WOLF CREEK
NUCLEAR OPERATING CORPORATION

August 11, 2006

Terry J Garrett
Vice President, Engineering

ET 06-0028

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

Reference: 1) Letter WO 04-0030, dated July 23, 2004, from D. Jacobs, WCNOC, to USNRC

2) Letter dated May 19, 2006, from J. N. Donohew, USNRC, to R. A. Muench, WCNOC

Subject: Docket No. 50-482: Response to Request for Additional Information Related to License Amendment Request to Extend Containment Isolation Valve Completion Times

Gentlemen:

Reference 1 provided Wolf Creek Nuclear Operating Corporation's (WCNOC) application to revise Technical Specification (TS) 3.6.3, "Containment Isolation Valves," to extend the Completion Times for an inoperable containment isolation valve. The proposed changes are based on WCAP-15791-P, Revision 1, "Risk-Informed Evaluation of Extensions to Containment Isolation Valve Completion Times." Reference 2 provided a request for additional information (RAI) based on Nuclear Regulatory Commission (NRC) Staff review of the final safety evaluation dated March 10, 2006, on WCAP-15791-P, Revision 1, and Reference 1.

Attachment I provides responses to the question provided in Reference 2. Attachment II provides a revised TS 3.6.3 page as discussed in the response to RAI #2. Attachment III provides a List of Commitments.

The additional information provided in the Attachments does not impact the conclusions of the No Significant Hazards Consideration provided in Reference 1. In accordance with 10 CFR 50.91, a copy of this submittal is being provided to the designated Kansas State official.

A001

If you have any questions concerning this matter, please contact me at (620) 364-4084, or Mr. Kevin Moles at (620) 364-4126.

Very truly yours,

Terry J. Garrett

TJG/rlt

Attachments

cc: T. A. Conley (KDHE), w/a
J. N. Donohew (NRC), w/a
W. B. Jones (NRC), w/a
B. S. Mallett (NRC), w/a
Senior Resident Inspector (NRC), w/a

STATE OF KANSAS)
) SS
COUNTY OF COFFEY)

Terry J. Garrett, of lawful age, being first duly sworn upon oath says that he is Vice President Engineering of Wolf Creek Nuclear Operating Corporation; that he has read the foregoing document and knows the contents thereof; that he has executed the same for and on behalf of said Corporation with full power and authority to do so; and that the facts therein stated are true and correct to the best of his knowledge, information and belief.

By _____
Terry J. Garrett
Vice President Engineering

SUBSCRIBED and sworn to before me this 11th day of Aug., 2006.

_____
Notary Public

NOTARY PUBLIC STATE OF KANSAS
CINDY NOVINGER
My Appt. Exp. 7/8/10

Expiration Date 7/8/10

RESPONSES TO REQUEST FOR ADDITIONAL INFORMATION

This Attachment provides Wolf Creek Nuclear Operating Corporation's (WCNOC's) responses to the Nuclear Regulatory Commission (NRC) request for additional information (RAI) dated May 19, 2006. The NRC provided the request for additional information discussed below based on its review of the final safety evaluation dated March 10, 2006, on WCAP-15791-P, Revision 1, "Risk-Informed Evaluation of Extensions to Containment Isolation Valve Completion Times," (hereafter referred to as WCAP-15791)and on WCNOC's application dated July 23, 2004. The specific NRC RAIs and specific items referenced in the final safety evaluation are italicized.

1. *RAI response dated February 13, 2004, Question 12, added a clarification to Note 3 of Table 9-1a to the LTR stating that, "CDF due to SGTR is not provided since Wolf Creek Generating Station (WCGS) has no CIVs in the containment penetration from the SGs due to their containment boundary definition."*

   The response to RAI 12 explained that, according to the WCGS USAR, "the containment penetrations associated with the steam generators are not subject to GDC-57, since the containment barrier integrity is not breached. The boundary or barrier against fission product leakage to the environment is the inside of the steam generator tubes, the outside of the steam generator shell, and the outside of the lines emanating from the steam generator shell side." It further states that there are no CIVs associated with these penetrations.

   It appears that [t]his position, and the USAR section that supports it, is not in compliance with the requirements of the regulations (specifically GDC-57); further, it is inconsistent with the applicable guidance documents (Regulatory Guide 1.141, American National Standard N271-1976/ANS-56.2, and Standard Review Plan 6.2.4); and finally, that it is contrary to the review and conclusions contained in the Safety Evaluation Report related to the licensing of WCGS, NUREG-0881, dated April 1982.

RESPONSE: Updated Safety Analysis Report (USAR) Section 6.2.4.3, Safety Evaluation Seven states: "As indicated in Table 6.2.4-1, there are no penetrations which are subject to GDC-57. Note that the containment penetrations associated with the steam generators are not subject to GDC-57, since the containment barrier integrity is not breached. The boundary or barrier against fission product leakage to the environment is the inside of the steam generator tubes, the outside of the steam generator shell, and the outside of the lines emanating from the steam generator shell side. Figure 6.2.4-2 shows the arrangement and justifies compliance with containment isolation." A review of the Final Safety Analysis Report (FSAR) at the time the plant was licensed identified that the current wording in Safety Evaluation Seven is the same wording as when the plant was licensed.

This issue was also identified during the conversion to the improved Standard Technical Specifications (Amendment No. 123). Question Q 3.6.3-10 pertained to a proposal to add a Note to Limiting Condition for Operation (LCO) 3.6.3 that indicated that the requirements of Technical Specification (TS) 3.6.3 did not apply to Main Steam Safety Valves, Main Steam Isolation Valves, Main Feedwater Isolation Valves, the associated by-pass valves, and Steam Generator Atmospheric Relief Valves. This was discussed in WCNOC letter WO 98-0105 (Reference 4). The resolution was that the Note to the LCO was withdrawn since the USAR

provided the licensing basis that these valves were not considered as containment isolation valves.

As such, WCNOC's licensing basis is that that containment penetrations associated with the steam generators are not subject to GDC-57.

2. *The Technical Specification (TS) markups are not consistent with the proposed TS revisions proposed by WCAP-15791. See TSTF-446, Revision 1. TS Condition A does not differentiate the CT depending on whether the pressure boundary for the penetration is intact. Provide a markup consistent with WCAP-15791 Revision 1 or clarify the current TS approach.*

RESPONSE: During the development of the WCNOC license amendment request, a review of the differences in the Completion Times for the pressure boundary intact versus the pressure boundary not intact was performed. This review identified 18 containment isolation valves that had different Completion Times. For 14 of these containment isolation valves, the Completion Time specified in the associated system technical specification was more limiting than the longer of the Completion Times for the pressure boundary intact or not intact. WCNOC determined that since there were a reasonably small number of containment isolation valves with different Completion Times and we wanted to minimize the impact on the Control Room staff (i.e., not have to place an additional burden on the staff to determine if the pressure boundary was intact or not), WCNOC chose to eliminate the pressure boundary aspects and the more restrictive of the Completion Times were utilized for the 18 containment isolation valves. This is consistent with the intent of TSTF-446, Revision 1, due to the brackets utilized in Conditions A and B.

