March 23, 1977

Docket No.: 50-271

Yankee Atomic Electric Company
ATTN: Mr. Robert H. Groce
Licensing Engineer
20 Turnpike Road
Westboro, Massachusetts 01581

Gentlemen:

The Commission has issued the enclosed Amendment No. 33 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 November 9, 1976.

This amendment revises the pressure-temperature limitations in order to comply with 10 CFR Part 50, Appendix G, "Fracture Toughness Requirements." It also establishes a surveillance capsule removal schedule to assure compliance with 10 CFR Part 50, Appendix H, "Reactor Vessel Material Surveillance Program Requirements."

Copies of the Safety Evaluation and the Federal Register Notice are also enclosed.

Sincerely,

Robert W. Reid, Chief
Operating Reactors Branch #4
Division of Operating Reactors

Enclosures:
1. Amendment No. 33
2. Safety Evaluation
3. Federal Register Notice

cc w/enclosures:
See next page

distribution:
Docket
NRC PDR
Local PDR
ORB#4 Rdg.
VStello
KRGoller/TJCarter
RIngram
PDiBenedetto
Attorney, OELD
OI&E - 5
BJones - 4
BScharf - 10
JMcGough
BHarless
DEisenhut
ACRS - 16
OPA, Clare Miles
DRoss
Gray File
XTra Cy File - 4

OFFICE ▶	ORB#4:DOR	~~ORB#4:DOR~~	OELD	C-ORB#4:DOR		
SURNAME ▶	RIngram	PDiBenedetto		RWReid		
DATE ▶	3/11/77	3/17/77	3/23/77	3/23/77		

NRC Form 318 (2-76) NRCM 02040 ☆U.S. GOVERNMENT PRINTING OFFICE: 1976—634—782

cc w/enclosure(s):
Mr. James E. Griffin, President
Vermont Yankee Nuclear Power Corporation
77 Grove Street
Rutland, Vermont 05701

Mr. Donald E. Vandenburgh, Vice President
Vermont Yankee Nuclear Power Corporation
Turnpike Road, Route 9
Westboro, Massachusetts 01581

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

Gregor I. McGregor, Esquire
Assistant Attorney General
Department of the Attorney General
State House, Room 370
Boston, Massachusetts 02133

Richard E. Ayres, Esquire
Natural Resources Defense Council
917 - 15th Street, N. W.
Washington, D. C. 20005

Honorable M. Jerome Diamond
Attorney General
State of Vermont
109 State Street
Pavilion Office Building
Montpelier, Vermont 05602

John A. Calhoun
Assistant Attorney General
State of Vermont
109 State Street
Pavilion Office Building
Montpelier, Vermont 05602

Anthony Z. Roisman, Esquire
Berlin, Roisman and Kessler
1025 15th Street, N.W., 5th Floor
Washington, D. C. 20005

Brooks Memorial Library
224 Main Street
Brattleboro, Vermont 05301

John R. Stanton, Director
Radiation Control Agency
Hazen Drive
Concord, New Hampshire 03301

John W. Stevens
Conservation Society of
Southern Vermont
P. O. Box 256
Townshend, Vermont 05353

Mr. David M. Scott
Radiation Health Engineer
Agency of Human Services
Division of Occupational Health
P. O. Box 607
Barre, Vermont 05641

New England Coalition on
Nuclear Pollution
Hill and Dale Farm
West Hill - Faraway Road
Putney, Vermont 05346

Mr. Raymond H. Puffer
Chairman
Board of Selectman
Vernon, Vermont 05354

Chief, Energy Systems
Analyses Branch (AW-459)
Office of Radiation Programs
U. S. Environmental Protection
Agency
Room 645, East Tower
401 M Street, S.W.
Washington, D.C. 20460

Yankee Atomic Electric
Company

U. S. Environmental Protection
Agency
Region I Office
ATTN: EIS COORDINATOR
JFK Federal Building
Boston, Massachusetts 02203

cc w/enclosures and cy of VY's
filing dtd.: 11/9/76
Public Service Board
State of Vermont
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. 33
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 November 9, 1976, 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 3.B. of Facility Operating License No. DPR-28 is hereby amended to read as follows:

