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), 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	February 11, 2009 Docket No. 7440

New England Coalition, Inc. Prefiled Direct Testimony of Raymond Shadis

1Q. Please state your name and occupation.

1A. My Name is Raymond G. Shadis. I am a resident of Edgecomb, Maine. I am currently serving New England Coalition, Inc. of Brattleboro, Vermont as a consultant on nuclear power issues for the purpose of evaluating Vermont Yankee Nuclear Power Station as a candidate for approval of what is ostensibly a twenty year extended period of operation.

2Q. Please state briefly your background and experience related to nuclear power issues.

2A. For the last 30 years I have engaged in self-directed concentrated studies in commercial nuclear power issues. I have gained throughout this period extensive experience in tracking and evaluating nuclear licensee performance, industry and regulatory trends, and nuclear safety and environmental issues as documented in professional journals, technical and industry journals, published research, and regulatory public records.

I have further been educated through ongoing interaction with state and federal regulators and industry personnel on nuclear management, safety, and environmental issues.

I have been an invited presenter at numerous U.S. Nuclear Regulatory Commission (NRC) events including full Commission meetings and successive Annual Regulatory Information Conferences.

During 1999 and 2000, I served on NRC's Reactor Oversight Process Initial Implementation Evaluation Panel, a panel convened Federal Advisory Committees Act which mandates, expertise.

From January 1998 through 2006, I was employed by New England Coalition, Inc. as Staff Technical Advisor and I am presently a technical consultant to the coalition.

A more complete narrative of my experience is attached to this testimony as NEC EXHIBIT RS-1.

3Q. Have you previously been admitted as a witness on behalf of New England Coalition before the Vermont Public Service Board?

3A. Yes, my testimony was admitted in Vermont Yankee Nuclear Power Station-related Dockets 6545 (Vermont Yankee Sale) and 7195 (Vermont Yankee Steam dryer Investigation).

4Q. What is the purpose of your testimony?

4A. The purpose of my testimony is to bring to the Board's attention certain aspects of the Petition, the Comprehensive Vertical Audit , Vermont Yankee's management,

maintenance, and physical condition, decommissioning and nuclear waste storage, and the risks inherent in extended operation that give rise for concern in weighing the potential costs and benefits in granting a Certificate of Public Good.

5Q. Have you read the Petition to extend operation of Vermont Yankee for an additional twenty years and to increase dry cask waste storage?

5A. Yes, I have.

6Q. What are your first concerns with the Petition?

6A. The Petition sets out conditions and proposed initiatives that are not consistent with ENVY representations and commitments to the Public Service Board and the Public made or implied during previous proceedings. On the face this calls into question the presumption of trust and candor between the regulator and the regulated.

For example, in seeking approval of the purchase of Vermont Yankee, Entergy proposed a scenario in which the facility would be promptly decommissioned upon termination of license, an option under federal regulations termed, "Decon." This option has typically resulted in site restoration and release for unrestricted use within seven to ten years of entering permanently defueled status.

In Docket 6545, Citizen's Awareness Network, an intervenor argued that there was less risk inherent in "Safestor' than in "Decon". Under Safestor, a plant's reactor is defueled and along with other active components, secured for 20 years or more before dismantlement and clean-up activities. This waiting period allows radionuclides to decay thus reducing worker exposure and cost of handling and disposal of radioactive materials.

Entergy countered that the Vermont Yankee site did not lend itself to Safestor; that the cost of maintaining the integrity of the buildings over that period of time would drive decommissioning costs to unacceptable level.

However, in 2007, ENVY let it be known that whether or not Vermont Yankee was closed or not in 2012, the plant would be with Vermonters for at least the term of the extended license, another twenty years because ENVY now intended to exercise an option called, "Safestor."

In November of 2008, ENVY brought out its latest decommissioning cost study which contemplates extending Safestor to its maximum term of about 55 years. This approximates the 60 years limit the U.S. Nuclear regulatory Commission places on decommissioning, unless exception is granted.

Beyond that is the option of "Entomb" which involves literally casting a tomb around the plant and leaving it sit until, at least radiation has decayed to clearance levels, or at least 100 years. At the rate ENVY's decommissioning timeframes are expanding, New England Coalition fears, Entombment may be the next stop. Attached to my testimony is NEC EXHIBIT RS 2, an NRC PSDAR review outline that contains an explanation of decommissioning options.

In Docket 6545, parties, including Entergy, squabbled over to what share of decommissioning surplus ratepayers might be entitled. Entergy allowed projections for the decommissioning fund into the discussion that were based on the assumption that ENVY, as a merchant plant, would be making up for ratepayer contributions to the fund , by contributing the equivalent on its own. And thus the decommissioning would be fully

funded by 2012. Now, it turns out, that the fund falls short and that ENVY has contributed nothing to the fund; all necessitating the delay of Safestor, rather than Decon.

