



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

March 20, 2008

The Honorable Dale E. Klein  
Chairman  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

SUBJECT: REPORT ON THE SAFETY ASPECTS OF THE LICENSE RENEWAL  
APPLICATION FOR THE VERMONT YANKEE NUCLEAR POWER STATION

Dear Chairman Klein:

During the 550<sup>th</sup> meeting of the Advisory Committee on Reactor Safeguards, March 6-7, 2008, we completed our review of the license renewal application for the Vermont Yankee Nuclear Power Station (VYNPS) and the final Safety Evaluation Report (SER) prepared by the NRC staff. We also reviewed this matter during our February 7-9, 2008 meeting. Our Plant License Renewal subcommittee reviewed this matter during a meeting on June 6, 2007. During these reviews, we had the benefit of discussions with representatives of the NRC staff, the applicant, Entergy Nuclear Operations, Inc. (ENO), the State of Vermont, and the New England Coalition. We also had the benefit of the documents referenced. This report fulfills the requirements of 10 CFR 54.25 that the ACRS review and report on all license renewal applications.

#### **CONCLUSION AND RECOMMENDATION**

- The programs established and committed to by the applicant to manage age-related degradation provide reasonable assurance that VYNPS 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 ENO application for renewal of the operating license for VYNPS should be approved.

#### **BACKGROUND AND DISCUSSION**

VYNPS is a General Electric boiling water reactor-4 (BWR-4) with a Mark-1 containment. The current power rating of 1912 MWt includes a 20 percent power uprate that was implemented in 2006. ENO requested renewal of the VYNPS operating license for 20 years beyond the current license term, which expires on March 21, 2012.

In the final SER, the staff documented its review of the license renewal application and other information submitted by ENO and obtained during the audits and inspections conducted at the plant site. The staff reviewed: the completeness of the applicant's identification of structures, systems, and components (SSCs) that are within the scope of license renewal; the integrated plant assessment process; the applicant's identification of the plausible aging mechanisms associated with passive, long-lived components; the adequacy of the applicant's Aging Management Programs (AMPs); and the identification and assessment of time-limited aging analyses (TLAAs) requiring review.

The VYNPS application either demonstrates consistency with the Generic Aging Lessons Learned (GALL) Report or documents deviations to the specified approaches in this Report. The VYNPS application includes a significant number of exceptions to the approaches specified in the GALL Report. We reviewed these exceptions and agree with the staff that they are acceptable. Other recent license renewal applications have exhibited a similar trend toward an increasing number of exceptions to the GALL Report. The staff agrees that future updates of the GALL Report should incorporate alternative approaches which are used by the industry and have been approved by the staff. This will reduce the number of exceptions to the GALL Report in future applications and will facilitate the staff review.

In the VYNPS application, ENO identified the SSCs that fall within the scope of license renewal and performed an aging management review for these SSCs. Based on this review, the applicant will implement 39 AMPs for license renewal including existing, enhanced, and new programs. Three of the AMPs were added as a result of staff review.

The staff conducted several audits and site inspections. The audits verified the appropriateness of the scoping and screening methodology, AMPs, aging management review, and TLAAs. The regional inspectors verified that the license renewal requirements are appropriately implemented. During the site inspections, six confirmatory items related to the identification of the non-safety-related portions of several systems to be included within the scope of license renewal were verified. The Region 1 inspection team performing the site scoping inspection determined that VYNPS had not identified all the boundaries of non-safety-related systems attached to safety-related systems to be included within the scope of license renewal. The follow-up identification by the applicant of the appropriate scoping boundaries resulted in the identification of many new systems and components to be added to the scope of license renewal. In the SER, the staff concluded that, following closure of the confirmatory items, ENO has appropriately identified the SSCs within the scope of license renewal and that the AMPs described by the applicant are sufficient to manage aging of the long-lived passive components within the scope of license renewal. We concur with this conclusion. The staff should be commended for the thoroughness and effectiveness of their review and inspections.

During our meetings, we reviewed the physical condition of certain components and the associated AMPs that are the current focus of the staff and the industry, as described below.

The applicant stated, and the NRC inspectors confirmed, that the VYNPS drywell shell and the torus shell are in good physical condition. The VYNPS drywell design minimizes the potential for water intrusion, provides diverse methods for preventing and identifying potential water leakage into the air gap should this occur, and minimizes corrosion potential since there is no water-retaining foam or insulation in the air gap. The plant has not experienced any refueling bellows or refueling cavity leakage events. Drywell aging will be managed by Inspection Program B of the American Society of Mechanical Engineers (ASME) Code, Section XI, Subsection IWE. These inspections will be augmented with ultrasonic testing (UT) if unexpected flaws or areas of degradation are

found. The torus condition meets design requirements, and no margin has been lost due to corrosion since the torus was re-coated in 1998. The torus condition will be monitored by ongoing IWE inspections of the coating and UT measurements for the next three refueling outages.