   B. Technical Specifications

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 33 , 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

Robert W. Reid, Chief
Operating Reactors Branch #4
Division of Operating Reactors

Attachment:
Changes to the Technical
Specifications

Date of Issuance: March 23, 1977

ATTACHMENT TO LICENSE AMENDMENT NO. 33

FACILITY OPERATING LICENSE NO. DPR-28

DOCKET NO. 50-271

Revise Appendix A Technical Specifications as follows:

Remove Pages	Insert Pages
105 & 106R	105 & 106
111	111
-	111a & 111b
117 & 118	117 & 118

The changed areas on the revised pages are shown by marginal lines.

3.6 LIMITING CONDITIONS FOR OPERATION

3.6 REACTOR COOLANT SYSTEM

Applicability:

Applies to the operating status of the reactor coolant system.

Objective:

To assure the integrity and safe operation of the reactor coolant system.

Specification:

A. Pressure and Temperature Limitations

1. The reactor coolant system temperature and pressure shall be limited in accordance with the limit lines shown on Figure 3.6.1 during heatup, cooldown, criticality (except for the purposes of low power physics testing), and in-service leak and hydrostatic testing.
2. The maximum heatup or cooldown rate is 100°F when averaged over any one hour period.
3. The reactor vessel head bolting shall not be tensioned unless the temperature of the vessel head flange and the head is greater than 70°F.
4. The pump in an idle recirculation loop shall not be started unless the temperatures of the coolant within the idle and operating recirculation loops are within 50°F of each other.

4.6 SURVEILLANCE REQUIREMENTS

4.6 REACTOR COOLANT SYSTEM

Applicability:

Applies to the periodic examination and testing requirements for the reactor coolant system.

Objective:

To determine the condition of the reactor coolant system and the operation of the safety devices related to i

Specification:

A. Pressure and Temperature Limitations

1. The reactor coolant temperature and pressure shall be recorded at least once per hour during system heatup, cooldown and inservice leak and hydrostatic testing operations.
2. The reactor coolant temperature and pressure shall be recorded at the time of reactor criticality.
3. When the reactor vessel head bolting is being tightened or loosened the reactor vessel shell temperature immediately below the vessel flange shal be permanently recorded.
4. Prior to and after startup of an idle recirculation loop the temperature of the reactor coolant in the operating and idle loops shall be recorded.

.6 LIMITING CONDITIONS FOR OPERATION

.6 REACTOR COOLANT SYSTEM

B. Coolant Chemistry

1. The steady state radioiodine concentration in the reactor coolant shall not exceed 1.1 microcuries of I-131 dose equivalent per gram of water.

4.6 SURVEILLANCE REQUIREMENTS

4.6 REACTOR COOLANT SYSTEM

Specification:

A. Pressure and Temperature Limitations (cont.)

5. The reactor vessel irradiation surveillance specimens shall be removed and examined to determine changes in material properties in accordance with the following schedule:

CAPSULE	REMOVAL YEAR
1	10
2	30
3	Standby

The results shall be used to update Figures 3.6.2 and 3.6.3. The removal times shall be referenced to the refueling outage following the year specified, referenced to the date of commercial operation.

B. Coolant Chemistry

1. a. A sample of reactor coolant shall be taken at least every 96 hours and analyzed for radioactive iodines of I-131 through I-135 during power operation. In addition, when steam jet air ejector monitors indicate an increase in radioactive gaseous effluents of 25 percent or 5000 uCi/sec, whichever is greater, during steady state reactor operation a reactor coolant sample shall be taken and analyzed for radioactive iodines.

b. An isotopic analysis of a reactor coolant sample shall be made at least once per month.

