12-707-CV(L)

12-791-CV(XAP)

IN THE UNITED STATES COURT OF APPEALS
FOR THE SECOND CIRCUIT

ENTERGY NUCLEAR VERMONT YANKEE, LLC
and ENTERGY NUCLEAR OPERATIONS, INC.,
Plaintiffs – Appellees – Cross-Appellants,

v.

PETER SHUMLIN, in his official capacity as GOVERNOR OF THE STATE OF VERMONT; WILLIAM H. SORRELL, in his official capacity as ATTORNEY GENERAL OF THE STATE OF VERMONT; and JAMES VOLZ, JOHN BURKE, and DAVID COEN, in their official capacities as members of THE VERMONT PUBLIC SERVICE BOARD,
Defendants – Appellants – Cross-Appellees.

On Appeal from the United States District Court for the District of Vermont

JOINT APPENDIX – VOLUME III OF VII
(Pages A-574 to A-867)

WILLIAM H. SORRELL
Attorney General for the State of Vermont
SCOT L. KLINE
BRIDGET C. ASAY
KYLE H. LANDIS-MARINELLO
Assistant Attorneys General
109 State Street
Montpelier, VT 05609-1001
(802) 828-3186

DAVID C. FREDERICK
SCOTT H. ANGSTREICH
WILLIAM J. RINNER
KELLOGG, HUBER, HANSEN, TODD,
EVANS & FIGEL, P.L.L.C.
1615 M Street, N.W., Suite 400
Washington, D.C. 20036
(202) 326-7900
(202) 326-7999 (facsimile)

Attorneys for Defendants – Appellants – Cross-Appellees
Peter Shumlin, William Sorrell, James Volz, John Burke and David Coen

(Counsel continued on inside front cover)

June 4, 2012

Matthew B. Byrne, Esq.
Robert B. Hemley, Esq.
Gravel and Shea, P.C.
76 Saint Paul Street
7th Floor
Burlington, VT 05401
802-658-0220

Kathleen M. Sullivan, Esq.
William B. Adams, Esq.
Faith E. Gay, Esq.
Sanford I. Weisburst, Esq.
Quinn Emanuel Urquhart & Sullivan, LLP
51 Madison Avenue, 22nd Floor
New York, NY 10010
212-849-7000

Attorneys for Plaintiffs – Appellees – Cross-Appellants
Entergy Nuclear Vermont Yankee, LLC and Entergy Nuclear Operations, Inc.

CONTENTS

Page

Docket Entries

Docket in *Entergy Nuclear Vermont Yankee, LLC v. Shumlin*, 1:11-cv-00099-jgm, D. Vt., dated May 24, 2012 ..... A-1

Transcripts

Preliminary Injunction Hearing Transcript, June 23, 2011 [pp. 1-261] A-26

Preliminary Injunction Hearing Transcript, June 24, 2011 [pp. 1-179] A-92

Trial Transcript, September 12, 2011 AM [pp. 1-154] A-137

Trial Transcript, September 12, 2011 PM [pp. 155-270]..... A-177

Trial Transcript, September 13, 2011 AM [pp. 271-422] A-207

Trial Transcript, September 13, 2011 PM [pp. 423-579]..... A-246

Trial Transcript, September 14, 2011 AM [pp. 580-709] A-286

Trial Transcript, September 14, 2011 PM [pp. 710-849]..... A-320

Trial Exhibits

Plaintiffs' Trial Exhibit 303 –
Act 189 Comparison to Component Design Basis Inspection, 2008 Legislative Session A-356

Plaintiffs' Trial Exhibit 306 [excerpts] –
Vermont Yankee v. United States – Court of Federal Claims,
Defendant's Post-Trial Brief, May 20, 2010 ..... A-367

Plaintiffs' Trial Exhibit 308 –
Letter re: Vermont Attorney General Opinion on Dry Cask
Storage, April 30, 2004 ..... A-373

Plaintiffs' Trial Exhibit 327 [excerpts]–
GDS Study, February 2, 2009 ..... A-378

Plaintiffs' Trial Exhibit 329 –
2010 Study – Consensus Economic and Fiscal Impact
Analyses Associated with the Future of the Vermont Yankee
Power Plant, March 2010 ..... A-403

Plaintiffs' Trial Exhibit 330 –
2009 Study – "An Independent Assessment of the
Environmental and Economic Impacts Associated with the
Closing of the Vermont Yankee Nuclear Plant – Updated,"
March 2009 ..... A-416

Plaintiffs' Trial Exhibit 333 –
2011 "Issue Brief – Vermont Yankee Nuclear Power Facility:
Taxation and Other Fees and Payments to the State –
Updated," February 2011 ..... A-448

Plaintiffs' Trial Exhibit 338 –
2010 Business Wire – "Final Capacity Auction Results:
Surplus Resources Available for 2013-2014," August 30, 2010 ..... A-452

Plaintiffs' Trial Exhibit 339 –
2010 Memo to Consumer Liaison Group Coordinating
Committee on the subject of "Answers to Questions on
Vermont Yankee and Kleen Energy," May 5, 2010 ..... A-455

Plaintiffs' Trial Exhibit 343 –
2011 ISO-NE – Summary of Vermont/New Hampshire Transmission Systems 2010 Needs Assessment, February 17, 2011 ..... A-459

Plaintiffs' Trial Exhibit 344 –
2010 ISO-NE – "An Overview of Markets, Planning and Vermont Issues," January 21, 2010 ..... A-463

Plaintiffs' Trial Exhibit 345a –
2010 FERC Testimony of Stephen Rourke, August 30, 2010 ..... A-500

Plaintiffs' Trial Exhibit 345b –
2010 ISO-NE Forward Capacity Results Filing, August 30, 2010 ..... A-535

Plaintiffs' Trial Exhibit 353 –
2011 Associated Press – "VT utility to buy power from NH's Seabrook," May 24, 2011 ..... A-551

Plaintiffs' Trial Exhibit 361 –
Memorandum of Understanding filed in PSB Docket No. 6545, March 4, 2002 ..... A-553

Plaintiffs' Trial Exhibit 362 [excerpts] –
PSB Docket No. 7082 – Order, April 26, 2006 ..... A-567

Plaintiffs' Trial Exhibit 364 –
Rutland Herald & Times Argus, "Douglas signs bill giving lawmakers say in nuke's future," May 21, 2006 ..... A-570

Plaintiffs' Trial Exhibit 367 –
Letter from Shumlin to Thayer, February 9, 2009 ..... A-572

Plaintiffs' Trial Exhibit 378 [excerpts] –
PSB Docket No. 6545 – Order, June 13, 2002 ..... A-574

Plaintiffs' Trial Exhibit 379 –
FERC Docket No. ER02-564-006 – Order, January 7, 2009 ..... A-608

Plaintiffs' Trial Exhibit 380 –
FERC Docket No. ER99-1004-007 – Order, October 11, 2006 ..... A-613

Plaintiffs' Trial Exhibit 381 –
FERC Docket No. ER02-564-000 – Order, February 5, 2002..... A-616

Plaintiffs' Trial Exhibit 382 [excerpts] –
2009 Report of the Public Oversight Panel on the
Comprehensive Reliability Assessment of the Vermont
Yankee Nuclear Power Plant, March 17, 2009..... A-626

Plaintiffs' Trial Exhibit 387 [excerpts] –
2010 Supplemental Report To the Comprehensive Reliability
Assessment of the Vermont Yankee Nuclear Facility, April
30, 2010..... A-640

Plaintiffs' Trial Exhibit 388 –
Letter from Roberts to Colomb, April 16, 2010 ..... A-646

Plaintiffs' Trial Exhibit 389 –
PSB Docket No. 7600 – Testimony of Richard Spiese, July 2,
2010 ..... A-650

Plaintiffs' Trial Exhibit 390 –
PSB Docket No. 7600 – Testimony of Uldis Vanags, January
13, 2010..... A-657

Plaintiffs' Trial Exhibit 391 [excerpts] –
2008 Reliability Assessment of the Vermont Nuclear
Facility, dated December 22, 2008..... A-671

Plaintiffs' Trial Exhibit 398 –
Senate Finance Committee – Testimony of Gerry Morris, CD
06-45, February 1, 2006 ..... A-687

Plaintiffs' Trial Exhibit 399 –
Senate Finance Committee – Testimony of Tim Nulty, CD 06-46, February 1, 2006 ..... A-689

Plaintiffs' Trial Exhibit 403 –
Senate Finance Committee – Testimony of James Volz, CD 06-88, March 2, 2006 ..... A-692

Plaintiffs' Trial Exhibit 407 –
2008 Fairewinds Associates Report – Vermont Yankee Comprehensive Vertical Audit: Recommended Methodology to Thoroughly Assess Reliability and Safety Issues at Entergy Nuclear Vermont Yankee, January 2008 ..... A-696

Plaintiffs' Trial Exhibit 412 –
CVA – Issues relating to Draft #3 (Act 189), 2008 Legislative Session A-717

Plaintiffs' Trial Exhibit 433 –
Draft #3 of S.269 (Act 189), February 20, 2008 ..... A-719

Plaintiffs' Trial Exhibit 467 –
FERC Docket No. ER10-1143-000 et al. – unpublished letter order, July 28, 2010 ..... A-730

Plaintiffs' Trial Exhibit 472 –
Q1 2011 Central Vermont Public Service Corp. Earnings Conference Call, May 6, 2011 ..... A-734

Plaintiffs' Trial Exhibit 489 [excerpts] –
GMP-Seabrook Power Purchase Agreement, May 24, 2011 ..... A-745

Plaintiffs' Trial Exhibit 520 –
Letter from Smith to Thayer, July 28, 2009 ..... A-754

Plaintiffs' Trial Exhibit 555 [excerpts] –
PSB Docket No. 7440 – Prefiled Direct Testimony of David Lamont, February 11, 2009 ..... A-755

Plaintiffs' Trial Exhibit 556 –
PSB Docket No. 7440 – Prefiled Surrebuttal Direct
Testimony of David Lamont, April 24, 2009 ..... A-766

Plaintiff's Trial Exhibit 557 [excerpts] –
Brief of the Vermont Department of Public Service, PSB
Docket No. 7440, July 17, 2009 ..... A-781

Plaintiffs' Trial Exhibit 614 –
Boiling Water Reactor Diagram A-789

Plaintiffs' Trial Exhibit 618 –
Effects of Electric Utility Market Deregulation –
Backgrounder, November 2004 ..... A-790

Defendants' Trial Exhibit 1003 –
U.S. Nuclear Regulatory Commission Final Report, March
2006 ..... A-793

Defendants' Trial Exhibit 1004 –
U.S. Nuclear Regulatory Commission Office of Nuclear
Reactor Regulation, Generic Environmental Impact
Statement for License Renewal of Nuclear Plants, issued
May 1996 ..... A-797

Defendants' Trial Exhibit 1005 –
U.S. Nuclear Regulatory Commission, Generic
Environmental Impact, August 2007 ..... A-800

Defendants' Trial Exhibit 1006 –
Entergy Vermont Yankee Nuclear Power Station Applicant's
Environmental Report, January 25, 2006 ..... A-803

Defendants' Trial Exhibit 1009 –
Testimony of Jay Thayer, Vice President, PSB Docket No.
6812, January 15, 2004 ..... A-810

Defendants' Trial Exhibit 1016 –
Excerpts of the Prefiled Rebuttal Testimony of Connie Wells, Senior Manager, PSB Docket No. 6545, February 25, 2002 ..... A-813

Defendants' Trial Exhibit 1017 –
Entergy's Memorandum in Opposition to NECNP's Supplemental Motion to Reconsider, PSB Docket No. 6545, July 9, 2002 ..... A-817

Defendants' Trial Exhibit 1018 –
Entergy's Initial Brief, PSB Docket No. 6545, May 7, 2002 ..... A-824

Defendants' Trial Exhibit 1020 –
Excerpts of Entergy's Post-Trial Reply Brief submitted in *Entergy v. U.S.*, 95 Fed. Cl. 160, June 25, 2010 ..... A-830

Defendants' Trial Exhibit 1024 –
Certificate of Public Good, PSB Docket No. 6545, June 13, 2002 ..... A-833

Defendants' Trial Exhibit 1030 –
Entergy's Market-Based Rate Tariff, Second Revised Volume No. I, June 24, 2010..... A-836

Defendants' Trial Exhibit 1031 –
Unpublished letter order of the Federal Energy Regulatory Commission in PECO Energy Co., et al., Docket No. ER10-1143-000 et al., July 28, 2010 ..... A-843

Defendants' Trial Exhibit 1034 –
Letter from Dale Klein, NRC to Gov. James Douglas (contained in the legislative record of Act 189), April 11, 2008 ..... A-847

Defendants' Trial Exhibit 1035 –
Index of the legislative record for Act 74, Act 160, and Act 189, prepared by Defendants' counsel A-849

Defendants' Trial Exhibit 1038 –
Declaration of Bruce E. Hinkley, May 22, 2011 ..... A-852

Defendants' Trial Exhibit 1039 –
Supplemental Declaration of Bruce E. Hinkley, June 13, 2011 ..... A-861

Defendants' Trial Exhibit 1046 –
Entergy's proposed Act 74 bill, March 10, 2005 ..... A-865

Defendants' Trial Exhibit 1049 –
Declaration of Seth G. Parker, May 23, 2011 ..... A-868

Defendants' Trial Exhibit 1050 –
Supplemental Declaration of Seth G. Parker, June 13, 2011 ..... A-898

Defendants' Trial Exhibit 1053 –
Excerpts from VT Electric Plan, 2005 ..... A-902

Defendants' Trial Exhibit 1065 –
Clean Water Act 316b proposed regs factsheet, March 2011..... A-909

Defendants' Trial Exhibit 1074 –
Declaration of Robert deR. Stein, May 23, 2011 ..... A-911

Defendants' Trial Exhibit 1094 –
Green Mountain Power, Update on Vermont Yankee Decisions..... A-925

Defendants' Trial Exhibit 1115 –
ISO New England NHNT Transmission Analysis Solutions Study, April 13, 2011..... A-926

Defendants' Trial Exhibit 1116 –
Letter from Samuel Collins, NRC Regional Administrator, to David O'Brien, DPS Commissioner, July 11, 2008 ..... A-928

Defendants' Trial Exhibit 1117 –
Floor debates in the Vermont Senate, track listing and quotes, 2005-2010 Legislative Sessions A-930

Defendants' Trial Exhibit 1124 –
Plaintiffs' Responses and Objections to Defendants' First Set of Requests for Admission, August 26, 2011 ..... A-931

Defendants' Trial Exhibit 1220 –
Draft letter from Thayer to Vermont Legislator, January 18, 2005 ..... A-945

Defendants' Trial Exhibit 1225 –
Email from Thayer to VTY-All Users re: "VY Dry Cask Legislation PASSED!" June 6, 2005 ..... A-948

Defendants' Trial Exhibit 1230 –
Letter from Thayer to Vermont Senate and House of Representatives, December 18, 2008 ..... A-950

Defendants' Trial Exhibit 1240 –
Email from Potkin to Cosgrove re: "comments on JFO report assessing financial impact of VY options," March 28, 2010 ..... A-952

Defendants' Trial Exhibit 1250 –
Email from Cosgrove to Hebert et al. re: "VPR story on today's news conference," February 24, 2010 ..... A-956

Defendants' Trial Exhibit 1251 –
Email from Hebert to Leonard re: "VY update," May 6, 2010 ..... A-959

Defendants' Trial Exhibit 1277 –
Email from Cosgrove to Morris re: "legislative public hearing," April 13, 2005 ..... A-964

Defendants' Trial Exhibit 1278 –
Email from Marshall to Miller re: "suggested revisions to S.124," April 28, 2006 ..... A-969

Defendants' Trial Exhibit 1307 –
Letter from NRC Chairman Diaz to PSB Chairman Dworkin,
May 4, 2004 ..... A-971

Defendants' Trial Exhibit 1308 [excerpts] –
Transcript of trial testimony in *Entergy v. U.S.*, 95 Fed. Cl.
160, March 29, 2010 ..... A-974

Defendants' Trial Exhibit 1320 –
Supplemental Report of the Public Oversight Panel, July 20,
2010 ..... A-981

Defendants' Trial Exhibit 1340 [excerpts] –
20-Year Electric Plan, 1983 ..... A-1002

Defendants' Trial Exhibit 1341 [excerpts] –
20-Year Electric Plan, 1988 ..... A-1007

Defendants' Trial Exhibit 1342 [excerpts]–
20-Year Electric Plan, 1994 ..... A-1012

Defendants' Trial Exhibit 1343 [excerpts] –
20-Year Electric Plan, 2005 ..... A-1020

Defendants' Trial Exhibit 1344 [excerpts] –
Comprehensive Energy Plan, 1991 ..... A-1027

Defendants' Trial Exhibit 1345 [excerpts] –
Comprehensive Energy Plan: Fueling Vermont's Future, vol.
1, 1998 ..... A-1034

Defendants' Trial Exhibit 1346 [excerpts] –
Draft Comprehensive Energy Plan 2011 ..... A-1048

Defendants' Trial Exhibit 1363 –
Transcript excerpt of Hearing of House Nat. Res. & Energy
Committee, re: H.436, February 24, 2009 (NRC witnesses) A-1073

Defendants' Trial Exhibit 1366 –
Entergy's "Talking Points for Legislative/Administration Meetings" for Act 74 ..... A-1074

Defendants' Trial Exhibit 1371 [excerpts] –
Entergy Form IO-Q Quarterly Report, September 30, 2000..... A-1077

Defendants' Trial Exhibit 1377 –
ConEd press release November 9, 2000..... A-1079

Defendants' Trial Exhibit 1379 [excerpts] –
Hebert Deposition Transcript, August 30, 2011..... A-1080

Defendants' Trial Exhibit 1380 [excerpts] –
Meehan Deposition Transcript, August 11, 2011..... A-1111

Legislative History

Defendants' Legislative History Appendix A-1137

Plaintiffs' Legislative History Appendix..... A-1636

Documents from the Record

D.E. 1. Complaint A-1807

D.E. 1-1. Complaint Exhibit A A-1841

D.E. 4-2. John Herron Declaration A-1862

D.E. 4-11. Edward Kee Declaration..... A-1880

D.E. 46-1. John Herron Reply Declaration..... A-1922

D.E. 46-6. Edward Kee Reply Declaration A-1934

D.E. 46-13. Michael Courtemanche Declaration A-1969

D.E. 77-1. Standard & Poor's Global Credit Portal: Outlook On Entergy Corp. Is Revised To Negative Amid Relicensing Uncertainties; Rates Are Affirmed A-1972

Notices of Appeal

Defendants' Notice of Appeal, dated February 18, 2012 ..... A-1979

Plaintiffs' Notice of Cross-Appeal, dated February 27, 2012 ..... A-1981

Defendants' Amended Notice of Appeal, dated March 23, 2012 ..... A-1983

STATE OF VERMONT
PUBLIC SERVICE BOARD

Docket No. 6545

Investigation into General Order No. 45 Notice filed by Vermont Yankee Nuclear Power Corporation re: proposed sale of Vermont Yankee Nuclear Power Station to Entergy Nuclear Vermont Yankee, LLC, and related transactions	)))))	Schedule of Hearings *See Appendix A*

Order entered: 6/13/2002

PRESENT: Michael H. Dworkin, Board Chairman
David C. Coen, Board Member
John D. Burke, Board Member

APPEARANCES: *See Appendix B*

I. Introduction and Overview . . . 3
A. Summary . . . 3
B. Overview . . . 5
II. Background . . . 12
A. The Status Quo . . . 12
B. The Proposal Before the Board . . . 14
C. The Option That No Party Proposed: Prompt Closure . . . 15
III. Concerns of the Parties and the Public . . . 16
A. The Parties . . . 16
B. The Public . . . 18
IV. Criteria for Our Decision . . . 19
A. Introduction . . . 19
B. Factual Issues . . . 20
C. Vermont Statutes . . . 21
V. Analysis of Proposed Transactions . . . 22
A. The Proposed Transactions . . . 23
B. Merits of the Proposals, if Vermont Yankee's Operating Characteristics and Risks are Similar to the Recent Past . . . 25
C. Merits of the Proposals if Vermont Yankee's Operating Characteristics and Risks Are Different from the Past . . . 59
D. Summary of Economic Analyses . . . 75
E. Non-Financial Elements of Sale . . . 78
VI. Requested Rulings on Prudence, Use, and Economic Usefulness . . . 87
A. Introduction . . . 87

B. The Long-Standing Criterion 90
C. Board Authority to Issue Requested Findings 93
D. The Rate-Guarantee Findings Requested by Petitioners 98
VII. Should ENVY and ENO Receive a Certificate of Public Good? 104
A. Introduction 104
B. Service In-State and Service Territories 105
C. Technical Qualifications and Structure 108
D. Financial Assurances 113
E. Safety 121
F. Limited Term Certificate of Public Good 130
VIII. Use and Treatment of Sales Proceeds 132
A. Proposed Use of Funds by Central Vermont and Green Mountain 132
B. CLF's Proposed Renewable Energy Fund 137
C. Green Mountain and Central Vermont Accounting Orders 141
D. Vermont Yankee Nuclear Power Corporation's Pledge 144
IX. Discussion of Concerns Expressed by the Board in Docket 6300 and by the Public in This Case 144
A. Concerns Expressed in Docket 6300 144
B. Concerns Expressed by the Public 148
X. Conclusion 156
XI. Order 157
Appendix A — Schedule of Hearings i
Appendix B — Parties ii
Appendix C — Procedural History iv
Appendix D — Modifications to Memorandum of Understanding ix

I. INTRODUCTION AND OVERVIEW

A. Summary

Sixteen months ago, this Board rejected a request to sell the Vermont Yankee Nuclear Power Station ("Vermont Yankee") to AmerGen Energy Company, L.L.C. ("AmerGen"). We concluded that the proposal could not "as a matter of law, be found to promote the general good."[1] Today, we apply that same standard and substantially approve a much improved proposal to sell Vermont Yankee, this time to Entergy Nuclear Vermont Yankee, LLC ("ENVY").[2] The major components of the transaction are the sale of Vermont Yankee for a fixed price coupled with a commitment by the current owners of VYNPC to purchase power from Vermont Yankee for the remaining term of its license (*i.e.*, through 2012).

In today's Order, we approve the sale of Vermont Yankee and the associated commitment for the present owners to purchase 510 MW of power from the station until 2012.[3] We do so for two primary reasons. First, we conclude that ENVY and ENO will be likely to operate the plant as well as, or better than, the current owners. Second, we find that, under most reasonably foreseeable scenarios, the transactions are highly likely to produce an economic benefit for Vermont ratepayers. Together, these findings lead us to conclude that the sale will promote the general good.

The safe operation of Vermont Yankee is a critical concern for residents of Vermont. ENVY and ENO (on their own and through the ability to tap the broader resources of their

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1. *Investigation into General Order No. 45 Notice filed by Vermont Yankee Nuclear Power Corporation re: proposed sale of Vermont Yankee Nuclear Power Station and related transactions*, Docket 6300, Order of 2/14/01 at 2.

2. Vermont Yankee Nuclear Power Corporation ("VYNPC"), Central Vermont Public Service Corporation ("Central Vermont") and Green Mountain Power Corporation ("Green Mountain") have now requested that the Vermont Public Service Board ("Board") approve the sale of Vermont Yankee to ENVY. Central Vermont and Green Mountain own (between them) 55 percent of the shares in VYNPC, the company that in turn owns Vermont Yankee. These are the only owners selling electricity at retail in Vermont. In this Order, we refer to VYNPC, Central Vermont, Green Mountain, ENVY, and Entergy Nuclear Operations, Inc. ("ENO") (the company that will operate Vermont Yankee following the sale) collectively as the "Petitioners." We also refer to ENVY and ENO jointly as "Entergy," whereas we refer to their parent corporation as the Entergy Corporation.

The Vermont Department of Public Service ("Department") (the entity charged by law with representing the interests of the people of the state) also recommends that we authorize the sale of Vermont Yankee. The Petitioners and the Department entered into a Memorandum of Understanding ("MOU") in which the Department agrees to support the sale, upon certain conditions. Exh. VY-42.

3. Exh. VY-1 at exh. E, Schedule B. The actual power purchase amounts are expressed in terms of energy purchases (rather than capacity); they vary monthly.

parent, Entergy Corporation) have expertise in the ownership and safe operation of nuclear facilities and the ability to access greater resources than the present owners. These capabilities persuade us that Vermont Yankee will continue to be a safe source of power.

Green Mountain and Central Vermont will continue to receive power from Vermont Yankee following the sale, but the costs they pay for that power will be lower than their current commitments. Therefore, the sale will reduce the electric rates for Central Vermont and Green Mountain customers over the next ten years below the levels consumers would face if Green Mountain and Central Vermont continued to own and operate Vermont Yankee.

In addition, the sale has the advantage of transferring to ENVY significant financial risks associated with continued ownership of Vermont Yankee. If the costs of operation increase (due to equipment failures, increased security or other reasons), ENVY will bear the additional expenses; Green Mountain, Central Vermont, and Vermont ratepayers will be shielded. Similarly, increases in the contributions needed to ensure decommissioning upon shutdown will not be passed on to Vermont consumers.

The sale also provides significantly greater economic benefits to Vermont ratepayers than would an earlier closure of Vermont Yankee. Under all scenarios, an immediate shutdown of Vermont Yankee would increase costs, yet would still leave radioactive spent fuel on-site, perhaps for decades.

Our approval of the proposal before us is not absolute. We find that the proposal before us will promote the general good only if modified in the following four ways:

- Green Mountain and Central Vermont shall, in April 2003, submit updated costs of service adequate to determine the propriety of a rate decrease.
- If VYNPC receives Nuclear Electric Insurance Limited disbursements, access to excess funds in the Spent Fuel Disposal Trust, or claims related to the Department of Energy's defaults under the DOE Standard Contract under Section 2.2(i) of the Sale Agreement, Green Mountain and Central Vermont shall submit a plan for using their share of those funds to benefit ratepayers. The plan shall consider the application of a significant portion of these benefits towards the development and use of renewable resources.
- We do not accept Paragraph 3 of the MOU, which provides that ENVY will share any excess decommissioning funds with ratepayers. Instead, all money remaining in the fund shall be returned to ratepayers, consistent with the present Decommissioning Trust.

- We do not accept Paragraph 16 of the MOU, in which the Petitioners and the Department request that the Board treat costs associated with the sale and power purchased from ENVY *as if* they were prudent and used-and-useful, thus essentially waiving long-standing regulatory principles designed to protect ratepayers. We are convinced that, among the three options now available to Vermont Yankee's Sponsors (continued ownership, early closure, or sale to ENVY), the sale is the best choice and, therefore, the prudent one. Also, as a factual matter, it seems unlikely that a future Board would be presented with facts that could persuade it to order a substantial cost disallowance arising from the proposed transactions. To the contrary, the evidence presented to the Board in the current record suggests that the transactions are likely to be considered both used and economically useful. However, the Petitioners have not here persuaded us that we should now depart from consistent and long-standing regulatory practices and provide an unprecedented "before-the-fact" guarantee of future rate recovery.

B. Overview

Vermont Yankee is one of 103 operating nuclear power plants in the United States and is the largest generating station within the state of Vermont. Since it began operating in 1972, Vermont Yankee has been providing almost one-third of Vermont's electricity. To date, it has proven to be a reliable source of power, with one of the best operating records of boiling water reactors in the country over the past years.[4]

At the same time, Vermont Yankee has been the source of much public controversy; most of it concerning the concept of nuclear power in general, and some of it specifically directed at the plant and its current management. Many members of the public who commented oppose the continued operation of Vermont Yankee. These public commenters cite concerns about continued on-site storage and subsequent disposal of high-level radioactive waste. They also point to the possibility of terrorist actions directed at Vermont Yankee. In sharp contrast, a smaller, but significant number of other public commenters urge us to approve the sale, praising Vermont Yankee for its safe operation, its actions as a good corporate citizen, and its role as a major employer in southeastern Vermont. Commenters supporting the sale also argued that ENVY will maintain Vermont Yankee as a favorable source of power for Vermont at stable prices.

4. Barkhurst reb. pf. at 20.

Throughout our consideration of the proposed transaction, we have relied upon the formal evidentiary record before us; but we have looked at it with every effort to give serious consideration to the views of members of the public. In other words, we have seen the public comments as a great aid in determining what questions to ask; but we have relied upon record-tested evidence when reaching our answers. This includes the extensive sworn testimony from expert witnesses presented by the numerous parties in this case. Vermont law mandates that we weigh this evidence, consider the public comments, and determine whether the sale promotes the general good of the state.

Petitioners' proposal was presented primarily as a choice between continued ownership and operation of Vermont Yankee by VYNPC, as compared to the sale of Vermont Yankee to ENVY. However, as we declared in Docket 6300, and affirmed in this Docket's Scoping Order, a third option is also relevant. At the present time, VYNPC has the option of closing Vermont Yankee. Although none of the intervenors opposing approval of the petition recommended that the Board take steps that would lead to the imminent shutdown of Vermont Yankee, and no witness recommended that action, the Board received many public comments suggesting that the Board should require the immediate closure of Vermont Yankee. The Board has carefully considered whether the benefits of closure exceed those likely to accrue either through approval of the proposed transactions or retention of ownership by VYNPC. We have also considered whether we should deny approval of the proposed transactions for the option-value of allowing Vermont utilities the possibility of closing Vermont Yankee at some future time.

After comparing the three fundamental choices — (1) continued ownership and operation by VYNPC, (2) sale to ENVY, and (3) early shutdown — we conclude that approval of the Purchase and Sale Agreement ("Sale Agreement") is the preferred option and will promote the general good. The six following factors lead us to this conclusion.

First, we have looked at Entergy's record of plant operation and its current staff, resources, expertise, and incentives. The record on these points persuades us that ENVY and ENO are likely to run the plant as well as or better than the current owners. The proposed owner and operator of Vermont Yankee, ENVY and ENO, respectively, are capable companies. These companies, and their parent, the Entergy Corporation, have demonstrated the financial capability and technical expertise needed to operate Vermont Yankee safely. As added protection, Entergy

Corporation has committed to financial guarantees that will assure that ENVY has sufficient capital to operate Vermont Yankee or to transition to decommissioning should ENVY decide to close the station. Also, they will retain the facility's current staff, with its site-specific expertise.

ENVY and ENO also have (on their own or through their affiliates) significant experience operating nuclear plants and the ability to draw on experience from the other nuclear stations owned by Entergy Corporation. This expertise — and their resources — exceeds that of VYNPC, which is a single-asset owner. Because of these greater resources and expertise, we expect that ownership and operation by ENVY and ENO will be at least as safe as it would be under continued ownership.

Second, we have tested the economic effects of the proposal over a range of possible scenarios, including the following:

- Likely changes in the prices of power on the wholesale markets;
- Changes in operating expenses, including contributions to the fund to pay for eventual decommissioning;
- Increase in power production resulting from a potential power "up-rate" at Vermont Yankee;[5]
- The possible extension of Vermont Yankee's operating license beyond 2012;
- Increased costs to address security needs; and
- The effects of a major outage at Vermont Yankee due to equipment failure or sabotage.

The economic analyses presented by the parties show that under almost all scenarios (including the most likely ones), Vermont ratepayers will benefit from the transfer of ownership to ENVY. Over the remaining ten years of Vermont Yankee's operating license, the net costs to Green Mountain, Central Vermont, and (as a result) Vermont ratepayers are likely to be substantially less if the station is sold to Entergy pursuant to the Sale Agreement than they would be if VYNPC retained ownership or if the owners closed Vermont Yankee this autumn.[6] The

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5. Vermont Yankee's current capacity is approximately 510 MW. It is possible to make operational changes and physical improvements to Vermont Yankee that will increase the capacity from between 1.5 and 20 percent, depending upon the specific changes. These changes are generally referred to as a power "up-rate."

6. As we explain below, there are certain combinations of events that could make it more cost-effective for the present owners to retain ownership of Vermont Yankee. The evidence demonstrates that these scenarios are unlikely to develop.

substantial purchase price also provides Vermont Yankee's owners with significant up-front capital, allowing them to repay all Vermont Yankee debt, and avoiding the "front-loaded costs" problem of the AmerGen proposal.

Third, we find that the sale of Vermont Yankee transfers operating cost and decommissioning cost risks to ENVY. At the present time, the costs associated with major repairs or outages at Vermont Yankee are passed on to Vermont ratepayers. Ratepayers thus bear the risk of outages or increased operating costs. They also face the risk that the costs of decommissioning will exceed current estimates. Following the sale, in the event of an outage, Vermont ratepayers will still need to pay to replace the power normally supplied by Vermont Yankee, but they will be shielded from any increased operation and maintenance, shutdown, or decommissioning costs. This protects Vermonters *and* creates an incentive for ENVY to close the plant if its operating costs seem likely to exceed market value.

Fourth, the Purchase Power Agreement sets out fixed prices at which VYNPC (and thereby Green Mountain and Central Vermont) will purchase power from ENVY. These prices are substantially below the "currently committed" operating costs of Vermont Yankee over the remaining term of its license. Over the remaining term of the license, this will reduce costs for ratepayers. The fixed prices also establish a cap on the charges for Vermont Yankee power. This cap protects ratepayers from higher prices for power that they would incur if the Vermont Sponsors purchased power under higher wholesale market prices. Accompanying the cap is a Low Market Adjuster (commencing in November 2005), which will reduce the otherwise fixed prices under the Power Purchase Agreement if wholesale market prices for power turn out to be less than 95 percent of the price caps set out in the contract. The Low Market Adjuster means that ratepayers will pay *the lower of* the market price for uncapped power (plus a 5 percent premium for a price cap) or the fixed prices set out in the Power Purchase Agreement. In effect, it has the post-2005 benefit of allowing roughly one-third of the Vermont Sponsors' power costs to benefit from low market prices; at the same time, the fixed prices mean that, in conjunction with other major components of Green Mountain's and Central Vermont's supply portfolios,

more than three-quarters of those companies' total energy purchases are shielded against very high price markets.[7]

Fifth, ENVY has made other important commitments. The MOU provides increased access to Vermont Yankee by the state's nuclear engineer. It also grants Vermont Yankee's Sponsors, including Green Mountain and Central Vermont, the first opportunity to negotiate for additional power if ENVY increases the output of Vermont Yankee or extends the operating license. ENVY also agrees, through the MOU, that the Board has complete jurisdiction to decide whether to renew ENVY and ENO's Certificates of Public Good ("Certificate") if ENVY seeks to extend its operating license past the expiration of its present term. This clarification of authority and the contractual commitment with the Department (on which our approval relies) provide assurances to Vermont that ENVY and ENO cannot thwart state review if ENVY plans to operate Vermont Yankee beyond 2012.

