assumptions are applicable to their facility. The WOG provided a demonstration of the methodology for the Wolf Creek in Chapter 9.

The TR stated that because CIVs are used to maintain containment integrity, any change in their availability will directly impact releases from containment following a core damage event. Furthermore, the TR stated that the impact on CDF, as expressed by ΔCDF and ICCDP, is not relevant, since containment isolation is not directly related to the prevention or mitigation of core damage. In the RAIs, the NRC staff requested the following:

1. An evaluation of the impact on ΔCDF/ICCDP for the TR containment isolation configurations and systems associated with an accident mitigation function

(e.g., engineered safety feature actuation system, sample lines, letdown, containment cooling, reactor coolant system inventory control, or containment sprays).

2. Further evaluation of an open system (i.e., an open system inside containment is directly connected to the containment atmosphere and an open system outside containment is directly connected to the outside atmosphere) on CDF during maintenance activities and the ICCDP associated with CIVs that also have a safety function in addition to primary containment isolation that is in the closed position during maintenance.

In response to item 1 above, the WOG stated that systems that are used for accident mitigation that also contain valves that perform a containment isolation function may impact CDF. The WOG provided examples of systems that perform a dual function where the CIV was inoperable and would impact the operability of another system. The impact on operability is a function of the CT of the impacted system. In other words, the CT of the impacted system and the CT of the CIV would be controlled by the shorter of the impacted CTs. The WOG stated that, in all cases, the limiting CT was equal to or less than the CT for the associated mitigation system with a core damage or containment release mitigation function.

With an increase in the CIV CT, CDF is also impacted. The CDF impact depends on the inoperable CIV, its position, and the associated mitigation system function impacted by the inoperable CT. Again, the WOG noted that for this configuration the CT of the CIV would be limited by the mitigation system CT, which can be greater than the current CT of four hours. To address the proposed extended CIV CT, the WOG performed a bounding assessment of the CDF impact on ECCS (as an example) with an increased CIV CT. The WOG considered both preventive and corrective maintenance activities (common cause included). The WOG results indicated that the extended CIV CT impacts on CDF are within the acceptance guidelines given in RG 1.174.

For item 2 above, the NRC staff's RAI requested an evaluation of the impact of an open system on CDF, where the CIV has been removed during preventive or corrective maintenance. With a CIV removed for maintenance, the pressure boundary is not maintained and the impacted system is also inoperable (i.e., the CIV pressure boundary not intact). With a CIV in maintenance but still in place, the pressure boundary may remain intact and the impacted system may remain operable (i.e., the CIV pressure boundary remains intact). The TR evaluated CIVs in open systems with respect to LERF and ICLERP but did not evaluate the impact on CDF. The WOG evaluated two CIV configurations with the first being CIVs connected to the containment atmosphere. With these systems, a CIV that is open and inoperable or removed for maintenance cannot isolate the containment penetration. For CIVs in the line but open and inoperable, the associated mitigation system may or may not be operable depending on the required CIV position requirements. If the CIV is associated with a mitigation system then the inoperable CIV and/or ability and time frame necessary to restore the isolation valve to operability may impact CDF. As stated above, the shorter of the CTs for the CIV and associated inoperable system would be applied.

This second evaluation included CIVs connected to the RCS. An open and inoperable CIV impacts the frequency of an ISLOCA that bypasses containment and a core damage event would result in a large release. The TR evaluation based the CTs for these CIVs on the

LERF/ICLERP acceptance guidelines of RGs 1.174 and 1.177. The WOG stated that values of LERF and ICLERP were used to determine CTs based on the assumption that the impact on LERF and ICLERP would be the limiting metrics over the CDF metric, and was considered for this configuration of CIVs in the TR.

However, CDF may be the limiting metric for an LOCA inside containment where the CIV has been removed for maintenance. In this configuration of CIVs, the CDF is the concern since the penetration has only one CIV to maintain the RCS pressure boundary. The WOG also evaluated this configuration and found that the ICCDP met the acceptance guidelines of RG 1.177. The impact on CDF/ICCDP was evaluated and the results show that the ΔCDF estimates are within the acceptance guidelines of RG 1.174.

The WOG also addressed the ICCDP for CIVs that have an additional safety function that is in the closed position during maintenance. As with the other CIV configurations where CIVs are important to other safety systems, the CT of the impacted systems should also be evaluated. The WOG stated that the shorter of either the CIV or system CT will be applicable. The ICCDP will be equivalent to the limiting system CT estimate.

The TR evaluation uses plant-specific data from WOG plants to demonstrate a bounding methodology that would be applicable to licensees that confirm the bounding assumptions are applicable to their plants. The WOG selected the most limiting value for each input parameter (including valve type) from a plant-to-plant comparison of the WOG plants. The parameters used by the WOG in the calculation of LERF and ICLERP are included in WCAP-15791, Table 8-1. As stated above, the TR grouped CIVs by class and their associated penetration groups based on the type of containment penetration flow path. These assumptions will be assessed by the NRC staff to assure that the TR is applicable for each plant-specific application.

The CIV flow paths that were evaluated in WCAP-15791 are the penetration configuration types (i.e., Class and Group) that are listed in Appendix A to this SE. The TR includes the basis and general assumptions in estimating the risk impact for the proposed CIV CT extensions as listed below:

- Only one CIV is in maintenance with an extended CT at any time. This is a Tier 2 requirement, unless the licensee has proposed the additional ISTS LCO 3.6.3 Condition D in its plant-specific application.

- Maintenance on a valve can be performed such that either the valve is intact and capable of maintaining its pressure boundary function or the valve is not intact and is not capable of maintaining the pressure boundary.

- Before maintenance or corrective maintenance (repair) is performed on a CIV, the TR evaluation assumes that the other CIV(s) in the penetration flow path has been checked to ensure that they are in their proper position. This is a Tier 2 requirement.

- For penetrations with two or more CIVs of the same valve type, common cause failures (CCFs) are included in the TR evaluation. CIVs of the same type are not differentiated

by manufacturer. For CIVs of different valve types, CCFs are not included in the TR evaluation.

- For penetrations with diverse types of CIVs, the TR evaluation was simplified to assume that all CIVs were the same type. Plant-specific applications of the generic analysis and, if used, plant-specific analyses are to be based on the CIV within the penetration with the highest failure rate. Common cause is included when the CIVs in the penetration are the same type (See the previous bullet).

- Multiple systems are not expected to be out of service simultaneously during the extended CTs.

- A deterministic evaluation was used to establish the containment hole size and associated pipe diameter screening threshold value for a large release. The evaluation determined that any CIV in a penetration not connected to the RCS or steam generators (SGs) that has a hole size less than the threshold value would default to a CT of seven days. Based on NRC staff questions concerning the WOG alternate large release criteria and the WOG response to the NRC staff's RAI, a 2-inch containment hole size is used as the screening threshold for a large release for all three containment types (i.e., sub-atmospheric, ice-condenser, and large dry).

