AUG 1 1991

Docket No. 50-271 License No. DPR-28

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

Dear Mr. Murphy:

SUBJECT: EXAMINATION REPORT 50-271/91-02, VERMONT YANKEE RESPONSE TO EMERGENCY OPERATING PROCEDURE ISSUES

Your July 1, 1991, letter responded to the NRC April 19, 1991, letter regarding the Vermont Yankee emergency operating procedures (EOPs). Your letter described actions to update the Vermont Yankee Plant Specific Technical Guideline (PSTG), to develop a linkage document to reflect the relationship between the Vermont Yankee implementing procedures and the PSTG, and to verify the process using an independent consultant expert. Your actions should assist in developing documentation that demonstrates that the EOPs implement the accident mitigation strategies contained in the BWR Owners Group Emergency Procedure Guidelines and also provide the NRC staff the necessary information to determine the adequacy of the Vermont Yankee EOPs. Your actions as well as the items listed below will be examined during a future inspection of your licensed activities.

As described in your letter, your EOP philosophy is to utilize both symptom based flowchart format procedures and supplemental procedures to implement the EOP guidelines. During the NRC inspection, the supplemental procedures will be reviewed in part to determine that they are included in the same validation and verification program as the symptom based flowchart format procedures.

Your response to item 5 does not identify whether the PSTG will be modified to make it clear that commencing reactor depressurization at normal cooldown rates to below 200 psig (based on reaching a torus temperature of 120°F) will only be performed when it is determined that the reactor will remain shutdown during the depressurization.

Your response to item 7 provides the definition of a secondary containment area as a functional area rather than a physical area. Using a functional definition and only considering loss of areas for both redundant trains of a required safety or critical function may not provide the same level of protection

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for secondary containment. Additional NRC staff and licensee discussions and reviews are required to assess whether your approach is adequate.

Sincerely,

Lee H. Bettenhausen, Chief
Operations Branch
Division of Reactor Safety

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References: a) License No. DPR-28 (Docket No. 50-271)
b) Letter, USNRC to VYNPC (NVY 91-70), Requalification Program Evaluation and Operational Evaluations, Report No. 50/271/91-02 (OL), dated April 19, 1991
c) Letter, USNRC to VYNPC (NVY 90-238), Inspection Report 50-271/90-16, dated December 27, 1990
d) Letter, VYNPC to USNRC (BVY 90-082), Status of Vermont Yankee Procedure Generation Package and Corresponding Emergency Operating Procedures, dated July 24, 1990
e) Letter, USNRC to VYNPC (NVY 90-118), Safety Evaluation for Vermont Yankee Nuclear Power Station Procedures Generation Package (TAC No. 44347), dated June 7, 1990
f) NRC Safety Evaluation Report - BRWOG Emergency Procedures Guidelines, Revision 4, dated June 7, 1990
g) Letter, USNRC to VYNPC (NVY 88-160), Emergency Operating Procedure (EOP) Inspection (50-271/88-200), dated August 10, 1988

Dear Sir:

Subject: **Vermont Yankee Response to Report No. 50-271/91-02, Additional Information Regarding Emergency Operating Procedures (EOPs)**

As a result of the Emergency Operating Procedure (EOP) review conducted as part of the Licensed Operator Requalification Program Evaluation performed at our facility during the period of February 25 to March 1, 1991, Reference b) requested that we provide you with additional information regarding our technical justifications for the items discussed in Attachment 7 of Reference b). This request is based on an unresolved item relating to the adequacy of several of our justifications for departing from the accident mitigation strategy of Revision 4 of the BWR Owners Group Emergency Procedures Guidelines (EPGs). The attachment to this letter provides detailed responses to the concerns raised in Attachment 7 to Reference b).

To address the issue in an efficient and effective manner, we are presently in the process of performing a complete review, verification, and validation of our Procedure Generation Package (PGP) and EOPs. The PGP which include our Writer's Guide and our Plant Specific Technical Guidelines (PSTGs), the technical justifications for differences from Revision 4 of the EPGs. It is our plan to resolve all issues related both to our internal review and the NRC inspection and include the appropriate revisions within an updated PGP and EOPs. In order to ensure that our EOPs properly implement the EPG accident mitigation strategies and provide our operators with the best possible guidance, the verification will be performed by an independent consultant expert in the area of EPGs. If our verification and validation effort identifies any deviations from positions presented in this letter, they will be submitted for your review.

We expect to incorporate the updates to the PGP and the EOPs so that they may be used for training beginning October 1, 1991. The Writer's Guide included within the updated PGP will also address the issues presented in Reference e). Following the updates, documentation will be maintained at our facility and will be available for inspection.

We trust that the above information is satisfactory; however, should you have any questions or desire any additional information on this issue, please do not hesitate to contact us.

Very truly yours,

Vermont Yankee Nuclear Power Corporation

Warren P. Murphy
Senior Vice President, Operations

cc: USNRC Regional Administrator, Region I
USNRC Resident Inspector, VYNPS
USNRC Project Manager, VYNPS

ATTACHMENT 1

Response to NRC Concerns
Vermont Yankee PSTG/EPG Revision 4 Differences

Summary:

Our technical justifications for deviations from the BWR Owners Group Emergency Procedures Guidelines (EPGs) result from our method of implementing the Plant Specific Technical Guidelines (PSTGs). Specifically, the PSTGs provide the overall guidance for implementation of the EPGs at Vermont Yankee. Where other specific Vermont Yankee operating and emergency procedures implement the guidance provided by the EPGs, this is recognized as a deviation from the EPGs and suitable justification is provided for not including the action in the core EOPs (i.e., OE 3101 through OE 3106). Vermont Yankee fully endorses the implementation of the accident mitigation strategies contained in the EPGs.

