

October 12, 2005

Mr. Michael Kansler  
President  
Entergy Nuclear Operations, Inc.  
440 Hamilton Avenue  
White Plains, NY 10601

SUBJECT: VERMONT YANKEE NUCLEAR POWER STATION - EXTENDED POWER  
UPRATE REVIEW SCHEDULE AND LICENSE CONDITIONS  
(TAC NO. MC0761)

Dear Mr. Kansler:

By letter dated September 10, 2003, as supplemented by letters dated October 1, and October 28 (2 letters), 2003, January 31 (2 letters), March 4, May 19, July 2, July 27, July 30, August 12, August 25, September 14, September 15, September 23, September 30 (2 letters), October 5, October 7 (2 letters), December 8, and December 9, 2004, and February 24, March 10, March 24, March 31, April 5, April 22, June 2, August 1, August 4, September 10, September 14, September 18, and September 28, 2005, Entergy Nuclear Vermont Yankee, LLC and Entergy Nuclear Operations, Inc. (Entergy or the licensee) submitted a proposed license amendment to the Nuclear Regulatory Commission (NRC) for the Vermont Yankee Nuclear Power Station (VYNPS). The proposed amendment, "Technical Specification Proposed Change No. 263, Extended Power Uprate," would allow an increase in the maximum authorized power level for VYNPS from 1593 megawatts thermal (MWT) to 1912 MWT.

In a letter dated December 15, 2003, the NRC staff informed Entergy that, based on a review of the VYNPS extended power uprate (EPU) application dated September 10, 2003, the supplement dated October 1, 2003, and the two supplements dated October 28, 2003, sufficient information had not been provided to allow the NRC staff to establish a review schedule. Entergy provided additional information in two supplements dated January 31, 2004, to address the NRC staff's concerns. Subsequently, in a letter dated February 20, 2004, the NRC staff informed Entergy that the staff had completed its acceptance review of the VYNPS EPU license amendment application and had established a forecast review completion date of January 31, 2005.

In a letter dated October 15, 2004, the NRC staff notified Entergy that the staff's review schedule for the proposed VYNPS EPU amendment would be impacted, primarily due to concerns regarding the steam dryer analysis. The letter noted that during the review, in an attempt to resolve our steam dryer concerns, the NRC staff had requested additional information, held three public meetings with Entergy, and performed an audit of the steam dryer analysis at the General Electric (GE) office in San Jose, California. The letter also noted that information was needed to address technical issues raised during the VYNPS engineering inspection that was completed in September 2004. The letter stated that the EPU review schedule would be reassessed following receipt and review of supplemental information from Entergy.

On April 5, 2005, Entergy submitted a supplement to the EPU application that completed submittal of a series of supplements to address the concerns in the October 15, 2004, letter. These supplements collectively contained a substantial amount of information that necessitated significant NRC staff review time. As a result of the review of this information, the NRC staff issued a request for additional information (RAI) on July 27, 2005. The RAI contained 200 questions, of which 132 pertained to the steam dryer analysis, and 35 pertained to issues related to the methods used by GE to perform reactor neutronic and thermal/hydraulic analysis. To expedite the review, several draft versions of the RAIs were provided to Entergy prior to formal RAI issuance on July 27, 2005, a technical audit of the steam dryer analysis was conducted on June 15 and 16, 2005, at the GE office in Washington, DC, and a public meeting on the GE methods issues was held at the NRC on June 30, 2005. Entergy provided responses to the RAI in supplements dated August 1, and August 4, 2005.

The NRC staff reestablished the VYNPS EPU review schedule in a conference call with the Atomic Safety and Licensing Board (ASLB) on August 3, 2005. The transcript for the conference call can be accessed from the Agencywide Documents Access and Management System (ADAMS) Public Electronic Reading Room on the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> by entering Accession No. ML052210402. As discussed during the conference call, in which Entergy also participated, the next major milestone in the schedule is for the NRC staff to provide a draft safety evaluation (SE) to the Advisory Committee for Reactor Safeguards (ACRS) by October 21, 2005. The draft SE is needed to support an ACRS Subcommittee meeting in Vermont on November 15 and 16, 2005, and a second ACRS Subcommittee meeting at NRC Headquarters on November 30 and December 1, 2005. Other milestones discussed include an ACRS Full Committee meeting on December 8, 2005, and issuance of the final SE by February 24, 2006. As discussed during the conference call, and as also documented in the NRC staff's status report to the ASLB dated August 15, 2005 (ADAMS Accession No. ML052310345), the staff noted that the schedule could be delayed if the responses dated August 1 and August 4, 2005, do not fully address the issues raised in the RAI dated July 27, 2005.