Finally, our analysis of an early closure of Vermont Yankee indicates that it would almost certainly lead to higher rates for Vermont consumers than would either the sale to ENVY or continued ownership and operation by VYNPC. This conclusion that early closure would increase costs is the same whether the owners immediately decommission Vermont Yankee or delay decommissioning. Early closure also does not achieve many of the environmental and safety benefits suggested by members of the public. Even if the owners were to immediately decommission Vermont Yankee, the highly radioactive spent fuel would remain on-site for a protracted period (testimony suggested that it would not be removed before 2030).[8]

We cannot assume, as urged by several members of the public, that the power from Vermont Yankee can be quickly replaced by renewable resources. Vermont already gets a higher percentage of its power from renewable sources (mostly large hydro-power dams) than many other states.[9] With the exception of large hydro dams, renewable energy resources tend to be relatively small sources of generation, particularly in relation to Vermont Yankee. Thus, instead of renewable sources, Vermont utilities would need to rely on fossil fuel generating stations to

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7. Green Mountain and Central Vermont obtain more than 75 percent of their power from Vermont Yankee, Hydro-Québec, or qualifying facility purchases under 30 V.S.A. § 209(a)(8) and Board Rule 4.100. The price of all of this power is capped and will not rise, even if wholesale market prices increase greatly.

8. Tr. 4/1/02 at 111 (Cloutier)

9. *Funding Vermont's Future: Comprehensive Energy Plan and Greenhouse Action Plan*, VTDPS, July 1998.

replace much of the power now provided by Vermont Yankee. This option would have the very serious disadvantage of significantly increasing the emission of air contaminants and greenhouse gases.

While we do not find that Vermont can promptly replace Vermont Yankee with renewable resources, we *are* convinced that more effort to encourage the development of renewable sources of power would be beneficial. Vermont needs to take more steps to help renewable energy overcome the market barriers that it faces. CLF has proposed a renewable fund to achieve these goals. We do not accept CLF's proposal, which we find to be insufficiently developed, at the present time. Nonetheless, we will consider further investigation of the establishment of a renewable energy fund in the future. We are also convinced that Vermont utilities should more fully integrate renewable energy sources into their planning so that they can meet incremental needs for power through such sources. To this end, in this Order we require, that, if VYNPC receives additional money due to Nuclear Electric Insurance Limited distributions, excess funding of the Spent Fuel Disposal Trust (after payment of the one-time fee for pre-1983 spent fuel obligations under the Department of Energy's Standard Contract), or claims related to the Department of Energy's defaults under the DOE Standard Contract under Section 2.2(i) of the Sale Agreement, Green Mountain and Central Vermont submit a plan for ensuring that their share of the funds are used to benefit ratepayers. The plan shall consider the application of a significant portion of these benefits towards the development and use of renewable resources.

We conclude for the reasons cited above that the proposed transactions are in the best interest of ratepayers. However, two aspects of the proposal before us are not acceptable. First, in the MOU, the Department and the Petitioners agreed to ask the Board to treat the transactions, the Petitioners' actions prior to the close of evidence, the MOU, and the power purchased from Vermont Yankee as part of the transaction *as if* they were both prudent and used-and-useful. Granting the request would effectively assure Central Vermont and Green Mountain of rate recovery for all costs associated with the sale, including the purchase of their share of the current power output of Vermont Yankee.

The principle that utility investments and purchases must be both prudent and used-and-useful is long-established in this state and throughout our nation. These standards are intended to

Yankee's Sponsors," as provided for in Section 7.02 of the current Decommissioning Trust; this provision shall apply regardless of the date of decommissioning.[72]

We do not base this decision on NECNP's or CAN's legal arguments, nor are we ruling upon whether the Petitioners have interpreted the terms and conditions of the Decommissioning Trust correctly. We do not rule here on the legality of the proposed sharing provision.[73] Rather, we condition our approval of the sale on the modification of this provision because we believe that rewarding Entergy with the savings of reduced decommissioning efforts would be inconsistent with the general good of Vermont.

2. Financial Value of The Transaction

a. The financial merits of the transaction as a whole

In this section we examine the financial merits of the proposed sale of Vermont Yankee. In this analysis, we assume that Vermont Yankee keeps operating as it is now, *i.e.*, that overall there is no significant change in Vermont Yankee's capacity factor and available output; that operating costs remain in line with company projections, and that the plant continues to generate power for the remaining current license life. In the following section (Part V.C. at 59), we examine various adjustments to the costs of operation and other risks that could alter the conclusions we reach in this section.

Overall, we conclude that if Vermont Yankee continues operating as it has recently, the transaction as a whole has economic benefits when compared to the status quo due to: (1) the $180 million initial payment from ENVY to VYNPC; (2) Power Purchase Agreement prices which are below projected costs to continue to operate Vermont Yankee under status quo

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72. The MOU at ¶ 3 further explains that excess funds shall be paid to VYNPC "for the benefit of electric consumers in pro rata shares in proportion to the stated ownership percentage of the VYNPC sponsors." We note that the language is substantially similar to Article 7.02 of the Decommissioning Trust: "for the benefit *of the customers of* Vermont Yankee's sponsors . . ." as discussed below. *See*, Appendix D for the complete, amended language of ¶ 3.

73. In general, we find some merit in the Petitioners' arguments, although it is not clear that the technical requirements of Section 7.01 — which requires either legislative action to create a new trust, or the *merger* of the existing trust into a successor trust — have been met. The technical question of whether the relevant NRC Order which requires a "transfer" of the funds into the new trust is equivalent to a "merger" under Section 7.01 of the current Trust is one that we need not address here; this is because we rely upon the general-good standard and deterrence of perverse incentives, rather than upon possible technical differences between the Petitioners' Trust instruments and the recent Nuclear Regulatory Commission Orders.

conditions; (3) the Low Market Adjuster price resetting mechanism which limits Central Vermont and Green Mountain's Power Purchase Agreement-related exposure to above-market power costs; and (4) recoupment of the bulk of Central Vermont and Green Mountain's investment in Vermont Yankee, which decreases their respective rate bases and substantially limits potential stranded cost liabilities.

(1) Findings

39. The essential method of analysis used by the Department, Green Mountain and Central Vermont is one in which annual cost streams are projected and then discounted to present value dollars. The net benefits (or cost) of the transaction are determined by comparing the status quo case to the proposed transaction. Biewald pf. at 7.

40. If Vermont Yankee's operating costs and performance are similar to recent experience, the sale to ENVY will provide a net present benefit of between $263 million and $383 million as compared to continued ownership.[74] The benefit depends upon whether wholesale market prices activate the Low Market Adjuster (which would reduce prices and increase benefits). Exh. DPS-WKS-9.

41. If VYNPC were to reduce operating expenses and achieve a power uprate (as described below, the expected net present value benefit of the sale ranges from $39 million to $383 million when comparing the sale of Vermont Yankee to continued ownership of the plant. Exh. DPS-WKS-9; Sherman sur. pf. at 7–8.

42. Use of the proceeds will reduce Central Vermont's rate base by $12.2 million, and reduce Green Mountain's rate base by $7.6 million. Exh. CPVS-Boyle-4 Revised; exh. GMP-2.

43. In every year except 2002 and 2003, the Power Purchase Agreement prices are lower than forecasted Vermont Yankee operating costs. Because of these reduced power costs, and a smaller rate base, rate request filings by Central Vermont and Green Mountain should be delayed beyond what they otherwise would have been. Exh. Wiggett-9 (revised).

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74. These net benefits are based upon Vermont Yankee's estimate of its future operating costs. Although we do not necessarily adopt all of these costs as accurate, they are reasonably representative of future costs.

Also, as we discuss in Finding 52, below, the parties presented many projections of future market power costs. We find the range represented by two of these forecasts — the CVPS 2002 and DPS 2001 — to be a reasonable representation of future wholesale market prices.

(a) Power Purchase Agreement Prices Compared to Status Quo Operating Costs

44. Vermont Yankee projects $1.337 billion (present value) in costs through the remaining license term. In contrast, the Power Purchase Agreement represents an aggregate cost obligation of $1.066 billion, excluding potential benefits from the Low Market Adjuster. Exh. CPVS-Rebuttal-Page-1 at 1; exh. VY-Wiggett-9 Revised.

45. The annual prices in the Power Purchase Agreement as compared to VYNPC's projected operating costs expressed on a dollars per KWh basis are as follows:

Projected Operating Costs Under Current Ownership vs. ENVY Power Purchase Agreement											
Date	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
VY Costs	$4.99	$4.22	$5.37	$5.52	$4.57	$5.68	$5.94	$5.18	$6.40	$6.68	$14.57
PPA	$5.14	$4.20	$4.28	$3.95	$3.90	$4.00	$4.10	$4.20	$4.30	$4.40	$4.50

Exh. GMP-NRB-12; exh. VY-1, exh. E.

46. The net present value of Central Vermont's share of projected Vermont Yankee operating costs from July 2002 through March 2012 are estimated at $438 million. The net present value of Central Vermont's commitment under the Power Purchase Agreement over this same time period is $332 million. Exh. GMP-NRB-12; exh. GMP-NRB-9A.

47. The net present value of Green Mountain's share of projected Vermont Yankee operating costs from July 2002 through March 2012 are estimated at $250 million. The net present value of Green Mountain's commitment under the Power Purchase Agreement over the same time period is $190 million. Exh. GMP-NRB-12; exh. GMP-NRB-9A.

48. The net present value of Central Vermont's and Green Mountain's purchases under the Power Purchase Agreement would be lower if the Low Market Adjuster is triggered. Exh. GMP-NRB-12.

49. When compared with the status quo, under the Power Purchase Agreement Central Vermont and Green Mountain will save $106 million and $60 million, respectively, in power costs between July 2002 and March 2012. These savings would increase if the market price for power is more than 5% below the prices in the Power Purchase Agreement. Findings 46–48, above.

(b) Power Purchase Agreement Prices Compared with Forecasts of Wholesale Prices

50. The Power Purchase Agreement sets fixed power purchase prices for specific amounts of Vermont Yankee power through November 1, 2005, and contains a mechanism that ties contract prices to the wholesale market for the remaining duration of the contract. Kansler pf. at 22; exh VY-42, exh. E.

51. The Power Purchase Agreement is a unit contingent contract. Central Vermont and Green Mountain will receive power from ENVY under the power purchase contract only when Vermont Yankee is operating. Kansler pf. at 22.

52. The Board heard evidence on nine forecasts of power costs during the remaining ten years of Vermont Yankee's operating license and proposed Certificate: (1) the Department's April 2000 forecast (referred to here as DPS 2002); (2) the Department's December 2000 forecast (DPS 2000a); (3) the LaCapra 2001 forecast prepared for Green Mountain (GMP 2/01); (4) the Green Mountain 2001 forecast (GMP 7/01); (5) the Central Vermont 2001 forecast (CVPS 2001); (6) the Department's 2001 forecast (DPS 2001); (7) the LaCapra 2002 forecast prepared for GMP (GMP 1/02); (8) the Central Vermont 2002 forecast (CVPS 2002); and (9) CLF's price projections (CLF).[75] The power cost projections contained in these forecasts, and the prices in the Power Purchase Agreement (assuming that low market prices do not trigger the Low Market Adjuster) are as follows:

75. CLF generated its forecast by adjusting the assumptions used in the GMP 2001 forecast and the DPS 2000 forecast. Weiss pf. at 42–44.

SUMMARY OF VARIOUS PRICE FORECASTS

Nominal Market Price (in Dollars per MWh, including energy and ICAP)

	Date	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
DPS2000	Apr-00	$39.74	$42.03	$43.11	$44.54	$46.01	$47.52	$49.09	$50.72	$52.52	$54.40	$56.35
DPS2000a	Dec-00	$46.94	$43.04	$44.14	$45.68	$47.27	$48.74	$50.44	$52.19	$54.09	$56.05	$58.09
GMP 2/01	Feb-01	$37.72	$35.19	$34.02	$33.66	$33.82	$35.65	$35.65	$37.05	$39.00	$40.09	$41.22
GMP 7/01	Jul-01	$42.05	$39.18	$37.86	$37.45	$37.14	$37.63	$39.70	$41.29	$43.50	$44.74	$46.01
CVPS 01	Jul-01	$45.85	$43.04	$38.02	$39.07	$40.16	$41.29	$42.46	$43.67	$45.03	$46.46	$47.93
DPS2001	Jan-02	$38.84	$36.34	$34.36	$37.66	$40.95	$44.25	$47.55	$50.85	$52.74	$54.62	$56.56
CLF	Jan-02	$35.18	$32.65	$31.48	$31.12	$30.85	$31.28	$33.11	$34.51	$36.46	$38.54	$40.74
GMP 1/02	Jan-02	$30.68	$26.36	$25.87	$26.52	$27.54	$28.92	$30.30	$31.68	$33.80	$35.41	$37.44
CVPS 02	Feb-02	$30.87	$31.44	$32.18	$32.48	$32.67	$35.26	$40.34	$41.55	$42.86	$44.21	$45.60
PPA w/o LMA		$51.42	$42.00	$42.80	$39.50	$39.00	$40.00	$41.00	$42.00	$43.00	$44.00	$45.00

Exh. GMP-NRB -12.

53. The range bounded by the Central Vermont 2002 forecast and the DPS 2001 forecast reasonably represent likely future market prices. They are both based upon recent Natsource market price information. Tr. 2/8/02 at 85 and 119 (Weiss); exh. DPS-DFL-1 at 6; tr. 4/7/02 at 261–62 (Biewald).

54. Washington Electric Cooperative, Inc. and the City of Burlington Electric Department arranged for alternative replacement power for the years 2002–2007 at prices in the range of $32.50 to $36/MWh. Lamont surr. pf. at 8–9.

55. Based upon the DPS 2001, Central Vermont and GMP 2002 forecasts, the annual *above market* payments by VYNPC for years 2002–2005 range from $82 million to $205 million. Weiss pf. 3/29/02 at 14; exh. CLF-JW-R2.

56. The amount of power covered under the Power Purchase Agreement is consistent with Vermont Yankee's nominal output, and does not result in substantial lost opportunity value. Exh. VY-1, exh. E, Schedule B; exh. CLF-2 at 37.

57. From July 1, 2002, through November 1, 2005, Central Vermont is committed to buying 4,697,516 megawatt hours of Vermont Yankee output at a net present value cost of $151 million. Exh. GMP-NRB-12.

58. From July 1, 2002, through November 1, 2005, Green Mountain is committed to buying 2,684,295 megawatt hours of Vermont Yankee output at a net present value cost of $86 million. *Id.*

59. Purchasing the same amount of power under the full range of market price forecasts would cost Central Vermont between $94 million and $156 million. Using the range of wholesale market prices bounded by the DPS 2001 and CVPS 2002 forecasts, the costs to Central Vermont are between $112 million and $128 million.[76] *Id.*

60. Purchasing the same amount of power under the market price forecasts would cost Green Mountain between $54 million and $89 million. Using the range of wholesale market prices bounded by the DPS 2001 and CVPS 2002 forecasts, the costs to Green Mountain are between $64 million and $73 million. *Id.*

61. Using the range of wholesale market prices bounded by the DPS 2001 and CVPS 2002 forecasts, Central Vermont's above-market payments under the Power Purchase Agreement are between $23 million and $39 million. Using the same assumptions, Green Mountain's above-market payments under the Power Purchase Agreement are between $13 million and $22 million. Findings 52–60, above.

62. Over the entire life of the Power Purchase Agreement, projected payments under the contract could be below market prices by as much as $27 million if the prices in the DPS 2000 forecast occur. Exh. GMP-NRB-12.

63. The 10% default value for ICAP will probably be too high. If another measure is more appropriate, the MOU allows the parties to replace ICAP with that measure. Biewald pf. at 19; tr. 4/18/02 at 45–56 (Weiss); exh. VY-42 at ¶ 14.

64. In the event that ENVY increases the output from Vermont Yankee, or the facility is relicensed, ENVY will give the Vermont Yankee sponsors a thirty-day exclusive period to negotiate the purchase of the additional power. Keuter supp. pf. 3/15/02 at 21; exh. VY-42.

(c) Rate Base Effects and Other Transfers

65. By using its cash proceeds from the proposed sale to reduce its rate base, Central Vermont will reduce the revenue requirement to recover its pre-tax cost of capital by $1.8 million in the first full year after implementation. Exh. Central Vermont Boyle-5 Revised.

76. *See* table on p. 50, below.

66. By reducing its rate base $8.6 million, , Green Mountain will lower its overall cost of capital. Green Mountain plans to reduce high-cost equity. Brock reb. pf. at 24–25.

(2) Discussion

The economic analyses demonstrate that the sale of Vermont Yankee to ENVY will have strong economic benefits. Indeed, if Vermont Yankee's operating costs and performance over the next ten years are similar to the recent past, those benefits are substantial, ranging from $263 million to $383 million as compared to continued ownership and operation.[77] These savings amount to approximately 20 percent of the costs that VYNPC's Sponsors (and as a result, ratepayers) would otherwise pay for power from Vermont Yankee and they provide a real and tangible benefit. Moreover, if wholesale market prices for power are low, the Low Market Adjuster mechanism will cause prices for power from ENVY to fall and further increase the benefits of the proposed transactions.

The proposed transaction has two main components that produce this result. First, ENVY will purchase Vermont Yankee, providing an initial $180 million payment to VYNPC. As we explain below, this initial payment has immediate benefits to VYNPC and its owners. It also permits Central Vermont and Green Mountain to recoup the bulk of their investment in Vermont Yankee, decreasing their respective rate bases and substantially limiting potential stranded cost liabilities. Second, accompanying the sale, VYNPC will enter into a Power Purchase Agreement, whose prices are below projected costs to continue to operate Vermont Yankee under status quo conditions. Included in the Power Purchase Agreement is a Low Market Adjuster, which could produce lower prices for VYNPC's Sponsors if wholesale market prices are low.

In the following discussion we examine the financial ramifications of each of the major aspects of the proposed sale and purchase power transactions.

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77. Exh. DPS-WKS-9; exh. CVPS-Page-Rebuttal-1. VYNPC's estimated savings are consistent with these figures. Exhs. VY-Wiggett-6 Revised and VY-Wiggett-10 Revised.

(a) Upfront Cash Payment

One of the key components of the transaction is the *immediate* and *real* transfer from ENVY to Vermont Yankee of approximately $180 million. This initial payment has several direct benefits. It allows VYNPC to completely repay its debt obligations, removing from Green Mountain and Central Vermont ultimate responsibility for a proportion of these obligations. The cash payment also permits Green Mountain and Central Vermont to recover a significant portion of their investment in Vermont Yankee. By recouping their Vermont Yankee investment from ENVY instead of ratepayers, Vermont Yankee's Sponsors substantially, albeit not totally, alleviate potential stranded cost recovery concerns.[78]

The upfront cash payment is tangible and definite. It will provide benefits to Central Vermont and Green Mountain irrespective of the benefits of other aspects of the transaction or whether Vermont Yankee operates at all. Specifically, VYNPC receives the initial payment, which allows for the payback of $99 million in Vermont Yankee obligations, for which Central Vermont and Green Mountain Power would have a proportional responsibility. The cash payment also provides for Central Vermont and Green Mountain to receive $13.1 million and $8.6 million from the sale, respectively, as a return of their investment. These payments are real dollar flow benefits, and are not dependent on estimates of future market prices. It is possible that over the remaining ten years of operation other provisions of the proposed transaction *could* have greater returns. For example, the Power Purchase Agreement is expected to save ratepayers millions of dollars. Nonetheless, the most striking economic benefit occurs at closing when the $180 million purchase price is received.

(b) Status Quo Operating Costs versus Power Purchase Agreement Prices

The second major benefit of the proposed transaction is the long-term purchase power contract which replaces the current wholesale power rate based upon Vermont Yankee's operating costs. The evidence shows that in all years except 2002 and 2003, the prices embedded

78. Substantial stranded costs were an issue in the AmerGen sale proposal.

in the Power Purchase Agreement are below the wholesale rates that the Sponsors would pay based upon current expectations.

Projections provided by Vermont Yankee show an aggregate cost to continue to own and operate the facility of $1.329 billion which, barring a sale, would ultimately be borne by ratepayers in proportion to their respective ownership interests. Vermont Yankee projects that its costs to produce a megawatt hour of power range from a low of $42.20 in 2003 to $66.80 in 2011.[79] Central Vermont's share of Vermont Yankee's operating costs, as projected, represent a present value obligation of $438 million.[80] Similarly, Green Mountain's obligation is $250 million.[81]

During this same period, stated Power Purchase Agreement prices range from a low of $39 in 2006 to a high of $44 in 2011.[82] Under the Power Purchase Agreement, the same power will cost Central Vermont $332 million, present value, and Green Mountain $190 million.[83] The substantial difference in prices means that, over the next ten years, Central Vermont will save an estimated $107 million on its power costs (compared to what it would have spent as an owner of Vermont Yankee), while Green Mountain's savings are estimated at $60 million.[84]

The gap between Vermont Yankee's projected operating costs and prices for power under the Power Purchase Agreement will widen if New England wholesale market prices are more than 5 percent below the prices set out in the Power Purchase Agreement. This event would trigger the Low Market Adjuster, and would provide an additional benefit to the Vermont utilities, and by extension their ratepayers.

Overall, we conclude that the Power Purchase Agreement sets power purchase levels which are below the projected costs of continuing to own and operate Vermont Yankee through the end of its license.

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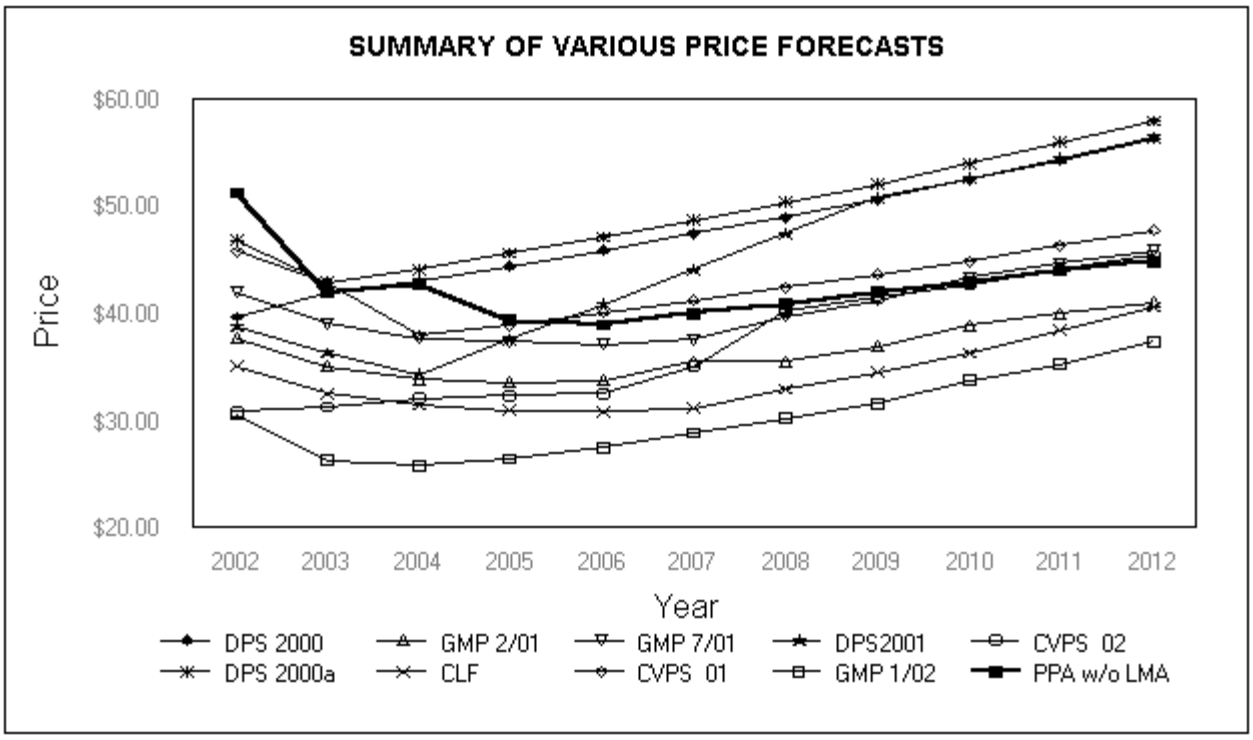
79. *See* Finding 45, above. For this comparison, we have excluded prices for the partial years of 2002 and 2012.
80. *See* Finding 46, above.
81. *See* Finding 47, above.
82. *See* Finding 45, above. For this comparison, we have excluded prices for the partial years of 2002 and 2012.
83. *See* Findings 46 and 47, above.
84. *See* Finding 49, above.

(c) Power Purchase Agreement Prices compared with Forecasts of Wholesale Prices

The Power Purchase Agreement, while providing real savings by comparison to the continued operation of Vermont Yankee, appears to be priced substantially above the expected wholesale market prices, primarily during the period between closing and the onset of the Low Market Adjuster. This fact causes us to question (1) whether the Power Purchase Agreement prices are unreasonable because they exceed market prices and (2) whether the risk that the above-market prices pose is acceptable.

During the course of this docket the parties presented a variety of projections concerning future energy prices. These projections, which range from the Department's 2000a forecast to GMP's 2002 LaCapra study, are shown below.[85]



85. Forecast market prices for power in New England are subject to a number of uncertainties such as fluctuation in oil and natural gas prices, the timing of new generating capacity, and developments in the regional wholesale marketplace. Any of these could cause actual market prices to diverge significantly from a particular forecast. Exh. GMP-1 at 1.

e. License Extension

(1) Findings

101. A plant owner can seek to obtain NRC approval to extend its operating license. License renewal is becoming common industry practice. Schlissel pf. at 40–42.

102. ENVY and ENO have committed that they will not attempt to operate Vermont Yankee beyond its current term without obtaining an extension or renewal of its Certificate from the Board. ENVY and ENO have agreed that the following conditions can be imposed:

> ENVY agrees that the order in this case may state that operation of [Vermont Yankee] beyond its current operating license termination date (March, 2012) is not permitted and will be allowed only if application to the Board for renewal of the [Certificate] is made and granted. ENVY and ENO expressly and irrevocably agree to waive any claim they or their affiliates may have that the jurisdiction of the Board to issue the [Certificate] is preempted by federal law.

Wells pf. reb. at 7–8.

103. The current regulatory environment at the NRC regarding license extensions is quite favorable. Schlissel pf. at 35.

104. The cost of seeking and obtaining NRC approval for license extension is $10–20 million. Schlissel pf. reb. at 7; Biewald pf. at 13.

(2) Discussion: License Extension

Vermont Yankee's current operating license expires on March 1, 2012. A plant owner can seek approval from the NRC to renew its license. Owning and operating Vermont Yankee after 2012 is potentially a very profitable enterprise. At that time, under the current ownership, almost all of the plant assets will be paid for. The increased value to the owner after license extension is greater if market prices for power are higher. A capacity uprate would further add to this net present value. Operating cost savings and capacity factors would also significantly improve the value of operating Vermont Yankee beyond 2012.[139]

Other factors, however, cause us to discount these benefits. We recognize that the economic, political, and operational risks and uncertainty of continued operation of an aging

139. Exh. DPS-BEB-7.

Vermont Yankee will increase significantly over the next decade, and considerably more in the two decades beyond. Alternative technologies, spent nuclear fuel storage capabilities, low market power costs, and a changing political and economic environment all increase the uncertainty surrounding the operation of the plant beyond 2012. Even minor adjustments to Vermont Yankee's operating costs and capacity factors have a very substantial effect on the valuation of license extension. For example, if we reduce the capacity factor by 1 percent a year and increase operational costs by 1 percent beyond inflation per year after 2012, the net present value of license extension in an own and operate scenario declines by half ($102 million).[140] Even a single extended outage, such as occurred in the mid-1980's, would vastly reduce the economic benefit of license extension.

The likelihood of license renewal under continued ownership also raises questions about whether we can reasonably reject the current proposal out of a belief that Vermont ratepayers, in the period from 2012–2032 would benefit from life-extension by the current owners. The Petitioners have asserted that the current owners would not pursue a license extension. We are not persuaded that the owners would make the affirmative decision to shut down Vermont Yankee rather than obtain the potential value that a license extension would bring. Nonetheless, we must recognize that the opposition of certain owners may reduce the possibility of obtaining a license extension, or increase its cost for Vermont owners.

It is entirely possible that license extension would not provide benefits to VYNPC and its owners if they retain Vermont Yankee. The above risks, however, highlight the perils of relying upon that assumption in deciding whether to approve the sale. Although the evidence shows that if VYNPC obtains license extension *and* Vermont Yankee continues to operate as it has in the recent past, continued ownership would be more beneficial, these are both assumptions rather than certainties. Once we discount them to take into account the risks of obtaining license extension and the risks that operating costs will increase or output will decrease, we must place a low probability on the chance receiving the economic benefits of continued ownership and operation of Vermont Yankee beyond 2012.

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140. Biewald surr. pf. at 3; exh. DPS-BEB-7; *see* Schlissel pf. at 8.

It is important to note that the economic benefits of license extension are greatest if market prices rise above currently-projected levels. Through the MOU, ENVY has made some of these benefits available to Vermont ratepayers. In particular, Paragraph 4 provides that if Vermont Yankee's average energy price exceeds $61/MWh (adjusted for inflation beginning in 2013), ENVY will share 50 percent of the excess revenues with VYNPC and its Sponsors.[141] This sharing mechanism captures some of the value that Vermont Yankee's owners would obtain if they had not sold the station and successfully relicensed.[142]

Finally, ENVY has also provided VYNPC and its Sponsors a "commercially reasonable opportunity" to negotiate on an exclusive basis (for 30 days) to purchase the output of Vermont Yankee if license extension occurs.[143] This exclusive negotiating period will give VYNPC's Sponsors, including Green Mountain and Central Vermont, a chance to reappraise and, if desirable, to seek some of the benefit of extended output from VYNPC before that power is marketed to other potential purchasers.

f. Other Risks/Adjustments

(1) Early Shutdown for Operating or Market Reasons

In Section V.B.1., we concluded that the transfer of risks associated with operating costs was a significant benefit of the proposed sale. Here, we examine a similar scenario — the possibility that Vermont Yankee is forced into an early shutdown for either operating or market price reasons. We conclude that the sale of Vermont Yankee to ENVY would always be financially beneficial to ratepayers if such an event occurred. After the sale, the only obligation Central Vermont and Green Mountain will have to ENVY is a commitment to buy the facility's output. By contrast, the two companies currently have an obligation to cover Vermont Yankee's costs, plus purchase power from alternative sources in the event of an outage or early closure.

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141. Exh. VY-42 at ¶ 4. Excess revenues are defined as the difference between Vermont Yankee's average energy price and $61/MWh, multiplied by the number of MWhs sold.

142. We note that the $61 strike price is higher than the prices that any party has forecast for wholesale market power in 2012 (for example, it is approximately 10 percent above the DPS 2001 forecast that we find represents one end of the reasonable range of price projections). *See* Finding 52. Thus, based upon present projections, this sharing provision is not likely to have any value to ratepayers. Nonetheless, it does provide protection should energy market prices change precipitously.

143. Exh. VY-42 at ¶ 1.

to ENVY and ENO under Section 231. The Board has the authority under Section 231(a) of Title 30 to amend or revoke any Certificate for good cause. Thus, if the Board were to find upon a compelling record that any owner's ownership of Vermont Yankee no longer promoted the general good, the Board could revoke the Certificate, regardless of whether it was held by ENVY or VYNPC.[159]

A second area in which the Board has direct regulation of Vermont Yankee pertains to activities at the station that constitute construction or site preparation. Under 30 V.S.A. § 248, VYNPC must obtain prior approval for plant additions or upgrades that require construction, "except for the replacement of existing facilities with equivalent facilities in the usual course of business." For example, when VYNPC constructed a new office building on the Vernon site, the company first obtained approval under Section 248.[160] This authority is also unchanged.

Vermont Yankee's primary purpose is to generate and sell power in *wholesale* markets. Wholesale power sales are regulated by FERC and not by state utility commissions.[161] At the present time, the sale of power from Vermont Yankee is not within the Board's jurisdiction.[162] Rather, the power sale under the Power Contract and Amended Power Contract is regulated by FERC.[163] The sale does not alter the Board's authority.

The sale will reduce the Board's ability to influence actions at Vermont Yankee in one respect. The Board presently has the authority to establish the *retail* rates for Green Mountain and Central Vermont. Although the Board's ability to use its retail rate-setting authority to disallow costs associated with Vermont Yankee is limited, the Board does have broad authority to oversee the manner in which Green Mountain and Central Vermont operate. In particular, as (collective) majority owners of VYNPC, Green Mountain and Central Vermont have the capability to exert great (if not unfettered) influence over the actions of VYNPC. Our supervisory authority and rate-setting authority enables the Board to evaluate Green Mountain's and Central Vermont's management of VYNPC. If we concluded that the Vermont Sponsors had

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159. This assumes, of course, both a fair *and* thorough administrative proceeding and a set of concerns that would be adequate despite federal preemption as to radiological safety. *See*, *PG&E vs. SERCDC*, above.

160. Vermont Yankee Nuclear Power Corp., Docket 6054, Order of 8/10/98.

161. 16 U.S.C. § 4 791c *et seq.*

162. This Board retains the power to review Vermont utilities' decisions to buy power *from* wholesale sources, at wholesale rates approved by the FERC for sale of power *by* those wholesale sellers.

163. FERC also has jurisdiction over the Amendatory Agreements.

b. Preemption

According to CAN, because Entergy's agreement to provide financial assurances is preempted by NRC regulations, the Board must reject the MOU, as it fails to actually provide the adequate assurances that the Department deemed necessary to support approval of the sale. We find CAN's preemption argument unpersuasive. A decision by this Board based upon this state's traditional police power, limited to issues associated with the manner in which Vermont meets its energy needs, does not conflict with the Atomic Energy Act or the NRC's regulations.

