From: Rick Ennis
To: Allen Howe; Brian Sheron; Cliff Anderson; Cornelius Holden; David Pelton; Diane Screnci; Donald Florek; Donna Skay; Eric Leeds; James Clifford; Jim Dyer; Kamal Manoly; Neil Sheehan; Richard Lobel; Robert Bores; Robert Dennig; Robert Jasinski; Rosetta Virgilio; Scott Burnell; Scott Wall; Tad Marsh; Tae Kim; Thomas Madden
Date: 6/9/04 12:08PM
Subject: Fwd: State of Vermont comments on EPU and AST

Attached are 2 letters from the State of Vermont that Bill Sherman just emailed to me. They provide State comments on the Vermont Yankee AST amendment request and the EPU amendment request. Note, these are the second set of comments from the State on each amendment request. We previously responded to the first AST letter on 12/16/03 and the response to the first EPU letter (NPSH issue) is with Jim Dyer for review (scheduled to be issued today).

The letter concerning the AST amendment request is one Bill previously told me he was sending in response to my routine request on whether the State had comments on the amendment. Based on the comments, we will not be able to issue the amendment by 6/30/04 as per the current schedule. I will pass this info on to the licensee. My plan is to coordinate with Tech Staff such that we can address the comments in the SE in parallel with sending a response back to the State. The issues concern SLC and the single failure criteria, quality standards for the ALT pathway, and reducing margin by increasing the allowed MSIV leakage.

The second letter was a suprise to me. It requests the NRC to perform independent calculations as part of the power uprate review in the areas concerning steam dryers, NPSH, and flow-induced vibration.

I will take both of these letters to the 5th floor so they can be Yellow Ticketed.

Thanks,

Rick
415-1420

E-49

Mail Envelope Properties (40C73606.350 : 15 : 20516)

Subject: Fwd: State of Vermont comments on EPU and AST
Creation Date: 6/9/04 12:08PM
From: Rick Ennis

Created By: RXE@nrc.gov

Recipients	**Action**	**Date & Time**
twf5_po.TWFN_DO	Delivered	06/09/04 12:08PM
TJM (Thomas Madden)	Opened	06/09/04 01:13PM
nrc.gov		
kp1_po.KP_DO	Delivered	06/09/04 12:09PM
CJA (Cliff Anderson)	Opened	06/09/04 12:09PM
DJF1 (Donald Florek)	Opened	06/09/04 12:11PM
DLP1 (David Pelton)	Opened	06/09/04 01:06PM
DPS (Diane Screnci)	Opened	06/09/04 12:18PM
NAS (Neil Sheehan)	Opened	06/09/04 12:18PM
RJB (Robert Bores)	Opened	06/09/04 08:13PM
nrc.gov		
owf1_po.OWFN_DO	Delivered	06/09/04 12:08PM
ROV (Rosetta Virgilio)	Opened	06/09/04 12:34PM
SRB3 (Scott Burnell)	Opened	06/09/04 12:27PM
nrc.gov		
owf2_po.OWFN_DO	Delivered	06/09/04 12:08PM
DMS6 (Donna Skay)	Opened	06/09/04 12:57PM
KAM (Kamal Manoly)	Opened	06/09/04 12:08PM
RML (Richard Lobel)	Opened	06/09/04 03:07PM
nrc.gov		
owf4_po.OWFN_DO	Delivered	06/09/04 12:08PM
AGH1 (Allen Howe)	Opened	06/15/04 09:01AM
BWS (Brian Sheron)	Opened	06/09/04 12:27PM
CFH (Cornelius Holden)	Opened	06/09/04 03:49PM
EJL (Eric Leeds)	Opened	06/09/04 02:01PM
JED2 (Jim Dyer)	Opened	06/09/04 04:09PM
JWC (James Clifford)	Opened	06/09/04 12:39PM
LBM (Tad Marsh)	Opened	06/09/04 12:27PM
RJJ1 (Robert Jasinski)	Opened	06/09/04 12:09PM
RLD (Robert Dennig)	Opened	06/09/04 01:05PM
RXE BC (Rick Ennis)	Opened	06/09/04 12:15PM
SPW (Scott Wall)	Opened	06/09/04 12:45PM

TJK3 (Tae Kim)	Opened	06/09/04 12:46PM

Post Office	Delivered	Route
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Files	Size	Date & Time
Mail		
MESSAGE	2196	06/09/04 12:08PM

Options

Auto Delete:	No
Expiration Date:	None
Notify Recipients:	Yes
Priority:	Standard
Reply Requested:	No
Return Notification:	None
Concealed Subject:	No
Security:	Standard
To Be Delivered:	Immediate
Status Tracking:	Delivered & Opened

From: "Sherman, William" <William.Sherman@state.vt.us>
To: "Rick Ennis (E-mail)" <rxe@nrc.gov>
Date: 6/9/04 11:11AM
Subject: Comments on EPU and AST

Dear Rick,

Today we signed out the attached letters regarding proposed Vermont Yankee amendments - one providing comments on EPU, the other on AST.