To document this philosophy, we are currently in the process of updating our PGP, and specifically the PSTGs, to ensure they more accurately reflect this concept. We will also develop a "linkage document" which will reflect the inter-relationships between the Vermont Yankee implementing procedures and the PSTGs.

Supplement 1 to NUREG-0737 requires that plant-specific technical guidelines include plant-specific information justifying safety-significant differences from the generic technical guidelines. Safety-significance, in this context, is not defined. Per NUREG-1358, the technical guidelines should be sufficiently documented to show the flow of information from the analytical basis to the guideline. Therefore, in order to demonstrate adequate justification for a specific deviation, the analytical basis for the generic guideline must first be known. In isolated cases, an analytical basis does not exist. Rather, the bases presented in the EPGs result from industry consensus drawn from operational experience of the various BWR types and systems, with differing organizational structures and operating philosophies.

Since some of the NRC identified inadequacies of our technical justifications for deviations from the EPGs lie in the area of insufficient analysis supporting the deviation, part of the above described revision workscope will include a more thorough presentation of both the generic technical basis and our reasoning supporting the deviation and its relationship to Vermont Yankee's BWR type and systems, as well as our organizational structure and operating philosophy.

1) **EPG Statement:**

RPV Control Guideline Entry Condition - RPV pressure above [1045 psig (high RPV pressure scram setpoint)].

PSTG, Revision 6 Statement:

N/A

Basis for NRC Concern:

"The VY PSTG does not describe unique design features or provide analysis that would justify deleting this symptom as an entry condition into symptom based emergency operating procedures."

Response:

In the case of a high RPV pressure condition, the symptom-based, flowchart-formatted procedure OE-3100, "Scram Procedure," is entered whenever a condition exists where RPV pressure is above the scram setpoint, i.e., a scram condition exists. The operator is then directed to control RPV water level and pressure, monitor SRV actuations, initiate Torus cooling as required, and commence RPV depressurization and cooldown in a manner consistent with the PSTGs. If an ATWS or low RPV water level condition exists, the operator is directed to execute OE-3101, "RPV Control Procedure," concurrently, where the additional RPV pressure control actions described in the PSTGs are performed.

The Vermont Yankee PSTGs will be revised to include the above RPV Control Guideline Entry Condition.

The addition of this entry condition to the PSTGs will not affect the actions directed by the Vermont Yankee EOPs. The PSTGs RPV Control Guideline is implemented via OE-3100 and OE-3101, as described above. This ensures a consistent accident mitigation strategy should an event subsequently degrade and prevents concurrent, conflicting instructions regarding the control of RPV parameters. As discussed in the Summary section of this Attachment, the implementation of the PSTG guidance in this manner is considered a deviation from the EPGs and justification will be included in our "linkage document" which will reflect the inter-relationships between the Vermont Yankee implementing procedures and the PSTGs.

2) **EPG Statement:**

RPV Control Guideline Entry Condition - Drywell pressure above [2.0 psig (high drywell pressure scram setpoint)].

PSTG, Revision 6 Statement:

N/A

Basis for NRC Concern:

"The VY PSTG does not describe unique design features or provide analysis that would justify deleting this symptom as an entry condition into symptom based emergency operating procedures."

Response:

In the case of a high drywell pressure condition, the symptom-based, flowchart-formatted procedure OE-3100, "Scram Procedure," is entered whenever a condition exists where drywell pressure is above the scram setpoint, i.e., a scram condition exists. The operator is then directed to control RPV water level and pressure, monitor SRV actuations, initiate Torus cooling as required, and commence RPV depressurization and cooldown in a manner consistent with the PSTGs. If the high drywell pressure is caused by an ATWS or low RPV water level condition exists, the operator is directed to execute OE-3101, "RPV Control Procedure," concurrently, where the additional reactor power control and RPV water level and pressure control actions described in the PSTGs are performed.

The Vermont Yankee PSTGs will be revised to include the above RPV Control Guideline Entry Condition.

The addition of this entry condition to the PSTGs will not affect the actions directed by the Vermont Yankee EOPs. The PSTGs RPV Control Guideline is implemented via OE-3100 and OE-3101, as described above. This ensures a consistent accident mitigation strategy should an event subsequently degrade and prevents concurrent, conflicting instructions regarding the control of RPV parameters. As discussed in the Summary section of this Attachment, the implementation of the PSTG guidance in this manner is considered a deviation from the EPGs and justification will be included in our "linkage document" which will reflect the inter-relationships between the Vermont Yankee implementing procedures and the PSTGs.

3) **EPG Statement:**

RPV Control Guideline, Step RC/P-3 - When either:

- All control rods are inserted to or beyond position [02 (Maximum Subcritical Banked Withdrawal Position)], or

- It has been determined that the reactor will remain shutdown under all conditions without boron, or

- [700 pounds (Cold Shutdown Boron Weight)] of boron have been injected into the RPV, or

- The reactor is shutdown and no boron has been injected into the RPV,

depressurize the RPV and maintain a cooldown rate below [100 °F/hr (RPV cooldown rate LCO)].