In *Pacific Gas and Electric Co. v. State Energy Resources Conservation & Development Commission* ("PG&E"), the U.S. Supreme Court held that the Atomic Energy Act[247] preempts state jurisdiction as to the "radiological safety aspects involved in the construction or operation of a nuclear plant . . ." but also that "States retain their traditional responsibility in the field of regulating electrical utilities for determining questions of need, reliability, cost and other related state concerns."[248]

The Court explained, however, that even when a statute, such as the Atomic Energy Act, does not expressly preempt state authority, a scheme of federal regulation may be so pervasive as to make reasonable the inference that Congress left no room for states to supplement it.[249] Upon review of the Atomic Energy Act and its legislative history, the Court concluded that the federal government occupies the entire field of nuclear-safety concerns, although it does not displace states' traditional authority over "the need for additional generating capacity, the type of generating facilities to be licensed, land use, rate-making, and the like." [250] The Court also

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247. Atomic Energy Act of 1954, §§ 1–320, 274(k), as amended, 42 U.S.C.A. §§ 2011–2286i, 2021(k).

248. *Pacific Gas and Electric Co. v. State Energy Resources Conservation & Development Commission*, 461 U.S. at 205 (1983). Although *PG&E* considered the preemptive effect of Section 274 of the Atomic Energy Act, the Supreme Court interpreted Section 274(k) as a reflection of the general distinction between federal and state authority to regulate activities covered by the Atomic Energy Act, as amended.

249. *Id.* at 204. Congress can preempt state authority through either express terms of legislation or by enactment of a scheme of federal regulation that is "so pervasive as to make reasonable the inference that Congress left no room for the States to supplement it," or where an Act of Congress "touch[es] a field in which the federal interest is so dominant that the federal system will be assumed to preclude enforcement of state laws on the same subject." *Id.* citing *Rice v. Santa Fe Elevator Corp.*, 331 U.S. 218, 230 (1947).

250. *Id.* at 212–13. *PG&E* involved a California statute that imposed a moratorium on the construction of nuclear plants until a state administrative board "finds that there has been developed and the United States through its authorized agency has approved and there exists a demonstrated technology or means for the disposal of high level nuclear waste." *Id.* at 198. Upon a challenge by utility companies that, among other things, the state of

(continued...)

indicated that state regulation is preempted where it actually conflicts with federal law, *i.e.*, in a case where compliance with both federal and state regulations is an impossibility, or when state regulations serve as an obstacle to the accomplishment and execution of the full purposes and objectives of Congress.[251]

The Department and the Petitioners have willingly entered into a Memorandum of Understanding designed to, among other things, ensure that ENVY is appropriately capitalized. The proposed financial assurances are designed to provide ENVY with access to credit during periods of regular operation and, if necessary, during an extended period necessary to plan and execute a shutdown of Vermont Yankee, and to prepare for full access of decommissioning trust funds.

Neither the Atomic Energy Act nor Nuclear Regulatory Commission regulations are implicated by our approval of the MOU. In the MOU, Entergy Corporation agrees to provide sufficient capitalization to its affiliate, ENVY. It is a consensual document which neither imposes safety standards upon ENVY, nor impedes ENVY's ability to meet safety standards to which it is otherwise subject. The MOU ensures that Entergy Corporation makes available a minimum amount of funding to ENVY which we have determined is in the good of the state. This requirement need have no impact on decisions by ENVY and ENO regarding radiological safety. Therefore, we conclude Entergy Corporation's voluntary agreement to capitalize ENVY to the level agreed upon in the MOU is not preempted by federal law.

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250. (...continued)
California was preempted by the federal statutory scheme, the Court held first that the federal government has occupied the entire field of nuclear safety concerns, but also that the California statute was based on economic considerations, and thus fell within the broad responsibilities traditionally held by the states in the field of public utility regulation. *Id.* at 206.

251. *PG&E*, *supra*, at 204. There was no inherent conflict between a Nuclear Regulatory Commission decision that a plant's operation was safe and California's decision that its operation might not be economically wise, *id.* at 218–19. *See Kerr-McGee v. City of West Chicago*, Nuclear Reg. Rep. P 20,515, 59 USLW 2243, 32 ERC 1095, 20 Envtl. L. Rep. 21,369 (1990). In Kerr-McGee, the U.S. Court of Appeals for the Seventh Circuit held, among other things, that the Atomic Energy Act did not preempt West Chicago's application of its erosion and sedimentation regulations to Kerr-McGee's on-site nuclear waste disposal project. Even though erosion and sedimentation are mentioned in the federal regulations, the city's regulations did not directly interfere with the regulation of radiological hazards.

3. Entergy's Structure and Financial Safeguards

Above, we concluded that Entergy's structure will not pose a problem to ENVY's and ENO's ownership and operation of Vermont Yankee. We reach this conclusion, in large part, because of Entergy Corporation's financial situation and the financial safeguards it has agreed to put into place.

In this investigation we have sought to determine how well financed ENVY is today and whether the State of Vermont can assure that ENVY will continue to have sufficient funds in case operational difficulties at Vermont Yankee create financial hardships for ENVY. We believe that the financial assurances that Entergy Corporation has agreed to provide ENVY will be sufficient to ensure that ENVY has the resources it needs to operate and to eventually close and decommission Vermont Yankee.[252]

ENVY can expect to be financially sound for a number of reasons. First, it will have revenues from the power purchase agreement that it has entered into with the current owners of Vermont Yankee. VYNPC's Sponsors have agreed to buy nearly all of the electricity that Vermont Yankee produces until 2012. Second, two Entergy Corporation affiliates have entered into credit agreements with ENVY. One agreement provides a $35 million line of credit for ENVY's ongoing operational needs. The other agreement provides a $35 million line of credit in case ENVY has to shut down Vermont Yankee and is unable to get any income from selling electricity. Third, ENVY has also agreed to purchase and maintain an insurance policy in case it has to shut down Vermont Yankee and cannot sell electricity. Finally, Entergy Corporation has given ENVY a guaranty of $60 million in case ENVY uses up the money provided by the other two credit agreements.

The Power Purchase Agreement, credit agreements, insurance and Entergy's guaranty are designed to protect ENVY for enough time for ENVY to consider and to decide whether to repair and restart or to close and to decommission Vermont Yankee.[253] If ENVY chooses the latter

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252. Exh. VY-42 at ¶ 13 and exhs. B & C; Sherman supp. pf. at 13.

253. Six months from the time of an unplanned shutdown is sufficient time for ENVY to make a decision to permanently shut down Vermont Yankee and to take appropriate steps to access decommissioning funds. Keuter reb. pf.. at 9–10; tr. 4/4/02 at 232–33. Requiring Entergy Corporation to provide a guaranty of one year's operating costs, as suggested during hearings, is not justified because ENVY expects that it will make a decision to permanently shutdown with sufficient speed so that six months after an unplanned shutdown ENVY will be able to

(continued...)

option, then it will seek access to the decommissioning fund which is designed to cover the costs of fully-closing and dismantling the plant. On the basis of these protections, we conclude that ENVY has in place adequate guarantees that it will be able to operate safely and to maintain solvency during the extended period necessary to plan and execute a shutdown of Vermont Yankee, and to prepare for full access of decommissioning trust funds.

E. Safety

We find that Entergy Corporation, ENVY, and ENO can and should own and operate Vermont Yankee in a safe and reliable manner. We also conclude that we have heard no testimony sufficient to warrant this Board requiring an additional independent safety assessment at Vermont Yankee.

1. Findings

a. Vermont Yankee's Safety History

172. VYNPC has operated Vermont Yankee safely and reliably during the plant's nearly thirty-year history. Sherman pf. at 36.

173. Vermont Yankee has been one of the top-performing boiling water reactors in the nation. Barkhurst reb. pf. at 20; Keane reb. pf. at 18; tr. 4/18/02 at 232 (Sherman); Keane reb. pf. at 18; Schlissel pf. at 10; tr. 2/15/02 at 30–31 (Schlissel).

174. The NRC has recently made significant changes in many of the ways it performs its role. Sherman pf. at 36–37.

175. Until 1998, the NRC evaluated nuclear facilities, like Vermont Yankee, by a numerical ranking system called the Systematic Assessment of Licensee Performance, a numerically-based ranking system. Tr. 4/19/02 at 42 (Sherman).

176. After October, 1998, the NRC rating system changed to a color-based system whereby performance indicators were color coded. According to this newly-devised scheme, inspection findings could be labeled green (very low safety issue), white (low to moderate safety issue),

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253. (...continued)
access its decommissioning fund. Keuter reb. pf. at 9–10; tr. 4/4/02 at 232–33.

X. CONCLUSION

We find that the sale of the Vermont Yankee Nuclear Power Station to Entergy Nuclear Vermont Yankee will promote the general good of the state and we, therefore, grant our approval. The evidence demonstrates the sale of Vermont Yankee will procure continued safe operation of the station. It will simultaneously reduce costs for VYNPC, its Sponsors, and their ratepayers, including the customers of Green Mountain and Central Vermont.

In summary, we conclude the following:

- ENVY and ENO are capable companies that will operate Vermont Yankee at least as safely as would the present owners. These companies also have access to financial resources and broad expertise of the Entergy Corporation, resources and experience that exceed those available to the present owners.
- The transfer of Vermont Yankee and the purchase of power from ENVY will produce lower costs for ratepayers during the remaining term of Vermont Yankee's operating license than would continued ownership of the nuclear generating station by the present owners. In particular, the Power Purchase Agreement prices are below Vermont Yankee's current operating costs.
- The proposed sale will reduce risks now faced by VYNPC's owners, including the risks of increased costs of operation or funding the eventual decommissioning of Vermont Yankee.
- In addition to embodying fixed prices that are lower than current operating costs, the Power Purchase Agreement includes a Low Market Adjuster beginning in 2005 that will pass through market-based prices if wholesale markets are below the fixed prices in the Agreement.
- ENVY has made additional commitments to ensure state jurisdiction over a possible license extension, provide increased access to the Vermont nuclear engineer, and permit Green Mountain and Central Vermont the first opportunity to obtain power if ENVY increases Vermont Yankee's output or if this Board permits ENVY to operate past 2012.
- Early shutdown of Vermont Yankee would increase costs for Vermont ratepayers and is not in the best interest of the state.
- Among the three options now available to VYNPC — continued ownership, consummation of the Sale Agreement, and shutdown — the sale is the most cost-effective and reasonable option and, for that reason, prudent.
- To ensure that the proposed sale promotes the general good, we adopt several conditions:

  (1) We do not grant the Petitioners' extraordinary request in Paragraph 16 of the MOU that we waive our long-standing ratemaking doctrines and guarantee rate

recovery by treating all transaction-related costs as if they were prudent and used-and-useful (with the exception of our limited finding on prudence noted above). Although we find it unlikely that a future material disallowance could occur, we expressly decline to rule on any issues related to whether the transactions and power purchases are used-and-useful and whether the process was prudent.

(2) At such times as VYNPC receives Nuclear Electric Insurance Limited insurance disbursements, access to excess funds in the Spent Fuel Disposal Trust, or claims related to the Department of Energy's defaults under the DOE Standard Contract under Section 2.2(i) of the Sale Agreement, Green Mountain and Central Vermont each shall submit a plan for using its share of those funds to benefit ratepayers. The plan shall consider the application of a significant portion of these benefits towards the development and use of renewable resources.

(3) All money remaining in the decommissioning fund following completion of decommissioning shall be returned to consumers of VYNPC's Sponsors. This condition modifies Paragraph 3 of the MOU (which provides that ENVY will share any excess decommissioning funds with ratepayers).

(4) Green Mountain and Central Vermont shall submit updated costs of service in April 2003.

XI. ORDER

IT IS HEREBY ORDERED, ADJUDGED AND DECREED by the Public Service Board of the State of Vermont that:

1. The sale of substantially all of the assets of Vermont Yankee Nuclear Power Corporation, including those constituting or used in the operation of the Vermont Yankee Nuclear Power Station, to Entergy Nuclear Vermont Yankee, LLC, as described in the Findings, is approved, and a Certificate of Consent under 30 V.S.A. § 109 shall be issued.

2. The transactions required or contemplated by the Purchase and Sale Agreement between and among Vermont Yankee Nuclear Power Corporation, and Entergy Nuclear Vermont Yankee, LLC, and Entergy Corporation, as guarantor, including:

(a) the execution and performance by all parties of the Purchase and Sale Agreement;

(b) the Power Purchase Agreement;

(c) the 2001 Amendatory Agreements;

(d) the Interconnection Agreement between Entergy Nuclear Vermont Yankee, LLC and Vermont Electric Power Company, Inc.;

(e) the Security Agreement between Vermont Yankee Nuclear Power Corporation and Entergy Nuclear Vermont Yankee, LLC;

(f) the First Supplemental to Vermont Yankee Amended and Restated Spent Fuel Disposal Trust; and

(g) all ancillary agreements with respect to the transactions required or contemplated by the Purchase and Sale Agreement are approved.

3. With the exception of the following subsections, which shall be amended in accordance with this Order (as set out in Appendix D) or excluded from approval, the Memorandum of Understanding among Entergy Nuclear Vermont Yankee, LLC, Entergy Nuclear Operations, Inc., Vermont Yankee Nuclear Power Corporation, Central Vermont Public Service Corporation ("Central Vermont"), Green Mountain Power Corporation ("Green Mountain"), and the Vermont Department of Public Service ("Department") is approved:

Section 3;
Sections 15.1, 15.2, 15.3, 15.4;
Section 16.6.; and
Section 16.7.

4. Upon completion of the decommissioning of Vermont Yankee, any property remaining in ENVY's Decommissioning Trust funds shall be distributed by the Trustee for the benefits of the customers of Vermont Yankee's sponsors.

5. The Accounting Orders proposed by Central Vermont Public Service Corporation are approved.

6. The Accounting Order proposed by Green Mountain Power Corporation is approved.

7. Pursuant to 30 V.S.A. § 231, a Certificate of Public Good, to expire on March 21, 2012, shall be issued to Entergy Nuclear Vermont Yankee, LLC to own the Vermont Yankee Nuclear Power Station and to Entergy Nuclear Operations, Inc. to operate the Vermont Yankee Nuclear Power Station as described in the foregoing findings.

8. Absent issuance of a new Certificate of Public Good or renewal of the Certificate of Public Good issued today, Entergy Nuclear Vermont Yankee, LLC and Entergy Nuclear Operations, Inc. are prohibited from operating the Vermont Yankee Nuclear Power Station after March 21, 2012.

9. Entergy Nuclear Vermont Yankee, LLC shall notify the Board and the Department every six months, beginning January 1, 2003, as to the status and amounts of guaranties of Entergy Corporation that are outstanding at the time of the filing.

10. Entergy Nuclear Vermont Yankee, LLC shall report to the Board and to the Department the status of the decommissioning funds and the latest Nuclear Regulatory Commission ("NRC") calculation of such responsibility at the same time such report is required by the NRC. ENVY shall make this information available to the public and will participate in a public discussion, on the adequacy of the decommissioning funds at a meeting or meetings or some other forum to be determined in conjunction with the Department.

11. Every five (5) years, beginning with the fifth anniversary of the closing under the Sale Agreement, Entergy Nuclear Vermont Yankee, LLC shall update the site-specific decommissioning study and submit the results to the Board and the Department. Following the completion of each study, Entergy Nuclear Vermont Yankee, LLC shall (i) inform the public of the estimated cost of decommissioning which resulted from the analysis, and (ii) participate in a public discussion of the results at a forum to be determined in conjunction with the Department.

12. Within nine months of the date of this Order, Entergy Nuclear Vermont Yankee, LLC shall file with the Board and the Department a copy of the Post Shutdown Decommissioning Activities Report ("PSDAR") which it has pledged it would prepare and maintain in the event of an unexpected shutdown. ENVY shall update the PSDAR, once a year on the anniversary of the issuance of its Certificate of Public Good, and file the update with the Board and the Department.

13. The amendment of and assignment to Entergy Nuclear Vermont Yankee, LLC, of the station-service agreement between Green Mountain Power Corporation and Vermont Yankee Nuclear Power Corporation, are approved.

14. The Board hereby consents to and approves the pledge by Vermont Yankee Nuclear Power Corporation of its rights to receive certain payments under the Power Contracts and Additional Power Contracts, as amended by the 2001 Amendatory Agreements, to secure the Corporation's obligation to pay Entergy Nuclear Vermont Yankee, LLC, under the Power Purchase Agreement and the Purchase and Sale Agreement, and consents to and approves the Security Agreement between Vermont Yankee Nuclear Power Corporation and Entergy Nuclear Vermont Yankee, LLC.

15. Entergy Nuclear Vermont Yankee, LLC shall file a letter notifying the Board of the date of the closing within ten days following the closing.

16. Green Mountain and Central Vermont shall file, in April 2003, an updated cost-of-service based upon a test year ending December 31, 2002, with appropriate additional information as necessary to determine whether a rate decrease is appropriate in 2003 or 2004.

17. If VYNPC receives Nuclear Electric Insurance Limited disbursements, access to excess funds in the Spent Fuel Disposal Trust, or claims related to the Department of Energy's defaults under the DOE Standard Contract under Section 2.2(i) of the Sale Agreement, Green Mountain and Central Vermont shall submit a plan for using their share of those funds to benefit ratepayers. The plan shall include consideration of renewable resources. The plan shall consider the application of a significant portion of these benefits towards the development and use of renewable resources.

18. ENVY shall certify, within 30 days of this Order, that, in the case that a functional equivalent of Installed Capability is adopted under some other name, the equivalent term adopted shall be treated in the same manner as Installed Capability as described in this Order.

19. All findings and rulings requested by the parties, other than those addressed above, are hereby denied, except that ENVY's Motion of June 7, 2002, shall be considered separately.

Dated at Montpelier, Vermont, this 13th day of June, 2002.

s/ Michael H. Dworkin	)	
	)	PUBLIC SERVICE
	)	
s/ David C. Coen	)	BOARD
	)	
	)	OF VERMONT
s/ John D. Burke	)	

OFFICE OF THE CLERK

FILED: June 13, 2002

ATTEST: s/ Susan M. Hudson

Clerk of the Board

NOTICE TO READERS: This decision is subject to revision of technical errors. Readers are requested to notify the Clerk of the Board (by e-mail, telephone, or in writing) of any apparent errors, in order that any necessary corrections may be made. (E-mail address: Clerk@psb.state.vt.us)

Appeal of this decision to the Supreme Court of Vermont must be filed with the Clerk of the Board within thirty days. Appeal will not stay the effect of this Order, absent further Order by this Board or appropriate action by the Supreme Court of Vermont. Motions for reconsideration or stay, if any, must be filed with the Clerk of the Board within ten days of the date of this decision and order.

20090107-3008 FERC PDF (Unofficial) 01/07/2009

FEDERAL ENERGY REGULATORY COMMISSION
Washington, D.C. 20426

In Reply Refer To:

Entergy Nuclear Fitzpatrick, LLC	Docket Nos. ER00-2738-008
Entergy Nuclear Generation Company	ER99-1004-009
Entergy Nuclear Indian Point 2, LLC	ER01-1721-006
Entergy Nuclear Indian Point 3, LLC	ER00-2740-008
Entergy Nuclear Vermont Yankee, LLC	ER02-564-006
Entergy Nuclear Power Marketing, LLC	ER06-653-003
(collectively, Entergy Nuclear Group)	**January 7, 2009**

Ms. Andrea Weinstein
Entergy Services, Inc.
Assistant General Counsel
101 Constitution Avenue, N.W.
Suite 200 East
Washington, D.C. 20001

Reference: Updated Market Power Analysis in Compliance with Order No. 697

Dear Ms. Weinstein:

Pursuant to the authority delegated to the Director, Division of Tariffs and Market Development - West, under 18 C.F.R. § 375.307, your submittals filed in the referenced dockets are accepted for filing, effective September 18, 2007.[1] Based on your representations, you meet the criteria for a Category 2 seller and are so designated.[2]

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[1] Entergy Nuclear Fitzpatrick, LLC, FERC Electric Tariff, First Revised Volume No. 1, First Revised Sheet Nos. 1-3 (Supersedes Original Sheet Nos. 1-7); Entergy Nuclear Generating Company, FERC Electric Tariff, First Revised Volume No. 1, Substitute First Revised Sheet Nos. 1-2 and Second Substitute First Revised Sheet No. 3 (Supersedes Original Sheet Nos. 1-7); Entergy Nuclear Indian Point 2, LLC, FERC Electric Tariff, First Revised Volume No. 1, Second Substitute First Revised Sheet Nos. 1-3 (Supersedes Original Sheet Nos. 1-5); Entergy Nuclear Indian Point 3, LLC, FERC Electric Tariff, First Revised Volume No. 1, Substitute First Revised Sheet Nos. 1-2 and Second Substitute First Revised Sheet No. 3 (Supersedes Original Sheet Nos. 1-5); Entergy Nuclear Vermont Yankee, LLC, FERC Electric Tariff, First Revised Volume No. 1, Substitute Second Revised Sheet Nos. 1-2 and Second Substitute Second Revised

On June 30, 2008, as amended on August 19, 2008 and November 21, 2008, you filed on behalf of the Entergy Nuclear Group an updated market power analysis in compliance with the regional reporting schedule adopted in Order No. 697[3] and pursuant to the Commission's order granting the Entergy Nuclear Group authority to sell electric energy and capacity at market-based rates.[4] You also submitted revised tariff sheets to incorporate the required provisions adopted by the Commission in Order No. 697[5] and Order No. 697-A.[6]

You state that the Entergy Nuclear Group owns and operates generation facilities in the markets administered by New York Independent System Operator, Inc. (NYISO) and ISO New England Inc. (ISO-NE). You add that the Entergy Nuclear Group is an indirect, wholly-owned subsidiary of the Entergy Corporation. You further state that the Entergy Corporation owns transmission facilities in the Southeast Region. You state that the Entergy Corporation has an Open Access Transmission Tariff on file with the Commission and therefore has mitigated any transmission market power.[7] Further, you

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Sheet No. 3 (Supersedes First Revised Sheet Nos. 1-3); and Entergy Nuclear Power Marketing, LLC, Substitute Original Volume No. 1, Substitute First Revised Sheet Nos. 1-3 (Supersedes Original Sheet Nos. 1-5).

[2] *Market-Based Rates for Wholesale Sales of Electric Energy, Capacity and Ancillary Services by Public Utilities*, Order No. 697, 72 Fed. Reg. 39,904 (July 20, 2007), FERC Stats. & Regs. ¶ 31,252 at P 848-850, *clarified*, 121 FERC ¶ 61,260 (2007) (Order Clarifying Final Rule), *order on reh'g*, Order No. 697-A, FERC Stats. & Regs. ¶ 31,268 (2008). You must file an updated market power analysis in compliance with the regional reporting schedule adopted in Order No. 697. Order No. 697, FERC Stats. & Regs. ¶ 31,252.

[3] Order No. 697, FERC Stats. & Regs. ¶ 31,252 at P 882-893, App. D; Order Clarifying Final Rule, 121 FERC ¶ 61,260 at P 9-10, App. D-1.

[4] *Entergy Nuclear Fitzpatrick, LLC*, Docket No. ER00-2738-000 (August 9, 2000) (unpublished letter order); *Entergy Nuclear Generating Company*, 86 FERC ¶ 61,142 (1999); *Entergy Nuclear Indian Point 2, LLC*, Docket No. ER01-1721-000 (May 24, 2001) (unpublished letter order); *Entergy Nuclear Vermont Yankee, LLC*, Docket No. ER02-564-000 (February 5, 2002) (unpublished letter order); and *Entergy Nuclear Power Marketing, LLC*, Docket No. ER06-653-000 (April 19, 2006) (unpublished letter order).

[5] Order No. 697, FERC Stats. & Regs. ¶ 31,252 at P 914-918.

[6] Order No. 697-A, FERC Stats. & Regs. ¶ 31,268 at P 387, P 391.

[7] *Entergy Services Inc.*, 74 FERC ¶ 61,137 (1996).

affirmatively state that the Entergy Nuclear Group has not erected any barriers to entry and will not erect any barriers to entry in the future.

Your filings were noticed on July 9, 2008, November 26, 2008 and December 11, 2008, with comments, protests or interventions due on or before August 29, 2008, December 1, 2008, and December 15, 2008, respectively. None was filed.

Market-Based Rate Authorization

The Commission allows power sales at market-based rates if the seller and its affiliates do not have, or have adequately mitigated, horizontal and vertical market power.[8]

You have prepared the pivotal supplier and wholesale market share screens for the NYISO and ISO-NE markets consistent with the requirements of Order No. 697.

Your generation market power screens have been reviewed, and you pass both the pivotal supplier and wholesale market share screens in those markets. Based on your representations, your submittal satisfies the Commission's requirements for market-based rates regarding horizontal market power.

Based on your representations, your submittal also satisfies the Commission's requirements for market-based rates regarding vertical market power.

You must file electronically with the Commission Electric Quarterly Reports.[9] You further must timely report to the Commission any change in status that would reflect a departure from the characteristics the Commission relied upon in granting market-based rate authority.[10]

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[8] Order No. 697, FERC Stats. & Regs. ¶ 31,252 at P 62, 399, 408, 440.

[9] *Revised Public Utility Filing Requirements*, Order No. 2001, FERC Stats. & Regs. ¶ 31,127, *reh'g denied*, Order No. 2001-A, 100 FERC ¶ 61,074, *reh'g denied*, Order No. 2001-B, 100 FERC ¶ 61,342, *order directing filing*, Order No. 2001-C, 101 FERC ¶ 61,314 (2002), *order directing filing*, Order No. 2001-D, 102 FERC ¶ 61,334 (2003). Attachments B and C of Order No. 2001 describe the required data sets for contractual and transaction information. Public utilities must submit Electric Quarterly Report to the Commission using the EQR Submission System Software, which may be downloaded from the Commission's website at http://www.ferc.gov/docs-filing/eqr.asp.

[10] *Reporting Requirement for Changes in Status for Public Utilities with Market-Based Rate Authority*, Order No. 652, FERC Stats. & Regs. ¶ 31,175, *order on reh'g*, 111 FERC ¶ 61,413 (2005); 18 C.F.R. § 35.42.

20090107-3008 FERC PDF (Unofficial) 01/07/2009

This action does not constitute approval of any service, rate, charge, classification, or any rule, regulation, or practice affecting such rate or service provided for in the filed documents; nor shall such action be deemed as recognition of any claimed contractual right or obligation affecting or relating to such service or rate; and such acceptance is without prejudice to any findings or orders which have been or may hereafter be made by the Commission in any proceeding now pending or hereafter instituted by or against any of the applicant(s).

This order constitutes final agency action. Requests for rehearing by the Commission may be filed within 30 days of the date of issuance of this order, pursuant to 18 C.F.R § 385.713.

Questions regarding the above order should be directed to:

Federal Energy Regulatory Commission
Attn: Valerie Gill
Phone: (202) 502-8527
Office of Energy Market Regulation
888 First Street, N.E.
Washington, D.C. 20426

Sincerely,

Steve P. Rodgers, Director
Division of Tariffs and Market
Development - West

20090107-3008 FERC PDF (Unofficial) 01/07/2009

Document Content(s)

19905126.DOC.....1-4

20061011-3011 Issued by FERC OSEC 10/11/2006 in Docket#: ER00-2738-006

FEDERAL ENERGY REGULATORY COMMISSION
Washington, D.C. 20426

In Reply Refer To:
Entergy Nuclear Generation Co.,
Entergy Nuclear FitzPatrick, LLC,
Entergy Nuclear Indian Point 3, LLC,
Entergy Nuclear Indian Point 2, LLC and
Entergy Nuclear Vermont Yankee, LLC
Docket Nos. ER99-1004-007
ER00-2738-006
ER00-2740-006
ER01-1721-004 and
ER02-564-004

October 11, 2006

Ms. Andrea Weinstein
Attorney for Entergy Services, Inc.
101 Constitution Ave., NW
Suite 200 East
Washington, D.C. 20001

Reference: Compliance Filing

Dear Ms. Weinstein:

Pursuant to the authority delegated to the Director, Division of Tariffs and Market Development - West, under 18 C.F.R. § 375.307, your submittal filed in the referenced docket is accepted for filing, effective August 31, 2006, a day after filing.[1]

[1] Entergy Nuclear Generation Company, FERC Electric Tariff, Original Volume No. 1, First Revised Sheet Nos. 3-5 (supersedes Original Sheet Nos. 3-5); Entergy Nuclear FitzPatrick, LLC, FERC Electric Tariff, Original Volume No. 1, First Revised Sheet Nos. 3-5 (supersedes Original Sheet Nos. 3-5); Nuclear Indian Point 3, LLC, FERC Electric Tariff, Original Volume No. 1, First Revised Sheet Nos. 3-5 (supersedes Original Sheet Nos. 3-5); Nuclear Indian Point 2, LLC, FERC Electric Tariff, Original Volume No. 1, Second Revised Sheet No. 2, First Revised Sheet Nos. 4-6, (supersedes First Revised Sheet No. 2 and Original Sheet Nos. 4-6); and Entergy Nuclear Vermont Yankee, LLC, FERC Electric Tariff, Original Volume No. 1, First Revised Sheet Nos. 3-4 (supersedes Original Sheet Nos. 3-4).

On August 30, 2006, you filed on behalf of Entergy Nuclear Generation Company, Entergy Nuclear FitzPatrick, LLC, Entergy Nuclear Indian Point 3, LLC, Entergy Nuclear Indian Point 2, LLC, (Indian Point 2) and Entergy Nuclear Vermont Yankee (collectively Entergy Nuclear Companies), revised market-based rate tariffs in compliance with the Commission's order accepting Entergy Nuclear Companies' update market power analysis to include the Commission's standard code of conduct.[2] You also submit tariff revisions to Indian Point 2's market-based rate tariff to include language stating that it will not makes sales to affiliates "without first receiving" Commission authorization of the transaction under section 205 of the Federal Power Act.[3]

Your filing was noticed on September 6, 2006, with comments, protests or interventions due on or before September 20, 2006. None was filed.

This action does not constitute approval of any service, rate, charge, classification, or any rule, regulation, or practice affecting such rate or service provided for in the filed documents; nor shall such action be deemed as recognition of any claimed contractual right or obligation affecting or relating to such service or rate; and such acceptance is without prejudice to any findings or orders which have been or may hereafter be made by the Commission in any proceeding now pending or hereafter instituted by or against any of the applicant(s).

This order constitutes final agency action. Requests for rehearing by the Commission may be filed within 30 days of the date of issuance of this order, pursuant to 18 C.F.R. § 385.713.

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[2] *Entergy Nuclear Generation Company*, 116 FERC ¶ 61, 101 (2006) (July 31 Order) at P 19.

[3] July 31 Order at P 18.

20061011-3011 Issued by FERC OSEC 10/11/2006 in Docket#: ER00-2738-006

Questions regarding the above order should be directed to:

Federal Energy Regulatory Commission
Attn: Michelle Barnaby
Phone: (202) 502-8407
Office of Energy Markets and Reliability
888 First Street, N.E., EM-5.6
Washington, D.C. 20426

Sincerely,

Steve P. Rodgers, Director
Division of Tariffs and Market
Development - West

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426

February 5, 2002

Entergy Nuclear Vermont Yankee, LLC
Docket No. ER02-564-000

Skadden, Arps, Slate, Meagher & Flom LLP
Attention: William R. Hollaway
Attorney for Entergy Nuclear Vermont Yankee, LLC.
1440 New York Avenue, N.W.
Washington, DC 20005-2111

Reference: Market-Based Rate Authorization with Code of Conduct and Service Agreement Under the Market-Based Tariff

Dear Mr. Hollaway:

On December 19, 2001, you filed with the Commission, on behalf of Entergy Nuclear Vermont Yankee (Entergy Nuclear VY), an application for market-based rate authority, with an accompanying tariff and code of conduct. The proposed market based tariff provides for sales of capacity, energy and ancillary services at market based rates, and for the reassignment of transmission capacity. Also submitted was a long-term power purchase agreement between Entergy Nuclear VY and Vermont Yankee Nuclear Power Corporation (VYNPC).

Pursuant to authority delegated to the Director, Office of Markets, Tariffs and Rates - Central, under 18 C.F.R. §375.307, your submittal complies with the Commission's requirements for market-based rates and is accepted for filing effective February 17, 2002, subject to the compliance filing discussed below. Any waivers or authorizations requested in you application are granted to the extent specified in Appendix A. In addition, Applicant must comply with the reporting requirements and other requirements specified in Appendix A. Your designations are shown in the following footnote[1].

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[1]FERC Electric Tariff, Original Volume No. 1, Original Sheet Nos. 1-4; and Service Agreement No. 1 under FERC Electric Tariff, Original Volume No. 1.

Entergy Nuclear VY was created principally to acquire, from VYNPC, the Vermont Yankee Nuclear Power Station (Vermont Yankee) and certain facilities and assets associated therewith. The Vermont Yankee Plant is a 510 MW nuclear generating station located in Vernon, Vermont which is within the ISO-New England market. Entergy Nuclear VY has entered into a long-term agreement to sell its entire output of energy from Vermont Yankee to VYNPC, who in turn will sell it to eight New England Utilities.

In its order issued in AEP Power Marketing, Inc., et al., 97 FERC ¶ 61,219 (2001); the Commission announced a new generation market power screen, the Supply Margin Assessment (SMA), to be applied to market-based rate applications on an interim basis pending a generic review of new analytical methods for analyzing market power. The SMA screen would be applied to all sales other than those in independent system operator (ISO) or regional transmission organization (RTO) markets with Commission-approved market monitoring and mitigation. Because Entergy Nuclear VY will sell into the ISO-New England market, which has Commission-approved market monitoring and mitigation in place,[2] we conclude that Entergy Nuclear VY is exempt from the SMA and instead is governed by the specific thresholds and mitigation approved for sales in the ISO-New England market.

Acceptance of Entergy Nuclear VY's application in the instant proceeding is subject to any tariff condition adopted by the Commission in Docket No. EL01-118-000, Investigation of Terms and Conditions of Public Utility Market-Based Rate Authorizations, 97 FERC ¶ 61,220 (2001). Within 15 days of the date of issuance of an order adopting a tariff condition in Docket No. EL01-118-000, Entergy Nuclear VY is directed to make a compliance filing in the instant proceeding to amend its tariffs accordingly.

This filing was noticed on December 19, 2001, with comments, protests or interventions due on or before January 9, 2002. None were filed.

This action does not constitute approval of any service, rate, charge, classification, or any rule, regulation, contract, or practice affecting such rate or service provided for in the filed documents; nor shall such action be deemed as recognition of any claimed contractual right or obligation affecting or relating to such service or rate; and such action is without prejudice to any findings or orders which have been or may hereafter be made by the Commission in any proceeding now pending or hereafter instituted by or against Entergy Nuclear VY.

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[2]See, e.g., New England Power Pool, 85 FERC ¶ 61,379 (1998).

This constitutes final agency action. Requests for rehearing by the Commission may be filed within 30 days of the date of issuance of this order, pursuant to 18 C.F.R. § 385.713.

