

WOLF CREEK

NUCLEAR OPERATING CORPORATION

Terry J Garrett
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ET 06-0043

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

Reference: Letter ET 06-0010, dated March 2, 2006, from T. J. Garrett, WCNO, to USNRC

Subject: Docket 50-482: Wolf Creek Nuclear Operating Corporation's Response to NRC Request for Additional Information Regarding 10 CFR 50.55a Request I3R-01

Gentlemen:

The Reference provided Wolf Creek Nuclear Operating Corporation (WCNO) 10 CFR 50.55a Requests I3R-01 and I3R-02, which requested alternatives to the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (BPV) Code, Section XI for inservice inspection (ISI) and testing for the Third Ten-Year Interval of WCNO's ISI Program.

On September 19, 2006, the Nuclear Regulatory Commission (NRC) Project Manager for WCNO provided by electronic mail a request for additional information (RAI) regarding 10 CFR 50.55a (Relief) Request I3R-01 (TAC MD0297).

The Attachment to this letter provides WCNO's response to the RAI. It lists each NRC question followed by WCNO's response to each of those questions.

The Enclosure to this letter is a "Facts and Observations (F&Os) List and Status" which provides supporting information for Question 1.b of the RAI. It provides information from an internal WCNO work status tracking database. Any statements made in this enclosure are for internal WCNO tracking purposes only and are not to be construed as regulatory commitments.

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There are no commitments associated with this submittal. 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

Attachment: Response to NRC Request for Additional Information Regarding 10 CFR 50.55a
Request I3R-01

Enclosure: Facts and Observations (F&O) List and Status

cc: J. N. Donohew (NRC), w/a, w/e
G. E. Werner (NRC), w/a, w/e
B. S. Mallett (NRC), w/a, w/e
Senior Resident Inspector (NRC), w/a, w/e

Wolf Creek Nuclear Operating Corporation (WCNOC) Response to NRC Request for Additional Information (RAI) Regarding 10 CFR 50.55a (Relief) Request I3R-01

Based on its review of relief request I3R-01 in the application dated March 2, 2006, the NRC staff has the following questions:

1. Regulatory Guide (RG) 1.178, "An Approach for Plant-Specific Risk-Informed Decisionmaking for Inservice Inspection of Piping," Revision 1, includes guidance on what should be included in risk-informed inservice inspection (RI-ISI) submittals, particularly in dealing with probabilistic risk assessment (PRA) issues. Specifically, RG 1.178 states that submittals should include a description of the process used to update the PRA and of staff and industry reviews performed on the PRA, including reviewer comments and their resolution.

The original Wolf Creek Generating Station (WCGS) RI-ISI submittal, dated February 15, 2001, discussed PRA quality, noting that the last model update was completed in August 1999 and a peer review was performed in August 2000. However, between the original RI-ISI submittal and the current relief request, there is no discussion of updates to the PRA model. Hence, to establish confidence that the quality of the PRA is sufficient to support your recent RI-ISI analysis:

- a. Provide the following information regarding the version of the WCGS PRA model used to re-perform the RI-ISI analysis:
 - i. model designator
 - ii. date of last update and "freeze date"
 - iii. major changes incorporated
 - iv. baseline core damage frequency (CDF) and large early release frequency (LERF)
 - v. whether the two PRA modeling enhancements identified in the original RI-ISI submittal and approval (that is, modeling of high temperature seals on all four reactor coolant pumps and removal of component cooling water dependency for the centrifugal charging pump) have been made.

WCNOC Response to Question 1.a:

- i. The RI-ISI analysis performed in preparation for renewing the program utilized Revision 2 of WCGS PRA model. Revision 2 of the WCGS PRA model is the model that underwent the WOG PRA Peer Review. Revision 2 of the WCGS PRA was also the model revision utilized for the original RI-ISI submittal [SER 01-00965, dated 12/13/2001].
- ii. Documentation of the last WCGS PRA model update (Revision 3) was completed in March 2006. The "freeze date" for plant specific data and plant design/procedure change incorporation was the end of calendar year 2002.
- iii. Major changes incorporated in the WCGS PRA Revision 3 model include:
 - WOG 2000 Reactor Coolant Pump (RCP) Seal Leakage Model incorporated for Loss of RCP Seal Cooling type events.