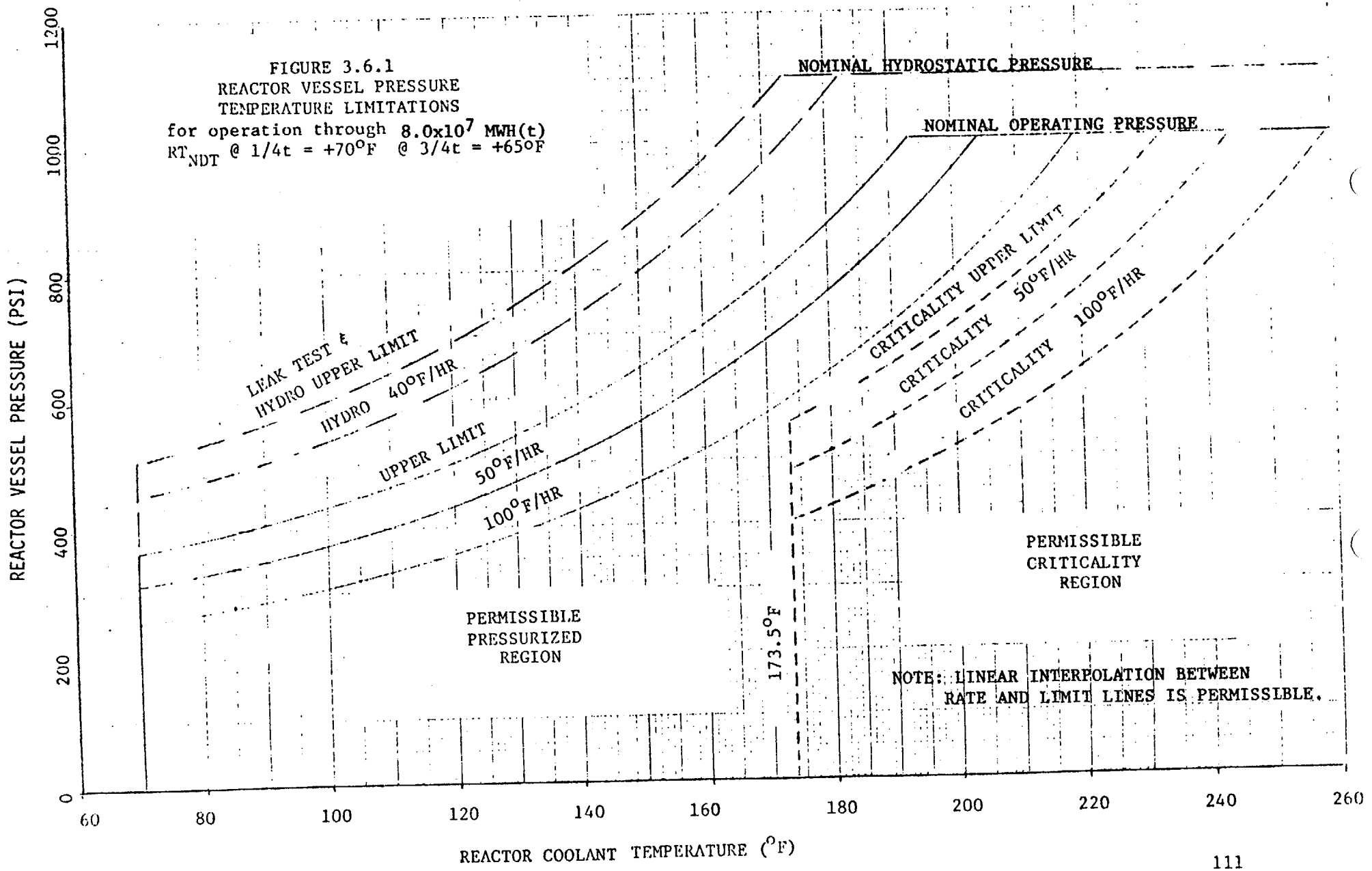


FIGURE 3.6.1
REACTOR VESSEL PRESSURE
TEMPERATURE LIMITATIONS
for operation through 8.0x10^7 MWH(t)
RT_NDT @ 1/4t = +70°F @ 3/4t = +65°F
NOMINAL HYDROSTATIC PRESSURE
NOMINAL OPERATING PRESSURE
LEAK TEST & HYDRO UPPER LIMIT
HYDRO 40°F/HR
UPPER LIMIT 50°F/HR
100°F/HR
CRITICALITY UPPER LIMIT
CRITICALITY 50°F/HR
CRITICALITY 100°F/HR
PERMISSIBLE CRITICALITY REGION
PERMISSIBLE PRESSURIZED REGION
173.5°F
NOTE: LINEAR INTERPOLATION BETWEEN RATE AND LIMIT LINES IS PERMISSIBLE.
REACTOR VESSEL PRESSURE (PSI)
REACTOR COOLANT TEMPERATURE (°F)
0
200
400
600
800
1000
1200
60
80
100
120
140
160
180
200
220
240
260

FIGURE 3.6.2

FAST NEUTRON FLUENCE (E > 1 MEV) AS A FUNCTION

THERMAL ENERGY

REFERENCE: EB Norris, "Vessel Material Surveillance Program for Vermont Yankee Nuclear Power Station," SwRI Project 02-4032, May 23, 1975.

