

STATE OF VERMONT
PUBLIC SERVICE BOARD

Petition of Entergy Nuclear Vermont Yankee, LLC, and)
Entergy Nuclear Operations, Inc., for amendment of their)
certificates of public good and other approvals required)
under 10 V.S.A. §§ 6501-6504 and 30 V.S.A. §§ 231(a),) Docket No. _____
248 & 254, for authority to continue after March 21, 2012,)
operation of the Vermont Yankee Nuclear Power Station,)
including the storage of spent-nuclear fuel)

SUMMARY OF PREFILED TESTIMONY OF WILLIAM A. CLOUTIER, JR.

Mr. Cloutier's testimony presents the most recent decommissioning-cost analysis prepared by TLG Services, Inc., for Entergy VY which provides the estimated costs associated with a 2032 shutdown of the VY Station under several scenarios. Mr. Cloutier also provides information regarding the financial requirements for the VY Station's decommissioning and its storage and ultimate disposition of spent-nuclear fuel.

Mr. Cloutier sponsors the following exhibits:

Exhibit EN-TLG-1	Resume of William A. Cloutier, Jr.
Exhibit EN-TLG-2	Decommissioning Cost Analysis for the Vermont Yankee Nuclear Power Station, January 2007
Exhibit EN-TLG-3	Decommissioning Funding Requirements

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PREFILED TESTIMONY OF WILLIAM A. CLOUTIER, JR.

- 1 Q1. State your name and business address.
- 2 A1. William A. Cloutier, Jr., 148 New Milford Road East, Bridgewater, CT 06752.
- 3 Q2. On whose behalf are you testifying?
- 4 A2. I am testifying on behalf of Entergy Nuclear Vermont Yankee, LLC, and Entergy
5 Nuclear Operations, Inc. (collectively referenced by me as “Entergy VY”).
- 6 Q3. What is your occupation?
- 7 A3. I am the Manager of Decommissioning Services at TLG Services, Inc. (“TLG”), an
8 engineering and field-services company. TLG is the leading provider of
9 decommissioning-cost and planning services to the nuclear industry in North America.
10 As Manager of Decommissioning Services, I am responsible for the technical and
11 business management of engineering-consulting services in the area of decommissioning
12 planning for nuclear-generating stations. In addition, I have been directly involved with
13 TLG’s development of decommissioning-cost estimates for the Vermont Yankee Nuclear
14 Power Station (to which I will refer as the “VY Station” or “Station”) since 1989, and I

1 served as Project Manager for the 2001 and 2007 decommissioning-cost estimates
2 undertaken on behalf of the Station's prior owner, Vermont Yankee Nuclear Power
3 Corporation (or "VYNPC") and for Entergy VY, respectively.

4 Q4. Is TLG affiliated with Entergy VY?

5 A4. TLG is not directly affiliated with Entergy VY. However, TLG is a wholly-owned
6 subsidiary of Entergy Nuclear, Inc.

7 Q5. Have you previously testified before the Vermont Public Service Board?

8 A5. Yes. I submitted Prefiled Rebuttal Testimony, dated December 12, 2005, on behalf of
9 Entergy VY in Docket No. 7082, which considered the adequacy of financial assurances
10 for decommissioning the VY Station, including long-term storage of spent-nuclear fuel
11 (or "SNF"), in the context of authorizing Entergy VY to construct a dry-fuel-storage (or
12 "DFS") facility at the VY Station. I testified on February 1, 2006, at the technical
13 hearings in that docket. My testimony discussed the costs for management of SNF in the
14 context of alternative decommissioning scenarios and responded to the Department of
15 Public Service's testimony on the reasonableness of the financial assurances that Entergy
16 VY had made in its initial testimony.

17
18 I also submitted Prefiled Rebuttal Testimony, dated February 25, 2002, on behalf of
19 VYNPC in Docket No. 6545, which considered the proposed sale of the VY Station to
20 Entergy VY. I subsequently testified on April 1, 2002, at the rebuttal hearings in Docket
21 No. 6545. My testimony discussed the 2001, decommissioning-cost estimate that TLG

1 prepared for VYNPC and responded to arguments raised by the Department concerning
2 the reasonableness of the 2001 TLG decommissioning-cost estimate for the Station.

