

**ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
SUBCOMMITTEE ON PLANT LICENSE RENEWAL
WOLF CREEK GENERATING STATION
MARCH 5, 2007
ROCKVILLE, MARYLAND**

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<u>Cognizant ACRS Member:</u>	Jack Sieber
<u>Cognizant ACRS Staff Engineer:</u>	Maitri Banerjee

**Advisory Committee on Reactor Safeguards
Plant License Renewal Subcommittee Meeting
Wolf Creek Generating Station (WCGS)**

March 5, 2008
Rockville, MD

-PROPOSED AGENDA-

Cognizant Staff Engineer: Maitri Banerjee mxb@NRC.GOV (301) 415-6973

Topics	Presenters	Time
Opening Remarks	J. Sieber, ACRS	10:30 am - 10:35 am
Staff Introduction	P. T. Kuo, NRR	10:35 am - 10:40 am
WCNOC - WCGS Renewal Application A. Background B. Operating History C. Scoping Discussion D. Application of GALL E. Commitment Process F. Unresolved issues	Wolf Creek Nuclear Operating Corporation (WCNOC)	10:40 am - 12:00 pm
Lunch Break		12:00 pm – 1:00 pm
Station Blackout Recovery Issue	WCNOC	1:00 pm - 1:20 pm
Metal Fatigue Analyses Issue Other Unresolved Issues	WCNOC	1:20 pm - 1:45 pm
NRC Staff Presentation SER Overview A. Scoping and Screening Results B. Onsite Inspection Results	Tam Tran, NRR Greg Pick, Region IV	1:45 pm – 2:15 pm
Break		2:15 pm – 2:30 pm
NRC Staff Presentation SER Overview (Cont'd) C. NRC audit D. Time Limited Aging Analyses	Tam Tran, NRR	2:30 pm – 3:00 pm
Subcommittee Discussion	J. Sieber, ACRS	3:00 pm – 4:00 pm

NOTE:

- Presentation time should not exceed 50 percent of the total time allocated for a specific item. The remaining 50 percent of the time is reserved for discussion.
- Presenters to bring in 40 copies of the presentation slides prior to the meeting and save the presentation in the slide projection laptop.

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WOLF CREEK GENERATING STATION
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- STATUS REPORT -

PURPOSE

The purpose of this meeting is to review the License Renewal Application (LRA) for Wolf Creek Generating Station (WCGS), and the associated Draft Safety Evaluation Report (SER) with Open Items, dated February 2008. The Subcommittee will hear presentations by and hold discussions with representatives of the U.S. Nuclear Regulatory Commission (NRC or the staff) and the applicant, Wolf Creek Nuclear operating Corporation (WCNOC).

BACKGROUND

The WCGS is a single unit facility located approximately 3.5 miles northeast of Burlington, Kansas. The WCGS is a Westinghouse PWR with a licensed power of 3565 MWt. The NRC issued an operating license for WCGS on June 4, 1985, which is in effect until midnight on March 11, 2025.

DISCUSSION

By letter dated September 27, 2006, WCNOC submitted the LRA for WCGS in accordance with Title 10, Part 54, of the *Code of Federal Regulations* (10 CFR Part 54).

WCNOC is requesting renewal of the operating licenses for WCGS, for a period of 20 years beyond the current expiration date of March 11, 2025. The staff reviewed the LRA for WCGS in accordance with the NRC regulations and NUREG-1800, Revision 1, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants," dated September 2005. Title 10, Section 54.29, of the *Code of Federal Regulations* (10 CFR 54.29) provides the standards for issuance of a renewed license.

In addition to NUREG-1800 the staff used the following guidance in its review:

- (1) NUREG 1801, Rev. 1, "Generic Aging Lessons Learned (GALL) Report," September 2005
- (2) Regulatory Guide 1.188, "Standard Format and Content for Application to Renew Nuclear Power Plant Operating Licenses," endorses NEI 95-10, Rev. 6 "Industry Guideline for Implementing the Requirements of 10 CFR Part 54, "The License Renewal Rule," September 2005

The applicant stated that it had not identified any Technical Specification (TS) changes necessary to support issuance of the renewed operating license.

The draft SER presents the status of the staff's review of the WCGS LRA and information submitted through December 7, 2007. The SER discusses five open items, no confirmatory items

which must be resolved before the staff can make a final determination on the LRA, three proposed license conditions, and 39 commitments. Overall, the staff concluded that there is reasonable assurance that the activities authorized by the renewed license will continue to be conducted in accordance with the current licensing basis (CLB), and any changes made to the CLB comply with the regulations.