Additionally, in an electronic mail provided to the NRC Project Manager on August 12, 2005 and again on February 24, 2006, identifying that WCNOC letter WO 04-0030 (Reference 3) was based on a draft of Revision 1 of TSTF-446 and struck the "or more" phrase. This submittal supplements the amendment request to reinstate the "or more" phrase. Attachment II to this letter provides the correct TS 3.6.3 markup. Page 2 of 2 of Attachment II replaces Page 2 of 6 in Attachment III to WO 04-0030.

3. *Address how the general assumptions listed in Section 3.2 of the NRC staff SE for WCAP-15791 are incorporated in the specific plant practices, procedures, TSs, and plant probabilistic risk assessment (PRA). See also Question 6 below.*

RESPONSE: The NRC lists 13 general assumptions in Section 3.2 of their final safety evaluation on WCAP-15791. In subsequent discussions with the NRC, the Pressurized Water Reactor Owners Group (PWROG) noted that a number of these "assumptions" are not "assumptions," but provide the basis for the analysis approach. Only Items 1, 3, and 6 are assumptions. Each item listed by the NRC in Section 3.2 is addressed in the following.

Item 1: Only one CIV is in maintenance with an extended CT at any one time.

Response: This is addressed by the addition of Condition D to TSTF-446, Rev. 1. For WCGS, Condition C (which is Condition D in TSTF-446, Rev. 1) was added to TS 3.6.3 and this Condition, Required Action, and Completion Time are:

- Condition C: Two or more penetration flow paths with one containment isolation valve inoperable for reasons other than Condition D.

- Required Action C.1: Isolate all but one penetration flow path by use of at least one closed and de-activated automatic valve, closed manual valve, or blind flange.

- Completion Time: 4 hours.

Note 2 to the ACTIONS Table of TS 3.6.3 specifies that separate Condition entry is allowed for each penetration flow path. Technical Specification 1.3, "Completion Times," states that once a Condition has been entered, subsequent trains, subsystems, components, or variables expressed in the Condition, discovered to be inoperable or not within limits, will not result in separate entry into the Condition unless specifically stated. In this case, Note 2 to the ACTIONS Table allows separate Condition entry for all applicable Conditions, including Condition C. The following discussion will be added to the Required Action C.1 TS Bases:

> "For subsequent containment isolation valve inoperabilities, the Required Action and Completion Time continue to apply to each additional containment isolation valve inoperability, with the Completion Time based on each subsequent entry into the Condition consistent with Note 2 to the ACTIONS Table (e.g., for each entry into the Condition), the containment isolation valve(s) inoperable as a result of that entry shall meet the Required Action and Completion Time."

For example, containment isolation valve (CIV) 1 (168 hour Completion Time) is declared inoperable, Condition A is entered with 168 hours to restore the CIV to OPERABLE status or the penetration flow path isolated. CIV 2 (72 hour Completion Time) is declared inoperable (1 hour after CIV 1 was declared inoperable), Condition A and Condition C would both be entered. For this case either the CIV 1 or CIV 2 penetration flow path would be required to be isolated within 4 hours. CIV 3 (72 hour Completion Time) is declared inoperable (1 hour after CIV 2 was declared inoperable and the penetration flow path for CIV 1 or CIV 2 had not been isolated), Condition A and Condition C are both entered for CIV 3 and a new Completion Time clock is started for CIV 3. The penetration flow path for CIV 1 or CIV 2 (CIV 1 penetration flow path is isolated for this example) required to be isolated 3 hours after the initial entry into Condition C for the CIV 2 inoperability. Then the penetration flow path for CIV 2 or CIV 3 is required to be isolated within 4 hours of entry into Condition C for the CIV 2 inoperability.

Sequential containment isolation valve inoperability is addressed consistently with current TS usage for sequential system, subsystem or component inoperabilities. This was previously discussed in RAI # 6 of letter WOG-04-077 (Ref. 1), and is consistent with the WCAP-15791 assumption of only one containment isolation valve in an extended Completion Time that was justified in the topical report.

Item 2: 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.

Response: This is a statement of the analysis approach and not an assumption. Analyses were done to determine appropriate Completion Times for the two possible configurations; pressure boundary intact and pressure boundary not intact. Note that WCNOC decided to use a single Completion Time that is applicable to both configurations as discussed in the response to RAI #2 above. The more restrictive of the two Completion Times is used.

Item 3: 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 have been checked to ensure they are in their proper position.

Response: This is an analysis assumption and implementation of these extended Completion Times will need to be done in a manner consistent with this assumption. WCNOC will implement in its procedures the requirement to confirm that the remaining containment isolation valve(s) in the affected penetration(s) are in their correct position(s) prior to performing maintenance on a containment isolation valve.

Item 4: For penetrations with two or more CIVs of the same 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 types, CCFs are not included in the TR evaluation.

Response: This is a statement of the analysis approach and not an assumption. This provides the approach used to address common cause failures between containment isolation valves, which is consistent with industry practice.

Item 5: 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 analysis 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).

Response: This is a statement of the analysis approach and not an assumption. This approach provides a conservative assessment since the highest containment isolation valve failure probability is applied to all the containment isolation valves in the affected penetration.

Item 6: Multiple systems are not expected to be out of service simultaneously during the extended CTs.

Response: As with any Completion Time extension analysis, and consistent with Regulatory Guide 1.177, the analysis is completed with only one component or train in the system of interest out of service. The analysis does not preclude other components or systems from being out of service at the same time. Tier 2 and Tier 3 address additional out of service systems. Tier 2 limitations provide reasonable assurance that risk-significant plant equipment outage configurations will not occur when plant equipment is out of service consistent with the proposed TS change. Tier 3 evaluations ensure that the risk impact of out of service equipment

is evaluated prior to performing maintenance activities. The response to RAI #5 discusses Tier 2 and the response to RAI #6 discusses Tier 3.

Item 7: 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 7 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 a LERF.

Response: This is a statement of the analysis approach and not an assumption. Following discussions with the NRC, it was agreed that a 2 inch containment hole size would be used as the threshold for a large release. The Completion Time changes requested for WCGS are consistent with using this 2 inch threshold for a large release.

Item 8: 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.

Response: This is a statement of the analysis approach and not an assumption. This approach provides a conservative assessment since the highest containment isolation valve failure probability is applied.

Item 9: 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.

Response: This is a statement of fact and not an assumption. The Completion Time extensions requested for WCGS are consistent with the penetration configurations and maintenance activities applicable to WCGS and was completed following the approach in Chapter 9 of WCAP-15791.

Item 10: 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.

Response: This is a statement of the analysis approach and not an assumption. The Completion Time extensions requested for WCGS are based on this analysis approach.

Item 11: Non-seismically qualified piping was assumed to fail with a probability of one, given a seismic event.

Response: This is a statement of the analysis approach and not an assumption. This provides a conservative assessment since the piping is assumed to fail during a seismic event.

Item 12: 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.

Response: This is statement of what was done in the analysis and in response to NRC RAIs associated with WCAP-15791. No response to this item is required.

Item 13: Additional class-specific assumptions are stated for each CIV "Class" in WCAP-15791.

Response: Each containment isolation valve Group lists several items that provide the basis (key modeling details) for the analysis. These are not assumptions, but provide the basis for the analysis.