The NRC staff's review of the August 1 and August 4, 2005, responses determined that the issues raised in the RAI dated July 27, 2005, were not fully addressed by Entergy and that further information would be required for the staff to complete its review. The staff's efforts to expedite receipt of this information included: (1) an audit of GE's steam dryer scale model test facility in Vallecitos, California on August 15 and 16, 2005; (2) an audit of the steam dryer analysis at GE's office in Washington, DC on August 22 through August 25, 2005; (3) an audit of the methods used by GE to perform reactor neutronic and thermal/hydraulic analysis at GE's office in Washington, DC on September 7, 2005; (4) issuance of an RAI on September 7, 2005; (5) a meeting at GE's office in Washington, DC on September 14 and 15, 2005, to discuss the GE methods issues; and (6) a meeting at the NRC on September 21, 2005, also to discuss the GE methods issues. Entergy provided additional information to address the issues raised in the RAI, audits, and meetings in supplements dated September 10, 14, 18, and 28, 2005.

The NRC staff's status report to the ASLB dated September 15, 2005, stated that the staff does not believe it is likely that the draft SE can be completed by October 21, 2005. Our assessment of the schedule was primarily based on the fact that Entergy has not been able to adequately resolve the staff's concerns regarding the steam dryer analysis and the GE methods issue. In addition, through several rounds of RAIs, Entergy has also not resolved the staff's concerns regarding the need for post-EPU testing of modifications made to the condensate and feedwater system.

The NRC staff has decided that several license conditions and a regulatory commitment, as shown in the enclosure to this letter, will be necessary to address the staff's concerns or to confirm predictions and assertions you have made. One of the conditions slightly modifies a condition proposed in Entergy's letter dated September 28, 2005, pertaining to the minimum critical power ratio (addresses concerns related to uncertainties in the GE methods). Another condition, pertaining to monitoring and evaluating potential adverse flow effects (including steam dryer structural integrity), adds new requirements to a condition proposed in Entergy's letter dated September 14, 2005. A third condition, proposed by the NRC staff, pertains to transient testing of the condensate and feedwater system. The proposed regulatory commitment pertains to actions associated with the license condition addressing potential adverse flow effects.

In order to support the issuance of the draft SE by October 21, 2005, Entergy is requested to submit a supplement to the EPU application by October 17, 2005, accepting the license conditions and regulatory commitment proposed in the enclosure to this letter. It should be noted, however, that your acceptance does not constitute completion of the staff's review of the EPU application.

If you have any questions, please contact the VYNPS Project Manager, Mr. Richard Ennis, at (301) 415-1420.

Sincerely,

*/RA/*

J. E. Dyer, Director  
Office of Nuclear Reactor Regulation

Docket No. 50-271

Enclosure: As stated

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Sincerely,

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J. E. Dyer, Director

Office of Nuclear Reactor Regulation

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**Proposed New License Conditions and Regulatory Commitment  
for Facility License DPR-28  
In Support of Vermont Yankee Nuclear Power Station Extended Power Uprate Review**

**Proposed License Conditions**

As part of the proposed extended power uprate amendment for the Vermont Yankee Nuclear Power Station, license conditions 3.K, 3.L, and 3.M would be added to Facility Operating License DPR-28 as follows:

**K. Minimum Critical Power Ratio**

When operating at thermal power greater than 1593 megawatts thermal, the safety limit minimum critical power ratio (SLMCPR) shall be established by adding 0.02 to the cycle-specific SLMCPR value calculated using the NRC-approved methodologies documented in General Electric Licensing Topical Report NEDE-24011-P-A, "General Electric Standard Application for Reactor Fuel," as amended, and documented in the Core Operating Limits Report.

