

State of Vermont
Public Service Board

Docket No. 6545

Investigation in General Order No. 45)
Notice filed by Vermont Yankee Nuclear)
Power Corporation re: proposed sale)
of Vermont Yankee Nuclear Power Station)
and related transactions)

PREFILED TESTIMONY OF
DAVID A. SCHLISSEL
ON BEHALF OF THE
VERMONT DEPARTMENT OF PUBLIC SERVICE

Synapse Energy Economics, Inc.
22 Pearl Street, Cambridge, MA 02139

January 7, 2002

REDACTED

Summary: Mr. Schlissel's testimony addresses the likely future operating performance and costs of Vermont Yankee and the issues of completing a power uprate and extending the plant's operating life.

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List of Exhibits

Exhibit DPS-DAS-1	Resume of David A. Schlissel
Exhibit DPS-DAS-2	Vermont Yankee’s Board-approved 2002 Operating and Capital Budgets and 2002-2004 Three Year Operating and Capital Forecast – Provided in Vermont Yankee’s Response to DPS Information Request No. 1-22
Exhibit DPS-DAS-3	Paper on Power Uprates presented at the August 21, 2001 Meeting of Vermont Yankee’s Nuclear Oversight Committee - Provided in Vermont Yankee’s Response to DPS Information Request No. 1-47
Exhibit DPS-DAS-4	Article from August 23, 2001 issue of <u>Nucleonics Week</u> , entitled, “Entergy to Boost Vermont Yankee Output by 10% After Sale Closing”
Exhibit DPS-DAS-5	Paper on License Renewal presented at the August 21, 2001 Meeting of Vermont Yankee’s Nuclear Oversight Committee - Provided in Vermont Yankee’s Response to DPS Information Request No. 1-47

1 **1. Qualifications**

2 Q. State your name, occupation and business address.

3 A. My name is David A. Schlissel. I am a Senior Consultant at Synapse Energy
4 Economics, Inc., 22 Pearl Street, Cambridge, Massachusetts, 02138.

5

6 Q. On whose behalf are you testifying in this case?

7 A. I am testifying on behalf of the Vermont Department of Public Service
8 (“DPS”).

9

10 Q. Please describe Synapse Energy Economics.

11 A. Synapse Energy Economics (“Synapse”) is a research and consulting firm
12 specializing in energy and environmental issues, including electric generation,
13 transmission and distribution system reliability, market power, electricity market
14 prices, stranded costs, efficiency, renewable energy, environmental quality, and
15 nuclear power.

16

17 Q. Please summarize your educational background and recent work experience.

18 A. I graduated from the Massachusetts Institute of Technology in 1968 with a
19 Bachelor of Science Degree in Engineering. In 1969, I received a Master of
20 Science Degree in Engineering from Stanford University. In 1973, I received a

1 Law Degree from Stanford University. In addition, I studied nuclear engineering
2 and project management at the Massachusetts Institute of Technology during the
3 years 1983-1986.

4 Since 1983, I have been retained by governmental bodies, publicly-owned
5 utilities and private organizations in 24 states to prepare expert testimony and
6 analyses on engineering and economic issues related to electric utilities. My
7 clients have included the Staff of the California Public Utilities Commission, the
8 Staff of the Arizona Corporation Commission, the General Staff of the Arkansas
9 Public Service Commission, municipal utilities in Massachusetts, New York,
10 Texas, and North Carolina, and the Attorneys General of the Commonwealth of
11 Massachusetts and the State of Illinois.

12 I have testified before state regulatory commissions in Arizona, New
13 Jersey, Connecticut, Kansas, Texas, New Mexico, New York, Vermont, North
14 Carolina, South Carolina, Maine, Illinois, Indiana, Ohio, Massachusetts, Missouri,
15 and Wisconsin, and before an Atomic Safety & Licensing Board of the U.S.
16 Nuclear Regulatory Commission.

17 A copy of my current resume is attached as Exhibit DPS-DAS-1.

18

19 Q. Have you testified previously before the Vermont Public Service Board?

20 A. Yes. I have testified in Vermont Public Service Board Dockets 4865 and

1 6300.

2 **2. Summary and Recommendations**

3 Q. What issues does your testimony address?

4 A. My testimony addresses a number of engineering issues related to the
5 proposed sale of the Vermont Yankee Nuclear Plant to Entergy Nuclear Vermont
6 Yankee and provides the bases for nuclear performance and cost-related input
7 assumptions used in Synapse’s analyses of the proposed sale:

- 8 * Vermont Yankee’s likely future operating performance and costs.
- 9 * The issue of achieving a power uprate at Vermont Yankee.
- 10 * The issue of extending Vermont Yankee’s operating license beyond 2012.
- 11 * Whether all feasible alternatives to the sale were adequately considered by
12 Vermont Yankee Nuclear Power Corporation (“VYNPC”).

13

14 Q. Please summarize your conclusions.

15 A. My conclusions are as follows:

- 16 1. Vermont Yankee’s projected annual capacity factors of 96.1 percent
17 during non-refueling outage years and 84.9 percent during the years in
18 which there are refueling outages appears reasonable based on the plant’s
19 very good operating performance over the past decade.
- 20 2. Vermont Yankee is currently on an eighteen month refueling cycle which

- 1 means that there are two refueling outages every three calendar years.
- 2 3. Other nuclear power plants similar to Vermont Yankee in design and
3 vintage have changed or are in the process of changing to twenty-four
4 month refueling cycles which mean one refueling outage every two years.
- 5 4. I have seen no evidence that Vermont Yankee's current owners would not
6 be able to implement a twenty-four month refueling cycle if they maintain
7 ownership of the plant.
- 8 5. Changing to a twenty-four month refueling cycle would provide additional
9 economic benefits to the current Vermont Yankee owners if they maintain
10 their ownership by improving the plant's average annual capacity factor
11 and by eliminating one refueling outage between 2002 and 2012.
12 Therefore, changing to a twenty-four month cycle would improve the
13 relative economics of continued ownership as compared to the proposed
14 sale to Entergy.
- 15 6. The annual Vermont Yankee capacity costs for the years 2002 to 2004
16 used by VYNPC witness Wiggett in the own and operate analysis in
17 Exhibit BW-9 are unreasonably high when compared to VYNPC's current
18 2002 Operating and Capital Budgets and its Three Year Operating and
19 Capital Forecast. The use of these overstated capacity costs biases his
20 analyses in favor of the sale to Entergy.