Sincerely,

Michael C. McLaughlin, Director
Division of Tariffs and Rates - Central

APPENDIX A

Waivers and Authorizations

Any waivers or authorizations requested by the applicants are granted to the extent specified herein. Waiver of the prior or advance notice requirements, if requested, is granted. The applicant must comply with the reporting requirements specified herein.

If requested, the following waivers of the Commission's Regulations are granted:

1) Subparts B and C of Part 35, regarding the filing of rate schedules, except for Sections 35.12(a), 35.13(b), 35.15 (which requires applicant to file a Notice of Cancellation or Termination when it ceases its marketing activities), and 35.16 (which requires applicant to file a notice of succession whenever its name or operational control is changed).
2) Part 41, regarding accounts, records, and memoranda;
3) Part 101, regarding the uniform system of accounts; and
4) Part 41, regarding statements and reports, with the exception of 18 C.F.R. §§ 141.14,.15 (2001). Licensees remain obligated to file the Form No. 80 and the Annual Conveyance Report.

See Citizens Energy Corporation (Citizens Energy), 35 FERC ¶ 61,198 (1986), Citizens Power and Light Corporation (Citizens P&L), 48 FERC ¶ 61,210 (1989), and Enron Power Marketing, Inc. (Enron), 65 FERC ¶ 61,305 (1993), order on rehearing, 66 FERC ¶ 62,244 (1994).

The requirements of Part 34 of the Commission's Regulations regarding securities and assumptions of liabilities are statutory in nature and cannot be waived. If an applicant requested blanket approval under Part 34, a separate notice will be published in the Federal Register following this letter order, establishing a period during which protests may be filed. Absent a request to be heard in opposition within the period set fourth in the notice, if the applicant has requested such approval, the applicant is authorized to issue securities and assume obligations or liabilities as guarantor, endorser, surety, or otherwise in respect of any security of another person; provided that such issue or assumption is for some lawful object within the corporate purposes of the applicant, compatible with the public interest, and reasonably necessary or appropriate for such purposes. See Citizens P&L and Enron.

Requests that the Commission waive the requirements of Part 46 of its Regulations regarding interlocking directors are denied. In Enron the Commission stated that the requirements of Part 46 regarding interlocking directors are statutory in nature and may not be waived.

If requested, until further order of the Commission, the full requirements of Part 45 of the Commission's Regulations, except as noted below, are hereby waived with respect to any person now holding or who may hold an otherwise proscribed interlocking directorate involving the applicants. Any such person instead shall file a sworn application providing for the following information: (1) full name and business address, and (2) all jurisdictional interlocks, identifying the affected companies and the positions held by that person. See Enron.

The Commission reserves the right to require a further showing that neither public nor private interests will be adversely affected by continued Commission approval of issuances of securities or assumptions of liabilities, or by the continued holding of any affected interlocks.

Requests for disclaimer of jurisdiction over brokering activities, in which title to electricity is not taken, must be filed separately as a petition for declaratory order accompanied by the appropriate filing fee. See Citizens Energy and Heartland Energy Services, Inc., 68 FERC ¶ 61,223 (1994).

Requests that the Commission waive annual charges for power marketers, under part 382 of the Commission's Regulations, are denied. See Morgan Stanley Capital Group Inc. (Morgan Stanley I), 69 FERC ¶ 61, 175 (1994) and Morgan Stanley Capital Group Inc. (Morgan Stanley II), 72 FERC ¶ 61,082 (1995).

Requests for waiver of the provisions of Section 203 regarding the disposition of jurisdictional facilities, the merger of consolidation of such facilities, or the acquisition of the securities of another public utility, are denied. The provisions of Section 203 are statutory in nature and may not be waived. See Resources Recovery (Dade County), Inc., 20 FERC ¶ 61,138 (1982). Requests for clarification that sales of accounts receivable are not dispositions of jurisdictional facilities and are, therefore, not within the scope of Section 203, are granted. See Enron. Requests for clarification that the assignment of a power sales contract constitutes a disposition of jurisdictional facilities under Section

203 are granted. See Enron. Requests for clarification that funds received from the sale of electricity are not jurisdictional facilities within the meaning of Section 203 are

granted. See Citizens Energy. Also, requests for clarification that the requirements of Section 203 do not apply to the facilities of a power marketer that are not involved in the generation, transmission or sale for resale of electric energy, are granted. See Howell Gas Management Co., 40 FERC ¶ 61,336 (1987).

If requested, waiver of compliance with the requirements of Order Nos. 888 and 889 is granted. Waiver of compliance with the requirements of Order No. 888 is granted until such time as the applicant receives a request for transmission service. See Black Creek Hydro, Inc., et all., 77 FERC ¶ 61,232 and 61,941 (1996). Waiver of compliance with the requirements of Order No. 889 is appropriate because: (1) the applicant owns, operates, or controls only limited and discrete transmission facilities (rather that an integrated transmission grid); or (2) the applicant is a small public utility that owns, operates, or controls an integrated transmission grid. See Midwest Energy, Inc., et all., 77 FERC ¶ 61, 208 at 61,854 (1996).

Requests that the Commission waive its requirement that purchasers of electricity under market-based rate schedules certify that the purchase price was equal to or less than its avoided cost, are moot. The Commission eliminated the requirement in Louisville Gas & Electric Company, 62 FERC ¶ 61,016 (1993).

Requests for approval to reassign transmission capacity are found to be consistent with the Commission's requirements. See Southwestern Public Service Company, 80 FERC ¶ 61,245 (1997). Power marketers not requesting approval to reassign transmission capacity are informed that they are authorized to reassign transmission capacity pursuant to the Commission's order in Enron Power Marketing, Inc., 81 FERC ¶ 61,277 (1997).

Requests for approval to buy and sell firm transmission rights are found to be consistent with the Commission's requirements. See California Independent System Operator, Inc., 89 FERC ¶ 61,153 (1999)

Should an applicant or any of its affiliates deny, delay, or require unreasonable terms, conditions or rates for natural gas fuel or services to a potential electric competitor in bulk power markets, then that electric competitor may file a complaint with the Commission that could result in the applicant's or its affiliate's authority to sell power at

market-based rates being suspended. See, e.g., Louisville Gas & Electric Company, 62 FERC 61,016 at 61,148 (1993).

If the applicant submitted a code of conduct, it is accepted if consistent with Appendix B which reflects requirements adopted in previous Commission orders. Any code of conduct inconsistent with Appendix B is rejected and in such case Appendix B has been designated as the applicant's code of conduct.

Reporting Requirements

Applicants who own generating facilities may file umbrella service agreements for short-term power sales (one year or less) within 30 days of the date of commencement of short-term service, to be followed by quarterly transaction summaries of specific sales (including risk management transactions if they result in actual deliver of electricity). For long-term transactions (longer than one year), applicants must submit the actual individual service agreement for each transaction within 30 days of the date of commencement of service. To ensure the clear identification of filings, and in order to facilitate the orderly maintenance of the Commission's files and public access to documents, long-term transaction service agreements should not be filed together with short-term transaction summaries. For applicants who own, control or operate facilities used for the transmission of electric energy in interstate commerce, prices for generation, transmission and ancillary services must be stated separately in the quarterly reports and long-term service agreements.

Applicants who do not own generating facilities must file quarterly reports detailing the purchase and sale transactions undertaken in the prior quarter (including risk management transactions if they result in actual delivery of electricity). Applicants who are power marketers should include in their quarterly reports only those risk management transactions that result in the actual delivery of electricity. On May 27, 1999, the Commission issued an order in which it modified the reporting requirements for long-term transactions applicable to public utilities without ownership or control over generation or transmission facilities that are authorized to sell power at market-based rates (power marketers). Southern Company Services, et al., 87 FERC ¶ 61,214 (1999), reh'g pending, (Southern). Specifically, with respect to any long-term transaction agreed to by a power marketer after 30 days from the date of issuance of a final order in the Southern case, the power marketer must file a service agreement with the Commission within 30 days after service commences, rather than reporting transactions thereunder in its quarterly transaction summaries. Requests for different reporting requirements are denied.

The first quarterly report filed by an applicant will be due within 30 days of the end of the quarter in which the rate schedule is made effective.

Requests to file quarterly transaction reports on a confidential basis are denied. See National Electric Associates L.P., 50 FERC ¶ 61, 378 (1990). See also, AIG Trading Corporation, 71 FERC ¶ 61,148 (1995), LG&E Power Marketing Inc., 68 FERC ¶ 61,247, and Enron.

Each applicant must file an updated market analysis within three years of the date of this order, and every three years thereafter. The Commission reserves the right to require such an analysis at any time. The applicants must also inform the Commission promptly of any change in status that would reflect a departure from the characteristics the Commission has relied upon in approving market-based pricing. These include, but are not limited to: (a) ownership of generation or transmission supplies; or (b) affiliation with any entity not disclosed in the applicants' filing that owns generation or transmission facilities or inputs to electric power production, or affiliation with any entity that as a franchised service area. Alternatively, the applicants may elect to report such changes in conjunction with the updated market analysis required above. Each applicant must notify the Commission of which option it elects in the first quarterly report filed with the Commission.

APPENDIX B

[APPLICANT]
SUPPLEMENT NO. _ TO RATE SCHEDULE NO. _

STATEMENT OF POLICY
AND CODE OF CONDUCT
WITH RESPECT TO THE RELATIONSHIP BETWEEN
[POWER MARKETER] AND [PUBLIC UTILITY]

Marketing of Power

1. To the maximum extent practical, the employees of [Power Marketer] will operate separately from the employees of [Public Utility].

2. All market information shared between [Public Utility] and [Power Marketer] will be disclosed simultaneously to the public. This includes all market information, including but not limited to, any communication concerning power or transmission business, present or future, positive or negative, concrete or potential. Shared employees in a support role are not bound by this provision, but they may not serve as an improper conduit of information to non-support personnel.

3. Sales of any non-power goods or services by [Public Utility], including sales made through its affiliated EWG's or QF's, to [Power Marketer] will be at the higher of cost or market price.

4. Sales of any non-power goods or services by the [Power Marketer] to [Public Utility] will not be at a price above market.

Brokering of Power

To the extent [Power Marketer] seeks to broker power for [Public Utility]:

5. [Power Marketer] will offer [Public Utility's] power first.

6. The arrangement between [Power Marketer] and [Public Utility] is non-exclusive.

7. [Power Marketer] will not accept any fees in conjunction with any Brokering services it performs for [Public Utility].

Report of the Public Oversight Panel on the Comprehensive Reliability Assessment of the Vermont Yankee Nuclear Power Plant

March 17, 2009

Pl. Trial Exhibit 382

Report of the Public Oversight Panel on the Comprehensive Reliability Assessment of the Vermont Yankee Nuclear Power Plant

EXECUTIVE SUMMARY

This is the report of the Public Oversight Panel ("the Panel") created by Section 6 of Act No. 189 of the Vermont General Assembly, enacted in June 2008. The purpose of this report is to provide information to the legislature in making its determination whether the Entergy Nuclear Vermont Yankee plant should be authorized to operate in the State beyond the expiration of its current license on March 21, 2012.

Act 189 required a comprehensive vertical audit and reliability assessment ("the reliability assessment") of the Vermont Yankee Nuclear facility. The reliability assessment was performed by Nuclear Safety Associates (NSA) under contract to the Vermont Department of Public Service (DPS), and summarized in the report, *Reliability Assessment of the Vermont Yankee Nuclear Facility*, 12/22/08 ("the NSA Report").

This Executive Summary provides a synopsis of the Panel's findings and evaluations. The main report covers the Panel's effort in more detail.

The Panel

The Panel consisted of Peter Bradford, appointed by former Speaker Gaye Symington; Arnold Gundersen, appointed by Senate President Peter Shumlin; William Sherman, appointed by Governor Jim Douglas; and David Lochbaum and Dr. Fred Sears, chosen by the Panel. Dr. Lawrence Hochreiter, originally chosen by Governor Douglas, passed away in September 2008. This report is dedicated to Dr. Hochreiter's memory.

The Panel's role has been to further transparency, public oversight, and public involvement in the various aspects of the reliability assessment. The Panel participated in weekly status conference calls and met approximately monthly during the NSA assessment process and more frequently during the drafting of the report. The Panel took an active role in defining the scope of the assessment, recommending specific attention to systems that had experienced significant operational shortcomings (the main transformer and the cooling towers). The Panel also recommended that credit be taken for the Nuclear Regulatory Commission (NRC) team inspection of the electrical system, and for periodic tests performed on portions of the containment system. In addition, the Panel asked for a management/corporate review and a sister-plant review. All of the Panel's recommendations for the scope of the assessment were taken.

The Reliability Assessment

The reliability assessment was performed by Nuclear Safety Associates (NSA) under contract to the Vermont Department of Public Service (DPS). NSA employed a team of 30 inspectors who had no association with Entergy or Vermont Yankee within the past three years. This level of inspection for reliability is unprecedented in Vermont Yankee's history.

After performing the reliability assessment, the NSA team's overall conclusion was that VY is operated reliably and that the current level of reliability can be maintained through an extended operating period provided that the areas identified by the NSA report are effectively addressed. The NSA audit team identified specific challenges to plant reliability that warrant additional management attention to ensure future reliable operations. These challenges are identified as principal conclusions, and include five management areas and three equipment items:

Management Areas

1. Procedure quality – The composition, presentation, and formatting of the majority of VY's procedures do not meet industry standards.
2. Management emphasis on worker performance – Weaknesses exist in management's emphasis on worker performance in the areas of adherence to procedures, worker accidents or injuries, and practices for maintaining plant cleanliness.
3. Adoption of certain industry best practices – ENVY has been slow to adopt an industry equipment reliability index, and ENVY does not meet industry standards for system engineer workload.
4. Use of change management methods – ENVY could do a better job in managing major changes occurring at the site.
5. Inadequate contractor oversight – There were shortcomings in oversight of contractors with regard to the structural collapse of the cooling towers.

Equipment Items

1. Condensers and condensate demineralizers – Condenser erosion and a high chemistry index are both a near-term and long-term reliability challenge. (Subsequent to the NSA assessment, ENVY modified condensate demineralizers to bring the chemistry index under control.)
2. Cooling towers – Re-evaluation of inspection methods and repair schedule should be performed. Under the current methods and repair schedule, the cooling towers challenge future plant reliability.
3. Spare main transformer – ENVY should upgrade the former main transformer to function as a spare in case of difficulty with the existing main transformer.

The Goals and Objectives of the Act

The five goals and objectives of Act 189 are stated in Section 2 of the Act, and are summarized as follows:

1. Assess the conformance to design and licensing bases;
2. Identify relevant deviations, exemptions, or waivers from regulatory requirements applicable to Vermont Yankee and applicable to new nuclear reactors, and verify whether adequate operating margins are retained;
3. Assess the facility's operational performance, and the facility's reliability for continued power production;
4. Evaluate the effectiveness of licensee self-assessments, corrective actions, and improvement plans; and
5. Determine the causes of and conclusions from significant operational shortcomings.

These goals were met, as amplified by the Panel's findings and conclusions in this report.

Panel Findings and Conclusions

As part of our review, we considered three questions:

1. **Does the Reliability Assessment meet the intent of Act 189?**

We conclude the General Assembly's overall intent in Act 189 has been met.

Notwithstanding this overall conclusion, we found a number of areas in which the NSA team could have improved its work. The audit team did an adequate job. However, individual Panel members are aware of documentation that they might have expected the audit team to discover and review, but it did not. The Panel agrees with the audit team's principal conclusions, and chooses to emphasize the following additional items:

Management issues – ENVY management needs to do a more effective job of leading VY in improvement changes and in effectively applying procedures and processes. ENVY management attention and leadership for the changes recommended by the Report are extremely important as the ENVY workforce changes with retirement and replacements of long term employees. ENVY management needs to assure adequate resources are allocated to the reliability of nonsafety-related systems.

Equipment reliability index – ENVY ranks in the bottom quartile of this index that contains a mix of historical and predictive indicators. This low ranking is troubling to the Panel.

Condenser – The state and federal decisions on operation after 2012 have held up the effort to re-tube or replace the condenser. The increased probability of reliability problems from the condenser will now extend into the early years of extended operation, if granted.

Main steam isolation valves – The Panel is concerned about significantly increased leakage of main steam isolation valves that was discovered in the 2008 refueling outage.

Flow Accelerated Corrosion – NSA was unable to complete the requested scope in this area due to an ongoing NRC investigation of an allegation. The NSA report did not benefit by review of this area.

Preventative maintenance process – Programs should be put in place to eliminate ENVY's higher-than-expected preventative maintenance backlog.

Staffing turnover issues – VY is experiencing higher staff vacancies and turnovers than in its earlier history. This staff turnover is a new challenge to VY, and it makes other recommendations, such as procedure quality, adherence to procedures, and change management, all the more important.

Use of operating experience –ENVY must use operating experience more pro-actively, specifically in non-safety areas, to maintain reliable performance.

Corrective Actions – ENVY's corrective action process should be modified so that Corrective Action Requests cannot be closed based on open Work Orders.

2. **Are the transformer fire and cooling tower collapse events indications that VY will not perform reliably in the future?**

These events are not precursors of unreliable operation in the future. VY has had very good historical performance. Yet, recently it has suffered significant operational shortcomings – the transformer fire, and the cooling tower collapse and subsequent cooling tower events. Management action is necessary to address items such as procedures, at-risk designs, operational experience, and needed resources.

3. **What steps must VY take to avoid operational shortcomings like the transformer fire and cooling tower collapse in order to maintain and improve its reliable performance?**

Entergy and ENVY management must be committed to a high standard of reliable performance, to be shown by management's satisfactorily addressing the items in the NSA Report and the Panel Report. Furthermore, it is important to establish a verification process to see that improvements are accomplished and the commitment to reliability remains high.

The Panel's Overall Conclusion

Acceptable reliability of VY for operation beyond 2012 is possible if the recommendations of this report and the NSA Report are taken. Specifically, there must be a credible and public verification put in place to assure the recommendations are implemented satisfactorily and in a timely manner. This verification should be accomplished through strengthened government institutions that should be characterized by high professional competence commensurate with the tasks at hand, domination neither by specific proponents nor by specific opponents of nuclear power, resources adequate to effective performance at ENVY's expense, periodic effective reports of verification, with reports available to the public, and the ability for public interaction and recourse through structured, credible and established institutions. Also, because there are always risks for reliability from changes in management philosophy or from unexpected technical causes, the PSB and general assembly should assure that an adequate benefit is provided to Vermonters for operation beyond 2012.

ENVY applied to the PSB for a certificate of public good for extended operation in March 2008. The PSB opened Docket No. 7440 to consider the ENVY application. Between now and July 6, 2009 the Board is scheduled to consider direct, rebuttal and surrebuttal testimony as well as hold technical hearings and receive briefs.

1.3 Definition of Reliability

Neither the NSA Report nor Act 189 defines the term reliability. In some places, the NSA Report speaks of *equipment reliability* or the *equipment reliability index*.[6] In other places, the NSA Report uses reliability to refer to *plant reliability*.[7] As a general matter, this report assesses reliability in commonly understood terms, i.e. can Vermont Yankee operate dependably and predictably at or above nuclear power industry norms. To address this question, some related concepts of reliability must also be taken into account.

Reliability in the context of electric power systems is normally used to describe the degree of assurance that customers have of receiving service. Individual plant reliability is not regulated. The grid must withstand the sudden closing of any power plant without impact on the customers. Adequate service to electric customers does not depend on the reliable operation of any one power plant.

Nuclear plants operate as many hours as possible for a combination of technical and economic reasons. Unlike gas fired plants, they have relatively low operating costs but high fixed costs. Furthermore, they are not well suited to varying their output as electric demand rises and falls. Consequently, good nuclear plant reliability requires that the plant be operated a high percentage of the hours of the year, a yardstick that the industry has met successfully for the last twenty years.

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[6] For example, p. 56 contains:

> The Nuclear Industry has standardized the Equipment Reliability (ER) processes. The ER process description at most sites is consistent with the definition promoted by the "Nuclear Industry Equipment Reliability Working Group" (ERWG) which is comprised of most of the US Nuclear Generators, the Institute of Nuclear Power Operations (INPO) and the Electric Power Research Institute (EPRI). This standardization provides transparency across the industry and allows for reliable comparisons to industry best practices. Also, the ERWG has created standard ER Performance Metrics referred to as the "ER Index" (ERI). This index includes 19 leading and lagging performance indicators that are collected and reported by a majority of US Nuclear Power Generating Companies.

[7] An example of this usage is on page A-2: "The ENVY site has been a reliable performer throughout its operating life."

The legislation creating this Panel requires that we consider the reliability of a single unit rather than the electrical power system or grid. Therefore, this report uses the term reliability in two ways. First, Section 2(3) of Act 189 sets as a goal that we "Assess the facility's operational performance, and the facility's reliability for continued power production, giving risk perspectives where appropriate."

Second, this Report speaks of *reliability* in terms of plant structure, system, and component reliability. This is roughly equivalent to the NSA Report's emphasis on *equipment reliability* or the *equipment reliability index*. The reliability of nuclear structures, systems, and components is assessed and assured through many standard practices in the nuclear industry.

1.4 Vermont Yankee Historical Reliability and Comparisons to Other Plants

VY's average capacity factor[8] for the twenty years 1988-2007 has been about 90%. From 1998-2007, VY's average capacity factor has been about 92%. The achievement of capacity factors above 90% for extended periods is considered good performance in the nuclear industry today.[9]

In two of every three years, VY has refueling outages. A three-year rolling average smooths out the differences between outage years and non-outage years. Table 1.4-1 illustrates comparative three-year rolling averages for VY from 1988 through 2007.

VYNPC was able to improve its 3-year rolling average capacity to about 95% at the time of the 2002 sale. ENVY has not been able to match this performance.[10] However, the 3-year rolling average capacity factors above 91% in the ENVY years still represent highly reliable performance.

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[8] Capacity Factor is the ratio of the net electricity generated to the electricity that could have been generated at continuous full-power operation.

[9] VY's lifetime capacity factor is approximately 82%, exceptional for a plant of VY's age, The VY average capacity factor for the first fifteen years was 68%, a result of initial run-in problems, more frequent refueling outages, failed nuclear fuel, and a nine-month recirculation piping replacement outage in the mid-1980's. In addition, VY's early years predated the nuclear industry's emphasis on more reliable operation and development of methods to shorten refueling outages and reduce forced outages. In the last twenty years, the nuclear industry has adopted company and industry measures leading to greatly improved performance.

[10] The reasons for ENVY's not meeting VYNPC's levels include the extended 2004 outage to implement uprate changes, the 2004 transformer fire, and the 2007 cooling tower collapse.

Table 1.4-1[11]

Year	VY 3-Year Rolling Avg Net Cap Fac	Owner ship
1988	---	VYNPC
1989	---	VYNPC
1990	85.50	VYNPC
1991	85.57	VYNPC
1992	86.47	VYNPC
1993	84.63	VYNPC
1994	86.17	VYNPC
1995	86.97	VYNPC
1996	89.77	VYNPC
1997	89.03	VYNPC
1998	85.17	VYNPC
1999	87.20	VYNPC
2000	89.20	VYNPC
2001	95.27	VYNPC
2002	94.53	ENVY
2003	93.87	ENVY
2004	91.43	ENVY
2005	92.50	ENVY
2006	92.73	ENVY
2007	93.63	ENVY

Table 1.4-2[12]

Entergy Plants 2005-2007 Net Capacity Factors	
Fitzpatrick	96.69
Indian Pt 2	94.59
ANO-2	93.33
Vermont Yankee	**92.96**
Indian Pt 3	92.11
Grand Gulf	90.89
Pilgrim	90.57
ANO-1	90.03
Waterford 3	89.65
River Bend	88.61
Palisades	86.94
Average	91.49

Table 1.4-3[13]

Sister Plants 2005-2007 Net Capacity Factors	
Fitzpatrick	96.69
Dresden-3	95.51
Vermont Yankee	**92.96**
Quad Cities 2	92.77
Dresden-2	91.45
Nine Mile Pt-1	91.16
Pilgrim	90.57
Cooper	90.35
Duane Arnold	90.03
Hatch-1	89.9
Brunswick-1	88.7
Hatch-2	88.5
Oyster Creek	88.38
Quad Cities 1	87.7
Monticello	87.14
Brunswick-2	83.92
Average	90.36

Tables 1.4-2 and 1.4-3 compare Entergy Plants and Sister Plants to VY in a three-year average comparison for 2005-2007. Among Entergy plants, VY is 4th out of 11. Among sister plants, VY is 3rd out of 16.[14]

[11] E-mail from D. McElwee, February 17, 2009.

[12] Nuclear News, May 2008, pp 29-30.

[13] Id.

[14] The NSA Report includes a comparison of capacity factors on page B-4. The first comparison for all units using 2004 to 2006 appears consistent with the 3-year rolling average from Table1.4-1 above and the data from Table 1.4-2. Table B-4 reports that VY is in the bottom quartile of sister plants while Table 1.4.-3 above reveals that VY is actually in the top quartile in this comparison. The Table B-4 comparison is not an exact three year period. VY has three

Despite VY's reliable past performance, the plant has experienced significant operational shortcomings in the recent past. In June 2004, an electrical problem in the portion of the plant that carries electricity out of the plant resulted in a significant fire in the plant's main transformer located just outside the turbine building. In August 2007, part of the cooling tower collapsed. The structural members of the cooling tower were repaired. Yet subsequent to the repair, in 2008, another failure occurred followed by an additional occasion of cooling tower leakage.

Individually, these events were not of much reliability significance. Their importance in indicating potential areas of concern is discussed in Section 4.5.2 of this report.

1.5 Reliability and Aging Management

For plants operating beyond forty years, aging effects are the primary concern.

The U.S. Office of Technology Assessment conducted a 1993 review entitled "Aging Nuclear Power Plants", which observed

> For nuclear power plants, aging degradation is defined as the cumulative degradation that occurs with the passage of time in systems, structures and components that can, if unchecked, lead to a loss of function .....The basic processes of aging are generally, if imperfectly, understood; continuing experience and research provide ongoing improvements in scientific understanding and ability to predict and address the effects.[15]

Concurrent with and subsequent to this 1993 statement by the U.S. Office of Technology Assessment, copious research was conducted and evaluated with regard to the aging of nuclear plant systems, structures, and components. In December 1996, the NRC published NUREG/CR-6490, "Nuclear Power Plant Generic Aging Lessons Learned (GALL)," which is a systematic compilation of plant aging information. The NUREG/CR-6490 report was based on information in over 500 documents: Nuclear Plant Aging Research (NPAR) program reports sponsored by the Office of Nuclear Regulatory Research, Nuclear Management and Resources Council (NUMARC, now NEI) industry reports addressing license renewal for major structures and components, licensee event reports (LERs), information notices, generic letters, bulletins, and information from reports provided by the Union of Concerned Scientists (UCS) in a letter dated May 5, 2000.[16]

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refueling years and only one non-refueling year. It is not clear what refueling schedules the sister plants had. The data from Table 1.4-3 is gives a more accurate comparison.

[15] U.S. Congress, Office of Technology Assessment, Aging Nuclear Power Plants: Managing Plant Life and Decommissioning, 1993, p. 9.

[16] NUREG-1801, Volume 1, Revision 1, "Generic Aging Lessons Learned Report, September 2005, p. 1.

The NRC's most recent and comprehensive regulatory compilation of aging programs is "Generic Aging Lessons Learned (GALL) Report" (NUREG-1801, Volume 1 and Volume 2, Revision 1) dated September 2005. The GALL Report contains the NRC's generic evaluation of existing plant aging management processes and documents the technical basis for determining where existing aging management programs are adequate without modification, and where existing programs should be augmented for extended operation.

The first U.S. plants actually to operate beyond forty years will do so in 2009,[17] so the nuclear industry is just beginning to gain, analyze and apply experience with plants of this vintage.

The NRC has established a process for reviewing the management of aging beyond forty years.[18] In accordance with this process, ENVY's January 27, 2006 license renewal application evaluates aging management beyond the original forty years, including safety-related structures, systems, and components and also those non-safety structures, systems, and components whose failure could prevent satisfactory accomplishment of any safety-related functions. The age management plan for license renewal includes all the systems included in the scope of the reliability assessment. As part of its license renewal application, ENVY committed to implementing a comprehensive aging management program, consistent with the GALL Report, by 2012.

The NSA audit team concluded, "ENVY can be a reliable station beyond its current operating license provided that the areas identified in the following principal conclusions are effectively addressed".[19]

Subject to the Panel comments throughout this report, we share this conclusion. However, no report written in 2009 can provide firm assurances as to events between now and 2032. ENVY has committed to thirty-nine specific long range programs for aging management,[20] but these programs are only commitments that have not yet been developed. The NSA team identifies a need to establish a more comprehensive/integrated asset management and long range planning program with regard to these aging management items.[21]

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[17] Fifty plants have been granted license renewals allowing operation beyond 40 years. Another 18 have applications under NRC review.

[18] 10 C.F.R. Part 54, *Requirements for Renewal of Operating Licenses for Nuclear Power Plants.*

[19] NSA Report, p. 2.

[20] NSA Report, pp. 65-67.

[21] NSA Report, p. 67.

The Panel agrees with the NSA team's identification of the need for a more comprehensive and integrated asset management and long range planning program, and believes that continuing State verification must monitor the implementation of these aging management programs.

1.6 The Reliability Assessment Report and Nuclear Safety

The Legislature's purpose in enacting Act 189 was "to provide for a thorough, independent, and public assessment of the *reliability* of the systems, structures, and components of the Entergy Nuclear Vermont Yankee facility." Act 189, § 1(d) (emphasis added). The U.S. Atomic Energy Act preempts states from regulating radiological health and safety but not reliability.[22] The NSA Reliability Assessment is strictly a review of reliability.

Still, nothing prevents our venturing the following observations on the potential interplay of reliability considerations and safety:

- Events and lapses that undermine reliability can undermine safety, and vice versa. A plant's capacity factor suffers during an extended shutdown, whatever the cause.
- Extended, even permanent, shutdowns have resulted from events beginning in systems not considered to be safety related.
- The improved reliability achieved by the nuclear industry has been accompanied by a decline in events requiring rapid shutdown of nuclear power plants, a gain for both reliability and for safety.
- The NSA team's and the Panel's evaluation of VY's future reliability required some review of the plant's safety systems. The NSA Report rightly states: "This report assesses reliability at ENVY, not safety. However, when a safety-related function does not perform properly, it can impact reliability by causing forced outages or power derates".[23]
- DPS, through a memo of understanding with VY has for many years participated in safety-related inspections and has used the knowledge so acquired to inform Vermont government in many aspects of its decision making regarding Vermont Yankee.

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[22] "Congress, in passing the 1954 Act and in subsequently amending it, intended.....that the States retain their traditional responsibility in the field of regulating electrical utilities for determining questions of need, *reliability*, cost, and other related state concerns." *Pacific Gas & Electric Company v. State Energy Resources Conservation & Development Commission,* 461 U.S. 190, 103 S. Ct. 1713 (1983) (emphasis added).

[23] NSA Report, p. 96

As required by Act 189, the consultants and the Oversight Panel looked at both safety and non-safety systems to determine VY's future reliability. Specifically:

- Act 189 directed the consultants to conduct a vertical slice of seven systems at the VY plant, five of which are all or in part safety-related systems. Act 189, § 3(a) (2) (emergency core cooling system), (a)(3) (condensate feed water system), (a)(4) (primary containment system), (a)(5) (heat removal system), (a)(6) (underground piping system that carries radionuclides).

- Act 189 likewise directed that the comprehensive reliability assessment include an investigation of the physical and electrical separation of safety-related cables. Act 189, § 3(c).

- Act 189 instructed that the vertical slice reviews include safety-related inquiries. See, e.g., Act 189, §4(4) ("[H]ave any unanticipated system operations outcomes been duly corrected or compensated in all safety and reliability operations and procedures?"); (4)(10) ("Have changes to the plant since its original construction been reviewed to ensure that safety margins have not been reduced?"); (4)(10) ("Are all systems still 'single failure proof"?).

After conducting its review, as explained below in Section 3.4.5, the NSA team identified six areas that it considered challenges to plant reliability:

1. Procedure quality issues;
2. Human performance issues;
3. System and Technical Focus Areas (condensers, cooling towers, spare main transformer);
4. Delays in adopting industry equipment reliability (ER) best practices;
5. Ineffective Use of Change Management; and
6. Shortcomings in contractor oversight.

See NSA Report, Executive Summary, pp. 2-7. Three of these items - procedure quality issues, human performance issues, and ineffective use of change management - apply to both nuclear safety and to reliability. A safety inspection might well have uncovered the same challenges. The Panel concludes that the NSA Audit has accomplished many of the aspects of a comprehensive safety assessment. However, the Panel draws no safety related conclusions. The NSA team's and the Panel's scope was exclusively on the impact of these challenges on the reliability of the Vermont Yankee power plant.

4.6 Overall Panel Conclusions

The NSA Report found that in general VY is reliably operated and maintained with appropriate design, engineering, modification, maintenance, training, operations, staffing, documentation, and management. That said, the NSA Report also indicated too great a reliance on individual experience and relationships, and that behavior on occasion is not driven by programs, processes, and procedure adherence. Thus improvements are needed in management leadership to achieve more consistent and improved performance. This is especially true as the work force is changing and the challenges of a maturing physical plant need to be worked in a more integrated and assured manner to maintain reliability.

The Panel finds that the NSA recommendations for improvement and for management engagement/leadership are appropriate and needed to provide reasonable assurance of reliable operation for the future and for operation beyond 2012.

A recurring theme associated with significant operational events of the past few years is inadequate consideration of operating experience in identification of potential component degradation in non-safety systems and related improvement of inspection methods and techniques. In some cases interviews appeared to indicate that personnel felt efforts to carry out improved inspections were precluded by resource limitations (either cost or schedule). It was also not clear that engineering personnel were aggressively identifying or communicating to management the need for improvements in inspections which operating experience would indicate. For the transformer fire this might well have produced an improved ability to access portions of the ducts for inspections; for the cooling towers this might well have resulted in better physical inspection of the structural members and the identification of their degrading condition prior to failure. Effective age management programs require improved inspection programs and allocation of resources and schedule to effectively accomplish the inspections. It also requires the work load of the system engineers/managers be such that they can routinely review and consider operational experience to identify risks associated with aging components and structures and consider "what if" scenarios that would not routinely come to mind with newer equipment and materials.