3
4 In addition, I submitted Prefiled Rebuttal Testimony, dated May 31, 2000, on behalf of
5 VYNPC in Docket No. 6300, which considered the proposed sale of the VY Station to
6 AmerGen Energy Company, LLC. I subsequently testified on June 8, 2000, at the
7 rebuttal hearings in Docket No. 6300. My testimony in Docket No. 6300 responded to
8 issues raised by the Department and intervenor parties concerning the reasonableness of
9 the 1999, TLG decommissioning-cost estimate for the VY Station.

10 Q6. What is your educational and professional background?

11 A6. I completed my BSME at Worcester Polytechnic Institute of Worcester, Massachusetts,
12 in 1977. From 1977 to 1980, I was employed as a Radwaste Engineer with EBASCO
13 Services. In 1980, I joined Nuclear Energy Services in Danbury, Connecticut, as a Waste
14 Management Engineer. In July 1983, I moved to TLG, where I have been employed in
15 various positions for the last 24 years. Exhibit EN-TLG-1 is my resume.

16 Q7. What is the purpose of your testimony in this proceeding?

17 A7. The purpose of my testimony is to address the estimated cost of decommissioning the VY
18 Station in the event that Entergy VY is licensed to operate the Station for an additional 20
19 years, or until 2032, including the estimated cost of storing SNF at the VY Station in the
20 event the Department of Energy (or "DOE") does not fulfill its obligation to complete
21 pick up of SNF until 2057 or 2082. In addition, my testimony addresses the financial-
22 assurances issue and shows the level of return that Entergy VY needs to achieve, based

1 on reasonable assumptions and information provided to me by Entergy VY regarding the
2 market value of the qualifying and non-qualifying trust funds as of September 30, 2007,
3 to have sufficient resources in these funds for decommissioning the VY Station,
4 including long-term interim storage of SNF, under various scenarios assuming a 2032
5 shutdown date.

6 Q8. Please describe the most recent decommissioning-cost analysis TLG has prepared for the
7 VY Station.

8 A8. TLG completed its most recent decommissioning-cost analysis for the VY Station in
9 December 2006 (issued in January 2007). Exhibit EN-TLG-2 is a copy of the 2007
10 decommissioning-cost analysis. The 2007 analysis evaluated an array of
11 decommissioning scenarios that reflected differences in the operating life of the plant, the
12 decommissioning alternative selected as well as expectations on when the DOE will
13 complete the transfer of SNF from the site.

14 Q9. What is the objective in preparing a decommissioning-cost analysis?

15 A9. A decommissioning-cost analysis is prepared to evaluate and capture the cost(s) to
16 decontaminate and dismantle a nuclear facility for one or more scenarios for the purpose
17 of establishing the revenue requirements to complete such scenario(s). The results can be
18 used to support financial planning, rate recovery (if available) or decision-making
19 regarding the ultimate disposition of a facility.

20 Q10. How are the decommissioning scenarios established?

21 A10. Typically, a scenario is based upon one or a combination of the NRC's approved
22 decommissioning alternatives: DECON (prompt decommissioning) or SAFSTOR

1 (deferred decommissioning). Site- and facility-specific requirements are also considered
2 in developing a scenario including decontamination and dismantling requirements, site-
3 remediation requirements and process constraints (*e.g.*, on spent-fuel caretaking).

4 Q11. Is there a standard process or procedure followed in developing a decommissioning-cost
5 analysis?

6 A11. Yes. An analysis is prepared following standardized and industry-accepted processes and
7 practices. The methodology used to develop a cost estimate follows the basic approach
8 originally presented in the cost-estimating guidelines (AIF/NESP-036) developed by the
9 Atomic Industrial Forum (now Nuclear Energy Institute) as well as recommendations
10 provided in Regulatory Guide 1.202 (Standard Format and Content of Decommissioning
11 Cost Estimates of Decommissioning Cost Estimates for Nuclear Power Reactors).

