

JUN 21 1990

Mr. L. A. Tremblay
Licensing Engineer
Vermont Yankee Nuclear Power Corporation
580 Main Street
Bolton, Massachusetts 01740-1398

Dear Mr. Tremblay:

SUBJECT: ENVIRONMENTAL ASSESSMENT - VERMONT YANKEE NUCLEAR POWER STATION
(TAC NO. 73089)

Enclosed is a copy of an Environmental Assessment relating to your April 27, 1989 application for a license amendment for the Vermont Yankee Nuclear Power Station. The proposed amendment would change the expiration date of Facility Operating License DPR-28 from December 11, 2007 to March 21, 2012.

The original copy of the Notice of Environmental Assessment and Finding of No Significant Impact, has been forwarded to the Office of the Federal Register for publication.

Sincerely,

Morton B. Fairtile, Senior Project Manager
Project Directorate I-3
Division of Reactor Projects I/II
Office of Nuclear Reactor Regulation

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Environmental Assessment Notice

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

JUN 21 1990

Docket No. 50-271

Mr. L. A. Tremblay
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A handwritten signature in black ink, appearing to read "Morton B. Fairtile".

Morton B. Fairtile, Senior Project Manager
Project Directorate I-3
Division of Reactor Projects I/II
Office of Nuclear Reactor Regulation

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Environmental Assessment Notice

cc w/enclosure:
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Environmental Assessment - Vermont Yankee Nuclear Power Station

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S. Varga
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GPA/PA - 2G5 OWFN
J. Johnson, Region I
A. Hodgdon, OGC - 15G18
C. Poslusny-PDIV-1

Mr. L. A. Tremblay, Senior Licensing Engineer

Vermont Yankee

cc:

Mr. J. Gary Weigand
President & Chief Executive Officer
Vermont Yankee Nuclear Power Corp.
R.D. 5, Box 169
Ferry Road
Brattleboro, Vermont 05301

Mr. John DeVincentis, Vice President
Yankee Atomic Electric Company
580 Main Street
Bolton, Massachusetts 01740-1398

Vermont Public Interest Research
Group, Inc.
43 State Street
Montpelier, Vermont 05602

Regional Administrator, Region I
U.S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, Pennsylvania 19406

R. K. Gad, III
Ropes & Gray
One International Place
Boston, Massachusetts 02110

Mr. W. P. Murphy, Senior Vice President,
Operations
Vermont Yankee Nuclear Power Corporation
R.D. 5, Box 169
Ferry Road
Brattleboro, Vermont 05301

Mr. George Sterzinger, Commissioner
Vermont Department of Public Service
120 State Street, 3rd Floor
Montpelier, Vermont 05602

Public Service Board
State of Vermont
120 State Street
Montpelier, Vermont 05602

Chairman, Board of Selectmen
Town of Vernon
Post Office Box 116
Vernon, Vermont 05353-0116

Mr. Raymond N. McCandless
Vermont Division of Occupational
and Radiological Health
Administration Building
Montpelier, Vermont 05602

Honorable John J. Easton
Attorney General
State of Vermont
109 State Street
Montpelier, Vermont 05602

Diane Curran, Esq.
Harmon, Curran & Tousley
2001 S Street, N.W., Suite 430
Washington, D.C. 20009

James Volz, Esq.
Special Assistant Attorney General
Vermont Department of Public Service
120 State Street
Montpelier, Vermont 05602

G. Dana Bisbee, Esq.
Office of the Attorney General
Environmental Protection Bureau
State House Annex
25 Capitol Street
Concord, New Hampshire 03301-6397

Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Mr. James P. Pelletier
Vice President - Engineering
Vermont Yankee Nuclear Power Corporation
P.O. Box 169, Ferry Road
Brattleboro, Vermont 05301

Mr. L. A. Tremblay

Vermont Yankee

cc:

Mr. Gustave A. Linenberger, Jr.
Administrative Judge
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Robert M. Lazo, Chairman
Atomic Safety and Licensing Board
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Resident Inspector
Vermont Yankee Nuclear Power Station
U.S. Nuclear Regulatory Commission
P.O. Box 176
Vernon, Vermont 05354

Frederick J. Shon
Administrative Judge
Atomic Safety and Licensing Board
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

John Traficonte, Esq.
Chief Safety Unit
Office of the Attorney General
One Ashburton Place, 19th Floor
Boston, Massachusetts 02108

Jerry Harbour
Administrative Judge
Atomic Safety and Licensing Board
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Geoffrey M. Huntington, Esquire
Office of the Attorney General
Environmental Protection Bureau
State House Annex
25 Capitol Street
Concord, New Hampshire 03301-6397

Charles Bechhoefer, Esq.
Administrative Judge
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dr. James H. Carpenter
Administrative Judge
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Adjudicatory File (2)
Atomic Safety and Licensing Board
Panel Docket
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

ENVIRONMENTAL ASSESSMENT
BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATING TO THE CHANGE IN EXPIRATION DATE OF
FACILITY OPERATING LICENSE NO. DPR-28
VERMONT YANKEE NUCLEAR POWER CORPORATION
FOR THE
VERMONT YANKEE NUCLEAR POWER STATION
DOCKET NO. 50-271

INTRODUCTION

The Vermont Yankee Nuclear Power Station (VYNPS or the plant) is currently licensed for operation for 40 years commencing with the issuance of the construction permit. The license expires on December 11, 2007. By letter dated April 27, 1989, and as supplemented on June 23, 1989, Vermont Yankee Nuclear Power Corporation (VYNPC or the licensee) requested that the license expiration date for the plant be extended to March 21, 2012 or 40 years after the date of the issuance of the "low-power" operating license. The currently effective Facility Operating License (DPR-28 Amendment No. 5) was issued on February 28, 1973 and authorizes operation at full power, not to exceed 1593 megawatts thermal.

NEED FOR THE PROPOSED ACTION

The granting of this request would allow the licensee to operate the plant for approximately four years and three months beyond the current license expiration date, thus recapturing the construction period. This extension would also permit the plant to operate for the full forty year design basis lifetime,

consistent with previously stated Commission policy (Memorandum dated August 16, 1982, from William J. Dircks, Executive Director for Operations, to the Commissioners) and as evidenced by the issuance of over 30 similar extensions to other licensees.

ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

The anticipated impact of the plant on the environment was evaluated in the Staff's Final Environmental Statement (FES) dated July 1972. Since that time its impact on the environment has been observed and recorded. In order to arrive at a finding on the acceptability of the plant's impact on the environment the following considerations will be evaluated in this assessment:

1. Radiological Impacts of the Hypothetical Design Basis Accident
2. Radiological Impacts of Annual Releases
3. Environmental Impact of Uranium Fuel Cycle
4. Non-Radiological Impacts
5. Plant Modifications
6. Conclusion on Environmental Impacts

Each of these considerations is sequentially discussed below.

1. Radiological Impacts of the Hypothetical Design Basis Accident (DBA)

The offsite exposure from releases due to postulated accidents has been analyzed by the licensee in the VYNPS Final Safety Analysis Report (FSAR). The results of these analyses were within the bounds of 10 CFR Part 100 and thus acceptable. This type of analysis is a function of four parameters: (1) the types of accidents postulated, (2) the radioactivity release calculated for each accident, (3) the assumed meteorological conditions, and (4)

population distribution versus distance from the plant. The staff has concluded that neither the types of accidents nor the calculated radioactivity releases will change through the proposed amendment term. Furthermore, the site meteorology as defined in the FSAR is essentially a constant and consideration herein is therefore unwarranted. Thus, the one parameter that is dependent on the proposed license amendment is the population size and distribution, as it could vary with time. The population size and distribution within a 50-mile radius of the plant has been studied four times between 1969 and 1986. The 1986 study projected population changes through the year 2012. There are no significant land use changes expected during the amendment term that could affect offsite dose calculations. The results of the 1986 study and those of the other studies are presented in Figure 1, Summary of Population Projections for Vermont Yankee derived from the licensee's April 27, 1989 letter.

