January 29, 1987

Docket No.: 50-271

Mr. R. W. Capstick
Licensing Engineer
Vermont Yankee Nuclear Power
Corporation
1671 Worcester Road
Framingham, Massachusetts 01701

Dear Mr. Capstick:

The Commission has issued the enclosed Amendment No. 98 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 2, 1984, as clarified by letter dated March 14, 1986. We have also issued at this time changes to the Technical Specifications in response to your application dated December 29, 1981.

The amendment changes the Technical Specifications to provide trip settings, operability requirements and testing requirements for control and instrumentation circuitry which provides protection in case of degraded grid voltage. The amendment also provides limiting conditions of operation and surveillance requirements for noble gas effluent monitors.

A copy of the Safety Evaluation is also enclosed. Notice of Issuance will be included in the Commission's Bi-Weekly Federal Register Notice.

Sincerely,

Original signed by

Vernon L. Rooney, Project Manager
BWR Project Directorate #2
Division of BWR Licensing

Enclosures:
1. Amendment No. 98 to License No. DPR-28
2. Safety Evaluation

cc w/enclosure:
See next page

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1/5/87

Mr. R. W. Capstick
Vermont Yankee Nuclear Power Corporation

Vermont Yankee Nuclear Power
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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. 98
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 2, 1984 as supplemented March 14, 1986, and the application dated December 29, 1981, comply 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. 98 , 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

Daniel R Muller

Daniel R. Muller, Project Director
BWR Project Directorate #2
Division of BWR Licensing

Attachment:
Changes to the Technical
Specifications

Date of Issuance: January 29, 1987

ATTACHMENT TO LICENSE AMENDMENT NO. 98

FACILITY OPERATING LICENSE NO. DPR-28

DOCKET NO. 50-271

Replace the following pages of the Appendix A Technical Specifications with the enclosed pages. The revised areas are indicated by marginal lines.

Pages

34a
49a
49b
49d*
60a
60c*
61
66
67
67a*

*Page added

3.2 LIMITING CONDITIONS FOR OPERATION

3.2 PROTECTIVE INSTRUMENT SYSTEMS

Specification (cont'd)

I. Recirculation Pump Trip Instrumentation

During reactor power operation, the Recirculation Pump Trip Instrumentation shall be operative in accordance with Table 3.2.1.

J. Control Room Toxic Gas Monitoring

Whenever the Control Room is required to be manned, the Toxic Gas Monitoring System shall be operable in accordance with Table 3.2.7.

K. Degraded Grid Protective System

During reactor power operation, the emergency bus undervoltage instrumentation shall be operative in accordance with Table 3.2.8.

4.2 SURVEILLANCE REQUIREMENTS

4.2 PROTECTIVE INSTRUMENT SYSTEMS

Specification (cont'd)

I. Recirculation Pump Trip Instrumentation

The Recirculation Pump Trip Instrumentation shall be functionally tested and calibrated in accordance with Table 4.2.1.

J. Control Room Toxic Gas Monitoring

The Toxic Gas Monitoring System Instrumentation shall be calibrated in accordance with Table 4.2.7.

K. Degraded Grid Protective System

The emergency bus undervoltage instrumentation shall be functionally tested and calibrated in accordance with Table 4.2.8.

TABLE 3.2.6

POST-ACCIDENT INSTRUMENTATION
(continued)

Minimum Number of Operable Instrument Channels	Parameter	Type of Indication	Instrument Range
1/valve	Safety Valve Position From Acoustic Monitor (Note 5)	Meter Z1-2-1A/B	Closed - Open
2	Containment Hydrogen/Oxygen Monitor (Note 1)	Meter SR-VG-6A Meter SR-VG-6B	0-30% hydrogen 0-25% oxygen
2	Containment High-Range Radiation Monitor (Note 6)	Meter RM-16-19-1A/B	1 R/hr-10^7 R/hr
1	Stack Noble Gas Effluent (Note 7)	Meter RM-17-155	0.1 - 10^7 mR/hr

TABLE 3.2.6

POST-ACCIDENT INSTRUMENTATION
(continued)

TABLE 3.2.6 NOTES

Note 1 - From and after the date that a parameter is reduced to one indication, operation is permissible for 30 days. If a parameter is not indicated in the Control Room, continued operation is permissible during the next seven days. If indication cannot be restored within the next six hours, an orderly shutdown shall be initiated and the reactor shall be in a hot shutdown condition in six hours and a cold shutdown condition in the following 18 hours.

