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BVY 90-016
REPLY TO
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U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Document Control Desk

References:
a) License No. DPR-28 (Docket No. 50-271)
b) Letter, USNRC to VYNPC, NVY 89-54, Inspection Report 89-01, dated 3/20/89
c) General Electric Specification 22A1265 Design Specification - Reactor Containment
d) Vermont Yankee Final Safety Analysis (FSAR)
e) GE Specification 22A2856 Design Specification - Atmospheric Control, Primary Containment
f) Vermont Yankee Safety Evaluation Report, dated 6/1/71
g) 10CFR50, Appendix A, General Design Criteria No. 56
h) Vermont Yankee Technical Specification
i) Letter, VYNPC to USNRC, FVY 86-80, dated 8/26/86; Proposed Change No. 134
j) Letter VYNPC to USNRC, BVY 90-005, dated 1/16/90

Dear Sir:

Subject: Vermont Yankee Torus to Reactor Building Vacuum Breaker Operability

During system reviews and evaluations performed in accordance with NRC Generic Letter 88-14, Instrument Air System Problems, a potential design deficiency with the Torus-to-Reactor Building Vacuum Breakers was identified. The purpose of this letter is to provide the NRC with the results of Vermont Yankee's review of the design bases and operability status of these vacuum breakers as Attachment A.

Two vacuum breaker relief lines each contain two valves in series (see Figure 1): an air-operated butterfly valve (V16-19-11A&B) and a swing check valve (V16-19-12A&B). These lines serve two functions; the first and primary safety function is to limit potential negative pressure in the suppression chamber under post-accident conditions. Should torus pressure drop to a negative 0.50 psi, the butterfly valves would open allowing air from the reactor building to flow into the torus, preventing damage to the containment. Failure of the butterfly valves in the open position, as would occur on loss of instrument air, would not affect the vacuum relief function of these lines. The

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secondary function of these lines is to fulfill the containment isolation function. In this case, failure of the butterfly valves would reduce the primary containment integrity to a single valve. Vermont Yankee Technical Specification Table 4.7.2.a, Primary Containment Isolation Valves - Valves subject to Type C Leakage Tests, includes both the butterfly valves and the check valves. Technical Specification 3.7.D.1 requires that all valves listed in this table be operable during reactor power operation; 3.7.D.2 provides relief from 3.7.D.1 provided at least one valve in any line containing an inoperable isolation valve is in the position corresponding to the isolated condition. Based on the identified concerns with the design bases of these vacuum breakers and discussion with the resident inspector, these vacuum breakers were declared inoperable in accordance with 3.7.D.1 on January 20, 1989. The relief allowed by Technical Specification 3.7.D.2 was implemented and the in series check valves (V16-19-12A&B) are verified closed and logged in the control room, in accordance with Technical Specification 4.7.D.2, on a daily basis.

We conclude following subsequent review of these circumstances, that in the case where the butterfly valves fail open and would therefore not serve a containment isolation function, the check valves would provide this containment isolation function. This situation is acceptable as this configuration allows both safety functions of this line to be met, using a highly reliable, as shown in Attachment B, passive check valve to accomplish the isolation function. Vermont Yankee believes this was the intent of the original designers and the reason for the special consideration given this penetration. Therefore, these valves are in compliance with the current licensing bases. Additionally, the NRC has recently issued Amendment 119 of Vermont Yankee Technical Specifications [Reference h)] which clarifies the operability requirements of the Torus-to-Reactor Building Vacuum Breaker system. Based on this review of design bases, the recent Technical Specification change, and discussion with the Vermont Yankee NRC Project Manager, Vermont Yankee has declared the subject vacuum breakers operable.

We hope this information is responsive to your concerns regarding the operability and the design basis of the Torus to Reactor Building vacuum breakers. Should you have any questions or require additional information, please do not hesitate to contact us.

Very truly yours,

VERMONT YANKEE NUCLEAR POWER CORPORATION

for Warren P. Murphy
Vice President and
Manager of Operations

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

ATTACHMENT A

LICENSING/DESIGN BASIS FOR REACTOR
BUILDING TO TORUS VACUUM BREAKER ASSEMBLY

Design Basis Review

The Reactor Building to Torus Vacuum Breaker valves have a dual safety function. The primary function is a containment vacuum relief "to limit the potential negative pressure that the containment may experience during post-accident conditions" [Reference c)]. Secondly, since this primary function requires a containment penetration, these valves also serve a containment isolation function.