12 Q12. Please describe the general process of preparing a decommissioning-cost analysis.

13 A12. Costs are accumulated for direct activities (*e.g.*, decontaminating, removing, packaging,
14 transporting and disposing of a contaminated pump or other plant commodity), managing
15 the project (*e.g.*, supervision, technical support and logistical support), site operations
16 (*e.g.*, energy consumption, facility maintenance, security, support services, supplies and
17 administration) and other costs such as licensing and emergency planning fees and
18 insurance. Costs are based upon current site economic information (*e.g.*, labor
19 agreements, waste-disposal-service contracts, salaries, operating budgets, etc.) and the
20 expected plant condition at the time operations cease (*e.g.*, reactor-vessel activation levels
21 and spent-fuel inventories). Contingency is added to account for unforeseeable events
22 that will increase costs and are likely to occur. Additional information on the process,

1 and more importantly, the assumptions relied upon in developing the estimates is
2 provided within Exhibit EN-TLG-2.

3 Q13. Is the analysis specific to the VY Station?

4 A13. Yes. The plant inventory and working conditions were originally established by two
5 experienced, TLG cost estimators with extensive decommissioning experience, working
6 at the site over a two-month period in 1998. The data collected by these individuals has
7 been reviewed and updated as necessary for the 2001 and 2007 analyses.

8 Q14. For purposes of the analysis, when was the nuclear unit assumed to cease operation
9 permanently?

10 A14. Scenarios were developed for two possible shutdown dates at the end of the VY Station's
11 current operating license in 2012 and assuming a 20-year extension of the current license
12 with shutdown in 2032.

13 Q15. Which decommissioning alternatives were considered?

14 A15. The analysis evaluated both prompt (DECON) and deferred (SAFSTOR)
15 decommissioning alternatives. For the SAFSTOR analyses, the storage period was based
16 upon either the time required to complete the transfer of SNF from the site or completing
17 the decommissioning process and terminating the operating license within the NRC-
18 specified, 60-year period (in an extended, spent-fuel-storage scenario).

19 Q16. When was the pickup of SNF from the Vermont Yankee site expected to be completed?

20 A16. The analysis considered three possible dates. Assuming that the DOE begins to accept
21 SNF from commercial reactors in 2017, Entergy VY projected that the transfer of fuel
22 from the Vermont Yankee site could be completed in years 2042 and 2057 for a 2012 and

1 2032 shutdown, respectively. The third possible date of completion (2082) was based
 2 upon the position of the Vermont Department of Public Service in Docket No. 7082.

3 Q17. Can you summarize the results of TLG's 2007 analysis?

4 A17. Yes. The following chart summarizes the scenarios considered and the cost estimates for
 5 each scenario.

6

Scenario	Shutdown	Option	1 st Spent Fuel Assembly Pickup	Last Spent Fuel Assembly Pickup	Cost millions \$06
1	2012	DECON	2017	2042	728.146
2	2032	DECON	2017	2057	655.528
3	2012	DECON	2057	2082	893.379
4	2032	DECON	2042	2082	815.315
5	2012	SAFSTOR	2017	2042	803.732
6	2032	SAFSTOR	2017	2057	717.372
7	2012	SAFSTOR	2057	2082	991.115
8	2032	SAFSTOR	2042	2082	932.380

7

8 Q18. What scenarios are relevant for purposes of considering continued operation of the VY
 9 Station?

10 A18. Scenarios 2, 4, 6 and 8 are most relevant to the extent they consider the costs of
 11 alternative scenarios assuming a 2032 shutdown date for the VY Station. Scenarios 2 and
 12 4 examine the DECON, or immediate decommissioning, alternative assuming different
 13 dates for final transfer of SNF to DOE. Scenarios 6 and 8 examine the SAFSTOR
 14 alternative, again assuming different dates for the final transfer of SNF.