The Panel concludes that reliability of VY for operation beyond 2012 can be reasonably expected if the recommendations of this report and the NSA report are taken. Specifically, there must be an effective verification put in place to assure the recommendations are implemented satisfactorily and in a timely manner. Also, because there are always risks for reliability from changes in management philosophy or from unexpected technical causes, the PSB and General Assembly must assure that an adequate benefit is provided to Vermonters for operation beyond 2012.

REDACTED VERSION

Supplemental Report

To the Comprehensive Reliability Assessment of the

Vermont Yankee Nuclear Facility

Provided by Nuclear Safety Associates

to the

State of Vermont Department of Public Service

April 30, 2010

Pl. Trial Exhibit 387

Executive Summary

As a result of the recent discovery of tritium in an Entergy Nuclear Vermont Yankee (ENVY) station monitoring well, the State of Vermont has learned that there are underground piping systems at the ENVY plant that carry radionuclides. Subsequently, ENVY disclosed that there were additional piping sections that meet the requirements of Section 3(a)(7) of Act 189. Therefore, to completely fulfill its obligations under Act 189, the Department of Public Service (DPS) initiated an independent vertical assessment of the Advanced Off-Gas (AOG) system[1], which includes underground piping that carries radionuclides.

The Act also called for a horizontal investigation at any point in the vertical inspection at which an emergency-related function, the operability, the design, the performance, or aging issues, or other unanalyzed or nonconforming conditions are encountered. Act 189 states, "….a thorough horizontal or lateral exploration shall be conducted to determine extent-of-condition and root cause with attention to evaluating licensee performance in problem identification and resolution, testing, engineering, in-service inspection, and maintenance." Based on the discovery of tritium in station monitoring wells, the recent underground pipe leak in the Advanced Off- Gas (AOG) System and future potential for leaking underground piping or tanks, the Vermont DPS in consultation with the Public Oversight Panel (POP), determined that a horizontal review of ENVY's Buried Piping and Tanks Inspection Program was also required as part of the supplemental assessment.

Due to the complex nature of the AOG leak event, the supplemental assessment scope was further expanded by the POP and DPS to include assessment of station activities associated with the AOG leak investigation, location and repair.

In summary; the scope of this Supplemental Report (SR) to the Comprehensive Reliability Assessment (CRA) report dated 12/22/2008[2] specifically deals with the AOG system, recent station activities associated with the investigation, location and repair of the current underground AOG leak, and the Buried Pipe and Tank Inspection Program. The findings in this SR are based on the assessment of these three focus areas; therefore, the SR did not undertake to confirm or update the CRA assessment in other areas of performance or to reassess the findings in the CRA report.

[1] This system was chosen in consultation with the Public Oversight Panel.

[2] A less redacted edition of the report was issued on 1/15/09. The same material was in both editions of the CRA but more material was made public in the 1/15/09 edition.

Overall Conclusions

The SR Assessment Team reviewed various managerial and technical areas associated with the scope described above. In many of these areas, ENVY practices meet industry standards and in some cases exceed industry standards. The assessment also identified challenges and watch areas that should be addressed to ensure that ENVY will run reliably for an extended operating period.

Based upon the assessment of the AOG system, BPTIP, and the recent AOG leak investigation, location and repair activities, the SR Assessment Team believes that these specific areas will not prevent ENVY from operating reliably over an extended operating period. The supplemental assessment does not change the overall conclusions provided in the initial CRA report.

The following principal conclusions of the SR are those high level issues that could potentially impact ENVY's ability to achieve and sustain high levels of equipment reliability over an extended operating period. Management action, oversight and follow-through are needed to ensure that these issues are addressed and resolved if ENVY is to maintain high levels of equipment reliability for an extended operating period.

Principal Conclusions

Low Level Repetitive Equipment Issues

Low level repetitive equipment issues on non-safety related systems are not resolved in a timely manner and could challenge future plant reliability. There is a need for more management focus and timely resolution of repetitive low-level equipment issues on non-safety related structures, systems, and components. This was identified in the original CRA as an issue with the Cooling Towers, and it has recently been self-identified during an ENVY Quality Assurance Audit in March 2009 as an area for improvement: "Weaknesses in implementation of some corrective actions have led to untimely or ineffective issue resolution." It was evident again, during this supplemental assessment of the AOG system, that long-standing repetitive issues with AOG components such as: hydrogen analyzers; valve seat issues with AOV-OG-101A; AOG drain tank level control issues; and, steam trap MS-107-1A repairs challenged Operations and could have impacted station reliability.

Underground and Non-readily Accessible Piping

Underground and non-readily accessible piping leaks must be more proactively monitored, detected and managed. Over the past few years, five pipe leak events have occurred on AOG drain lines at ENVY. While none of these were "buried pipes,"[3] they were either in underground piping that is not buried or in non-readily accessible pipes. A few of these required significant investigation and repair activities. The SR Assessment Team concluded that ENVY does not

[3] "Buried pipe" connotes piping directly in contact with soil or concrete.

have an effective program or practices in place for early leak detection and monitoring of underground and non-readily accessible piping. The extent of conditions from the current AOG leak event is unknown and will not be fully understood until after the completion of the Root Cause Analysis[4]. Therefore, underground and other non-readily accessible piping could be a challenge to future plant reliability if they are not proactively monitored, detected, and managed.

[4] A Root Cause Analysis is being prepared by Entergy

ENVY is in the process of completing a Root Cause Analysis (RCA) which should determine what actions to take for infrequently accessed and inaccessible areas. As part of the RCA analysis ENVY will identify other piping that may be susceptible to similar failure mechanisms as the AOG piping, identify all pipe tunnels, and actions to address clogged drains.

In addition, ENVY is considering the following monitoring and mitigating activities for inaccessible areas: installing cameras to provide remote visual observation; cutting access ports to provide easier entry; using Remotely Operated Vehicles to monitor difficult to enter or high radiation areas; installing timers on sump pumps which do not have them and improving sump monitoring; and, re-routing lines to provide access.

Although ENVY is considering these options, decisions will be based on the outcome of the Root Cause Evaluation. ENVY expects the decisions on how to proceed will be made in approximately 90 days from April 1, 2010.

In addition to the above actions by ENVY, the SR Assessment Team conducted a supplemental search of Condition Reports (CRs) beyond those identified under Criterion 13 – Corrective Action Program. The purpose of the search was to look for adverse trends associated with leaks and clogged drains. CRs were searched for a 10 year period starting at 2000. Search criteria were used to identify pipe leaks, clogged drains, sump debris, and underground pipes. No significant trends were identified as a result of the search.

It is not possible to determine the extent of condition for the two pipe leaks in the AOG tunnel at this time since ENVY has not completed the RCA and determined the future actions. Future monitoring activities should review and assess ENVY's corrective actions to determine if extent of condition has been adequately addressed.

3.7 Summary Conclusions

Based on the reviews and interviews conducted the assessment team's conclusions concerning the AOG leak event are summarized below.

ENVY's activities related to locating and excavating the AOG leaks were timely, appropriate, and planned effectively. Significant resources were dedicated to determining the source of the leaks, and an investigative plan was developed and executed with sufficient resources to determine the source of the leak. A root cause analysis was initiated which should identify the cause of the leaks and recommend corrective actions. Management oversight was evident during the leak investigation and excavation.

An Extent of Condition evaluation is being performed by ENVY. The evaluation is scheduled to be completed by the end of June, 2010. Considering there is a unit refueling outage during that time period, the schedule appears reasonable. The Extent of Condition evaluation is intended to determine the vulnerability of the plant to similar leaks and should define the interim and long-term actions necessary to detect and prevent similar leaks in the future. The occurrence of the

leaks underscores the need to more proactively determine plant vulnerability to similar leaks. While the occurrence of the leaks is not in and of itself indicative of a lack of management oversight, more management attention needs to be applied to detect future leaks at an early stage.

Until the interim and long term corrective actions are implemented to prevent and detect similar leaks, it is the SR Assessment Team's judgment that the plant is potentially susceptible to this type of leakage and considers this a challenge to continued plant reliability.

In the 2008 NSA CRA report, contractor oversight was determined to be a watch area. During the excavation of the AOG leak contractor oversight was determined to be adequate.

In the 2008 NSA CRA report the use of the "Work at Risk" process was also determined to be a watch area. During the excavation of the AOG leak use of the "Work at Risk" process was determined to be adequately and appropriately applied.

Although the AOG leak investigation and repair was a significant event, it did not affect the overall reliability of the plant. To ensure that long term reliability is not impacted ENVY should increase its focus and improve its methods and practices for identifying plant leaks at an early stage through more effective monitoring. Specifically this is associated with all underground piping (including buried piping) and piping that is not readily accessible for inspection.

3.8 References

Procedures

1. EN-DC-115, Engineering Change Process
2. EN-DC-126, Engineering Calculation Process
3. EN-DC-149, Acceptance of Vendor Documents
4. EN-IS-112, Trenching, Excavating and Ground Penetrating Activities
5. EN-MA-126, Control of Supplemental Personnel

Documents

1. Modification Package EC – 20014
2. WO- 219750-06
3. WO – 219750-11
4. WO – 219750-15

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PENNSYLVANIA 19406-1415

April 16, 2010

Mr. Michael Colomb
Site Vice President
Entergy Nuclear Operations, Inc.
Vermont Yankee Nuclear Power Station
185 Old Ferry Road
P.O. Box 500
Brattleboro, VT 05302-0500

SUBJECT: VERMONT YANKEE NUCLEAR POWER STATION PRELIMINARY RESULTS OF INSPECTION RELATED TO VERMONT YANKEE GROUND WATER PROGRAM AND RECENT ONSITE GROUND WATER CONTAMINATION

Dear Mr. Colomb:

This letter documents the preliminary results of NRC's review and assessment of your implementation of the Nuclear Entergy Institute (NEI) 07-07, Ground Water Protection Initiative (GPI), and the inspection of your performance relative to the discovery of onsite groundwater contamination that was reported to the NRC on January 7, 2010. The inspection was conducted from January 25, 2010, through April 14, 2010, in accordance with NRC Temporary Instruction (TI) 2515/173, "Review of the Implementation of the Industry Ground Water Protection Voluntary Initiative"; and NRC Inspection Procedure 71153, "Follow-up of Events and Notices of Enforcement Discretion."

The GPI program is a formal voluntary industry commitment to address the monitoring of groundwater at nuclear power plant facilities, with a goal to minimize the potential for groundwater contamination to adversely impact the environment. The objective of TI-2515/173 is to assess the groundwater protection programs to determine whether licensees have implemented the specifications of the voluntary industry groundwater protection initiative. The inspection at Vermont Yankee specific to TI-2515/173 and IP 71153 included a review of the recent groundwater contamination at Vermont Yankee to assess Entergy's performance relative to its investigation of the associated tritium leak and corrective actions.

Regarding the NRC review of your GPI program, the NRC determined that, as of the end of 2009, Entergy had completed certain essential elements of the voluntary GPI, including the establishment of three wells that were situated to detect contaminated groundwater that may flow to the Connecticut River. One of these wells, GZ-3, was instrumental in the identification of the tritium-contaminated groundwater in January 2010.

Although the previously installed monitoring wells were key in the identification of the recent groundwater contamination, some voluntary aspects of the GPI had not been completed within the timeframe specified by the industry initiative. These included enhancements of existing leak detection methods, enhancements to prevent spills or leaks from reaching the groundwater, preventive maintenance of equipment to minimize the potential release of radioactive material, and establishing a frequency for the review of structures, systems, and components, and work

practices. In addition, Entergy had not established a site-specific groundwater monitoring plan or revised its Final Safety Analysis Report to include the current characterization of hydrology and geology at the site. While the GPI contained voluntary elements relative to onsite groundwater monitoring, the NRC also verified the licensee's compliance with regulatory requirements related to effluent and environmental monitoring, including those related to documentation and reporting.

Relative to NRC's review in accordance with NRC Inspection Procedure 71153, "Follow-up of Events and Notices of Enforcement Discretion," the NRC confirmed that, upon indication of groundwater contamination in early January 2010, Entergy initiated immediate actions to review and assess the condition. By mid-February, Entergy identified and terminated the leak of tritiated water from an underground pipe vault associated with the Advanced Off-Gas (AOG) system. As of the completion of this NRC inspection, Entergy's root cause analysis (RCA) for this matter had not been completed. Upon Entergy's completion of its RCA, the NRC will review and assess the comprehensiveness of the RCA in a separate NRC inspection activity, and the results will be documented in a separate inspection report.

Relative to the impact of the AOG system leak on public health and safety, as well as its impact on the environment, the NRC, based on its inspection, determined that Entergy appropriately evaluated the contaminated groundwater with respect to off-site effluent release limits and the resulting radiological impact to public health and safety; and that Entergy complied with all applicable regulatory requirements and standards pertaining to radiological effluent monitoring, dose assessment, and radiological evaluation. Based on our reviews, we have concluded that no violations of NRC requirements were identified.

Specifically, the NRC independently confirmed that:

- Regarding the tritium contaminated groundwater condition, the public's health and safety, and the off-site environment were not adversely affected. To date, plant-related radioactivity, including tritium, has not been detected in any samples of water, river sediment, or fish collected from the Connecticut River; or in any drinking water wells, on- or off-site; and only tritium has been identified in any on-site groundwater monitoring well.

- The estimated dose to the maximum exposed member of the public due to potential groundwater migration to the adjacent Connecticut River is less than 0.01 millirem in a year, i.e, well below the established limits of: NRC's 100 millirem per year dose limit for individual members of the public [10 CFR Part 20.1301(a)], Environmental Protection Agency's (EPA) 25 millirem per year specification for an individual member of the public [10 CFR Part 20.1301(e)], and NRC's liquid effluent As Low As is Reasonably Achievable (ALARA) design criteria of 3 millirem per year [10 CFR Part 50, Appendix I].

- Regarding the soil contaminated with low levels of cesium-137, cobalt-60, zinc-65, and manganese-54 that was found in the immediate vicinity of the leakage from the AOG system pipe vault area, there is no radiological significance relative to public health and safety. Sampling indicated very limited migration in the immediate area, which is typical and expected for these radionuclides. Entergy took appropriate precautions to protect onsite workers and has initiated action to remove the contaminated soil and dispose of it in accordance with NRC regulatory requirements.

As you aware, the NRC has established a Task Force [ADAMS Accession No. ML100640188] to re-evaluate the current practices and threshold for response to groundwater contamination incidents. Lessons-learned from Vermont Yankee will be incorporated into this initiative.

We expect to finalize and issue the associated inspection report (IR 05000271/2010006) in mid-May 2010. We are prepared to discuss the preliminary results included in this letter at the public open house and question and answer meeting scheduled for April 19, 2010, in Brattleboro, VT. If you have any questions in any of these matters, please contact Mr. John White of my staff at (610) 337-5114.

Sincerely,

for

Darrell J. Roberts, Director
Division of Reactor Safety

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As you aware, the NRC has established a Task Force [ADAMS Accession No. ML100640188] to re-evaluate the current practices and threshold for response to groundwater contamination incidents. Lessons-learned from Vermont Yankee will be incorporated into this initiative.

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Sincerely,
/RA/ Peter R. Wilson for:
Darrell J. Roberts, Director
Division of Reactor Safety

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STATE OF VERMONT

PUBLIC SERVICE BOARD

Investigation into (1) whether ENVY Nuclear Vermont Yankee, LLC, and ENVY Nuclear Operations, Inc., (collectively, "ENVY VY"), should be required to cease operations at the Vermont Yankee Nuclear Power Station, or take other ameliorative actions, pending completion of repairs to stop releases of radionuclides, radioactive materials, and, potentially, other non-radioactive materials into the environment; (2) whether good cause exists to modify or revoke the 30 V.S.A. § 231 Certificate of Public Good issued to ENVY VY; and (3) whether any penalties should be imposed on ENVY VY for any identified violations of Vermont Statutes or Board orders related to the releases.	)))	Public Service Board Docket No. 7600

TESTIMONY OF RICHARD SPIESE

SUMMARY

Richard Spiese is an Environmental Analyst with the Sites Management Section of the Waste Management Division of the Agency of Natural Resources, Department of Environmental Conservation. Mr. Spiese will offer testimony on the groundwater monitoring at the VY site and offer recommendations for groundwater protection.

Direct Testimony of Richard Spiese

Q: Please state your name, place of employment, and current position.

A: Richard Spiese, State of Vermont, Agency of Natural Resources, Department of Environmental Conservation, Waste Management Division, Sites Management Section, Environmental Analyst V.

Q: Please state your educational and relevant professional experience.

A: I have a Bachelors of Science from the Pennsylvania State University in Geological Sciences and numerous classes at the University of Vermont in the School of Natural Resources and Engineering. I have also been involved with numerous trainings as part of my job responsibilities. I have worked as a project manager for the Sites Management Section since 1987. My major job duties include overseeing hazardous waste investigations and cleanups. I have attached my resume as ANR-RS-1.

Q: Have you previously provided testimony to the Public Service Board or any other tribunal?

A: I have not provided testimony to the Public Service Board but I have appeared before other tribunals. I have appeared before the U.S. District Court in Burlington and Vermont Superior Court in Rutland and Montpelier.

Q: What is the purpose of your testimony?

A: To describe the Agency of Natural Resources involvement with the leak of tritium contaminated water at the Vermont Yankee (VY) nuclear power plant and to make recommendations regarding future groundwater protection measures.

Q: Have you been involved in the monitoring of the tritium leak?

A: Yes, since February 1, 2010.

Q: How did the Agency become involved in the monitoring process?

A: On February 1, 2010, the Vermont Department of Health requested assistance from the Agency of Natural Resources to assist with hydrogeologic investigations at VY and to assist with overseeing the sampling of groundwater. Due to my experience with the State's Radiological Sampling Team and additional radiological training with the Vermont Hazardous Materials Response Team, my supervisor asked me to assist the Department of Health.

Q: What is meant by hydrogeologic investigations or what do hydrogeologic investigations entail?

A: Hydrogeologic investigations involve l the installation and gauging of monitoring wells in order to determine the direction of groundwater flow. These wells are also tested to determine the rate of movement of groundwater, and sampled to determine the quality of the groundwater.

Q: What services or role did the Agency provide?

A: The Agency has been in a supportive role to the Vermont Department of Health. I have been providing assistance in evaluating the hydrogeology under the site and interfacing with VY's environmental consultant, GZA. For several months I also was the head of the State's on site environmental sampling team. This team documented the groundwater sampling performed by another of VY's consultants, Normandeau Associates, as well as placing chain-of-custody seals on split samples that were being transported to the Vermont Department of Health laboratory. Once the leak was identified and stopped and groundwater conditions under the site were better understood and concentrations diminished the sampling team's frequency of going to oversee work at the site became less frequent and oversight for the team reverted back to the Vermont Department of Health.

Q: What is a split sample and what is the purpose of a split sample?

A: A split sample is a sample where the same material (in this case groundwater) is taken and put into two or more separate sampling containers to be analyzed two different times. In the case of VY, four different samples were taken at each well on full sampling days, with one sample being analyzed by VY's lab at the plant, one being sent to VY's independent contracted lab off-site, one sample remaining in storage, and one sample going to the Vermont Department of Health lab.

Q: Describe the monitoring that took place at the site?

A: Normandeau was responsible for obtaining the groundwater, surface water, and drinking water samples at the site (although for some drinking water samples VY personnel obtained the samples). For groundwater Normandeau has a Standard Operating Procedure approved by VY that they followed. This included having dedicated pumps and tubing in each monitoring well on site. The Normandeau sampler would record the depth to groundwater, the depth of the well, the

water temperature, and describe the weather on that day. They would pump three well volumes into a bucket and then fill four, four liter plastic jugs with water from the well. These jugs were labeled, and in the case of the samples going to the Vermont Department of Health, the State sampling team member would label the jug with the well number, the sampler's initials, and the time and date as well as putting a number identifier seal and a chain-of-custody seal on each sample. For river water samples and drinking water samples they would obtain grab samples since purging a specific volume of water is not appropriate for these types of samples. This is due to the large volumes of water in a drinking water well and in the river. Tap water samples were run for 5-10 minutes before sampling.

Q: What were the results of the sampling?

A: The results of the monitoring showed the highest concentrations of tritium nearest the source of the leak and decreasing concentrations down gradient of the leak towards the east and the river. This is what would be expected because as the groundwater flows away from the source it is diluted and clean groundwater mixes with the contaminated groundwater, thereby reducing the concentration of contamination in these down gradient wells. Once the leak was stopped the concentrations of tritium in the monitoring well nearest the leak began to decrease to the point where after several months the samples from this well did not have any tritium identified in them. Concentrations of some of the down gradient monitoring wells continue to increase as the source area water continues to migrate down gradient towards the river. This will continue until the most contaminated parts of the plume pass beyond these wells, most likely over the next one to two years.

Q: Do you have confidence in the results, why?

A: Yes, I do. The results reported by VY compared fairly well with the results from the Vermont Department of Health lab. Also, the results reported from GZ-10, the monitoring well closest to the leak source had tritium concentrations very close to that of the concentrations of tritium reported leaking from the steam tunnel and pipes.

Q: Has the information provided been adequate to evaluate the effects of the leak?

A: Yes. I received information concerning the concentrations of tritium in numerous monitoring wells located around the plant. There still is information; however, I would like to review concerning boring log results, geophysical testing results, soil properties, and depth to groundwater measurements. This information will assist in a better understanding of the properties of the site and make predictions concerning the duration of the tritium plume and the migration of any remaining radio nuclides more certain.

Q: Has tritium contaminated groundwater entered the Connecticut River?

A: VY officials and GZA specialists have confirmed that tritium contaminated groundwater is seeping into the Connecticut River. The area of contaminated groundwater is from north of GZ-3 to about GZ-4, a length of approximately 400 feet. The height is from the top of the water table to a depth in the river of 20 to 40 feet (this depth is determined from well log results and professional experience and will vary from expert to expert without additional investigations). The dose assessment calculations make a reasonable estimate of the amount of tritium that could conservatively be flowing with groundwater into the Connecticut River. Released tritium that is not captured by the extraction system will migrate into the river.

Q: Has VY or its consultant provided any estimates of tritium in the Connecticut River?

A: The calculations of tritium getting to the Connecticut River are compiled in a summary report for VY by their contractor AREVA NP Inc. This document is attached as ANR-RS-2.

AREVA calculated a maximum dose of exposure to an individual child of 0.000319 mrem/year. This calculation was proofed by the Vermont Department of Health. NRC uses total annual dose to a person to determine if there is an exposure that is over the allowable limit. The allowable does is 4 mrem/year.

AREVA's estimate calculates that the dose to individuals is several orders of magnitude below the allowable annual limit. The concentrations of tritium in the river are below the lower detectable limit for normal lab analysis of approximately 500 pc/l (the lowest practicable level normal lab analysis can detect down to).

Q: Have you conducted dose assessment calculations on the possible amounts of tritium contaminated groundwater that is seeping into the Connecticut River?

A: I have also performed some of these calculations which estimate the maximum dose expected in the river on an annual basis. The amount was calculated to be 0.35 curies/year.

Q: What is the source of the discharge?

A: The source of the discharge is groundwater flowing into the river through natural groundwater flow. The initial source was the leak from the AOG pipe tunnel and the sump drain.

Q: What is the basis for that information?

A: Information from VY officials concerning the leak and sampling results from monitoring wells, specifically the results from GZ-3 and GZ-14.

Q: Do you have any recommendations for measures Vermont Yankee should implement to prevent future leaks or to detect and remedy future leaks?

A: VY should implement the conclusions and Corrective Action Plans contained in its Root Cause Evaluation report. VY should either replace underground piping with above ground piping or install physical means of monitoring piping before potential future leakage can escape the pipes or pipe tunnels and get into the environment. VY should consider installing additional recovery wells to intercept the tritium groundwater plume and recover and treat this contaminated water. VY should perform routine groundwater sampling of monitoring wells located near every potential source or radioactive liquids that could leak from the piping in the plant. As mentioned above, I also request information concerning boring log results, geophysical testing results, soil properties, and depth to groundwater measurements. This information will assist in a better understanding of the properties of the site and make predictions concerning the duration of the tritium plume and the migration of any remaining radio nuclides more certain.

Q: How frequently should the sampling occur?

A: Sampling should occur no less frequently than four times per year (quarterly), but could occur on a more frequent basis.

Q: Do you recommend that the Public Service Board adopt any of these recommendations as conditions in the Certificate of Public Good?

A: The Root Cause Analysis recognizes that implementation of the Groundwater Protection Initiative measures and goals could have "led to more timely identification of the tritium leakage in the groundwater." VY, in response to discovery has indicated that it will be implementing these measures by August 30, 2010. To help ensure protection of groundwater, ANR recommends that the Board incorporate into the VY Certificate of Public Good that VY implement the Groundwater Protection Initiative Measures by August 30, 2010.

Q: Does ANR recommend that the Board impose any penalties on VY as a result of the tritium leaks?

A: The matter of any radioactive liquid leaks and compliance with state environmental laws has been referred to the Vermont Attorney General's Office by ANR for investigation and consultation. That investigation is still ongoing at this time and ANR will not take a

position regarding penalties in the Public Service Board docket during the pendency of the Attorney General investigation.

Q: Does that conclude your testimony?

A: Yes.

1
STATE OF VERMONT
2 PUBLIC SERVICE BOARD
3
DOCKET NUMBER 7600
4
INVESTIGATION INTO: (1) WHETHER ENTERGY NUCLEAR
5 VERMONT YANKEE, LLC, AND ENTERGY NUCLEAR OPERATIONS,
INC. (COLLECTIVELY, "ENTERGY VY"), SHOULD BE REQUIRED
6 TO CEASE OPERATIONS AT THE VERMONT YANKEE NUCLEAR
POWER STATION, OR TAKE OTHER AMELIORATIVE ACTIONS,
7 PENDING COMPLETION OF REPAIRS TO STOP RELEASES OF
RADIONUCLIDES, RADIOACTIVE MATERIALS, AND,
8 POTENTIALLY, OTHER NON-RADIOACTIVE MATERIALS INTO
THE ENVIRONMENT; (2) WHETHER GOOD CAUSE EXISTS TO
9 MODIFY OR REVOKE THE 30 V.S.A. SECTION 231
CERTIFICATE OF PUBLIC GOOD ISSUED TO ENTERGY VY; AND
10 (3) WHETHER ANY PENALTIES SHOULD BE IMPOSED ON
ENTERGY VY FOR ANY IDENTIFIED VIOLATIONS OF VERMONT
11 STATUTES OR BOARD ORDERS RELATED TO THE RELEASES.
12
13 January 13, 2011
9:50 a.m.
14 -----
112 State Street
15 Montpelier, Vermont
16
17 Technical Hearing held before the Vermont Public
Service Board, at the Third Floor Hearing Room,
18 People's United Bank Building, 112 State Street,
Montpelier, Vermont, on January 13, 2011, beginning at
19 9:50 a.m..
20
P R E S E N T
21
BOARD MEMBERS: James Volz, Chairman
22 David C. Coen
John D. Burke
23
CAPITOL COURT REPORTERS, INC.
24 P.O. BOX 329
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25 (802) 863-6067

Page 230

occurred as a result of the releases that are at issue in this docket to your knowledge?

MS. GREENWOOD: My testimony -- the purpose of my testimony was to provide a framework of the groundwater regulatory system so I haven't looked at data in either direction. I haven't done a comprehensive evaluation of the data so I can't answer that with any certainty.

MS. TIERNEY: Do you have any knowledge of any such problems?

MS. GREENWOOD: I don't know whether there is or haven't. I don't know whether that evaluation has occurred.

MS. TIERNEY: That's all I have.

CHAIRMAN VOLZ: Any follow-up? Any redirect?

MR. GROVEMAN: No, Mr. Chairman.

CHAIRMAN VOLZ: Great. Thank you. You're excused. All right. So now the issue is should we start -- I think we decided we're not going to start Mr. Vanags now because we're not going to finish him tonight.

(A discussion was held off the record.)

BOARD MEMBER COEN: Raise your

Page 231

right-hand.

ULDIS VANAGS,

Having been duly sworn, testified as follows:

MS. HOFMANN: Have we been stipulating in testimony?

CHAIRMAN VOLZ: No, we haven't been.

MS. HOFMANN: Okay.

CHAIRMAN VOLZ: But we've been doing a pretty quick version of it.

DIRECT EXAMINATION

BY MS. HOFMANN:

Q. Can you state your name for the record?

A. Uldis Vanags.

Q. And, Mr. Vanags, what's your position?

A. I'm the nuclear engineer in the Public Service Department.

Q. And did you submit testimony dated July 2nd, 2010?

A. Yes, I did.

Q. And did you have one correction to that testimony?

A. Yes, I do.

Q. Is that on page 2?

A. Yes.

Page 232

Q. And line 13?

A. Correct.

Q. And you have January 15th. What should that be?

A. January 7th.

Q. Do you have any other corrections?

A. Yes, in a discovery response.

Q. We'll take care of that later, and we have two exhibits DPS-UV-1 and UV-2. UV-1 is your resume and UV-2 is the supplemental report to the comprehensive reliability assessment and it's a redacted version; is that correct?

A. That's correct.

Q. And were these all prepared -- the exhibits and the testimony prepared by you or under your supervision?

A. Yes.

Q. Are they true and correct to the best of your knowledge?

A. Yes, they are.

MS. HOFMANN: We would move the admission of the testimony dated -- of Uldis Vanags dated July 2nd, 2010 and the two exhibits UV-1 and DPS-UV-2.

CHAIRMAN VOLZ: Any objection? Okay.

Page 233

They are admitted.

(The Prefiled Testimony of Uldis Vanags was admitted into the record.)

(Exhibits marked DPS-UV 1-2 were admitted into the record.)

Page 234

MS. HOFMANN: I will hand the court reporter the testimony as if given and Ms. Tierney the exhibits. Thank you very much and the witness is available for cross examination.

CHAIRMAN VOLZ: All right. Ms. Levine.

MS. LEVINE: Thank you.

CROSS EXAMINATION

BY MS. LEVINE:

Q. Good afternoon.

A. Good afternoon. Be good evening soon.

Q. Good evening. Okay. Did you make the correction to your testimony on page 2?

A. Yes.

Q. Okay. I was reviewing my cross. I wanted to make sure that was made. On page 2 lines 12 through 14 of your testimony you make reference to Vermont Yankee assembling an effective team to locate and stop the source of the leak to the environment. Do you see that?

A. Which lines were they again?

Q. 12 to 14.

A. Okay. Yes.

Q. Now in your reference to the assembling of an effective team to locate and stop the source of the leak, that doesn't cover the revelation that the leaks were

Page 235

ongoing for at least two months and maybe even two years before they were reported or that the level of monitoring was less than Entergy's own groundwater protection initiative had recommended?

A. Correct. What I'm referring to there is when the leak was discovered they assembled a team to find it, to investigate it.

Q. Also on page 2 lines 14 to 16 you note that you closely monitored the team's progress and persistence to methodically locate the source of the leak. Do you see that?

A. Uh-huh. Yes.

Q. And you were first notified in January and the location of the source of the leak was in February, about six weeks later?

A. Correct.

Q. And you're familiar with the site hydrogeologic assessment for Vermont Yankee that was performed in 2007, an exhibit to Mr. French's testimony?

A. I know of it.

Q. And in that one of the first potential direct pathways to ground identified is the AOG and the AOG cooling system. Are you familiar with that?

A. No, I'm not.

Q. And are you familiar with the NRC inspection

Page 236

report dated May 20, 2010? Again this was an exhibit to Mr. French's testimony.

A. Yes.

Q. And the hydrogeology assessment in there notes that Entergy's actions in response to the groundwater protection initiative was not sufficiently detailed and did not provide sufficient specificity to identify the source area for the tritium leak. Are you familiar with those conclusions in that report?

A. Yes.

Q. Would you agree this hindered a more rapid identification and repair of the leak?

A. Yes.

Q. And on page 3 of your testimony lines 1 through 4 you note that it's your assessment that the continued operation of the facility -- states operation of the station while searching for the source of the leak would not impact public health. Do you see that?

A. Yes.

Q. And this assessment is based only on the radiation dose analysis performed by AREVA for Vermont Yankee; is that correct?

A. Yes.

Q. You didn't perform any of your own independent analysis?

Page 237

A. No.

Q. And this analysis is only based on an impact to public health, correct?

A. Correct.

Q. No assessment of an evaluation of an environmental impact apart from public health?

A. I don't know of any other radiological impact that could occur at these low doses.

Q. And do you agree that once the leaks occurred there was a release of contamination into the environment?

A. Well correct. Tritium was released to the groundwater, to soil.

Q. And at that time there was no control of that release?

A. Correct. Until they found it. Until they identified it on February 15th.

Q. And you provide testimony on page 5 referring to the contamination and its effect on the cost of decommissioning lines 26 to 28.

A. Okay.

Q. You did not conduct any independent research or collect any independent data regarding the extent of contamination or the cost to -- for decommissioning, did you?