  Several studies including NUREG/CR-4330, “Review of Light-Water Reactor Regulatory Requirements,” NUREG-1493, “Performance-Based Containment Leak-Test Program,” NUREG/CR-6418, “Risk Importance of Containment and Related ESF System Performance Requirements,” and NUREG-1765, “Basis Document for Large Early Release Frequency (LERF) Significance Determination Process (SDP),” have been performed to determine the risk significance of various levels of containment leakage. For example, a containment leakage rate of about 100 percent volume per day is approximately equivalent to a hole diameter of 2.5 to 3 inches for a pressurized-water reactor (PWR) large dry containment and 2 inches for a PWR ice condenser containment and is the threshold after which a release may become significant to an LERF.

- Failures (including failure to close on demand, and failure during the CT) for different valve types were evaluated. The TR selected the maximum value for each parameter within each valve type.

- Not all penetration configurations/maintenance situations may be applicable to all plants. Each licensee will determine the applicability of the proposed CTs for their plant following the approach used in Chapter 9 of the TR.

- Pipe failures, not related to a seismic event, were assumed to occur randomly. The frequency of a pipe break was selected based on a review of WCAP-14572-NP-A, Revision 1, “Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection Topical Report.” The WOG stated that the largest failure probability was selected for the TR evaluation.

- Non-seismically qualified piping was assumed to fail with a probability of one, given a seismic event.

- The WOG states that because containment isolation is a function that impacts containment response to an event and not the ability of the plant design to prevent or mitigate core damage, the impact on average CDF and ICCDP due to increased CIV unavailability was not evaluated in the TR. However, for CIVs installed in systems associated with accident mitigation, the WOG provided additional evaluations through responses to the NRC staff's RAI.

- Additional class-specific assumptions are stated for each CIV “Class” in WCAP-15791.

Plant-specific applications will need to discuss whether and how the first, third, and sixth assumptions are incorporated in their plant (1) operating practices, procedures, and TSs, and (2) PRA model.

Although WCAP-15791 states that it is not expected that multiple systems will be out of service simultaneously during extended CTs, it does not preclude the practice. Because LCO 3.6.3 Note 2 allows separate condition entry for each penetration flow path, proposed Condition D addresses an inoperable CIV in more than one penetration flow path and limits the CT for all but one CIV to four hours. Plant-specific applications must verify that the potential for any cumulative risk impact of failed CIVs and multiple CIV LCO entries has been evaluated and is acceptable.

The licensee's Tier 3 risk management program (10 CFR 50.65(a)(4)) must confirm that simultaneous entry for more than one inoperable CIV in separate penetration flow paths are evaluated. The purpose of this evaluation is to ensure that the cumulative risk of plant operation with multiple inoperable CIVs, including a CIV with an extended CT, does not exceed the conclusions of WCAP-15791 and this SE, and that defense-in-depth for safety systems is maintained.

Because not all penetrations in specific plants have the same impact on CDF, LERF, ICCDP, or ICLERP, licensees must address in their plant-specific applications whether or not (a) the CIV configurations for the specific plant match the configurations in the TR and (b) the risk parameter values used in the TR are bounding for the specific plant. Any additional CIV configurations or non-bounding risk parameter values in the plant-specific applications that were not evaluated by the TR must be addressed in the plant-specific analyses. Note that CIV configurations and extended CTs not specifically evaluated by the TR, or non-bounding risk parameter values outside the scope of the TR will require NRC staff review of the specific penetrations and related justifications for the proposed CTs.

3.3 Review Methodology

The NRC staff reviewed the WOG submittal using the three-tiered approach referenced in RG 1.174, RG 1.177, and SRP Chapters 16.1, Revision 1, March 2007, and Chapter 19, Section 19.2, June 2007.

Tier 1 includes assessing the risk impact of the proposed change in accordance with acceptance guidelines consistent with the Commission's Safety Goal Policy Statement, as documented in RGs 1.174 and 1.177. The first tier assesses the impact on operational plant risk based on ΔCDF and ΔLERF. It also evaluates plant risk while equipment covered by the proposed CT is out of service, as represented by the ICCDP and ICLERP. In addition, Tier 1 should establish whether the quality of the PRA and PRA impact assessment are compatible with the safety implications of a proposed plant-specific TS change and that the scope and level of detail of the PRA are adequate to fully support the evaluation of the proposed TS change. Cumulative risk of the proposed TS change in light of past applications, or additional applications under review, should be considered along with an uncertainty/sensitivity analysis with respect to the assumptions related to the proposed TS change. PRA quality of the plant-specific application will be evaluated by the NRC staff, as discussed below.

Tier 2 involves identifying potential high-risk configurations that may exist if other equipment or systems (in addition to the equipment associated with the proposed change) were also taken out of service simultaneously, or subjected to concurrent testing. The purpose of the Tier 2 evaluation is to ensure that appropriate restrictions will be in place to prevent the occurrence of high-risk configurations.

Tier 3 establishes a risk management program for the overall configuration and confirms that risk insights are incorporated into the decisionmaking process before taking equipment out of service prior to or during the CT. The third tier provides additional coverage to ensure risk-significant plant equipment outage configurations are identified in a timely manner and that the risk impact of out-of-service equipment during planned and unplanned maintenance activities is appropriately evaluated prior to performing any maintenance activity over extended periods of plant operation. Licensees can implement the overall CRMP (as referenced in RG 1.177) through the Maintenance Rule of 10 CFR 50.65(a)(4) where implementation of 10 CFR 50.65 incorporates PRAs of sufficient technical quality to support a plant-specific licensing action. Specifically, the rule requires that, before performing any maintenance activity, the licensee must assess and manage the potential risk increase that may result from that activity.

For the quantitative evaluation of the risk impact of extending the current CIV CT from four hours up to a maximum proposed duration of seven days, the WOG developed a methodology to organize various containment penetrations into defined classes and subgroup. This is addressed in Appendix A of this SE. For each defined class and subgroup, the WOG developed generic configurations of containment penetrations to assess the impact on the plant at-power risk utilizing the proposed seven-day CT, and shorter CTs, for the associated penetration CIVs and addressing Tier 1, Tier 2, and Tier 3, as discussed below.

3.3.1 Tier 1: PRA Applicability and Insights

The analyses used in WCAP-15791 are generic and, therefore, each licensee requesting CIV CT extensions will need to justify the applicability of the TR results to their particular plant. It is expected that licensees will evaluate their plant-specific information to confirm the applicability of the WCAP-15791 methodology and results to the plant-specific cases as presented in Chapter 9 or 10 of the TR. The CT changes requested by licensees should correspond to those

included in the TR, and any penetration flow path type not specifically included in the TR will require a plant-specific analysis.