OPEN ITEMS

As a result of its review of the LRA, including additional information submitted through December 7, 2007, the staff identified the following open items. An item is considered open if, in the staff's judgment it did not meet all applicable regulatory requirements at the time of the issuance of the SER with Open Items:

1. The staff has determined that in order to meet the station blackout (SBO) rule for license renewal, the circuits up to and including the switchyard circuit breakers must be included in the scope of license renewal review.
2. With respect to the above open item, the applicant needs to address how to manage the aging effect of inaccessible medium voltage cables not subject to the EQ rule.
3. The LRA states that with the exception of the thermowells, surge line nozzles, and the pressurizer surge line, usage factor in Class 1 piping pressure boundaries do not depend on time dependent effects of steady state conditions, but depend only on effects of operational, abnormal, and upset transient events. The staff reviewed the CUF calculation in the basis document supporting the LRA and found that the analyses that used actual transient data for Period 2 does not consider significant piping insurge and outsurge cycles from Period 1 to support the validity of the backward projections. Additionally, the staff noted that the applicant's backward projection ignored severity of transients by using only the cycle ratio.

The applicant committed to submit additional information regarding the backward projection for the surge line hot leg nozzle, charging nozzles, and alternate charging nozzles by January 31, 2008. The applicant committed to calculate an updated baseline fatigue usage factor that adequately bounds transients experienced before the monitoring of cumulative usage factors (CUFs) was started. The existing baseline CUF for all monitored locations will be increased to bound the potential CUF contribution from the transients that were under-represented in the existing baseline. The staff is currently reviewing the information submitted by the applicant.

4. In the LRA, the applicant stated that some part of the fatigue usage in the reactor pressure vessel internals is due to high-cycle effects and, therefore, depends on steady-state operating time rather than on the number of transient events. High-cycle fatigue must, therefore, be evaluated separately in order to extend the conclusion of the supplementary design report to the end of the 60-year operating period. 10 CFR 54.21(c)(1)(ii) states that the applicant shall demonstrate that the analyses have been projected to the end of the period of extended operation. The analyses have not been completed for the staff's review. Additionally, regarding thermal cycle count for allowable secondary stress reduction factor (ASME Code B31.1 and Section III class 2 and 3 piping) the analyses for reactor coolant sample lines have not been revised for the PEO.

By a letter dated November 30, 2007, the applicant addressed the above two concerns. The staff will verify by doing an audit the validity of the applicant's assessment of the impact of high-cycle fatigue to the total fatigue usage factor for the reactor pressure vessel internals and the assumed thermal cycle count for allowable secondary stress range reduction factor in B31.1 and ASME Code Section III, Class 2 and 3 piping. The staff audit of the design basis documents is scheduled for early 2008. This audit will be performed prior to closure of open items related to metal fatigue analysis.

5. This open item relates to the applicant's use of the FatiguePro 1D stress analysis methodology. WCGS performed plant-specific calculations for the seven locations identified by NUREG/CR-6260 and evaluated effects of the reactor coolant environment on fatigue calculations. For the hot leg and charging nozzle, the expected 60-year fatigue usage factor was projected from historical and current rates of accumulation of transient cycles and usage factors, using the stress-based method. During the audit, the staff reviewed the applicant's FatiguePro stress calculations. The staff's understanding is that this methodology is not consistent with the rules set forth in the ASME Code, Section III, has its limitations and can generate inaccurately low stress results. Several RAI responses from the applicant did not resolve the staff's concerns on the 1D virtual stress related issues. Therefore, this item remains open.

PROPOSED LICENSE CONDITIONS

Following the staff's review of the LRA, including subsequent information and clarifications from the applicant, the staff identified three proposed license conditions:

1. The first license condition requires the applicant to include the UFSAR supplement required by 10 CFR 54.21(d) in the next UFSAR update, as required by 10 CFR 50.71(e), following the issuance of the renewed license.
2. The second license condition requires future activities identified in the UFSAR supplement to be completed prior to the period of extended operation (PEO).
3. The third license condition requires all capsules in the reactor vessel that are removed and tested meet the requirements of American Society for Testing and Materials (ASTM) E 185-82 to the extent practicable for the configuration of the specimens in the capsule. Any changes to the capsule withdrawal schedule, including spare capsules, must be approved by the staff prior to implementation. All capsules placed in storage must be maintained for future insertion. Any changes to storage requirements must be approved by the staff as required by 10 CFR Part 50, Appendix H.

COMMITMENTS

Commitments made by the licensee are listed in detail in Appendix A to the SER. The licensee made 39 commitments related to the aging management programs (AMPs) to manage aging effects of structures and components to be implemented before the periods of extended operation.