Note 2 - Control rod position and neutron monitor instruments are considered to be redundant to each other.

Note 3 - From and after the date that this parameter is reduced to one indication in the Control Room, continued reactor operation is permissible during the next 30 days. If both channels are inoperable and indication cannot be restored in six hours, an orderly shutdown shall be initiated and the reactor shall be in a hot shutdown condition in six hours and a cold shutdown condition in the following 18 hours.

Note 4 - From and after the date that safety/relief valve position from pressure switches is unavailable, reactor operation may continue provided safety/relief valve position can be determined from Recorder #2-166 (thermocouple, 0-600°F) and Meter #16-19-48 (torus water temperature, 60-180°F). If both indications are not available, the reactor shall be in a hot shutdown condition in six hours and a cold shutdown condition in the following 18 hours.

Note 5 - From and after the date that safety valve position from the acoustic monitor is unavailable, reactor operation may continue provided safety valve position can be determined from Recorder #2-166 (thermocouple, 0-600°F) and Meter #16-19-29A or B (containment pressure 0-275 psia). If both indications are not available, the reactor shall be in a hot shutdown condition in six hours and in a cold shutdown condition in the following 18 hours.

Note 6 - Within 30 days following the loss of one indication, or seven days following the loss of both indications, restore the inoperable channel(s) to an operable status or a special report to the Commission pursuant to Specification 6.7 must be prepared and submitted within the subsequent 14 days, outlining the action taken, the cause of the inoperability, and the plans and schedule for restoring the system to operable status.

Note 7 - From and after the date that this parameter is unavailable by Control Room indication and cannot be restored within 24 hours, continued reactor operation is permissible for the next 30 days provided that local sampling capacity is available. If the Control Room indication cannot be restored within 30 days, the reactor shall be in hot shutdown within 6 hours and in cold shutdown within the subsequent 24 hours.

TABLE 3.2.8

Emergency Bus Undervoltage Instrumentation

Minimum Number of Operable Instruments	Parameter	Trip Setting	Required Action
2 per bus	Degraded Bus Voltage - Voltage (27/3Z, 27/3W, 27/4Z, 27/4W)	3,700 volts ±40 volts	Note 1
2 per bus	Degraded Bus Voltage - Time Delay (62/3W, 62/3Z, 62/4W, 62/4Z)	10 seconds ± 1 second	Note 2

TABLE 3.2.7 NOTES

1. If the minimum number of operable instrument channels are not available, the inoperable channel shall be tripped using test jacks or other permanently installed circuits within one hour.

2. If the minimum number of operable instrument channels are not available, reactor power operation is permissible for only 7 successive days unless the system is sooner made operable.

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TABLE 4.2.6

CALIBRATION REQUIREMENTS

POST-ACCIDENT INSTRUMENTATION (Cont)

Parameter	Calibration	Instrument Check
Containment Hydrogen/Oxygen Monitor	Once/Operating Cycle	Once each day
Containment High-Range Radiation Monitor	Once/Operating Cycle	Once each day
Stack Noble Gas Effluent	Every Operating Cycle (a Functional Test to be performed quarterly)	Once each day

TABLE 4.2.8

Emergency Bus Undervoltage Instrumentation

Trip System	Functional Test	Calibration (8)
Degraded Bus Voltage	See Note 10	Once/Operating Cycle

TABLE 4.2 NOTES

1. Initially once per month; thereafter, a longer interval as determined by test results on this type of instrumentation.

2. During each refueling outage, simulated automatic actuation which opens all pilot valves shall be performed such that each trip system logic can be verified independent of its redundant counterpart.

3. Trip system logic calibration shall include only time delay relays and timers necessary for proper functioning of the trip system.

4. This intrumentation is excepted from functional test definition. The functional test will consist of injecting a simulated electrical signal into the measurement channel.

5. Check control rod position indication while performing the surveillance requirement of Section 3.3.

6. Functional tests, calibrations and instrument checks are not required when these instruments are not to be operable or tripped. Functional tests shall be performed before each startup with a required frequency not to exceed once per week. Calibration shall be performed prior to or during each startup or controlled shutdown with a required frequency not to exceed once per week. Instrument checks shall be performed at least once per day during those periods when instruments are required to be operable.

7. This instrumentation is excepted from the functional test definitions and shall be calibrated using simulated electrical signals once every three months.

8. Functional tests and calibrations are not required when systems are not required to be operable.

9. The thermocouples associated with safety/relief valves and safety valve position, that may be used for backup position indication, shall be verified to be operable every operating cycle.