4. *Because not all penetrations have the same impact on CDF, LERF, ICCDP, or ICLERP, 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.)*

RESPONSE: It should be noted that the WCNOC Completion Time extension amendment request is based on a plant-specific analysis and not application of the generic results. Therefore, it is not necessary to demonstrate that the risk-parameter values used in WCAP-15791 are bounding. It is only necessary to demonstrate that the configurations for the specific plant match those included in the WCAP. However, since the WCAP also includes application of the generic results to WCGS, a response will be provided for both; application of the generic results and a plant-specific analysis.

Application of the Generic Results

The procedure for implementation of the generic analysis and results is provided in Chapter 9 of WCAP-15791. It consists of the following steps:

Step 1: Containment penetration data collection
Step 2: Confirmation of analysis input parameters
Step 3: Grouping (of penetration configurations)
Step 4: Identification of Small Lines
Step 5: Grouping Match (to generic configurations)

Step 2 compares the parameters used in the analysis against the corresponding plant-specific parameters. This was demonstrated for WCGS in Tables 9-1a, 9-1b, and 9-1c and shows that the values in the generic analyses are bounding for WCGS. Step 5 matched the WCGS specific penetrations against those analyzed in WCAP-15791 and the appropriate Completion Times assigned. The penetration configurations analyzed in the generic analyses addressed all the WCGS penetration configurations.

Plant-Specific Analysis

The approach for performing a plant-specific analysis is provided in Chapter 10 of WCAP-15791. As stated above, WCNOC performed a plant-specific analysis and the requested Completion Time changes are based on the plant-specific analysis, not the generic analysis. The only difference between the generic analysis and the plant-specific analysis are the input parameters. The plant-specific analysis uses plant-specific input parameters, therefore, question 4.(b) above, "the risk-parameter values used in the TR are bounding for the specific plant," is not applicable.

With regard to question 4.(a), all the configurations analyzed in the generic analysis are re-evaluated in the plant-specific analysis approach using the plant-specific input parameters. Then the WCGS specific penetrations are matched with the corresponding penetration configurations and the appropriate Completion Times assigned. The penetration configurations analyzed and included in WCAP-15791 addressed all the WCGS penetration configurations.

5. *Discuss the Tier 2 assessment and methodology (see RG 1.177 Section 2.3) employed at WCGS and any risk significant configurations identified for an extended CIV CT. Include in the discussion the assumptions identified in Section 3.2 of the SE to WCAP-15791 as shown below.*

   - *Only one CIV is in maintenance with an extended CT at any time.*
   - *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 have been checked to ensure they are in their proper position.*
   - *Multiple systems are not expected to be out of service simultaneously during the extended CTs.*

RESPONSE: Section 8.4 of WCAP-15791 discusses Tier 2 restrictions related to risk significant configurations. It is based on qualitative considerations of defense-in-depth and the functions of the other containment systems. It was concluded in this section that no Tier 2 restrictions are required. That is, risk-significant plant outage configurations will not occur when a containment isolation valve and other plant equipment is out of service. If a risk-significant configuration does occur, it will not have been caused by the containment isolation valve, and placing restrictions on the containment isolation valve will not alleviate the risk. WCGS is a typical Westinghouse NSSS plant with a large dry containment and the containment isolation requirement, penetrations, and penetration configurations analyzed are consistent with the WCAP analysis. The conclusions in Section 8.4 are also applicable to the plant-specific analysis performed in Section 9 of WCAP-15791. No Tier 2 restrictions are necessary due to extending the Completion Times for inoperable containment isolation valves.

The bullets above represent analysis assumptions that the licensee is required to meet. Each is discussed in the following:

1. Only one CIV is in maintenance with an extended CT at any one time.

As discussed in response to Item 1 in RAI #3, this is addressed by the addition of Condition D to TSTF-446, Rev. 1. For WCGS, Condition C (which is Condition D in TSTF-446, Rev. 1) was added to TS 3.6.3 and this Condition, Required Action, and Completion Time are:

- Condition C: Two or more penetration flow paths with one containment isolation valve inoperable for reasons other than Condition D.

- Required Action C.1: Isolate all but one penetration flow path by use of at least one closed and de-activated automatic valve, closed manual valve, or blind flange.

- Completion Time: 4 hours.

2. Before maintenance or corrective maintenance (repair) is performed on a CIV, the WCAP-15791 evaluation assumes that the other containment isolation valve(s) in the penetration flow path have been checked to ensure they are in their proper position.

As discussed in the response to Item 3 in RAI #3, implementation of these Completion Time extensions will need to be done in a manner consistent with this assumption. WCNOC will implement in its procedures the requirement to confirm that the remaining containment isolation valve(s) in the affected penetration(s) are in their correct position(s).

3. Multiple systems are not expected to be out of service simultaneously during the extended Completion Time(s).

As discussed in the response to Item 6 in RAI #3, for any Completion Time extension analysis that is consistent with Regulatory Guide 1.177, the analysis is completed with only one component or train in the system of interest out of service. The analysis does not preclude other components or systems from being out of service at the same time. Tier 2 and Tier 3 requirements address additional out of service equipment. Tier 2 limitations provide reasonable assurance that risk-significant plant equipment outage configurations will not occur when plant equipment is out of service consistent with the proposed TS change.

The four-hour Completion Time of Technical Specification 3.6.3 (Condition C) makes it very unlikely that pre-planned activities would be scheduled that would result in more than one containment isolation valve being removed from service at the same time. The plant staff will attempt to avoid conditions where scheduled activities will purposely result in the need to isolate all but one penetration path with the urgency required by a short four-hour Completion Time. In this regard, the four-hour Completion Time of Technical Specification 3.6.3 (proposed Condition C) may be considered to provide a built-in assessment for the planned removal of more than one containment isolation valve from service at the same time. Thus, no Tier 2 restrictions are required.

Tier 3 evaluations ensure that the risk impact of out of service equipment is evaluated prior to performing maintenance activities. Therefore, the risk associated with multiple systems out of service simultaneously will be addressed by Tier 3 requirements. At WCGS, Tier 3 requirements are addressed by the plant's configuration risk management program as part of the Maintenance Rule. This is further discussed in the response to RAI #6 below.

6. *Because WCAP-15791 does not address Tier 3, 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.*

   The following was identified as Item 9 in the staff SE to WCAP-15791: Explain how LERF/ICLERP are assessed in the program. This assessment is to be documented in a regulatory commitment in the plant-specific application.

RESPONSE: As indicated in Section 4.2 (page 10 of 68) of Attachment II to WO 04-0030 (Reference 3), the risk impact associated with performance of maintenance and testing activities is evaluated in accordance with procedure AP 22C-003, "Operational Risk Assessment Program." The guidance provided in AP 22C-003 implements the requirements of 10 CFR 50.65, paragraph (a)(4) that requires licensees, prior to performing maintenance activities, to access and manage the increase in risk that may result from the proposed maintenance activities. The operational risk assessment is performed for maintenance and testing activities within a weekly schedule. The risk assessment is completed, reviewed and approved prior to the week in which the activities are scheduled to be performed. The operational risk assessment and associated weekly schedule are reviewed by the WCGS Probabilistic Safety Assessment (PSA) group and approved by the Plant Manger or designee.