PSTG, Revision 6 Statement:

RPV Control Guideline, Step RC/P-4 - When:

- All control rods are inserted to or beyond position 02 (Maximum Subcritical Banked Withdrawal Position), or

- 465 pounds (Cold Shutdown Boron Weight) of boron have been injected into the RPV, and

- RPV level has been restored between 127 inches (Low reactor water level scram setpoint) and 177 inches (High reactor water level trip setpoint),

Proceed to cold shutdown in accordance with Plant Restoration procedure OP-0109.

Basis for NRC Concern:

"The VY PSTG does not consider the deviation in the context of the overall EPG RPV pressure control strategy as it relates to RPV Control, Primary Containment Control, Secondary Containment Control, Radiation Release Control, and the Contingencies. These procedures depend on the reactor pressure reduction as a part of the overall accident mitigation strategy. The EPG considerations for beginning a pressure reduction are that the reactor will remain shutdown during the cooldown and an emergency situation still exists (page I-4 of EPG). There is no consideration provided in the EPG for RPV level to be restored before a pressure reduction is initiated. Inclusion of the RPV level in the direction to begin normal depressurization unnecessarily delays actions that could also mitigate the symptoms in other procedures.

"It is appropriate to include the statement 'It has been determined that the reactor will remain shutdown under all conditions without boron.' The VY PSTG does not describe any unique features that would justify not

including this statement. The statement does not direct operators to make this judgement, and other BWRs do not require operators to make this determination. If this information is available from either the reactor engineer or the Technical Support Center, then it can be used as part of the accident mitigation strategy."

Response:

The Vermont Yankee PSTGs and EOPs will be revised to perform an RPV pressure reduction when it is assured that the reactor will remain shutdown during the depressurization, irrespective of RPV water level considerations.

The phrases "It has been determined that the reactor will remain shutdown under all conditions without boron" and "The reactor is shutdown and no boron has been injected into the RPV" were added to Revision 4 of the EPGs in an effort to provide additional flexibility in responding to an ATWS event. The EPGs also leave it up to the individual utility to determine what the acceptance criteria should be. Based on concerns with the format of the EPG statements and shift staffing requirements, Vermont Yankee established the criteria as "all control rods are inserted to or beyond position 02". The justification for this decision is as follows:

1. For a given set of reactivity coefficients, the reactor can be shutdown by any of the following methods:

   a) Control rod insertion alone, or

   b) Boron injection alone, or

   c) A combination of control rod insertion and boron injection.

   The EPG conditions, as written, exclude the third method. They pertain to the current shutdown state of the reactor and all possible future states of core reactivity, hence the use of the future tense in the EPG phrase "... will remain shutdown under all conditions ...". Actions that follow the EPG conditions are not allowed to proceed unless sufficient control rod density exists to assure reactor shutdown under all possible subsequent reactivity states.

2. The determination that the reactor will remain shutdown for control rod insertion configurations other than:

   a) All control rods inserted to or beyond position 02 (Maximum Subcritical Banked Withdrawal Position), or

   b) The existence of the Technical Specifications requirement for shutdown margin (i.e., all control rods inserted to position 0

except one rod), is beyond the capability of the control room crew. All other control rod configurations would not be considered until the Technical Support Center response team is assembled to evaluate the shutdown state of the reactor.

Upon review, our overall accident mitigation strategy may be enhanced by providing clear, concise direction through revision of the PSTGs as follows:

"When:

- All control rods are inserted to or beyond position 02 (Maximum Subcritical Banked Withdrawal Position), or
- All control rods are inserted to position 00 except one rod (Technical Specifications requirement for shutdown margin), or
- Technical Support Center or Reactor Engineering has determined that sufficient control rod density exists, or
- 465 pounds (Cold Shutdown Boron Weight) of boron have been injected into the RPV, ..."

The Vermont Yankee PSTGs and EOPs will be revised to include the above conditions.

4) **EPG Statement:**

RPV Control Guideline, Step RC/P-1 Override - If while executing the following steps:

- Boron Injection is required, and
- The main condenser is available, and
- There has been no indication of gross fuel failure or steam line break,

open MSIVs, bypassing pneumatic system and low RPV water level isolation interlocks if necessary, to reestablish the main condenser as a heat sink.

PSTG, Revision 6 Statement:

RPV Control Guideline, Step RC/P-1 - If:

- MSIV isolation occurred,
- The main condenser is available, and

- No indication of gross fuel failure or steam line break exists,

Open MSIVs, bypassing Low Low RPV water level (82.5 inches) and High Steam Flow Not In Run (40%) isolation interlocks, if necessary, to re-establish the main condenser as a heat sink.

Basis for NRC Concern:

"VY has a design feature of a 105% bypass valve capability and its use should be factored into the accident mitigation strategy. The EPGs support the use of the main condenser as a heat sink. The EPGs also are clear on those conditions which authorize use of defeating isolation interlocks to be able to use the main condenser as a heat sink. For the particular step in question, the EPGs do not allow defeating the MSIV isolation interlocks unless boron injection is required. This occurs when the reactor cannot be shutdown and the suppression pool temperature reaches the boron injection initiation temperature (BIIT). The BIIT is established to assure that the heat capacity temperature limit will not be exceeded when the hot shutdown boron weight is injected into the vessel during an ATWS, the MSIVs are closed, and no torus cooling is available. The VY PSTG defeats an isolation provision without analysis of the consequence of the actions. This may represent an unreviewed safety issue."