None of the projected changes in population between the years 2007 and 2012, the added term of the proposed license amendment, will significantly impact any accident analysis previously calculated. Furthermore, the current exclusion area boundary, low population zone and nearest population center distance are not likely to be significantly changed through the amendment term from those originally and currently used by the VYNPS. Accordingly, we conclude that the proposed license amendment will not significantly change previous conclusions on the potential environmental effects of offsite releases from postulated accidents.

The staff stated in their proposed no significant hazards consideration determination (54 FR 31120) dated July 26, 1989, that the change in expiration

date to March 21, 2012 is consistent with current NRC policy and the originally engineered design life of the plant, i.e. 40-years of operation. Age related degradation was the only mechanism we identified in the above mentioned determination that could impact the probability or consequences of a previously evaluated accident. However, due to design conservatism, maintenance and surveillance programs, inspection programs and the Plant Technical Specifications, the proposed additional four years and three months of operation will have no significant impact on safety. That is, regardless of the age of the facility, the above mentioned programs and Technical Specifications ensure that components, systems and structures will be refurbished or replaced to maintain their requisite safety function.

2. Radiological Impacts of Annual Releases

a. Onsite Doses

The VYNPS occupational (onsite) exposure trend and comparative magnitude with the industry's average boiling water reactor (BWR) site, based on average annual exposures in terms of person-rem per five-year period, is shown in Figure 2, Vermont Yankee vs. BWR Industry - Five-Year Occupational Exposure Averages, taken from the licensee's April 27, 1989 letter. The data in Figure 2, in regards to both total dose and average dose per worker, indicate that the licensee has implemented a very successful program under 10 CFR 50, Appendix I "As Low as Reasonably Achievable" (ALARA) guidelines. Given the licensee's continued implementation of its ALARA program and the plant's historically stable occupational exposure, we conclude that the average of the 1987 and 1988 exposures of about 220 person-rem, cumulative, will serve as an upper limit in future years of normal operation, i.e. non-reload years and years without major

maintenance such as fuel pool modifications. During the proposed amendment term, it is assumed that the VYNPS will continue to operate with an approximately 18-month long fuel cycle. This would result in a maximum of four refueling outages during the proposed amendment term. Using annual exposures of 700 and 220 person-rem for years with and without typical refueling outages, respectively, it is estimated that the total occupational exposure during the proposed amendment term will be about 3,000 person-rem. This averages to about 600 person-rem per year. This projection is consistent with the plant's recent five-year average occupational exposure level of 534 person-rem per year. All other BWR plants had a five-year average of 691 person-rem per year in this same time period. The expected exposures for the plant are in accordance with 10 CFR 20 and Regulatory Guide 8.8.

b. Offsite Doses

Appendix I guidelines on ALARA were briefly discussed above in regard to on-site doses; however, these guidelines also apply to releases that could cause offsite doses. In addition, routine releases to the environment are governed by 10 CFR 20.1(c), which states that such releases should be as low as reasonably achievable. Appendix I is more explicit in that it establishes radioactive design/dose objectives for liquid and gaseous offsite releases including iodine/particulate radionuclides. Figure 3, Summary of OffSite Appendix I Radiation Exposure

Limits and Actual Performance Data (as millirem) provides a comparison of Appendix I limits with consolidated plant operating data. This figure is derived from the licensee's letter of April 27, 1989. A review of the values in Figure 3 indicates that the actual performance of the plant to control and limit liquid gaseous radioactive releases has been well within the Appendix I radiation exposure limit objectives. There have been no radioactive liquid releases in nine of the past twelve years and none in the past seven years. The plant has demonstrated its ability to hold up, process and reuse waste water to a degree that has not necessitated the routine release of significant radioactive liquid wastes.