3.3.1.1 PRA Applicability

The objective of the NRC staff's PRA review is to determine whether the TR generic risk assessments used in evaluating the proposed CIV extended CTs were of sufficient scope and detail. The NRC staff reviewed the information provided in WCAP-15791 and, based on the above discussion, the NRC staff concludes that the TR adequately addressed the issue of capability, and the risk analysis was of sufficient scope and detail to estimate the risk associated with the proposed CIV extended CTs on a generic basis. The quality of the licensees' PRA is applicable based on the approved methodology in WCAP-15791, the RG 1.174 PRA quality guidance, and the subsequent impact on Tier 3 evaluations.

To ensure the adequacy of the plant-specific PRA model for Tier 3 evaluations, additional information on the PRA quality will be required of each plant-specific application in the following areas:

1. Assurance that the plant-specific PRA reflects the as-built, as-operated plant.

2. Assurance that the applicable PRA updates include the findings from the individual plant evaluation (IPE) and the IPE for external events. External events may include seismic, high winds, fires, floods, or other related events applicable to each licensee. Licensees must demonstrate, by either quantitative or qualitative means, that external event risk will not have an adverse impact on the conclusions of the plant-specific analyses with respect to the TR evaluation. For some participating plants, internal fires and other external event risk may contribute significantly to overall plant baseline risk which may impact the WCAP-15791 methodology results such that a plant-specific application of the WCAP-15791 methodology may not be found acceptable in all cases. Specifically, the risk from external events should not make the total baseline risk exceed 1E-4/yr CDF or 1E-5/yr LERF without justification.

3. Assurance that conclusions from the peer review, including facts and observations (A and B), per NEI 00-02, "Probabilistic Risk Assessment (PRA) Peer Review Process Guidance," Revision A3 and American Society of Mechanical Engineers (ASME) RA-S-2002, "Standard for Probabilistic Risk Assessment for Nuclear Power Plant Applications," that are applicable to the proposed CIV extended CTs were considered and resolved. If not resolved, justification for acceptability of conclusions (e.g., sensitivity studies showing negligible impact) must be provided. The licensee should indicate the PRA revision that underwent the peer review and the PRA revision that was used in the plant-specific application.

4. Assurance that there is PRA configuration control and updating, including PRA quality assurance programs, associated procedures, and PRA revision schedules.

5. Assurance that there is PRA adequacy, completeness, and applicability with respect to evaluating the risk associated with the proposed CIV CT extensions.

6. Assurance that plant design or operational modifications that are related to or could impact the proposed CT extensions are reflected in the PRA revision used in the plant-specific application, or a justification provided for not including these modifications in the PRA.

3.3.1.2 PRA Insights

One approach to demonstrate that the risk impact of the proposed change is acceptable is to show that the licensing basis meets the key principles set forth in RG 1.174 for the proposed change. One of these principles is to show that when the proposed change results in an increase in risk, the increased risk is small. In addition, the impact of the proposed change should be monitored using performance measurement strategies. RGs 1.174 and 1.177 provide acceptance guidelines for meeting the above principles. Specifically, those guidelines include ΔCDF, ΔLERF, ICCDP, and ICLERP. The risk metrics ICCDP and ICLERP, suggested by RG 1.177, are used in addition to the metrics outlined in RG 1.174 for the evaluation of CTs because CTs are entered infrequently and are temporary in nature.

The risk impact of extending CIV CTs is summarized on a generic basis in Table 8-2 of the TR. The results show that the risk impacts of the proposed CIV CTs are within the ΔLERF and ICLERP acceptance guidelines of RGs 1.174 and 1.177, respectively. The impacts on average CDF and ICCDP due to increased CIV unavailability were addressed in a response to an NRC staff RAI, and the response shows that the estimates for ΔCDF and ICCDP are also within the acceptance guidelines of RGs 1.174 and 1.177. The intent of WCAP-15791 is to provide a generic analysis applicable to all WOG plants; however, the TR also includes a plant-specific analysis in Chapter 10 of the TR where Wolf Creek is the lead plant. A licensee that implements the generic results in WCAP-15791 must demonstrate by its plant-specific application, the applicability of WCAP-15791 input parameter assumptions with respect to ΔCDF, ΔLERF, ICCDP, and ICLERP to their particular plant.

3.3.1.3 PRA Uncertainty

As discussed in RG 1.174 and NUREG/CR-6141, "Handbook of Methods for Risk-Based Analyses of Technical Specifications," a licensee can perform sensitivity studies to provide additional insights into the uncertainties related to the proposed CT extension and demonstrate compliance with the guidelines and evaluate uncertainties related to modeling and completeness issues.

Based on the RAI responses, the WOG stated the parameters used (e.g., valve failure rates, CDF, and CCF values) were based on generic WOG plant PRA values. The estimates used were stated in WCAP-15791 to be the most conservative values obtained from the WOG plant-specific PRA models. Because of this, the WOG stated that the values used in the analysis are bounding and no data uncertainty analysis was required. Therefore, WCAP-15791 did not provide sensitivity studies with respect to the CT extension risk analysis. However, based on the TR's use of bounding values for input parameters, a sensitivity analysis using an upper bound value should be inherent in the results. As a further check, the NRC staff reviewed NUREG-1715, Volume 3, “Component Performance Study - Air-Operated Valves, 1987 - 1998,”

and Volume 4, "Component Performance Study-Motor-Operated Valves, 1987 - 1998 Commercial Power Reactors," data for motor-operated and air-operated valve failures on demand. Although limited to motor-operated and air-operated valves, the data presented in NUREG-1715 show that the CIV failure probability estimates used in WCAP-15791 are consistent with the range of values given in NUREG-1715. NUREG-1715 also indicated a decreasing trend for air-operated valve failures for PWRs in risk-important systems. For motor-operated valves, there were no statistically significant trends noted.

Additional uncertainty due to plant PRA models is not addressed in WCAP-15791, but the use of bounding values from various models should limit model uncertainty in the analysis. In addition, based on responses to the NRC staff's RAI, the WOG generic analysis was redone assuming a CDF total of 1.0E-4/year to bound internal and external events. The new CDF estimate is greater than the original WOG composite total plant internal CDF of 7.8E-5/year.

3.3.2 Tier 2: Avoidance of Risk-Significant Plant Configurations

For the Tier 2 analysis, a licensee must provide reasonable assurance that risk-significant plant equipment outage configurations will not occur when specific plant equipment is out of service in accordance with the proposed extended CIV CT changes. A Tier 2 program is intended to limit the degradation of plant mitigation capabilities with a CIV out of service (i.e., in a LCO condition) such that defense-in-depth is maintained. The TR evaluation identified no generic Tier 2 conditions as a result of the proposed CT extension for CIVs. For licensees adopting WCAP-15791, an evaluation should be performed to confirm that the conclusions of the TR concerning Tier 2 requirements remain applicable to the licensee’s plant.