- 1 7. It is reasonable to expect that the capacity costs in Exhibit BW-9 for the
2 years after 2004 are also too high.
- 3 8. The future refueling outage costs used by Mr. Wiggett also are too high
4 because they fail to reflect the actual cost of Vermont Yankee's 2001
5 refueling outage.
- 6 9. It is unclear whether the projected base operating, operating project, and
7 shutdown project expenditures used by Mr. Wiggett reflect the significant
8 reductions in total employee and contractor staffing that VYNPC has
9 projected would occur during the years 2000-2002.
- 10 10. I have seen no reason why VYNPC could not achieve many of the same
11 O&M and other cost savings that Entergy is claiming it would be able to
12 achieve.
- 13 11. VYNPC's projected higher operating and capital costs as a result of the
14 events of September 11, 2001 appear reasonable.
- 15 12. Twenty other Boiling Water Reactor nuclear power plants ("BWRs") have
16 implemented power uprates. Applications are currently pending before
17 the NRC to raise the power levels of a number of BWRs similar in design
18 and vintage to Vermont Yankee by as much as 15 to 20 percent. It is
19 anticipated that other BWRs similar in design and vintage to Vermont
20 Yankee also will seek NRC approval in the near future to implement

1 similar extended power uprates.

2 13. It is reasonable to assume that the current Vermont Yankee owners could
3 achieve an uprate in the range of thirteen to fifteen percent given the
4 experience of other BWRs and trends in the industry. In fact, VYNPC has
5 acknowledged that a thirteen percent uprate may be a reasonable cost-
6 effective uprate that could be achieved at Vermont Yankee based on
7 industry-trends for plants of Vermont Yankee's vintage.

8 14. The NRC has approved the applications by three utilities to extend the
9 operating licenses of six nuclear units by twenty years beyond the
10 expiration of their initial NRC-issued operating licenses. Seven other
11 applications are currently under review by the NRC. Another sixteen such
12 license renewal applications for twenty four units are expected to be
13 submitted to the NRC during the next three years. A significant number
14 of the plants with license renewal applications currently under review by
15 the NRC or expected to be filed during the next three years are BWRs
16 similar to Vermont Yankee in design and vintage.

17 15. The cost of seeking and obtaining NRC approval for extending a nuclear
18 power plant's operating license is relatively minor, i.e., on the order of
19 \$10-20 million, compared to the potential economic benefits that an
20 additional twenty years of operating revenues would provide.

1 16. Based on trends in the industry and the NRC's recent approval of
2 extended operating licenses for several plants, I believe that license
3 renewal is a possibility that needs to be considered in economics analyses
4 of the proposed sale to Entergy.

5 17. VYNPC, CVPS, and GMP have not adequately considered all reasonable
6 alternatives to the sale because they did not investigate the potential costs
7 and benefits of retaining an experienced firm to manage Vermont Yankee
8 for the current owners.

9 18. It is reasonable to expect that the current Vermont Yankee owners also
10 could retain an experienced firm to manage the plant's decommissioning
11 and thereby achieve significant cost savings.

12
13 Q. Please summarize the recommendations that you have made to Mr. Biewald
14 concerning the nuclear performance and cost-related inputs to be used in
15 Synapse's analyses of the proposed sale to Entergy.

16 A. I made the following recommendations to Mr. Biewald:

17 1. I recommended that Mr. Biewald use Vermont Yankee's projected 96.1
18 percent (non-refueling years) and 84.9 percent (refueling years) capacity
19 factors in Synapse's base case analyses. I also recommended that Mr.
20 Biewald perform sensitivity analyses with capacity factors \pm 5 percentage

- 1 points of these base case figures.
- 2 2. I recommended that Mr. Biewald reduce Mr. Wiggett's non-refueling year
3 O&M expenditures by \$3 million and refueling year O&M expenditures
4 by \$5 million to reflect conservative savings that could be achieved by the
5 current Vermont Yankee owners. I also recommended that Mr. Biewald
6 perform sensitivity analyses which reflect no O&M savings and savings
7 that are roughly double these base case reductions. I further recommended
8 that Mr. Biewald include a one-time capital expenditure of \$1.1 million
9 2002 and increase annual O&M expenditures by \$1.5 million starting in
10 2002 to reflect heightened security requirements following the events of
11 September 11, 2001.
- 12 3. To evaluate the potential negative impacts of nuclear power plant aging I
13 recommended that Mr. Biewald perform a sensitivity analysis that (1)
14 reduces Vermont Yankee's project annual capacity factors by one
15 percentage point each year after 2012 and (2) increases plant O&M costs
16 each year after 2012 at a rate one percent above the rate of inflation.
- 17 4. I recommended that Mr. Biewald assume that the current Vermont Yankee
18 owners would complete a thirteen percent power uprate in three stages – a
19 five percent uprate in mid-2003, a second five percent uprate in early
20 2004, at the end of the plant's cycle 24 refueling outage, and the final

1 three percent uprate in October 2005. I also recommended that Mr.
2 Biewald use VYNPC's estimated costs of such a thirteen percent power
3 uprate.

4 5. I recommended that Mr. Biewald use VYNPC's current estimate that it
5 would cost \$20 million to seek and obtain NRC approval for a twenty year
6 extension of Vermont Yankee's operating license.

7
8 **3. Vermont Yankee's Likely Future Operating Performance and**
9 **Costs**

10
11 **Vermont Yankee's Likely Future Operating Performance**

12 Q. What capacity factors does VYNPC assume for the remaining years of Vermont
13 Yankee's operating life in its economic analyses of the proposed sale to Entergy?

14 A. VYNPC projects in its continued own and operate analysis that under the
15 current ownership Vermont Yankee would achieve a 96.1 percent capacity factor
16 during non-refueling outage years and an 84.9 percent capacity factor during the
17 years in which there are refueling outages.

18 Vermont Yankee is currently on an eighteen month refueling cycle. This
19 means that there is one refueling outage every eighteen months and two outages
20 every three calendar years. As a result, the 96.1 percent and 84.9 percent capacity
21 factors used by VYNPC for outage and non-outage years translate into an 88.6
22 percent average annual capacity factor.

