



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RECOMBINER CAPABILITY REQUIREMENTS  
OF 10 CFR 50.44(c)(3)(ii) (RESPONSE TO GENERIC LETTER 84-09)

VERMONT YANKEE NUCLEAR POWER CORPORATION

VERMONT YANKEE NUCLEAR POWER STATION

DOCKET NO. 50-271

Background

On December 2, 1981, the NRC amended §50.44 of its regulations by addition of the provisions in §50.44 (c)(3). One of these provisions requires licensees of LWRs, that rely upon purge/repressurization systems as the primary means of hydrogen control, to provide a recombiner capability by the end of the first scheduled outage after July 5, 1982, of sufficient duration to permit the required modifications. Those plants for which notices of hearing on applications for construction permits were published on or after November 5, 1970, are not permitted by 10 CFR 50.44 (e) to rely on purge/repressurization systems as the primary means for hydrogen control. Therefore, these plants are not affected by the requirement for recombiner capability. However, Vermont Yankee is affected by the new requirement.

As a result of the new inerting requirements in §50.44 (c)(3), the BWR Mark I Owners Group undertook a substantial program to demonstrate that the Mark I plants potentially affected by the recombiner capability requirements of the rule do not need to rely on the safety grade purge/repressurization system required by the original 10 CFR 50.44 rule as the primary means of hydrogen control. Extensive review and independent studies by the NRC staff generally supported the findings of the Mark I Owners Group program.

The Commission has determined that a Mark I BWR plant will be found to not rely on purge/repressurization systems as the primary means of hydrogen control, if certain technical criteria are satisfied. These criteria were provided in the Generic Letter No. 84-09 (Ref. 1), dated May 8, 1984, which was sent to all licensees of operating reactors. Therefore, the recombiner capability defined in 10 CFR 50.44 (c)(3)(ii) need not be furnished for those inerted Mark I BWR containments where the licensees are able to demonstrate the applicability of the Generic Study (Ref. 2) to the licensee's plant provided that: 1) the plant has Technical Specifications requiring that, when the containment is required to be inerted, the containment atmosphere be less than four percent oxygen; 2) the plant has only nitrogen or recycled containment atmosphere for use in all pneumatic control systems within containment; and 3) there are no potential sources of oxygen in containment other than that resulting from radiolysis of the reactor coolant.

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Most of the affected Mark I BWR plants have Containment Atmosphere Dilution (CAD) Systems utilizing either nitrogen or air. In order to clarify the staff's position regarding these systems, Generic Letter 84-09 stated that a plant that has a "safety grade" purge/repressurization system designed to conform with the general requirements of criteria 41, 42 and 43 of Appendix A of 10 CFR Part 50 and installed in accordance with §50.44 (f) or §50.44 (g) must continue to have that system, even though it may be determined with respect to §50.44 (c)(3) that the plant does not rely on that system as the primary means for hydrogen control; thus, a decision on recombiner capability does not affect the requirements of §50.44 (f) and §50.44 (g) for the "safety grade" purge/repressurization system.

#### Evaluation

In a letter dated August 24, 1984, (Ref. 3), the licensee for Vermont Yankee Nuclear Power Station, Vermont Yankee Nuclear Power Corporation, submitted a preliminary response to the staff's Generic Letter 84-09. After this preliminary assessment, the licensee submitted a more detailed engineering evaluation via a letter dated October 31, 1984 (Ref. 4). The licensee concluded that with one exception regarding the Containment Atmosphere Dilution (CAD) System, they meet all criteria of the Generic Letter. The CAD System at Vermont Yankee was designed to utilize air and, therefore, may become a potential source of oxygen to the containment in post-accident situations. The licensee has committed to convert the existing air CAD System to a nitrogen system for purge and repressurization capability.

The staff has reviewed the compliance of the Vermont Yankee Station with the criteria presented in Generic Letter 84-09. We have found that the licensee has participated in the generic study (Ref. 2) made by the BWR Owners Group. The main parameter regarding the applicability of the study was found to be the ratio of the core thermal power to the free drywell volume. The applicability of the study to Vermont Yankee has been addressed in Chapter 1.3 of the study. We agree that the conclusions of the generic study are applicable to Vermont Yankee, provided the three criteria of the Generic Letter 84-09 are satisfied.

- 1) Vermont Yankee Technical Specification 3.7.A.7 requires that when the containment is inerted, the containment atmosphere should be less than four percent oxygen. Therefore, the first of the three criteria of Generic Letter 84-09 is satisfied.
- 2) Vermont Yankee's pneumatic supply for drywell instruments can be provided from three sources: during power operation, the Nitrogen Supply System is normally in service and the Containment Air System, a closed loop system that recycles the containment atmosphere, is available as a backup. In case both systems would fail, the Plant Instrument Air System can be cross-connected to the Nitrogen Supply System piping. The Plant Instrument Air System is normally isolated from the Nitrogen Supply System by blind flanges during power

operation. Procedural controls are in place that restrict the use of the Plant Instrument Air/Nitrogen Supply cross-connection during power operation. During cold shutdown modes, however, the Instrument Air System can be used without limitations. This use may fill the accumulators and piping within the primary containment with atmospheric air. However, even in the case that all this air is released into the containment after start-up of the plant and an accident occurs, the amount of air available from this source would be negligible.

We find that Vermont Yankee meets the second of the three criteria of the Generic Letter 84-09.

- 3) The licensee has completed an engineering review to identify any potential sources of oxygen in containment other than that resulting from radiolysis. The detailed evaluation (Ref. 2) concludes that the only credible source of oxygen, which has been found in the study, is the CAD System utilizing atmospheric air. The system has been designed to inject air from the Reactor Building into the primary containment to reduce postulated post-accident hydrogen concentration. The licensee is planning to convert the existing air CAD System to utilize nitrogen. The licensee has committed to complete the design and installation before start-up following the next refueling outage, which is scheduled to begin in September 1985.

The staff finds the conclusion of the licensee acceptable. After the modification of the gas supply to the CAD System, Vermont Yankee will satisfy the third of the three criteria of the Generic Letter 84-09.

#### Conclusions

We conclude that with your commitment, as stated in your August 24, 1984 letter, to convert the existing air Containment Atmosphere Dilution system to a nitrogen system, Criteria 1 through 3 in GL 84-09 are satisfied and, therefore, recombiner capability for Vermont Yankee Nuclear Power Station is not required.

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Dated: September 10, 1985

#### REFERENCES

- (1) Letter from D. G. Eisenhut to All Licensees dated May 8, 1984, "Recombiner Capability Requirements of 10 CFR 50.44 (c)(3)(ii) (Generic Letter 84-09).
- (2) "Generation and Mitigation of Combustible Gas Mixtures in Inerted BWR Mark I Containments", by F. R. Hayes, L. B. Nesbitt and P. P. Stancavage. Technical Report NEDO-22155/82-NEDO-69/CLASS 1/ June 1982.
- (3) Letter from A. C. Kadak, VYNPC, to D. B. Vassallo, NRC, dated August 24, 1984, "Recombiner Capability Requirements of 10 CFR 50.44(c)(3)(ii)".
- (4) Letter from W. P. Murphy, VYNPC, to D. B. Vassallo, NRC, dated October 31, 1984, "Recombiner Capability Requirements of 10 CFR 50.44(c)(3)(ii)".