UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 127 TO FACILITY OPERATING LICENSE NO. DPR-28

VERMONT YANKEE NUCLEAR POWER CORPORATION

VERMONT YANKEE NUCLEAR POWER STATION

DOCKET NO. 50-271

INTRODUCTION

By letters dated April 27 and June 23, 1989, the Vermont Yankee Nuclear Power Corporation (VYNPC or the licensee) requested an amendment to Facility Operating License No. DPR-28 for the Vermont Yankee Nuclear Power Station (VYNPS or the plant). The proposed amendment would change the expiration date of Facility Operating License No. DPR-28 from December 11, 2007 to March 21, 2012.

BACKGROUND

The licensee's letter of April 27, 1989 requested an expiration date based on 40 years from issuance of the full power operating license that was issued on February 28, 1973. However, the plant received a fuel load and low-power operating license dated March 21, 1972. The staff pointed out in discussions with the licensee that the operating period started on March 21, 1972, not February 28, 1973. The licensee, by letter dated June 23, 1989, revised their application to change the operating license expiration date to 40 years from March 21, 1972.

The staff issued a notice of "Proposed No Significant Hazards Consideration Determination" in the Federal Register (54 FR 31120) dated July 26, 1989. This notice allows for public comment or a request for a hearing from "any person whose interest may be affected by this proceeding." By letter dated August 22, 1989 the State of Vermont filed a petition for leave to intervene and requested an evidentiary hearing. An Atomic Safety and Licensing Board was established to consider this matter and the State of Vermont was admitted into the proceeding as an intervenor pursuant to 10 CFR §2.714 on January 26, 1990.

The staff issued an Environmental Assessment (EA) dated June 27, 1990 (55 FR 26313), as required by 10 CFR 51.21 and 51.22, in which it concluded that the July 1972 Final Environmental Statement for VYNPS remains valid and pursuant to 10 CFR 51.31 an environmental impact statement need not be prepared for this action.

DISCUSSION

Section 103.c of the Atomic Energy Act of 1954 provides that a license is to be issued for a specified period not exceeding 40 years. The Code of Federal Regulations in 10 CFR 50.51 specifies that each license will be issued for a fixed period of time not to exceed 40 years from date of issuance. Also, 10 CFR 50.56 and 10 CFR 50.57 allow the issuance of an operating license

pursuant to 10 CFR 50.51 after the construction of the facility has been substantially completed, in conformity with the construction permit and when other provisions specified in 10 CFR 50.57 are met. The currently licensed term for the VYNPS is 40 years, commencing with the issuance of the construction permit on December 11, 1967. Accounting for the time that was required for plant construction, this represents an effective operating license term of less than 36 years. Consistent with Section 103.c of the Atomic Energy Act and Sections 50.51, 50.56 and 50.57 of the Commission's regulations, the licensee, by its application of April 27 and June 23, 1989, seeks extension of the operating license term from the date of operating license issuance, namely 40 years from March 21, 1972. This action would extend the period of operation to the full 40 years provided by the Atomic Energy Act and the Code of Federal Regulations.

EVALUATION

The licensee's request for extension of the operating license is based on the fact that a 40 year service life was considered during the design and construction of the plant. Although this does not mean that some components will not wear out during the plant lifetime, design features were incorporated which maximize the inspectability of structures, systems and equipment. Surveillance and maintenance practices which were implemented in accordance with the ASME code and the facility Technical Specifications provide assurance that any unexpected degradation in plant equipment will be identified and corrected. The plant's mechanical and electrical equipment, reactor vessel integrity and structures are evaluated in the following separate sections of this report.

a. Mechanical Equipment

The Final Safety Analysis Report for VYNPS as approved by NRC's Safety Evaluation Report, has evaluated the adequacy of safety-related mechanical systems, equipment, and components for 40 years of plant operation. Where a specific design lifetime is specified in the Safety Analysis Report, it is at least 40 years (e.g., 32 Effective Full Power Years (EFPY) at 80% capacity factor). However, the plant has operated over the past 18 years at a 70% capacity factor; thus, this equipment has received only a fraction of its design life to date.

Although some mechanical equipment and components might wear out or need replacement during the plant operating lifetime, existing surveillance and maintenance programs are sufficient to maintain or determine the need for replacement of safety-related components. Periodic inservice inspection and testing requirements have been incorporated into procedures to provide the added assurance that any unanticipated degradation in systems or equipment will be identified and corrected in a timely manner. The licensee has demonstrated a willingness to replace degraded safety-related components or to add new components or systems as recently demonstrated by the proposed replacement of large diameter feedwater check valves and the uninterruptible power supply to the low-pressure coolant system injection valves and the voluntary commitment to add a wetwell hardened vent path. These are commitments made in 1990.