WCAP-15791 provides minimal guidance on cumulative risk impacts, although risk impact is recognized as part of a risk-informed review. With respect to past plant-specific license amendments, or additional plant-specific applications for a TS change under review, and the plant-specific CIV CT application based on WCAP-15791, the cumulative risk must be evaluated on a plant-specific basis consistent with the guidance given in RG 1.174, and addressed in the plant-specific application. Licensees should consider the guidance given in RG 1.174 for combined TS change requests.

Also, the following Tier 2 restrictions address assumptions of the TR. These are the following: (1) unless the licensee has proposed the additional ISTS LCO 3.6.3 Condition D in its plant-specific application, only one CIV can be in maintenance with an extended CT at any time and (2) before maintenance or corrective maintenance (repair) is performed on a CIV, other CIV(s) in the penetration flow path shall have been checked to ensure they are in their proper position.

3.3.3 Tier 3: Risk-Informed Configuration Risk Management

WCAP-15791 did not address Tier 3 requirements and is based on generic plant characteristics, except for the lead plant Wolf Creek plant-specific risk information presented in Chapter 10 of the TR, therefore, licensees adopting the TR must address Tier 3 information concerning their plants in their plant-specific applications.

A Tier 3 program ensures that, while a CIV is in a LCO condition, additional activities will not be performed that could further degrade the capability of the plant to respond to a condition the inoperable CIV or system was designed to mitigate, and, as a result, increase plant risk beyond that assumed by the TR analysis. Tier 3 programs do the following: (1) ensure that additional maintenance does not increase the likelihood of an initiating event intended to be mitigated by the out-of-service equipment, (2) evaluate the effects of additional equipment out of service during CIV maintenance activities that would adversely impact CIV CT risk such as from redundant systems or components, and (3) evaluate the impact of maintenance on equipment or systems assumed to remain operable by the CIV CT analysis. WCAP-15791 did not address Tier 3 requirements and, therefore, these requirements must be addressed by licensees in their plant-specific applications.

Accordingly, for extended CIV CTs, a licensee should have a program to ensure that it appropriately evaluates the risk impact of out-of-service equipment before performing a maintenance activity on a CIV. Licensees can utilize the overall CRMP, as referenced in RG 1.177, through the Maintenance Rule (i.e., 10 CFR 50.65(a)(4)) if the PRA quality aspects of this program meet the quality needs of a risk-informed licensing action. Specifically, the rule requires that, before performing any maintenance activity, the licensee must assess and manage the potential risk increase that may result from that activity. Plant-specific applications referencing WCAP-15791 must include a discussion on the licensee's CRMP for assessing the risk associated with removal of CIVs from service and their conformance to the requirements of 10 CFR 50.65(a)(4), and the additions and clarifications outlined in Section 2.3.7.2 of RG 1.177 as they relate to the proposed extended CIV CTs. The PRA quality guidance in RG 1.174 provides one method to demonstrate such required quality.

The program used by licensees to meet 10 CFR 50.65(a)(4) and assess and manage the increase in risk that may result from proposed maintenance would be required to address the maintenance of CIVs. For the CIVs with extended CTs, the program would need to assess and manage risk in terms of the LERF and ICLERP metrics because the extended CTs are based on these metrics. The licensees proposing extended CIV CTs in plant-specific applications based on WCAP-15791 must discuss how the LERF and ICLERP would be addressed in these programs.

In addition, RG 1.174 also states that an implementation and monitoring plan should be developed to ensure that the impact of the proposed changes continues to reflect the actual reliability and availability of the CIVs evaluated to support the proposed CIV CT extension. Monitoring performed in conformance with the maintenance rule of 10 CFR 50.65 can be used when such monitoring is sufficient for the structures, systems, and components affected by the risk-informed application. WCAP-15791 is based on generic plant characteristics, therefore, each licensee adopting the TR must confirm plant-specific implementation and monitoring in their individual applications. Plant-specific CIV availability will be monitored and assessed by the licensee under the maintenance rule (10 CFR 50.65) to confirm that performance continues to be consistent with the analysis assumptions used to justify the extended CIV CTs.

Although the TR assumes that only one CIV is in maintenance at any time (i.e., there is only one inoperable CIV), the TR notes that the existing ISTS LCO 3.6.3 would allow multiple simultaneous entries into the LCO for inoperable CIVs for which the proposed extended CIV

CTs would apply. Although the existing ISTS LCO 3.6.3 Condition B, which is listed in Section 3.1 of this SE, requires action within one hour when one or more flow paths with two or more inoperable CIVs; there could be multiple inoperable CIVs because the proposed ISTS LCO 3.6.3 Condition A, which has the proposed extended CIV CTs, would allow one or more flow paths each having an inoperable CIV. This case of multiple LCO entries for a single inoperable CIV, in multiple penetrations, incorporating the proposed extended CTs would result in increased CDF, LERF, ICCDP and ICLERP values from those assumed in the TR. Simultaneous multiple entries and the subsequent impact on risk were not evaluated by the WOG, because, as stated in the TR, CIV inoperability is not expected to occur frequently and single CIV inoperabilty in multiple penetrations flow paths is expected to occur less frequently.

In response to the NRC staff's RAI 6, in its February 13, 2004, letter, the WOG stated that the TSs in TSTF-446 would be revised to be consistent with the single inoperable CIV assumed in WCAP-15791. The intent of the revision is to limit the TS condition entry to a single extended CIV CT such that multiple simultaneous inoperable CIVs, each with an extended CT, would not be allowed. The revision is the proposed addition of TS LCO 3.6.3 Condition D, which states that, for two or more penetration flow paths with one CIV inoperable, the required action of isolating all but one flow path is to be completed within four hours, which is the current CT for an inoperable CIV. However, the proposed ISTS LCO 3.6.3 Condition A and the proposed ISTS LCO 3.6.3 Condition D would allow one inoperable CIV in one penetration flow path to be in maintenance in an extended CIV CT (Proposed Condition A) and one or more inoperable CIVs in one or more other penetration flow paths in the four-hour CT (Proposed Condition D). Therefore, in the case of having multiple CIVs inoperable with no more than one inoperable CIV in any penetration flow path, the first inoperable CIV would be in the proposed Condition A with an extended CIV CT, and the second and any other inoperable CIV would be in proposed Condition D because Note 2 to ISTS LCO 3.6.3 allows a separate condition entry for each penetration flow path.

The Required Action D.1 for proposed Condition D would require all but one penetration flow path to be isolated within four hours of when the second CIV was found inoperable, or the plant would be required to shut down because the required action and associated CT were not being met. The remaining inoperable CIV would be in proposed Condition A, and its CT would be that for the appropriate CIV category in WCAP-15791, Appendix D.

The required action for proposed Condition D would require all but one penetration flow path to be isolated, within the four hours or start shutting down the plant, therefore, the case of more than one inoperable CIV would exist for no longer time than the four hours. Therefore, there could not exist more than one inoperable CIV in an extended CIV CT for more than four hours without the plant having to shut down. Because the longest time period where more than one CIV may be inoperable is the four-hour CT allowed by existing ISTS LCO 3.6.3 Condition A for an inoperable CIV, the NRC staff concludes that the proposed Condition D meets the TR assumption that only one CIV is in maintenance at the extended CIV CT at any time.