10. Separate functional tests are not required for this instrumentation. The calibration and integrated ECCS tests which are performed once per operating cycle will adequately demonstrate proper equipment operation.

3.2 (Continued)

standby gas treatment system operation so that none of the activity released during the refueling accident leave the Reactor Building via the normal ventilation stack but that all activity is processed by the standby gas treatment system. Trip settings for the monitors in the ventilation duct are based upon initiation of the normal ventilation isolation and standby gas treatment system operation at a radiation level equivalent to the maximum release rate of $0.08/E_{\gamma}$ Ci/sec given in Specification 3.8.C.1.a. The monitoring system in the plant stack represents a backup to this system to limit gross radioactivity releases to the environs.

The purpose of isolating the mechanical vacuum pump line is to limit release of radioactivity from the main condenser. During an accident, fission products would be transported from the reactor through the main steam line to the main condenser. The fission product radioactivity would be sensed by the main steam line radiation monitors which initiate isolation.

Post-accident instrumentation parameters for Containment Pressure, Torus Water Level, Containment Hydrogen/Oxygen Monitor, and Containment High-Range Radiation Monitor, are redundant, environmentally and seismically qualified instruments provided to enhance the operators' ability to follow the course of an event. The purpose of each of these instruments is to provide detection and measurement capability during and following an accident as required by NUREG-0737 by ensuring continuous on-scale indication of the following: containment pressure in the 0 to 275 psia range; torus water level in the 0 to 25 foot range (i.e., the bottom to 5 feet above the normal water level of the torus pool); containment hydrogen/oxygen concentrations (0 to 30% hydrogen and 0 to 25% oxygen); and containment radiation in the 1 R/hr to 10^7 R/hr gamma. The Control Room Toxic Gas Monitor assures that the Control Room operators, wherever required to be in the Control Room, will be adequately protected against the effects of an accidental release of toxic gases and that the plant can be safely operated or shut down under design basis accident conditions.

The Degraded Grid Protective System has been installed to assure that safety-related electrical equipment will not be subjected to sustained degraded voltage. This system incorporates voltage relays on 4160 Volt Emergency Buses 3 and 4 which are set to actuate at the minimum voltage required to prevent damage of safety-related equipment.

If Degraded Grid conditions exist for 10 seconds, either relay will actuate an alarm to alert operators of this condition. Based upon an assessment of these conditions the operator may choose to manually disconnect the off-site power. In addition, if an ESF signal is initiated in conjunction with low voltage below the relay setpoint for 10 seconds, the off-site power will be automatically disconnected.

4.2 PROTECTIVE INSTRUMENTATION

The protective instrumentation systems covered by this Specification are listed in Table 4.2. Most of these protective systems are composed of two or more independent and redundant subsystems which are combined in a dual-channel arrangement. Each of these subsystems contains an arrangement of electrical relays which operate to initiate the required system protective action.

The relays in a subsystem are actuated by a number of means, including manually-operated switches, process-operated switches (sensors), bistable devices operated by analog sensor signals, timers, limit switches, and other relays. In most cases, final subsystem relay actuation is obtained by satisfying the logic conditions established by a number of these relay contacts in a logic array. When a subsystem is actuated, the final subsystem relay(s) can operate protective equipment, such as valves and pumps, and can perform other protective actions, such as tripping the main turbine generator unit.

With the dual-channel arrangement of these subsystems, the single failure of a ready circuit can be tolerated because the redundant subsystem or system (in the case of high pressure coolant injection) will then initiate the necessary protective action. If a failure in one of these circuits occurs in such a way that an action is taken, the operator is immediately alerted to the failure. If the failure occurs and causes no action, it could then remain undetected, causing a loss of the redundancy in the dual-channel arrangement. Losses in redundancy of this nature are found by periodically testing the relay circuits in the subsystems to assure that they are operating properly.

It has been the practice in boiling water reactor plants to functionally test protective instrumentation sensors and sensor relays on-line on a monthly frequency. Since logic circuit tests result in the actuation of plant equipment, testing of this nature was done while the plant was shutdown for refueling. In this way, the testing of equipment would not jeopardize plant operation. However, a refueling interval could be as long as eighteen months, which is too long a period to allow an undetected failure to exist.

