From: Michael Modes
To: Conte, Richard
Date: 09/27/2007 6:51:23 PM
Subject: Fwd: VYNPS LRA Amenment 30 (ANSWER TO QUESTION ABOUT COOLING TOWER FAILURE)

M²
Senior Reactor Inspector
Engineering Branch One
Division of Reactor Safety
Region I
(610) 337-5198

CC: Beth Sienel; Darrell Roberts; Douglas Tifft; James Clifford; John Richmond; Lew, David; Marsha Gamberoni; Meyer, Glenn; Raymond Powell

Mail Envelope Properties (46FC33E7.73B : 16 : 55602)

Subject: Fwd: VYNPS LRA Amenment 30 (ANSWER TO QUESTION ABOUT COOLING TOWER FAILURE)
Creation Date 09/27/2007 6:51:19 PM
From: Michael Modes

Created By: MCM@nrc.gov

Recipients
nrc.gov
kp1_po.KP_DO
BEK CC (Beth Sienel)
DBT CC (Douglas Tifft)
DCL CC (David Lew)
DJR CC (Darrell Roberts)
GWM CC (Glenn Meyer)
JER4 CC (John Richmond)
JWC CC (James Clifford)
MKG CC (Marsha Gamberoni)
RJC (Richard Conte)
RJP CC (Raymond Powell)

Post Office	Route
kp1_po.KP_DO	nrc.gov

Files	Size	Date & Time
MESSAGE	593	09/27/2007 6:51:19 PM
Mail		

Options
Expiration Date: None
Priority: Standard
ReplyRequested: No
Return Notification: None

Concealed Subject: No
Security: Standard

Junk Mail Handling Evaluation Results
Message is not eligible for Junk Mail handling
Message is from an internal sender

Junk Mail settings when this message was delivered

Junk Mail handling disabled by User
Junk List is not enabled
Junk Mail using personal address books is not enabled
Block List is not enabled

From: "Hamer, Mike" <mhamer@entergy.com>
To: "Jonathan Rowley" <JGR@nrc.gov>, "Michael Modes" <MCM@nrc.gov>
Date: 09/27/2007 4:12:47 PM
Subject: VYNPS LRA Amenment 30

Jonathan,

Please see the attached letter, BVY 07-062, dated September 27, 2007
that is being submitted as VYNPS LRA Amendment 30 to provide a response
to RAI 2.4.4-2 regarding the recent cooling tower event.

<<BVY 07-062 - VYNPS LRA Amendment 30.PDF>>
Please call Dave Mannai or Mike Metell if you have any questions.

Regards,
Mike Hamer

CC: "Dreyfuss, John" <jdreyfu@entergy.com>, "Mannai, David" <dmannai@entergy.com>, "McCann, John (Licensing Director)" <jmccan1@entergy.com>, "YOUNG, GARRY G" <GYOUNG4@entergy.com>, "Lach, David J" <DLach@entergy.com>, "COX, ALAN B" <acox@entergy.com>, "Metell, Mike" <hmetell@entergy.com>

Mail Envelope Properties (46FC33E7.73B : 16 : 55602)

Subject: Fwd: VYNPS LRA Amenment 30 (ANSWER TO QUESTION ABOUT COOLING TOWER FAILURE)
Creation Date 09/27/2007 6:51:19 PM
From: Michael Modes

Created By: MCM@nrc.gov

Recipients
nrc.gov
kp1_po.KP_DO
BEK CC (Beth Sienel)
DBT CC (Douglas Tifft)
DCL CC (David Lew)
DJR CC (Darrell Roberts)
GWM CC (Glenn Meyer)
JER4 CC (John Richmond)
JWC CC (James Clifford)
MKG CC (Marsha Gamberoni)
RJC (Richard Conte)
RJP CC (Raymond Powell)

Post Office	Route
kp1_po.KP_DO	nrc.gov

Files	Size	Date & Time
MESSAGE	593	09/27/2007 6:51:19 PM
Mail		

Options
Expiration Date: None
Priority: Standard
ReplyRequested: No
Return Notification: None

Concealed Subject: No
Security: Standard

Junk Mail Handling Evaluation Results
Message is not eligible for Junk Mail handling
Message is from an internal sender

Junk Mail settings when this message was delivered

Junk Mail handling disabled by User
Junk List is not enabled
Junk Mail using personal address books is not enabled
Block List is not enabled

Entergy

Entergy Nuclear Operations, Inc.
Vermont Yankee
P.O. Box 0500
185 Old Ferry Road
Brattleboro, VT 05302-0500
Tel 802 257 5271

September 27, 2007
Docket No. 50-271
BVY 07-062
TAC No. MC 9668

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Reference:
1. Letter, Entergy to USNRC, "Vermont Yankee Nuclear Power Station, License No. DPR-28, License Renewal Application," BVY 06-009, dated January 25, 2006.
2. Letter, USNRC to Entergy, "Request for Additional Information for the Review of the Vermont Yankee Nuclear Power Station, License Renewal Application," NVY 07-121, dated August 29, 2007.