How public good can be determined with the prospect of an orphan nuclear site looming is hard to fathom.

Further, in Docket 7082, Jay Thayer, Entergy's site vice-president of Vermont Yankee offered, "Entergy VY understands that if it receives permission to build and operate the ISFSI, it is responsible for and commits to pay the cost of storing spent fuel at the Station-no matter how long the fuel must be stored – until such time as the DOE takes title to and responsibility for the fuel." *Thayer Prefiled, June 16, 2005, Page 8.*

Yet with only a few spent fuel casks deployed, ENVY has now applied for and has been granted permission by NRC to tap the decommissioning fund to pay for spent fuel cask storage. I have attached NEC EXHIBIT RS-3, an NRC Fact Sheet on Decommissioning Finance Assurance to further explain funding options.

In the matter of plant maintenance and operations issues, ENVY has repeatedly, with each incident of failure, expressed intent to reform and then expressed surprise at each succeeding incident.

Entergy, itself, has identified many of the issues that have arisen during it's tenure at Vermont Yankee as being rooted in lack of supervision, poor maintenance, poor communication, and failure to take a lesson from industry experience. But incident after incident tries credulity.

In Docket 6545, Entergy committed to conforming with all agreements in place with the State of Vermont. These agreements included adherence to a long-standing fenceline/offsite radiation dose or exposure limit of 20 millirem, as determined by

measurement protocols agreed to by Vermont Yankee and the State. However, in Docket 6812 when New England Coalition point out that radiation limits would be approached or possibly exceeded due to the proposed extended power uprate, Entergy moved to adopt an adjustment factor not previously employed at the Vermont Yankee. The adjustment factor reduced the reported dose to within comfortable margins. Under the new scheme, the theoretical fenceline resident would not receive as much radiation as we had calculated in the past, but whatever he did actually receive, he would now receive more due to uprate.

Aside from the annoying semantics, why is this troublesome? It is trouble some because it is not without real effect. As the National Academies of Science have consistently pointed out, for regulatory purposes, there is no lower radiation threshold for risk.

In Docket 6812, New England Coalition, relying on evidence from ENVY in-house communications, argued that the cooling towers were not in good condition and that the design itself was flawed and subject to catastrophic failure (Similar to that which occurred in August of 2007). Entergy said, no, and pointed to the rigor of its periodic examinations; chiding Witness Arnold Gundersen, for worrying about evidence of a few cracked timbers when these were routinely replaced.

In August 2004, New England Coalition took this concern to the NRC Atomic Safety and Licensing Board proceeding on Vermont Yankee's Extended power Uprate, only to have Entergy, in the Spring of 2006, bring forth an intensive examination and analysis report showing that the cooling towers were in very good condition and very well maintained. In fact, in a year and a half they collapsed. From then until now,

examinations and incidents have revealed one material or engineering defect after another.

Under normal circumstances, the statements of the Petitioner are presumed to be correct unless evidence is brought to the contrary, but the foregoing examples call into serious question how much reliance we can place on ENVY's representations. Surely, at the least, a rigorous inquiry into the facts should form the basis for going forward.

7Q. Are the additional concerns with respect to credibility or with respect to reliance on the Petition?

7A. Yes, one and it is fairly basic. The Petition requests a CPG for a 20 year period of extended operation. New England Coalition is concerned that ENVY may actually be considering, and laying the ground for operation beyond 2032. ENVY personnel recently attended an NRC headquarters workshop to discuss consideration of a new rule that would allow application of a second 20 year license renewal involving little or no review and no opportunity to the affected states or public for a hearing. It is my understanding that NRC Staff proposes that these second renewals could and maybe should come promptly on the heels of the first renewal. In Docket 6545, Entergy agreed to come before the Public Service Board for License Renewal. Since no one at the time contemplated a second renewal or a deferred license amendment, or whatever it is to be called, the question that looms is: Does favorable action on this petition terminate Entergy's obligation to come before the Board for approval of any future action, short of major construction?

8Q. Have you any concerns with reliance on the Comprehensive Vertical Assessment (CVA) in determining reliability across the span of extended operation?

8A. I do. First, let me say that the CVA can be a useful tool on the path to determining reliability. The audit team has compiled a wealth of information and brought a number of insightful and valuable observations to the table; but the report is not the table.

The audit team was comprised largely of former nuclear utility people, a large percentage formerly with PECO, a utility not without its problems. From my reading of the report, I am not led to think that the team necessarily brought a pro-licensee bias to the audit, but I do believe that the weight they assigned to defects and many of their conclusions came from an industry perspective. Further, it appears that they came to the information with an underlying presumption that Vermont Yankee would be running beyond 2012. This can only serve to color the conclusions.

Nuclear utility people, in my experience, tend to believe that no mechanical problem, and very few management/performance problems, cannot be solved given enough time and the financial resources.

