March 13, 1984

Docket No. 50-271

Mr. J. B. Sinclair
Licensing Engineer
Vermont Yankee Nuclear Power Corporation
1671 Worcester Road
Framingham, Massachusetts 01701

Dear Mr. Sinclair:

The Commission has issued the enclosed Amendment No. 81 to Facility Operating License No. DPR-28 for the Vermont Yankee Nuclear Power Station. The amendment consists of changes to the Technical Specifications in response to your application dated May 26, 1983.

The amendment revises the Technical Specifications to accommodate shifts in transition temperature for the reactor pressure vessel materials that were induced by radiation damage. These shifts are accounted for by revision of the plant pressure-temperature limits for heating up and cooling down the reactor vessel. Periodic review and adjustment, if necessary, of the curves to account for the effects of irradiation are required by 10 CFR 50, Appendices G & H.

A copy of the Safety Evaluation is also enclosed.

Sincerely,

Original signed by/

Vernon L. Rooney, Project Manager
Operating Reactors Branch #2
Division of Licensing

Enclosures:
1. Amendment No. 81 to License No. DPR-28
2. Safety Evaluation

cc w/enclosure:
See next page

DISTRIBUTION	Extra - 5			
Docket File	DEisenhut	SECY	TBarnhart (4)	ACRS (10)
NRC PDR	SNorris	LJHarmon	WJones	OPA, CMiles
Local PDR	VRooney	ELJordan	DBrinkman	RDiggs
ORB#2 Reading	OELD	JNGrace	BJElliot	Gray File

DL:ORB#2	DL:ORB#2	DL:ORB#2	OELD	DL:AD-OR	DE:MTEB
SNorris:ajs	VRooney	DVassallo	Eychmans	GLainas	BJE 2/29/84
02/29/84	02/29/84	02/29/84	03/2 /84	03/12/84	

Mr. J. B. Sinclair
Vermont Yankee Nuclear Power Corporation
Vermont Yankee Nuclear Power Station

cc:

Mr. W. F. Conway
President & Chief Executive Officer
Vermont Yankee Nuclear Power Corp.
R. D. 5, Box 169
Ferry Road
Brattleboro, Vermont 05301

Mr. Louis Heider, Vice President
Vermont Yankee Nuclear Power Corp.
1671 Worcester Road
Framingham, Massachusetts 01701

New England Coalition on Nuclear
Pollution
Hill and Dale Farm
R. D. 2, Box 223
Putney, Vermont 05346

Mr. Walter Zaluzny
Chairman, Board of Selectman
Post Office Box 116
Vernon, Vermont 05354

J. P. Pelletier, Plant Manager
Vermont Yankee Nuclear Power Corp.
Post Office Box 157
Vernon, Vermont 05354

Raymond N. McCandless
Vermont Division of Occupational
& Radiological Health
Administration Building
10 Baldwin Street
Montpelier, Vermont 05602

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

John A. Ritscher, Esquire
Ropes & Gray
225 Franklin Street
Boston, Massachusetts 02110

W. P. Murphy, Vice President &
Manager of Operations
Vermont Yankee Nuclear Power Corp.
R. D. 5, Box 169
Ferry Road
Brattleboro, Vermont 05301

U. S. Environmental Protection
Agency
Region I Office
Regional Radiation Representative
JFK Federal Building
Boston, Massachusetts 02203

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

Vermont Yankee Decommissioning
Alliance
5 State Street
Box 1117
Montpelier, Vermont 05602

Resident Inspector
U. S. Nuclear Regulatory Commission
Post Office Box 176
Vernon, Vermont 05354

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

Thomas A. Murley
Regional Administrator
Region I Office
U. S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, Pennsylvania 19406

Mr. Richard Saudek, Commissioner
Vermont Department of Public Service
120 State Street
Montpelier, Vermont 05602

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

VERMONT YANKEE NUCLEAR POWER CORPORATION

DOCKET NO. 50-271

VERMONT YANKEE NUCLEAR POWER STATION

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 81
License No. DPR-28

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Vermont Yankee Nuclear Power Corporation (the licensee) dated May 26, 1983 complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. DPR-28 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 81 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Domenic B. Vassallo, Chief
Operating Reactors Branch #2
Division of Licensing