15 Q19. Please describe the processes and time-lines that would be followed in the four scenarios
 16 which assume a 2032 shutdown?

1 A19. There are two primary differences in the four scenarios, associated with the assumed
2 disposition of SNF and the timing of the active decommissioning phase.

3
4 In Scenarios 2 and 6, the DOE is assumed to commence acceptance of SNF from the
5 commercial nuclear industry beginning in 2017. On the basis that fuel would be received
6 based upon its date of discharge (oldest fuel first) and that the geologic repository would
7 be able to accommodate 3,000 metric tons of fuel annually, Entergy VY expects that the
8 VY Station SNF could be removed from the site by the year 2057. In Scenario 2,
9 decommissioning would commence immediately after the cessation of plant operations
10 (in 2032). The SNF residing in the storage pool would be relocated to an existing Interim
11 Spent Fuel Storage Installation (or "ISFSI"). The remaining facilities on site would be
12 decontaminated and dismantled as described in Exhibit EN-TLG-2. ISFSI operations
13 would continue at the site until the last of the fuel has been transferred to the DOE. In
14 Scenario 6, the plant would be placed into safe-storage until the SNF is removed from the
15 site (in 2057). Once the transfer is completed, decommissioning operations would
16 commence. The site would be available for alternative use (license terminated and site
17 restored) in years 2058 and 2065 for Scenarios 2 and 6, respectively.

18
19 In Scenarios 4 and 8, the removal of SNF from the Vermont Yankee site is not expected
20 to be completed until 2082 (DPS Scenario). As in Scenario 2, decommissioning would
21 commence in Scenario 4 immediately after the cessation of plant operations (in 2032).
22 The SNF residing in the storage pool would be relocated to a newly-constructed ISFSI.

1 The remaining facilities on site would be decontaminated and dismantled as described in
2 Exhibit EN-TLG-2. ISFSI operations would continue at the site until the last of the SNF
3 has been transferred to the DOE. In Scenario 8, the plant would be placed into safe-
4 storage until the SNF is removed from the site (in 2082). Once the transfer is completed,
5 decommissioning operations would commence. The site would be available for
6 alternative use (license terminated and site restored) in years 2083 and 2090 for Scenarios
7 4 and 8, respectively.

8 Q20. Why do Scenarios 4 and 8 require the construction of an additional ISFSI?

9 A20. Scenarios 4 and 8 assume that there is a significant delay in the acceptance of SNF by the
10 DOE (*i.e.*, that no SNF would be accepted from the VY Station site during plant
11 operations). As such, additional pad capacity would be needed to accommodate the pool
12 inventory at shutdown.

13 Q21. Has the recent uprate in power been considered in the decommissioning-cost analyses?

14 A21. Yes. The uprate has been considered to the extent that there will be additional activation
15 of the reactor vessel and associated components and additional fuel assemblies
16 discharged during plant operations. There were no significant plant modifications for the
17 uprate (*i.e.*, one-for-one replacements or component upgrades do not affect the overall
18 inventory of components that need to be addressed during decommissioning). While
19 Entergy VY expects small increases in the volume of waste produced during plant
20 operation, there were no changes expected in the design or operation of the gaseous,
21 liquid or solid-waste systems. As such, the configuration and status of the plant systems

1 is not expected to change (meaning increase) the dismantling and disposition
2 requirements during decommissioning.

3 Q22. As you previously stated, this decommissioning analysis was completed in December
4 2006. Please discuss any facts that have developed since December 2006, either at the
5 VY Station or in the industry, that would affect the estimates contained in the 2007
6 analysis and describe how TLG's estimates would be affected.

7 A22. The analysis remains a reasonable and current (excluding inflation) assessment of the
8 financial liabilities associated with the identified scenarios. There have been no
9 significant changes to the physical plant configuration that would impact
10 decommissioning. The DOE still maintains 2017 as achievable for initiating receipt of
11 the industry's SNF, and Entergy Nuclear has recently entered into a "Life of Plant
12 Agreement" with EnergySolutions that will provide a more stable and predictable basis
13 for waste-disposal rates. As such, I would expect that any change in the estimate over the
14 past year would be due to effects of general inflation.