- Added automatic opening of Component Cooling Water (CCW) valves to Residual Heat Removal (RHR) heat exchangers on switchover to Emergency Core Cooling System (ECCS) recirculation mode.
 - Added separate loss of offsite power conditional event following a Loss of Coolant Accident (LOCA) type initiator.
 - Support system dependency matrices added to the system notebooks.
 - Removed isolation failure events from Interfacing Systems LOCA fault tree models based on the determination that valves are not verified to have the ability to close against full Reactor Coolant System (RCS) pressure.
 - Plant specific data (component failure rates and system/train unavailability) and common cause factors updated.
 - Update of the post-initiator Human Reliability Analysis (HRA) evaluation and values.
 - Pre-initiator evaluation performed with incorporation of results.
 - Detailed HRA dependency evaluation performed and documented.
- iv. The baseline core damage frequency (CDF), and Large Early Release Frequency (LERF) for the WCGS PRA Revision 2 model were 5.479E-05/yr and 8.30E-07/yr, respectively. The baseline core damage frequency (CDF), and Large Early Release Frequency (LERF) for the WCGS PRA Revision 3 model are 2.985E-05/yr and 2.540E-06/yr, respectively.
- v. Modeling of the high temperature seal material on all four reactor coolant pumps and removal of the component cooling water dependency for the normal charging pump were not incorporated in the WCGS PRA Revision 2 model utilized for the RI-ISI analysis performed in preparation for renewing the program. Both of these modeling enhancements have been incorporated into the WCGS PRA Revision 3 model.
- b. Provide a listing of the Level A and B Facts and Observations (F&Os) from the 2000 peer review, along with their resolutions. If there are outstanding F&Os that were not resolved at the time of the re-performed analysis, please explain why resolving them would not have a potentially significant impact on the RI-ISI program (either from the risk-significance of pipe segments or from an overall delta-risk perspective).

WCNOC Response to Question 1.b:

There were two Level A and 25 Level B F&Os identified in the 2000 peer review. Both of the Level A, and 14 of the Level B, F&Os have been resolved and incorporated, as appropriate, in the WCGS PRA Revision 3 model update. Information from an internal WCNOC work status tracking

database is enclosed with this submittal as supporting documentation identified as the "F and O List and Status". It provides additional information on each of the Level A and B F&Os. All of the Level A and B F&Os are listed in this enclosure, along with their status ("Open" or "Closed"), significance level, description, and a "Comments" field that documents the resolution or current status and remaining actions needed to close out the F&O. Any statements made in this F&O List and Status enclosure are for internal WCNOC tracking purposes only and are not to be construed as regulatory commitments.

The majority of the open Level B F&Os are considered documentation issues that have no impact on the model or the RI-ISI evaluation. The open Level B F&Os have been determined to have either no impact, or no appreciable impact, on the RI-ISI analyses.

The RI-ISI analysis has been evaluated using the WCGS PRA Revision 3 model update. This evaluation has determined that no piping segments had an increase in consequence risk ranking. Documentation of this evaluation is currently ongoing. Section 4.2 of NEI 04-05, "Living Program Guidance to Maintain Risk-Informed Inservice Inspection Programs for Nuclear Plant Piping Systems," states "for the EPRI RI-ISI methodology, as long as the consequence rank assignments are consistent between the original PRA and the updated PRA, then these results can be documented and no further analysis is required." Accordingly, the WCGS PRA Revision 3 model update does not change the RI-ISI analysis results.

- c. In addition, identify any other PRA "open items" that would meet the threshold of a Level A or B F&O and explain why resolving them would not have a potentially significant impact on the RI-ISI program (again, either from the risk-significance of pipe segments or from an overall delta-risk perspective).

WCNOC Response to Question 1.c:

No other known PRA "open items" have been identified which are considered to meet the threshold of a Level A or B F&O.

2. In system BB (Reactor Coolant System), for the inspection locations in Risk Category 6, Attachment 1 (Page 5 of 7 of the application) indicates a population of 18 welds during the "1st Approved RI-ISI Interval." However, in the original submittal, dated February 15, 2001, Table 5-2 (Page 24 of 26) indicates 6 welds in Category 6 and 12 welds in Category 7 for system BB. The 12 welds in Category 7 were found to have low consequence rather than medium consequence ranking. Explain the apparent discrepancy.

WCNOC Response:

There is an error in I3R-01 application, Page 1 of 7, section 4, third paragraph, which states that Revision 1 of the original RI-ISI template was submitted to the NRC. Revision 0 of the RI-ISI template was submitted to the NRC, which listed 6 welds in Category 6 and 12 welds in Category 7. The program was later revised when it was discovered that

the consequence ranking for the welds in the RCP seal injection lines between the first and second isolation valves was increased from low to medium. This change in consequence ranking changed the risk ranking for the 12 welds from Risk Category 7 to Risk Category 6; which still does not require examinations.