1

2 Q. Are these reasonable capacity factors to use when evaluating the proposed sale?

3 A. Yes. These capacity factors appear reasonable given the plant's very good
4 operating performance over the past decade.

5

6 Q. Does VYNPC assume that the plant would continue to achieve these same annual
7 capacity factors if its operating license were renewed by the NRC and it was able
8 to continue operating beyond 2012?

9 A. Yes. VYNPC projects that Vermont Yankee would operate at the same
10 capacity factors during the years after 2012 as it does during the years 2001
11 through 2012.

12

13 Q. In your opinion is this a reasonable assumption?

14 A. At this time I see no reason why Vermont Yankee could not continue to
15 achieve excellent operating performance for at least some of the years after 2012
16 if VYNPC, or whatever party owns the plant, is diligent about managing and
17 addressing the potential negative effects of plant aging. However, it also is
18 possible that the plant's capacity factors will start to decline at some point as a
19 result of the negative effects of aging.

20

21 Q. What are Entergy's projected capacity factors for Vermont Yankee?

22 A. Entergy has projected that it would be able to achieve 95 percent capacity

1 factors during non-outage years and 88.5 percent capacity factors during those
2 years when there is a refueling outage.

3
4 Q. Would Entergy keep Vermont Yankee on an eighteen month refueling cycle?

5 ***** [BEGIN CONFIDENTIAL]*****

6 A.

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13 ***** [END CONFIDENTIAL]*****

14 Q. Have other nuclear power plants similar in design and vintage to Vermont Yankee
15 changed to twenty-four month refueling cycles?

16 A. Yes. A number of BWRs similar in design and vintage to Vermont
17 Yankee, including Hatch Units 1 and 2, Peach Bottom Unit 3, Browns Ferry Unit
18 2, Browns Ferry Unit 3, and Duane Arnold, either are currently operating on
19 twenty-four month refueling cycles or are intending to transition to such cycles
20 within the next year or so.

¹ Entergy Confidential Response to DPS Information Requests 1-19, 1-25 and 1-46.

1

2 Q. Has VYNPC performed any analyses of the costs and benefits of changing to a
3 twenty-four month refueling cycle?

4 A. No.² VYNPC has performed an analysis of switching to a twenty-two
5 month refueling cycle but not to a twenty-four month cycle.

6

7 Q. What were the results of this analysis?

8 A. A November 1998 study prepared for VYNPC by Duke Engineering &
9 Service found that implementing twenty-two month refueling cycle could lower
10 Vermont Yankee's power cost by \$1.28/MWH between 1998 and 2009. It also
11 would eliminate one refueling outage by 2009 which according to Duke would
12 result in a \$26 million net present value O&M savings.³

13

14 Q. Did VYNPC decide to implement the twenty-two month refueling cycles?

15 A. No. VYNPC decided that such a twenty-two month cycle would result in
16 outages during the high demand summer and winter peak periods and,

²

VYNPC Response to Informal Follow-Up Question No. 5 submitted by Bruce Biewald and David Effron.

³

Vermont Yankee Fuel Cycle Planning Study, dated November 17, 1998, provided as an attachment to VYNPC's Response to Informal Follow-Up Question No. 5 submitted by Bruce Biewald and David Effron.

1 consequently, should not be implemented.⁴

2

3 Q. Have you seen any reasons why Vermont Yankee's current owners would not be
4 able to implement a twenty-four month refueling cycle at Vermont Yankee if they
5 maintain ownership of the plant?

6 A. No. In fact, VYNPC has decided to begin use of a new fuel design, called
7 "GE14" fuel, which will allow both a power uprate and a twenty-four month
8 refueling cycle.

9

10 Q. Would changing to a twenty-four month refueling cycle provide any economic
11 benefits to the current Vermont Yankee owners?

12 A. Yes. Extending Vermont Yankee's operating cycle to twenty-four months
13 would increase Vermont Yankee's average annual capacity factor from 88.6
14 percent to 90.5 percent. Extending Vermont Yankee's operating cycle also would
15 eliminate one refueling outage between 2002 and 2009 and, consequently, would
16 reduce the overall net present cost of continued ownership by the current owners.
17 Therefore, it would improve the economics of continued ownership as compared
18 to the proposed sale to Entergy.

19

⁴ VYNPC Response to Informal Follow-Up Question No. 5 submitted by Bruce Biewald and David Effron.

1 Q. What capacity factors have you recommended that Mr. Biewald use in Synapse's
2 analyses of the proposed Vermont Yankee sale?

3 A. I have recommended that Mr. Biewald use Vermont Yankee's projected
4 capacity factors for our base case analyses. I also have recommended that he
5 perform sensitivity studies of ± 5 percentage points over the base case figures. In
6 addition, I recommended that Mr. Biewald evaluate the potential negative impacts
7 of power plant aging on Vermont Yankee's performance after 2012 by
8 performing a sensitivity analysis that (1) reduces the plant's projected annual
9 capacity factors by one percentage point each year after 2012 and (2) increases
10 O&M costs each year after 2012 at a rate one percent above the rate of inflation.

11

12 Q. Do Mr. Biewald's analyses reflect the benefits that the current owners could gain
13 by switching to a twenty-four month refueling cycle?

14 A. No. Those benefits are not reflected in the results of Mr. Biewald's
15 analyses and would further enhance the relative economics of continued
16 ownership by the current VYNPC owners.

17 **Vermont Yankee's Likely Future Operating Costs**

18 Q. Are the annual capacity costs used by VYNPC witness Wiggett in the own and
19 operate analysis in Exhibit BW-9 consistent with VYNPC's current 2002
20 Operating and Capital Budgets and its Three Year Operating and Capital

1 Forecast?

2 A. No. The capacity cost figures used by Mr. Wiggett are substantially
3 higher than VYNPC's current projections when you consider that the current
4 VYNPC operating and capital cost projections for the years 2002 through 2004
5 include significant expenditures for completing a power uprate.

