



**UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, DC 20555 - 0001**

October 14, 2014

The Honorable Allison M. Macfarlane
Chairman
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

**SUBJECT: REPORT ON THE SAFETY ASPECTS OF THE LICENSE RENEWAL
 APPLICATION OF THE CALLAWAY PLANT, UNIT 1**

Dear Chairman Macfarlane:

During the 618th meeting of the Advisory Committee on Reactor Safeguards (ACRS), October 2-4, 2014, we completed our review of the license renewal application for Callaway Plant, Unit 1 (Callaway) and the Final Safety Evaluation Report (SER) prepared by the NRC staff. Our subcommittee on Plant License Renewal reviewed this matter during a meeting on May 22, 2014. During these reviews, we had the benefit of discussions with representatives of the NRC staff and Ameren Missouri (the applicant). We also had the benefit of the documents referenced. This report fulfills the requirement of 10 CFR 54.25 that the ACRS review and report on all license renewal applications.

CONCLUSION AND RECOMMENDATION

1. The programs established and committed to by Ameren Missouri to manage age-related degradation provide reasonable assurance that Callaway can be operated in accordance with its current licensing basis for the period of extended operation without undue risk to the health and safety of the public.

2. The Ameren Missouri application for renewal of the operating license for Callaway should be approved.

BACKGROUND

The nuclear steam supply system for Callaway is a pressurized water reactor that was designed and supplied by the Westinghouse Electric Corporation. The reactor core is designed for an output of 3,565 MWt and the electrical rating is 1,284 MWe. The containment is a carbon steel-lined, concrete structure. The walls and dome are post-tensioned, prestressed concrete, and the base slab is reinforced concrete.

Callaway is located 10 miles southeast of the city of Fulton in Callaway County, Missouri, and is located 80 miles west of the St. Louis metropolitan area. The nearest population center is Jefferson City, Missouri, located 25 miles west-southwest of the site. Callaway is situated on a 7,354 acre site with the power plant site occupying approximately 2,765 acres. The plant is located on a high plateau approximately 300 feet above the Missouri River, and the river is located about five miles to the south of the plant.

The NRC issued Callaway's construction permit on April 16, 1976, and operating license on October 18, 1984. In this application, Ameren Missouri requested renewal of the Callaway Operating License No. NPF-30, for a period of 20 years beyond the expiration of the current license, which occurs on October 18, 2024.

DISCUSSION

In the final SER, the staff documented its review of the license renewal application and other information submitted by the applicant or obtained from the staff audits and an inspection at the plant site. The staff reviewed the completeness of the identification of structures, systems, and components (SSCs) that are within the scope of license renewal; the integrated plant assessment process; the identification of plausible aging mechanisms associated with passive, long-lived components; adequacy of the Aging Management Programs (AMPs); and identification and assessment of Time-Limited Aging Analyses (TLAAs) requiring review.

In the Callaway license renewal application, Ameren Missouri identified the SSCs that fall within the scope of license renewal. Based on this review, the applicant will implement 42 AMPs for license renewal, comprised of 32 existing programs and 10 new programs. Nineteen AMPs are consistent with the Generic Aging Lessons Learned (GALL) Report (NUREG-1801, Revision 2), without enhancements or exceptions. Twenty three AMPs are consistent with enhancements or exceptions. There are no plant-specific AMPs.

The application either demonstrates consistency with the GALL Report or documents and justifies deviations to the specified approaches in that report. The license renewal application includes six exceptions to the GALL Report. We reviewed these exceptions (selective leaching, inspection of internal surfaces of miscellaneous piping and ducting, buried underground tanks, protective coating monitoring and maintenance program, fire water system, and above-ground metallic tanks). The applicant subsequently resolved the last of these exceptions. We agree with the staff's conclusions that the remaining five exceptions are acceptable.

The staff conducted license renewal audits and performed a license renewal inspection at Callaway. The audits verified the appropriateness of the scoping and screening methodology for AMPs, the aging management review, and the TLAAs. The inspection verified that the license renewal requirements are appropriately implemented. Both the inspection and the report of that inspection are very thorough. Based on the audits, inspection, and staff reviews related to this license renewal application, the staff concluded in the final SER that the proposed activities will manage the effects of aging of SSCs identified in the application and that the intended functions of these SSCs will be maintained during the period of extended operation. We agree with this conclusion.