3. On Page 3 of 7 of the application, it is stated that all piping welds that are potentially susceptible to PWSCC will be volumetrically examined, and that this includes 14 Examination Category B-F welds. State whether any Category B-J welds susceptible to PWSCC and, if so, whether they will be volumetrically examined.

WCNOC Response:

According to WCSG documentation for piping and welds in the RI-ISI scope: The 14 Examination Category B-F welds are the only piping welds that utilize Alloy 82/182 weld metal (these welds also include the Inconel butter). These 14 welds are the only B-F welds at WCGS. There are no B-J welds that utilize Alloy 82/182 weld metal. There is no Alloy 600 base material utilized in the piping.

Therefore; only the 14 Examination Category B-F welds are susceptible to Primary Water Stress Corrosion Cracking (PWSCC); no Category B-J welds are susceptible to PWSCC.

4. The original RI-ISI submittal, dated February 15, 2001, indicated that "Additional examinations will be performed on these elements up to a number equivalent to the number of elements required to be inspected on the segment or segments initially. If unacceptable flaws or relevant conditions are again found similar to the initial problem, the remaining elements identified as susceptible will be examined." The Request for Additional Information on this aspect of the RI-ISI program addressed the number of additional examinations and the method of selection of locations for these examinations. However, the timeframe for completing these additional examinations, particularly if flaws are found in the first sample expansion, was not specified. Provide a timeframe for completing all required additional examinations. The staff expects that sample expansion examinations will be performed in the same timeframe that is outlined in ASME Section XI IWB-2430.

WCNOC Response:

The sample expansion examinations will be performed during the current outage, which is the same timeframe outlined in IWB-2430.

F and O List and Status

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F&O	Significance	Status	F&O Description	Comments
IE-3	B	Closed	PSA notebook AN-98-044, 'Initiating Event Notebook' Attachment B uses Bayesian update based on gamma distribution. This Bayesian updating method is not recommended for updating event frequency with a mean probability greater than 0.05.	The R-DAT Plus Reliability Data Collection and Analysis Tool (Version 1.5.2) was used for all Bayesian updates that were performed for the WCGS PRA Revision 3 update. The R-DAT tool contains many Bayesian update options, allowing the most appropriate method to be selected for each situation.
IE-4	B	Closed	Insufficient documentation provided for screening out 4 reactor trips from the transient initiating event frequency determination.	No trips were excluded from the transient initiating event frequency determination for the plant history period considered in the WCGS PRA Revision 3 model update.
IE-8	B	Closed	Quantification process for determining loss of CCW and loss of SWS IE frequency does not correctly account for common cause failures.	The CCW and SWS initiating event frequency fault trees were revised to properly account for the common cause contribution in the WCGS PRA Revision 3 model update.
IE-9	B	Closed	Lack of documentation discussing use of NUREG/CR-4550 LOCA frequencies vs. the more recent NUREG/CR-5750 LOCA frequencies in Initiating Event Notebook.	The primary reference for non-transient, non-loss of offsite power initiating event frequency values in the WCGS PRA Revision 3 model update is NUREG/CR-5750. The WCGS PRA Revision 3 model update utilizes the interim LOCA frequency values provided by the NRC in, "Technical Work to Support Possible Rulemaking For a Risk-Informed Alternative to 10CFR50.46/GDC 35".
AS-1	B	Closed	AFW success criteria for SGTR allows indefinite heat removal with the ruptured SG if feedwater to 1 of 3 intact SGs fails (model lacks sufficient logic steps).	The logic for using a ruptured steam generator for plant cooldown following an SGTR event was eliminated from the WCGS PRA Revision 3 model update.
AS-6	B	Closed	The sequence transfer process does not appear adequate to ensure that all transfer sequences are transferred to the assigned tree. There is generic indication of possible omission of sequence transfers.	For the WCGS PRA Revision 3 update a transfer sequence tracking table was added to the Model Quantification Notebook to ensure all transfer sequences are properly addressed.
TH-1	B	Open	Inappropriate utilization of MAAP 3.0B code for Accumulator Safety Injection Success Criteria for Large LOCA event	WCGS plans to either evaluate the Accumulator Safety Injection success criteria for Large LOCA using an alternate applicable T/H code; or adopt the WCGS USAR success criteria of 3 out of 3 accumulators required. A sensitivity quantification was performed using the 3 out of 3 accumulator success criteria for Large LOCA. An increase of less than 0.04% in overall CDF would be realized by adopting the 3 out of 3 accumulator success criteria. Application of the Large LOCA CCDP from this sensitivity quantification does not impact the risk consequence ranking for any of the RI-ISI segments.

