VERMONT YANKEE
NUCLEAR POWER CORPORATION

RD 5, Box 169, Ferry Road, Brattleboro, VT 05301

REPLY TO:
ENGINEERING OFFICE
1671 WORCESTER ROAD
FRAMINGHAM, MASSACHUSETTS 01701
TELEPHONE 617-872-8100

May 15, 1984
FVY 84-46

United States Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Office of Nuclear Reactor Regulation
Mr. Domenic B. Vassallo, Chief
Operating Reactors Branch No. 2
Division of Licensing

References: (a) License No. DPR-28 (Docket No. 50-271)
(b) Letter, USNRC to VYNPC, NVY 82-177, dated November 2, 1982
(c) Letter, VYNPC to USNRC, FVY 82-128, dated December 7, 1982

Subject: Degraded Grid Voltage Protection

Dear Sir:

By Reference (b), you requested additional information in order to complete your review of our proposed scheme for degraded grid voltage protection at our facility. By Reference (c), we committed to providing this information prior to implementing the associated design modification, which is scheduled to be installed during our 1984 refueling outage. The requested information is provided as Enclosure 1 to this letter.

We trust that this information will allow you to complete your review; however, should you need additional information, please contact us.

Very truly yours,

VERMONT YANKEE NUCLEAR POWER CORPORATION

J B. Sinclair

J. B. Sinclair
Licensing Engineer

JBS/kg

Enclosure

A015
1/1

ENCLOSURE 1

Response to NRC Request for Additional Information
of November 2, 1982
Vermont Yankee Degraded Grid Voltage Protection

Item (1)

Provide the details on how the load shedding feature will be bypassed when the on-site Emergency Diesel Generators are supplying power to the Class 1E buses, and how this feature will be reinstated if an on-site Emergency Diesel Generator breaker should trip.

Response

Loss of normal AC power, or low emergency bus voltage for ten seconds in conjunction with an accident, will cause the following sequence of events:

a) The diesel generator will start.

b) The bus tie breaker between the emergency bus and the off-site power source will open, and

c) The emergency bus will shed loads.

Once the diesel generator is at its required operating voltage, the diesel generator breaker closes, and the emergency bus loads are sequenced onto the bus. While the diesel generator is supplying the emergency bus, the load shed relays are locked out to prevent load shedding. Additional load shed relays will be installed to reinstate load shedding if the diesel generator breaker trips.

Item (2)

Provide Technical Specifications to cover the setpoints and tolerances, limiting conditions for operation, and surveillance testing for the under-voltage protective relaying system.

Response

Draft Technical Specifications are provided as Attachment A. A formal operating license amendment request will be written following the installation of the design modification (August 1984). The amendment request will be submitted to the NRC by October 1984, following the completion of the necessary internal review and approval process.

Item (3)

Provide plant operating procedures to cover operator action under degraded grid and non-accident conditions.

Summary of Low Grid Voltage Alarm Response Procedure

Degraded grid voltage during normal plant operation will actuate an alarm in the Control Room. The operator will investigate the cause of the alarm by checking the voltage of the emergency buses and the 115 kV and 345 kV buses.

If the cause of low voltage condition is internal to the plant, the operator will take the appropriate action to restore normal voltage by transfering loads, or by using bus ties, etc.

If the low voltage condition is attributed to the grid, the operator will contact the Rhode Island, Eastern Massachusetts, and Vermont Energy Control (REMVEC) System Operator to request an assessment of the degraded grid condition, and to take action to restore normal voltage. Should restoration fail, the operator will start the emergency diesel generator. After ensuring the diesel generators are running, the operator will disconnect the off-site power source and notify higher plant management to determine further action.

The Alarm Response Procedure is presently being finalized and will be approved and implemented prior to startup from the 1984 refueling outage. A copy of the draft procedure is provided as Attachment B. Copies of the subsequent final procedure can be made available for your review at our plant site.

DRAFT

I. RECIRCULATION PUMP TRIP INSTRUMENTATION

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

J. LOSS OF POWER INSTRUMENTATION

During reactor power operation, the Loss of Power Instrumentation shall be operative in accordance with Table 3.2.7.

I. RECIRC PUMP TRIP INSTRUMENTATION

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

J. LOSS OF POWER INSTRUMENTATION

The Loss of Power Instrumentation shall be functionally tested and calibrated in accordance with Table 4.2.7.

DRAFT

TABLE 3.2.7

Loss of Power Instrumentation

Loss of Power			
2	Degraded Bus Voltage - Voltage (27/3Z, 27/3W, 27/4Z, 27/4W)	3,700 volts ± 40 Volts	Note 1
	Degraded Bus Voltage - Time (62/3W, 62/3Z, 62/4W, 62/4Z)	10 seconds ± 1 second	

TABLE 3.2.1 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. If the channel cannot be tripped by the means stated above, that channel shall be made operable within 24 hours or an orderly shutdown shall be initiated and the reactor shall be in the cold shutdown condition within 24 hours.

DRAFT

TABLE 4.2.7

Loss of Power Instrumentation

Loss of Power			
Trip System	Functional Test (8)	Calibration (8)	Instrument Check
Degraded Bus Voltage	Once/Operating Cycle	Once/Operating Cycle	--

Draft

OP 3140 (Alarm Annunciator Response Sheets)

CRP 9-8 8-C 4-C

LOW GRID VOLTAGE WITHOUT AN ACCIDENT SIGNAL.

Causes:

1. Emergency bus voltage ≤3700 volts
2. Emergency Bus De-energized.
3. Relay failure or blown control power fuse.

   Relay Locations

   a. SWGR #3 Compartment 1A
   b. SWGR #4 Compartment 9

4. Diesel generator operating with low voltage regulator setting.
5. Malfunction or overload of unit auxiliary transformer or start-up transformer.
6. 345 KV bus voltage low.
7. 115 KV bus voltage low.

Actions:

1. Check voltage on all 4160 volt buses.
   Bus #3 Computerpoint E006
   Bus #4 Computerpoint E007

2. Determine if the low voltage can be attributed to the grid by observing the 345 KV and 115 KV bus voltage.

3. Determine if the low voltage is caused by a malfunction or overload of the unit auxiliary transformer or start-up transformers. Low voltage from transformer malfunction or overload may be indicated by normal voltage on 345 KV and 115 KV buses and low voltage on 4160 volt buses.

4. Check position on bus tie breakers 3T1 and 4T2.

5. Check diesel generator voltage if operating.

6. Advise REMVEC that safety bus voltage is at a critical point and determine what type of transient the grid is undergoing. If short term recovery is likely, then maintain the load. If short term recovery is unlikely and no positive action is planned by the REMVEC dispatcher proceed as follows:

   a) Start the diesel generators and pick up the load on the safety buses.

NOTE

Opening breakers 3T1 and 4T2 will result in partial load shed on 4KV and 480 volt safety buses.

b) Disconnect the safety buses from the off-site power source by opening 4KV tie breakers 3T1 and 4T2 and maintain safety bus loads with the diesel generators.

c) Refer to OP 3103, Loss of Normal Power Emergency Procedure, for direction on load shed recovery and restore loads as necessary.

d) Notify higher plant management to determine further action and refer to AP 3125 and AP 0156 to determine any emergency plan or notification requirements.

SRP/pd 404.56.1