The following open items were resolved prior to our final review on October 2, 2014:

Scoping of Fire Protection SSCs and NFPA 805 Transition

The staff raised questions regarding fire protection SSCs in Callaway's auxiliary boiler room and in various locations in the turbine building. The staff's concern was that if these water systems and components were excluded from the scope of license renewal they would not be subject to an aging management review. The staff requested that the applicant provide justification for these exclusions. The applicant subsequently reexamined these components. That reexamination resulted in either addition of the turbine building SSCs to the scope of the aging management review or removal of SSCs from the scope, as appropriate.

Ameren Missouri submitted a license amendment request to transition Callaway's existing Fire Protection Program to a risk-informed, performance-based program based on National Fire Protection Association Standard NFPA 805. Subsequently, Ameren Missouri submitted the license renewal application for renewal of their Operating License NPF-30 for Callaway. Ameren Missouri performed a gap analysis that described the changes to the license renewal application based on components that were added to or removed from the Fire Protection Program as the result of the transition to NFPA 805, and updated the license renewal scope to be consistent with NFPA 805.

Reactor Vessel Head Closure Studs

During their review of the license renewal application, the staff determined that on multiple occasions several of Callaway's reactor vessel head closure studs had become stuck during either stud insertion or stud removal. The applicant has committed to remove the one remaining stuck Stud No. 18 and inspect its stud hole in the lower reactor vessel head flange prior to entering the period of extended operation. Stud No. 18 will be replaced. Threads in six stud holes are damaged. Threads in four other stud holes have been repaired. The applicant has committed to inspect the six stud holes with thread damage and to inspect the four other stud holes with thread repair prior to entering the period of extended operation.

Materials Reliability Program Issues

Ameren Missouri's PWR Vessel Internals Program implements the guidance of Materials Reliability Program (MRP)-227-A, "PWR Reactor Internals Inspection and Evaluation Guideline," dated January 9, 2012, which includes their plant-specific responses to action items, conditions, and limitations identified in the NRC Safety Evaluation for

MRP-227, "Materials Reliability Program: Pressurized Water Reactor Internals Inspection and Evaluation Guideline (MRP-227, Revision 0)." During the review of Callaway's program and their responses to action items for MRP-227-A, the staff identified several issues requiring additional information. The issues were resolved by the applicant including an AMP for vessel internals that is consistent with MRP-227-A; justifying replacement of a hold down spring with martensitic stainless steel material; and providing flaw tolerance analyses, functionality analyses or susceptibility analyses for cast austenitic stainless steel used in the reactor vessel internals.

ASME Code Class 1 Small-Bore Socket Weld Population

The staff communicated that the accounting for Callaway's population of small-bore socket welds in ASME Code Class 1 piping less than 4 inches and greater than or equal to 1 inch nominal pipe size was initially inaccurate. Subsequent actions and reviews of the as-built drawings resulted in an acceptable accounting for all of these small-bore socket weld locations.

Effects of the Reactor Coolant System Environment on Fatigue Life of Piping and Components

Ameren Missouri performed a systematic review of all wetted reactor coolant pressure boundary components with a Class 1 fatigue analysis to either show that the NUREG/CR-6260 locations are bounding or to incorporate environmentally assisted fatigue into the licensing basis for more limiting components. The staff had concerns about the approach taken by the applicant to address the effects of the reactor coolant system environment on fatigue life of piping and components.

The applicant performed a systematic review to determine the "sentinel" locations to be monitored by the Fatigue Monitoring Program. This systematic review involved ranking and comparisons of environmental fatigue usage. However, in justifying its systematic review, the applicant did not initially demonstrate that the values for environmental fatigue usage were based on a normalized scale. Thus, the staff's concern was that Callaway's original ranking and comparisons may not have appropriately determined the "sentinel" locations. The applicant subsequently provided justification for the screening methods used to identify the "sentinel" locations.