Hence the audit team finds that Vermont Yankee is reliable and good for go, albeit pending 139 problems or areas for improve. On what they base their confidence that ENVY will satisfactorily perform in this area is unclear. The audit team will not be around for the follow through. Vermont's "Nuclear Engineer", though a fine fellow, holds no degree in nuclear engineering; and, we understand, is in fact not an engineer.

In some instances, the report's conclusions cannot logically flow from observations and findings. For example, the audit team found that ENVY was very poor at Foreign Materials Exclusion (FME) practice. FME is loosely termed "housekeeping"

in the professional nonchalance of regulators and utility folk, but it means taking precautions to make certain that no foreign material; no loose objects wind up in piping, pumps, motors, the reactor vessel, the spent fuel pool, or anywhere else where they might affect safety or the operation of the plant. Historically, in the nuclear industry foreign materials have jammed pumps, valves, and cranes, clogged fuel cooling channels. In my collection of Maine Yankee atomic Power station memorabilia, I have a training film titled, "Foreign Materials Exclusion, A Matter of Life and Death!" It is not over-dramatic. A piece of loose sheet metal , some say it was a baffle tacked in last minute, and some say it was a flattened beer can, blocked a fuel cooling channel in a sodium-cooled reactor, the Fermi-1, near Detroit in 1966. The result was a partial melt of the reactor core.

Even though the audit team reported numerous instances of workers cluttering job sites, working on critical piping without sealing openings, and littering the safety-related cooling tower basin with wood, metal, and fiberglass debris, they also shrugged their shoulders and declined to list this failed FME program in their list of to do's

The audit team relied heavily on professional discretion in lending weight, priority, or significance to their findings, but their professional discretion could not take them very far from the path marked by DPS. The audit team adhered strictly to the scope of work outlined by the Department and cleaved to a selection of components and actions negotiated between DPS and ENVY. Of a consequence they undertook no review of components of major significance, such as the primary containment and reactor vessel. This vessel is irreplaceable. In the case of Yankee Rowe, the inability to be able to

reproduce aging analyses embrittlement data for its reactor vessel was a major factor in the decision to shutdown permanently.

The audit team was not an inspection team; it did not perform a physical examination. It did not do confirmatory analyses or calculations. It audited, which is something quite different. It reviewed documentation; it observed, and it interviewed plant employees. Also, while the audit found some managerial and performance issues, it was not diagnostic in character, save for its un-quantified needs-improvement lists. It appears to have done a good job within the scope prescribed.

However, the CVA should not be equated with an NRC-conducted, Diagnostic Evaluation Team (DET) inspection like the one completed at Palo Verde Nuclear Station in 2007-2008 nor should it be equated with the Independent Safety Assessment (ISA) performed at Maine Yankee in 1996. The DET and the ISA (derived from the DET handbook) would both have conducted confirmatory analyses and calculations and added some physical inspection as well. In addition to scope, the DET and ISA exceed the CVA in scale -24,000 hours for the ISA, 20 member team for 5 months for the DET as opposed to 6000 hours for the CVA.

Finally, the findings of the ISA and the DET, having been made by NRC, can be translated into enforceable requirements. This competent enforcement is something sadly in the outcome of the CVA.

Given the rich trove of information and complexity in the CVA, I would recommend that the Board take time to examine it in detail; establishing a sub-docket for the purpose if feasible.

9Q. Has ENVY given adequate consideration to long term environmental effects of extended operation?

9A. No, in my opinion, upon review of the Petition and the NRC Environmental Impact Statement, it has not. While, it may be argued that because Vermont Yankee has had little demonstrable environmental impact in 37 years of operation, adding twenty years to its forty year term will also have little impact, I can find no evidence that certain potential cumulative impacts of Vermont Yankee operations have ever been analyzed. For example, Vermont Yankee routinely treats its service water and circulating water with chemical biocides; among them: Chlorine (as sodium hypochlorite), Bromine (as sodium bromide), Bulab 8006, Bulab 7034, Spectrux NX 1104, Cortrol OS770, Ferroquest FQ7101, and Ferroquest FQ7102. ENVY has stated that it may amend this list in the future. These chemicals, at what ever concentrations, are entrained in Vermont Yankee's cooling tower drift. Drift is the spray (or droplets as opposed to the vapor seen in the cooling tower vertical plumes) that is blown more or less horizontally from the cooling towers to ranges of up to a half-mile and more and in quantities on the order of several thousand gallons per day. (Please, See NEC EXHIBIT RS 4) ENVY has provided no information on this biocide chemical discharge quantifying accumulation, distribution, re-concentration, chemical interaction, or potential long-term effect on biota (including humans) in the environment. Without a baseline, it is impossible to predict what additional effects, if any, there may be. ENVY should be required to perform measurements and analyses to quantify the potential long term impact.

10Q. Does this complete your testimony?

10A. Yes. It does.