Proposed Change #144

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FVY 88-40

REPLY TO
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May 23, 1988

U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attn: Document Control Desk

References:
a) License No. DPR-28 (Docket No. 50-271)
b) General Electric Standard Application for Reactor Fuel (GESTARII), NEDE-24011-P-A-8, dated May 1986, as amended
c) General Electric Company, "LOCA Analysis Report for Vermont Yankee Nuclear Power Station," NEDE-21697, dated August 1977
d) Letter, USNRC to VYNPC, SER, dated 11/30/77
e) Letter, USNRC to VYNPC, "Amendment No. 37," dated 9/15/77
f) Letter, VYNPC to USNRC, WVY 76-101, dated 11/5/76
g) Letter and SER, USNRC to VYNPC, dated 11/27/81
h) Letter, USNRC to Carolina Power and Light Company, dated 10/27/87
i) Letter, D.T. Weiss (GE to J.M. Buchheit, "Addtional MAPLHGR Related Data for Vermont Yankee HEB's," DTW 87199, dated 12/14/87
j) Letter, D.T. Weiss (GE to J.M. Buchheit, "MAPLHGR Data for the Vermont Yankee High Energy Bundles," DTW 87191, dated 12/7/87

Dear Sir:

Subject: Proposed Technical Specification Change for New Fuel Assembly Type

Pursuant to the Commission's rules and regulations set forth in 10 CFR50.90, Vermont Yankee Nuclear Power Corporation (VYNPC) hereby proposes the following change to Appendix A of the Vermont Yankee plant operating license [Reference a)].

Proposed Change

VYNPC intends to use an improved fuel type designed for longer life for its next refueling. This fuel type is designated GE 8x8EB by the manufacturer, the General Electric Company. Assemblies of the GE 8x8EB mechanical design type have been approved for use by the NRC [Reference b)] and similar fuel is

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currently in use at seven (7) other BWR's in the U.S. In addition to these utilities, four (4) other facilities have received approval to use the new fuel design. Other advantages to be gained with the new fuel design will include less start-up and shutdown cycles, reduced personnel exposure, reduced generation of low level waste, as well as additional operational benefits including cycle flexibility. The use of axial gadolinium in this design facilitate enhanced start-up and shutdown margins and power peaking control which will tend to improve control blade life. Thermo-mechanical improvements will reduce fuel pellet temperatures, which will tend to reduce the potential for fuel leakage. Several administrative changes are required in the Technical Specifications in order to accommodate the introduction of this fuel type. These changes are described below:

1. Revise Limiting Conditions for Operation (LCO) 3.11A to allow the addition of two new tables of APLHGR limits for the two GE 8x8EB fuel types to be used in the next operating cycle. A revised page 180a and two new tables, 3.11-1I and 3.11-1J, are attached.

2. Review LCO 3.11B to include vendor recommended LHGR limiting values for the two GE 8x8EB fuel types to be used in the next operating cycle. Revised pages 180b and 180f are attached.

3. Revise Section 5.5E to specify the peak uncontrolled infinite lattice multiplication factor appropriate for the two GE 8x8EB fuel types as a means of assuring compliance with Section 5.5A and 5.5B. A revised page 189 is attached.

Reason for Change

The GE 8x8EB fuel design will allow VYNPC to maintain an operating cycle length of 18 months, while maintaining applicable safety limits. The NRC has approved the use of this fuel mechanical design as specified in Section US.C of Reference b). Technical Specifications which designate operating limits by fuel type must be changed before the fuel can be used. This reason applies to Parts 1 and 2 of the proposed change specified above.

Part 3, the change to Section 5.5E, is requested because the GE 8x8EB fuel types ordered for VYNPC will have U-235 loadings slightly higher than the current specification limit of 16 grams per longitudinal centimeter of assembly (by less than 2%). This change is consistent with current practice accepted by the NRC [Reference b)] and has been approved for several other BWR licensees, most recently Carolina Power and Light for its Brunswick units [Reference h)].

Basis for Change

With regard to Part 1 of the proposed change: the APLHGR limits for the two GE 8x8EB fuel types, as shown on Tables 3.11-1I and 3.11-1J, were calculated using approved ECCS evaluation methods, as described in Reference c) and approved by the NRC in Reference d). These methods are the same ones used to calculate the limits used currently for other fuel types in the Technical Specification, Tables 3.11-1A through 3.11-1H.

The two GE 8x8EB fuel types proposed for use in Vermont Yankee have multiple lattices which are arranged axially. This is commonly referred to as "axially zoned fuel." The process computer will have the capability of applying the appropriate APLHGR limit to each axial zone of the given fuel type. Thus, the APLHGR limits for each axial zone are provided in Tables 3.11-1I and 3.11-1J. The common designations of the axial fuel zones are used in the tables because the specific axial location and lattice description of each zone is proprietary to the vendor. The lattice locations and descriptions, their associated APLHGR limits, and the basis for those limits are described in Attachment A.