Ameren Missouri identified the systems and components requiring TLAAAs and reevaluated them for the period of extended operation. The staff concluded that Ameren Missouri has provided an adequate list of TLAAAs. Further, the staff concluded that the applicant has met the requirements of the License Renewal Rule by demonstrating that the TLAAAs will remain valid for the period of extended operation, or that the TLAAAs have been projected to the end of the period of extended operation, or that the aging effects will be adequately managed for the period of extended operation. The staff has concluded that the applicant has demonstrated that the effects of aging at Callaway will be adequately managed so that the intended function(s) will be maintained consistent with the current licensing basis for the period of extended operation, as required by 10 CFR 54.21(a)(3).

We agree with the staff that there are no issues related to the matters described in 10 CFR 54.29(a) (1) and (a) (2) that preclude renewal of the operating license for Callaway. None of the items described in this letter report precludes approval of this license renewal application. The programs established and committed to by Ameren Missouri provide reasonable assurance that Callaway can be operated in accordance with its current licensing basis for the period of extended operation without undue risk to the health and safety of the public. The Ameren Missouri application for renewal of the operating license for Callaway should be approved.

Dr. Peter Riccardella did not participate in the Committee's deliberations regarding this matter.

Sincerely,

/RA/

John W. Stetkar
Chairman

REFERENCES

1. Safety Evaluation Report Related to the License Renewal of Callaway Plant, Unit 1, dated August 2014 (ML14232A380).
2. NRR Memorandum from John Lubinski to Edwin Hackett, dated May 12, 2014, Subject: Review of the Callaway Nuclear Plant License Renewal Application - Safety Evaluation Report (ML14121A106).
3. Safety Evaluation Report With Open Items Related to the License Renewal of Callaway Plant, Unit 1, dated April 2013 (ML13086A224).
4. Letter from McLachlan, M., Ameren Missouri: Enclosure 2 - Amendment 26, LRA Changes, dated August 29, 2013 (ML13242A291).
5. Callaway Plant Unit 1, License Renewal Application 2012 Annual Update, Amendment 18, dated December 19, 2012 (ML123560157).
6. NRC Inspection Report 05000483/2012009, dated November 20, 2012 (ML12328A053).
7. NRC Aging Management Programs Audit Report, dated August 9, 2012 (ML12180A023).
8. NRC Scoping and Screening Audit Report, dated August 6, 2012 (ML12178A475).
9. PWR Reactor Internals Inspection and Evaluation Guidelines, dated January 9, 2012 (ML12017A193).
10. Letter from Ameren Missouri to NRC, Submitting Callaway Plant Unit 1, License Renewal Application, dated December 15, 2011 (ML113530367).

11. Callaway Plant, Unit 1, License Renewal Application, dated December 15, 2011 (ML113530372).
12. NRC NUREG-1800, Revision 2, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants" (SRP-LR), dated December 2010 (ML103409036).
13. NRC NUREG 1801, Revision 2, "Generic Aging Lessons Learned (GALL) Report," dated December 2010 (ML103409041).
14. NRC Regulatory Guide 1.188, Revision 1, "Standard Format and Content for Applications to Renew Nuclear Power Plant Operating Licenses," dated September 15, 2005 (ML082950585).
16. National Fire Protection Association Standard (NFPA) 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants," 2001 Edition.
17. NUREG/CR-6260, "Application of NUREG/CR-5999 Interim Fatigue Curves to Selected Nuclear Power Plant Components," dated February 28, 1995 (ML031480219).

11. Callaway Plant, Unit 1, License Renewal Application, dated December 15, 2011 (ML113530372).
12. NRC NUREG-1800, Revision 2, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants" (SRP-LR), dated December 2010 (ML103409036).
13. NRC NUREG 1801, Revision 2, "Generic Aging Lessons Learned (GALL) Report," dated December 2010 (ML103409041).
14. NRC Regulatory Guide 1.188, Revision 1, "Standard Format and Content for Application to Renew Nuclear Power Plant Operating Licenses," dated September 2005 (ML082950585).
15. National Fire Protection Association Standard (NFPA) 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants," 2001 Edition.
16. NUREG/CR-6260, "Application of NUREG/CR-5999 Interim Fatigue Curves to Selected Nuclear Power Plant Components," dated February 28, 1995 (ML031480219).

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