Response:

The Vermont Yankee PSTGs and EOPs will be revised to permit defeating the MSIV isolation interlocks only if boron injection is required.

Analysis for the present PSTG and EOP actions clearly demonstrates that an unreviewed safety issue does not exist. Assurance that the use of the MSIVs will not result in adverse radiological consequences is provided by the PCIS Group 1 isolation signals, which will close the MSIVs should adverse conditions develop. Vermont Yankee Technical Specifications Bases Section 3.2 states that the function of the PCIS Group 1 isolation signal for low low RPV water level is to assure that the limits of 10CFR100 will not be violated. However, the following PCIS Group 1 isolation signals, which are not bypassed in PSTG Step RC/P-1, provide equivalent protection:

- High Main Steam Line Radiation Levels. The setting of 3 times normal background levels, coupled with the MSIV closure time requirements, assure that fission product release is limited so that 10CFR100 limits are not exceeded for the control rod drop accident, and 10CFR20 limits are not exceeded for gross fuel failure during reactor operations.

- High Steam Tunnel Area Temperatures. The setting of ambient plus 95 °F is low enough to detect leaks of the order of 5 to 10 gpm;

thus, it is capable of covering the entire spectrum of breaks and gives isolation before the limits of 10CFR100 are exceeded.

- Low Condenser Vacuum. The purpose of this isolation signal is to prevent the release of radioactive gases from the primary containment through the main condenser. The setting of 12 inches of mercury absolute provides sufficient margin to assure retention capability in the condenser when gas flow is stopped and sufficient margin below operating values.

5) **EPG Statement:**

N/A

PSTG, Revision 6 Statement:

Torus Control Guideline, Step T/T-3 - If torus water temperature is above 120 °F (Technical Specifications torus temperature LCO, during reactor isolation conditions, requiring reactor depressurization to <200 psig) and the RPV is isolated from the main condenser, commence depressurizing the RPV at normal cooldown rates to <200 psig, unless Emergency RPV Depressurization is required.

Basis for NRC Concern:

"The licensee steps severely complicate the actions for responding to an ATWS event with the MSIVs closed and a relief valve operating. The licensee actions to depressurize the RPV are in direct conflict with the overall EPG strategy to combat ATWS scenarios. During the ATWS, the EPGs do not depressurize the RPV based on torus temperature considerations unless the torus temperature is impacting the heat capacity temperature limit (HCTL). Based on the VY HCTL curve, this temperature is approximately 195 °F. The VY PSTG does not describe unique features regarding the VY torus which would justify ATWS actions different than that contained in the EPGs. In addition had the licensee implemented the pressure control portion of the RPV control in accordance with the EPG guidelines, the procedure would require beginning a cooldown when reactor power is under control which would address the actions covered in the VY technical specifications. The operators are trained not to depressurize the RPV with an ATWS condition, which directly conflicts with the direction given in the suppression pool temperature control procedure."

Response:

Page 49 of the NRC Safety Evaluation Report [Reference f)] for Revision 4 of the EPGs states that "each BWR licensee should verify if the EPGs are consistent with its licensing based analysis. That is, BWR plants

should implement appropriate plant specific procedures consistent with its safety analysis or provide the staff with additional information to remedy such deviations."

The addition of PSTG Step T/T-3 was performed to maintain compliance with Vermont Yankee Technical Specifications Section 3.7.A.1.d for those EOP actions which may be performed during design basis events and so meet the intent of the above SER statement. Continued NRC/NRR and BWROG discussions are in progress on the design basis issue. Program enhancements may be made based on how the results effect Vermont Yankee.

Technical Specifications Section 3.7.A.1.d states that during reactor isolation conditions, the RPV shall be depressurized to less than 200 psig at normal cooldown rates if suppression pool temperature exceeds 120 °F. The basis for this Technical Specification is formed by experimental data which indicate that excessive steam condensing loads can be avoided if the peak temperature of the suppression pool is maintained below 160 °F during any period of relief valve operation with sonic conditions at the discharge exit. Therefore, this specification has been placed on the envelope of reactor operating conditions so that the reactor can be depressurized in a timely manner to avoid the regime of potentially high suppression pool loadings. This condition is not addressed by the EPG Heat Capacity Temperature Limit (HCTL). The HCTL is defined to be the highest suppression pool temperature at which initiation of RPV depressurization will not result in either (1) exceeding the suppression chamber design temperature or (2) exceeding the Primary Containment Pressure Limit before the rate of energy transfer from the RPV to the containment is within the capacity of the containment vent.

Both PSTG Step T/T-3 and Technical Specifications Section 3.7.A.1.d direct the operator to commence RPV depressurization at normal cooldown rates to below 200 psig. Technical Specifications Section 3.6.A.2 specifies a maximum heatup or cooldown rate of 100 °F averaged over any one hour period.

No minimum cooldown rate is specified and the operators are properly trained to prioritize actions and control the cooldown rate to prevent an inadvertent reactor power level increase during the level/power control actions of PSTG Contingency #5. No conflicting actions have been identified with the present procedural steps during previous EOP validations and continuing Licensed Operator Requalification Training.