A review of original design documents [References c) and e)] and the Final Safety Analysis Report [Reference d)] indicates that this penetration is an exception to typical Class B containment penetrations. FSAR Table 5.2.2 lists only the check valve as a containment isolation valve and Table 7.3.1 lists both the check valve and the air operated valve but denotes this penetration as a special case. The original design documents provide some further insight into the special nature of the penetration. The containment design specification [Reference e)] states that only one remotely operated or self actuated valve is required for lines that open into the suppression chamber. The Primary Containment Atmospheric Control Design Specification [Reference e)] reiterates the requirement of providing a single isolation valve for this type of line. This configuration is also allowable within the General Design Criteria [Reference g)] which generally requires two (2) isolation valves unless it can be demonstrated that the lines are acceptable on some other defined basis. This criterion also stipulates that "upon loss of actuating power, automatic isolation valves shall take the position that provides greater safety." Vermont Yankee's original Safety Evaluation Report [Reference f)] states that lines that penetrate the containment but communicate only with containment, are equipped with at least one isolation valve located outside of the containment. Accordingly, the reactor building to torus vacuum breaker lines at Vermont Yankee are provided with check valves for providing the isolation function. The air-operated valve provides an additional degree of isolation under most circumstances. Vermont Yankee believes this configuration was in 1971 and is now, demonstrated to be an acceptable variation to the general rules of containment isolation.

In trying to reconstruct the original designer's thinking, it becomes clear that the as-designed configuration provides a reliable solution to satisfying both safety functions of this penetration and meeting all original design requirements. For the majority of accident scenarios one might postulate at Vermont Yankee, a vacuum in the containment would not exist. For these scenarios, the normally closed check valve provides highly reliable passive containment isolation protection. There are, however, scenarios for which vacuum relief becomes a valuable safety function in the protection from the consequences of a negative containment pressure. The check valve would also assure that protection is provided.

The existing butterfly valve provides the means for testing the check valve. The choice of an air-operated, normally closed, fail open butterfly valve allows testing and provides added containment isolation capability over a normally open manual valve used for test purposes only. Additionally, this valve is designed with remote valve position indication and annunciation upon opening.

The fact that Technical Specification [Reference h)] Table 4.7.2.2 lists the butterfly valves as leak tested containment isolation valves does not preclude the special design basis that was intentionally applied to these valves licensed in 1971.

Regardless of the fact that these valves open upon loss of instrument air, these valves form an integral part of the leak rate test boundary. Since testing for penetration leakage is performed by pressurizing the piping between the check valve and the butterfly, both valves are tested at the same time and one cannot be tested without testing the other. It should also be noted that the leak rate assigned to each valve (the check and the butterfly), is actually equal to the combined leak rate of both valves.

Vermont Yankee considers the testing required by the Technical Specification table to be an added degree of conservatism which strengthens the performance of both the vacuum breaker and containment isolation functions.

Summary and Conclusions

The butterfly valves that are part of Vermont Yankee's Reactor Building to Torus Vacuum Breaker penetration were originally designed with dual safety functions. They were also originally specifically designed to open upon loss of the Instrument Air System.

Vermont Yankee considers these valves operable and in compliance with its current licensing basis. It is clear that, this penetration required special considerations during the original design of the plant, and these considerations were documented and licensed in 1971.

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ATTACHMENT B

OPERATIONAL REVIEW OF REACTOR BUILDING
TO TORUS VACUUM BREAKER ASSEMBLY
CHECK VALVES AND BUTTERFLY VALVE AIR SUPPLY

Operational Review

A review of the operational history of the check valves (VG16-19-12A&B) contained in the vacuum breaker relief lines shows there is more than reasonable assurance that the existing check valves are sufficient to provide a single valve containment isolation boundary should the vacuum breaker fail open.

These valves are locally leak rate tested per 10CFR50 Appendix J each refueling outage.

A review of past data indicates these valves have an excellent record, consistently meeting the single valve acceptance criteria given in Vermont Yankee Technical Specifications. Maintenance records further show that no problems have been noted with these valves and no maintenance has been required.

The use of a swing check valve design was reviewed for this application and it was concluded that this valve type is adequate. The check valve is a very passive barrier for containment isolation in that no operator action or instrument signal input is required for the valve to perform the containment isolation function. The valve is normally in the isolated position (closed) and if called on to open and relieve a vacuum in the suppression chamber will return to the isolated position with no action required. The Institute of Nuclear Power Operations (INPO) reviewed check valve failures in "Significant Operating Experience Report 86-03," and concluded that "most of the reported failures involved minor internal or external leakage" and not "failures to close" (excessive seat leakage is included in this category).