The licensee has demonstrated, see Figure 3, that the gaseous Radwaste System is capable of limiting releases associated with both routine operations and special occurrences, such as reloads, to a fraction of ALARA design objectives.

Based on the continued operation of the plant's existing liquid and gaseous radwaste systems, we conclude that the anticipated offsite doses during the period covered by the proposed license amendment would remain a fraction of 10 CFR 50, Appendix I limits.

The volume of solid waste at the VYNPS has been below that generated at the average BWR. In addition, the licensee has committed to further reduce the amount generated in future years.

The staff concludes that the releases from the plant, both onsite and offsite, have remained within the bounds of the FES and have complied with the applicable portions of 10 CFR 20 and 50 as discussed above. As a consequence, we would expect releases during the proposed license extension period to remain within these bounds.

3. Environmental Impact of the Uranium Fuel Cycle

The VYNPS reactor contains 368 fuel bundles. Until recently, the plant has operated in a twelve to fourteen month fuel cycle. However, due to improved fuel designs, the plant is currently in an eighteen month fuel cycle. This has reduced the demand for fissile uranium.

The additional period of reactor operation requested by the licensee will increase the need for fissile uranium over the plant's operating lifetime. The licensee assumes that operation will continue utilizing an eighteen month fuel cycle. There will be a cumulative increase in the use of uranium due to the lengthened period of operation. This cumulative increase will have an insignificant environmental impact. The total number of fuel assemblies that will be used and that will need to be stored if the amendment request is granted is 3,545. The number predicted in the FES in 1972 for 40 years of operation was 3,500 fuel assemblies. Thus, the prediction made in the FES and the current prediction are substantially similar as regards uranium use and the need for storage or disposal of spent fuel.

The environmental impacts, both radiological and non-radiological, attributable to transportation of fuel and waste to and from plant sites, with respect to normal conditions of transport and possible accidents in transport have been assessed in several generic environmental impact statements. These assessments represent the contribution of such transportation to annual environmental costs including dose per reactor year to exposed transportation workers and to the general public. These annual environmental costs, which are displayed in Table S-4 of the Commission's regulations, 10 CFR §51.52, would not be changed by the extended period of operation.

Based on the above, the staff concludes that there are no significant changes in the environmental impact related to the uranium fuel cycle due to the proposed extended operation of the VYNPS.

4. Non-Radiological Impacts

The major non-radiological impact of the plant on the environment is through the operation of the plant's cooling systems. There are three modes of operation of the Condenser Cooling System. This is the system that transports waste heat from the condensers to the heat sink. There are two heat sink paths at VYNPS, first to the Connecticut River then indirectly to the atmosphere or directly to the atmosphere. The three modes of operation are: open, closed and hybrid cycle. The open cycle uses the river for waste

heat discharge, the closed cycle uses mechanical draft cooling towers and transports heat directly to the atmosphere and the hybrid cycle is a combination of the open and closed cycles. The use of the open cycle is the normal mode of operation. However, occasionally, the requirements of the National Pollution Discharge Elimination System (NPDES) permit enforce use of the other two modes in order to reduce thermal effects on the Connecticut River. This permit is issued by the State of Vermont and is renewed on a five-year cycle.

The NPDES permit requirements serve to protect fish, organisms in the river and migratory wildlife that use the river from the impacts of plant operations. In addition, the permit insures satisfaction of the pertinent requirements of the federal Clean Water Act and the State of Vermont water quality standards. The impacts of the plant on the river and the environment have been within the predictions of the FES, have remained stable during plant operation and the licensee is required to continue to monitor the non-radiological impacts by the terms of the Operating License requirements and the NPDES permit.