The operational risk assessment includes assignment of compensatory measures and contingency plans for activities that are determined to be risk significant for safe shutdown, accident mitigation or commercial operation. The operational risk assessment also considers plant configurations determined to be risk significant by Tier 2 evaluations performed for previously approved risk-informed licensing actions.

The impact on an operational risk assessment due to added or emergent activities, or activities that have exceeded the time scheduled to complete the activity, is evaluated by the Shift Manager/Control Room Supervisor. Based on the impact to the risk assessment, the Shift Manager may elect to manage risk by continuing with activities as scheduled, deferring scheduled activities, or by implementing additional compensatory measures. Response to emergent plant conditions may result in not performing an additional risk assessment, which is consistent with the guidance provided in item 8 in Section 11.3.2 of Reference 5. A risk matrix is available in procedure AP 22C-003 to assist the Shift Manager in his evaluation of the impact on the risk assessment due to added or emergent activities. The Shift Manager may also request the assistance of the WCGS PSA Group in the evaluation of impact on the risk assessment due to added or emergent activities or activities that have exceeded the time scheduled to complete the activity.

The WCGS PSA group review of the weekly schedule includes generation of a risk profile for the weekly scheduled activities using the Safety Monitor™ risk assessment tool. The Safety Monitor™ determines the Core Damage Frequency (CDF) and Large Early Release Frequency (LERF) based on the plant configuration (equipment out of service, testing activities, system alignment and operating status). Safety Monitor™ utilizes Incremental Core Damage Probability (ICDP) and Incremental Large Early Release Probability (ILERP) to determine an acceptable time to remain in any given plant configuration based on the guidance provided in NUMARC 93-01 (Reference 5).

The event tree sequences from the WCGS Probabilistic Risk Assessment (PRA) model are translated into a top logic fault tree model, which is solved for CDF and LERF by Safety Monitor™. The same system level fault trees are utilized for quantification of the WCGS PRA event tree model and the Safety Monitor™ top logic fault tree model. The top logic fault tree model is solved once to generate both CDF and LERF cutsets. These cutsets are then segregated based on core damage or LERF flag events, and combined to determine total CDF and LERF values. The core damage top logic structure is imported directly into the LERF top logic structure, as appropriate, to allow determination of both CDF and LERF by a single quantification of an overall top logic fault tree model. Solution in this manner prevents subsuming of any core damage sequence solutions prior to the determination of LERF.

Following each PRA model update, results from the quantification of the PRA event tree model, and the top logic fault tree model, are compared to ensure that the top logic fault tree model properly reflects the event tree sequences. The quality of the PRA model is addressed in the response to RAI #7 below.

The current WCGS PRA model includes consideration of containment isolation failures following core damage in the determination of LERF. While isolation failure for a number of containment penetrations is specifically modeled in the current containment isolation fault tree, not all of the penetrations or penetrations types, identified in Chapters 9 and 10 of WCAP-15791 as applicable to WCGS, are modeled. It is possible to determine a LERF impact by utilization of a modeled penetration as a surrogate when removing a valve from service associated with a penetration not modeled in the containment isolation fault tree. However, to ensure, as a minimum, that all penetration types identified in WCAP-15791 as applicable to WCGS are considered; WCGS will revise the containment isolation fault tree model prior to utilization of the requested containment isolation valve Completion Time extensions by either: 1) modeling containment isolation valves for at least one of each WCAP-15791 penetration type applicable

to WCGS, including penetrations to the containment atmosphere greater than 2 inches in diameter or 2) modeling all containment isolation valves associated with this license amendment request, including penetrations to the atmosphere greater than 2 inches in diameter. Penetrations to containment atmosphere less than 2 inches are not modeled since a large release is not possible. Therefore, the WCAP-15791 analysis is applicable regardless of the potential impact on CDF of the additional inoperable component(s), the configuration (with regard to large early release) is acceptable, and no additional LERF evaluation is necessary.

Chapters 9 and 10 of WCAP-15791 evaluate the acceptability of extending the Completion Times for the WCGS containment isolation valves using primarily the LERF and ICLERP metrics in accordance with RG 1.174 and RG 1.177. This addresses the Tier 1 assessment of risk.

The following paragraph, taken from the NRC safety evaluation associated with Amendment No. 163 (Reference 6) provides a fairly comprehensive description of the purpose and approach for a Tier 3 assessment:

> "Tier 3 addresses the licensee's overall configuration risk management program (CRMP) to ensure that adequate programs and procedures are in place for identifying risk-significant plant configurations resulting from maintenance or other operational activities and appropriate compensatory measures to avoid such configurations are taken that may not have been considered when the Tier 2 guidance was developed. 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 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 (10 CFR 50.65(a)(4)), which requires a licensee to assess and manage the increase in risk that may result from activities such as surveillance, testing, and corrective and preventative maintenance, subject to the guidance provided in RG 1.177, Section 2.3.7.1, and the adequacy of the licensee's program and PRA model for this application. The CRMP is to ensure that equipment removed from service prior to or during the proposed extended CT will be appropriately assessed from a risk perspective."

As described above in the response to this RAI, WCGS has a process and procedures in place to perform a Maintenance Rule risk assessment (10 CFR 50.65 (a)(4)) to satisfy the Tier 3 guidance consistent with the key components listed in Section 2.3.7.2 of Regulatory Guide 1.177. This assessment considers the metrics of CDF, LERF, ICDP and ILERP, and follows the guidance provided in NUMARC 93-01. WCGS has utilized this process for satisfying Tier 3 assessment guidance in the past and will continue to apply this process in future 10 CFR 50.65 (a)(4) assessments; including assessment of the risks associated with removing containment isolation valves from service subsequent to approval of the requested amendment.

7. *Verify that the plant-specific PRA quality for Tier 2 and 3 assessments is acceptable for this application in accordance with the guidelines given in RGs 1.174 and 1.177, which are identified in the 6 items listed in Section 3.3.1.1 of the WCAP-15791 SE. This includes a verification 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.*

RESPONSE: Each of the six items from Section 3.3.1.1 of the NRC safety evaluation for WCAP-15791 is addressed:

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

   The current plant-specific PRA model reflects the as-built, as-operated plant. The only identified plant change of significance to the PRA since completion of the current PRA model is consideration for the Sharpe Station gensets located approximately 2 miles north of the WCGS plant site. The Sharpe Station gensets are considered in support of Amendment No. 163 (Reference 6) which approved an extension of the Completion Time for the WCGS Diesel Generators (DGs). WCGS is currently in the process of incorporating changes to the PRA model for Safety Monitor™ to reflect the risk impact of the Sharpe Station in accordance with Amendment No. 163. Consideration for the Sharpe Station gensets will result in a reduction in the WCGS CDF. Some minor reduction in LERF will also result. Any CDF or LERF impacts due to removing a containment isolation valve from service will be reduced once consideration for the Sharpe Station gensets is incorporated in the PRA model for Safety Monitor™. In addition, the containment isolation fault tree model will be enhanced as described in the response to RAI #6 above.