Attachment:
Changes to the Technical
Specifications

Date of Issuance: March 13, 1984

ATTACHMENT TO LICENSE AMENDMENT NO. 81

FACILITY OPERATING LICENSE NO. DPR-28

DOCKET NO. 50-271

Revise the Technical Specifications as follows:

Remove	Insert
111	111
117	117

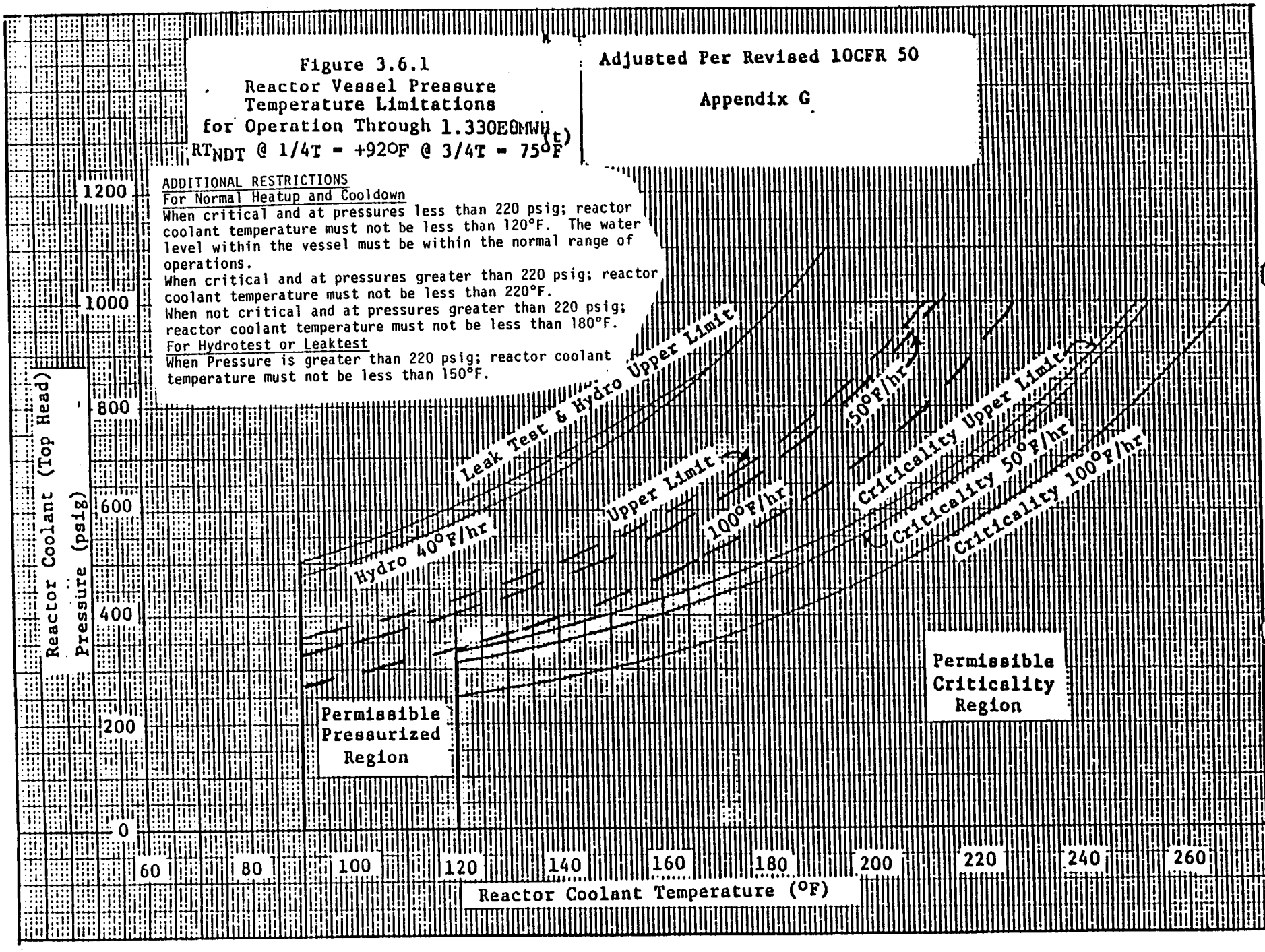
Figure 3.6.1
Reactor Vessel Pressure
Temperature Limitations
for Operation Through 1.330E0MWt(E)
RTNDT @ 1/4T = +92°F @ 3/4T = 75°F
Adjusted Per Revised 10CFR 50
Appendix G
ADDITIONAL RESTRICTIONS
For Normal Heatup and Cooldown
When critical and at pressures less than 220 psig; reactor coolant temperature must not be less than 120°F. The water level within the vessel must be within the normal range of operations.
When critical and at pressures greater than 220 psig; reactor coolant temperature must not be less than 220°F.
When not critical and at pressures greater than 220 psig; reactor coolant temperature must not be less than 180°F.
For Hydrotest or Leaktest
When Pressure is greater than 220 psig; reactor coolant temperature must not be less than 150°F.
Reactor Coolant (Top Head) Pressure (psig)
1200
1000
800
600
400
200
0
60
80
100
120
140
160
180
200
220
240
260
Reactor Coolant Temperature (°F)
Leak Test & Hydro Upper Limit
Hydro 40°F/hr
Upper Limit
100°F/hr
50°F/hr
Criticality Upper Limit
Criticality 50°F/hr
Criticality 100°F/hr
Permissible Pressurized Region
Permissible Criticality Region