6 For example, the \$175.31 million capacity cost used by Mr. Wiggett in
7 Exhibit BW-9 for the year 2002 is approximately \$3.5 million higher than the
8 \$171.8 million capacity cost projected for that year in VYNPC's current Board-
9 approved 2002 Operating and Capital Budgets and Three Year Operating and
10 Capital Forecast.⁵ However, this \$3.5 million figure actually understates the
11 amount by which the 2002 capacity cost in Exhibit BW-9 exceeds VYNPC's
12 current projections because, as I noted above, VYNPC's current 2002 Budgets
13 and Three Year Operating and Capital Forecast include a \$6.9 million capital
14 expenditure in 2002 for a power uprate while the figures in BW-9 do not reflect
15 such an uprate. If the \$6.9 million uprate-related expenditure (and any other
16 uprate-related costs) were eliminated, VYNPC's projected 2002 capacity cost in
17 the approved 2002 Operating Budget and the approved Three Year Operating and
18 Capital Forecast would be even lower than \$171.8 million and, as a result, the

⁵ These documents were provided in VYNPC's Response to Information Request No. DPS 1-22 and are attached as Exhibit DPS-DAS-2.

1 \$175.31 million figure used in Exhibit BW-9 would be even more overstated.

2

3 Q. Are the annual capacity costs in Exhibit BW-9 for the years 2003 and 2004 also
4 too high?

5 A. Yes. Although the capacity costs in Mr. Wiggett's Exhibit BW-9 for the
6 years 2003 and 2004 are approximately the same as the capacity costs in the
7 approved Three Year Operating and Capital Forecast it is clear that the figures in
8 the Three Year Operating and Capital Forecast include large expenditures to
9 complete a power uprate. If these costs were removed, VYNPC's current
10 projections for 2003 and 2004 would be significantly lower than the figures used
11 by Mr. Wiggett's in the own and operate analysis in Exhibit BW-9.

12 Mr. Wiggett needs to be consistent. If the own and operate analysis that
13 he presents in Exhibit BW-9 does not reflect the additional benefits that the
14 current owners would gain from completing a power uprate, his cost figures
15 should not include the costs of implementing such an uprate.

16

17 Q. Why do you believe that the capacity costs in the Three Year Operating and
18 Capital Forecast include the costs of achieving a power uprate?

19 A. First, as I noted above, the approved 2002 Capital Budget specifically

1 includes a \$6.9 million expenditure for a power uprate.⁶ In addition, the approved
2 Three Year Operating and Capital Forecast projects that Vermont Yankee will
3 generate 4,170,000 MWH in 2004 which is approximately 10 percent more
4 generation than Mr. Wiggett uses in Exhibit BW-9.⁷ This increased generation
5 reflects the additional MWH that would be available as a result of a power uprate.

6

7 Q. Is it reasonable to expect that the capacity costs used in Exhibit BW-9 for the
8 years after 2004 are also too high?

9 A. Yes. It appears that Mr. Wiggett derived Vermont Yankee's projected
10 annual base operating, operating project and shutdown project expenditures for
11 the years after 2004 by escalating the year 2004 base operating, operating project,
12 and shutdown project expenditures at an assumed inflation rate. Consequently,
13 any overstatement in the year 2004 base operating, operating project and/or
14 shutdown project expenditures would necessarily lead to the expenditures being
15 too high in subsequent years.

16

17 Q. Have you been able to precisely quantify the amounts by which and to identify
18 the specific areas in which Mr. Wiggett's 2002-2004 capacity costs are too high?

⁶ Exhibit DPS-DAS-2.

⁷ Exhibit DPS-DAS-2.

1 A. No. The budget materials that VYNPC has provided do not contain
2 sufficient detail to allow us to precisely quantify what VYNPC's projected 2003
3 and 2004 projected capacity costs would be if the expenditures for the power
4 uprate were eliminated. However, VYNPC has provided its current estimate of
5 the annual expenditures that would be required in the years 2002-2005 to
6 complete a 13 percent power uprate.⁸ The net present value of these expenditures
7 is approximately \$30 million. I believe it is reasonable and very conservative to
8 assume that the net present value cost of the continued own and operate scenario
9 presented in Exhibit BW-9 would be reduced by at least this amount if Mr.
10 Wiggett used the capacity costs in VYNPC's approved Three Year Operating and
11 Capital Forecast instead of the out-of-date projections on which he appears to
12 have based his analysis. This change, in turn, would reduce the net present value
13 benefit which Mr. Wiggett claims for the proposed sale to Entergy.

14
15 Q. Have you identified any other areas in which Mr. Wiggett's assumed annual
16 operating expenditures are too high?

17 A. Yes. Mr. Wiggett's own and operate analysis assumes that the cost of
18 Vermont Yankee's 2001 refueling outage was \$21.714 million when the actual
19 cost of the outage was only \$20.334 million. If the actual cost of this outage is

⁸ VYNPC Response to Information Request No. DPS2-18(f).

1 escalated into future years at a 3 percent annual inflation rate, the projected cost
2 of future Vermont Yankee outages would be significantly lower than the future
3 outage costs used by Mr. Wiggett in Exhibit BW-9.

4 In addition, it is unclear whether the projected operating expenses in
5 Exhibit BW-9 reflect the significant reductions in the total employee and
6 contractor workforce at Vermont Yankee that VYNPC has projected in its 2002
7 Budgets and the 2002-2004 Operating and Capital Forecast.⁹ For example,
8 VYNPC's 2002 Operating and Capital Budgets appear to be based on the
9 assumption that the total Vermont Yankee staff (all employees and consultants)
10 will be reduced by 150 to 300 positions by 2002.¹⁰ These reductions should lead
11 to lower base operating, operating project, and shutdown project expenditures.

12
13 Q. Has VYNPC attempted to quantify the potential reductions it could achieve in
14 future Vermont Yankee costs if the current sponsors maintained ownership of the
15 plant?

16 A. No. VYNPC has said that it has not performed, or have in its possession,

⁹

See the Attachment to VYNPC's response to DPS Information Request No.1-23, at page numbered 23 and the Attachment to VYNPC's response to Interrogatory BED:1-18, at page 35.

¹⁰ Page number 21 in the Attachment to VYNPC's Response to DPS Information Request No. 1-23.

1 any analysis of the probability of achieving reduced going-forward costs at
2 Vermont Yankee.¹¹

3

4 Q. Has Entergy said that it could achieve significant operating cost savings if it were
5 to purchase Vermont Yankee?

6 A. Yes.

7 ***** [BEGIN CONFIDENTIAL]*****

8

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11 Q.

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13 A.

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¹¹ VYNPC Response to Interrogatory CLF:1-28(b).

¹² Entergy Confidential Response to DPS Information Request No. 1-23.

¹³ Entergy Confidential Response to DPS Information Request No. 1-23.