This specification is a periodic testing program which is based upon the overall on-line testing of protective instrumentation systems, including logic circuits as well as sensor circuits. Table 4.2 outlined the test, calibration, and logic system functional test schedule for the protective instrumentation systems. The testing of a subsystem includes a functional test of each relay wherever practicable. The testing of each relay includes all circuitry necessary to make the relay operate, and also the proper functioning of the relay contacts. Functional testing of the inaccessible temperature switches associated with the isolation systems is accomplished remotely by application of a heat source to individual switches.

All subsystems are functionally tested, calibrated, and operated in their entirety if practicable. Certain exceptions are necessary because the actuation of certain relays would jeopardize plant operation or present an operational hardship.

4.2 (Continued)

For example, certain relays trip recirculation system discharge valves, and the actuation of these relays would cause a severe plant transient. In cases of this nature, the devices in the relay circuit will be tested, but the relay will only be actuated during a refueling outage. The number of relays in this category is very small compared to the total number of identical relays being tested on-line.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 98 TO FACILITY OPERATING LICENSE NO. DPR-28

VERMONT YANKEE NUCLEAR POWER CORPORATION

VERMONT YANKEE NUCLEAR POWER STATION

DOCKET NO. 50-271

1.0 INTRODUCTION

A degraded grid voltage condition occurred at Millstone Nuclear Power Station on July 5, 1976 which caused component failures in the class 1E electric system of Unit 2. An NRC Generic letter of June 3, 1977 transmitted to Vermont Yankee Nuclear Power Corporation (the licensee) a statement of the staff positions relative to the emergency power systems for operating reactors. It required that licensees develop plant modifications including appropriate technical specification changes or that they provide an analysis to show that the existing facility has equivalent capabilities and protective functions. Included in the NRC staff positions was a requirement for automatic separation from the off-site grid.

In response to the degraded grid voltage problem and the NRC request, the licensee conducted tests and analysis to determine the plant modifications, technical specification changes, and operating procedures required to assure that class 1E electrical equipment would not be damaged. The licensee made plans to install voltage sensing devices on the class 1E buses with coincident logic and with the low voltage set points above values where equipment damage could occur. The voltage sensing devices would cause the off-site grid power supply to be disconnected from the class 1E system above voltages where the damage could occur. The class 1E buses upon being disconnected would then be supplied power from their respective emergency diesel generator, EDG. However, New England licensees of operating power reactors, including Vermont Yankee Nuclear Power Corporation, were concerned that significant degradation of the grid would result if the above automatic disconnection occurred. This was a result of the large number of nuclear plants in the New England area. It was their view that automatic disconnection from the grid should only be required if a low grid voltage occurred at the same time as a Loss of Coolant Accident (LOCA). The licensee agreed that should their plant have a LOCA at the same time there was a degraded grid voltage condition, they would automatically disconnect from the off-site grid. The EDGs would then supply power to the class 1E systems. However, if there was a degraded grid voltage condition without a LOCA, the operator would take the necessary manual action to protect the class 1E system. This proposal by the licensee has been reviewed and accepted by the NRC. It was the intent of the NRC that Vermont Yankee Nuclear Power Corporation develop technical specifications to provide for degraded grid voltage protection.

By letters dated November 2, 1984 and March 14, 1986, the licensee proposed changes to the technical specifications to provide for degraded grid voltage protection. This Safety Evaluation deals with those changes.

By letter dated December 29, 1981, the licensee also proposed technical specification changes pertaining to limiting conditions of operation and surveillance requirements for the high range noble gas effluent monitor.

2.0 DISCUSSION

Hardware changes were made by the licensee in the control and instrumentation circuitry for the emergency 4160 volt buses. These changes provide alarms for operator information and action to ensure protection under conditions of degraded grid voltage. The changes also provide for automatic actions in the event of degraded grid voltage coincident with a LOCA. The changes incorporate reactor protection system trip settings and alarms, specify minimum numbers of operable instruments, functional tests and calibration requirements. These changes are reflected in new Technical Specification Items 3.2.J, 4.2.J, Table 3.2.7, and Table 4.2.7 including Footnote 10, all of which were included in the licensee's November 2, 1984 and March 14, 1986 submittals.

High range noble gas monitor operability requirements are reflected in Table 3.2.6 and surveillance requirements in Table 4.2.6 of the proposed Technical Specifications.

Each Technical Specification change is reviewed separately as described below.

-- Section 3.2. LCO

Add new paragraph J "Degraded Grid Protection System" which requires emergency bus undervoltage instrumentation to be operative in accordance with new Table 3.2.7.