Bases

3.6 & 4.6 REACTOR COOLANT SYSTEM

A. Pressure and Temperature Limitations

All components in the Reactor Coolant System are designed to withstand the effects of cyclic loads due to system temperature and pressure changes. These cyclic loads are introduced by normal load transients, reactor trips, and startup and shutdown operations. The various categories of load cycles used for design purposes are provided in Section 4.2 of the FSAR. During startup and shutdown, the rates of temperature and pressure changes are limited so that the maximum specified heatup and cooldown rates are consistent with the design assumptions and satisfy the stress limits for cyclic operation.

During heatup, the thermal gradients in the reactor vessel wall produce thermal stresses which vary from compressive at the inner wall to tensile at the outer wall. These thermal induced compressive stresses tend to alleviate the tensile stresses induced by the internal pressure. Therefore, a pressure-temperature curve based on steady state conditions (i.e., no thermal stresses) represents a lower bound of all similar curves for finite heatup rates when the inner wall of the vessel is treated as the governing locations.

The heatup analysis also covers the determination of pressure-temperature limitations for the case in which the outer wall of the vessel becomes the controlling location. The thermal gradients established during heatup produce tensile stresses at the outer wall of the vessel. These stresses are additive to the pressure induced tensile stresses which are already present. The thermal induced stresses at the outer wall of the vessel are tensile and are dependent on both the rate of heatup and the time along the heatup ramp; therefore, a lower bound curve similar to that described for the heatup of the inner wall cannot be defined. Subsequently, for the cases in which the outer wall of the vessel becomes the stress controlling location, each heatup rate of interest must be analyzed on an individual basis.

In order to prevent undue stress on the vessel nozzles and bottom head region, the recirculation loop temperatures should be within 50°F of each other prior to startup of an idle loop.

The reactor vessel materials have been tested to determine their initial nil-ductility transition temperature (NDTT) of 40°F maximum. An additional margin of 20°F has been added in order to estimate reference temperature, RT_{NDT}. Reactor operation and resultant fast neutron (E >1 Mev) irradiation will cause an increase in the RT_{NDT}. Therefore, an adjusted reference temperature can be predicted using current industry practices (GE SIL No. 14, Supplement No. 1) based on recent GE surveillance data. The pressure/temperature limit curve, Figure 3.6.1, includes predicted adjustments for this shift in RT_{NDT} for operation through 1.330×10^8 MWH(t), as well as adjustments for possible errors in the pressure and temperature sensing instruments.

Amendment No. 81

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 81 TO FACILITY OPERATING LICENSE NO. DPR-28

VERMONT YANKEE NUCLEAR POWER CORPORATION

VERMONT YANKEE NUCLEAR POWER STATION

DOCKET NO. 50-271

Introduction

By letter dated May 26, 1983, the Vermont Yankee Nuclear Power Corporation, the licensee, requested a change to the Vermont Yankee Reactor Vessel Pressure Temperature Limits, which are part of the Vermont Yankee Nuclear Power Station (VYNPS) Technical Specifications, in order to meet the safety margins required by Appendix G, 10 CFR 50, "Fracture Toughness Requirements." Appendix G requires that reactor vessel materials be monitored by a material surveillance program conforming to the "Reactor Vessel Material Surveillance Program Requirements" set forth in Appendix H. A revision to Appendix G was published in the Federal Register on May 27, 1983 and became effective on July 26, 1983. The revised Appendix G, 10 CFR 50, requires that all reactor vessel pressure-temperature limit curves include additional safety margins for the closure flange region of the vessel.