15 Q23. Please describe the financial analysis that you have undertaken on behalf of Entergy VY
16 in this docket and the assumptions underlying that analysis.

17 A23. I analyzed the financial requirements associated with the four identified decommissioning
18 scenarios assuming a 2032 shutdown of the VY Station and the return on investment
19 necessary to fund each scenario. The analysis relied upon the 2007, decommissioning-
20 cost analysis for the VY Station and Entergy VY's Decommissioning Trust Fund Report,
21 dated September 30, 2007, as reported to the Department.

22

1 For purposes of comparison, I also conducted a similar financial-requirements analysis
 2 for the four decommissioning scenarios in the 2007 analysis that assume a 2012
 3 shutdown date.

4 Q24. Please provide the results of your analysis.

5 A24. As shown in Exhibit EN-TLG-3 and summarized in the chart that follows, rates of return
 6 of between 4.17% and 4.98% will be required on the decommissioning-trust funds to
 7 accomplish decommissioning assuming a 2032 shutdown of the VY Station and
 8 continued storage of SNF until 2057 or 2082. In contrast, rates of return of between
 9 5.47% and 8.85% will be required on the decommissioning-trust funds to accomplish
 10 decommissioning assuming a 2012 shutdown of the VY Station and continued storage of
 11 SNF until 2057 or 2082.

12

Scenario	2	4	6	8
Shutdown Date	2032	2032	2032	2032
Decommissioning Alternative	DECON	DECON	SAFSTOR	SAFSTOR
Spent Fuel Off Site	2057	2082	2057	2082
Cost Estimate (millions 2006 \$)	655.53	815.32	717.37	932.38
Rate of Return Required	4.42%	4.98%	4.17%	4.45%

13

Scenario	1	3	5	7
Shutdown Date	2012	2012	2012	2012
Decommissioning Alternative	DECON	DECON	SAFSTOR	SAFSTOR
Spent Fuel Off Site	2042	2082	2042	2082
Cost Estimate (millions 2006 \$)	728.15	893.38	803.73	991.12
Rate of Return Required	8.66%	8.85%	5.67%	5.47%

14

1 Q25. How do the required returns you have calculated compare to the historical rates of return
2 on the decommissioning-trust funds?

3 A25. According to information provided by Entergy VY, the decommissioning-trust funds
4 grew at an after-tax annual rate of 6.33% from July 31, 2002, to September 30, 2007.

5 Q26. What conclusions do you draw from your analysis of decommissioning and SNF storage
6 costs as compared to the present size of the decommissioning-trust funds and rate-of-
7 return requirements just identified?

8 A26. First, it is clear that under reasonable assumptions the Vermont Yankee
9 decommissioning-trust funds will be sufficient to decommission the VY Station safely
10 and completely, to restore the site to green-field condition and to store safely SNF until
11 final transfer to DOE. Based on my analysis, it is more likely that the decommissioning-
12 trust funds will be sufficient to implement DECON, or an immediate decommissioning of
13 the Station, if the Station operates to 2032 as opposed to a 2012 shutdown date, based
14 upon the current fund balance and historical rate of return. This is so because not only
15 will the decommissioning-trust funds have 20 additional years to grow, but Entergy VY
16 will be funding ongoing SNF storage costs during the 20-year period through operating
17 revenues as opposed to utilizing decommissioning-trust funds.

18

19 If the VY Station is decommissioned in 2032, it will also benefit from the
20 decommissioning of other reactors in the Entergy fleet (two similar boiling-water
21 reactors, Pilgrim and Fitzpatrick, would be scheduled for decommissioning in 2032 and
22 2034, respectively, assuming license renewal). The additional 20 years of plant

1 operations will also allow the maturation of the DOE's waste-management system and
2 the logistics of fuel acceptance (e.g., packaging and transportation).

3 Q27. Does this conclude your testimony?

4 A27. Yes, it does.