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.*

   There were two concerns identified in the NRC Staff Evaluation Report (Reference 7) on the WCGS Individual Plant Examination (IPE):

   (1) *A limited set (5) of Human Reliability Analysis (HRA) of calibration actions, including the refueling water storage tank level, which other IPEs have identified as a potentially significant event. However, the basis as to why these were the only events identified for the analysis was not provided.*

   Pre-initiator human failure events, also known as latent human errors, are human errors that occur before the initiating event in a PRA. Latent errors are failures or events that render safety systems unavailable to operate, when demanded, following operational tests or maintenance. These events typically fall into two categories, failure to restore a component to service following test or maintenance, and miscalibration.

A systematic analysis has been performed to identify pre-initiators. This analysis employed a systematic, comprehensive review of the calibration and surveillance test procedures supplemented by a review of plant-specific, historical data. Calibration procedures and surveillance tests that are periodically conducted were assessed for their impact on the plant during power operations, and included those calibration activities that are scheduled during a plant shutdown. The historical data consisted of an evaluation of past operating history based on WCGS License Event Reports (LERs).

The current WCGS PRA model incorporates the pre-initiator failure events identified by this analysis.

(2) *The modeling of errors associated with actions that have to be performed within a very short time (e.g., times in the range of seconds to 1 minute).*

Time critical actions are defined as those which take a long time to diagnose and perform, relative to the length of the time window available. The time critical actions are treated in the following manner in the Wolf Creek human reliability analysis.

Identification: Time critical actions are primarily identified through the operator interview process, and an examination of the time windows available from thermal-hydraulic analyses such as MAAP or other engineering calculations. The operator interview process ascertains the cues and steps in the procedure that the operators use to diagnose the event and the time at which this diagnosis takes. Then, the steps judged to be critical to that particular HRA are confirmed and the overall time to successfully complete these steps determined. The overall time accounts for potential delays due to additional, non-critical procedural steps that must be executed first, the time required for the component to change state (e.g. to start a turbine-driven pump), and limitations that may be present due to crew staffing.

Treatment: If the time window is less than the diagnosis time plus the time required to successfully complete the actions, then the action is assumed to be failed. If the time window is larger than the diagnosis time plus the time required to successfully complete the actions, then the probability of failure is adjusted either directly (e.g. taken as an unavailability of 0.1), or through selection of the stress factor and the allowed credit for recovery. For example, if there is a 30-minute time window and the action takes 5 minutes to diagnose and 15-20 minutes to execute, then a moderate to extreme level of stress is taken (depending on if there are other, competing actions occurring simultaneously) and no credit is given for recovery. Alternately, if the time window is 1 hour, and the action is at the end of a success branch on an event tree (e.g. LOCA followed by successful injection, cooldown, and depressurization such that the time window starts several hours after the initiator), and the competition from other actions is low, then the stress is taken as optimal and credit may be given for recovery. In each case, the operator actions are examined in the full context of the scenario, including timing, to determine the potential impact of time constraints.

Note that this response to IPE Staff Evaluation Report concern (2) was previously provided in the responses to RAIs (Reference 9, RAI #7) regarding the Risk-Informed Inservice Inspection Program Plan (Reference 10).

There were no findings from the NRC Staff Evaluation Report (Reference 8) on the WCGS Individual Plant Examination of External Events (IPEEE):

For the most part, external events considered in the IPEEE were evaluated against screening criteria specific to each event in accordance with the methodologies listed as acceptable in Generic Letter 88-20, Supplement 4.

Seismic – WCGS is located in a relatively low hazard region of the U.S. A reduced scope seismic margins assessment was performed as part of the Individual Plant Examination for External Events. At a minimum, plant components were screened to the plant design basis safe shutdown earthquake (SSE) of 0.2g; although a majority (90% or more) of the components were screened at 0.3g SSE. All the plant valves are screened at 0.3 g. No significant seismic issues were identified.

High Winds, Floods, and Other External Events – Screening evaluations for these events were performed with the conclusion that the WCGS is in compliance with the standard review plan, the events are of low risk significance, and no vulnerabilities were identified.

For all external events except fire, the evaluation indicated low risk significance and the events were screened out.

Fire risk – For fire areas that did not screen out using the progressive screening of the EPRI Fire-Induced Vulnerability Evaluation (FIVE) methodology, quantitative evaluations using conventional PRA approaches were performed. The fire CDF, as reported in Reference 2, was assessed to be 7.6E-06/yr, which was approximately 15% of the internal events CDF determined in the IPE. In 1998, the fire risk evaluation was revisited, using the same methodology, with a resultant quantified CDF due to fire of 8.14E-06/yr. This represented approximately 13% of the internal events CDF of 6.31E-05/yr for the PRA model current at the time the fire risk was evaluated. The fire risk evaluation has not been updated subsequent to the 1998 time frame.

The total internal events CDF for the current WCGS PRA model, including internal flooding, is 3.24E-05/yr. The only external event for which CDF was quantified is internal fires. The total quantified CDF for the WCGS PRA is 4.053E-05/yr. This value is significantly less than 1.0E-04/yr total CDF value from WCAP-15791 utilized for the generic and plant-specific evaluation for containment isolation valve Completion Time extensions.

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.*

   All Category A Facts & Observations (F&O's) have been resolved and incorporated as appropriate into the current WCGS PRA model. The majority of Category B F&Os have also been resolved and incorporated, as appropriate into the current model. Those Category B F&Os that have not yet been resolved have been reviewed and none were identified to impact the evaluation for the containment isolation valve Completion Time extensions.

   As indicated in Chapters 9 and 10 of WCAP-15791, the evaluation performed for the plant-specific application did not use the WCGS PRA model. The data used for the plant-specific application is identified in Tables 9-1b and 9-1c from Chapter 9 of WCAP-15791. The plant-specific data from these WCAP tables are from the PRA revision that underwent the peer review. The current PRA model, which incorporates the resolution of the Category A and most of the Category B F&Os, will be utilized for 10 CFR 50.65 (a)(4) risk assessments.

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

   The process for PRA configuration control and updating, including the PRA revision schedule, is contained in SADI-001, "Maintenance of the Wolf Creek PSA Model." The PRA model, and associated documentation, is subject to an independent review by a PRA group analyst, with approval by the PRA group supervisor.

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

   The WCGS PRA model includes evaluation of LERF. The LERF evaluation results are dominated by containment bypass type sequences (interfacing systems LOCA and SGTR), but include consideration of containment isolation failures leading to LERF following a core damage event. As indicated in the response to RAI #6 above, WCGS will expand the containment isolation fault tree model currently utilized for LERF evaluation prior to implementation of these containment isolation valve Completion Time extensions. The containment isolation fault tree will be enhanced to either 1) model at least one of each type of containment penetration, including penetrations to the atmosphere greater than 2 inches in diameter described in Chapter 9 of WCAP-15791; or 2) model all applicable WCGS containment penetrations, including penetrations to the containment atmosphere greater than 2 inches in diameter. Additionally, RAI #6 above provides a basis for not modeling penetrations to the containment atmosphere less than 2 inches in size.