-- Bill Sherman

<<EPU comments1.wpd>> <<AST comments1.wpd>>

CC: "Dave Pelton (E-mail)" <dlp1@nrc.gov>, "Cliff Anderson (E-mail)" <cja@nrc.gov>, "Beth S (E-mail)" <bek@nrc.gov>

June 8, 2004

RE: Vermont Yankee Nuclear Power Station
License No. DPR-28 (Docket No. 50-271)
Technical Specification Proposed Change No. 263
Extended Power Uprate - State of Vermont Comments

Richard Ennis, Project Manager
U.S. Nuclear Regulatory Commission
Washington, D.C., 20555

Dear Mr. Ennis,

The state of Vermont, through its NRC state liaison officer, makes the requests identified below of the Nuclear Regulatory Commission staff (NRC) with regard to its review of the proposed Vermont Yankee power uprate. Vermont asks that NRC perform independent calculations in three areas to confirm the adequacy of the proposed uprate: 1) the adequacy the steam dryer with power uprate flow rates, 2) credit for containment overpressure for net positive suction head (NPSH) adequacy, and 3) flow-induced vibration adequacy of the main steam and feedwater systems. This request is consistent with NRC's Review Standard for Extended Power Uprates (RS-001).

Background

On March 15, 2004, the Vermont Public Service Board requested the NRC perform an *independent engineering assessment*[1] of Vermont Yankee related to its proposed 20% power uprate. NRC responded on May 4, 2004, stating it would perform a new engineering assessment inspection at Vermont Yankee. In its May 4, 2004, letter, NRC also identified that its power uprate review consisted of a comprehensive assessment of engineering, design and safety analyses comprising about 4000 staff-hours.

[1] The PSB created the term, *independent engineering assessment*, which it defined within its March 15, 2004 request as a level of effort of four persons for four weeks.

Also, in December 2003, the NRC issued Revision 0 of RS-001. In response to comments from the Advisory Committee on Reactor Safeguards (ACRS), NRC included the following statement regarding independent calculations:

> *Perform audits and/or independent calculations as deemed necessary and appropriate to support review of the licensee's application. In determining the need for performing audits and/or independent calculations, consider the following:*
>
> - *confidence of the NRC staff in the models and/or methods used by the licensee*
> - *confidence of the NRC staff in the analysis results*
> - *familiarity of the NRC staff with the models and/or methods used by the licensee*
> - *prior use of the models and/or methods for similar plant designs and operating conditions and the NRC staff's experience related to such use*
> - *NRC staff experience with the impact of proposed changes on analysis results*
> - *available margin versus level of uncertainty in analysis results*
> - *efficiency gains that may result from performing audits and/or independent calculations*
>
> RS-001, Section 2.1, page 2.1-3.

Accordingly, we believe that independent calculations should be performed by NRC as part of the new engineering assessment inspection, together with the power uprate review, in the three areas identified below.

Steam Dryer Analysis

Despite licensee and industry analysis, significant, power uprate related failures of steam dryers have occurred at four units - Quad Cities 1 & 2 and Dresden 2 & 3.Of three types of steam dryers, square, curved and slanted, Vermont Yankee has the same squared-design steam dryer as Quad Cities and Dresden, determined to be the most susceptible to power uprate related cracking.

In NRC's letter of May 4, 2004, it was stated that outside technical experts are assisting NRC staff on steam dryer issues. In addition, we are aware that Entergy has performed an analysis of its steam dryer and has completed modifications for power uprate in its Spring 2004 refueling outage. In addition, Entergy discovered and dispositioned numerous cracks in the steam dryer.

We believe the analysis for the adequacy of the steam dryer meets the criteria for independent calculation stated in RS-001, Section 2.1. Therefore, we request that NRC verify by independent calculation the adequacy of Vermont Yankee's steam dryer, with modifications, for power uprate as part of its new engineering assessment inspection, together with the power uprate review. Further, we request that Vermont Yankee not be allowed to operate above original licensed thermal power (OLTP) until the NRC verification analysis of the steam dryer is completed.