With regard to Part 2 of the proposed change: the design basis for the GE 8x8EB fuel type is described in Reference b). The improvements made to this fuel type relative to earlier fuel types have allowed an increase in the peak linear heat generation rate while maintaining applicable safety margins. The appropriate LHGR limit for GE 8x8EB fuel is documented in various correspondence between GE and the NRC, specifically, a letter from J.S. Charnley (GE) to C.O. Thomas (NRC), "Response to Request Number 1 for Additional Information on NEDE-24011-P-A-6, Amendment 10," dated March 11, 1985, and an additional letter from J.S. Charnley (GE) to R. Lobel (NRC), "Presentation on GE 8x8E and GE 8x8EB Fuel Designs," dated November 14, 1987 (GE Proprietary). NRC approval of the appropriate LHGR limit is found in Appendix US.C of Reference b), specifically "NRC Safety Evaluation Report Approving Amendment 10 to NEDE-24011-P."

With regard to Part 3 of the proposed change: Section 5.5E was added to the Technical Specifications by Amendment 37 [Reference e)], in order to provide a method of ensuring compliance with the effective multiplication factor safety limit for fuel storage stated in Section 5.5B of the Technical Specifications. The current 16 grams of U-235 per axial centimeter stated in Section 5.5E is not the best measure of the primary variable which affects the effective multiplication factor of the stored fuel. An improved method of ensuring compliance with the safety limit is to compare the maximum, cold, infinite lattice multiplication factor, K_∞, of each assembly design against the K_∞ of the hypothetical stored assembly assumed in the analysis. The latter method provides a truer estimate of an assembly's margin to the safety limit.

For the hypothetical fuel assembly used in the analysis of Reference f), the K_∞, in an infinite lattice core configuration, is 1.33. This value was calculated using NRC-approved methods [Reference g)]. For the purposes of assuring compliance with the safety limit, the maximum cold K_∞ of any fuel must be shown to be less than or equal to 1.33, in the infinite lattice core configuration.

However, in order to address the subcriticality requirements stated in Section 5.5A as well as 5.5B, VYNPC proposes to provide a single fuel specification that will assure compliance with both.

New fuel assemblies with an initial K_∞ less than or equal to 1.31 will meet the subcriticality requirements stated in Section 5.5A. This new fuel K_∞ limit of 1.31 has been approved by the NRC and is documented in Section 3.3.2.1.4 of Reference b). A K_∞ specification of 1.31 is more restrictive than the 1.33 discussed above. Therefore, it is conservative to adopt 1.31 as the bounding value to assure compliance with Sections 5.5A and 5.5B.

Compliance with Sections 5.5A and 5.5B is assured in the following manner: the cold (20°C) assembly K_∞ is calculated, as a function of exposure, using the Vermont Yankee methods approved in Reference g). This includes appropriate conservatism, during the infinite lattice depletion, to maximize fissile plutonium buildup. In the case of multiple lattice fuel designs, all enriched lattices are checked for cold K_∞ versus exposure. The maximum cold K_∞ must be less than or equal to the 1.31 criterion proposed for Section 5.5E. This analysis is performed on all assembly/lattice designs selected for use in Vermont Yankee.

Safety Considerations

The proposed change does not constitute an unreviewed safety question as defined in 10CFR50.59(a)(2). The basis for this conclusion is described below under Significant Hazards Consideration. This change has been reviewed by the Plant Operations Review Committee and the Nuclear Safety Audit and Review Committee.

Significant Hazards Consideration

Three standards defined in 10CFR50.92 are used to arrive at a determination that this request for amendment involves no significant hazards considerations. The discussion below addresses these three standards and demonstrates that operating the facility in accordance with this proposed change involves no significant hazards considerations:

(i) The proposed change will not involve any significant increase in the probability or consequences of an accident previously evaluated because: No changes are being made to the facility or its equipment

other than the introduction of the GE 8x8EB fuel type. The NRC has separately approved GE's extended burnup fuel design via a letter from H.N. Berkow (NRC) to J.S. Charnley (GE) entitled "Acceptance for Approval of Fuel Designs Described in Licensing Topical Report NEDE-24011-P-A-6, Amendment 10 for Extended Burnup Operation," dated December 3, 1985. This letter and the Safety Evaluation Report are included in Appendix US.C of Reference b).

The NRC specifically found that GE 8x8EB designs are acceptable for operation to extended burnups as defined in Amendment 10.

Operation of the plant with the GE 8x8EB fuel type will not significantly increase the probability or consequences of an accident previously evaluated. Increasing the probability of an accident could only occur if the facility were materially weakened or degraded in some fashion by the introduction of the GE 8x8EB fuel design or by the three administrative changes to the Technical Specifications described above. There is nothing in the GE 8x8EB fuel design that would cause the facility to be materially weakened or degraded. Neither do the three administrative changes weaken or degrade the facility. Rather, they provide controls on the use of the fuel to assure safety limits are not exceeded.