With the enhanced containment isolation fault tree model, the WCGS PRA model for LERF will be adequate, complete and applicable for evaluating the risk associated with the proposed containment isolation valve Completion Time 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.*

As indicated above, the WCGS PRA model was not utilized for the WCGS plant-specific evaluation presented in WCAP-15791. Plant-specific data provided in Tables 9-1b and 9-1c of WCAP-15791 was utilized for the plant-specific containment isolation valve Completion Time extension application.

The only plant change since the completion of the last PRA model revision which has been identified as potentially impacting the proposed Completion Time extensions is incorporation of consideration for the Sharpe Station gensets. Consideration for the impact of the Sharpe Station gensets will be incorporated prior to application of the approved Completion Time extension for the WCGS DGs. The impact on LERF from incorporation of consideration for the Shape Station gensets will be minor, but will only serve to reduce the LERF values from those that would be generated by the current WCGS PRA model. In addition, the containment isolation fault tree model utilized for LERF evaluation will be enhanced as indicated in the response to RAI #6 above.

8. *Address how plant-specific CIV reliability and availability are 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 (i.e., Implementation and Monitoring Program)*

RESPONSE: The containment isolation function is within the scope of the WCGS Maintenance Rule program (procedure AP 23M-001). The unavailability criteria is that there will be no loss of containment isolation function based on compliance with TS 3.6.3, "Containment Isolation Valves." The reliability criteria is less than or equal to one functional failure per valve during an 18 month period. These criteria are monitored by the Containment Leakage Measurement program (procedure AP 29E-001). The specific times for either restoring a containment isolation valve to OPERABLE status or isolating the affected penetration is not addressed by these programs.

The important parameter to be monitored to meet the WCAP-15791 analysis assumptions is the unavailability of the containment isolation valves. For the containment isolation valves, the unavailability time is the time from when the valve is declared inoperable until the penetration is isolated or the inoperable containment isolation valve is restored to OPERABLE status. Either isolating the penetration or returning the containment isolation valve to OPERABLE status addresses the penetration isolation issue. Only the unavailability of the containment isolation valves impacts the WCAP analysis for the increased Completion Times. There was no credit

taken for improved containment isolation valve reliability due to the increased Completion Times, therefore, the reliability of these components does not need to be monitored.

The WCAP-15791 analysis used a maintenance (preventative or corrective) frequency of 0.1/yr for each containment isolation valve. The unavailability per valve used in the analysis can be determined by multiplying this frequency by the Completion Time. Therefore, the acceptable containment isolation valve maintenance unavailability on a yearly basis, required to remain consistent with the WCAP analysis, is dependent on the Completion Time determined to be acceptable for each containment isolation valve. The following table lists the average yearly containment isolation valve outage time that needs to be met to be consistent with the analysis.

CIV Category	Completion Time (hours)	Yearly Unavailability[1] (hours)
2	8	0.8
3	12	1.2
4	24	2.4
5	48	4.8
6	72	7.2
7	168	16.8

Note: 1 – Unavailability is the time from when the containment isolation valve is declared inoperable (due to preventative or corrective maintenance) until the penetration is isolated or the inoperable containment isolation valve is returned to OPERABLE status.

For the purpose of monitoring, containment isolation valve unavailability can be monitored on an individual containment isolation valve basis or with the containment isolation valves grouped according to their Completion Times. However, if done on an individual containment isolation valve basis, the data collection time required to develop a sufficient amount of unavailability data on each containment isolation valve to demonstrate consistency with the analysis will be relatively long.

With the implementation of this amendment, WCNOC will revise the appropriate procedures such that containment isolation valve unavailability will be monitored by containment isolation valve category with the category defined by a common Completion Time. Each containment isolation valve will be assigned to Category 2-7 (consistent with TS 3.6.3) and the monitoring of the unavailability time will be completed on the category basis.

9. *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.*

RESPONSE: Previous risk-informed submittals of the same type (extension of Completion Times) include: 1) WCNOC letter WO 98-0082 (Reference 11) – Accumulator allowed outage time (Completion Time) increase, 2) WCNOC letter WO 03-0059 (Reference 12) – Reactor Trip System (RTS) and Engineered Safety Feature Actuation System (ESFAS) Instrumentation

Completion Time extensions; and 3) WCNOC letter WO 03-0057 (Reference 13) – Diesel Generator Completion Time extension.

The evaluation for the increase in the Accumulator allowed outage time (Completion Time) was performed generically in WCAP-15049-A, Revision 1, "Risk Informed Evaluation of an Extension to Accumulator Completion Times." From Table 1 of Attachment I to WO 98-0082, the generically determined CDF increase applicable to the WCGS is 3.60E-08/yr. WCAP-15049 did not perform any quantitative evaluations of the potential impact on LERF. However, the LERF increase would be negligible given the small increase in CDF, the fact that the success or failure of containment systems is independent of the accumulators, the accumulators and associated piping are located within the containment building (no containment bypass sequence possible), and the dominant contributors to LERF being containment bypass sequences (Interfacing Systems LOCA and Steam Generator Tube Rupture) for which the WCGS PRA does not consider accumulators for event mitigation.

The evaluation for technical specification changes related to the RTS and ESFAS Instrumentation was performed generically in WCAP-14333-P-A, Revision 1, "Probabilistic Risk Analysis of the RPS and ESFAS Test Times and Completion Times," and WCAP-15376-P-A, Revision 1, "Risk-Informed Assessment of the RTS and ESFAS Surveillance Test Intervals and Reactor Trip Breaker Test and Completion Times." From Attachment I to WO 03-0059, the increase in CDF is 8.0E-07/yr; and the increase in LERF is 3.09E-08/yr.

Consideration for the accumulator and RTS/ESFAS applications are included, as appropriate, in the WCGS PRA model version utilized for the plant-specific evaluation of the Diesel Generator Completion Time extension. This version of the WCGS PRA is also the source of the data contained in Tables 9-1a, 9-1b and 9-1c utilized for the WCGS specific evaluation in WCAP-15791.

The results of the evaluation for extending the Completion Time for an inoperable Diesel Generator due to pre-planned maintenance activities were provided in Reference 13. The increases in CDF and LERF for the proposed Completion Time extension are 4.56E-07/yr and 1.07E-08/yr, respectively.

The evaluation for extending the Completion Time for an inoperable Diesel Generator depends extensively on consideration of the Sharpe Station Gensets located adjacent to the WCGS site. A description of the configuration and capability of the Sharpe Station Gensets is included in Reference 13. Table 8-1 in Section 4.1.1.1.6 of Reference 13 indicates that consideration for the Sharpe Station Gensets provides a reduction in the baseline CDF from a value of 5.48E-05/yr to a value of 3.485E-05/yr, and a reduction in the baseline LERF from a value of 8.3E-07/yr to a value of 7.735E-07/yr, for the WCGS PRA internal events model utilized for the DG Completion Time extension. Consideration for the Sharpe Station Gensets is being incorporated into the current WCGS PRA model. The internal events CDF (including internal flooding) for the current WCGS PRA model is 3.24E-05/yr, and the LERF value is 2.54E-06/yr, without consideration for the Sharpe Station Gensets. Incorporation of the Sharpe Station Gensets is expected to result in a reduction in the baseline CDF for the current PRA model of a similar percentage as was realized for the baseline CDF in the PRA model version utilized in Reference 13. Incorporation of the Sharpe Station Gensets will result in some reduction in LERF, but almost certainly a lesser percentage reduction than was realized for the baseline LERF in the PRA model version utilized in Reference 13. The LERF value in the current WCGS

PRA model is heavily dominated by Interfacing Systems LOCA sequences (ISL is ~76 % of the 2.54E-06/yr value) which will not be impacted by incorporation of consideration for the Sharpe Station Gensets.