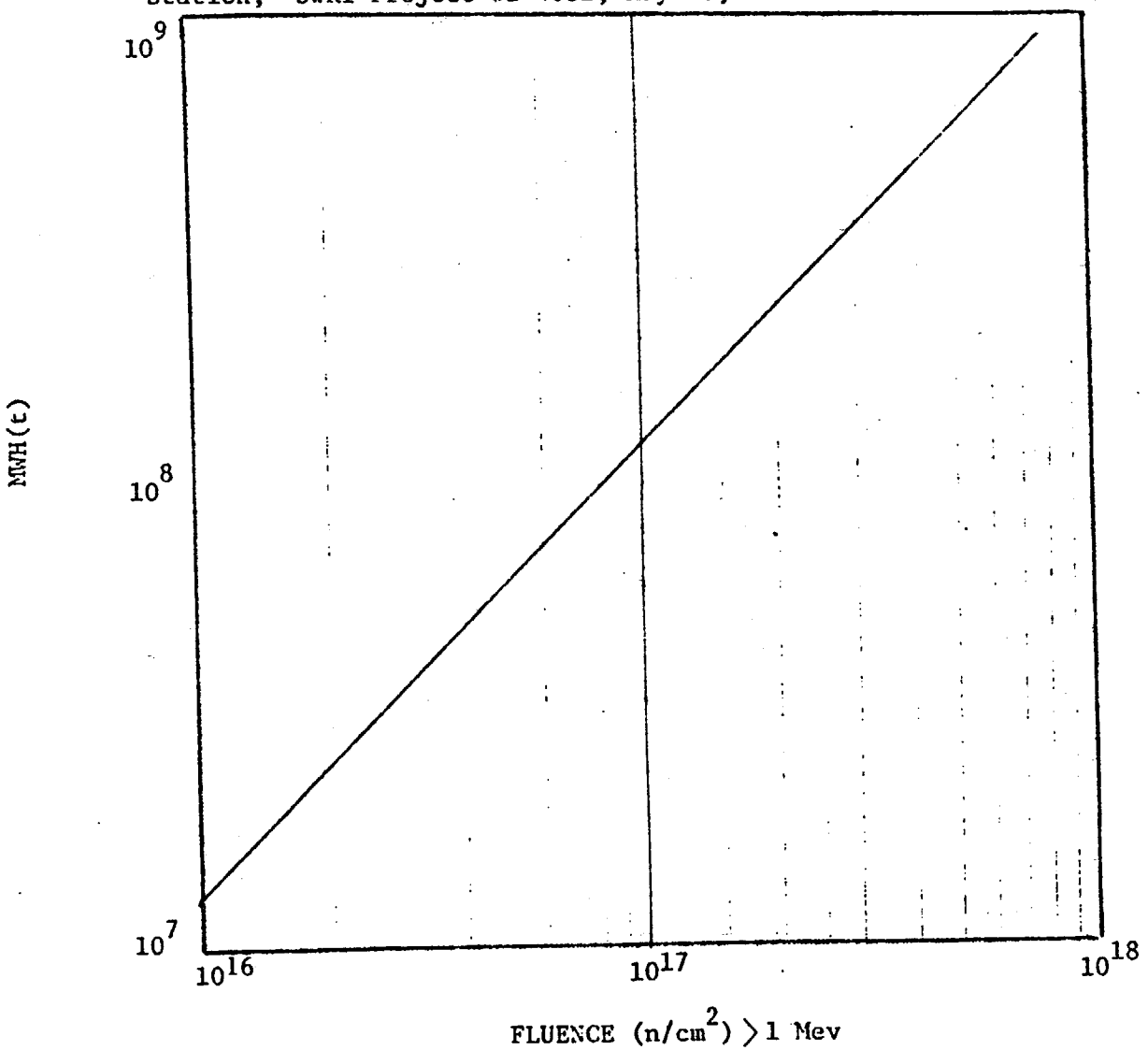