***** [END CONFIDENTIAL]*****

Entergy has further stated that starting in 2004 it would expect Vermont

Yankee refueling outages to cost \$18 million which is \$7 million to \$12 million lower than the projected refueling outage costs used by Mr. Wiggett in the continued own and operate analysis in Exhibit BW-9.¹⁵

However, a direct comparison between VYNPC and Entergy's projected operating costs is impossible because Entergy considers as capital projects many of the projects that VYNPC includes as non-capital O&M expenses.¹⁶

Q. Do you believe that the current owners could achieve some of the same savings that Entergy is claiming it will be able to achieve?

A. Yes. I see no reason why VYNPC could not achieve many of the cost savings that Entergy is claiming it would be able to achieve if it were allowed to purchase Vermont Yankee.

First, the current owners should be able to achieve the same decommissioning contribution savings as Entergy is claiming it will be able to

¹⁴ Entergy Confidential Response to DPS Information Request No. 1-58.

¹⁵ Entergy Response to DPS Information Request No. 2-49.

¹⁶ Entergy Response to DPS Information Request No. 2-49.

1 achieve. In fact, as DPS witness Sherman has discussed in his testimony, it is
2 reasonable to assume that all contributions to the decommissioning trust fund can
3 be ended after 2002 whether Entergy or the current owners own Vermont Yankee.

4 *****[BEGIN CONFIDENTIAL]*****

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8 *****[END CONFIDENTIAL]*****

9 There is no reason why this same option would not available to the current
10 Vermont Yankee owners.

11 Second, as I have discussed above, I believe that it is clear that the current
12 Vermont Yankee owners already are projecting savings in plant operating costs in
13 VYNPC's approved 2002-2004 Capital and Operating Budgets and in the 2002-
14 2004 Operating and Capital Forecast.

15 Finally, as I will discuss in Section 6 of my testimony, it is reasonable to
16 believe that the current Vermont Yankee owners could retain an experienced firm
17 to manage future operations at Vermont Yankee and, thereby, gain cost savings
18 through joint purchasing of fuel, supplies, and services. Such an arrangement
19 could enable the current owners to realize fuel and non-fuel O&M cost

¹⁷ VYNPC Confidential Response to DPS Information Request No. 2-58.

1 efficiencies similar to those claimed by Entergy.

2

3 Q. Has VYNPC projected higher operating and capital costs as a result of the events
4 of September 11, 2001?

5 A. Yes. VYNPC has projected that it will have to spend an additional \$1.5
6 million of security-related O&M expenditures and make a one-time \$1.1 million
7 capital expense in 2002 as a result of heightened security concerns after the
8 events of September 11th.¹⁸

9

10 Q. Do these costs appear reasonable?

11 A. Yes. I believe that these estimates appear reasonable given the uncertainty
12 surrounding the specific improvements in nuclear plant security that will be
13 required by the NRC and the question of who (taxpayers, ratepayers, or plant
14 owners) will be required to pay for these improvements.

15

16 Q. What O&M reductions have you recommended that Mr. Biewald use in his
17 analyses of the proposed sale to Entergy?

18 A. I have recommended that Mr. Biewald assume that in the base case
19 scenario in which the current owners maintain ownership of Vermont Yankee,

¹⁸ VYNPC Response to DPS Information Request No. 1-39.

1 VYNPC would be able to reduce O&M expenditures by \$3 million in non-
2 refueling years and by \$5 million in those years in which there is a refueling
3 outage. I also have recommended that he perform two sensitivity analyses, one
4 with no O&M savings and another with roughly double the base case O&M
5 savings to reflect a more optimistic scenario in which the current owners are able
6 to achieve greater savings either through their own efforts or through the hiring of
7 an experienced firm to manage Vermont Yankee.

8

9 Q. Have you recommended that Mr. Biewald use VYNPC's projected annual capital
10 additions expenditures?

11 A. Yes. I have recommended that Mr. Biewald use VYNPC's projected
12 annual capital additions costs in his analyses except that, as I will discuss below, I
13 have recommended that Mr. Biewald include the projected costs of completing a
14 thirteen percent power uprate.

15 **4. Power Uprate**

16 Q. What is a power uprate?

17 A. A power uprate means increasing the thermal power produced by a power
18 plant. A power uprate allows a utility to increase the output of its plant(s) at a
19 relatively low cost.

20 Power uprates are classified in three categories by the NRC. The first

1 category includes what are called measurement uncertainty recapture power
2 uprates which are on the order of 1.5 percent and are achieved by implementing
3 enhanced techniques for calculating reactor power. This involves the use of state-
4 of-the-art feedwater flow measurement devices that reduce the degree of
5 uncertainty associated with feedwater flow measurement and, in turn, provide for
6 a more accurate calculation of power.

7 The second category includes stretch power uprates which typically are on
8 the order of five percent and usually require detailed analyses and some minor
9 plant modifications. Stretch power uprates for BWRs like Vermont Yankee
10 generally do not involve major plant modifications.

11 The third category includes extended power uprates which usually are for
12 eight to twenty percent power increases. Extended power uprates usually require
13 some plant modifications to balance-of-plant equipment such as the turbines,
14 condensate pumps and motors, main generators or transformers.

15

16 Q. Have other BWRs achieved power uprates?

17 A. Yes. A power plant owner must seek NRC approval to implement a
18 power uprate. As of this past August, 57 power uprate amendments had been
19 approved by the NRC. Twenty BWRs had implemented power uprates. In fact,
20 according to a paper on power uprates presented at the August 21, 2001 meeting

1 of VYNPC's Nuclear Oversight Committee, "Vermont Yankee and Cooper are
2 the only 2 domestic BWRs with no complete or planned uprate."¹⁹

3 Most of these power uprates have been measurement uncertainty or stretch
4 uprates. However, a number of BWRs have sought or currently are seeking
5 extended power uprates as large as twenty percent. For example, the two Hatch
6 BWRs implemented eight percent extended power uprates in the late 1990's.
7 Applications are currently pending before the NRC to raise the power levels of
8 the Duane Arnold BWR by fifteen percent, the four Dresden and Quad Cities
9 BWRs by seventeen percent and the Clinton BWR by twenty percent. The Duane
10 Arnold extended power uprate would be on top of the five percent stretch uprate
11 the unit implemented several years ago and would bring the unit to approximately
12 120 percent of its original power level.