No actions?

6) **EPG Statement:**

Secondary Containment Control Guideline Entry Condition - Differential pressure at or above 0 inches of water.

PSTG, Revision 6 Statement:

Basis for NRC Concern:

"The EPG entry conditions are symptomatic of both emergencies and events which may degrade into emergencies. The EPGs specify actions appropriate for both. Entry into procedures developed from the guidelines is not conclusive that an emergency has occurred. Differential pressure at or above 0 inches of water, is symptomatic of a condition which may degrade into an emergency. The VY PSTG does not describe unique features or provide analysis that justifies deleting this entry condition."

Response:

It is the Vermont Yankee position that the EOPs are a part of the overall emergency response strategy. For certain events, emergency response and recovery are optimized through the combined use of the symptom-based, flowchart-format EOPs and supplemental procedures. This is true for this case.

For the condition of Secondary Containment differential pressure at or above 0 inches of water, the EPG basis states that a high Secondary Containment differential pressure is indicative of a potential loss of Secondary Containment integrity and could result in uncontrolled release of radioactivity to the environment. However, the root cause of the high differential pressure may be either a condition symptomatic of an emergency, one which could degrade into an emergency, or a non-emergency condition such as shutdown of the Secondary Containment HVAC or high wind conditions.

At Vermont Yankee, the Secondary Containment pressure with respect to the outside atmosphere is measured on each of the four (4) outside walls of the reactor building. Two separate sets of instruments exist which independently measure all four (4) sides of the building and read out in the control room. The results of testing indicate that under high wind conditions, the pressure at the leeward side of the building may become positive with respect to the outside atmosphere. Therefore, the existence of Secondary Containment differential pressure greater than zero is not conclusive indication of a loss of reactor building structural integrity. Further, the radiological consequences of the reactor building pressure becoming positive under high wind conditions has been previously evaluated. (Reference: Memo, E.C. Tarnuzzer to A.M. Shepard, "Evaluation of Reactor Building Leakage," dated January 18, 1972)

In all cases, the EPG Secondary Containment Control Guideline directs the following initial operator actions for area temperature, radiation levels, or water levels exceeding the maximum safe operating limits:

- Monitor and control Secondary Containment temperatures, radiation levels and water levels. (EPG Steps SC/T, SC/R and SC/L)

- Operate available area coolers. (EPG Step SC/T-1)

- If Secondary Containment HVAC exhaust radiation level is below the Secondary Containment HVAC isolation setpoint, operate available secondary containment HVAC. (EPG Step SC/T-2)

In order to ensure a consistent accident mitigation strategy should an event subsequently degrade, and to prevent concurrent, conflicting instructions regarding the control of secondary containment HVAC and eliminate needless entry into an EOP when it is not required, the above initial actions common to both non-emergency and emergency conditions are contained within procedures, OP-2116, "Secondary Containment Integrity Control", ON-3153, "Excessive Radiation Levels," and ON-3158, "Reactor Building High Area Temperature/Water Level". OP-2116 directs the operator to place area coolers in operation and start the Standby Gas Treatment System for Secondary Containment HVAC. ON-3153 and ON-3158, which are entered for area temperatures, radiation levels or water levels at or below to PSTG entry condition values, direct the operator to monitor area temperatures, radiation levels and water levels.

For conditions which are symptomatic of an emergency or those which could degrade into an emergency, pressurization of the Secondary Containment to or above atmospheric pressure would be accompanied by either high area temperatures, radiation levels, or water levels due to a high energy line break. Each of these conditions is an entry condition into OE-3105, "Secondary Containment Control," which includes both the above initial actions and the required subsequent actions.

The Vermont Yankee PSTGs will be revised to include the above Secondary Containment Control Guideline Entry Condition.

The addition of this entry condition will not affect the actions directed by the Vermont Yankee EOPs. The PSTGs Secondary Containment Control Guideline is implemented via OP-2116, ON-3153, ON-3158 and OE-3105, as described above. As discussed in the Summary section of this Attachment, the implementation of the PSTG guidance in this manner is considered a deviation from the EPGs and justification will be included in our "linkage document" which will reflect the inter-relationships between the Vermont Yankee implementing procedures and the PSTGs.

7) **EPG Statement:**

Secondary Containment Control Guideline, Step SC/T-4.2 - When an area temperature exceeds its maximum safe operating temperature in more than one area, Emergency RPV Depressurization is required.

PSTG, Revision 6 Statement:

Secondary Containment Control Guideline, Step SC/T-3.2 - When a maximum safe operating temperature for a limiting combination is

exceeded, Emergency RPV Depressurization is required, enter Contingency #2 and execute it concurrently with this procedure.

Basis for NRC Concern:

"The VY distinction of limiting combination rather than more than one area does not address the consideration of a wide-spread problem which may pose a direct and immediate threat to secondary containment integrity. The VY PSTG can allow more than one area above the maximum safe temperature without requiring emergency depressurization. The VY PSTG does not address unique design features that would justify not implementing revision 4 of the EPGs. The PSTG justification also does not address temperature limitations due to personnel access requirements."