The licensee has submitted two sets of reactor vessel pressure temperature limit curves. The licensee stated that one set of curves conforms to the safety margins of Appendix G that was effective prior to July 26, 1983, and the second set of curves conforms to the safety margins of Appendix G, which became effective after July 26, 1983. Both sets of curves were to be valid for the interval of reactor operating time corresponding to 133 million MWH(t). Because this evaluation was performed after the revised Appendix G became effective, the evaluation addresses only the curve applicable to the rule which became effective July 26, 1983.

Evaluation

The length of time a set of pressure temperature curves remains valid is determined by estimating the amount of shift in reference temperature (RT_{NDT}) for the limiting reactor vessel material. The amount of shift in RT_{NDT} is dependent upon the amount of neutron fluence and residual elements, especially copper and nickel, in the limiting reactor vessel material. According to the licensee, the limiting material in the Vermont Yankee reactor vessel is a plate which has 0.10 percent copper and 0.63 percent nickel.

The licensee has estimated the amount of neutron fluence using a linear relationship between neutron fluence and megawatt thermal power, which was recommended by General Electric in Service Information Letter No. 14, Rev. 1, dated June 9, 1980. This relationship is 1000 MWD(t) = 8 x 10^{13} n/cm^2 (E 1 MeV). The Vermont Yankee dosimetry analysis indicates that for the Vermont Yankee reactor vessel the relationship between neutron fluence and megawatt thermal power, as recommended by General Electric, has a safety factor of approximately 4. We believe that the factor of 4 of neutron fluence will provide sufficient margin to account for the simplifying assumption that the neutron flux is linear with thermal power. Hence, we have utilized the General Electric relationship for determining the amount of neutron fluence corresponding to 133 million MWH(t).

The first Vermont Yankee reactor vessel material surveillance capsule was removed in April 1983. The material test results from this capsule have not been completed. Since there are no plant-specific test data available from the Vermont Yankee reactor vessel material surveillance program, we have utilized the "Guthrie Formula" for determining the amount of shift in RT_{NDT} for the limiting reactor vessel material. The "Guthrie Formula" is identified in Appendix E of Commission Report SECY-82-465, "Pressurized Thermal Shock" and has 95 percent confidence limits of ± 48°F. We have estimated that shift in RT_{NDT} using (a) the "Guthrie Formula," (b) the copper and nickel content for the limiting material, which was reported by the licensee (c) the neutron fluence, which was calculated in accordance with the method recommended by General Electric, and (d) the "Guthrie Formula" upper 95 percent confidence limits.

We have evaluated the licensee's pressure-temperature limit curve using the previously discussed method for estimating the shift in RT_{NDT} and the calculational methods in Standard Review Plan Section 5.3.2.

We have required certain additional restrictions which we have listed as "Additional Restrictions" on Figure 3.6.1 of the proposed Technical Specifications. These restrictions must be observed during normal heatup/cooldown, core critical operations, and during hydrostatic testing in order to meet the closure flange pressure temperature safety margins of the revised regulation (effective after July 26, 1983). The licensee, in a telecon on February 22, 1984, agreed with the staff to these additional restrictions in order to make the Technical Specifications agree with the revised regulation. The changes do not affect the discussion or conclusion of the initial notice of this action in the Federal Register in any way. The staff finds the changes to be acceptable because they are required by the revised regulation, and the explicit inclusion of these requirements in the Technical Specifications will be consistent with the Standard Technical Specification practice of fully expressing the reactor vessel pressure temperature limitations.

Environmental Considerations

We have determined that the amendment does not authorize a change in effluent types or total amounts nor an increase in power level and will not result in any signficant environmental impact. Having made this determination, we have further concluded that the amendment involves an action which is insignificant from the standpoint of environmental impact and, pursuant to 10 CFR §51.5(d)(4), that an environmental impact statement, or negative declaration and environmental impact appraisal need not be prepared in connection with the issuance of this amendment.

Conclusion

We have concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (2) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: B. J. Elliot

Dated: March 13, 1984