If the plant-specific TSs would allow CIV maintenance that could include multiple simultaneous LCO entries for single inoperative CIVs, in multiple penetrations, then this case must be evaluated in the plant-specific applications to demonstrate that the risk-impact assumptions of CDF, LERF, ICCDP, and ICLERP remain less than the RGs 1.174 and 1.177 acceptance

guidelines and are consistent with the guidance contained in NUMARC 93.01, "Industry Guidelines for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," Section 11, "Assessment of Risk Resulting from Performance of Maintenance Activities," as endorsed by RG 1.182, "Assessing and Managing Risk Before Maintenance Activities at Nuclear Power Plants." CIV extended CTs as implemented per the NRC staff findings and conditions of this SE and the Maintenance Rule (10 CFR 50.65(a)(4)) will limit the overall risk associated with extended CIV CT interval maintenance. As discussed above, the NRC staff has concluded that the proposed ISTS LCO 3.6.3 Condition D would prevent this case of multiple inoperable CIVs with one CIV in maintenance in an extended CIV CT.

3.4 Regulatory Commitments

The RG 1.177 Tier 3 program ensures that while a CIV is in an LCO condition, additional activities will not be performed that could further degrade the capabilities of the plant to respond to a condition for which the inoperable CIV or system was designed to mitigate, and as a result, increase plant risk beyond that assumed by the TR analysis. A licensee's implementation of RG 1.177 Tier 3 guidelines generally implies the assessment of risk with respect to CDF. However, the proposed CIV CT impacts containment isolation and consequently LERF and ICLERP, as well as CDF. The equations used in WCAP-15791 to determine the extended CIV CTs are based on the LERF and ICLERP metrics, therefore, the management of risk in accordance with 10 CFR 50.65(a)(4) for these extended CIV CTs must assess LERF and ICLERP.

Therefore, a licensee's CRMP, including those implemented under the Maintenance Rule of 10 CFR 50.65(a)(4), must be addressed in the plant-specific submittal to explain how LERF/ICLERP is assessed and must be documented in the plant-specific applications as a regulatory commitment (i.e., included in the licensee's commitment tracking system in accordance with NEI 99-04, Revision 0, "Guidelines for Managing NRC Commitment Changes") in the licensees' plant-specific applications referencing WCAP-15791, as well as demonstrating PRA quality as part of the licensee's Tier 3 assessment. Since NUMARC 93-01 implements ILERP as the quantitative risk metric (i.e., based on a zero maintenance model) and RG 1.177 utilizes ICLERP (i.e., based on an average maintenance model), the licensees, in their implementation of WCAP-15791, will need to demonstrate the equivalence for Tier 3 decisionmaking.

The NRC staff finds that reasonable controls for the implementation and for subsequent evaluation of proposed changes pertaining to regulatory commitment(s) can be provided by the licensees' administrative processes, including their commitment management program. The NRC staff has agreed that NEI 99-04 provides reasonable guidance for the control of regulatory commitments made to the NRC staff (see Regulatory Issue Summary 2000-17, "Managing Regulatory Commitments Made by Power Reactor Licensees to the NRC Staff," dated September 21, 2000). The NRC staff notes that this establishes a voluntary reporting system for the operating data that is similar to the system established for the ROP PI program. The commitments would be controlled in accordance with the industry guidance or comparable criteria employed by a specific licensee. The NRC staff may choose to verify the implementation and maintenance of these commitments in a future inspection or audit. Should licensees choose to incorporate a regulatory commitment into the final safety analysis report or

other document with established regulatory controls, the associated regulations would define the appropriate change-control and reporting requirements.

3.5 NRC Staff Conclusions in Plant-Specific License Amendment Requests Referencing WCAP-15791

The results presented in WCAP-15791 are consistent with the specific guidance and acceptance guidelines given in RGs 1.174 and 1.177, and outlined in SRP Chapter 16, Section 16.1, Revision 1, March 2007, and Chapter 19, Section 19.2, July 2007, of NUREG-0800, and show a small increase in plant risk due to the extension of CIV CTs up to seven days. The proposed CIV CTs in the plant-specific applications referencing WCAP-15791 would also meet this criteria if the plant-specific submittals showed the following:

- Licensees that apply the generic results have confirmed that the generic WOG plant PRA values used for the Tier 1 evaluations in WCAP-15791 envelope the PRA values for their plants,

- Licensees have confirmed that the penetration flow path configurations used in WCAP-15791 to justify extended CIV CTs are applicable to their plants,

- Licensees have confirmed that the assumptions (the first, third, and sixth bullets) in Section 3.2 in this SE are met at their plants, including the assumption that not more than one CIV is in maintenance and in an extended CT at a time,

- Licensees have confirmed that the CIV configurations addressed in their plant-specific application match the configurations in the TR and have correlated the CIVs to the 14 categories of CIVs, with CTs from four hours to seven days as described in WCAP-15791 Tables D-1 and D-2, for their plants,

- Licensees have confirmed that no additional Tier 2 requirements are needed, as is stated in WCAP-15791, or have acceptably addressed what are the Tier 2 requirements for their plants, and

- Licensees have acceptably addressed the Tier 3 requirements for their plants.

Based on the licensees demonstrating that the above review elements are met, the NRC staff would conclude in the evaluations of the plant-specific license amendment requests that the calculations of ICLERP and ΔLERF for the proposed CIV CTs described in WCAP-15791 are acceptably justified. This includes the calculations performed to justify the CTs for the Category 1 through 14 valves listed in TR Tables D-1 and D-2. Based on this, the NRC staff would conclude that WCAP-15791 provides an acceptable methodology for determining plant-specific CIV CTs of up to seven days, because the CIV CTs based on WCAP-15791 would meet 10 CFR 50.36.

4.0 LIMITATIONS AND CONDITIONS

1. WCAP-15791 is based on only one CIV being in maintenance at any time. The TR states that it is not expected that multiple systems will be out of service simultaneously during extended CTs, but the TR does not preclude the practice. Although TS LCO 3.6.3 Note 2 allows separate condition entry for each penetration flow path, proposed Condition D (see Section 3.3.3 of this SE) addresses an inoperable CIV in more than one peneration flow path and limits the CT to four hours. If the licensees' proposed TS change does not include this Condition D, then the licensees' applications must verify that the potential for any cumulative risk impact of failed CIVs and multiple CIV LCO entries has been evaluated and is acceptable. The licensee must confirm that its Tier 3 risk management program in accordance with 10 CFR 50.65(a)(4) will address the possibility of simultaneous LCO entries of inoperable CIVs in separate penetrations such that defense-in-depth for safety systems is maintained. (See Section 3.2 of this SE.)