The ability of the instrument air system at Vermont Yankee to provide a reliable air supply to the vacuum breakers was also assessed. This review determined that portions of the original design were seismic. The pipe support upgrades called for in USNRC Bulletins 79-02 and 79-14 were implemented in the instrument air system to retain the seismic function. The instrument air system has four air compressors of 50% capacity each; two of these compressors are supplied with essential power. The system also is comprised of two headers, each equipped with check valves that allow system isolation.

This evaluation indicates that the instrument air system, although not maintained as a nuclear safety system, was designed and has demonstrated a level of safety and reliability similar to safety systems. There is more than reasonable assurance that the system will be available post-earthquake to minimize the potential for the butterfly valves failing open. Further, should the butterfly valves fail open, the operational review of the check valve shows with a high confidence level that the passive check valve will accomplish the containment isolation function.

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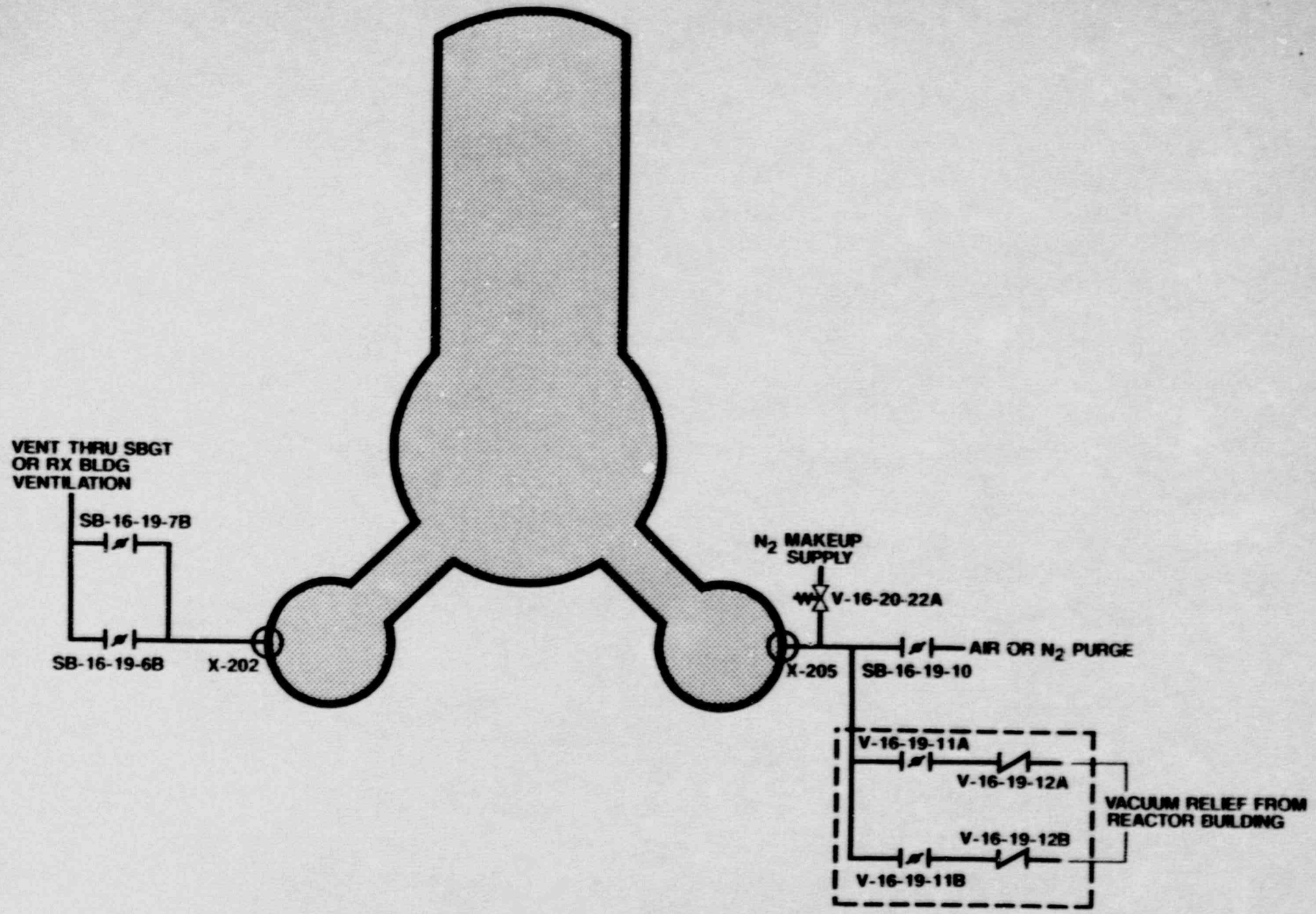

Torus - Reactor Building Vacuum Breaker Arrangement

Figure 1