Response:

Step SC/T-4.2 of the EPG Secondary Containment Control Guideline directs the operator to perform an Emergency RPV Depressurization when an area temperature exceeds its maximum safe operating temperature in more than one area. The basis provided for this step states:

> "The criteria of 'more than one area' specified in this step identifies the rise in secondary containment temperature as a wide-spread problem which may pose a direct and immediate threat to secondary containment integrity, equipment located in the secondary containment, and continued safe operation of the plant."

The EPGs do not explicitly define the term "area" to mean physical area. As such, Vermont Yankee has defined "area" to mean functional area, which may be made up of one or more physical volumes. The physical volumes, in turn, are obtained from the Vermont Yankee specific Reactor Building model developed for the Vermont Yankee Environmental Qualification Program. This model is used in the RELAP/MOD5 computer application code to predict high energy line break mass, energy release and subsequent Reactor Building response.

In establishing the Vermont Yankee area temperature limits and functional areas, critical plant physical volumes and equipment were determined and the environmental tolerance levels for this equipment obtained. Critical equipment was defined as that equipment needed for shutdown and decay heat removal. Only those functional areas which could result in the potential loss of both redundant trains of a required safety, or critical, function were considered. This addresses preservation of reactivity control, ECCS initiation and cooling, RPV level and pressure control, decay heat removal, and post-accident monitoring functions. Focus on these functions prioritizes actions necessary to address core cooling and primary containment integrity concerns relative to secondary containment concerns and so assures that radioactive releases to the environment are minimized. As such, an Emergency RPV Depressurization, with the resulting transient on the RPV and potential complications, is performed only as required.

It is the Vermont Yankee position that this in-depth study provides a greater degree of safety than that provided by the EPGs.

Concerning temperature limitations due to personnel access requirements, a review of the above area temperature limits indicates that personnel access considerations are adequately addressed through present Vermont Yankee administrative procedures.

8) **EPG Statement:**

Secondary Containment Control Guideline, Step SC/R-2.2 - When an area radiation level exceeds its maximum safe operating radiation level in more than one area, Emergency RPV Depressurization is required.

PSTG, Revision 6 Statement:

N/A

Basis for NRC Concern:

"Radiation levels above the maximum safe operating in more than one area is a symptom that there is a widespread problem which may pose a direct and immediate threat to plant equipment and to personnel both on and off site. Reliance on actions within the temperature leg, which do not require emergency depressurization unless a limiting combination is exceeded does not assure that the personnel on or off site are protected. If a limiting temperature combination is not exceeded and there is more than one area above the maximum safe radiation operating level during an unisolated primary system discharge to the secondary containment, emergency depressurization will not be performed to minimize the release of radioactivity to secondary containment. The licensee justification does not address the threat to personnel both on and off site from radiation releases. The licensee justification is based on a high energy line break with no substantial radiological source term. The licensee is using event based information to restrict symptom based procedures."

Response:

The EPG Secondary Containment Control Guideline directs the operator to operate secondary ventilation systems, isolate system discharges and control RPV pressure through sequentially executed steps as required to:

- Protect equipment in the secondary containment,
- Limit radioactivity release to the secondary containment, and either:

- Maintain secondary containment integrity, or

- Limit radioactivity release from the secondary containment.

The Vermont Yankee position, as discussed in the above NRC concern, was based upon an engineering evaluation performed in 1986 in support of the implementation of Revision 3 of the EPGs. That evaluation concluded that, in the case of Vermont Yankee, the requirement to perform an Emergency RPV Depressurization due to high area radiation levels within the secondary containment was redundant to actions already contained within the area temperature and water level sections of the PSTG Secondary Containment Control Guideline and that no credible event sequence could be identified for utilization of the remaining EPG Guideline Steps. This position was carried forward to Revision 4 of the PSTGs as the EPG Secondary Containment Control Guideline remained essentially unchanged.

Further review in this area has been performed using expanded criteria and improved analytical techniques. This updated evaluation concludes that event scenarios exist where secondary containment area radiation levels may exceed the Maximum Safe Operating Level without the corresponding area temperatures or water levels.

Based on this updated evaluation, our overall accident mitigation strategy may be enhanced through the inclusion of the EPG Secondary Containment Control Guideline Step SC/R-2.2 within the Vermont Yankee PSTGs. The Vermont Yankee PSTGs will be revised to reflect this.

The Mazimum Safe Operating Radiation Levels will be defined based on a) equipment qualification doses, b) onsite habitability requirements, and c) offsite dose potential.

9) **EPG Statement:**

Radioactivity Release Control Guideline.

PSTG, Revision 6 Statement:

N/A

Basis for NRC Concern:

"Not all scenarios for primary systems discharging outside primary and secondary containments were addressed since the licensee justification only considers a high energy line break without a significant radiological source term. The radioactive release control procedure is intended to limit radioactivity releases to areas outside of primary and secondary containments. The VY PSTG does not describe unique features which

would justify deleting this emergency operating procedure. Technical specification 6.5.A.4 also requires procedures for emergency conditions involving potential or actual release of radioactivity. The licensee is using event based information to restrict symptom based procedures."

Response:

The EPG Radioactivity Release Control Guideline directs the operator to isolate primary system discharges and control RPV pressure through sequentially executed steps as required to minimize the offsite release of radioactivity during emergency response conditions.