2. The existing and proposed TS 3.6.3 must not allow multiple simultaneous extended CIV CTs to occur for more than four hours, which is the existing CT for an inoperable CIV in ISTS LCO 3.6.3. This is to meet the TR assumption listed in Section 3.2 of this SE that only one valve within a single penetration can be in maintenance at a time (i.e., for more than the four hours allowed by the current ISTS LCO 3.6.3 Condition A). The existing ISTS LCO 3.6.3 Condition B, and the proposed ISTS 3.6.3 Conditions A and D, assure that this assumption is being met. If the TSs do not prevent this case (i.e., Condition D is not adopted), then this case must be evaluated in the plant-specific applications to demonstrate that the risk impact assumptions of CDF, LERF, ICCDP and ICLERP remain less than the RGs 1.174 and 1.177 acceptance guidelines as discussed in Section 3.3.3 of this SE. Also, the plant-specific application must address if the position of the remaining CIVs in the affected penetration flow path, or another penetration flow path, are confirmed before entering the extended CT for the inoperable CIV. (See Section 3.3.3 of this SE.)

5.0 ADDITIONAL INFORMATION NEEDED IN APPLICATIONS REFERENCING TR WCAP-15791

The additional information that must be provided in the plant-specific applications referencing WCAP-15791 is as follows:

1. Address how the first, third, and sixth items of the basis and general assumptions of WCAP-15791, which are listed in Section 3.2 in the SE, are incorporated in the specific plant practices, procedures, TSs, and PRA. (See Section 3.2 of this SE.)

2. Not all penetrations have the same impact on CDF, LERF, ICCDP, or ICLERP, therefore, verify the applicability of WCAP-15791 to the specific plant, including verification that (a) the CIV configurations for the specific plant match the configurations in the TR and (b) the risk-parameter values used in the TR are bounding for the specific plant. Any additional CIV configurations, CT extensions, or non-bounding risk parameter values not evaluated by the TR should be addressed in the plant-specific analyses. Note that CIV configurations and extended CTs not specifically evaluated by the TR, or

non-bounding risk parameter values outside the scope of the TR will require NRC staff review of the specific penetrations and related justifications for the proposed CTs. (See Sections 3.2 and 3.3.1 of this SE.)

3. Confirm that the Tier 2 conclusion of the TR (i.e., no Tier 2 requirements are needed) is applicable to the specific plant, or provide the plant-specific Tier 2 requirements needed for the plant. (Section 3.3.2 of this SE.)

4. WCAP-15791 does not address Tier 3, therefore, each plant-specific application must address Tier 3 for the specific plant. The plant-specific application must discuss conformance to the requirements of the Maintenance Rule (i.e., 10 CFR 50.65(a)(4)), as the requirements relate to the proposed CIV CTs and the guidance contained in NUMARC 93.01, Section 11, as endorsed by RG 1.182, including verification that the licensee's maintenance rule program, with respect to CIVs, includes a LERF/ICLERP (i.e., ILERP as defined in NUMARC 93-01) assessment as part of the maintenance rule process, and that the PRA quality is adequate as part of the basis of a risk-informed licensing action. (See Sections 3.3.3 and 3.4 of this SE.)

5. Verify that the plant-specific PRA quality is acceptable for Tier 3 applications in accordance with the guidelines given in RGs 1.174 and 1.177, which are identified in the six items listed in Section 3.3.1.1 of this SE. (See Section 3.3.1.1 of this SE.)

6. Verify that external event risk, including seismic and fires, either through quantitative or qualitative evaluation, is bounded by the TR assumptions and will not have an adverse impact on the conclusions of the plant-specific analysis for extending the CIV CTs. (See Section 3.3.1.1 of this SE.)

7. Address how plant-specific CIV availability is monitored and assessed at the plant under the Maintenance Rule (i.e., 10 CFR 50.65) to confirm that performance continues to be consistent with the analysis assumptions used to justify extended CIV CTs, including the assumptions in WCAP-15791 (which are discussed in Section 3.2 of this SE). (See Section 3.3.3 of this SE.)

8. The cumulative risk impact of the proposed CIV CT extensions must be addressed in the plant-specific application in accordance with the acceptance guidelines in RG 1.174. The cumulative risk impact must include both previous plant license changes and additional plant applications still under review. (See Section 3.3.2 of this SE.)

9. Uncertainty due to plant PRA models is not addressed in WCAP-15791, therefore, the plant-specific applications must discuss uncertainties in the risk assessment. (See Section 3.3.1.3 of this SE.)

10. Address the plant CRMP, including the Maintenance Rule program implemented under 10 CFR 50.65(a)(4), and explain how the LERF/ICLERP is assessed in the program. This assessment is to be documented in a regulatory commitment in the plant-specific application. (See Section 3.4 of this SE.)

6.0 CONCLUSIONS

The risk impact of the proposed seven-day CT for the CIVs, as estimated by ΔCDF, ΔLERF, ICCDP, and ICLERP, is consistent with the acceptance guidelines specified in RG 1.174, RG 1.177, and staff guidance outlined in SRP Chapter 16, Section 16.1, Revision 1, March 2007, and Chapter 19, Section 19.2, July 2007, of NUREG-0800. However, to be within these guidelines, some CIV CTs had to be less than seven days. WCAP-15791 shows that shorter than seven-day CTs were justified for certain CIV groupings as listed in WCAP Tables D-1 and D-2. The NRC staff finds that the risk-analysis methodology and approach used by the WOG to estimate the risk impacts were reasonable and of sufficient quality. The Tier 2 evaluation did not identify any risk-significant plant equipment configurations requiring TSs, or procedural, or compensatory measures, on a generic basis, but a plant-specific assessment of Tier 2 considerations must be done by licensees for plants adopting WCAP-15791 to confirm or adjust this aspect of the evaluation, as appropriate. WCAP-15791 references a CRMP for Tier 3 using 10 CFR 50.65(a)(4) to manage plant risk when CIVs are taken out of service. CIV availability will also be monitored and assessed under the maintenance rule (10 CFR 50.65) to confirm that performance continues to be consistent with the analysis assumptions used to justify extended CIVs CTs. Based on the above, and the fact that the licensee demonstrates that PRA quality is adequate as part of the basis of a risk-informed application, the NRC staff finds that the proposed seven-day and shorter CIV CTs are acceptable for the CIVs as described in WCAP-15791 for Westinghouse pressurized water reactors. However, the conditions and additional information needed, as identified in Sections 4 and 5 of this SE, must also be addressed by licensees adopting WCAP-15791 in their plant-specific applications.

Although Wolf Creek plant-specific information was presented in Chapter 10 of the TR, the NRC staff did not review that data to draw any conclusion about the acceptability of CIV CTs in WCAP-15791 for the Wolf Creek plant. Also, although TSTF-446 is not addressed in the SE, it is referred to in Sections 3.1 and 3.3.3 of the SE because the WOG referenced the TSTF in its response to an NRC RAI. The acceptability of the TSs in the proposed TSTF will be addressed in a separate evaluation.