AUDIT OF SCOPING & SCREENING AND AMPs & AMRs

The staff performed audits of scoping and screening methodology, AMP, aging management reviews (AMRs), and time-limited aging analysis (TLAAs). NRC inspectors from Region IV and region I and also the license renewal Project Manager performed onsite inspections of license renewal activities. These audits, inspection and technical reviews of the applicant's AMPs, AMRs and TLAAs determine whether the effects of aging on SCs can be adequately managed to maintain their intended function(s) consistent with the plant's CLB for the period of extended operation.

The staff's scoping and screening methodology audit was completed onsite, during the week of January 8, 2007. Additionally, the staff conducted onsite audits of selected AMRs and associated AMPs during the weeks of March 26, May 7, and July 9, 2007. The NRC inspection team completed its onsite inspection on October 26, 2007. These audits and inspections identified a number of areas that resulted in changes to the application, programs, and procedures. These items include: 1) scope of plant's system boundary of the offsite power system for the SBO restoration (open item no 1 above); and 2) inaccessible medium voltage cables not subject to 10 CFR 50.49 environmental qualification requirements (open item 2).

The inspectors found water accumulation in the emergency service water cable manholes. These cables are within the scope of license renewal. The plant has a history of water in cable manholes and corrective actions were not working. As a result, the applicant revised its procedure to include operating history when determining the frequency of cable vault pumping and clarified its requirement that the cables were to remain dry before entering the period of extended operation. In addition, the applicant revised the procedure to ensure that if any cable is found submerged: (1) a work request will be initiated, (2) the manhole will be pumped dry, and (3) the inspection frequency will be increased.

The audits and inspections concluded that overall the applicant's aging management activities and programs will adequately manage the effects of aging on SSCs for the PEO.

TLAAs

Based on WCGS' current licensing basis, UFSAR, and design-basis documents, the following categories of TLAAs were identified by the applicant:

- Reactor vessel neutron embrittlement
- Metal fatigue
- Environmental qualification (EQ) of electrical equipment
- Concrete containment tendon prestress
- Containment liner plate, polar crane bracket, and penetrations load cycles
- Containment polar crane, fuel building cask handling crane, spent fuel pool bridge crane, and fuel handling machine load cycle limits
- Absence of TLAA for reactor vessel underclad cracking analysis (per WCAP-15338-A)
- Absence of TLAA in a reactor coolant pump flywheel fatigue crack growth analysis (per WCAP-15666-A)

The applicant identified one TLAA based exemption for continuation into the PEO, namely, the fatigue crack growth assessment in support of a fracture mechanics analysis for the leak-before-break elimination of the dynamic effects of primary loop piping failures.

On the basis of its review, the staff concluded, subject to the resolution of open items discussed above, that the applicant has provided an adequate list of TLAAs, as defined in 10 CFR 54.3. Further, the staff concludes that the applicant has demonstrated that (1) the TLAAs will remain valid for the PEO, (2) the TLAAs have been projected to the end of the PEO, or (3) that the aging effects will be adequately managed for the PEO, as required by the NRC regulations. In addition, consistent with 10 CFR 54.21(c)(2), the staff concludes that no plant-specific, TLAA-based exemptions are in effect.

EXPECTED SUBCOMMITTEE ACTION

The Subcommittee Chairman will provide a report to the Full Committee during the March 2008 ACRS meeting.

References

1. WCNOC License Renewal Application for Wolf Creek, dated September 27, 2006.
2. NRC Safety Evaluation Report with Open Items, dated February 2008.
3. NRC Staff onsite Audit Report, dated February 14, 2008.
4. NRC Inspection Report 05000482/2007007, dated December 5, 2007.
5. NUREG/CR-6260, "Application of NUREG/CR-5999 Interim Fatigue Curves to Selected Nuclear Power Plant Components."
6. WCAP-15338-A, "A Review of Cracking Associated with Weld Deposited Cladding in Operating PWR Plants."
7. WCAP-15666, "Extension of Reactor Coolant Pump Motor Flywheel Extension"

FAX COVER PAGE

TO: MAITRI BANARTEE

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FROM: JOHN BARTON
ACRS CONSULTANT

SUBJ: REPORT ON WOLF CREEK
LRA/SER

MAITRI - PLEASE DISTRIBUTE AS
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TOTAL PGS. SENT INCLUDING THIS PG.