The Vermont Yankee position, as discussed in the above NRC concern, was based upon an engineering evaluation performed in 1986 in support of the implementation of Revision 3 of the EPGs. That evaluation concluded that, in the case of Vermont Yankee, the actions prescribed in the EPG Guideline were redundant to actions already contained within existing plant procedures and other sections of the PSTGs and that no credible event sequence could be found for utilization of the remaining EPG Guideline Steps. This position was carried forward to Revision 4 of the PSTGs as the EPG Radioactivity Release Control Guideline remained essentially unchanged.

Further review in this area has been performed using expanded criteria and improved analytical techniques. This updated evaluation concludes that:

a) The present EPG actions relating to Turbine Building HVAC and isolation of primary systems discharging into areas outside of primary and secondary containments are adequately contained within procedure ON-3153, "Excessive Radiation Levels".

b) An event scenario exists where offsite radioactivity release rates may exceed the value which requires a General Emergency prior the initiation of an Emergency RPV Depressurization from guidance already contained within the PSTGs. This scenario involves a liquid ground release resulting from a small break LOCA in which neither cooling nor filtering of the discharge occurs.

Based on this updated evaluation, our overall accident mitigation strategy may be enhanced through the implementation of the EPG Radioactivity Release Control Guideline. The Vermont Yankee PSTGs will be revised to include the EPG Radioactivity Release Control Guideline with the following exceptions:

1) EPG: "Offsite radioactivity release rate above the offsite release rate which requires an Alert"

   PSTG: "An Alert Radiological Conditions Emergency Action Level exists in accordance with AP 3125"

2) EPG: "When offsite radioactivity release rate approaches or exceeds the offsite release rate which requires a General Emergency but ... "

PSTG: "When a General Emergency Radiological Conditions Emergency Action Level exists in accordance with AP 3125, but ... "

These revised statements will provide clear concise direction to the operators in carrying out the required actions and will improve coordination with our Emergency Plan implementing procedures through reference to AP-3125, "Emergency Plan Classification and Action Level Scheme". The Emergency Plan implementing procedures satisfy the requirements of Technical Specifications Section 6.5.A.4.

The PSTGs Radioactivity Release Control Guideline will be implemented via ON-3153, as described above, and a new EOP, OE-3106, "Radioactivity Release Control Procedure". As discussed in the Summary section of this Attachment, the implementation of the PSTG guidance in this manner is considered a deviation from the EPGs and justification will be included in our "linkage document" which will reflect the inter-relationships between the Vermont Yankee implementing procedures and the PSTGs.

10) **EPG Statement:**

Contingency #1, Alternate Level Control, Step C1-3.2 - When RPV water level drops to [-164 in. (top of active fuel)]:

- If any system, injection subsystem or alternate injection subsystem is lined up with at least one pump running, Emergency RPV Depressurization is required.

PSTG, Revision 6 Statement:

Contingency #1, Alternate Level Control, Step C1-4 - If any system, injection subsystem or alternate injection subsystem is lined up with a pump running, Emergency RPV Depressurization is required; enter Contingency #2 and execute it concurrently with this procedure.

Basis for NRC Concern:

"The licensee argument is not based on technical arguments but on 'prudence.' As long as the core is covered adequate core cooling is assured. In addition the RPV control strategy if implemented in accordance with the EPG guidelines will require the operator to begin a normal cooldown if reactor power is under control. The licensee actions are not a conservative or required action to take under all circumstances. The additional time obtained by delaying emergency depressurization until

RPV water level is at the top of active fuel permits recovery actions for other sources of water to avoid an unnecessary emergency depressurization. The VY PSTG does not describe unique features which would justify adding this to the emergency operating procedure."

Response:

As discussed in the Summary section of this Attachment, in some cases the bases presented in the EPGs are based on industry consensus drawn from operational experience of the various BWR types and systems, with differing organizational structures and operating philosophies, rather than on detailed analytical review. This is true for this case.

The basis for the EPG position for not initiating an Emergency RPV Depressurization until RPV water level has dropped to the Top of Active Fuel is as follows:

- "Adequate core cooling exists so long as RPV water level remains above the Top of Active Fuel.

- "The time required for RPV water level to decrease to the Top of Active Fuel can best be used to line up and start pumps, attempting to reverse the decreasing RPV water level trend before RPV depressurization is required to assure adequate core cooling."

The Vermont Yankee position stated that an Emergency RPV Depressurization should be performed if any system, injection subsystem or alternate injection subsystem is lined up with at least one pump running, without waiting until RPV water level drops to the Top of Active Fuel. The basis for this position is as follows:

- Entry into Contingency #1 is made when it has been concluded that RPV water level cannot be maintained above the Top of Active Fuel. This determination may be reached either before or when RPV water level has reached the Top of Active Fuel. As such, sufficient time may or may not exist to line up and start additional injection sources.

- When at least one system, injection subsystem or alternate injection subsystem is lined up with at least one pump running, conditions have been established whereby injection will occur as soon as RPV pressure drops below the system shutoff head.

- The preferred method of adequate core cooling is by core submergence. By delaying Emergency RPV Depressurization until the Top of Active Fuel is reached, core submergence may not be maintained during the subsequent depressurization and initial low-pressure system injection.

Each of the above positions presents positive and negative aspects. However, because neither position can be analytically determined to be superior and in order to provide consistency with the EPGs, the Vermont Yankee PSTGs will be revised to perform an Emergency RPV Depressurization when RPV water level drops to the Top of Active Fuel and any system, injection subsystem or alternate injection subsystem is lined up with a pump running.