F and O List and Status

F&O	Significance	Status	F&O Description	Comments
TH-6	B	Open	Event Tree Analysis Notebook lacks definition of core damage and the definition provided by other sources is, at best, subjective and may be overly conservative in one sense and not bounding in another.	Core damage definition added to the Event Tree Notebook for the WCGS PRA Revision 3 update. WCGS applies either this, or a more conservative (core uncover) core damage definition for all sequences progressing to a core damage end state. With addition of this definition to the Event Tree Notebook, this F&O may be closed. However, WCGS is holding this F&O open pending completion of a currently ongoing re-evaluation of sequence success criteria and event timing using MAAP4.0.6. The current WCGS sequence success criteria are consistent with similar design plants. The expected result of the ongoing success criteria re-evaluation is removal of conservatisms in the current model. No impact on RI-ISI delta risk or segment ranking is expected.
TH-7	B	Open	Inconsistencies and conservatism in success criteria definitions due to lack of development guidance and old bases.	This is considered primarily a documentation issue. WCGS plans on updating guidance on success criteria definition and development in the future. Current sequence success criteria are being re-evaluated as indicated in Comments for F&O TH-6 above. No impact on RI-ISI delta risk or segment ranking is expected from this ongoing re-evaluation.
SY-8	B	Open	Evaluation for performance of equipment credited in the model that may be in a potentially degraded environment following initiating events for which it is considered.	This is considered primarily a documentation issue. Safety related equipment at WCGS is qualified for harsh post-accident environments for which it must operate for event mitigation. Most non-safety related equipment considered in the WCGS PRA model is not subject to harsh post-accident environments. Post-accident environmental conditions for specific equipment will be considered as a part of the currently ongoing re-evaluation of sequence success criteria indicated in the Comments for F&O TH-6 above. No impact on RI-ISI delta risk or segment ranking is expected.
DA-1	B	Open	Update and issue data analysis guidelines document.	This is considered a documentation issue. WCGS plans on updating the data analysis guidelines document in the future. No impact on RI-ISI delta risk or segment ranking is expected.
DA-2	A	Closed	No unique time frame in plant data collection used in developing plant specific data.	A standard time frame is utilized for data collection for plant specific data for the WCGS PRA Revision 3 model update.
DA-3	B	Closed	The start failures for all motor-driven pumps are taken as a group. This could cause MD pumps to have an artificially narrow distributions and result in optimistic failure rates.	The failure rate data for major safety related motor driven pumps were calculated for each individual system in the WCGS PRA Revision 3 model update.

F and O List and Status

F&O	Significance	Status	F&O Description	Comments
DA-6	B	Open	There is no discussion of the process used to identify components selected for common cause treatment. Suggested using an approach based on INEEL CCF database instead of NSAG-004.	The F&O made two recommendations: 1) Use INEEL database to select CC groups and 2) Expand the discussion on the process used to select components for CC treatment. The WCGS PRA Revision 3 model update considered WCAP-15167 and NUREG\CR-4550 when establishing CCFs. WCAP-15167 includes Common Cause MGL factor tables from NUREG\CR-5497 that are based on the INEEL database. This first recommendation of this F&O is considered closed. WCGS plans on updating the guidance for the CCF treatment process in the future. The second recommendation of this F&O is considered a documentation issue. No impact on RI-ISI delta risk or segment ranking is expected.
HR-1	B	Closed	There is little guidance for handling operator actions for recovery other than the HEP calculation. Indication of inconsistencies in event/fault trees and at least one inappropriate use of operator action for recovery.	In order to look for dependancies between cutsets, operator actions (OPAs) basic events were set to 1.0 and the PRA model quantified as a part of the WCGS PRA Revision 3 model update. Guidance is provided in an updated HRA Guidelines document.
HR-3	B	Closed	Apparent cognitive errors related to unrealized dependencies.	Addressed in the WCGS PRA Revision 3 model update as follows; all operator action events were set to 1.0 to identify cutsets with the highest risk operator action combinations. A review of the resultant cutsets with two or more operator actions was performed. Cutset combinations containing operator actions with dependencies were identified and changes necessary to account for these dependencies were factored back into the final core damage quantification.
QU-2	A	Closed	Several logic discrepancies with application of loss of service water recovery factor. Recoveries appear to be applied globally in the fault tree without consideration of the specific failure scenario.	All discrepancies noted in the observation for the loss of service water event quantification have been corrected in the WCGS PRA Revision 3 model update.
QU-3	B	Closed	Quantification process incorporates incorrect usage of the code (XCOM specifically) potentially resulting in sequences with negative frequency values.	The version (2.1) of the WinNUPRA code used for quantification of the WCGS PRA Revision 3 model update contains a feature that automatically changes negative values for XCOM events to zero. No negative XCOM events appear in the data file for the WCGS PRA Revision 3 model update.
QU-4	B	Closed	Equations duplicate the same name potentially resulting in quantification using the wrong equation.	In the WCGS PRA Revision 3 model update, the names of the event tree and associated quantification files were changed to remove any potential duplication.
QU-6	B	Closed	Recommend review of top ranking events ensuring data values used are reasonable and reflect current operating conditions of the plant.	Data for major risk significant components and core damage sequences and dominant cutsets were reviewed during the model documentation review process for the WCGS PRA Revision 3 model update.