13 It is anticipated that a number of other BWRs will seek NRC approval to
14 implement extended power uprates in the near future including the two
15 Brunswick BWRs (fifteen percent power uprates) and Browns Ferry Units 2 and 3
16 (fourteen percent power uprates). Like the Duane Arnold BWR, the Brunswick
17 extended power uprates would be on top of five percent stretch uprates that have
18 already been implemented at the units. These second uprates would bring each of
19 the units to approximately 120 percent of their original power levels.

¹⁹ Exhibit DPS-DAS-3.

1

2 Q. Has the NRC ever denied an application for a power uprate?

3 A. I am not aware of any instance in which the NRC has denied a utility's
4 request for a power uprate.

5

6 Q. Has VYNPC evaluated the engineering and economic costs and benefits of
7 implementing a power uprate at Vermont Yankee?

8 A. *****[BEGIN CONFIDENTIAL]*****

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*****[END CONFIDENTIAL]*****

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Q. Has VYNPC recently revisited the issue of implementing a power uprate at

16

Vermont Yankee?

17

A. Yes.

18

*****[BEGIN CONFIDENTIAL]*****

²¹ Attachment to VYNPC's Response to DPS Information Request No. 2-12.

²² Confidential Attachment to CVPS's Response to DPS Information Request 1-8.

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5 Q.

6 A.

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16 *****[END CONFIDENTIAL]*****

17 Q. Has VYNPC taken any steps to begin implementing a power uprate at Vermont
18 Yankee?

19 A. Yes. VYNPC has decided to switch to the new GE14 fuel design and is
20 considering a GE proposal for power uprate services.

21

²³ [BEGIN CONFIDENTIAL]

[END CONFIDENTIAL] provided in
VYNPC's Response to DPS Information Request No.1-30(a).

1 Q. Has VYNPC examined the economic costs and benefits of any power uprates at
2 Vermont Yankee as part of its evaluation of the sale to Entergy?

3 A. Although VYNPC has prepared several sensitivity analyses reflecting a
4 five percent or a thirteen percent power uprates, it has not explicitly examined the
5 impact of an uprate on the relative economics of selling versus keeping Vermont
6 Yankee. CVPS, however, has calculated that a five percent uprate would decrease
7
8 the net present value benefit of selling the plant by approximately \$38.52
9 million.²⁴

10
11 Q. Has VYNPC explained why it decided to look at a thirteen percent power uprate?

12 A. Yes. VYNPC has explained that a thirteen percent uprate “was selected
13 for analytic purposes based on industry trends for plants of Vermont Yankee’s
14 vintage that VY understands have successfully completed power uprates. The
15 13% was assumed to be a reasonable cost-effective uprate that could be achieved
16 in steps and over time at Vermont Yankee.”²⁵

17
18 Q. What schedule did VYNPC project for implementing the thirteen percent power

²⁴ Testimony of CVPS witness Stephen W. Page, at page 11, lines 8-15.

²⁵ VY Response to Interrogatory DPS2-18(g).

1 uprate?

2 A. VYNPC projected that the first five percent uprate would be implemented
3 in mid-2003. Another five percent uprate would be implemented in April 2004 at
4 the end of Vermont Yankee's cycle 24 refueling outage. The final three percent
5 uprate would be implemented in October 2005 at the conclusion of Vermont
6 Yankee's next refueling outage.

7

8 Q. What was VYNPC's estimated cost of implementing this thirteen percent power
9 uprate?

10 A. Vermont Yankee has estimated that the completion of a thirteen percent
11 uprate would require capital expenditures of \$7.5 million in 2002, \$15.8 million
12 in 2003, and \$13.3 million in the years 2004-2005.²⁶

13

14 Q. Has Entergy revealed the plan(s) it has for implementing a power uprate at
15 Vermont Yankee if it purchases the plant?

16 A. At best, Entergy has been very noncommittal in its discovery responses
17 concerning the issue of implementing a power uprate if it is allowed to purchase
18 Vermont Yankee. For example, Entergy has said that it is evaluating the
19 possibility of a five to ten percent uprate and "at this time a decision has not been

²⁶ VY Response to DPS Information Request 2-18(f).

1 made.”²⁷

2 However, this claim is contradicted by statements that Entergy made to
3 Nucleonics Week in which it said that if it is able to purchase Vermont Yankee, it
4 would uprate the plant over the next three years and sell that additional output
5 into the open market. According to Nucleonics Week:

6 Once Entergy closes on the deal, which is expected in spring 2002, it will
7 make a 5% uprate by the end of next year’s refueling outage and add
8 another 5% during the following refueling 18 months later. Entergy
9 Nuclear Spokesman Carl Crawford said the power increases would likely
10 be done through a combination of an engineering study on paper and
11 physical improvements. An exact determination on achieving the uprates
12 and whether some modifications can be made while the plant is operating,
13 has not yet been made, he said.²⁸

14
15
16 Q. In your opinion, what is a reasonable power uprate that the NRC will approve and
17 that could be implemented at Vermont Yankee?

18 A. The optimum power uprate for Vermont Yankee will be determined
19 through detailed engineering and economic analyses. However, it is certainly
20 reasonable to assume that VYNPC could achieve an uprate in the range of
21 thirteen to fifteen percent given the experience of other BWRs and trends in the
22 industry. For this reason, I have recommended to Mr. Biewald that his base case

²⁷ Entergy Response to DPS Information Request No. 1-26(a).

²⁸ Nucleonics Week, August 23, 2001, at page 3, in an article entitled “Entergy to Boost Vermont Yankee Output by 10% After Sale Closing,” a copy of which is included as Exhibit DPS-DAS-4.

1 economic analyses reflect a conservative thirteen percent uprate.

2 I also have recommended that Mr. Biewald perform sensitivity analyses
3 for twenty percent and ten percent uprates. Again, given recent industry trends, I
4 think it is reasonable to expect that VYNPC, or any other potential owner, could
5 achieve between a thirteen and a twenty percent uprate. At the same time, I don't
6 believe that it is reasonable to assume that VYNPC or any other potential owner
7 would not be able to implement at least a ten percent uprate.

8

9 Q. What cost and schedule do you think are reasonable to assume for the
10 implementation of a thirteen percent uprate?