VYNPS has recently completed its first year of operation at 20 percent uprated power level. The applicant stated that inspection of the steam dryers during the first outage following the uprate did not reveal fatigue indications seen elsewhere in the industry. There were indications identified as intergranular stress corrosion cracking which were dispositioned as acceptable. For this outage, flow accelerated corrosion (FAC) inspections were increased by 50% over the pre-uprate number. The applicant stated that the results of these inspections were satisfactory and consistent with the VYNPS analytical modeling for FAC. The enhanced number of inspections will continue through the next two refueling outages to confirm the ability of the VYNPS CHECWORKS model to conservatively predict FAC rates at the uprated power level.

The applicant identified the systems and components requiring TLAAAs and reevaluated them for 20 more years of operation. The staff concluded that the applicant has provided an adequate list of TLAAAs. Further, the staff concluded that in all cases the applicant has met the requirements of the license renewal rule. We concur with the staff that VYNPS TLAAAs have been properly identified and that criteria supporting 20 more years of operation have been met.

The applicant has chosen to address environmentally assisted fatigue by demonstrating that the cumulative usage factor (CUF) at the most sensitive locations will remain below 1.0 throughout the period of extended operation, considering both mechanical and environmental effects. Analyses were performed by the applicant using assumptions to be monitored and verified during the period of extended operation. These analyses showed that the CUF at all analyzed locations will remain below 1.0 throughout the period of extended operation. However, for those locations with geometric discontinuities or non-symmetric loads such as the feedwater nozzle, the reactor recirculation outlet nozzle, and the core spray line nozzle, the staff challenged the methodology used by the applicant because this methodology neglects shear stresses on the component. At the request of the staff, the applicant performed an additional analysis of the expected limiting location, the feedwater nozzle, using an approved methodology that accounts for all stress components. This analysis confirmed that the CUF will not exceed 1.0 during the period of extended operation. Since this analysis showed that the original methodology could underestimate the CUF, the staff has concluded that additional analyses are needed for the reactor recirculation outlet and the core spray line nozzles. These three analyses will be the analyses-of-record for these components. Performance of the remaining analyses at least two years before entering the period of extended operation will be a license condition. We agree with the staff's conclusion.

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 VYNPS. The programs established and committed to by ENO provide reasonable assurance that VYNPS 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 ENO application for renewal of the operating license for VYNPS should be approved.

Sincerely,

*/RA/*

William J. Shack  
Chairman

#### REFERENCES

1. Memorandum to Frank Gillespie, Executive Director, Advisory Committee on Reactor Safeguards and Advisory Committee on Nuclear Waste and Materials, from Rani Franovich, Branch Chief, Division of License Renewal, Office of Nuclear Reactor Regulation, transmitting, "Safety Evaluation Report Related to the License Renewal of Vermont Yankee Nuclear Power Station," dated February 27, 2008, (ML080560627 and ML080560462).
2. Letter to Michael Kansler, President, Entergy Nuclear Operations, Inc., from P.T. Kuo, Director, Division of License Renewal, Office of Nuclear Reactor Regulation, regarding, "Safety Evaluation Report with Confirmatory Items Related to the License Renewal of Vermont Yankee Nuclear Power Station," dated March 30, 2007, (ML070870378).
3. Letter to the U.S. Nuclear Regulatory Commission, from William F. Maguire, General Manager, Plant Operations, Vermont Yankee Nuclear Power Station, transmitting Vermont Yankee Nuclear Power Station License Renewal Application, dated January 27, 2006, (ML060300082).
4. Audit and Review Report for Plant Aging Management Review and Program, Vermont Yankee Nuclear Power Station, dated March 30, 2007, (ML070860005).
5. Letter to Theodore Sullivan, Site Vice President, Entergy Nuclear Operation, Inc., from Richard J. Conte, Chief, Engineering Branch 1, Division of Reactor Safety, Region I, regarding Vermont Yankee Nuclear Power Station - NRC License Renewal Inspection Report 05000271/2007006, June 4, 2007, (ML071550330).
6. U.S. Nuclear Regulatory Commission, "Generic Aging Lessons Learned Report," NUREG-1801, Vol. 1-2, Rev. 1, dated September 2005.

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 VYNPS. The programs established and committed to by ENO provide reasonable assurance that VYNPS 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 ENO application for renewal of the operating license for VYNPS should be approved.

Sincerely,

**/RA/**

William J. Shack  
Chairman

**REFERENCES**

1. Memorandum to Frank Gillespie, Executive Director, Advisory Committee on Reactor Safeguards and Advisory Committee on Nuclear Waste and Materials, from Rani Franovich, Branch Chief, Division of License Renewal, Office of Nuclear Reactor Regulation, transmitting, "Safety Evaluation Report Related to the License Renewal of Vermont Yankee Nuclear Power Station," dated February 27, 2008, (ML080560627 and ML080560462).
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ADAMS ML080660692

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ACRS  
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