F and O List and Status

F&O	Significance	Status	F&O Description	Comments
QU-7	B	Closed	Lack of documentation of a results convergence analysis on the truncation limit used in the quantification.	Convergence of the core damage results is demonstrated by quantification in the WCGS PRA Revision 3 model update and is documented in the Model Quantification Notebook.
QU-8	B	Closed	Limited documentation in the area of uncertainty and sensitivity analyses.	The WCGS PRA Revision 3 model update includes several sensitivity quantification runs performed for uncertainty considerations including: parametric uncertainty, uncertainty in various data values and uncertainty in sequence success criteria. The sensitivity analyses are documented in the Model Quantification Notebook.
QU-9	B	Open	Internal flooding scenarios have not been included in PRA updates.	Update of the Internal flooding portion of the internal events analysis has not been performed since WCGS PRA model Revision 1. WCGS plans to update of the internal flooding evaluation in the future. Changes in the internal flooding evaluation are not expected to impact the RI-ISI delta risk or segment consequence risk ranking. The RI-ISI segment consequence evaluations already include consideration for any spacial effects (flooding, spray, etc.) due to a break in the piping segment.
L2-1	B	Open	IPE Level 2 Class G is omitted from the LERF model without sufficient documentation.	The containment performance analysis performed in the Wolf Creek IPE contained a number of simplified techniques. This F&O arises partly due to the scarcity of discussion on how containment isolation was treated. Tracking of the sequences in the containment performance analysis tables indicates that these sequences were treated as containment isolation failure sequences which are included in LERF. In effect, these sequences are double counted. A more detailed analysis of containment performance would have partitioned the Bin 14 (Release Category G) sequences and avoided any double counting. In addition, the RI-ISI consequence evaluation considered spatial affects such that if containment isolation were impacted, containment bypass was assumed. WCGS plans on updating the Level 2 evaluation, including LERF, in the future. The WCGS PRA LERF is heavily dominated by containment bypass sequences (IS LOCA and Steam Generator Tube Rupture). The LERF impact from update of the Level 2 evaluation is expected to be small. No impact on segment consequence risk ranking is expected.

F and O List and Status

F&O	Significance	Status	F&O Description	Comments
L2-2	B	Open	The conditional probability of LERF (CLERP) for a very small LOCA appears disproportionately high when compared with other initiators.	The CLERP, and associated LERF cutsets, for the Very Small LOCA event from the WCGS PRA Revision 3 model update have been reviewed and are reasonable and correct. While this F&O could be closed based on this review, it was decided to leave this F&O open until the planned Level 2 evaluation indicated in the Comments for F&O L2-1 above is completed. Application of the CLERP values for Very Small LOCA from the WCGS PRA Revision 3 model update have no impact on the RI-ISI segment risk ranking or overall delta LERF values.
MU-2	B	Open	PSA model update guidance lacks sufficient detail regarding activities to be included as part of an update.	The F&O recommendation is to update the guidance to include more detail on the activities performed for a PRA update. This is considered a "documentation issue" and does not affect PRA modeling or results. Review of the PRA model update process during the Peer Review did not identify any inadequate or incomplete steps.
MU-3	B	Open	PSA model update guidance lacks emphasis that determining updating urgency should consider impact on risk-informed applications as well as on the base PSA.	The F&O states that discussions indicate an appropriate process is being followed and recommends that the update process be clearly documented in the desktop instruction. This is considered a "documentation issue" and does not affect PRA modeling or results.