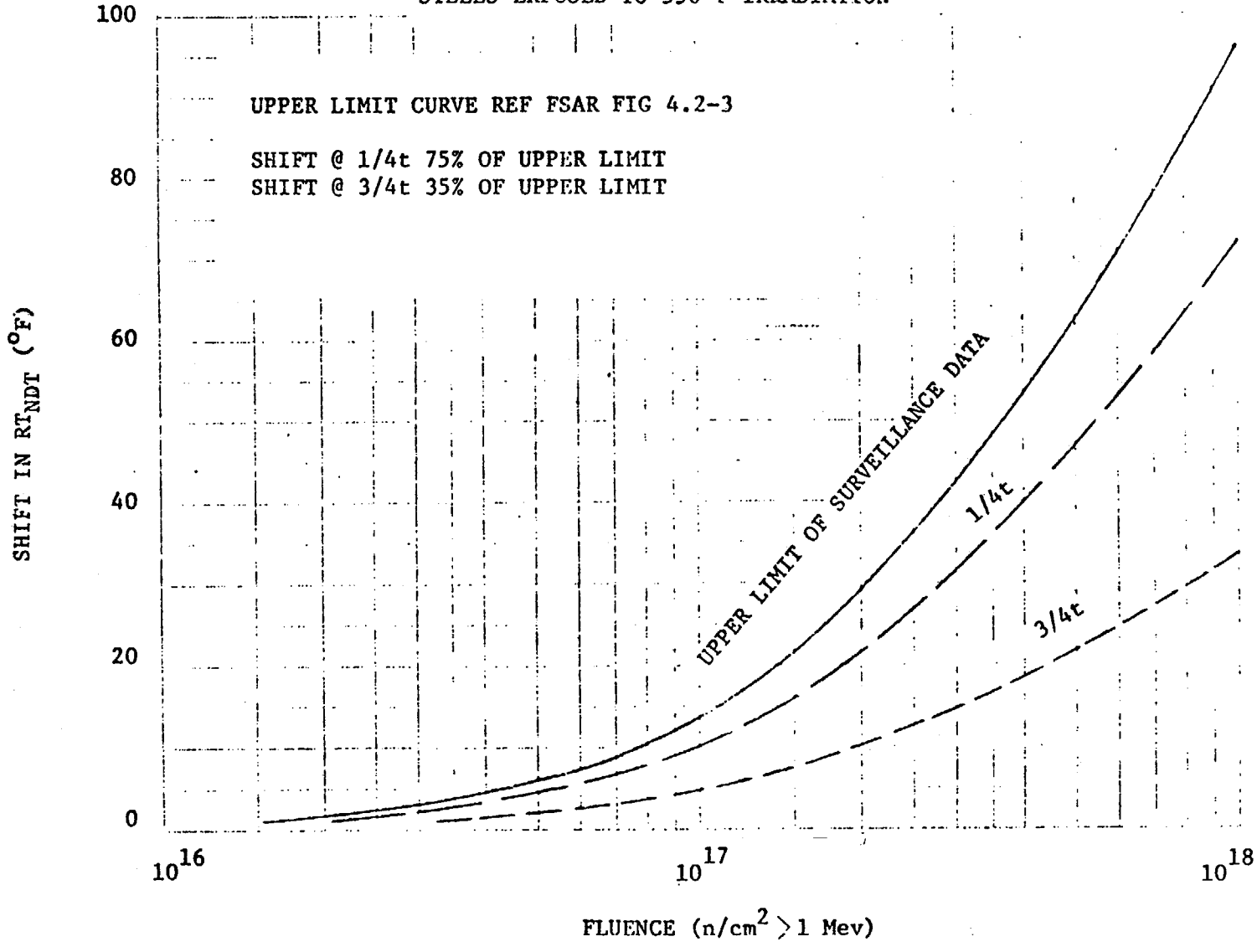