11 A. The cost and schedule for the chosen power uprate will be determined
12 through detailed engineering and economic analyses. Nevertheless, I think that
13 VYNPC's projected cost and schedule for the implementation of a thirteen
14 percent uprate are probably conservative and reasonable. Therefore, I have
15 recommended that Mr. Biewald use VYNPC's projected cost and schedule in his
16 base case economic analyses.

17 However, it is possible that a thirteen percent power uprate will cost less
18 than the \$37 million projected by VYNPC or that a fifteen percent uprate could be
19 achieved for that same \$37 million. Clearly, the economic benefits from an
20 uprate increase as the size of the uprate increases and/or the cost decreases.

1

2 **5. Extending Vermont Yankee's Operating License**

3

4 Q. Have any utilities applied to the NRC for approval to continue operating their
5 nuclear power plants beyond the expiration of their current NRC-issued operating
6 licenses?

7 A. Yes. To date, seven utilities have requested that the NRC renew the
8 operating licenses for twenty nuclear units located at nine sites.²⁹

9

10 Q. Has the NRC granted any of these requests?

11 A. Yes. The NRC has approved the applications by Baltimore Gas and
12 Electric to extend the operating license of the two unit Calvert Cliffs nuclear
13 plant, Duke Power Company to extend the license for the three unit Oconee
14 nuclear station, and Entergy to extend the license of the Arkansas Nuclear One
15 plant. Another seven applications are currently under review with final NRC
16 decisions expected within the next two years.

17

18 Q. What are the durations of the license extensions that have been granted by the
19 NRC?

20 A. The NRC's license renewal regulations allow a utility to submit an

²⁹ Nuclear News, November 2001, at page 21.

1 application for a twenty year extension beyond the current expiration date of its
2 existing operating license.

3

4 Q. Has the NRC denied any license extension applications?

5 A. No.

6

7 Q. Are any of the nuclear plants whose applications for license extensions have been
8 granted by the NRC or are currently under review similar in design and vintage to
9 Vermont Yankee?

10 A. Yes. Southern Company's Hatch Units 1 and 2 and Exelon's
11 Peachbottom Units 2 and 3 are BWRs similar to Vermont Yankee in design and
12 vintage.

13

14 Q. Have other utilities indicated whether they intend to apply for similar license
15 extensions?

16 A. Yes. Another sixteen license renewal applications for twenty four units
17 are expected to be submitted to the NRC by early 2005.³⁰

18 In fact, Entergy's President has warned other utilities: "License renewal –
19 everybody's jumping on that bandwagon..... If you're not already decided, you

³⁰ Nuclear News, November 2001, at page 21.

1 better do it quickly because resources are going to get tight.”³¹

2

3 Q. Are any of the nuclear power plants whose owners have said that they will submit
4 applications for license extensions similar in design and vintage to Vermont
5 Yankee?

6 A. Yes. License renewal applications are expected to be submitted within the
7 next few years for Exelon’s four Dresden and Quad Cities units, Carolina Power
8 & Light Company’s two Brunswick units, Nebraska Public Power District’s
9 Cooper plant, and Entergy’s Pilgrim plant which all are BWRs are similar in
10 design and vintage to Vermont Yankee.

11

12 Q. Has VYNPC decided whether to apply to the NRC to extend Vermont Yankee’s
13 operating license if it retains ownership of the plant?

14 A. I have seen no evidence that VYNPC has decided whether it will submit
15 an application to the NRC to extend Vermont Yankee’s operating license if it
16 retains ownership of the plant.

17

18 Q. Has Entergy stated whether it intends to apply to the NRC to extend Vermont
19 Yankee’s operating license if it is allowed to purchase the unit?

³¹ Inside NRC, August 16, 1999, at page 1.

1 A. No. Entergy has said that it has not yet undertaken any sort of “formal
2 evaluation” of life extension for Vermont Yankee.³²

3

4 Q. What is the cost of seeking and obtaining NRC approval for extending a nuclear
5 power plant’s operating license?

6 A. VYNPC has stated in response to an interrogatory that it expects that it
7 would cost \$20 million to renew Vermont Yankee’s operating license.³³

8 However, an internal VYNPC presentation on “License Renewal” has indicated
9 that although the cost of license renewals will vary between plants, the “total cost
10 is expected to be in the \$10-15 [million] range; for preparation, NRC review, and
11 immediate corrective actions.”³⁴

12

13 Q. What has Entergy estimated for the cost of renewing Vermont Yankee’s NRC
14 operating license?

15 A. *****[BEGIN CONFIDENTIAL]*****

16

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³² Entergy Response to DPS Information Request No. 2-52.

³³ VY Response to Interrogatory DPS2-17.

³⁴ Exhibit DPS-DAS-5.

***** [END CONFIDENTIAL]*****

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Q. Do you think that the potential for extending Vermont Yankee’s operating life should be considered when evaluating the potential costs and benefits of the proposed sale to Entergy?

A. Yes. Based on trends in the industry and the NRC’s recent approval of extended operating licenses for several plants, I believe that license renewal is a possibility that needs to be examined in economics analyses of the proposed sale to Entergy.

Q. If VYNPC or Entergy were to seek to extend Vermont Yankee’s operating life when would they have to begin the license renewal process?

- A. An internal VYNPC presentation has set out the following tentative schedule for seeking renewal of Vermont Yankee’s operating license.
- Vermont Yankee’s license expires in March 2012
 - Submit an application to the NRC no later than March 2007 - “call this 2006”
 - Start license renewal project no later than 2004

³⁵ Entergy Responses to DPS Information Requests Nos. 1-38 and 1-39.

1
2 - Add uncertainty for potential hearing process - 2003³⁶

3
4 Consequently, the presentation warned that “VY is nearing the threshold
5 to decide if license renewal is in its future. A review slot will need to be reserved
6 with the NRC.”

7
8 Q. Is there additional evidence that license renewal is becoming common in the
9 industry?