Other non-radiological impacts of the proposed license extension involve the following factors:

a. Short-Term Use Versus Long-Term Productivity

The plant has maintained an average capacity factor of about 70% since start of commercial operation. The average for all U. S. nuclear plants is 60%. The plant has maintained an excellent safety record during this period and the NRC systematic assessment of licensee performance (SALP) gave the VYNPS a high rating. We stated in our March 7, 1990 Final SALP Report, covering the most current interval, in regards to licensee performance, "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." The staff expects that the level of performance noted above will continue during the remaining license period and during the requested extension period.

b. Irreversible and Irretrievable Commitment of Resources

The FES stated in its discussion of this factor, in regard to the initial plant construction as well as projected operation, "These commitments are small compared with the need for production of essential electrical energy

for this area." While the population in the immediate plant vicinity has not experienced growth, the service area demand has increased since issuance of the operating license. While there have been modifications to the plant since the original license was issued, these have involved only readily available construction materials, not materials in short supply. The staff has not determined the need for any significant resource commitments necessary as a result of the proposed license extension.

c. Historic Preservation

Through the requirements of Section 106 of the National Historic Preservation Act, the staff has an obligation to make a determination as to the impact of the proposed license extension on any significant nearby historical or archeological sites. The FES contained a Section entitled, Historic Significance that dealt with this issue in depth. The Governor Hunt house, located at the site boundary, is the only nearby identified historical site. The Vermont Archeological Society and excavations for site construction did not identify any archeological materials nor fossils of any significance. The licensee in their letter of April 27, 1989 identified the Governor Hunt house as the only nearby historic property. The licensee has restored this property and has pledged to maintain it. In addition, the licensee investigated other historic sites in the three state area for any signs of deterioration caused by plant operation; no evidence of such deterioration was discovered. Based on the above, the staff has determined that the proposed license extension would have no adverse affect on any historic property.

5. Plant Modifications

Many modifications and design changes have taken place at the plant since original construction. Those that involve an unreviewed safety question or require a change to the Technical Specifications are submitted to the NRC for prior review and approval. This review includes a determination of the environmental effects of the proposed change. As provided by our regulations, other changes may be implemented by the licensee without prior NRC approval. The licensee must first perform a safety evaluation for any such changes, subject to NRC inspection and audit. The licensee also submits such changes to the staff in an Annual Report, which is reviewed by the staff. A complete detailed description of all the changes including a summary of the safety evaluation is included in the annual update of the Final Safety Analysis Report (FSAR). The staff reviews the FSAR updates to verify that the changes did not require prior NRC review and approval. In general, these changes improve plant reliability and do not adversely impact the environment. While it is recognized that the requested license extension will possibly result in further routine design changes and modifications similar in nature to those already conducted, it is not anticipated that these would have any adverse impact on the environment.

6. Conclusion on Environmental Impacts

Based on the above, we conclude that the proposed extension will not have any significant impact on the environment.

ALTERNATIVES TO THE PROPOSED ACTION

One alternative to the proposed license extension would be to deny the application. This would require the plant to shut down upon expiration of the current operating license. Another alternative, presented by the licensee in their April 27, 1989 submittal and derived from a study performed by the Amos Tuck Business School at Dartmouth College, would be the construction of an oil-fired plant to replace the electrical generation of the VYNPS. The licensee performed an analysis of the costs of power generation and the environmental impacts of such an oil-fired plant. During the period of the license extension, the licensee stated that VYNPS would provide power to the public for about \$443 million less than the alternative. The alternate plant would have many, real, adverse environmental impacts that would contribute to the amount of acid rain in the Northeast region of the United States and to global warming. The staff examined the licensee's cost analysis and concluded that it is reasonable. Based on the above considerations, the staff concludes that continued operation of the plant for the license extension period remains the most economical and environmentally attractive alternative.

ALTERNATIVE USE OF RESOURCES

This action does not involve the use of resources not previously considered in the FES in relation to the operation of the plant.