A. No. I utilized the data acquired by Vermont

Page 238

Yankee in their soil sample and wells.
Q. And have you evaluated the six-point program that Mr. Mitchell identified in his testimony?
A. Yes. I have.
Q. And would you agree that these provide an evaluation, but does not commit Entergy to implementation of specific improvements?
A. No, it does -- it does -- it has a schedule where a plan is produced and then they do produce an inspection plan and then they will implement the inspection plan.
Q. If I could show you Mr. Mitchell's testimony where that's referred to --
CHAIRMAN VOLZ: Do you have Mr. Mitchell's testimony with you?
MS. HOFMANN: I have a copy, if you don't mind if I hand the witness my copy.
BY MS. LEVINE:
Q. And at a six-point plan is referred to on page 8?
A. Yes. I have that.
Q. Could you identify -- okay. Page 8 line 8 notes that these improvements may be in the form of any of the following. The use of the word may there indicates that some of these may not be implemented or put in place,

Page 239

correct?
A. I suppose so.
Q. So do you agree that these -- as represented by Mr. Mitchell this six-point plan does not commit Entergy to the implementation of any specific improvements?
A. I don't. I think that's extending use of may to the limit of a negative.
Q. Could you identify the specific improvements that your evaluation -- in your evaluation Entergy has committed itself to?
A. What have they committed themselves to? I will have to pull things out. I can't remember everything off the top of my head.
Just as an example I'm looking at their schedule here. They have committed to prepare -- conduct a detailed technical review of the previously performed risk ranking evaluations by December 13, '10. That should be completed. Prepare an inspection plan for the repair of the piping system containing radioactive materials. That's to be completed on 1/29/11. And then March 28th the corrective action due date for that 2/19. Prepare an inspection plan for non-radioactive buried piping.
Q. And can I ask what you're referring to?
A. Well this is a list that I have of -- to keep

Page 240

track of what is -- what their plan is so I can keep track of what to look at.
CHAIRMAN VOLZ: Did you assemble that from some other documents of their's?
MR. VANAGS: No. This is something they provided to me during my regular inspections during the plant.
MS. LEVINE: Has that been provided to --
MR. MARGOLIS: We asked for documents certainly that -- communications between Uldis and Entergy and were not provided with anything like that.
MR. VANAGS: You didn't get this?
MR. MARGOLIS: No.
MS. HOFMANN: What question? What's the question? Which question, discovery question?
MR. MARGOLIS: I have to find it.
MR. VANAGS: Well there may be proprietary information on this too.
MR. MARGOLIS: It might not have been to them. I'm not saying you didn't provide. It -- I'm saying Entergy didn't provide it. You said Entergy gave it to him. We asked Entergy for that stuff. Not you. I'm not blaming

Page 241

you. I have to look it up.
CHAIRMAN VOLZ: At any rate what you're doing is you're reading off this document things that you believe that they have committed to do?
MR. VANAGS: This is -- this is -- yes. This is their schedule they provided to me during one of my inspections.
CHAIRMAN VOLZ: Okay.
MR. VANAGS: And this is what I will be referencing as I monitor their progress to see if they will keep up to these items.
BOARD MEMBER COEN: Just to be clear this is not in evidence anywhere; is that correct?
MS. HOFMANN: No.
CHAIRMAN VOLZ: Right. So do you want him to continue answering the question?
MS. LEVINE: No.
BY MS. LEVINE:
Q. And you have not provided any evidence in this proceeding of commitments of Entergy to implementation of specific improvements in its six-point plan, have you?
A. I would say no.
Q. And you would agree that an effective program

Page 242

would provide for implementation of those specific measures?
A. Yes, I do.
MS. LEVINE: That's all.
CHAIRMAN VOLZ: Thank you. Mr. Margolis.
MR. MARGOLIS: Yes. One moment.
CROSS EXAMINATION
BY MR. MARGOLIS:
Q. Good evening, Mr. Vanags.
A. Good evening.
MR. MARGOLIS: I guess before we start I would like to move to admit NEC-Cross-6 and NEC-Cross-9 which will do away with a lot of my questions.
CHAIRMAN VOLZ: Any objection?
MR. MARSHALL: No objection.
MS. HOFMANN: No objection.
CHAIRMAN VOLZ: You want to describe what they are for the record.
MR. MARGOLIS: Yes, and one of them, I believe he has a correction to NEC-Cross 6, is several responses of the Department of Public Service to New England Coalition's first set of information requests in this docket, and I

Page 243

was told that you have a correction to question 8, is it?
MS. ELIAS: 1/5 sub. The answer is letter G, lower case G in parentheses on page 4 of the exhibit.
MS. HOFMANN: Do you need a copy of it?
MR. VANAGS: No. No. I --
MS. HOFMANN: You better look at it.
CHAIRMAN VOLZ: You need to tell us the correction you're going to make and where it's going to be so --
A. Okay. There's no line numbers here, but it's G. It's question 5 the answer for G. It starts admitted. Assuming that the leak may have been present for two years resulting in 1.9 curies of tritium and the plant operating for 1.5 months while searching for the leak that may have added .12 curies or about 6 percent. This additional tritium would not significantly increase the dose estimate conducted by AREVA for Vermont Yankee.
I made an error in that calculation where the actual source term for the tritium is not 1.97. It's really closer to 3, to 3 curies. So I would like to change that to 3 curies of tritium and that changes the result to .19 curies may have been added.
BOARD MEMBER COEN: What about the

Page 244

percentage?
CHAIRMAN VOLZ: Is 6 percent still correct?
MR. VANAGS: No. That would not be. I have to correct that.
BOARD MEMBER COEN: Why don't we cross that out.
MR. VANAGS: Yeah, just cross that out, but the conclusion remains the same.
MR. MARGOLIS: So otherwise I would like to move to admit NEC-Cross-6.
CHAIRMAN VOLZ: Any objection?
MS. HOFMANN: No objection.
CHAIRMAN VOLZ: It's admitted.
(Exhibit NEC-Cross-6 was admitted into the record.)
MR. MARGOLIS: And NEC-Cross 9 is the supplemental report of the Public Oversight Panel regarding the comprehensive reliability assessment of the Vermont Yankee power plant dated July 20, 2010. Move to admit that.
CHAIRMAN VOLZ: Any objection?
MS. HOFMANN: No.
MS. LEVINE: No.
MR. MARGOLIS: Okay.

Page 245

CHAIRMAN VOLZ: Thank you. It's admitted.
(Exhibit NEC-Cross-9 was admitted into the record.)
BY MR. MARGOLIS:
Q. I have a few questions here. For ameliorative actions you've recommended that ENVY follow through with the BPTIP and the NEI groundwater initiative, correct?
A. Yes.
Q. So you believe that as an ameliorative action and to prevent future leaks ENVY needs to perform more inspections of buried and underground pipes at the plant?
A. Correct.
Q. And you agree that one way to -- one way to prevent pipes from leaking is to assess the condition of those pipes and replace and repair degraded pipe segments in a timely manner?
A. Yes.
Q. In response to a discovery question in the document that we just admitted as NEC-Cross 6 regarding how or whether the buried piping tank inspection program would prevent future leaks, you stated that the buried piping and tank inspection program will provide for inspection of pipes and tanks, risk ranking of pipes, mitigation of high risk pipes by change of material, et

Page 246

cetera. That was in DPS 8. Do you recall that?
A. Yes. I have that in front of me.
Q. Do you agree with Entergy's hypothesis of the cause of the leaks was interior erosion or corrosion or erosion/corrosion or some form of interior degradation?
A. Well I agree with them that the root cause -- the primary root cause was the clogged drain and the --
Q. I'm just talking about the cause. Sorry to interrupt you because we're running out of time. The cause of the holes in the pipes.
A. Well I would say I mean that the source of the liquid in the tunnel is from the pipes.
Q. Sure. Okay. So the inspections and risk ranking that you mention in your discovery response that would be done pursuant to the BPTIP, you agree though that would only be based on and it would only concern exterior corrosion, correct?
A. No. I think -- I believe the risk ranking includes both exterior and interior corrosion, you know, mechanisms for failure.
Q. The risk ranking potentially, but the inspections done pursuant to the BPTIP not only addresses external corrosion mechanisms; is that correct?
A. That's correct. Yes.
Q. Thank you, and you added in response to that

Page 247

question that a full discussion of the BPTIP is provided in the NSA supplemental report?
A. Yes.
Q. Correct?
A. Yes.
Q. So your testimony regarding the effectiveness of the BPTIP to prevent further leaks is based upon the assessment made in that report. Did you rely on that report?
A. I do. I rely on the NSA report.
Q. And you're aware that report specifically states the scope of the analysis does not include a horizontal evaluation of ENVY's program or practices for managing underground piping?
A. If you could show me where that is? I mean they did a horizontal analysis of the AOG which got them to the BTTIP.
Q. This report is DPS-UV-2; is that correct?
A. It is.
Q. If you look on page 48 of that --
CHAIRMAN VOLZ: And, Mr. Margolis, although we want to get done as quickly as reasonably possible, when you're actually asking the questions you need to slow down a little bit.

Page 248

MR. MARGOLIS: I apologize. I'm just all --
MS. HOFMANN: Too much coffee.
MR. MARGOLIS: I don't drink coffee. This is how I am naturally. I apologize.
CHAIRMAN VOLZ: Not a problem.
BY MR. MARGOLIS:
Q. Do you see that stated in the last paragraph before the section starting -- called 2.2? It says this supplemental report scope does not include a horizontal evaluation of ENVY's program or practices for managing underground piping.
A. I do see it. Let me just read it.
Q. Okay.
A. Okay. I see that.
Q. Is that something you would like to see, a horizontal evaluation of the program for managing underground piping?
A. I don't know. I would have to evaluate that later.
Q. I can appreciate that. Okay. Couple questions about the NEI buried piping integrity initiative which was admitted as NEC-Cross-4. Do you have that with you or I can give you a copy? You provided it in discovery as well I believe but --

Page 249

A. NEI0914?
Q. Yes. I had some similar questions of some Entergy witnesses, but I wanted to get your response to this as well. The guidelines, I believe it's on page 4, call for implementation of the inspection plan shall start no later than June 30, 2012, and then it says the condition assessment of buried piping containing radioactive material shall be completed by June 30th of 2013, and I'm wondering if you would agree with me that in light of the tritium leaks it may be reasonable to -- for that to be done sooner?
A. I know that in my inspection at the plant in discussing with them about their plans to meet this guidance and the other items that their -- that they are slightly ahead of these schedules by maybe around six months.
Q. So it is possible to do it sooner?
A. Well it may be. I know that they -- this schedule is slightly ahead of the deadline which kind of makes sense.
Q. Okay. But you would agree that if they want to be an industry leader and if they want to help to assuage any public concerns, they might want to do this as quickly as possible?
A. I agree.

Page 250

Q. Is it your opinion that opportunistic inspection of hard-to-access buried piping is enough to prevent future leaks?
A. No.
Q. I want to go to the supplemental report to the comprehensive reliability assessment, your DPS-UV-2, and if you could turn to page 94, first of all, do you agree with the findings of NSA that are set forth in this report?
A. I do.
Q. On page 94 on the top, this is in the section on extent of condition review or dealing with extent of condition review.
A. I hope I have my own copy of this. I hope the page numbers are the same. Is it the same 94 that has summary conclusions in 3.7?
Q. I believe so. Yes. Yes.
A. Okay.
Q. And this is within the summary conclusions. It states -- sorry. This is the top within -- this is in the top of page 94. It states at the very top ENVY is in the process of completing a root cause analysis. So this was done before the root cause analysis was completed?
A. Right. It was.
Q. And then it goes on to say, which should

Page 251

determine what actions to take for infrequently accessing inaccessible areas. It goes on to say, as part of the RCA analysis ENVY will identify other piping that may be susceptible to similar failure mechanism as the AOG piping. Was that your expectation of what the root cause would contain?
A. I believe it does contain that.
Q. You think it does?
A. Yes.
Q. Go through and explain exactly where else other piping may be susceptible to similar failure mechanisms as the AOG piping?
A. I believe, yes, they did do that.
Q. Can you show us where in the root cause analysis it actually does that?
A. Well that's -- I heard in testimony and also know just from, you know, understanding what's happening at the plant is that similar pipes that were, you know, steam -- drain lines from two-phase flow from the steam traps were -- they identified those.
Q. You were here for the testimony of Mr. Shadis, correct?
A. Yes.
Q. And he explained where -- that there could possibly be other areas besides those steam trap drain

Page 252

lines that could be -- could have similar failure mechanisms as the AOG piping?
A. Yeah, I heard him say that.
Q. Do you agree with that?
A. I suppose it's possible.
Q. And has the root cause analysis set forth where those might be?
A. Well that's in the extent of condition of the root cause analysis.
Q. And does the extent of condition part of the root cause analysis set forth where else -- where ENVY has identified other piping that may be susceptible to similar failure mechanisms as the AOG piping?
A. I don't know specifically because that part with the piping was entered into the corrective action program and that's where it would be identified what the steps will be taken, and I just have not had a chance to look at that and inspect it.
Q. Okay. This document speaks for itself so I can just brief on that.
I have a question for you about those corrective actions. Corrective actions are based on the extent of condition review, isn't that correct?
A. Yes. You know it depends.
Q. Okay. Depends?

Page 253

A. Depends on the corrective action, what you're correcting.
Q. But you create corrective actions based on your extent of condition review; is that correct?
A. Well I think that's just a part of a corrective action when we take corrective action. It's not just extent of condition.
Q. The scope of the corrective actions, would those be based on the extent of condition review? Is that fair to say?
A. For what specifically? I mean --
Q. For anything in general?
A. I don't know if I can say for anything. I just don't know for anything.
Q. For -- in case -- would the scope of the corrective actions be based on the extent of condition review?
A. It would be a major -- it would certainly be a significant item.
Q. That's fair enough.
A. That would be considered to be looked at.
Q. That's fair enough. Thank you. So if the extent of condition review was inadequate, doesn't it follow that the corrective actions scope of which might be partially, at least as you just said based on the extent

Page 254

of condition review, might also be inadequate in terms of their scope?
A. Can you please say that again?
Q. Sort of a logic question. Doesn't it follow that if the extent of condition was inadequate, then the corrective actions -- the scope of those corrective actions, which you just said might be based on the extent of condition, would also be inadequate?
A. I don't know how to answer that to be honest.
Q. And do you agree with the NSA team's statement that unless the interim and long term corrective actions are implemented to prevent and detect similar leaks, it is the SR assessment team's judgment that the plant is potentially susceptible to this type of leakage, and continues, this a challenge to continued plant reliability?
A. Yes, I agree with that.
MR. MARGOLIS: I think that's all I have. Thank you.
MR. VANAGS: Thank you.
CHAIRMAN VOLZ: Thank you.
MR. MARGOLIS: That was quick.
CHAIRMAN VOLZ: Mr. Lederer?
MR. LEDERER: No questions.
CHAIRMAN VOLZ: Mr. Marshall or Mr.

Page 255

Trach?
CROSS EXAMINATION
BY MR. MARSHALL:
Q. Turn to page 5 lines 11 through 14 of your affidavit.
A. It was page?
Q. Page 5 lines 11 through 14.
A. Okay.
Q. Now first your testimony was -- or your affidavit was prefiled on July 2nd of last year, correct?
A. Yes.
Q. At that point in time Entergy Vermont Yankee had not completed the voluntary GPI, correct?
A. Correct.
Q. Did you hear Mr. Hardy say in this proceeding that the GPI has been completed?
A. Yes, it has.
Q. So to your knowledge there's no aspect of the GPI that has not been completed?
A. Correct.
Q. Now look at page 3 lines 24 and 25.
A. Page 3?
Q. Page 3 lines 24 and 25.
A. Okay.
Q. Here you recommend that Entergy carry out the

Page 256

recommendations in the supplemental CRA report, correct?
A. Correct.
Q. Now you and the auditors for the CRA have met with Vermont Yankee to discuss those recommendations on a number of occasions, correct?
A. Yes, we have.
Q. And you and the auditors have -- are familiar -- you are personally familiar with Entergy's intentions with respect to implementation of these recommendations?
A. Yes, I am.
Q. And are you in disagreement with any of these recommendations?
A. No.
Q. And did you hear Mr. Mitchell testify the other day about his company's commitment to implement all of these recommendations?
A. Yes, I have.
Q. Do you agree that the corrective actions contained in the root cause evaluation report include corrective actions that address the contributing causes as well as the root causes?
A. Please read that again.
Q. Could you read it again?
(The record was read as requested.)
A. Yes, it does.

Page 257

MR. MARSHALL: That's all I have.
CHAIRMAN VOLZ: Thank you. We have questions.
MR. JANSON: Good afternoon.
MR. VANAGS: Good evening.
MR. JANSON: Almost. Please turn to page 5 of your testimony at lines 8 through 10.
MR. VANAGS: Okay.
MR. JANSON: You stated that if Entergy VY implemented the GPI on schedule it is highly likely that the leak would have been identified in its early stages.
Now I believe it was Mr. Shaw who testified I think to the contrary given the location of the wells, the additional wells compared to the plume. Is this still your testimony, and, if so, why in light of Mr. Shaw's testimony?
MR. VANAGS: Well I understand. I was -- admittedly when I wrote this I was not aware of the location of where those additional wells would be. It was my understanding those additional wells would come in closer to the plant area and by -- and

Page 258

by, you know, structures, systems and structures the components that were vulnerable to or potentially leak effluents into the ground.

I still do believe, you know, this groundwater initiative is, as Entergy stated, it's a living plan. It's a living plan. Once they just -- as they say they completed it, but it will be periodically reviewed and they would learn from it and update it. I expect that to happen. It will not remain static, and it was -- and this was supposed to be completed on the time frame of June 2008, August 2008, and I can't help but foresee that once you have something completed at that date there's already time for opportunity to think through what improvements may be needed, and I would like to say one thing that NEI groundwater initiative states is that you identify all the potential sources within your station that could possibly enter the environment, and I would think when that was done that wells would be brought in closer. I'm not sure of what value they would have wells far away as they are now.

Page 259

Now it's set up very well because the wells are in the areas where the structures are and where you cover entry. So when I wrote this I really thought that the wells would be coming in towards the structures so for early detection.

MR. JANSON: And in fact as it's turned out there have been wells that have been brought in closer?

MR. VANAGS: Yes, they have. It's a very good monitoring system now.

MR. JANSON: If you please turn to page 7, lines 5 through 7, you state that the GZA computer model of groundwater flow will provide information to the Department if the groundwater tritium concentrations will present any restrictions to the land use when Vermont Yankee is eventually decommissioned. In what way or ways could groundwater tritium concentrations restrict land use after decommissioning?

MR. VANAGS: Well when you decommission a plant, if you have residual radiation that's above the release limits for license what's called -- forget the term -- essentially the

Page 260

NRC 25 millirem for free release.

MR. LEDERER: Unrestrictied.

MR. VANAGS: Unrestricted. Thank you. Someone said that. Unrestricted license termination by NRC. If your dose limit is higher than that, there will be restrictions placed on the use of that property, and so that's what I was referring to here is that at some point we would like to conduct or have Vermont Yankee conduct some sort of a modeling to determine what will be the actual dissipation and decay of the tritium on the site to give some understanding about how that -- what timeline it will occur in.

MR. JANSON: And if those NRC levels are exceeded, what are the restrictions on land use if you know?

MR. VANAGS: If you exceed the NRC 25 millirem, essentially you could end up just using it for industrial -- use it for industrial use. So if you want to keep it industrial, fine, but if you wanted to turn it to farmland, you won't be able to do that.

MR. JANSON: Or residential or --

MR. VANAGS: Or residential.

Page 261

MR. JANSON: Schools, day cares would not be allowed, for example?

MR. VANAGS: Right.

MR. JANSON: Thank you.

MR. YOUNG: Just to follow up on that you were referring to the 25 millirem standard from the NRC for release, correct?

MR. VANAGS: Yes.

MR. YOUNG: Do I recall correctly that the Department was advocating a lower standard as a condition of relicensing to meet the greenfielding requirement?

MR. VANAGS: Yes. We still want that. We want the 10 millirem and for all pathways and four for water. We still -- but looking at the definition, if you meet that you meet unrestricted release, but if you're above 25, you're in restricted.

MR. YOUNG: But it is possible that you could meet the NRC requirements and still not meet -- have tritium -- residual tritium and still not meet the state requirements that you've been advocating?

MR. VANAGS: Oh, that's certainly possible.

Page 262

MR. YOUNG: We've heard a number of testimony -- or heard a bunch of testimony from Entergy witnesses about actions that the company plans to take during the next refueling outage. To your knowledge is Entergy now actively planning for another refueling outage?

MR. VANAGS: Yes, they are. Activities at the plant are as -- if you will continue to operate from cycle to cycle. There's been no changes at all.

MR. YOUNG: Given that the license at least now is slated for expiration as of next March, is there a time at which Entergy would need to make a decision whether to go forward with the outage this fall or not?

MR. VANAGS: Well I do know that they will need to order fuel at some point. Maybe around April or May.

MR. YOUNG: You've made several recommendations and some of those may come up -- some of those are CPG modifications that you're proposing. Given that the license is at least now scheduled to expire in only a little over a year, does the Department still

Page 263

recommend that the Board order specific relief in this docket?

MR. VANAGS: Yes.

MR. YOUNG: Thank you.

MS. TIERNEY: Good afternoon, Mr. Vanags. Were you here earlier when Mr. Spiese from the Agency of Natural Resources testified that he has had a supportive role for the Vermont Department of Health in the -- in connection with the investigation of these leaks?

MR. VANAGS: Yes.

MS. TIERNEY: Did you agree with his characterization of the relative roles between the Agency of Natural Resources and Department of Health?

MR. VANAGS: I believe they are correct. I really don't -- I really don't know much about the interaction between ANR and DOH.

MS. TIERNEY: So are you in a position to tell us who has had the lead and who has been supportive?

MR. VANAGS: Well I could tell you that when this tritium event was announced I discussed with the Department of Health about

Page 264

who would take the lead. Normally the Department of Public Service, anything involving inside the plant boundary is our responsibility and normally we always take the lead on this -- on these matters. In this case talking with the Department of Health or Bill Irwin is that --

MS. TIERNEY: I'm sorry. For the record who is Bill Irwin?

MR. VANAGS: Bill Irwin is chief radiological -- I don't know the rest of his title -- chief radiological person. I'm not sure what his title is.

CHAIRMAN VOLZ: But he works for the Department of Health and he's been working on this matter for the Department of Health?

MR. VANAGS: Yes. Yes. He's essentially been the lead person in DOH, and I discussed with Mr. Irwin that their department has been conducting environmental radiation surveillance for Vermont Yankee since the beginning and so they have the access to their own laboratory and the ability to collect samples. They know how to collect samples and take them.

Page 265

This tritium event obviously was going to involve a great deal of laboratory work and that's not something our department typically does, and so I essentially asked Bill, you know, to be the lead and to be the spokesman because I think people were very concerned about public health and safety and that seemed to be the right department to talk about that issue too.

So I worked -- we agreed to work cooperatively together on this issue. He would take the lead and address the public health and safety, you know, matters, and definitely and essentially do the bulk of the work for the collection of samples and take care of all that, and I would focus on the plant activities with regard to the monitoring their investigation into the source of the tritium and further on as they found it and whatever actions need to be taken later on. That's sort of the arrangement.

MS. TIERNEY: Are you able to provide the Board with an understanding of what the Department of Health's position is with respect to the safety and public health

Page 266

consequences of the leaks that have occurred as it is known today?

MR. VANAGS: I believe I can because they are consistent with the Nuclear Regulatory Commission's is that there is no health and safety risk to the public or the personnel on site at Vermont Yankee from this tritium leak nor will there be any. There will not be any risk. The tritium levels are very low. To cause -- they are just not possible to cause any health effect at that level.

MS. TIERNEY: To your knowledge, Mr. Vanags, has the Department of Health taken any action to have this plant shut down in any other forum outside of Vermont?

MR. VANAGS: I would say no.

MS. TIERNEY: To your knowledge has the Department of Health taken any action to have this plant shut down within Vermont in any other forum besides the Public Service Board?

MR. VANAGS: No.

MS. TIERNEY: Mr. Vanags, I'm going to hand you a document that's been identified for the record as Board 1, which is the request

Page 267

for affirmative relief filed by New England Coalition in this docket. I would ask you to briefly examine the first and second bullet points. When you're done please let me know.

MR. VANAGS: Okay.

MS. TIERNEY: In your capacity as the state nuclear engineer if the Board were to make a determination to order these items as a consequence of the testimony it has taken in this docket, would you believe that would be a prudent thing for the Board to do?

MR. VANAGS: Well it's written so generally I'm trying to understand what it says here.

MS. TIERNEY: If that's your answer, that's the answer we'll take at six o'clock in the evening.

MR. VANAGS: Sorry. My comment about this is that this almost seems essentially what Vermont Yankee has already planned in their six-point plan and in the buried pipe inspection program BPTIP. I'm not sure about this statement, take a thorough examination. Well I mean we have yet -- our consultants will assess the actual inspection plans for

Page 268

all these buried pipes, and we will be looking to determine whether we consider them thorough and effective. I'm not sure what thorough means here. Does thorough mean a sampling, does it mean a hundred percent, and that's -- an inspection program is never one hundred percent. No one can inspect a hundred percent of anything. Inspection programs are always a sampling, and if you do, as you heard, risk ranking to determine what requires more immediate attention, and that's how you prepare an inspection plan typically.

MS. TIERNEY: I understood you to say just a moment ago you would examine the plans for inspection that Entergy has; is that correct?

MR. VANAGS: Yes.

MS. TIERNEY: What would you do -- what would the Department do if it were not satisfied with the plans that Entergy set forth?

MR. VANAGS: Well we would first tell them that we're not satisfied and that we think these certain areas need improvement. At that point I would wait for a response.

Page 269

CHAIRMAN VOLZ: But at some point after you have had some interaction with them and you can't come to an agreement on what you want and they are doing less than what you want, what steps would the Department take at that point if you know?

MR. VANAGS: Well I believe without any -- we don't have any more authority to go any further than to ask for their cooperation.

CHAIRMAN VOLZ: You couldn't come here and ask us to order them assuming we have the authority?

MR. VANAGS: Yes. That would be nice.

MS. TIERNEY: Assuming we had the authority?

MR. VANAGS: Yes.

MS. TIERNEY: Very good. If I may ask in the same vein, the Conservation Law Foundation has requested that we order a third party independent inspection of the plant. Do you have the testimony in mind that's been given in this docket at that point?

CHAIRMAN VOLZ: Well are you familiar with their recommendation?

MR. VANAGS: Well the recommendation is

Page 270

that they would like a third party.
CHAIRMAN VOLZ: Right.
MS. TIERNEY: Yes. If you will give me just a moment. I'm handing the witness a document identified as Board 5 for the record. It's the second item.
MR. VANAGS: Inspection verification of all the needed repairs and remediation are completed in order to show the facility would operate in conformance with the Certificate of Public Good.
I'm not sure exactly what that means. Inspection verification of all needed repairs. Which repairs? The repairs have been made to stop the leak already? What -- I'm not sure what this is referring to.
MS. TIERNEY: So do you think there's a need for us to order this relief?
MR. VANAGS: No.
MS. TIERNEY: And why is that?
MR. VANAGS: No, because the programs in place that Vermont Yankee has, you know, committed to will assure that future -- the possibility of future leaks are extremely low.
MS. TIERNEY: Mr. Vanags, were you here

Page 271

-- I apologize if I'm mangling your name.
MR. VANAGS: That's all right.
MS. TIERNEY: Whatever penalty let me know. I had an exchange with Mr. Mitchell about the relief for request that's been identified in the record as Board 4 made by Windham Regional Commission, and Mr. Mitchell read into the record that WRC was taking the position any delay in returning the land currently occupied by Vermont Yankee Nuclear Power Station to productive use following the eventual closure of the plant would have a negative effect upon the economy of the state and the region.
My question to you is this; are you aware of any delay that the remediation of the leaks at issue in this docket is going to cause in returning the land occupied by the VY station to productive use following eventual closure of the plant?
MR. VANAGS: I would say no. If Vermont Yankee actually closed in 2012, their plant is to go into SAFSTOR. So the plant -- whatever tritium is there on the grounds will certainly be dissipated in a matter of 40 years.

Page 272

MS. TIERNEY: In a matter of 40 years. Is that the -- I'm sorry. That's the time for dissipation of tritium, but your reference to SAFSTOR does that connote a time period in your mind when -- how long SAFSTOR will last to your knowledge?
MR. VANAGS: Well SAFSTOR can't be more than 60 years including the decommissioning of the facility. So if the plant shuts down in 2012, at 60 years it has to be fully dismantled by then.
MS. TIERNEY: Very good. I have no further questions of this witness.
CHAIRMAN VOLZ: Any follow-up?
BOARD MEMBER BURKE: I have questions.
CHAIRMAN VOLZ: I'm sorry. Excuse me.
BOARD MEMBER BURKE: Mr. Vanags, you're familiar -- I assume you're familiar with the report and very familiar with the report that was attached as your exhibit 2. Is that fair to say?
MR. VANAGS: Yes. I am familiar with it. I can't remember every detail in it though.
BOARD MEMBER BURKE: Well I'll try to

Page 273

help you not remember every detail. If you can, turn to page 68 of the report. I'll try to show it to you and see how we do.
MR. VANAGS: All right. Okay.
BOARD MEMBER BURKE: First of all, on page 2.8 -- on page 69 it indicates that they're satisfied that the BPTIP will assure structural integrity of buried piping remaining intact for the life of the plant. Do you know what they meant when they said life of the plant?
MR. VANAGS: They are looking at the 20 year extension to 2032.
BOARD MEMBER BURKE: On page 68 near the very bottom the report indicates that there was slow industry-wide recognition of the importance of buried piping and tank program. Do you see that statement in --
MR. VANAGS: Where is that?
BOARD MEMBER BURKE: Right at the bottom of page 68.
MR. VANAGS: Okay. Yes, I see it.
BOARD MEMBER BURKE: This is an industry that we've heard of that really is right on top of itself and we got one of the leaders

Page 274

here by their own testimony. How does that statement make you feel in that report? Can you tell me?

MR. VANAGS: Well the industry as a whole did not recognize the problem with degrading pipes and possible tritium leaks to the environment for some time.

BOARD MEMBER BURKE: So you're telling me that an industry that lives and thrives to a large degree on piping that carries radionuclides, some of them underground and hard to inspect, was slow to realize that after 40 years in a plant this was something they ought to be taking a look at. Is that what you're saying to me?

MR. VANAGS: I believe they underestimated the consequence.

BOARD MEMBER BURKE: And what if this had been something other than tritium? What if this had been massive quantities of cesium or something like that that was in there? How would you feel about the statement then?

MR. VANAGS: I'm trying to find where -- cesium wouldn't distribute --

BOARD MEMBER BURKE: Let's put it this

Page 275

way. It could have been worse than tritium. Would you agree with me on that?

MR. VANAGS: Well there are fluid -- no. Well there are fluid lines and relatively -- these are fairly clean. The reactor water coolant has to be very clean for operation of the power plant. You can't have impurities in it and you can't -- so you can't have a lot of particulate activated metallic particles in it. That's what the resin filters are for. It's always to keep it clean. So those are captured so that's why you end up with a fairly clean reactor coolant. It has activity in it from small amounts of other parts of other fission products, but the tritium, you know, is the biggest component of that, but normally you don't have lots -- that's what those filtering mechanisms in the plant are for is to collect all those radioactive materials so that your system stays clean.

BOARD MEMBER BURKE: The NRC is responsible for nuclear radiological safety. Is that true?

MR. VANAGS: Oh yes.

BOARD MEMBER BURKE: Does this statement

Page 276

in 68 indicate that they were slow to realize this too?

MR. VANAGS: Yes.

BOARD MEMBER BURKE: I have no further questions.

CHAIRMAN VOLZ: I have just one and actually meant to ask you at the beginning, but it probably will work as well now.

Your testimony was filed over six months ago in July and a lot has happened since then. Does this still reflect the Department's position?

MR. VANAGS: My testimony?

CHAIRMAN VOLZ: Yes.

MR. VANAGS: Yes.

CHAIRMAN VOLZ: Okay. Can you confirm that, Ms. Hofmann?

MS. HOFMANN: I can confirm that Mr. Vanags' testimony stands as written.

CHAIRMAN VOLZ: Okay. Good. And represents the Department's current position?

MS. HOFMANN: It represents the thinking of the Department as this case came to hearing. Yes. I mean I cannot tell you that in brief I might have a different position.

Page 277

At the time we started these hearings this was our position.

CHAIRMAN VOLZ: Okay. Thank you.

MR. MARGOLIS: Can I ask one follow -up question?

CHAIRMAN VOLZ: Yes, and now for follow-up.

BY MR. MARGOLIS:

Q. Sorry. I don't know if anybody wanted to go before me. This goes to the questions you were just being asked about the slow industry-wide recognition of the buried piping and tank inspection program.

I just looked this up. Are you aware that the Waste Management Division of the Vermont DEC has an underground storage tank program?

A. I know all states have one.

Q. Are you aware that the underground storage tank program web site specifically states that the program was created in 1985 to help prevent contamination caused by leaking tanks?

A. Oh I know that that's been an effort for decades for fuel oil tanks.

Q. Thanks, and just one other question. You mentioned before the four millirem water standard that you have requested the plant be decommissioned to?

Page 278

A. Yes.
Q. Put that in perspective with picocuries of tritium. Do you agree that's equal to 20,000 picocuries per liter which is the EPA standard?
A. For drinking water, yes.
Q. Okay, and that would be equal to the four millirem standard that you want to -- its --
A. Right. Right. That is what's used in conversion right now.
MR. MARGOLIS: Thank you very much.
CHAIRMAN VOLZ: Ms. Levine.
MS. LEVINE: Nothing.
CHAIRMAN VOLZ: There was an issue about putting a diagram into evidence.
MS. HOFMANN: I actually have -- I wanted to just ask him one redirect.
CHAIRMAN VOLZ: Yes. Let's finish with Mr. Vanags first. Yes. Redirect.
MS. HOFMANN: Can I approach him for one second?
CHAIRMAN VOLZ: Sure.
(A discussion was held off the record.)
REDIRECT EXAMINATION
BY MS. HOFMANN:
Q. Mr. Vanags, you were asked a question I

Page 279

believe by Mr. -- Chairman Volz and also by Ms. Tierney about what if you're not satisfied with the results after you talk to Entergy about an issue at the plant. Can you tell me if -- where you believe you can bring certain issues?
A. Well I can bring reliability issues to the Board and nuclear safety issues will go to the NRC.
MS. HOFMANN: Thank you.
CHAIRMAN VOLZ: Thanks. Any other redirect?
MS. HOFMANN: No. Nothing else.
CHAIRMAN VOLZ: Great. All right. So we had the issue of the chart or the diagram.
MR. MARSHALL: It's been marked for identification as exhibit EN-TT-6. Drawing -- it's a drawing titled Process Flow Diagram Offgas System Offgas Modification.
CHAIRMAN VOLZ: Okay, and we're going to admit that into evidence.
MR. MARSHALL: There was no objection before.
CHAIRMAN VOLZ: Mr. Margolis, that's what you wanted to put into evidence?
MR. MARGOLIS: I believe so. Yes.
CHAIRMAN VOLZ: Okay. So that's

Page 280

admitted.
(Exhibit EN-TT-6 was admitted into the record.)
CHAIRMAN VOLZ: Thank you. Should we talk about a briefing schedule?
MR. MARGOLIS: Yes.
CHAIRMAN VOLZ: When would people like to file direct briefs?
MR. MARGOLIS: I believe we agreed to the -- was it the 9th?
CHAIRMAN VOLZ: The 9th of February.
MR. MARGOLIS: And the 18th for reply briefs.
MR. TRACH: That's correct. 9th for initial briefing and 18th for reply briefs.
MS. TIERNEY: You had a question this morning about whether the Board wanted a P for D and the answer to that was yes.
CHAIRMAN VOLZ: That would be helpful. At the very least proposed findings, but P for D if you would.
I guess we're done for tonight. I would like to thank everybody. Appreciate your cooperation.
(Whereupon, the proceeding was

Page 281

adjourned at 6:20 p.m..)