-- Section 4.2 Surveillance

Add new paragraph J "Degraded Grid Protection System" which requires emergency bus undervoltage instrumentation to be functionally tested and calibrated in accordance with new Table 4.2.7.

-- Table 3.2.6 Post Accident Instrumentation

Add new Table 3.2.6 requirements for minimum number of operable instruments and instrument range for the stack noble gas effluent monitor.

-- Table 3.2.7 Emergency Bus Undervoltage Instrumentation

Add new Table 3.2.7 requirements for minimum number of operable instruments for emergency bus undervoltage, trip settings and required actions.

Table 3.2.7 requires a minimum of 2 per bus operable instruments for sensing degraded voltage and 2 per bus for time delay.

Trip setting values for undervoltage are established at 3700 ± 40 volts and time delay is established at 10 ± 1 second.

If an emergency bus voltage instrument becomes inoperable, action is required to trip it within one hour.

If the emergency bus voltage time delay circuit becomes inoperable, action is required to make it operable or cease reactor power operations within 7 days.

-- Table 4.2.7 Calibration Requirements

Add new Table 4.2.7 requirements for calibration and instrument check for the stack noble gas effluent monitor.

-- Table 4.2.7 Emergency Bus Undervoltage Instrumentation

Add new Table 4.2.7 requirements for the calibration and functional tests of the degraded bus voltage instrumentation trip system once per operating cycle.

New footnote 10 provides for functionally testing once per operating cycle the instrumentation via the relay calibration surveillance and integrated ECCS tests.

3.0 EVALUATION

By letters dated November 2, 1984, March 14, 1986, and December 29, 1981, the licensee proposed changes to the technical specifications to incorporate setpoints and tolerances, limiting conditions for operation and surveillance requirements for the degraded grid protection system and the stack noble gas effluent monitor. The staff's evaluation of these technical specifications follows:

-- The changes proposed add undervoltage relays to monitor the voltage on the 4160 volt emergency buses and as such constitute an additional limitation and control not presently included in the Vermont Yankee Technical Specifications. These changes are consistent with the staff's request.

-- The degraded grid voltage system design is consistent with the 10 CFR 50 Appendix A General Design Criterion 17.

-- Voltage analysis studies submitted to NRC by licensee letter dated March 17, 1980 substantiate the degraded grid undervoltage relay setpoints and time delays to assure trip at a voltage level above that which could cause safety related equipment damage.

-- Degraded grid voltage in conjunction with an ESF actuation will automatically disconnect offsite power, start emergency diesels, and automatically sequence loads onto the bus. Load shedding and reinstatement of class 1E loads is accomplished without manual reset actions. Safety equipment is protected from a low voltage condition.

-- Degraded grid voltage without an ESF actuation will provide alarm which will provide the plant operators with time to attempt grid improvement and if that fails, the operator can then proceed to onsite emergency power. Operator action enhances plant safety by allowing the operator to evaluate the conditions and take appropriate actions to assure that the plant's auxiliary electrical system is connected to the most reliable power supply and that transients on the plant and reactor are minimized.

-- The degraded grid voltage system design is consistent with existing similar protective circuitry in satisfying the applicable requirements of IEEE Standard 279-1971 "Criterion for Protection Systems for Nuclear Power Generating Stations."

-- Coincident Circuits and time delay are included to preclude undesired actions due to transients or single failure.

-- The staff generic letter 83-36, dated November 1, 1983, provided technical specification guidance pertaining to Item II.F.1.1 of NUREG 0737 which dealt with noble gas effluent monitors. The requirement proposed by the licensee for local sampling within 24 hours if the stack monitor is out of service is consistent with staff requirements. The proposed requirement for plant shutdown within 30 days if control room indication can not be restored satisfied the staff concern that appropriate action be taken to restore operational capability in a reasonable period of time. Surveillance requirements proposed by the licensee are consistent with staff requirements for similar instrumentation.

Based on the above, the staff concludes that the proposed technical specifications enhance the overall margin of safety in the event of a degraded grid voltage condition, provide acceptable operability and surveillance requirements for the stack noble gas effluent monitor, and are consistent with the guidance issued by the Commission. Therefore, the staff finds the licensee's proposed technical specifications to be acceptable.

4.0 ENVIRONMENTAL CONSIDERATIONS

This amendment chages a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration and there has been no public comment on such finding. Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursant to 10 CDR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

5.0 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 the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: Carl H. Woodard and V. L. Rooney

Dated: January 29, 1987