Credit for Containment Overpressure

Centrifugal pumps required to perform safety actions must have adequate NPSH in order to function properly. For power uprate situations, available NPSH is reduced because water temperatures are warmer than at original power because more heat is produced in the reactor. To compensate for decreased NPSH because of hotter water temperatures, Entergy requests credit for the elevated pressure in containment (containment overpressure). In Section 4.2.6 of the *Safety Analysis Report for Vermont Yankee Nuclear Power Station Constant Pressure Power Uprate (PUSAR),* NEDC-33090, September 2003, Entergy requests containment overpressure credit for either one or two sets of pumps for four different situations:

- On loss of coolant accidents (LOCAs), for the residual heat removal (RHR) and core spray (CS) pumps
- On an anticipated transient without scram (ATWS), for the RHR pumps
- On station black outs (SBOs), for the RHR pumps
- On Appendix R fire events, for the RHR and CS pumps

In our letter of December 8, 2003[2], we asked NRC questions about granting containment overpressure credit, which represents both a change in Vermont Yankee's design basis and a change in NRC's regulatory policy. It does not appear that granting containment overpressure credit is *necessary* in the context of Draft Regulatory Guide DG 1107, at 7, and it appears that the design can be *practicably altered* in the context of DG 1107, at 16, by operation at OLTP. Therefore, pending response to our December 8, 2003 letter, we do not believe containment overpressure credit should be allowed.

Notwithstanding, and without waiving our belief that containment overpressure credit should not be allowed, if such credit is allowed, we believe the NRC should perform the following independent calculations.

[2] We are awaiting response to our letter of December 8, 2003.

The four situations for which containment overpressure credit is requested are fundamentally different. Two situations, LOCA and ATWS pressurize the drywell first and then the torus. The other situations, SBO and Appendix R events, pressurize only the torus. The analysis of each situation consists of a containment response analysis and an NPSH calculation. Finally, the single failure criteria effects are not the same for each situation.

Because of the importance of the RHR and CS pumps for the situations in question, and because of the controversial nature of the change in NRC's regulatory policy, we believe these situations meet the requirements of RS-001, Section 2.1 for independent calculations. Therefore, we request that NRC verify by independent calculation the adequacy of the claimed containment overpressure credit for power uprate as part of its new engineering assessment inspection, together with the power uprate review. The containment response for each situation where credit is requested should be independently verified by NRC analysis. A single failure mode and effects analysis should be performed by NRC for each situation and sufficient calculations should be performed to assure the most limiting single failure is identified[3]. The water temperature and available NPSH should be determined for each situation, again assuming the most limiting single failure, to verify the calculated containment overpressure provides sufficient NPSH.

Flow-Induced Vibration Adequacy

In *PUSAR* Section 3.4.1, it is stated that Entergy will demonstrate the adequacy of increased flow-induced vibration of the main steam system and feedwater system piping only through a piping startup testing program. However, since power uprate related, vibration failures have occurred for an electromatic releif valve, small piping in main steam and feedwater lines, and a feedwater instrument probe, we believe the flow-induced adequacy of the main steam and feedwater lines, including branch lines connected to the main steam and feedwater systems, should be confirmed by analysis wherever possible.

[3] With regard to the single failure mode and effects analysis, we believe the guidance from Regulatory Guide 1.183, Section C.5.1.4, albeit for a different subject - *alternative source term*, is sound and should be applied for the review of *containment overpressure credit*. In summary, Section C.5.1.4 states that, since a request for *alternative source term* is a change to a plant's historical licensing basis, the review of its adequacy may consider current, rather than historical, licensing requirements for other affected aspects of the request. Since *containment overpressure credit* is a change to Vermont Yankee's historical licensing basis, its adequacy should be evaluated using the single failure criteria applicable to current-day license evaluations.

Since failures have occurred in this area, we believe the area of flow-induced vibrations meet the requirement of RS-001, Section 2.1 for independent calculations. Therefore we request that NRC verify by independent calculation the adequacy of increased flow-induced vibration of the main steam and feedwater systems, including branch lines, as part of its new engineering assessment inspection, together with the power uprate review.

Conclusion

RS-001, Section 2.1 identifies either audits or independent calculations as appropriate actions for the conditions identified on page 2.1-3. We believe that independent calculations by the NRC should be performed for the three areas identified above. However, we would be pleased to discuss with the NRC whether audits of any of these areas is more appropriate than independent calculations. We welcome the opportunity to provide these comments and look forward to resolving these issues in a satisfactory manner. If you have questions about these items, please call me at 802-828-2321, or Mr. William Sherman of my staff at 802-828-3349.