Attachments: 1. Appendix A, "WCAP-15791 Analysis of Containment Isolation Valve Completion Times"
2. Comment Resolution Table

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Date: February 13, 2008

APPENDIX A

WCAP-15791 ANALYSIS OF CONTAINMENT ISOLATION VALVE COMPLETION TIMES

As stated in WCAP-15791, the containment isolation valves (CIVs) are used in plants to isolate the containment penetration flow paths with, typically, one CIV inside and one CIV outside containment performing this function. Depending on the purpose of the system which has CIVs, the CIVs may be normally open or closed. Also, these systems are considered either an open or closed system as follows: (1) an open system inside the containment is directly connected to the containment atmosphere and an open system outside containment is directly connected to the outside atmosphere and (2) a closed system inside containment is not directly connected to the containment atmosphere (e.g., a run of pipe inside containment) and a closed system outside containment is not directly connected to the outside atmosphere. A closed system might not have a CIV.

WCAP-15791 evaluated penetrations that connect directly to containment atmosphere, connect directly to the reactor coolant system (RCS), and connect directly to the steam generators (SGs). The evaluation included both penetration flow paths with multiple isolation valves and penetration flow paths with a single isolation valve and a closed system. The analysis also included CIV maintenance activities that cause the CIV to be inoperable as a pressure boundary or maintenance activities that allow a CIV to remain functional as a pressure boundary.

Regulatory Guide 1.177 provides generally acceptable bases for approving a Technical Specification (TS) change. Among these bases are improvements in operational safety, the TS change can be supported on a risk basis, and the change may be requested to reduce unnecessary burden caused by complying with current TS requirements. The Westinghouse Owners Group (WOG) stated that the proposed CIV extensions are to improve operational safety and reduce unnecessary burden. The proposed CIV completion time (CT) extensions are intended to provide for the performance of on-line testing, maintenance, and repair of CIVs declared inoperable during Modes 1, 2, 3, and 4. The WOG stated the proposed changes are acceptable based on the low risk associated with the extended CTs. In addition, the extended CTs provide additional flexibility in the performance of preventive and corrective maintenance during power operation and reduce the potential for plant shutdown and possible plant transients introduced by this reactor mode change. The original intent of the WOG methodology was to extend the CT for an inoperable CIV to seven days, consistent with the acceptance guidelines given in RGs 1.174 and 1.177; however, based on analysis results, a CT of less than the seven days was required to meet the acceptance guidelines for some CIVs. Therefore, WCAP-15791 supports CTs of four hours to 168 hours for an inoperable CIV.

The approach taken by the TR applied both deterministic and probabilistic evaluations. The deterministic approach was used to determine the minimum-containment hole size that would result in a large release from containment and penetration flow paths connected to the containment atmosphere smaller than this size were proposed to have a CT of seven days. All other penetrations were then evaluated on a probabilistic basis to demonstrate that either a CT of seven days is acceptable, or to determine a CT that is less than seven days.

For Tier 1, probabilistic risk assessment (PRA) capability and insights, the TR assessed the impact of the proposed CT on the incremental conditional large early release probability (ICLERP) and change in large early release frequency (ΔLERF) for each type of CIV penetration configuration that was evaluated. The impact of the change in core damage frequency (ΔCDF) was not evaluated in the TR because containment isolation is a function that impacts the containment response to an event and not the ability of the plant design to prevent or mitigate core damage. For Tier 2, avoidance of risk-significant plant configurations, WCAP-15791 did not identify any risk-significant Tier 2 plant equipment outage configurations requiring TS, procedure, or compensatory measures. The NRC staff addressed Tier 2 requirements and stated that an evaluation must be performed by licensees adopting WCAP-15791 and the results confirmed on a plant-specific basis. For Tier 3, risk-informed plant configurations, the TR did not address Tier 3 requirements and, therefore, these requirements will be addressed by licensees on a plant-specific basis in their plant-specific applications.

For Tier 1, if the ICLERP and ΔLERF for the CIV penetration configuration meet the criteria in RGs 1.174 and 1.177 (less than 5.0E-08 and 1.0E-07/year, respectively), a 168-hour (or seven-day) CT would be acceptable for the penetration configuration. For those penetration configurations that do not meet these criteria, CTs of 72, 48, 24, 12, or eight hours were evaluated in the equations for ICLERP and ΔLERF, and the largest CT where the ICLERP and ΔLERF meet the criteria in RGs 1.174 and 1.177 was judged to be acceptable for the penetration configurations.

The probabilistic evaluation is consistent with NRC's approach for using PRA in risk-informed decisions on plant-specific changes to the plant current licensing basis addressed in RGs 1.174 and 1.177. This approach evaluated the risk impact of the CT on a generic basis and on a plant-specific bases using the Wolf Creek Generating Station (Wolf Creek) as the lead plant. Data for both the generic case and for Wolf Creek are in WCAP-15791. Any licensee submitting a plant-specific application that references WCAP-15791 would need to demonstrate that the TR analysis is applicable to their plants.

The TR grouped the different types of penetration flow path configurations depending on (1) the system of interest and (2) if the system is closed or open with respect to the containment and outside atmospheres. In general, the following penetration configuration types that were evaluated are as follows:

Class I:

Penetrations with flow paths to the containment atmosphere:

- Group IA: Flow paths connected directly to the containment atmosphere and the outside environment (open/open penetration type).

- Group IB: Flow paths closed inside containment and connected directly to the outside environment (closed/open penetration).

- Group IC: Flow paths connected directly to the containment atmosphere and closed outside containment (open/closed penetration).

- Group ID: Flow paths closed inside containment and closed outside containment (closed/closed penetration type).

Class II:

Penetrations with flow paths to the RCS:

- Group IIA: Standby flow paths.
- Group IIB: Normally operating flow paths.

Class III:

Penetrations with flow paths to the SGs:

- Group IIIA: Flow paths connected to the SG secondary side and open to the outside environment.
- Group IIIB: Flow paths connected to the SG secondary side and closed to the outside environment.

In addition, the penetration flow paths within the above classification were further grouped by the following: (1) the arrangement of the CIVs (the penetration description) and (2) the maintenance on the inside and/or outside CIVs (i.e., the IC and/or OC valves) that affected the CIV's function as a pressure boundary and activities that allowed the CIVs to retain their pressure boundary functionality (the maintenance description). ICLERP and ΔLERF calculations were then done for each group of CIVs to decide on the maximum CT for the group, and the different groups and calculations were listed in tables as to the generic assessment of the impact on risk (Chapter 8 of the TR), the lead plant application of the generic analysis (Chapter 9 of the TR), and the recalculate CT for the lead plant-specific analysis (Chapter 10 of the TR).