C E R T I F I C A T E

I, JoAnn Q. Carson, do hereby certify that I recorded by stenographic means the technical hearing re: Docket Number 7600 at the Hearing Room of the Public Service Board, 112 State Street, Montpelier, Vermont, on January 13, 2011, beginning at 9:50 a.m..
I further certify that the foregoing testimony was taken by me stenographically and thereafter reduced to typewriting, and the foregoing 280 pages are a transcript of the stenograph notes taken by me of the evidence and the proceedings, to the best of my ability.
I further certify that I am not related to any of the parties thereto or their Counsel, and I am in no way interested in the outcome of said cause.
Dated at Burlington, Vermont, this 15th day of January, 2011.

_____

JoAnn Q. Carson
Registered Merit Reporter

NuclearSafety Associates

Reliability Assessment of the Vermont Yankee Nuclear Facility

Provided by Nuclear Safety Associates

to the

State of Vermont Department of Public Service

12/22/08

REDACTED PUBLIC VERSION

Pl. Trial Exhibit 391

Executive Summary

Entergy Nuclear Vermont Yankee (ENVY) provides about one-third of the energy for the State of Vermont. Since 2002, ENVY has increased its plant capacity from 1563 Mwt to 1912 Mwt. ENVY, on January 27, 2006, applied to the NRC for a 20-year extension of its operating license. Historically, ENVY has been a reliable source of power for Vermont. However, in recent years the station has experienced several operational events which have raised concerns about the reliability of the station.

The State of Vermont General Assembly passed Legislative Act 189 (S.364) which called for an independent assessment of the ENVY station's current and future reliability. Subsequently, during the period of August 13 through December 16, 2008, a team of nuclear professionals with exceptionally deep and diverse nuclear experiences from Nuclear Safety Associates (NSA) conducted an assessment of Entergy's Vermont Yankee nuclear power station. This assessment was conducted in accordance with the requirements of Legislative Act 189 (S.364) and the scope of work was approved by the State of Vermont Department of Public Service in consultation with the Public Oversight panel.

Act 189 called for a thorough, independent, and public assessment of the reliability of the systems, structures, and components of the ENVY facility and of its management and organizational effectiveness to examine the reliability of the nuclear station. Further details on the purpose, goals and the assessment process are included in the Introduction Section of this report.

As part of this assessment, NSA team members conducted reviews and assessed ENVY performance in comparison with NSA experiences and expectations for high performing nuclear plants. The criteria were applied to the evaluation of ENVY's systems, structures, components, station processes, and management and organizational effectiveness. Overall assessment of performance to these criteria was based on the collective professional judgment of the NSA team members, taking into account a range of qualitative and quantitative factors.

Overall and Principal Conclusions

The overall and principal conclusions are those high level, over-arching or cross-cutting issues that potentially support or challenge reliable operation of ENVY. Assessment findings of a minor nature, or limited to one area, are contained within the respective sections in the body of the Reliability Assessment Report.

Overall Conclusion

ENVY is operated reliably.

Entergy, the 2nd largest nuclear power generating company in the US, purchased the Vermont Yankee Nuclear Power Station in 2002. Following purchase of the station, Entergy made significant investments to improve the reliability of the station. NSA noted that station personnel were effectively trained and qualified to industry standards. Under Entergy direction, ENVY is moving to a

fleet standard organization with consistent procedures and standards. Overall, many station managerial and technical areas meet or exceed industry standards for performance. The station is operated and maintained in a reliable manner.

In addition, ENVY can be a reliable station beyond its current operating license, provided that the areas identified in the following principal conclusions are effectively addressed. Management action, oversight and follow-through are needed to ensure that these issues are addressed and resolved if ENVY is to improve its performance to top industry levels**.**

Principal Conclusions

The following issues are, or may be, watch areas or challenges to plant reliability.

1. Procedure quality issues

NSA review of procedures determined that, while procedures were technically correct, the current formatting did not readily support Human Performance (HU) tool usage, such as place keeping and data collection on each page. The formatting also was not up to current industry standards relative to linkage to other procedures. The existing format also lacks specific guidance at times, with 'if desired; when necessary' statements, leaving it open to interpretation and judgment by workers. As a result, there have been plant events related to procedure quality or procedure use and adherence.

Previously, ENVY had a stable workforce. However, in recent times there has been an influx of new employees, especially in the Operations Department and the Maintenance Department Electrical and Instrument and Controls sections. These newer individuals will be more dependent upon detailed procedure guidance.

In recognition of these procedure shortcomings, ENVY recently developed an action plan to improve station procedures. The plan is currently focused on developing a process to identify which procedures to upgrade on a priority basis; considering: condition reports, frequency of use, complexity, significance and other criteria. The General Manager Plant Operations stated that he intends that this new plan will supersede the procedure efforts that were previously ongoing in the Maintenance Department.

Once the full scope of procedure upgrades is identified, a detailed schedule will need to be developed to determine which procedures will be completed in order of priority. A detailed change management plan should also be developed to help manage the overall process and ensure its completion, especially in light of previous procedure projects being aborted. In recognition of the need for better procedures and the potential costs and complexity of this project, this is considered a challenge to future reliability.

2. Human Performance Issues.

Safety and Human Performance is one of 4 site focus areas identified in the ENVY 'Good to Great' program. ENVY has had issues with Human Performance in the past and conducted training on Human Performance expectations for self checking, peer checking, procedure adherence and pre-job walk downs after an Emergency Diesel Generator (EDG) Trip in February, 2007.

However, Human Performance does not meet expectations at ENVY because the organization continues to have issues. Some examples are:

- Procedure use and compliance - A common cause analysis was performed for Condition Report (CR) CR 2008-02152 to evaluate the causes for recent human performance events. One of the contributing causes identified was procedure use practices, and ENVY committed to develop a procedure use and adherence improvement plan which is currently in progress. This is an ongoing Human Performance issue.
- High OSHA Recordables - Benchmark data shows that ENVY is in the bottom quartile with respect to OSHA Recordables when compared to the sister plants. The site has recognized the need to make improvements in this area but contractor injuries remain high and ENVY had another OSHA Recordable during the October 2008 outage.
- Foreign Material Exclusion (FME) and Housekeeping practices - The Housekeeping and FME Programs at ENVY do not meet industry standards. Plants with good FME programs have high standards for housekeeping and FME controls. ENVY's performance, especially during the outage when it is most critical, was less than adequate. The low number of Condition Reports (CRs) identifying poor worker practices associated with FME indicates an inadequate threshold for identifying FME and Housekeeping issues.

In addition, as part of the Corrective Action Process, the Condition Report Review Group (CRG) can require a Human Performance Error Review (HPER) as part of the CR analysis process; however, these are infrequently performed. The high number of Human Performance events suggests that HPERs should be performed frequently.

Human Performance can impact plant reliability in numerous ways. Failure to follow procedures, FME which causes equipment problems or fuel failures, or an individual making a mistake which causes a loss of generation are all Human Performance issues. Therefore, Human Performance is a challenge to future reliability.

3. System and Technical Focus Issues

Condensers

ENVY recognizes that they have issues involving the plant's condensers and management has discussed long term options to resolve the problems. Chemistry index continues on an adverse trend. This is due partially from the increased flow as a result of the Extended Power Uprate (EPU) carrying materials from the condenser tubes. The demands on the condensate and feedwater system demineralizers have increased. All demineralizers are required to be in service at 100% power.

Therefore, when one needs to be backwashed or maintenance needs to be performed, the demineralizers have to be bypassed which causes a conductivity spike. ENVY has budgeted for future condenser improvements; however, the current condition of the condenser, coupled with the increased flow from EPU, is posing both a reliability challenge and affecting plant chemistry. The options to re-tube or replace the condenser with erosion resistant materials to mitigate these effects or to increase demineralizer capabilities are on hold until the decision is made regarding the plant license extension. It is the opinion of the NSA Team that this is a challenge to both near term and long term reliability.

Cooling Tower (CT)

ENVY developed a repair/upgrade plan for the Cooling Towers (CT) after the cell collapse in 2007. The plan covers 3 years for the non safety-related portion, with the first step completed in Spring 2008. During the Fall 2008 outage, the safety-related cell was inspected and repairs made. During the inspection, degraded columns were found which were not scheduled for replacement, and columns which were scheduled for replacement were more degraded than anticipated. On-line visual inspections did not identify these issues. Inspections and repairs to be performed during the spring of 2009 on non-safety related cells could also reveal items not found during on-line visual inspections.

A re-evaluation of on-line inspection methods and the repair plan/schedule for safety and non-safety related CT cells should be performed to ensure long term reliability especially considering that the current plan is based on system conditions that are now known to be degraded beyond their initial assumptions. It is the opinion of the NSA team that the Cooling Tower is a challenge to future plant reliability.

Spare Main Transformer

Large Power transformers such as ENVY's Main Transformer manufactured by ABB are not off-the-shelf or in stock items from a manufacturer. There is an industry-wide challenge regarding the ability to obtain replacement transformers in a timely manner. To acquire one could potentially take several years for delivery. The current designated spare for the Main Transformer at ENVY is the previous Main Transformer manufactured by Peebles, which was removed from service prior to the uprate of the plant. At the time of removal, the transformer was experiencing gassing issues (typically caused by a condition involved with the degradation of the transformer windings). ENVY decided to replace the transformer in anticipation of the Extended Power Uprate initiative. The spare transformer is capable of being utilized if the currently installed transformer (ABB) fails, but only at 80% of the current rated output of the plant. Additionally, the gassing issue in the Peebles transformer has not been addressed. This is a potential reliability issue. ENVY is in the process of addressing this issue as part of the Transformer and Switchyard system long-term plan. A corrective action (LO-VTYLO-2007-00136) was entered into the Corrective Action Program (CAP) to address the preventive maintenance and monitoring activities for maintaining the Peebles transformer in a 'ready' for installation condition. However, the actual plan for maintenance and monitoring activities needs to be developed and actions must be completed, to address the gassing issue. In addition, LO-VTYLO-2007-00136 does not address the Peebles transformer relative to its capability to provide 100% power.

The NSA team considers the transformer to be a watch area. A more comprehensive plan to include potential upgrades to the spare or access to a 100% load capacity spare should be included.

4. Delays in Adopting Industry Equipment Reliability (ER) Best Practices

The current ENVY culture is based on being a 'single-plant company' for most of the plant's operating history. Being exposed to numerous process changes as part of a large fleet like Entergy is a cultural change for many people. The Systems and Component/Programs Engineering Managers and Supervisors are very experienced but appear to not fully appreciate the value of fleet Equipment Reliability process standardization, which may be contributing to the slow movement to the new processes.

- Equipment Reliability Index

  The Nuclear Power Industry has worked together to define and standardize the Equipment Reliability (ER) processes and definitions. As part of this standardization effort, the Nuclear Industry's Equipment Reliability Working Group, comprised of most US Nuclear Generators, has created the 'ER Index' (ERI) made up of an aggregate of 19 standard performance metrics. ENVY has only recently begun to utilize the industry standard ERI as part of the Monthly Management Review Meeting.

  When compared to the US Nuclear Industry, the ENVY ERI index is in the bottom quartile. Major contributing factors for this poor performance are described in Section 1.3.

- System and Component Engineering Staffing and Expertise

  Attracting and retaining qualified, experienced personnel in the Systems & Component/Program Engineering Groups has been challenging at ENVY. There are vacant positions within the System Engineering group at ENVY resulting in some System Engineers having responsibilities for as many as 6 systems as compared to the industry average of 2 to 4 systems per System Engineer. Within the Component/Programs Engineering group, there has been a 40% turnover (eight engineers left, transferred or retired from the group) over the past year.

- System Health and Performance Monitoring

  The ENVY site manages system health in a matrix approach where the System Engineer, Component Engineer and Program Engineers have responsibility for specific processes, but no distinct single point accountability exists for ensuring system health. This matrix approach is currently effective at ENVY, where system, component and program engineers have high levels of experience. However, as the workforce turnover and near-term retirements impact the experience levels at ENVY, it will be more difficult to ensure reliability with this matrix approach. Industry top performers have implemented the System Manager concept, which emphasizes single point accountability for overall system health.

A detailed Change Management plan needs to be developed and executed to ensure timely transition to ER industry standards. The delay in adopting industry ER best practices and transition to fleet-wide ER processes could result in challenges to future plant reliability.

5. Ineffective Use of the Change Management.

ENVY has had major organization and operation changes as part of its transition to the Entergy fleet model, including staffing changes, organization realignment, and adoption of new processes, standards, and procedures. The steps taken to plan and implement the changes are governed by a Fleet Change Management process detailed in the Nuclear Management Manual EN-PL-155. Entergy and ENVY have not used the Change Management process effectively to implement many of the major change initiatives.

The Change Management process is intended to guide the user in developing a comprehensive plan to identify why the change is being made, what needs to be accomplished, who is responsible for implementation of actions, performance indicators to help track and measure transition progress, and dates for completion. Following are examples of major changes that do not have comprehensive Change Management plans.

- An integrated 'Fleet Transition Plan' to drive full integration of ENVY into the fleet could not be found. The 'Good to Great' plan, which is intended to set direction and help drive the station to top decile performance, is not a step-by-step plan. The plan is mostly a communication tool to keep employees informed and foster support for the 'Vision' to improve.
- The lack of Corporate direction for common procedures has hampered the procedure upgrade process at ENVY. Subsequently, ENVY has started and stopped procedure upgrade projects and has now developed another procedure upgrade effort for working level procedures. Detailed Change Management plans for these efforts have not been created.
- A major technology change from EMPAC to Indus (the computerized maintenance management system) was implemented without a comprehensive Change Management plan which has slowed the transition and use of the new program.
- ENVY recognizes the importance of the upcoming proposed transition to Vermont Electric Power Company (VELCO) for operating and maintaining the high voltage switch yard. A Change Management plan should be created for the transition.

Transition from a stand alone single unit plant to being part of a large fleet requires major changes in organization and processes. Detailed Change Management plans are needed to ensure timely and effective implementation of the changes. ENVY's transition has been ineffective or slower than necessary because of inadequate use of Change Management. The NSA team opinion is that the Change Management process is a watch area.

6. Shortcomings in contractor oversight.

Lack of contractor oversight of Cooling Tower (CT) work was identified as a cause of a cell collapse in 2007. In July 2008 problems were found with sagging of the distribution piping and leakage on one slip joint, in an area repaired during Spring 2008 work. Connections made during this work were not installed correctly. Similar issues with connections were found in two other cells. Again, lack of contractor oversight contributed to this issue.

Contractor Oversight is provided from two organizations at ENVY - Maintenance and Engineering Project Management. Outage work on the Cooling Towers is controlled by the Engineering Project Management group in accordance with their group procedures, and during non-outage by Maintenance. Maintenance does not have a program, procedure or specific training for the individuals responsible for Project Management.

Oversight issues identified during events include lack of drawings, inadequate Work Orders, insufficient oversight, and over reliance on the skill of the vendor craft. In addition, there was excessive delegation and lack of 'trust but verify' behavior by ENVY.

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Contactor oversight does not meet industry standards and has already caused reliability issues for ENVY and therefore, contract oversight is a watch area.

Introduction

Purpose, Goals and Assessment Approach

Entergy Nuclear Vermont Yankee provides about one-third of the energy for the state of Vermont and now is applying for a 20-year license extension beyond its original license expiration. The purpose of this assessment is to comply with the State of Vermont Legislative Act 189. The Act called for an independent assessment of the reliability of the systems, structures, and components of the ENVY facility; and management and organizational effectiveness, to examine the comprehensive reliability of the nuclear station to assist the state in determining if it should be authorized to operate beyond the current license expiration date of March 21, 2012.

Historically, ENVY has been a reliable source of power for Vermont. However, in recent years the station has experienced several operational events (e.g. partial collapse of a cooling tower, main transformer fire, and problems with the Reactor Building Bridge Crane while handling spent fuel), which raised concerns about the reliability of the station.

Therefore, the goals and objectives for this assessment, as stated in Vermont Legislative Act 189 were to:

1. Assess the conformance of the facility to its design and licensing bases, for operating at up to 120 percent of its originally intended power production level, including appropriate reviews at the plant's site and its corporate offices;
2. Identify all relevant deviations, exemptions, or waivers, or any combination of these from any regulatory requirements applicable to Vermont Yankee and from any regulatory requirements applicable to new nuclear reactors, and verify whether adequate operating margins are retained despite the cumulative effect of any deviations, exemptions, or waivers for the present licensed power level for the proposed period of license extension;
3. Assess the facility's operational performance, and the facility's reliability for continued power production, giving risk perspectives where appropriate;
4. Evaluate the effectiveness of licensee self-assessments, corrective actions, and improvement plans; and
5. Determine the cause or causes of any significant operational shortcomings identified, and draw conclusions on overall performance.

Specific responses to these 5 goals and objectives can be found in Appendix A

In preparation for a Reliability Assessment of the Vermont Yankee Nuclear Facility, the NSA evaluation team members reviewed Legislative Act 189, the scope of work approved by the Vermont Department of Public Service, and the requirements matrix created by the Vermont Department of Public Service and in consultation with the Public Oversight Panel (Refer to Appendix D). From this review it was determined that a limited scope vertical system evaluation approach would be applied to the list of safety-related and balance-of-plant systems that were provided in the requested scope of

work by the State of Vermont. In addition to the six systems listed in Act 189, seven technical focus areas were evaluated.

To assess the management areas, horizontal and vertical evaluations were conducted for key site organizations and their associated plant processes in the Operations, Maintenance, Engineering/Equipment Reliability, and Work Control areas. The scope included an assessment of the following elements to identify issues which could potentially impact plant reliability:

- Organization and staffing
- Experience levels and training
- Procedures
- Observation of field activities
- Human performance
- Overall departmental performance

For the management assessment, NSA team members used a variety of assessment tools, including:

- Interviews with Corporate and Station personnel.
- Review of selected station procedures and documents.
- Evaluation of processes and programs associated with procedures.
- Review of Performance Indicators and any associated analysis details.
- Review of Condition Reports and effectiveness of improvement plans/corrective actions.
- Review of station Self Assessments.
- Review of regulatory reports pertaining to performance and performance deficiencies.
- Attendance at various management organizational meetings.
- Plant and control room tours.
- Observation of operator rounds, on-line maintenance, and outage work activities.
- Evaluation of the methods and effectiveness of organizational communications.
- Attendance at various classroom and simulator training sessions.

In addition, NSA conducted an industry benchmarking study to compare ENVY staffing, performance, and Equipment Reliability Index (ERI) to other U.S. nuclear plants.

Any organizational performance trends or concerns were identified and evaluated. The intent of these evaluations was to identify potential organizational deficiencies or significant risks or challenges to plant reliability

2.0 System Analyses and Technical Focus Areas

Introduction

The System and Technical Focus Area section of this report includes the observations, results and conclusions of 6 'Vertical Slice' evaluations of selected systems. These evaluations were conducted to address the 13 specific 'Vertical Slice' criteria described in Act 189. hese criteria are as follows:

1. Initial Conditions - What were the codes and standards with which the system was designed to comply and what was the design basis? Is the design of the system in keeping with the expected initial conditions and its design basis?
2. Procurement - If there were procurement changes, was a new set of review calculations completed for those procurement changes and were those procurement changes compared against the original design and all of its calculations?
3. Installation - "as-built." Do plant records adequately represent the as-built condition of the plant? Are all changes reflected in all documents from the design basis through as-built and through current operations?
4. Operation - What changes or compensations have been made to accommodate unanticipated operations outcomes? Have those changes, compensations, and accommodations been duly noted in procedural manuals and logs? Have root cause analyses been conducted to reflect unanticipated outcomes? If root cause analyses were not conducted in any particular instance, why not? If root cause analyses were not conducted in any particular instance, have any unanticipated system operations outcomes been duly corrected or compensated in all safety and reliability operations and procedures?
5. Testing - When systems have undergone periodic tests, what have been the results? Are resulting corrective actions reflected in all documents from design through as-built through current operations?
6. Inspection - When systems have undergone periodic inspections, have those inspections been successful? Are the resulting changes reflected in all documents from design through as-built through current operations?
7. Maintenance - Has the management system for aging components been adequately maintained to assure the components meet the design basis? Is there a track-change system in place to determine what components have been reviewed, repaired, or replaced? Is there an accurate system in place to record when those reviews and repairs were completed? Is there a program of operations or a schedule of operations, that specifically delineates what aging management systems, as identified in the industry-wide database, are being reviewed and when? Is adequate time allowed in each outage for aging management review and adequate maintenance? Are the aging factors discovered actually being repaired in a timely manner?
8. Repairs - Have repairs been performed which assure the system will operate as expected? Are all repairs completed as soon as possible? Are repairs sufficiently in-depth to effectively invest in the plant and its operational systems?

9. Modifications - Do all modifications to the system also comply with the system's original design basis? Have all procedure manuals and operations manuals been updated to reflect the impact of any modifications made to any system?
10. Redesign - Have changes made to the plant since its original construction been reviewed to ensure that safety margins have not been reduced? Has each component modified for uprate been reviewed to assure that operational margins have not been reduced and to assure that design basis redundancy has not been compromised? Have any repairs, maintenance, or modifications impacted the original design of the redundant safety systems? Are all systems still "single failure proof"?
11. Seismic analysis - When was the most recent modern, computer generated, finite element seismic analysis performed on each of the seven vertical slice systems examined in the audit? Does ENVY remain capable of withstanding design basis events beyond the original 40-year design life of the plant to reflect the age-related changes in the plant and weight changes from all modifications during the first 35 years of operation?
12. Training - Has an adequate review and evaluation of operator training and operating procedures been conducted? Has each change been adequately reflected in the operations procedures? Have operations personnel been adequately trained in all modifications to all systems? Are operations personnel frequently updated and trained regarding any troublesome issues other plants have uncovered which may compromise operations and safe shutdown?
13. Corrective action programs. What corrective action programs have been established for each of the systems audited? Have the corrective actions taken been properly integrated in the corrective action program? Have corrective actions been taken in a timely manner? Where recorded items have been deferred, have they been appropriately evaluated for risks and potential consequences of deferral and appropriately tracked while awaiting resolution?

These criteria were used to guide the evaluation process for the following six systems

- Transformer and Switchyard System
- High Pressure Coolant Injection (HPCI) System
- Residual Heat Removal (RHR) System
- Condensate/Feedwater System (Including Condenser)
- Cooling Tower (CT) Structure
- Service Water (SW) System

For 2 specific systems (HPCI and SW) an additional criterion was evaluated. This was to address ACT 189 Section 2 (2) which requires the assessment to 'Identify all relevant deviations, exemptions, or wavers, or any combination of these from any regulatory requirements to ENVY and from any regulatory requirements applicable to new nuclear reactors, and verify whether adequate operating margins are retained dispute the accumulative effect of any deviations, exemptions, or wavers for the present licensed power level for the proposed period of license extension.' The NSA team evaluated these 2 systems against applicable sections of the current Standard Review Plan (SRP). The differences between the ENVY Design Basis Document and the SRP were evaluated and the difference(s) were assessed for their potential effect on plant reliability.

The methodology applied to evaluate these systems included:

- Interviews with design, system and component engineering personne
- Observation of field activities such as walk downs, testing, and inspection
- Review of numerous procedures and programs and drawings
- Review of NRC Inspection Reports
- Review of Design Basis Documents and the UFSAR
- Review of NRC Component Design Basis Inspection Reports
- Review of Condition Reports (CRs) and associated corrective actions
- Review of the industry standard Equipment Reliability (ER) sub-process application
- Review of Extended Power Uprate and License Renewal Applications and Safety Evaluation Reports
- Review of selected Modification Packages and calculations

Also various specific technical focus areas were evaluated for their potential impact on plant and equipment reliability. The technical areas reviewed included:

- Underground Piping and Tanks Inspection Program
- Cable Separation Practices
- Large Electric Motor Program Horizontal Review
- Primary Containment System (Drywell Shell, Torus Supports, Isolation Valves)
- Electrical System: Back up and Stand-by
- Flow Accelerated Corrosion Program
- Crane and Hoists Maintenance and Testing
- Seismic Analysis Program

Each of these technical focus areas was evaluated based on the specific methodology and objectives described in the respective sub-sections of this report. The seismic analysis review included a review of ENVY's seismic analysis program to determine the company's approach to seismic design requirements, a review of the modification process to determine how seismic design considerations were addressed, and a review of selected modification packages to determine if appropriate consideration was given to seismic analysis requirements.

Conclusions are included at the end of each sub-section and then summary conclusions are included at the end of the System and Technical Focus area (Section 2.14).

2.14 General Conclusions

The following are the overall conclusions for the six selected systems in the areas of: Design Bases (Criteria 1, 2, 3, 9, 10, 11), Equipment Reliability (Criteria 5, 6, 7, 8), Operations and Training (Criteria 4 & 12), and the Corrective Action Program (Criteria 13). The overall conclusions for the Technical Focus Areas are also provided below.

Design Bases

The assessment confirmed that for plant modifications, installation, design and procurement activities the processes and procedures are in place at ENVY to assure the conformance of the facility to its design and licensing bases, including its operation at the uprated power level. The assessment also confirmed that for the reviewed systems, the processes and procedures are being appropriately implemented. It also determined that the EPU License Amendment request appropriately considered the licensing and design bases of the plant.

The assessment reviewed the current General Design Criteria applicable to new plants and determined that the ENVY original and current design met the intent of those criteria. The assessment also reviewed ENVY's process for controlling margin changes, including margin changes associated with the EPU Program. For the systems reviewed, the assessment determined that changes to regulatory requirements were properly controlled and implemented, that adequate margins have been maintained for the uprated power level for the proposed period of license extension.

Equipment Reliability

The scoping and equipment criticality analysis performed for each of the selected systems was consistent with industry good practices. The process is documented and well controlled.

The bases for each testing and Preventive Maintenance (PM) task to be performed for important components within the selected systems was consistent with industry good practice, well documented and easily accessible by the System Engineers.

Testing and inspections that are required as per the maintenance bases documents for each system were typically implemented and performed within the designated time periods consistent with industry good practices

The current overall performance monitoring process at ENVY for the six selected systems meets industry standards with the following exceptions:

- Inconsistencies exist for system performance monitoring, system walk downs, and system notebooks.
- The communications between component engineers and System Engineers is sometimes informal and relies on experience and relationships and is not driven by program/procedure adherence.
- The individual component health reporting process is not automated and therefore case histories are not easily shared across the ENVY site and/or the Entergy fleet.

- The ENVY site manages system health in a matrix approach where the System Engineer, component engineer, PM lead, and program engineers have responsibility for special processes but no distinct single point accountability exists for ensuring system health. This matrix approach is currently effective for the six systems because system, component, and program engineers are experienced. As experience levels decrease due to attrition and retirements, it will be more difficult to ensure system health with this matrix approach. Industry top performers have implemented the system manager concept, which emphasizes single point accountability for overall system health.

The Long Term Asset Management processes at ENVY include refurbishment and replacement strategies, aging & obsolescence management and capital budgeting. Many fleet standard processes and procedures relating to Long Term Asset Management have been recently developed. The implementation of some of these processes/procedures as they apply to the six selected systems is not yet complete at ENVY. Some application inconsistencies were observed across the six systems.

Operations

Based on interviews, review of processes, procedures and other documents, and review of responses to unanticipated plant conditions and events for the 6 systems reviewed, the actions taken were assessed to meet industry standards. These actions included implementing compensatory and corrective actions, completing appropriate documentation and making procedures changes.

Training

Based on interviews, review of processes, procedures and other documents, and review of responses to plant modifications for the 6 systems reviewed, the actions taken were assessed to meet industry standards. These actions included revising operations procedures and training materials, modifying the simulator and conducting training.

Corrective Actions

An overall assessment of the corrective action program and its effectiveness was completed and is documented in section 1.2.5.1 that addresses the criterion 13 (Corrective Action Program) questions for the overall Corrective Action Program. The six system Condition Report reviews support the conclusion of Section 1.2.5.1 Corrective Action Program.

Technical Focus Areas

As part of this assessment, seven technical focus areas were reviewed. These areas were:

1. Electrical System: Back up & Standby
2. Primary Containment System
3. Underground Piping Program Evaluation
4. Cable Separation Practices
5. Large Electric Motor Program Horizontal Review

6. Flow Accelerated Corrosion (FAC)
7. Reactor Building Crane

Five of the Technical Focus Areas reviewed were determined to meet industry standards. The Electrical System: Back up & Standby, the Primary Containment System, the Underground Piping Program, and the Flow Accelerated Corrosion Program (FAC) all meet industry standards and provide reasonable assurance that long term plant reliability will be maintained. Details can be found in Sections 2.7, 2.8, 2.9 and 2.12.

Two of the Technical Focus Areas reviewed meet industry standards with minor exceptions. The Cable Separation Program, while meeting industry standards, could be improved if ENVY transferred their current cable separation database into an industry accepted computer data management system. Their program would then be more in line with industry best practices. Details can be found in Section 2.10. The Reactor Building Crane is maintained in accordance with industry standards except the implementation of maintenance practices and the learning process associated with equipment issues can be improved. This improvement will enhance the long-term reliability of the reactor building crane. Details can be found in Section 2.13.

1 Jim Volz: And I understand that one of the senators might not be here and I was wondering
2 if uh and had some questions about my potential conflicts that I might have to
3 know for the department is that something you want to address now?
4 MADAM CHAIR: Uh-
5 Jim Volz: I could do that if you like. It's up to you.
6 MADAM CHAIR: No, I think with the huge [unintelligible 20:35]. I'm not chasing my memory and
7 working for the [unintelligible 20:40]. Uhm there were some issues that you had
8 advised on in your previous -
9 Jim Volz: Right.
10 MADAM CHAIR: I was just looking through a, you know, list of what you would recuse.
11 Jim Volz: Okay. I have a list. Do you want it now or do you want me to bring it
12 tomorrow?
13 MADAM CHAIR: Uh bring it tomorrow. Let's not get you muddied up with [unintelligible 21:02],
14 okay?
15 Jim Volz: Thank you.
16 MADAM CHAIR: That will be tomorrow. Okay. Uhm, in the interest of time, I'm not going to -
17 this bill is going to take long. You can read it. Uhm, I'm not going to call Adam
18 here to read it for us. Just trying to take us through. The next one I have is Jerry
19 Morris.
20 Jerry Morris: Thank you, Madam Chai. Thank you. For the record, my name is Jerry Morris
21 and I'm a contract lobbyist here in Vermont representing Entergy Vermont
22 Yankee. I am sitting in the chair and not a member of the senior management
23 team because they're all on the Public Service Board because of our Certificate of
24 Public Good hearing started a couple of days ago. And of course they weren't
25 able to come as you please, Madam Chair.
26 MADAM CHAIR: Okay.

Jerry Morris: Entergy Vermont Yankee does not support S124. We are committed to pursuing a Certificate of Public Good before the Public Service Board. We have every confidence that that process achieves the intent of the legislature wish it to do when it created the PSB some decades ago. That's the end of my testimony.

MADAM CHAIR: That was quick. Thank you. It wasn't overly exciting either. [Cross talk 22:32].

MALE SPEAKER 8: You must not get paid by the word.

MADAM CHAIR: Okay. Now, Sarah. Okay.

SARAH HOFFMANN: [Verquisavich un 22 51]. I'm Sarah Hoffmann. I'm Director for Public Advocacy and probably unfortunately, I'm a lawyer and I used to work for Mr. Morris. Uhm, but uh we have a few comments and concerns about the bill as it's presented today. Uhm, the first one Chairman Volz already indicated in your subsection five (5) where you're actually saying that you're controlling when they can apply for a federal license. I have done some pre-emption research and I think you'd really be running afoul of federal law.

MADAM CHAIR: Okay.

SARAH HOFFMANN: And the federal government doesn't seem to like it when states tell people when they can apply for federal licensing.

MADAM CHAIR: I understand that one.

SARAH HOFFMANN: The other thing is I think it's moot because they - not actually you gotta apply last week for a license extension. So my advice would be to take out wherever it says the federal license. Take that out and I think Chairman Volz's suggestion using some of the language from the Board's Order would be very well taken. Uhm, in terms of the substance as indicated by also by Chairman Volz. You know, this is having the PSB come back in and not Entergy. I just want to make sure that everybody was clear on that point and that -

MADAM CHAIR: I think that I mean do I assume it would be cleaner to have Entergy come back.

1 Madam Chair: [Cross talk 9:48]

2 Tim Nulty: There'll be Dry Cask storage, but all of this engineer with the presumption
3 that it's temporary and the permanent is somewhere else. I think and I'm
4 not giving you an answer, -

5 Madam Chair: But you are saying -

6 Tim Nulty: -but the real question should Vermont think about creating - it's not a
7 desirable situation, but it's a second. If we have no choice, we should be
8 thinking about creating something that's pretty permanent.

9 Madam Chair: [unintelligible 10:18] ten years or the next years cleaning up temporary
10 site.

11 Tim Nulty: Exactly.

12 Madam Chair: Not cleaning.

13 Tim Nulty: Not cleaning it up, yeah.

14 Madam Chair: Okay.

15 Tim Nulty: And then so I the question of the Dry Cask storage is related to the
16 commissioning. It's related to the upgrade because the upgrade
17 dramatically increases the amount of spent fuel they're going to generate.

18 Madam Chair: Right.

19 Tim Nulty: Uhm and these are not - this range of issues is not. The PSB is not
20 institutionally equipped to think of them altogether. It's not allowed to
21 think about safety, as you know.