Sincerely,

David O'Brien, Commissioner
State Liaison Officer

cc: Mario V. Bonaca, Chairman, ACRS
J. Thayer, Entergy
Sen. Patrick Leahy
Sen. James Jeffords
Rep. Bernard Sanders

June 9, 2004

RE: Vermont Yankee Nuclear Power Station
License No. DPR-28 (Docket No. 50-271)
Technical Specification Proposed Change No. 262
Alternate Source Term - State of Vermont Comments

Richard Ennis, Project Manager
U.S. Nuclear Regulatory Commission
Washington, D.C., 20555

Dear Mr. Ennis,

The state of Vermont is asked to comment on Vermont Yankee's alternate source term (AST) proposal. We believe the AST proposal should not be approved without modifications for the following reasons:

1. The standby liquid control (SLC) system does not appear to meet the single failure criteria appropriate for a system used to mitigate the consequences of a design basis accident ("an engineered safety feature system").

2. The main steam isolation valve (MSIV) alternate leakage treatment (ALT) pathway does not appear to meet the quality standards appropriate for a system used to mitigate the consequences of a design basis accident ("an engineered safety feature system").

3. There is no reason to reduce safety margins for Vermonters by doubling the amount of allowed leakage from MSIV's from the leakage levels Vermont Yankee has met for the past 32 years.

Background

On August 8, 2003, we asked the NRC a series of questions regarding Vermont Yankee's AST proposal. The NRC staff responded on December 16, 2003. In that letter, NRC defers a number of responses by stating it "will address the adequacy of the licensee's request in our final SE [safety evaluation]". On May 12 and 13, 2004, we were provided

by email information on the NRC's proposed final SE of the SLC system single failure and AST quality assurance design.

SLC System Single Failure

As part of the AST proposal, the function of the Vermont Yankee standby liquid control (SLC) system would be modified. In its original design, the SLC system was provided as a backup system to provide negative reactivity to the reactor core in the event of beyond-design-basis events. As such, the SLC system was an auxiliary supporting system. For AST, the SLC function is changed to provide pH control for the suppression pool after design basis accidents. Therefore, the SLC becomes an engineered safety feature (ESF) system.

The SLC system is not fully redundant. Portions of the SLC piping are not redundant, and two non-redundant active check valves are located on the containment penetration for the system.

Regarding single failure, Vermont Yankee's ESF design criteria is stated in Section 1.5.6 (4) of its Final Safety Analysis Report:

> Essential safety actions shall be carried out by redundant and independent equipment so that no single failure of an active component can prevent required actions.

The current NRC single failure criteria is stated in 10 CFR 50, Appendix A as:

> Single failure. A single failure means an occurrence which results in the loss of capability of a component to perform its intended safety functions. Multiple failures resulting from a single occurrence are considered to be a single failure. Fluid and electric systems are considered to be designed against an assumed single failure if neither (1) a single failure of any active component (assuming passive components function properly) nor (2) a single failure of a passive component (assuming active components function properly), results in a loss of the capability of the system to perform its safety functions.

NRC claims that it is acceptable for an application not to meet the single failure criteria if acceptable quality and reliability of the non-redundant component can be shown. It's claims are based on guidance contained in Regulatory Guide 1.53, "Application of the

Single-Failure Criterion to Nuclear Power Plants Protection Systems." December 16 letter, Response 3(b).

We disagree with this interpretation of single failure for four reasons. First, it is contrary both to the plain statement of Vermont Yankee's design and licensing basis and the NRC's regulation. Second, it is contrary in practice to Vermont Yankee's design of engineered safety feature system. We do not know of other cases in which Vermont Yankee ESF systems were licensed with non-redundant active components. Third, if NRC is changing Vermont Yankee's licensing basis based on new interpretations, it should not grant this change piecemeal. Section C.5.1.4 of Regulatory Guide 1.183 (quoted below) states that current-day licensing standards will be used for the AST review:

> *5.1.4 Applicability of Prior Licensing Basis*
>
> *The NRC staff considers the implementation of an AST to be a significant change to the design basis of the facility that is voluntarily initiated by the licensee. In order to issue a license amendment authorizing the use of an AST and the TEDE dose criteria, the NRC staff must make a current finding of compliance with regulations applicable to the amendment. The characteristics of the ASTs and the revised dose calculational methodology may be incompatible with many of the analysis assumptions and methods currently reflected in the facility's design basis analyses. The NRC staff may find that new or unreviewed issues are created by a particular site-specific implementation of the AST, warranting review of staff positions approved subsequent to the initial issuance of the license. This is not considered a backfit as defined by 10 CFR 50.109, "Backfitting." However, prior design bases that are unrelated to the use of the AST, or are unaffected by the AST, may continue as the facility's design basis. Licensees should ensure that analysis assumptions and methods are compatible with the ASTs and the TEDE criteria.*