FIGURE 3.6.3

EFFECT OF FLUENCE ON SHIFT OF RT_{NDT} FOR REACTOR VESSEL STEELS EXPOSED TO 550°F IRRADIATION



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 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 Figures 3.6.2 and 3.6.3. The pressure/temperature limit curve Figure 3.6.1 includes predicted adjustments for this shift in RT_{NDT} for operation through 8.0×10^7 MWH(t), as well as adjustments for possible errors in the pressure and temperature sensing instruments.

The actual shift in NDTT of the vessel material will be established periodically during operation by removing and evaluating, in accordance with ASTM E185-73, reactor vessel material irradiation surveillance specimens installed near the inside wall of the reactor vessel in the core area. Since the neutron spectra at the irradiation samples and vessel inside radius are essentially identical, the measured transition shift for a sample can be applied with confidence to the adjacent section of the reactor vessel. In order to estimate the material properties at the 1/4 and

3/4 τ positions in the vessel plate, the shift in NDTT is assumed to be 75% and 35% respectively of the irradiation samples properties. The heatup and cooldown curves must be recalculated when the ΔRT_{NDT} determined from the surveillance capsule is different from the calculated ΔRT_{NDT} for the equivalent capsule radiation exposure.

The pressure-temperature limit lines shown on Figure 3.6.1 for reactor criticality and for inservice leak and hydrostatic testing have been provided to assure compliance with the minimum temperature requirements of Appendix G to 10 CFR 50 for reactor criticality and for inservice leak and hydrostatic testing.

The number of reactor vessel irradiation surveillance specimens and the frequencies for removing and testing these specimens are provided to assure compliance with the requirements of Appendix H to 10 CFR Part 50.

B. Coolant Chemistry

A steady state radioiodine concentration limit of 1.1 μCi of I-131 dose equivalent per gram of water in the reactor coolant system can be reached if the gross radioactivity in the gaseous effluents are near the limit as set forth in Specification 3.8.C.1.a or there is a failure or prolonged shutdown of the cleanup demineralizer. In the event of a steam line rupture outside the drywell, the NRC staff calculations show the resultant radiological dose at the site boundary to be less than 30 Rem to the thyroid. This dose was

In addition, VYNPC proposed a surveillance capsule removal schedule to assure compliance with 10 CFR Part 50, Appendix H, "Reactor Vessel Material Surveillance Program Requirements."