**L. Transient Testing**

During the extended power uprate (EPU) power ascension test program and prior to exceeding 168 hours of plant operation at the nominal full EPU reactor power level, with feedwater and condensate flow rates stabilized at approximately the EPU full power level, Entergy Nuclear Operations, Inc. shall confirm (1) through performance of transient testing that the loss of one condensate pump will not result in a complete loss of reactor feedwater and (2) through performance of additional transient testing, or analysis of the results of the testing conducted in (1) above, that the loss of one reactor feedwater pump will not result in a reactor trip.

**M. Potential Adverse Flow Effects**

This license condition provides for monitoring, evaluating, and taking prompt action in response to potential adverse flow effects as a result of power uprate operation on plant structures, systems, and components (including verifying the continued structural integrity of the steam dryer).

1. The following requirements are placed on operation of the facility above the original licensed thermal power (OLTP) level of 1593 megawatts thermal (MWt):
  - a. Entergy Nuclear Operations, Inc. shall monitor hourly the 32 main steam line (MSL) strain gages during power ascension above 1593 MWt for increasing pressure fluctuations in the steam lines.
  - b. Entergy Nuclear Operations, Inc. shall hold the facility for 24 hours at 105%, 110%, and 115% of OLTP to collect data from the 32 MSL strain gages required by Condition M.1.a, conduct plant inspections and walkdowns, and evaluate

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steam dryer performance based on these data; shall provide the evaluation to the NRC staff by facsimile or electronic transmission to the NRC project manager upon completion of the evaluation; and shall not increase power above each hold point until 96 hours after the NRC project manager confirms receipt of the transmission.

- c. If any frequency peak from the MSL strain gage data exceeds the limit curve established by Entergy Nuclear Operations, Inc. and submitted to the NRC staff prior to operation above OLTP, Entergy Nuclear Operations, Inc. shall return the facility to a power level at which the limit curve is not exceeded. Entergy Nuclear Operations, Inc. shall resolve the uncertainties in the steam dryer analysis, document the continued structural integrity of the steam dryer, and provide that documentation to the NRC staff by facsimile or electronic transmission to the NRC project manager prior to further increases in reactor power.
  - d. In addition to evaluating the MSL strain gage data, Entergy Nuclear Operations, Inc. shall monitor reactor pressure vessel water level instrumentation and MSL piping accelerometers on an hourly basis during power ascension above OLTP. If resonance frequencies are identified as increasing above nominal levels established at OLTP conditions, Entergy Nuclear Operations, Inc. shall stop power ascension, document the continued structural integrity of the steam dryer, and provide that documentation to the NRC staff by facsimile or electronic transmission to the NRC project manager prior to further increases in reactor power.
  - e. Following start-up testing, Entergy Nuclear Operations, Inc. shall resolve the uncertainties in the steam dryer analysis and provide that resolution to the NRC staff by facsimile or electronic transmission to the NRC project manager. If the uncertainties are not resolved within 90 days of issuance of the license amendment authorizing operation at 1912 MWt, Entergy Nuclear Operations, Inc. shall return the facility to OLTP.
2. As described in Entergy Nuclear Operations, Inc. letter BKY 05-084 dated September 14, 2005, Entergy Nuclear Operations, Inc. shall implement the following actions:
    - a. Prior to operation above OLTP, Entergy Nuclear Operations, Inc. shall install 32 additional strain gages on the main steam piping and shall enhance the data acquisition system in order to reduce the measurement uncertainty associated with the acoustic circuit model (ACM).
    - b. In the event that acoustic signals are identified that challenge the limit curve during power ascension above OLTP, Entergy Nuclear Operations, Inc. shall evaluate dryer loads and re-establish the limit curve based on the new strain gage data, and shall perform a frequency-specific assessment of ACM uncertainty at the acoustic signal frequency.