We believe that, if any part of new licensing bases are used, the complete applicable new licensing basis should be used. If NRC is applying a less-stringent, current-day single failure criteria, it should invoke all applicable current-day licensing bases, including but not limited to single passive failure design and current seismic design requirements.[1] Fourth, Vermont Yankee has not demonstrated the non-redundant check valves meet the NRC's current-day requirement for quality and reliability. Similar check valves have failed to open in five other similar applications in the industry. Entergy February 25, 2004 letter to NRC, Response to RAI No. 4(a)(2).

Therefore, we believe that, in order to approve the AST proposal, NRC should require the new Vermont Yankee ESF SLC system to meet the single failure criterion.

---

[1] We note that Entergy, in its February 25, 2004 Response to Request for Additional Information, Response to RAI No. 1 (b), states it does not meet current-day seismic design requirements but reverts to its earlier, less stringent original licensing basis.

MSIV Alternate Leakage Treatment (ALT) Pathway

In conjunction with, but unrelated to, its AST proposal, Vermont Yankee requests to double its allowable individual MSIV leakage of 31 standard cubic feet per hour as part of an alternate leakage treatment pathway. The ALT pathway includes piping and valves to the main condenser which were neither designed nor purchased to safety-related system requirements. Because the intended use of the ALT pathway is to mitigate the consequences of a design basis accident, it is an engineered safety feature. NRC letter of December 16, 2003, Response 2(a).

Vermont Yankee has performed analysis demonstrating the ALT piping and valves, including the condenser, are seismically rugged. However, this analysis is neither the same evaluation for ESF systems in Vermont Yankee's current licensing basis, nor is it the seismic analysis that would be required for ESF systems under NRC's current-day seismic requirements. In addition, since the ALT piping and values, including the condenser, were not purchased under an 10 C.F.R. 50, Appendix B quality assurance program, confidence in current seismic analysis is uncertain since material properties and weld techniques are uncertain.

The issues of seismic and quality assurance design of the ALT pathway were questioned in our August 8, 2003 letter. NRC's response was that the issues would be addressed in the final SE. NRC letter of December 16, 2003, Responses 2(e) and 2(f). In an email of May 13, 2004, NRC identified its intent to approve the seismic and quality assurance portions of the ALT pathway based on footnotes and exceptions from two Standard Review Plan (SRP) Revision 2 Drafts from 1996 (SRP 3.2.1, "Seismic Classification", and SRP 3.2.2, "System Quality Group Classification").

We disagree with NRC's evaluation for three reasons. First, we do not believe unapproved, draft SRPs should be used as the basis for approval of Vermont Yankee's proposed ALT. Why are the SRP's still in draft form from 1996? What is NRC's policy on using draft information for its review standard? We note that these draft SRP's are neither referred to in the Regulatory Standard for Power Uprate (RS-001) nor available in the NRC's SRP collection on its website. Second, we believe that Vermont Yankee's original ESF licensing basis should be invoked for the ESF ALT pathway. This would include Seismic Class I design and analysis and purchase to a 10 C.F.R. 50, Appendix B, quality assurance program. Third, we see no reason to allow Vermont Yankee twice as much leakage through its MSIV's. In its AST amendment request of July 31, 2003, it states that maintaining the current limit would cause unnecessary maintenance. However, Vermont Yankee has been able to maintain these MSIV's to the current limit for the last 32 years. Doubling the allowable leakage would mean potentially exposing Vermonters

to twice as much radioactive leakage from MSIV's in the event of a design basis loss-of-coolant accident. Based on past successful maintenance history, exposing Vermonters to this increased potential is unnecessary and undesirable.

We do not believe the request for increased MSIV leakage should be granted. If the increase MSIV leakage is granted, we would like NRC to provide a presentation of the increased risks to Vermonters from the increased MSIV leakage and the issues concerning whether Vermonters should be subject to this increased risk.

Conclusion

We welcome the opportunity to provide these comments and look forward to resolving these issues in a satisfactory manner. If you have questions about these items, please call me at 802-828-2321, or Mr. William Sherman of my staff at 802-828-3349.

Sincerely,

David O'Brien, Commissioner
State Liaison Officer

cc: J. Thayer, Entergy
Sen. Patrick Leahy
Sen. James Jeffords
Rep. Bernard Sanders