Examples of the generic calculations of the ICLERP and ΔLERF for different groups of CIVs are given in Section 8.2 of the TR for the generic assessment of the impact on risk. The calculation number and CIV group are listed in the table. The calculation number is the specific calculation used to determine the CT for the CIV; however, not all the calculations are in Section 8.2 of the TR. There are no calculations in Chapters 9 and 10 of the TR because the calculations are the same in terms of the generic assessment of the impact on risk. Only the input numbers would change as the lead plant is considered in these chapters.

Chapter 9 of the TR presents the analysis and assumptions used in the lead plant application of the generic assessment addressed in Chapter 8 of the TR. This involved identifying the lead plant CIVs and their configuration, using the two-inch containment hole size criteria to determine the "small lines" that are automatically justified for the seven-day CT, matching the remaining "large line" CIVs to the appropriate generic penetrations in Tables 8.2 through 8.4 of the TR, and finally determining the CTs based on the generic calculations of ICLERP and ΔLERF for the CIVs. Table 9-2 of the WCAP lists the lead plant penetrations and the CIVs on the penetration with the grouping explanation, the generic CIV group and calculation number, and the maintenance activity type for the CIV. In Chapter 9 of the TR, no plant-specific information was used except for the plant-specific CIVs and their configuration in the plant. The CTs justified for the CIVs are also given in Table 9-2 of the TR.

In Chapter 10 of the TR, the plant-specific PRA data (i.e., the Wolf Creek data) were also used in what would be the plant-specific calculations of ICLERP and ΔLERF to determine the CTs for

the CIVs. The plant-specific calculations used the data given in Tables 9-1a through 9-1c of the TR, and the justified CTs are listed in Table 10-1 of the TR.

For plant-specific applications, WCAP-15791 provides an option to use plant-specific data instead of generic data. The purpose of this option is to provide licensees the ability to further analyze a CIV that did not qualify for the full seven-day CT in the generic results. Chapter 10 of the TR describes the methodology to be used to replace the generic data in the analysis with plant-specific data such that CTs limited to seven days by the generic methodology may qualify for a further extended CT using a plant-specific approach. The use of plant-specific data by a licensee must be justified when implementing WCAP-15791.

The results in Tables 9-2 and 10-1 of the TR are for both the system pressure boundary maintained and system pressure boundary compromised for the maintenance activity type.

Comment Resolution Table

PAGE NO.	LINE NO.	COMMENTS	NRC RESOLUTION
13	8 - 9	It is stated "Plant-specific applications will need to discuss whether and how the above assumptions are incorporated in their plant (1) operating practices, procedures, and TSs, and (2) PRA models". This statement is inconsistent with item #1 in Section 5 which states "Address how the first, third, and sixth items of the general assumptions of WCAP-15791, which are listed in Section 3.2 in the SE, are incorporated in the specific plant practices, procedures, TS, and PRA." It is suggested that the sentence on lines 8-9 be modified as follows "Plant-specific applications will need to discuss whether and how the <u>first, third, and sixth</u> assumptions are incorporated in their plant (1) operating practices, procedures, and TSs, and (2) PRA models." Note that the revised words are underlined.	ACCEPTED
13	13 - 14	It is stated "…, Proposed Condition D addresses an inoperable CIV in more than one penetration flow path and limits the CT to four hours." Proposed Condition D limits all but one CIV to 4 hours. The CT for one CIV is allowed to be greater than 4 hours. For clarification purposes, it is suggested that this sentence be modified as follows "…, Proposed Condition D addresses an inoperable CIV in more than one penetration flow path and limits the CT <u>for all but one CIV</u> to four hours. Note that the revised words are underlined.	ACCEPTED
16	13 - 16	It is stated "A licensee that implements WCAP-15791 must demonstrate by its plant-specific application, the applicability of the WCAP-15791 input parameter assumptions with respect to ΔCDF, ΔLERF, ICCDP, and ICLERP to their particular plant." It is only necessary to demonstrate the applicability of WCAP-15791 input parameter assumptions if the generic results in the WCAP are being applied. Therefore, the following change is suggested "A licensee that implements <u>the generic results in</u> WCAP-15791…". Note that the revised words are underlined.	ACCEPTED
18	24 - 27	It is stated "Plant-specific CIV reliability and availability will be monitored and assessed…" As noted in previous PWROG comments, it is not necessary to monitor and assess reliability. The CIV reliability is not impacted by the proposed CT changes. Therefore, it is suggested that "reliability and" be removed from this sentence. This statement will then be consistent with Item 7 in Section 5.0 of the Safety Evaluation.	ACCEPTED

21	10 - 11	It is stated “Licensees have confirmed that (1) the generic WOG PRA values used for the Tier 1 evaluations in WCAP-15791 envelope the PRA values for their plants…”. This statement is almost duplicative of the statement on Page 20, Lines 41-43 (both are bullets in Section 3.5). The difference is that the statement on Page 20, Lines 41-43 specifies that this applies to licensees that apply the generic results, which is correct. It is suggested that the statement on Page 21, Lines 10-11 be deleted since it is incorrect and, if it was corrected, it would duplicate what is already stated.	ACCEPTED
22	14	Suggest adding the underlined words in the following sentence to be consistent with Section 3.2 and Section 8.2 of the WCAP. “Address how the first, third, and sixth items of the basis and general assumptions…”	ACCEPTED
22	43 - 45	It should be specified that this PRA quality requirement is only required for the Tier 3 evaluations to be consistent with Page 15, Line 4. Suggest replacing the word “this” with “Tier 3” in the following sentence “Verify that the plant-specific PRA quality is acceptable for this application… .” The revise sentence will be “Verify that the plant-specific PRA quality is acceptable for Tier 3 applications…”.	ACCEPTED
23	38 - 39	It is stated “CIV reliability and availability will also be monitored… .” The words “reliability and” should be removed from this sentence. This statement will then be consistent with Item 7 in Section 5.0 of the Safety Evaluation and the WCAP.	ACCEPTED
23	41 - 42	It should be specified that this PRA quality requirement is only required for the Tier 3 evaluations to be consistent with Page 15, Line 4. It suggested that the underlined words be added to the sentence “…that PRA quality is adequate for Tier 3 evaluations as part of the basis… .”	NOT ACCEPTED (See next comment)
E-mail dated Jan. 11, 2008	NA	… if the statement in Section 6 "...and the fact that the licensee demonstrates that PRA quality is adequate as part of the basis of a risk-informed application..." will not be interpreted by future Staff reviewers, of LARs implementing these changes, to extend beyond Item 5 in Section 5.0, then it's OK not to make the change proposed in Item 9. We made this comment thinking a future Staff reviewer may interpret this to require PRA quality beyond that required to meet the statement in Item 5 in Section 5.0.	The reviewers will not misinterpret the conclusion statement in Section 6.0 about PRA quality because the earlier statement in Section 5.0 of the Final SE states that the PRA quality applies to the level III PRA considerations.