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- c. After reaching 120% of OLTP, Entergy Nuclear Operations, Inc. shall obtain measurements from the MSL strain gages and establish the steam dryer flow-induced vibration load fatigue margin for the facility, update the dryer stress report, and re-establish the steam dryer monitoring plan (SDMP) limit curve with the updated ACM load definition and revised instrument uncertainty, which will be provided to the NRC staff.
  - d. During power ascension above OLTP, if an engineering evaluation is required in accordance with the SDMP, Entergy Nuclear Operations, Inc. shall perform the structural analysis to address frequency uncertainties up to  $\pm 10\%$  and assure that peak responses that fall within this uncertainty band are addressed.
  - e. Entergy Nuclear Operations, Inc. shall revise the SDMP to reflect long-term monitoring of plant parameters potentially indicative of steam dryer failure; to reflect consistency of the facility's steam dryer inspection program with General Electric Services Information Letter 644, Revision 1; and to identify the NRC Project Manager for the facility as the point of contact for providing SDMP information during power ascension.
  - f. Entergy Nuclear Operations, Inc. shall submit the final extended power uprate (EPU) steam dryer load definition for the facility to the NRC upon completion of the power ascension test program.
  - g. Entergy Nuclear Operations, Inc. shall submit the flow-induced vibration related portions of the EPU startup test procedure to the NRC, including methodology for updating the limit curve, prior to initial power ascension above OLTP.
3. Entergy Nuclear Operations, Inc. shall prepare the EPU startup test procedure to include the (a) stress limit curve to be applied for evaluating steam dryer performance; (b) specific hold points and their duration during EPU power ascension; (c) activities to be accomplished during hold points; (d) plant parameters to be monitored; (e) inspections and walkdowns to be conducted for steam, feedwater, and condensate systems and components during the hold points; (f) methods to be used to trend plant parameters; (g) acceptance criteria for monitoring and trending plant parameters, and conducting the walkdowns and inspections; (h) actions to be taken if acceptance criteria are not satisfied; and (i) verification of the completion of commitments and planned actions specified in its application and all supplements to the application in support of the EPU license amendment request pertaining to the steam dryer prior to power increase above OLTP. Entergy Nuclear Operations, Inc. shall submit the EPU startup test procedure to the NRC by facsimile or electronic transmission to the NRC project manager prior to increasing power above OLTP.
  4. When operating above OLTP, the operating limits, required actions, and surveillances specified in the SDMP shall be met. The following key attributes of the SDMP shall not be made less restrictive without prior NRC approval:

- a. During initial power ascension testing above OLTP, each test plateau increment shall be approximately 80 MWt;
- b. Level 1 performance criteria; and
- c. The methodology for establishing the stress spectra used for the Level 1 and Level 2 performance criteria.

Changes to other aspects of the SDMP may be made in accordance with the guidance of NEI 99-04.

5. During each of the three scheduled refueling outages (beginning with the spring 2007 refueling outage), a visual inspection shall be conducted of all accessible, susceptible locations of the steam dryer, including flaws left "as is" and modifications.
6. The results of the visual inspections of the steam dryer conducted during the three scheduled refueling outages (beginning with the spring 2007 refueling outage) shall be reported to the NRC staff within 60 days following startup from the respective refueling outage. The results of the SDMP shall be submitted to the NRC staff in a report within 60 days following the completion of all EPU power ascension testing.
7. The requirements of paragraph 4 above for meeting the SDMP shall be implemented upon issuance of the EPU license amendment and shall continue until the completion of one full operating cycle at EPU. If an unacceptable structural flaw (due to fatigue) is detected during the subsequent visual inspection of the steam dryer, the requirements of paragraph 4 shall extend another full operating cycle until the visual inspection standard of no new flaws/flaw growth based on visual inspection is satisfied.
8. This license condition shall expire upon satisfaction of the requirements in paragraphs 5, 6, and 7 provided that a visual inspection of the steam dryer does not reveal any new unacceptable flaw or unacceptable flaw growth that is due to fatigue.

### **Proposed Regulatory Commitment**

In addition to the license conditions proposed above, the licensee is requested to make the following regulatory commitment:

With regard to License Condition 3.M, "Potential Adverse Flow Effects," Entergy will provide information on plant data, evaluations, walkdowns, inspections, and procedures associated with the individual requirements of that license condition to the NRC staff prior to increasing power above 1593 MWt or each specified hold point, as applicable. If any safety concerns are identified during the NRC staff review of the provided information, Entergy will not increase power above 1593 MWt or the applicable hold

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point, and the specific requirements in the license condition will not be satisfied.