10 A. Yes. The available evidence is that the NRC has been working to improve
11 the regulatory process for applicants. For example, an article in Nuclear News, a
12 monthly publication of the American Nuclear Society, has explained:

13 The process is likely to improve as more plants go through the process and
14 the NRC settles on what NRC Commissioner Jeffrey Merrifield calls “the
15 right regulatory touch - not asking for too much information, but [asking
16 for] a sufficient amount so we can feel confident.” Merrifield said the
17 NRC needs to be disciplined to ensure that the requirements of the second
18 wave of license renewal applicants are the same as the first, and the
19 agency needs to continually strive to operate “more efficiently, better,
20 faster, and less expensively.”³⁷

21
22 In fact, VYNPC’s Nuclear Oversight Committee was recently told that
23 “License renewal continues to receive the higher of priorities by the NRC.”³⁸

36 Exhibit DPS-DAS-5.

37 Nuclear News, August 1999, at page 41.

38 Exhibit DPS-DAS-5.

1 Far from expecting that the NRC will adopt new and tougher requirements,
2 industry representatives have commended the NRC's approach to license renewal.
3 For example, the President of the industry's Nuclear Energy Institute has said that
4 the NRC's review of the Calvert Cliffs and Oconee license renewal applications
5 "provides a clearly marked path for other electric companies pursuing license
6 renewal."³⁹ At the same time, the Vice President for Nuclear Generation at Duke
7 Energy Company has said that as the cost for license renewal comes down with
8 experience gained on the initial reviews and the NRC review time shrinks, "it
9 becomes more likely that utilities are going to line up [for license renewal]."⁴⁰
10 Indeed, the NRC actually completed its review of Duke Power Company's
11 request for renewal of the operating licenses for the three unit Oconee plant in 23
12 months, which was about 7 months less than had been originally estimated.⁴¹

13 **6. Whether the Current Vermont Yankee Owners Adequately**
14 **Considered All Reasonable Alternatives to the Sale**
15

16 Q. Have VYNPC, CVPS, and GMP fully considered all reasonable alternatives to the
17 proposed sale of Vermont Yankee to Entergy?

18 A. No. VYNPC, CVPS and GMP did not consider the alternative of hiring

³⁹ Nucleonics Week, May 25, 2000, at page 1.

⁴⁰ Inside NRC, August 16, 1999, at page 1.

⁴¹ Nuclear News, July 2000, at page 20.

1 an experienced firm to manage operations and activities at Vermont Yankee for
2 the current owners.⁴²

3
4 Q. What explanation have the current Vermont Yankee owners provided for not
5 considering the option of contracting with an experienced firm to manage the
6 plant?

7 A. VYNPC has said that a management contract was not considered because
8 some of the plant's owners have decided or are under regulatory agreement or
9 order or legal obligation to exit the generation business.⁴³

10
11 Q. Is this a reasonable argument for CVPS and GMP?

12 A. No. The current Vermont owners are not under any legal requirement to
13 divest their ownership in Vermont Yankee. Any other owners which may have to
14 sell their shares of the plant because of regulatory agreements or orders or legal
15 obligations can still sell their minority shares even if CVPS and GMP maintain
16 their ownership of VYNPC. Consequently, this argument is not very persuasive.

17
18 Q. What would be the benefits from retaining an experienced firm to manage
19 Vermont Yankee?

⁴² VYNPC Responses to DPS Information Request No. 2-14 and CLF Information Request No. 2-2.

⁴³ VYNPC Response to CLF Information Request No. 2-2.

1 A. Entergy claims that it can lower Vermont Yankee's operating costs as a
2 result of (a) economies of scale in purchasing fuels, materials and contracts due to
3 its ownership of other nuclear plants (including several in the Northeast), (b) the
4 sharing of employees during refueling and other outages, and (c) its nuclear plant
5 management expertise.⁴⁴ Hiring an experienced firm which owns and/or manages
6 other nuclear power plants can offer similar opportunities to reduce operating
7 costs without the sale of the plant to Entergy.

8
9 Q. What evidence leads you to believe that this is a viable alternative to the sale to
10 Entergy?

11 A. Four Midwest utilities joined together in 1999 to form the Nuclear
12 Management Company ("NMC") for the purpose of operating the utilities' seven
13 nuclear plants.⁴⁵ The operating license for an eighth plant, Consumer Power
14 Company's Palisades unit, was transferred to NMC in mid-2001.⁴⁶

15 Each of the utilities involved in NMC continues to own its own plants, is
16 entitled to the energy generated by the plants, and retains the financial obligations

⁴⁴ Entergy Responses to DPS Information Requests Nos. 1-43, 1-54, and 1-58.

⁴⁵ Nuclear News, April 1999, at page 12 and Nucleonics Week, March 4, 1999, at page 4.

⁴⁶ Nuclear News, June 2001, at page 26.

1 for the plants safe operation, maintenance and decommissioning.⁴⁷ However,
2 NMC expects to be able to reduce each plant's power production costs by roughly
3 25 percent through efficiencies in purchasing fuels, joint contracting for services,
4 and by reducing general administrative costs.⁴⁸ For example, NMC has signed
5 contracts with Sargent & Lundy and Duke Engineering & Services to provide
6 engineering services to the nuclear plants it operates.⁴⁹

7
8 Q. Has NMC expressed any interest in operating or owning nuclear power plants
9 outside the Midwest?

10 A. Yes. NMC President Michael Spellman has said that NMC "certainly
11 would like to have other like-minded utilities join with us" and explicitly
12 indicated that NMC is "looking nationwide."⁵⁰ Mr. Spellman further noted that
13 NMC offers utilities the option of having someone else run the plant without
14 requiring a sale.

15 For example, NMC recently has signed a contract with the Nebraska
16 Public Power District ("NPPD") to provide management services to the Cooper

⁴⁷ Nuclear News, April 1999, at page 12.

⁴⁸ Nucleonics Week, December 2, 1999, at page 1.

⁴⁹ Nuclear News, August 2001, at page 111 and Nuclear Engineering International,
August 31, 2001, at page 6.

⁵⁰ Nucleonics Week, December 2, 1999, at page 1.

1 nuclear plant for a ten month period.⁵¹ Although NPPD and NMC are exploring
2 the possibility of Cooper becoming part of NMC, this contract is not a
3 commitment to join.

4
5 Q. Is it reasonable to expect that the current Vermont Yankee owners also could
6 retain an experienced firm to manage the plant's decommissioning?

7 A. Yes. For example, Entergy already has offered to manage Vermont
8 Yankee's decommissioning for the current owners, an arrangement that Entergy
9 has said could save VYNPC up to \$100 million.⁵²

10

11 Q. Does this complete your testimony?

12 A. Yes.

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⁵¹ Nucleonics Week, September 20, 2001, at page 2.

⁵² Entergy Response to DPS Information Request No. 2-55.

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