22 Madam Chair: Right.

23 Tim Nulty: It's - there are some questions about the jurisdiction of the legislature. But
24 at the very least the legislature would have jurisdiction to think about
25 compensation. Now let's suppose that the NRC says that something is

1 safe. We've established it in these type hearings uh uh from out of the
2 mouths of the NRC itself. Their view of safety is an on off situation. So
3 they look at everything and they decide that it has passed the threshold.
4 The degree of safety, the degree of risk has reached the point or has fallen
5 to a point where they say okay that's the cutoff. That's the threshold. The
6 on off switch and we deem it safe. They'd admit it, but that doesn't mean
7 it is utterly safe. Even below that threshold there are degrees of risk.
8 Now-
9 Madam Chair: Un-safe.
10 Tim Nulty: Yeah, and now they don't deal with that. And they said that. We don't
11 deal with it. That's not our problem. But there is at very least the question
12 that Vermont would want to site if a plant - even if a plant is deemed to be
13 safe. It doesn't mean it's absolutely safe and if there are measurable
14 additional risks associated with let's say an upgrade. Even though it was
15 deemed to be safe, should some compensation be arranged for this?
16 Madam Chair: [unintelligible 12:21].
17 Tim Nulty: Because there is -
18 Madam Chair: Economic risks.
19 Tim Nulty: Economic or - and - I mean economic and safety are related obviously.
20 Uhm the uh yeah I mean it's something that uhm a safety problem has
21 economic implications also.
22 Madam Chair: Oh yes.
23 Tim Nulty: Uhm, yeah.
24 Male Speaker 1: One of the, if I may, try and understand. One of the reasons that the NRC
25 says that a plant is safe because the NRC is convinced there is something

1 that appears to be going wrong. The plant can be shut down and the
2 electricity turned off and prevent anyone from being injured or hurt or
3 radioactivized.
4 Tim Nulty: With a certain degree of confidence.
5 Male Speaker 1: With confidence. But once that happens, uhm the electricity is gone.
6 Tim Nulty: Yeah.
7 Male Speaker 1: If you shut the plant down and keep anyone from being hurt by radioactive
8 fallout and there's no explosion. You have a plant that is safe. Shutdown.
9 But from that day on, a huge economic problem occurs to Vermont.
10 Tim Nulty: Uh hmmm.
11 Male Speaker 1: Because of our electricity is these.
12 Tim Nulty: Not only is it gone, I mean our electricity is the cheapest in New England
13 and Vermont Yankee and the buyback arrangement is a big part of that.
14 Madam Chair: It's just so interesting. You remember about three (3) years ago, we were
15 the most expensive in New England and I don't think our rates have
16 changed that much.
17 Tim Nulty: Right.
18 Madam Chair: But the books have predicted then that the other challenges we're
19 frontloading or back loading your expenses. I mean front loading that this
20 would happen and it did.
21 Tim Nulty: But the uhm uh if you explained as you did - well at least the difference
22 between [unintelligible 14:31] and being safe and something being
23 unreliable economic [unintelligible 14:37]. Yeah then the like I said the
24 previous testimony - the bits and pieces of the previous testimony
25 [unintelligible 14:46]. Oh my God, I beg your pardon.

1 Jim Volz: Right. And I think this is what Mike Dworkin testified. I'm just
2 [unintelligible 6:16] what he said and I'm putting a specific number to it.
3 Madam Chair: Okay. Uhm, the house can have a whole year. [Cross talk 6:27]
4 Jim Volz: Well, if the timing is right. A year and a half takes up two (2) legislative
5 sessions and I think if you do the math.
6 Madam Chair: [Cross talk 6:35].
7 Jim Volz: If you look at the calendar, you will see that it will work out. As I thought
8 that was your concern not so much two (2) years, but two legislative
9 sessions. That was my guess anyway.
10 Madam Chair: Yeah.
11 Jim Volz: Whatever you think.
12 Male Speaker 1: Thank you.
13 Jim Volz: Okay, you're welcome. Uhm on the next page under the public
14 engagement objectives, I'll just point out. I'm not asking for you to make a
15 change, but on the fourth line you mention safety, safety issues and..
16 Madam Chair: Yes.
17 Jim Volz: - you know, technically the state is pre-empted from engaging in those.
18 Now, this is under the public engagement section and I guess the way we
19 would handle this is we would be clear on our report that we'd make a
20 distinction between the safety issues that we are pre-empted from and the
21 other topics that we're allowed to talk about.
22 Madam Chair: Are you allowed to talk about environmental safety?
23 Jim Volz: We're allowed to talk about effect on the environment. Yes.
24 Male Speaker 2: Evacuations and things like that.

1 Jim Volz: And that safety that effects people in other areas. You can ask the
2 Department about this. I think they're more-
3 Madam Chair: Okay, we're working altogether a better term than safety or modify safety
4 so it-
5 Male Speaker 3: [Safety advice people, right? 7:48]
6 Jim Volz: If you ask me, in my view, it did. It does.
7 Madam Chair: We can't talk about how they are going to get radiation poisoning, but if
8 something happens. We can talk about getting them out of there fast
9 enough.
10 Jim Volz: I think so. If it's evacuation related, safety issues relating to evacuation. I
11 think that might be okay, but like I said I think the Department knows
12 where the lines are and the jurisdiction lines better than I do.
13 Madam Chair: Okay. [Cross talk 8:09].
14 Jim Volz: My concern is simply that if we introduced -
15 Madam Chair: Yeah.
16 Jim Volz: -an inappropriate safety discussion into this report and then the legislature
17 took up the report; it could end up causing - creating the possibility for
18 pre-emption later on.
19 Madam Chair: Yes.
20 Jim Volz: If somebody suggests that the legislature's decision was really based on
21 that safety discussion that's in this report and it's not really based on other
22 factors that are probably as well so.
23 Madam Chair: Okay, let's find another word for safety.
24 Jim Volz: Yes and the same things happens at the bottom of the page where you
25 reference public health issues. That's another -

1 Madam Chair: Yes.

2 Jim Volz: potential problem.

3 Female Speaker 2: We can't talk about public health?

4 Jim Volz: Excuse me?

5 Female Speaker 2: We're not supposed to talk about public health?

6 Jim Volz: Well, it depends on if it relates, you know, it depends on how broad it is.

7 All right. [Cross talk 8:54]

8 Madam Chair: Looks like a pre-emption.

9 Jim Volz: Yes.

10 Female Speaker 2: You mean [unintelligible 8:58] shouldn't be pre-empted by the - that right.

11 Jim Volz: Right.

12 Female Speaker 2: Okay.

13 Jim Volz: You issue us - you're going to approve this man- legislative management

14 instead of statute. Somebody could go to federal court and say this

15 statute's invalid because it's pre-empted by federal law because it's based

16 on radiological safety. So I just - I want to - I don't want - I just want to

17 alert you to that potential. Maybe you want to take some testimony from

18 the other witnesses about it.

19 Male Speaker 1: I understand what the [unintelligible 9:26] witness is bringing to our

20 attention and innate I would expect that we would write this. [Not only

21 the same when 9:36] that the work being conducted say these areas of

22 safety are the [bargain and BNRC 9:40] and they are not-

23 Jim Volz: Right.

24 Male Speaker 1: Easy periods of how to do emergency evaluations or make progress and

25 this is [unintelligible 9:50].

Jim Volz: If you don't make a change to this, there's no problem. When we do our report, we will keep everything clear.

Male Speaker 1: Okay.

Jim Volz: But I just wanted to just make you aware of this issue. That's all.

Madam Chair: Okay.

Jim Volz: But if you did make a change that might be okay. It might be wise to make a change, but if you don't we'll be sure that we keep it all straight.

Male Speaker 1: [Unintelligible 10:10].

Jim Volz: Uh page five (5) under Section 6(b), I think that section really belongs in Section 5, above because it's talking about uhm witnesses and support for the public engagement process. And so I would re-number it as capital C and move it up into five (5) just above Section 6. Section 6(A). And I would also change it to reflect - oh I'm sorry.

Madam Chair: Go ahead.

Male Speaker 1: We're working on a draft and [unintelligible 10:45] copy that.

Jim Volz: I also want to make some language changes in [unintelligible 10:51].

Madam Chair: Okay. We'll get that.

Jim Volz: So we're not aware of [unintelligible 10:54] changes. No matter where it's located, it references Section 20 and Section 20 contains similar language to this in terms of - It has a list of experts, counsel, advisors, et cetera. The list ought to be identical because it will be confusing otherwise. And so it should say, "the Board shall have authority to attain legal counsel, official stenographers, expert witnesses and advisors, temporary employees and other research services." And then go on and say "it may require to analyze and evaluate any issues and alternatives presented in the

Vermont Yankee
Comprehensive Vertical Audit
VYCVA

Recommended Methodology
to Thoroughly Assess Reliability and Safety Issues
at Entergy Nuclear Vermont Yankee

Prepared By:
Fairewinds Associates, Inc
Margaret & Arnie Gundersen
January 2008

Vermont Yankee
Comprehensive Vertical Audit
VYCVA

Legislators, ratepayers, environmentalists and concerned citizens from across the State have called for a NRC Maine Yankee (MY) Style ISA (Integrated Safety Assessment). Even the Vermont Legislature called for an ISA, while the Vermont Public Service Board called for a four-vertical-slice inspection. At the same time, due to alleged cost containment efforts and industry pressure, the NRC has vowed it will not conduct another ISA. The NRC maintains that its Reactor Oversight Process (ROP) fulfills all the functions of an ISA, which simply is untrue.

Performance at Vermont Yankee since Entergy bought the plant has had significant identified weaknesses including a transformer fire, lost nuclear fuel, a fire in an electrical fuse cabinet, an un-greased turbine stop valve, and a collapsed cooling tower. This series of incidents lead us to believe that a thorough Audit must occur prior to any consideration of life-extension.

CVA (Comprehensive Vertical Audit) Compare and Contrast

We are not proposing a 25,000 man-hour Maine Yankee ISA. The NRC has already opined that it would never support such an exhaustive exam, and truth be told, the ISA did not uncover all the problems facing Maine Yankee, nor did the results of the ISA shut Maine Yankee down. It is time to move beyond the myth of the infallible ISA to an examination and evaluation that will meet the needs of the State of Vermont, its citizens, and ENVY. The evidence collected during the PSB vertical slice option clearly showed that a ROP inspection does not meet the needs of an aged plant like Vermont Yankee. Furthermore, given that Vermont Yankee has had the largest uprate of any plant in the country and now is applying for a 20-year-life-extension beyond its 40-year design, there is more than adequate reason to conduct a Comprehensive Vertical Audit (CVA).

What would a CVA (Comprehensive Vertical Audit) mean for Vermont Yankee?
A CVA does not raise the bar for ENVY, nor does it set up more hoops through which ENVY must jump, but it does thoroughly examine specific safety and reliability systems to certify that each one of those systems is able to perform its critical safety function as designed. A CVA, as some claim, is not a hidden attempt to challenge the old plant to see if it meets newer criteria applied to newer plants. Rather, a CVA is a methodology by which to audit (conduct a methodical examination or review of a condition or situation) specific safety and reliability systems in order to compare and contrast the original plant design with changes in hardware, engineering, and maintenance.

Each nuclear power plant is designed with the real and known risk of atomic energy and awareness that any accident poses a threat to the public. Nuclear power plants are therefore designed with redundant safety systems in place, so that if one safety system fails, a second or third system will function as designed and hopefully protect the public from harmful radiation. In its typical manner, the nuclear industry has applied its amorphic euphemisms to the term redundant safety system and called it *single failure proof*, which in nuclear speak means that a single failure will not disable the plant. Recent NRC rulings in the light of uprated plants have pushed the redundant safety system to the point that it may in fact not be single failure proof. Consequently, a CVA would assess critical safety and reliability systems at Vermont Yankee in order to ascertain whether the plant is more or less reliable when generating electricity following uprate, and to certify that critical safety systems needed to protect the people of Vermont will perform as designed.

The importance of a CVA cannot be over-emphasized.

In order to achieve a Comprehensive Vertical Audit, five key parameters must be established. These parameters are detailed in this Preliminary Analysis recommending this Methodology

1. **Systems to be Audited**
2. **Methodology of the Audit**

3. **Duration of the Inspection**
4. **Composition and Size of Inspection Team**
5. **Availability of Documents**

Brief History:

Vermont Yankee was designed more than 40-years ago. When VY was newly built, it relied upon General Electric, the nuclear vendor that designed and sold the plant, and Ebasco, Vermont Yankee's Architect Engineer (AE) for its engineering support. As the nuclear industry evolved, and as plants aged, both the nuclear vendor and the AE dropped their engineering support and each nuclear power plant was required to develop its own in-house nuclear engineering department. This was a very costly proposition for a stand-alone plant like Vermont Yankee. While such a step gave VY an engineering group that intimately knew the plant and its workings, it also did not give such a small engineering team and corporation the wherewithal to make continuous re-evaluations or to employ arm's length oversight. One of the reasons that VY's purchase by Entergy was seen by the PSB, DPS, and Vermont's utilities as a great option was the anticipation that Entergy had both the financial wherewithal and expertise to manage a nuclear plant. We are talking about nuclear radiation and radioactive waste; it is not like maintaining an old car that if not well maintained may blow an engine which one could replace. An aging nuclear plant like Vermont Yankee needs a well-run and meticulous Aging Management System with which to conduct regular and thorough inspections of every system to look for flaws and weaknesses. When those weaknesses are discovered, then each component, pipe, cable, sensor, actuator, weld and piece of concrete must be promptly repaired, even if such a repair is very costly. Things should not be placed on a "deferred list" to see if they may or may not break. Corrective action for an old nuclear plant should be swift and thorough as real lives are at stake.

Instead, <u>under Entergy's ownership</u>, Entergy Nuclear Vermont Yankee (ENVY) has experienced a transformer fire and a collapsed cooling tower among other things that could have been avoided by proper Aging Management procedures and were seemingly unanticipated by State Regulators and the State Legislature. In light of the fact that

ENVY has increased its power output 20 percent above its original design and is now requesting a 20-year license extension beyond the original 40-year designed lifespan, it is imperative that this aged reactor has a complete safety and reliability review. The NRC has repeatedly stated that it is not responsible for reliability issues, only safety issues, but to Vermonters who depend upon ENVY's electric output during Vermont's long, cold winters, reliability is in actuality a safety component of VY's operation. Just as Commission Chairwoman Shirley Jackson ordered an ISA for Maine, the NRC or Chairman Dale Klein has the option to so order a CVA for Vermont Yankee. Moreover, such an Audit is critical given the facts that ENVY has applied for a 20-year license extension and its Decommissioning Fund is woefully unprepared to dismantle the plant in 2012 as most Vermonters anticipated.

CVA - Comprehensive Vertical Audit

A Comprehensive Vertical Audit would look at a minimum of four specific systems and preferably six specific systems in a comprehensive and in-depth manner. The Audit would look at each system from the time it was designed to present.

The Six Systems a CVA Would Examine Are:

1. **One electrical system: the diesel generator**. While the diesel name may sound mechanical, its function is not, because the diesel generator is one of VY'S most critical electrical components. It makes all the electricity for this nuke in the event of an accident, including power to the control room and every safety related pump.

2. **One safety system: Low pressure safety injection**. The low-pressure safety injection system is the system that cools the nuclear reactor in the event of an accident. There are two pressure safety injection systems: one high pressure and one low pressure. The high-pressure safety injection system runs for only a short period of time, while the low-pressure safety injection system is designed to run for a week or more in order to avoid a meltdown.

"All nuclear power plants have some form of emergency makeup water

system in the event that normal makeup is lost and a major break occurs in the reactor cooling system. These emergency systems are called such names as - High Pressure Coolant or Safety Injection, Low Pressure Coolant or Safety Injection, Reactor Core Injection Cooling.

There are two phases considered - (1) the Injection phase when the pumps take a suction from a large tank and pump that water into the reactor cooling system or reactor, and (2) the Recirculation phase when the pumps take a suction from the containment sump after all of the water has been pumped into the containment.

The Emergency Core Cooling Systems have 1 major function: Provide makeup water to cool the reactor in the event of a loss of coolant from the reactor cooling system. This cooling is needed to remove the decay heat still in the reactor's fuel after the reactor is shutdown…

- High Pressure Pumps - pump lots of water (e.g. 700 gpm) at a pressure of about 2,000 pound per square inch.
- Low Pressure Pumps - pump lots of water (e.g. 2000 gpm) at a pressure of about 150 pound per square inch…
  Joseph Gonyeau, http://www.nucleartourist.com

"Net positive suction head (NPSH) is a key parameter in determining whether the [Emergency Core Cooling System] ECCS pumps will be able to provide the necessary cooling water flow to the reactor vessel. The NPSH depends on factors like the static head (height of water), discharge head, water temperature, flow rate, and length of piping." *Union of Concerned Scientists (UCS) http://www.ucsusa.org/clean_energy/nuclear_safety/concerns-about-relying-on-containment-overpressure.html*

Yes, we know this sounds quite technical, but if you have a well, you may know that your well can lose suction in which case the well cannot pump water to your house. NPSH is a similar issue except that the pump might not be able to cool the critical core of the nuclear reactor!

"Some nuclear plant owners, like that for Vermont Yankee, seek to take credit for containment overpressure in order to meet the NPSH requirements for the ECCS pumps at uprated power levels. Containment overpressure is the pressure above atmospheric inside the containment caused by the energy released during the accident. That pressure, when added to the static head, can keep the water pressure inside the pump from dropping below the vapor pressure. The plants were originally built and licensed for static head alone to keep pressure above the vapor pressure. But higher suppression pool water temperature and/or higher ECCS pump

flow rates at power uprate levels drop the pressure below the vapor pressure—unless containment overpressure is available… Rather than take credit for containment overpressure and hope that one of these possible scenarios doesn't occur, the NRC should protect the public by insisting that adequate NSPH for ECCS pumps be guaranteed by static head alone." *Union of Concerned Scientists (UCS) http://www.ucsusa.org/clean_energy/nuclear_safety/concerns-about-relying-on-containment-overpressure.html*

3. **One mechanical system: condensate feedwater, including the condenser.**

Vermont Yankee is a BWR-4 model designed by General Electric.

The "water is circulated through the Reactor Core picking up heat as the water moves past the fuel assemblies. The water eventually is heated enough to convert to steam. Steam separators in the upper part of the reactor remove water from the steam.

The steam then passes through the Main Steam Lines to the Turbine-Generators. The steam typically goes first to a smaller High Pressure (HP) Turbine, then passes to Moisture Separators, and then on to the 2 or 3 larger Low Pressure (LP) Turbines. The turbines are connected to each other and to the Generator by a long shaft (not one piece). The Generator produces the electricity, typically at about 20,000 volts AC. This electrical power is then distributed to a Generator Transformer, which steps up the voltage to either 230,000 or 345,000 volts. Then the power is distributed to a switchyard or substation where the power is then sent offsite.

The steam, after passing through the turbines, then condenses in the Condenser, which is at a vacuum and is cooled by…" water from the Connecticut River. "The condensed steam then is pumped to Low Pressure Feedwater Heaters"… then "the water then passes to the Feedwater Pumps which in turn, pump the water to the reactor and start the cycle all over again…
…The Condenser has two major functions:

- Condense and recover the steam that passes through the turbine (Condensers are used in all power plants that use steam as the driving force)
- Maintain a vacuum to optimize the efficiency of the turbine." *Joseph Gonyeau, http://www.nucleartourist.com*

4. **One Structure: The Containment itself, including isolation valves and NPSH.**

A key principle in the design of the nuclear plant is defense in depth.

There are intended to be three barriers between the radioactive fission products and the public in order to reduce the likelihood of radioactive

releases. These three barriers are - the fuel cladding, the reactor coolant piping, and the containment.

Vermont Yankee is a Mark I Boiling Water Reactor (BWR) and therefore has the traditional torus and inverted light bulb design. This was the first generation of BWR containment, as used in the BWR 1 through 4 designs, and 22 nukes have this style of containment. The design includes:

- The drywell, which surrounds the reactor vessel and recirculation loops,
- A suppression chamber (also known as the torus), which stores a large body of water (suppression pool),
- An interconnecting vent network between the drywell and the suppression chamber, and
- The secondary containment, which surrounds the primary containment (drywell and suppression pool), and houses the spent fuel pool and emergency core cooling systems.

Vermont Yankee originally had 8 relief valves that discharged into the torus. One additional relief valve was added during the uprate. Isolation valves are a critical component of the containment system, including but not limited to the Main Steam Isolation Valve - usually an air operated or motor operated valve used to isolate the steam source from the turbine.

5. **One heat removal system: Cooling Towers**

Entergy's Vermont Yankee Nuclear Power Plant has a unique cooling tower design unlike any other. ENVY has one single, safety related[1] and seismic[2] related cooling tower, which is attached to a single seismic tower, which in

[1] "In the regulatory arena, this term [safety related] applies to systems, structures, components, procedures, and controls of a [nuclear] facility... that are relied upon to remain functional during and following design-basis events. ["Design Basis Event - A postulated accident that a nuclear facility must be designed and built to withstand without loss to the systems, structures, and components necessary to assure public health and safety".]" The *safety related* "functionality ensures that key regulatory criteria, such as levels of radioactivity released, are met." *NRC Glossary, http://www.nrc.gov/reading-rm/basic-ref/glossary.html*

[2] Seismic refers to the "structures, systems, and components that are designed and built to withstand the maximum potential earthquake stresses for the particular region where a nuclear plant is sited" and built. *NRC Glossary, http://www.nrc.gov/reading-rm/basic-ref/glossary.html*

turn is attached to a bank of non-safety, non-seismic cooling towers. ENVY is further unique in that the two seismic cooling towers, one of which is safety related, serve a dual purpose of cooling the plant in its normal operating mode as well as during the critical period in the case of an accident. As a result, the recent failure of a non-safety related tower, and the ongoing concerns regarding missing design basis documents presented during the uprate hearing strongly suggest that the Comprehensive Vertical Audit include the seismic and safety related cooling towers.

6. **One Generic Issue: Cable Separation – Separation of Safety Systems:** Each nuclear power plant has at least two sets of completely redundant safety systems in order to be "single failure proof". In order for safety-related components to be fully redundant, they must be physically separated. Physical separation assures that common events, like a fire or broken pipe, do not simultaneously impair the function of both systems. Therefore, pumps, electrical motors and valves are usually placed in separate rooms to insure that such separation exists, and which is quite easy to inspect. Unfortunately, determining that an actual separation exists between the individual cables (wires), that provide power to the pumps as well as the signals to the sensors, is a much more difficult issue to address.

For safety reasons, most of the thousands of miles of wires and or cables are wrapped in protective fire retardant blankets. During the original nuclear power plant design phase, these fire retardant blankets were designed to hold only one set of these redundant cables (called a safety train), and in that manner thus assuring the necessary separation of these critically redundant safety systems. The industry has been dismayed to discover that at almost every nuclear plant in the country, both sets of cables where placed together inside the same fire retardant blanket at some point during the construction phase. This error presents serious problems, as a short circuit in one set of cables would then cause a failure in the second set of cables thereby negating

the single failure proof design that assures critically redundant safety features.

The ISA at Maine Yankee uncovered numerous situations in which the cables were not physically separated. As a result there was an industry-wide review of this cable separation problem. The industry-review of cable separation uncovered and corrected many instances where these critical safety cables were in fact not installed as designed and were bundled all together. Prior to Vermont Yankee's purchase by Entergy, the cable separation review was ostensibly performed at Vermont Yankee, which claimed to have found separation problems, and corrected all of them. Entergy also claims to have solved this cable separation issue. Yet on more than one occasion since Entergy purchased VY, it has discovered cables in the wrong location and in violation of the cable separation issue. Given that VY previously claimed to have solved this problem, new findings of improperly bundled cable are quite problematic.

Therefore it is our opinion that the cable separation issue should be addressed as the "sixth" slice in this Comprehensive Vertical Audit. Determining physical separation is not simply an academic exercise that may be accomplished by reviewing old records. Therefore it is critical in a redundant safety feature of this nature that an actual physical examination of the cables be performed by opening the protective blankets and observing whether all the cables are in the location as designed to assure safe shutdown. Such an exam would be required to occur while the unit is shutdown for refueling. While planning for this critical portion of the Audit requires the expertise of experienced electrical engineers, the actual physical inspection does not. Certified electrical inspector technicians, who are specifically hired for this purpose during an outage, normally perform inspections of this nature. Such certified inspector technicians are available on the open labor market specifically to support nuclear power plant outages.

The difficulty in this part of the Audit is the planning detail, which will take three experienced electrical and control engineers, approximately one month. During the outage, it will take three teams of three certified inspector technicians to do the hands-on effort, reporting to only one manager. These outage inspector team members normally work 60-hour weeks for approximately three to four weeks. The areas of possible cable separation near the control room require special attention. Even during an outage, such an examination requires a unique and timely interface with Entergy because there is fuel on site and in the reactor, thus only one safety train may be examined at a time. The other set of cables must be free to perform its safety function if called upon to manage the fuel, which should be sitting idle. Following the outage, the three initial engineers will be required to reconvene in order to assess the exam and the data and to prepare a report.

While the man-hours for this particular effort are the largest of all the six slices in this Audit, it is important be aware of the fact that most of these additional hours will not require additional NRC resources. The nine certified electrical inspectors used during the outage are not NRC employees, rather they are available through several companies who routinely provide these specifically trained inspector technicians.

At a minimum, a Comprehensive Vertical Audit (CVA) would entail the following and would begin with an Audit of Vermont Yankee's Initial Conditions:

1. What were the codes and standards with which the system was designed to comply?
2. What was the system designed to do? [This is most often called the Design Basis.]
3. Is the design of the system in keeping with the expected initial conditions?
4. Procurement:

- Do the components match the original design or were items changed during construction?
- If there were procurement changes, were a new set of review calculations completed for those procurement changes and were those procurement changes compared against the original design and all of its calculations?

5. Installation: [often referred to as As-Built]
   - Was the system installed to match the original design?
   - If not, what was the impact on safety and reliability systems?
   - Were the codes and standards modified to include any changes to the design?
   - Does the As-Built meet the original system design?
   - If not, what are the specific As-Built changes and how do those changes meet codes and standards?
   - Were new computer modeling systems for accident scenarios or for radiation monitoring designed with the As-Built in mind or do they only reflect the original on-paper design?
6. Operation:
   - Has the system operated as the designers had planned and anticipated?
   - What were the unanticipated operations' outcomes?
   - What changes or compensations have been made to accommodate unanticipated operations outcomes?
   - Have those changes, compensations, and accommodations been duly noted in procedure manuals as well as in operation manuals and logs?
   - Has a root cause analysis been conducted to reflect unanticipated outcomes?
   - If a root cause analysis was not conducted, why not?
   - If a root cause analysis was not conducted, presently look for root cause in order to determine if unanticipated system operations outcomes have been duly compensated for in all safety and reliability operations and procedures.
7. Testing:
   - Has the system undergone periodic tests to prove it is capable of meeting its design basis?

- If the system has not undergone periodic tests, why not?
- If the system has undergone periodic tests, have those tests been successful?
- Are any changes reflected in all documents from Design through As-Built through current operations?

8. Inspection:
   - Has the system undergone periodic inspections to prove it is capable of meeting its design basis?
   - If the system has not undergone periodic inspections, why not?
   - If the system has undergone periodic inspections, have those inspections been successful?
   - Are any changes reflected in all documents from Design through As-Built through current operations?
9. Maintenance: The Aging Management System is one of the most critical aspects of the operation of older nuclear power plants like Vermont Yankee.

   Thorough industry-wide research conducted under the supervision of the NRC's Nuclear Plant Aging Research (NPAR) Program has resulted in a large database of component and system operating, maintenance, and testing information. This database has been used to determine the susceptibility to aging of selected components, and the potential for equipment aging to impact plant safety and availability [reliability]. The NPAR database also identifies methods for detecting and mitigating component and system aging. The NRC has noted that ENVY is not adequately maintaining or reviewing its aging management system. This is of grave concern.

   - Has the system been maintained to assure it will meet its design basis?
   - Is there a track-change system in place to determine what components have been reviewed, repaired or replaced?
   - Is there an accurate system in place to record when those reviews and repairs were completed?
   - Is there a program of operations or a schedule of operations that specifically delineates what aging management systems, as identified in the industry-

wide database, are being reviewed and when?

- Is adequate time allowed in each outage for aging management review, or are those items neglected in order to shorten outage times in an effort to maximize corporate profit?
- Are the aging factors discovered actually being repaired in a timely manner?

10. Repairs:
    - Have repairs been performed which assure the system will operate as expected?
    - Are all repairs completed as soon as possible or are they postponed in an effort to save money and shortage outage times?
    - Are repairs in-depth repairs that really invest in the plant and its operational safety or simply a band-aid approach done in order to save time and money?
11. Modifications:
    - Do all modifications to the system also comply with the system's original design basis?
    - Have all procedure manuals and operations manuals been updated to reflect the impact of any modifications made to any system?
12. Redesign:
    - Have changes made to the plant since original construction been reviewed to ensure that safety margins have not been reduced?
    - Has each component modified for uprate been reviewed to assure that safety margins have not been reduced and to assure that design basis safety redundancy has not been compromised?
13. Training:
    - Has an adequate review and evaluation of operator training and operating procedures been conducted as a method of determining if the design criterion has been met?
    - Have operations personnel been adequately trained in modifications to all systems?
    - Are there frequent meetings among operators and engineers for the purpose of uncovering discrepancies or idiosyncrasies in actual operations compared

to what engineers and management anticipated?

- Are operations personnel frequently updated and trained on what troublesome issues other plants have uncovered which may compromise operations and safe shutdown?

14. This final step is a critical key to a CVA. The CVA Team must examine all corrective actions programs for each of the systems Audited in order to determine what modifications may have been deferred and why those corrective actions were in fact deferred. Nuclear licensees like Vermont Yankee perform "Operability Assessments" which seek to justify continued operation in accordance with guidance from NRC generic letter 91-18 (Guidance for Engineering Judgment). Reviewing operability assessments after a thorough understanding of all prior criteria, will enable the CVA Inspection Team and the Public to ascertain whether critical systems which require regular inspection and maintenance are not having those inspections or whether that maintenance is being postponed in an effort to shorten outages and maximize profit.

Note: It should be noted that the draft design criteria to which Vermont Yankee was built no longer exists. Those older design criteria were replaced in the mid-70s by more modern design criteria. The CVA would not Audit to the newer mid-70s design criteria, which would most likely be an impossible hurdle. Instead, the CVA would reflect VY's original design criteria (the Design Basis).

CVA Duration:

We estimate that an Audit of this nature would be completed in less than five months and encompass slightly less than 15,000 man-hours, with approximately 8,500 man-hours on site, and the remaining hours spent in preparation, establishing criteria, or in report analysis and preparation. The aforementioned 25,000-hour inspection at Maine was due to the identification of many previously uncovered problems. If Vermont Yankee has been paying attention to its Aging Management System, as it has stated, and has regularly updated all procedures and operations manuals, and adequately meets its design criteria, approximately only 60 percent of the Maine Yankee type ISA man-hours will be required to complete the CVA.

This Audit must begin at least one to two months prior to the 2008 Outage. At least three of the on-site weeks must take place during the 2008 Outage to allow visual inspection of systems like the Containment Systems and the Safety Injection Systems.

On Site Hours	People	Weeks	Hours	Total Hours
Diesel Generator	3 x	6 x	50	= 900
LPSI	4 x	6 x	50	= 1200
Feedwater Condensate	4 x	6 x	50	= 1200
Containment/ Isolation Valve	5 x	6 x	50	= 1500
Cooling Tower	3 x	6 x	50	= 900
Cable Separation NRC Technicians	 1 x [9 x	 6 x 4 x	 50 60	 = 300 = 2160]
Team Leader (Administrator)	1 x	6 x	50	= 300
Total Onsite NRC Inspectors[3]	30 people x 21 + 9	For up to 6 weeks		
Total Offsite	23 people x	*3 weeks to set criteria 4 weeks to report For 7* weeks Total x	40	= 2760 = 3680 = 6440
Total Man-hours				= 14,900

However, if problems are uncovered during the preliminary review, it will be necessary to expand the CVA via an IPA (In-depth Perpendicular Audit) to uncover the root cause of failures and discrepancies and assure all parties that neither the Safety nor the Reliability of Vermont Yankee has been compromised.

In-depth Perpendicular Audit (IPA) Threshold Criteria

In the event that the results from each section of the Comprehensive Vertical Audit begin to show that a specific area contains a disproportionate number of Audit findings, there will be a clearly delineated and predetermined threshold for initializing the In-depth Perpendicular Audit.

[3] NRC offsite personnel exceed NRC onsite personnel because two cable separation experts are not required onsite during the outage while 9 non-NRC technicians perform cable separation inspections.

At what point do the results of the six vertical audits trigger a perpendicular audit of other similar areas in other systems beyond the original scope of the CVA? We believe that an In-depth Perpendicular Audit should be automatically triggered of at least four other systems not originally covered by the initial CVA when a single topic area within any Vertical Audit shows a pattern of either:

- three "green" findings, or
- two "white" findings, or
- two "green" and one "white" finding or
- a single "yellow" finding.*

Note: The Audit Color Code is already defined by the NRC regulations. This broadening of the original scope would be appropriate, given the appearance of a meaningful cluster of Audit findings in a single Audited area.

Composition and Size of Inspection Team

The CVA team assigned to the Audit would consist of 23 NRC inspectors for the complete six-system CVA and at least two specifically-named independent observers who are Vermont residents with nuclear expertise as well as a State and/or Legislative Representative.

The two proposed nuclear experts who reside in Vermont are former NRC Commissioner Peter Bradford and Nuclear Safety Expert Arnie Gundersen.

- In addition to his 5-year term as a Commissioner for the NRC, Commissioner Bradford was the Commission Chair on both the Maine and New York State Public Service Boards and teaches nuclear power and public policy at both Yale and Vermont Law School.
- Mr. Gundersen is a nuclear engineer, former nuclear industry senior vice-president, and former licensed reactor operator, who is the only independent nuclear engineer to review most of ENVY's 200,000 pages of documents provided through discovery for ENVY's uprate license application and hearings.

The Vermont Department of Public Service (DPS) may also wish to have its state nuclear engineer added as an observer, and the PSB and/or the State Legislature and/or Windham Regional Council may also wish to add an observer.

NRC Team Composition

- The NRC CVA will report directly to the Commission.
- None of the NRC team members will have previously worked Vermont Yankee in any capacity, either as a NRC employee, VY employee or independent contractor.
- No Region 1 personnel
- No personnel from NRR (Nuclear Reactor Regulation)

Availability of Documents:

An important distinction between the ENVY CVA and the MY ISA is that there have been significant improvements in information technology that allow for the rapid access to and the dissemination of documents. This should improve the overall efficiency of the CVA Team effort. These technological improvements will also allow for easy electronic access by the public to the CVA Report after it is completed. The ISA team for MY produced a 70-plus page report that was made publicly available. That report cited dozens, perhaps hundreds, of documents reviewed at Maine Yankee by the ISA team but unable to be viewed by the public.

With the technological changes in information systems, it should be relatively easy for the CVA report, output and inputs to be linked via the NRC website and other websites as a final work product available for public access.

Citizen Review Panel

Finally, as many of the issues discussed herein relate to public confidence, the final report from the Comprehensive Vertical Audit will be submitted to a Citizen Review Panel for comments. The Citizen Review Panel's comments would be submitted to the State Legislature along with the CVA for review in preparation for ENVY's license extension. The Citizen Review Panel's comments would be available to the general public and meet the legislature review timetable. Accordingly, a Legislative Task Force would be designated to create this Citizen Review Panel which at a minimum would include one member from each of the citizen interest groups, one member from each group that has been an intervenor in the process, key legislators who are part of the ENVY oversight