Therefore, the staff concludes that safety-related mechanical systems, equipment and components will not lose their intended safety function over a 40 year operating lifetime.

b. Electrical Equipment

The staff has also evaluated the safety implications of extending the operating license on safety-related electrical systems and equipment. This evaluation considered the licensee's review of extended service life impacts on equipment and integrated dose qualifications in response to 10 CFR 50.49, the environmental qualification rule. For safety-related electrical equipment within the scope of 10 CFR 50.49, aging reviews have been conducted by the licensee so as to establish a qualified life for the equipment.

For this equipment, the staff believes that the licensee has controls in place to ensure that required surveillance and maintenance are performed. These are described in the VYNPC Environmental Qualification Program and procedures. The current VYNPC Equipment Qualification (EQ) program is in compliance with 10 CFR 50.49. The extension of the operating license is not affected by any unresolved EQ issues.

As discussed in the preceding section on Mechanical Equipment the licensee has substantially upgraded safety-related electrical systems during 1990. This is demonstrated by the commitment to reroute power cables in the post-accident monitoring system, added battery surveillances and the previously mentioned Uninterruptible Power Supply which is both a mechanical and electrical system.

Based on this evaluation, the staff concludes that electrical systems design, electrical equipment selection and application, and environmental qualification of electrical equipment either considered the effects of a 40 year operational lifetime or will not be affected by a 40 year operational lifetime.

c. Reactor Vessel Integrity

Reactor Vessel (RV) integrity is ensured by having controlled the design of the RV and then limiting its operation within conservative bounds. In addition to these design and operating considerations, there are two surveillance programs in place to periodically monitor RV integrity.

The vessel was designed for a 40 year life; however, the Technical Specifications (TS) limit operation to 32 effective full-power years (EFPY). Since initial licensing in March 1972 to the present (September 1990) the vessel has operated at about 72% of this time interval, resulting in 0.72 x 18.5 calendar years = 13.3 EFPY of operation. Assuming the 4 year and 3 month license extension is added to future operation and assuming a conservative future operating rate of 80%, the resultant EFPY of operation is 0.8 x 21.5 = 17.2. The interval from the present time until March 2012 is 21.5 years. The sum of past and assumed future operation would then be 13.3 + 17.2 = 30.5 EFPY of operation. Therefore, two conservatisms are

present: first, the RV was designed for a 40 year full-power life but restricted to a 32 year operating life by the TS and second, it will not exceed a probable operating life of 30.5 years.

The two surveillance programs, mentioned above, and prescribed by the TS are the Structural Integrity and Operability Testing and the Pressure and Temperature Limitations programs. This latter program includes the RV irradiation surveillance specimen program. The Structural Integrity program includes the Inservice Inspection (ISI) and Inservice Test (IST) programs of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code - Section XI; implementation of these programs is mandated by 10 CFR 50.55a "Codes and Standards." The Staff has previously evaluated both the ISI and IST programs and found them acceptable.

The staff has reviewed the licensee's pressure and temperature limitations in a Safety Evaluation issued as part of License Amendment No. 120, dated April 17, 1990. This Safety Evaluation also included the staff's evaluation of the licensee's response to our Generic Letter 88-11, "NRC Position on Radiation Embrittlement of Reactor Vessel Materials." The staff concluded that the proposed pressure and temperature (P/T) limits for the reactor coolant system, of which the reactor vessel is an integral component, for heatup, cooldown, leak test and operation are valid through 32 EFPY as the limits conform to the requirements of Appendices G and H of 10 CFR Part 50. The licensee also satisfied Generic Letter 88-11 guidance by using the methods of Regulatory Guide 1.99, Revision 2, in a conservative manner to calculate the adjusted reference temperature. Therefore, the staff found the proposed P/T limits acceptable for incorporation into the VYNPS TS.

The staff concludes, based on the above evaluations, that reactor vessel integrity is ensured through March 21, 2012.

d. Structures

The structures at the VYNPS are heavy duty industrial buildings or unique structures, such as the drywell and wetwell (torus), constructed of reinforced concrete, structural steel or a combination of both. These structures were initially founded and erected with good construction practices and the construction was audited by NRC inspections. Industrial experience with such materials indicates that a service life in excess of 40 years is attainable.

Plant walkdowns of the containment structures are performed regularly so that any observed degradation can be corrected. In particular a containment integrated leak rate test (ILRT), that verifies the leak tightness of the containment throughout its service life, is performed at least three times every 10 years.

The staff concludes, based on the above evaluation, that the original construction standards and ongoing surveillance programs should ensure that the safety-related plant structures will provide satisfactory service for at least a 40 year operational lifetime.

e. Maintenance and Surveillance Programs

Surveillance programs that ensure functional operability of all safety-related structures, components and systems are mandated by the VYNPS Technical Specifications (TS). These TS are part of the plant's operating license and have been approved by the NRC, as are all subsequent changes to the TS. These surveillances ensure operability indefinitely. The scope of the surveillance requirements in the TS is delineated in 10 CFR 50.36(c)(3).