11) **EPG Statement:**

N/A

PSTG, Revision 6 Statement:

Contingency #2, Emergency RPV Depressurization, Step C2-3 - If the MSIV's are open and the main condenser is available:

- Open a minimum of 3 turbine bypass valves (Minimum number of bypass valves required for emergency depressurization).

Basis for NRC Concern:

"The 105% turbine bypass capability is a VY feature that should be considered in the development of the VY EOPs. The EPGs utilize the SRVs as the prime method to RPV emergency depressurize when the procedures indicate that it is required. The EPGs also indicate that, if RPV emergency depressurization is anticipated and if the bypass valves are available, the bypass valves should be used. The justification does not address why it is acceptable to utilize the turbine bypass valves as the prime method versus the SRVs when emergency depressurization is required. There is no analysis referenced that indicates that the depressurization rate using the BPVs is equivalent to or greater than the capability of the SRVs. Using the bypass valves versus the SRVs for RPV emergency depressurization has an influence on other portions of the procedures (i.e., when establishing the minimum alternate flooding pressure). Use of the BPVs for emergency depressurization in place of the SRVs was not accounted for in the other portions of the PSTG and EOPs."

Response:

Use of the turbine bypass valves (BPVs) as the prime method for Emergency RPV Depressurization is consistent with the overall Vermont Yankee strategy concerning containment venting. Discharging of heat energy from the RPV to the main condenser, while it is safe to do so, preserves the heat capacity of the suppression pool and may delay, or prevent, the need for containment venting due to high containment energy levels.

The above position is also consistent with the NRC position on primary containment venting, as presented on page 12 of the NRC Safety Evaluation Report for Revision 4 of the EPGs [Reference f)]:

"The staff's basic concern was (and remains) that venting, even if it results in some radiological consequences, should only be undertaken as an extreme means to prevent core melt or as a last resort measure to prevent the irreversible and unpredictable rupture of the containment which could otherwise lead to a larger release. The underlying strategy of containment venting is to prevent core melt and in extremely rare cases the choice of limiting potential release of radioactivity to avoid uncontrolled release."

The PSTG conditional statement requiring the MSIVs to be open provides assurance that the use of the BPVs will not result in adverse radiological consequences. The PCIS Group 1 isolation signals will close the MSIVs should adverse conditions develop. Vermont Yankee Technical Specifications Bases Section 3.2 states that the function of the PCIS Group 1 isolation signal for low low RPV water level is to assure that the limits of 10CFR100 will not be violated. As this isolation interlock may have been previously bypassed in accordance with the PSTGs (See item 4 above), the following PCIS Group 1 isolation signals, which are not bypassed, provide equivalent protection:

- High Main Steam Line Radiation Levels. The setting of 3 times normal background levels, coupled with the MSIV closure time requirements, assure that fission product release is limited so that 10CFR100 limits are not exceeded for the control rod drop accident, and 10CFR20 limits are not exceeded for gross fuel failure during reactor operations.

- High Steam Tunnel Area Temperatures. The setting of ambient plus 95 °F is low enough to detect leaks of the order of 5 to 10 gpm; thus, it is capable of covering the entire spectrum of breaks and gives isolation before the limits of 10CFR100 are exceeded.

- Low Condenser Vacuum. The purpose of this isolation signal is to prevent the release of radioactive gases from the primary containment through the main condenser. The setting of 12 inches of mercury absolute provides sufficient margin to assure retention capability in the condenser when gas flow is stopped and sufficient margin below operating values.

Although not referenced in the technical justification for this deviation, Vermont Yankee Calculation Number OPS-43, "Minimum Number of Bypass Valves Required for Emergency Depressurization for EPG, Rev. 4," dated January 9, 1990, provides the analysis that concludes that the depressurization rate using the BPVs is equivalent to that when using the SRVs.

The PSTG conditional statement requiring the main condenser to be available pre-supposes that the Advanced Off Gas system is functional and can be utilized for gas processing prior to release.

To ensure consistency with other portions of the Vermont Yankee PSTGs and EOPs, the use of the BPVs will be included in the other applicable sections. Values for the Minimum Alternate RPV Flooding Pressure and the Minimum Core Flooding Interval have been calculated considering the use of BPVs. These calculations were performed in a manner consistent with the EPG calculations.

12) **EPG Statement:**

RPV Control Guideline, RC/P Override Statement - If while executing the following steps:

- RPV water level cannot be determined and less than [7 (number of SRVs dedicated to ADS)] SRVs are open, enter [procedure developed from Contingency #2].

PSTG, Revision 6 Statement:

N/A

Basis for NRC Concern:

"The VY PSTG does not direct the operator to enter emergency depressurization if RPV water level cannot be determined and less than 4 SRVs are opened. The RPV flooding procedure does not require the operator to enter emergency depressurization if less than 4 SRVs are opened. The PSTG actions will not allow RPV flooding to take place if emergency depressurization is not performed when RPV water level cannot be determined. The justification does not address why RPV emergency depressurization is not required."

Response:

The RPV Flooding Contingency of the Vermont Yankee PSTGs and EOPs will be revised to require an Emergency RPV Depressurization if less than 4 SRVs, or an equivalent number of turbine bypass valves (BPVs) are open, consistent with the EPGs. The use of BPVs is discussed in Item 11 above.