Evaluation

VYNPC proposed a revision to Technical Specification 3.6/4.6A, "Pressure and Temperature Limitations," for VYNPS. The proposed operating limits were calculated in accordance with Appendix G, 10 CFR Part 50, and Standard Review Plan 5.3.2 which includes Branch Technical Position MTEB 5-2. These new operating limits were based on a fluence at the vessel wall inside diameter of 2.9×10^{17} neutrons per square centimeter (n/cm^2) and calculated for operation through 1.3×10^8 megawatt hours thermal (MWH(t)), approximately 13 effective full power years (EFPY). At this point in time the limiting reference temperature (RT_{NDT}) of the vessel was calculated to be 70°F. We find that the calculations performed were in accordance with 10 CFR Part 50, Appendix G, and are therefore acceptable. The basis for the fluence estimation was an analysis performed by Southwest Research Institute on a vessel wall dosimeter removed from the vessel in October 1974. This analysis is presented in Southwest Research Institute Report SWRI Project 02-4032, May 23, 1975. We find that their estimate for fluence at the vessel wall at end of life may be low in view of higher values now estimated for similar facilities. On this basis, we have reduced the time period relating to the pressure-temperature limits proposed in Technical Specification 3.6/4.6A and Figure 3.6.1 from 1.3×10^8 MWH(t) to 8.0×10^7 MWH(t). We have discussed this change with VYNPC and they have agreed. Based on this change, we conclude that the resulting values and the calculational methodology employed are acceptable.

Furthermore, we conclude that the use of Appendix G in establishing safe operating limitations will ensure adequate safety margins during operation, testing, maintenance and postulated accident conditions and therefore constitutes an acceptable basis for satisfying the requirements of NRC General Design Criterion 31, Appendix A, 10 CFR Part 50.

VYNPC's proposed change in the material surveillance capsule removal schedule (Technical Specification 4.6.A.5) is in accordance with Appendix H, 10 CFR Part 50, and we therefore conclude that it is acceptable.

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 significant 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) because the amendment does not involve a significant increase in the probability or consequences of accidents previously considered and does not involve a significant decrease in a safety margin, the amendment does not involve a significant hazards consideration, (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 this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Dated: March 23, 1977

UNITED STATES NUCLEAR REGULATORY COMMISSION

DOCKET NO. 50-271

VERMONT YANKEE NUCLEAR POWER CORPORATION

NOTICE OF ISSUANCE OF AMENDMENT TO FACILITY OPERATING LICENSE

The U. S. Nuclear Regulatory Commission (the Commission) has issued Amendment No. 33 to Facility Operating License No. DPR-28, issued to Vermont Yankee Nuclear Power Corporation (the licensee), which revised Technical Specifications for operation of the Vermont Yankee Nuclear Power Station (the facility) located near Vernon, Vermont. The amendment is effective as of its date of issuance.

This amendment revises the pressure-temperature limitations in order to comply with 10 CFR Part 50, Appendix G, "Fracture Toughness Requirements." It also establishes a surveillance capsule removal schedule to assure compliance with 10 CFR Part 50, Appendix H, "Reactor Vessel Material Surveillance Program Requirements."

The application for the amendment complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations. The Commission has made appropriate findings as required by the Act and the Commission's rules and regulations in 10 CFR Chapter I, which are set forth in the license amendment. Prior public notice of this amendment was not required since the amendment does not involve a significant hazards consideration.

The Commission has determined that the issuance of this amendment will not result in any significant environmental impact and that pursuant to 10 CFR §51.5(d)(4) an environmental statement, or negative declaration and environmental impact appraisal need not be prepared in connection with issuance of this amendment.

For further details with respect to this action, see (1) the application for amendment dated November 9, 1976, (2) Amendment No. 33 to License No. DPR-28, and (3) the Commission's related Safety Evaluation. All of these items are available for public inspection at the Commission's Public Document Room , 1717 H Street, N. W., Washington, D. C. and at the Brooks Memorial Library, 224 Main Street, Brattleboro, Vermont.

A copy of items (2) and (3) may be obtained upon request addressed to the U. S. Nuclear Regulatory Commission, Washington, D. C. 20555, Attention: Director, Division of Operating Reactors.

Dated at Bethesda, Maryland, this 23rd day of March 1977.

FOR THE NUCLEAR REGULATORY COMMISSION

Robert W. Reid, Chief
Operating Reactors Branch #4
Division of Operating Reactors