Subject: **Vermont Yankee Nuclear Power Station**
License No. DPR-28 (Docket No. 50-271)
License Renewal Application, Amendment 30

On January 25, 2006, Entergy Nuclear Operations, Inc. and Entergy Nuclear Vermont Yankee, LLC (Entergy) submitted the License Renewal Application (LRA) for the Vermont Yankee Nuclear Power Station (VYNPS) as indicated by Reference 1. Subsequent to an event that occurred at VYNPS on August 21, 2007, the NRC issued a "Request for Additional Information" (RAI) as indicated by Reference 2 as appropriate to clarify information contained within the LRA. This letter is submitted to provide our response to questions detailed in RAI 2.4.4-2.

Should you have any questions concerning this letter, please contact Mr. Dave Mannai at (802) 258-5422.

I declare under penalty of perjury that the foregoing is true and correct, executed on September 27, 2007.

Sincerely,

Ted A. Sullivan
Site Vice President
Vermont Yankee Nuclear Power Station

cc: See next page
enc: Attachment 1

cc: Mr. James Dyer, Director
U.S. Nuclear Regulatory Commission
Office O5E7
Washington, DC 20555-00001

Mr. Samuel J. Collins, Regional Administrator
U.S. Nuclear Regulatory Commission, Region 1
475 Allendale Road
King of Prussia, PA 19406-1415

Mr. Jack Strosnider, Director
U.S. Nuclear Regulatory Commission
Office T8A23
Washington, DC 20555-00001

Mr. Jonathan Rowley, Senior Project Manager
U.S. Nuclear Regulatory Commission
11555 Rockville Pike
MS-O-11F1
Rockville, MD 20853

Mr. Mike Modes
USNRC RI
475 Allendale Rd,
King of Prussia, PA 19406

Mr. James S. Kim, Project Manager
U.S. Nuclear Regulatory Commission
Mail Stop O 8 C2A
Washington, DC 20555

USNRC Resident Inspector
Entergy Nuclear Vermont Yankee, LLC
P.O. Box 157 *(for mail delivery)*
Vernon, Vermont 05354

Mr. David O'Brien, Commissioner
VT Department of Public Service
112 State Street – Drawer 20
Montpelier, Vermont 05620-2601

Diane Curran, Esq.
Harmon, Curran, Spielberg & Eisenberg, LLP
1726 M Street, N.W., Suite 600
Washington, D.C. 20036

Attachment 1

Vermont Yankee Nuclear Power Station

License Renewal Application

Amendment 30

RAI 2.4.4-2 Response

VERMONT YANKEE NUCLEAR POWER STATION
LICENSE RENEWAL APPLICATION SUPPLEMENT
ATTACHMENT 1

RAI 2.4.4-2

Please provide the results of the review performed to determine the impact of the circulating water piping, pipe supports, and west cooling tower cell (2-4) failures on license renewal scoping, screening, and applicable aging management programs. Please include the following:

A. A conclusion and basis as to whether the scoping results documented in the LRA, which initially determined that 9 of the 11 west cooling tower cells were not within the scope of license renewal, are still valid.

B. If found that the west cooling tower cells are within the scope of license renewal, please provide the following:

   I. The potential effect of a circulating water piping, pipe supports, or structural failure of the nonsafety-related west cooling tower cells (2-3 through 2-11), which were not included within the scope of license renewal, on safety-related systems, structures, and components (in accordance with 10 CFR 54.4(a)(2)). Include the potential effect of debris entering the deep basin beneath the cooling tower.

   II. The details of any age related degradation which caused the failure of the circulating water piping, pipe supports, and west cooling tower cell. Include the results of the piping and pipe supports inspection related to the current failure and any previously performed, and a description of the identified aging mechanism(s).

C. Any impact on the aging management programs for circulating water piping, pipe supports, or cooling tower cells.

Cooling Tower Background Information

VYNPS utilizes once-through condenser cooling from the Connecticut River supplemented by two forced draft cooling towers. Each tower consists of eleven cells, each cell equipped with its own forced draft fan. One cell in the west cooling tower, CT 2-1, provides a safety related function as the heat sink for the Residual Heat Removal Service Water system (RHRSW) in the Alternate Cooling System (ACS) mode and is constructed as a Seismic Class I structure. The adjacent cell, CT 2-2, is also designed and constructed as a Seismic Class I structure to prevent adversely impacting the structural integrity of CT 2-1 during a seismic event.

CT 2-1 and CT 2-2 structures have similar construction as the other cooling tower cells for dead weight loads, but a more robust bracing system to withstand wind and seismic loading. They are constructed from high quality timber and use stainless steel hardware for all bolted connections. The structural columns were refurbished during the 1980's, followed by end wall refurbishment between 2002 and 2007. As required for activities associated with any safety-related and Seismic Class I systems, structures, and components (SSCs), the inspections and repairs on cooling tower cells CT 2-1 and CT

2-2 receive additional oversight by the site Engineering, Maintenance, and Quality Assurance (QA) groups.