While not a risk informed application resulting in Completion Time extension, the Risk Informed evaluation for In-service Inspection (RI-ISI) submittal (Reference 10) indicates a very small reduction in overall CDF risk impact. The magnitude of this risk reduction is very small, such that the impact of this risk-informed application may be considered to be essentially risk-neutral.

The WCAP-15791 evaluation did not determine a total (cumulative) LERF or CDF impact for all of the containment isolation valve Completion Time changes. The approach of WCAP-15791 began with the determination of a delta LERF and ICLERP for a Completion Time of 168 hours. For the vast majority of the containment isolation valves, the delta LERF value for a Completion Time of 168 hours was acceptable (less than 1.0E-07/yr). The ICLERP was the limiting factor for Completion Time determination. The evaluation proceeded by the consideration of successively smaller Completion Time values until the ICLERP acceptance criteria was met (less than 5.0E-08/yr). The evaluation did not go back and determine a delta LERF value for the final ICLERP limited Completion Time.

Summing the delta LERF values in WCAP-15791 would result in an overly conservative and inaccurate LERF impact estimation, but based on the conservative calculated increases for each individual change, which range from less than 1E-10/yr to approximately 2E-08/yr, the total LERF impact is expected to be less than 1E-07/yr. The CDF impact from the containment isolation valve Completion Time extensions is also expected to be very small, since the majority of the containment isolation valves do not impact CDF.

While specific quantitative CDF and LERF values for the containment isolation valve Completion Time extension were not determined, the cumulative impact of this application in light of past applications is recognized and understood. The CDF impact from the containment isolation valve Completion Time extension will be very small, and when combined with the acceptably small quantified CDF impact from previous risk-informed applications is considered acceptable in accordance with the discussion provided in Section 3.3.2 of RG 1.174.

The LERF impact of this containment isolation valve Completion Time extension is expected to be less than 1.0E-07/yr. In the WCGS PRA model, LERF is heavily dominated by containment bypass type sequences (Interfacing systems LOCA and Steam Generator Tube Rupture). The contribution to LERF due to containment isolation failure sequences is minor, and the impact on this minor portion of LERF due to the containment isolation valve Completion Time extensions is expected to be small. The frequency of entering the containment isolation valve Completion Time conditions has been, and is expected to continue to be, low for the WCGS. Unavailability monitoring will be performed as indicated in the response to RAI #8 above to ensure that the assumptions and approach of the WCAP-15791 evaluation are maintained. The very small quantified LERF impact from previous risk-informed applications, when combined with the qualitative minor LERF impact of this containment isolation valve Completion Time extension is considered acceptable in accordance with the discussion provided in Section 3.3.2 of RG 1.174.

10. Because uncertainty due to plant PRA models is not addressed in WCAP-15791, the plant-specific applications must discuss uncertainties in the risk assessment. See the February 13, 2004 RAI response to WCAP-15791, number 8.

RESPONSE: Uncertainties in the plant-specific risk assessment performed for the WCGS can be limited to the input parameters used in the analysis, and limited primarily to the containment isolation function. Containment phenomological issues do not need to be addressed since they do not impact the isolation function.

As discussed in the WOG's Response to RAI #8 (Reference 1), the key parameters that form the basis for the plant-specific analysis are:

- Isolation valve failure rates
- Total core damage frequency
- Core damage frequency from seismic events
- Common cause failure factors

An uncertainty assessment was not explicitly completed, neither were sensitivity analyses completed. These were not considered necessary due to the conservative nature of the analysis and the input parameters used in the analysis. This is discussed in the following paragraphs.

Component failure probabilities

The containment isolation valves include motor-operated valves, air-operated valves, solenoid-operated valves, check valves, and safety relief valves. The following table provides a list of the failure probabilities for each valve type, and includes the value used in the WCGS plant-specific containment isolation valve Completion Time analysis and the most recently updated values used in the WCGS PRA model. The most recently updated values reflect the recent plant experience concerning the reliability of these components.

Containment Isolation Valve	Failure Probability Used in CIV CT Plant-Specific Analysis	Updated Failure Probability Used in the WCGS PRA Model
Motor-operated valve	6.15E-03/d	3.37E-03/d
Air-operated valve	2.00E-03/d	No change
Solenoid-operated valve	2.00E-03/d	No change
Check valve	1.00E-03/d	No change
Safety relief valve	3.00E-03/d	No change

The updated motor-operated valve failure probability currently used in the WCGS PRA model is significantly lower than the value used in the WCGS plant-specific containment isolation valve Completion Time extension analysis. In addition, since this value is larger than the containment isolation valve failure probabilities for the other types of containment isolation valves, it was used in the analyses for penetrations with more than one type of containment isolation valve if one was a motor-operated valve. Both of these items lead to a conservative analysis that results in shorter values of the extended Completion Times.

Total Plant CDF

The total core damage frequency for the WCGS is set to 1.0E-04/yr for the WCGS plant-specific analysis discussed in Chapter 10 of WCAP-15791.

The total internal events CDF, including internal flooding, for the WCGS is 3.24E-05/yr.

External event risk for WCGS has been, for the most part, addressed by screening evaluations which did not yield quantifiable CDF or LERF values.

Seismic – WCGS is located in a relatively low hazard region of the U.S. A reduced scope seismic margins assessment was performed as part of the IPEEE. At a minimum, plant components were screened to the plant design basis safe shutdown earthquake (SSE) of 0.2g; although a majority (90% or more) of the components were screened at 0.3g SSE. All the plant valves are screened at 0.3 g. No significant seismic issues were identified.

While seismic risk was not addressed quantitatively for WCGS, it is noted that WCGS is located in a relatively low hazard region of the U.S. and that no significant seismic issues were identified in the IPEEE. The portion of the 1.0E-04/yr total core damage frequency utilized in WCAP-15791 for the evaluation of seismic risk is 4.4E-05/yr. This is the value used in the generic analysis that bounds all Westinghouse NSSS plants and is a very conservative value to apply to the WCGS.

High Winds, Floods, and Other External Events – Screening evaluations for these events were performed with the conclusion that the WCGS is in compliance with the standard review plan, the events are of low risk significance, and no vulnerabilities were identified.

Fire risk – To address the IPEEE requirement, WCGS used a combination of the progressive screening approach of the EPRI Fire-Induced Vulnerability Evaluation (FIVE) methodology with a more detailed Fire PRA evaluation performed for fire areas that did not screen out. The fire CDF, as reported in Reference 2, was assessed to be 7.6E-06/yr. A subsequent update of the fire risk evaluation resulted in a fire CDF of 8.14E-06/yr.