4

J. Barton

JOHN J. BARTON
191 SW Hatteras Court
Palm City, Florida 34990
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DATE: February 20, 2008

TO: Mr. John Sieber
Chairman, Wolf Creek License
Renewal - Sub Committee

FROM: John J. Barton
ACRS Consultant

SUBJECT: License Renewal Application
Wolf Creek Generating Station - Unit 1

Having conducted a review for the License Renewal Application and the NRC Staff Safety Evaluation report with open items, I have the following questions and comments.

License Renewal Application

1. Scoping and Screening
Section 2.1, page 2,1 page 2.1-11

Station Blackout Related - "Westar Energy" owns the sub station.

What written agreement is in place that describes how work is accomplished in the sub station, and how does the plant control/oversee this work.?

2. Section 2.2 Plant Level Scoping
Table 2.2-1

The Turbine control oil system is listed as not in scope for licenses renewal; yet the turbine "EHC" system seems to be in scope for the ATWS Rule as described in Section 2.1, page 2.1-10.

Can you explain the difference in these two sections?

3. Section 2.2, Plant Level Scoping
Table 2.2-1

The Switchyard is listed as not in scope for license renewal. Isn't the switchyard required to satisfy the station Blackout scenario? Why wouldn't these components be in scope for license renewal?

4. Section 2.4, Scoping and Screening
Structures - Page 2.4-34

The condensate storage tank is not in scope for license renewal, yet the foundation and valve house are in scope. Please explain.

5. Section 2.5, Page 2.5-3
Subsection 2.5.1.6 switchyard and bus components

This section describes switchyard buses as in scope. How is this different than section 2.2, table 2.2-1 that says "not in scope"?

6. Section 3.6 Aging Management of Electrical and Instrumentation and Controls - subsection 3.6.2.2.3 "Loss of conductor strength due to corrosion".

The most prevalent mechanism contributing to loss of conductor strength of an aluminum conductor steel reinforced (ACSR) transmission conductor is corrosion.

The National Electric Safety Code requires that tension on installed conductors be a minimum of 60% of ultimate conductor strength. Wolf Creek based their conclusion that ACSR transmission conductors will satisfy all requirements based upon testing performed by Ontario Hydroelectric.

Has the staff reviewed the testing program performed by Ontario Hydroelectric to satisfy themselves that Wolf Creek's ACSR transmission conductors have adequate design margin for 60 years.?

7. Section 4 - Time Limited Aging Analyses. Table 4.3-1 Page 4.3-7. Item 27 - Secondary System Hydrostatic Test."

The design limit for the plant is 5. Operating cycles through 12/31/2005 indicate that the plant has already experienced this transient 4 times. The estimated cycles to a 60 year period is also 4.

Explain why this transient will not be experienced over the remaining years of plant operation.

8. Appendix B - Aging Management Programs - B, 2.1.14 Fuel Oil Chemistry

Fuel oil storage and day tank inspections revealed some interior coating failure in the past. One fuel oil day tank was to be inspected in the year 2006. What was the result of this inspection regarding the interior coating.?

Has any further coating failure been noted in any emergency fuel oil storage tanks?

9. Appendix B - Aging Management Programs B.2.1.1.18 "Buried Piping and Tanks Inspection"

There is some history of buried piping corrosion at the station. Has there been additional instances of this problem in the past several years, what would causes the station to implement this "new" program sooner?

10. Appendix B - Aging Management Programs B.2.1.26 "Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements."

This program is described as a "new" program that will be implemented prior to the period of extended operation, but does not give a date for implementation prior to March 2025.

This program contains items that should be performed currently. For example, the manholes that contain the subject cables should be periodically inspected for water collection during current plant operations. Is this being done currently under some existing program?

Safety Evaluation Report

1. General comments on scoping and screening results, section 2.3 and 2.5

It appears that many RAI's were issued in order to satisfy the staff that scoping and screening of mechanical and electrical components met the requirements for license renewal. In fact, there is still an un-resolved issue regarding scoping and screening results. Open Item OI 2.5.6.

It is my observation that more RAI's were generated regarding scoping and screening in this application than what I have observed in other recent applications.

Does the staff understand why there were so many RAI's on this subject, and does the staff feel that this subject will be satisfactory upon resolution to the one open item?

2. Appendix A - Wolf Creek License Renewal Commitments, Page A-4, Item number 6.

Words need to be added in the column titled "Enhancement of Implementation Schedule."

Under the date March 11, 2025, add the following - and once within 10 and 2 years of entering the period of extended operation."

I believe this is what was intended by the applicant, however the words are not there.

Conclusion:

Pending satisfactory resolution of all the open items, I don't find any issues, that would, in my judgement, prevent license extension of the Wolf Creek station.


John J. Barton