RAI 2.4.4-2.A

A conclusion and basis as to whether the scoping results documented in the LRA, which initially determined that 9 of the 11 west cooling tower cells were not within the scope of license renewal, are still valid.

Response to Part A:

Cooling tower cells CT 2-1 and CT 2-2 are the only cells in the scope of license renewal. Failures of the other cells will not prevent satisfactory accomplishment of a safety function identified in 10 CFR 54.4(a)(1). The scoping results documented in the LRA remain valid. See the response to part B for further discussion of potential failures.

RAI 2.4.4-2.B

If found that the west cooling tower cells are within the scope of license renewal, please provide the following:

I. The potential effect of a circulating water piping, pipe supports, or structural failure of the nonsafety-related west cooling tower cells (2-3 through 2-11), which were not included within the scope of license renewal, on safety-related systems, structures, and components (in accordance with 10 CFR 54.4(a)(2)). Include the potential effect of debris entering the deep basin beneath the cooling tower.

II. The details of any age related degradation which caused the failure of the circulating water piping, pipe supports, and west cooling tower cell. Include the results of the piping and pipe supports inspection related to the current failure and any previously performed, and a description of the identified aging mechanism(s).

Response to Part B

Subpart I:

As indicated in the LRA and in response to Part A, west cooling tower cells CT 2-1 and CT 2-2 are within the scope of license renewal. The failure of cooling tower cell CT 2-4 or any other of the cooling tower cells, along with the associated circulating water piping and pipe supports, has no impact on the ability of the in-scope cooling tower cells and the Cooling Tower No. 2 (west cooling tower) deep basin to accomplish safety functions under design basis conditions. Cooling tower cells CT 2-1 and CT 2-2 are seismically designed to ensure that they are not adversely affected by a seismic event or by failure of other cooling tower cells. This design includes "breakaway" connections to the remaining cooling tower cells.

The cooling tower basin has a storage capacity of 1.45 million gallons that is sufficient for seven days of ACS operation. The available capacity assumes that cooling tower cells CT 2-3 through CT 2-9 collapse during a seismic event resulting in an estimated 170,427 gallons of water (equivalent to the volume of all material in these cells) being displaced (lost). The evaluation does not credit the volume of water in basin below cooling tower cells CT 2-10 and CT 2-11.

The potential for debris blockage of the ACS suction following an event involving collapse of cooling tower cells CT 2-3 through CT 2-11 has also been evaluated. The velocity through the suction grating at an ACS flow rate of 8000 gpm is 0.25 ft/sec which is 10% of the velocity required to keep sediment in suspension. This low velocity coupled with the tower cross bracing in two directions will prevent migration of debris to the ACS suction.

Failure of cooling tower cells CT 2-3 through CT 2-11 (9 of 11 cells) and associated components has no impact on safety-related cooling tower cell CT 2-1.

Subpart II:

As identified in the VYNPS LRA, the aging effects on the cooling tower wooden structures are;

(a) change in material properties,
(b) cracking, and
(c) loss of material.

The aging mechanisms associated with the partial failure of CT 2-4 are;

(a) iron salt attack (formation of iron salts in the wood where ferrous hardware contacts the lumber and degrades the wood cells),
(b) fungal attack (wood destroying microscopic organism called decay fungi that forms in wood exposed to suitable temperature 40°F-140°F in moist environment), and
(c) repeated wetting and drying cycles causing wood checking and physical damage which reduce wood strength.

The circulating water piping within the cooling tower is made of fiberglass and is secured in wooden support saddles. The piping separation event resulted from the distribution deck sag that caused the bell/spigot joint to separate. It did not result from the effects of aging on the fiberglass piping. The wooden saddles supporting the distribution header were found in good condition with no significant degradation.

The supporting columns for the circulating water header experienced a reduction in strength due to iron salt attack and fungal attack at the upper spliced joints that caused cracking. This caused the initial failure of several support columns that led to deck sag and separation of the fiberglass circulating water piping joint, thereby increasing the local water loading, causing the additional column failures that lead to the partial failure of CT 2-4.

RAI 2.4.4-2.C

Any impact on the aging management programs for circulating water piping, pipe supports, or cooling tower cells.

Response to Part C:

The circulating water piping separated due to the initial CT 2-4 column failure, rather than due to the effects of aging. This failure does not indicate a need to change the aging management programs for the circulating water piping. Thus, there is no impact on the aging management programs for circulating water piping.

Aging effects identified in the VYNPS LRA for the cooling tower structural elements are; loss of material, cracking and change in material properties. These aging effects are consistent with those associated with the failure of CT 2-4. The LRA identifies a need for enhancing the Structures Monitoring Program to add guidance for performing examinations of the wood cooling tower elements as appropriate to identify a loss of material, cracking, or change in material properties. This enhancement will include details for the examination and acceptance criteria for wood structures and structural components (i.e., columns and circulating water pipe supports) to ensure aging effects are identified and corrected prior to a loss of intended function. To detect a change in material properties, the enhancement will entail inspections that are more involved than remote visual surface inspections. Lessons learned from review of the failure of CT 2-4 will be considered in implementation of the enhancement identified for the Structures Monitoring Program.