The consequences of an accident will not be significantly increased if the proposed change does not result in a significant increase in the release of fission products from the fuel in the event of a postulated accident. Such a release could be caused by an increase in the total fission product inventory available for release from some specified level of fission product barrier damage, or an increase in the level of fission product barrier damage, or both. The three administrative changes described above will provide assurance that the consequences of accidents previously evaluated will not be increased. Part 1 provides limits that will assure that the requirements of 10CFR50.46, which defines the acceptable consequences for a loss-of-coolant accident, are met for plant operation with the new fuel type. Part 2 defines the acceptable value for linear heat generation rate which will assure that the plant is operated within acceptable fuel cladding integrity safety limits as defined in Reference b), thus, ensuring that the consequences of an accident previously analyzed will not be increased.

Part 3 provides assurance that the criticality limits for fuel storage are maintained. The consequences of a hypothetical criticality accident are not affected by this change. The probability will be reduced because Part 3 provides an improved method for ensuring compliance with the safety limit.

(ii) The proposed change will not create the possibility of a new or different kind of accident from any accident previously evaluated because: The facility is not being changed, except for the introduction of the GE 8x8EB fuel type. Since this fuel type is essentially the same as the fuel currently in use and has been found to be acceptable for use per Reference b), there is no possibility that its use will create a new or different kind of accident. Parts 1 and 2 provide fuel thermal limits that are specified to assure the plant does not exceed applicable safety limits and, thus, do not, in and by themselves, create the possibility of a new or different accident from any previously evaluated. Part 3 provides further assurance that the criticality limits for fuel storage are not exceeded and, thus, does not, in and by itself, create the possibility of a new or different accident from any previously evaluated.

(iii) The proposed change will not involve a significant reduction in a margin of safety because: The GE 8x8EB fuel is designed to the same or higher standards of safety as fuel types previously used. The GE 8x8EB design is an improvement on the GE P8x8R and BP8x8R designs, which were previously approved for use by VYNPC. The NRC has approved the use of this fuel type [Reference b)] after considering a wide range of thermal-mechanical issues at extended burnups. Thus, its use will not involve a significant reduction in a margin of safety. Part 1 provides limits which will assure the acceptance criteria of 10CFR50.46 will be met; thus, Part 1 will not involve a reduction in a margin of safety since the margin of safety is defined by the acceptance criteria of 10CFR50.46. Part 2 provides assurance that the design basis for the GE 8x8EB fuel is not exceeded, thus assuring that the margin of safety, which has already been found to be acceptable in Reference b), is maintained; thus, Part 2 will not involve a reduction in a margin of safety. Part 3 provides assurance that the margin of safety for fuel storage is maintained. The margin of safety for the spent fuel storage is not being changed; nor is the licensee being relieved of demonstrating compliance with this limit. The proposed substitution of a K_∞ method of demonstrating compliance with this limit provides an equivalent and technically more appropriate method of assuring margin to the applicable safety limits. Thus, Part 3 will not involve a reduction in the margin of safety.

Fee Determination

In accordance with the provisions of 10CFR170.12, an application fee of $150.00 is enclosed.

Schedule for Change

We request that your review and approval of this proposed change be completed by July 15, 1988 in order to ensure that the change is incorporated in the Vermont Yankee Technical Specifications prior to manufacture of the GE 8x8EB designs scheduled for installation in Cycle 14. This change will be incorporated into the Vermont Yankee Technical Specifications as soon as practicable following receipt of your approval.

We trust that the information above adequately supports our request; however, should you have any questions in this matter, please contact us.

Very truly yours,

VERMONT YANKEE NUCLEAR POWER CORPORATION

Warren P. Murphy
Vice President and
Manager of Operations

/dm
cc: USNRC, Region I
USNRC Resident Inspector, VYNPC
Vermont Department of Public Service

STATE OF VERMONT)
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WINDHAM COUNTY)

Then personally appeared before me, Warren P. Murphy, who, being duly sworn, did state that he is Vice President and Manager of Operations of Vermont Yankee Nuclear Power Corporation, that he is duly authorized to execute and file the foregoing document in the name and on the behalf of Vermont Yankee Nuclear Power Corporation and that the statements therein are true to the best of his knowledge and belief.

DIANE M. McCUE
NOTARY PUBLIC
WINDHAM COUNTY, VERMONT

Diane M. McCue Notary Public
My Commission Expires February 10, 1991

Vermont Yankee Proposed Technical Specification Change
For New Fuel Assembly Type

Technical Specification Pages Deleted	Technical Specification Pages Inserted
180a	180a
180b	180b
180f	180f
-	180 - n7
-	180 - n8
189	189