Including consideration for those fire areas where detailed Fire PRA evaluation was performed, the total quantifiable CDF for the WCGS is 4.053E-05/yr. Based on this, it is concluded that the total plant CDF for WCGS is sufficiently less than the 1.0E-04/yr value used in the WCGS plant-specific analysis, therefore, using the 1.0E-04/yr value will result in a conservative analysis.

Seismic CDF

As discussed above, the total CDF due to seismic events was not addressed quantitatively for WCGS, but it is noted that WCGS is located in a relatively low hazard region of the U.S. and that no significant seismic issues were identified in the IPEEE. The seismic CDF used in the WCGS plant-specific containment isolation valve Completion Time extension analysis is 4.4E-05/yr. This is the value used in the generic analysis that bounds all Westinghouse NSSS plants and is a very conservative value to apply to the WCGS. Again, it is concluded that use of this value will result in a conservative analysis.

Additional Considerations

The most limiting Completion Times for the two configurations evaluated, pressure boundary intact or pressure boundary compromised, was selected. Applying the more limiting Completion Time regardless of the pressure barrier integrity results in a shorter Completion Time being applied for all situations where a longer Completion Time was justified in the analysis.

The assumption and application of the 2 inch hole size as the threshold for a large release for a large dry containment is conservative. Extending this to 3 inches would move a number of additional containment isolation valves below the threshold for a large release and extend their Completion Time to 168 hours.

At WCGS the large early release is dominated by containment bypass sequences which are related to interfacing systems LOCAs and steam generator tube rupture. Large early releases from core damage following by failure of containment isolation are a relatively small contributor. Therefore, the Completion Time changes are expected to have a small impact on LERF.

The calculations to determine incremental conditional large early release probability and the increase in LERF assume that the full Completion Time will be used. In the majority of situations, this would not be the case, and the inoperable component is returned to OPERABLE status in a time period shorter than the Completion Time.

Conclusion

Based on the above discussion, it is concluded that the WCGS plant-specific analysis was a conservative evaluation due to the approach and input parameters used in the analysis. Therefore, an uncertainty assessment or sensitivity assessment was not considered to be necessary. Varying the input parameters would have no significant impact on the Completion Times applied to the Containment Isolation Valves.

References:

1. Westinghouse Owners Group letter WOG-04-077, "Response to Request for Additional Information – WCAP-15791-P (Proprietary), "Risk-Informed Evaluation of Extensions to Containment Isolation Valve Completion Times", Tac No. MB5751 (MUHP-3010)," February 13, 2004.

2. NUREG-1742, Vol. 1, "Perspectives Gained from the Individual Plant Examination of External Events (IPEEE) Program," April 2002.

3. WCNOC letter WO 04-0030, "Revision to Technical Specification 3.6.3, "Containment Isolation Valves"," July 23, 2004.

4. WCNOC letter WO 98-0105, "Follow-up Items Related to the Proposed Conversion to the Improved Technical Specifications Section 1.0, 3.4, 3.5, and 3.6," November 24, 1998.

5. NUMARC 93-01, Revision 3, "Industry Guidelines for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," July 2000.

6. NRC letter from J. Donohew, NRC, to R. Muench, WCNOC, "Wolf Creek Generating Station – Issuance of Amendment Re: Extended Diesel Generator Completion Times (TAC NO. MC1257)," April 26, 2006.

7. NRC letter from J. Stone, NRC, to N. Carns, WCNOC, "Staff Evaluation Report for the Review of the Wolf Creek Generating Station Individual Plant Evaluation (TAC. NO. M74490)," November 18, 1996.

8. NRC letter from J. Donohew, NRC, to O. Maynard, WCNOC, "Review of Individual Plant Examination of External Events (IPEEE) for Wolf Creek Generating Station (TAC NO. M83696)," February 29, 2000.

9. WCNOC letter ET 01-0028, "Response to Request for Additional Information Regarding Relief Request for Application of an Alternative to the ASME Boiler and Pressure Vessel Code Section XI Examination Requirements for Class 1 and 2 Piping Welds (TAC No. MB1206)," September 27, 2001.

10. WCNOC letter ET 01-0009, "Relief Request for Application of an Alternative to the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Section XI Examination Requirements for Class 1 and 2 Piping Welds," February 15, 2001.

11. WCNOC letter WO 98-0082, "Revision to Technical Specification 3.5.1, "Emergency Core Cooling Systems – Accumulators"," October 23, 1998.

12. WCNOC letter WO 03-0059, "Revision to Technical Specification 3.3.1, "Reactor Trip System Instrumentation," and Technical Specification 3.3.2, "Engineered Safety Feature Actuation System Instrumentation" (Common STARS License Amendment)," December 15, 2003.

13. WCNOC letter WO 03-0057, "Revision to Technical Specifications – Extensions of AC Electrical Power Distribution Completion Times," October 30, 2003.

ATTACHMENT II

MARKUP OF TECHNICAL SPECIFICATION PAGES

3.6 CONTAINMENT SYSTEMS

3.6.3 Containment Isolation Valves

LCO 3.6.3 Each containment isolation valve shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

----------NOTES----------

1. Penetration flow path(s) except for containment shutdown purge valve flow paths may be unisolated intermittently under administrative controls.
2. Separate Condition entry is allowed for each penetration flow path.
3. Enter applicable Conditions and Required Actions for systems made inoperable by containment isolation valves.
4. Enter applicable Conditions and Required Actions of LCO 3.6.1, "Containment," when isolation valve leakage results in exceeding the overall containment leakage rate acceptance criteria.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ----------NOTE---------- Only applicable to penetration flow paths with two containment isolation valves. ---------- One or more penetration flow paths with one containment isolation valve inoperable except for purge valve leakage not within limit. (CIV)	A.1 Isolate the affected penetration flow path by use of at least one closed and de-activated automatic valve, closed manual valve, blind flange, or check valve with flow through the valve secured. AND	~~4 hours~~ INSERT 1

(continued)

LIST OF REGULATORY COMMITMENTS

The following table identifies those actions committed to by WCNOC in this document. Any other statements in this submittal are provided for information purposes and are not considered to be commitments. Please direct questions regarding these commitments to Mr. Kevin Moles at (620) 364-4126.

COMMITMENT	Due Date/Event
WCGS will revise the containment isolation fault tree model prior to utilization of the requested containment isolation valve Completion Time extensions by either: 1) modeling containment isolation valves for at least one of each WCAP-15791 penetration type applicable to WCGS, including penetrations to the containment atmosphere greater than 2 inches in diameter or 2) modeling all containment isolation valves associated with this license amendment request, including penetrations to the containment atmosphere greater than 2 inches in diameter.	Prior to implementation of the amendment
WCNOC will revise the appropriate procedures such that containment isolation valve unavailability will be monitored by containment isolation valve category with the category defined by a common Completion Time. Each containment isolation valve will be assigned to Category 2-7 (consistent with TS 3.6.3) and the monitoring of unavailability time will be completed on the category basis.	Prior to implementation of the amendment
WCNOC will implement in its procedures the requirement to confirm that the remaining containment isolation valve(s) in the affected penetration(s) are in their correct position(s) prior to performing maintenance on a containment isolation valve.	Prior to implementation of the amendment