The licensee has in place a maintenance program for all safety-related structures, components and systems. This program has been inspected by an NRC Maintenance Inspection Team which issued an Inspection Report (50-271/89-90) dated June 2, 1989. In terms of overall plant performance as related to maintenance, the Report stated: "General plant housekeeping and control of maintenance work areas, equipment, tools, and material were observed to be well suited for accomplishing maintenance work during the refueling outage. Observation of maintenance work in progress and review of completed work indicated that maintenance is being performed by skillful, knowledgeable and competent plant personnel and contractors. Maintenance work is well supervised and indicates that the standard for the quality of work is high. This standard is reflected in a relatively low rework rate for maintenance and repairs on plant systems. The good housekeeping and knowledgeable maintenance personnel are strengths in their maintenance program."

The Report found some minor problems in the maintenance program that have been satisfactorily resolved in a follow-up inspection report (50-271/90-12) dated November 21, 1990.

The licensee has in place an extensive Quality Assurance Program to support and verify the Surveillance and Maintenance Programs. The NRC in its most recent Systematic Assessment of Licensee Performance (SALP) Report (50-271/88-99) dated March 7, 1990 stated: "The SALP Board assessment noted a continued licensee commitment to the safe operation of the Vermont Yankee Nuclear Power Station. During the assessment period, few challenges to personnel and safety systems occurred, and the plant experienced a low transient rate. Overall performance was indicative of a management involvement in plant operations that was comprehensive and strongly oriented toward nuclear safety. Technical competence and management strengths were most notable in the functional areas of plant operations, maintenance and surveillance, engineering and technical support, and emergency preparedness."

This March 7, 1990 Report gave the licensee the NRC's highest rating in the functional areas of Maintenance/Surveillance and Safety Assessment/Quality Verification.

Based on the TS and observed licensee performance in the areas of surveillance and maintenance, the staff believes that future operation will be at the same level as past operation, thus ensuring proper maintenance and surveillance of safety-related structures, components and systems for the full 40 years of operation requested by the licensee.

FINAL NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

The licensee's request for amendment to the operating license for Vermont Yankee, including a proposed determination by the staff of no significant hazards consideration, was noticed in the Federal Register on July 26, 1989, (54 FR 31120).

In a letter dated May 9, 1990, the State of Vermont requested the staff to reconsider and withdraw its notice of the proposed determination of no significant hazards consideration. The staff responded by letter dated June 20, 1990, stating that it had re-reviewed its original determination and confirmed that the licensee's amendment request meets the criteria of 10 CFR 50.92; therefore, there was no reason to withdraw the notice.

The staff has considered the comments of the State of Vermont and the State of Vermont's contention admitted into this proceeding. The staff continues to believe that the analysis published in the Federal Register on July 26, 1989, (54 FR 31120) remains valid. The staff, therefore, concludes that the proposed amendment involves no significant hazards consideration.

SUMMARY OF FINDINGS

The NRC staff concluded in the Environmental Assessment that the annual radiological effects during the additional years of operation that would be authorized by the proposed license amendment are not more than were previously estimated in the Final Environmental Statement, and are acceptable.

The staff concludes from its considerations of the design, operation, maintenance and surveillance of the safety-related structures, components and systems at the VYNPS that an extension of the operating license to a 40 year service life is consistent with the plant's Final Safety Analysis Report (i.e., the design basis), and NRC Safety Evaluation Reports. Based on this, the staff further concludes that there is reasonable assurance that the plant will be able to continue to operate safely for the additional period authorized by this license amendment. The plant is operated in compliance with the Commission's regulations and the operating license dated February 28, 1973.

In summary, the NRC staff finds that extension of the operating license for the Vermont Yankee Nuclear Power Station to allow for a 40 year service life is consistent with the Final Environmental Statement and the Safety Evaluation Reports for the plant and that these documents remain valid for the proposed action.

ENVIRONMENTAL CONSIDERATION

A Notice of Issuance of Environmental Assessment and Finding of No Significant Impact relating to the proposed extension of the Facility Operating License termination dates for the VYNPS was published in the Federal Register on June 27, 1990 (55 FR 26313).

CONCLUSIONS

The staff has reviewed and evaluated the licensee's request for changing the expiration date of Facility Operating License DPR-28 for the Vermont Yankee Nuclear Power Station. Based on the considerations discussed in this safety evaluation, the staff concludes that:

(1) This amendment will not (a) significantly increase the probability or consequences of accidents previously evaluated, (b) create the possibility of a new or different accident from any accident previously evaluated, or (c) significantly reduce a margin of safety; and therefore, the amendment does not involve significant hazards considerations;

(2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and

(3) such activities will be conducted in compliance with the Commission's regulations, and the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Dated: December 17, 1990

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AMENDMENT NO. 127 TO DPR-28 VERMONT YANKEE NUCLEAR POWER STATION DATED December 17, 1990

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