AGENCIES AND PERSONS CONSULTED

The Commission made a proposed determination that the amendment involves no significant hazards consideration which was published in the Federal Register (54 FR 31120) on July 26, 1989. The State of Vermont has intervened in the issuance of this proposed license amendment; this action has resulted in ongoing contacts between the staff and the State.

BASIS AND CONCLUSION FOR NOT PREPARING AN ENVIRONMENTAL IMPACT STATEMENT

The conclusions of the July 1972 Final Environmental Statement remain valid and operation of the plant has demonstrated that its impact on the environment has been within the bounds predicted by the FES. The staff has reviewed the proposed license amendment relative to the requirements set forth in 10 CFR Part 51. Based on this assessment, the staff concludes that there are no significant radiological or non-radiological impacts associated with the proposed action and that the issuance of the proposed license amendment will have no significant impact on the quality of the human environment. Therefore, pursuant to 10 CFR 51.31, an environmental impact statement need not be prepared for this action.

Dated at Rockville, Maryland this *21st* day of *June* 1990.

FOR THE NUCLEAR REGULATORY COMMISSION

RH Wessman

Richard H. Wessman, Director
Project Directorate I-3
Division of Reactor Projects I/II

Figure 1

Summary of Population Projections
for Vermont Yankee

Area (Mile)	Original FSAR (1969) 2000	Revised FSAR (1982) 2000	Current 2007	ER (1971) 2010	Current 2012	Difference Between (as %)			
						Current 2012 and Orig. FSAR 2000	Current 2012 and Rev. FSAR 2000	Current 2012 and ER 2010	Current 2012 and 2007
0 - 5*	12,566	10,076	11,112	11,770	11,823	-5.9	+17.3	+0.4	+6.3
5 - 10	35,811	33,164	27,704	22,130	28,556	-20.2	-13.8	+29.0	+3.0
0 - 10	48,377	43,240	38,816	33,900	40,379	-16.5	-6.6	+19.1	+4.0
10 - 50	N/A	1,761,410	1,440,243	1,672,200	1,467,232	N/A	-12.2	-16.8	+1.9
0 - 50	N/A	1,804,650	1,479,059	1,706,100	1,507,611	N/A	-11.6	-16.4	+1.9

* Reflects Low Population Zone

Figure 2

Vermont Yankee vs. BWR Industry Five-Year Occupational Exposure Averages

Five-Year Interval	Total Dose (Person Rem)		Average Dose Per Worker (Rem)	
	Vermont Yankee	BWRs	Vermont Yankee	BWRs
1974-1978	275	690	0.45	1.05
1975-1979	466	687	0.60	0.91
1976-1980	703	815	0.70	0.87
1977-1981	767	891	0.70	0.85
1978-1982	756	896	0.71	0.80
1979-1983	994	969	0.76	0.80
1980-1984	880	1,067	0.76	0.80
1981-1985	823	936	0.59 (b)	(c)
1982-1986	914	915 (a)	0.57 (b)	(c)
1983-1987	934	817 (a)	0.51 (b)	(c)
1984-1988	534	691 (a)	0.36 (b)	(c)

Source: "Occupational Radiation Exposure at Commercial Nuclear Power Reactors," NUREG-0713, Volume 6, 1984.

- (a) INPO performance indicators for the U.S. Nuclear Utility Industry.
- (b) Plant records.
- (c) Not available.

Figure 3

Summary of Off-Site Appendix I Radiation
Exposure Limits and Actual Performance Data
(as mrem)

Parameter	Appendix I Limits	1976 Vermont Yankee Radwaste System Design Review Limit	Maximum Dose Received From Plant Since 1976
Liquid	≤3	2.2 x 10 ⁻²	5.0 x 10 ⁻⁴
Gaseous	≤5	1.2	0.32
Iodine and Particulates	≤15	3.8	0.32