

STATE OF VERMONT
PUBLIC SERVICE BOARD

Petition of Entergy Nuclear Vermont Yankee, LLC, and Entergy Nuclear Operations, Inc., for a Certificate of Public Good authorizing the construction of a second independent spent fuel storage installation storage pad and related improvements, including installation of a new diesel generator with an electrical rating of approximately 200 kW, at the Vermont Yankee Nuclear

August 19, 2015

Docket No. 8300

**PREFILED TESTIMONY OF RAYMOND SHADIS
ON BEHALF OF NEW ENGLAND COALITION**

SUMMARY

Mr. Shadis testifies as to the siting, construction and utilization of an Independent Spent Fuel Storage Installation (ISFSI) at the Maine Yankee Atomic Power Plant Site in Wiscasset, Maine. This testimony is intended to compare Maine Yankee Atomic Power Company's approach to establishing an ISFSI to that of Entergy Nuclear Vermont Yankee in order to provide additional context in which to examine the above-captioned petition. Maine Yankee's course of public involvement and stakeholder consultation in ISFSI planning and construction was profoundly different than that so far exhibited by Entergy Nuclear Vermont Yankee. In the case of Maine Yankee, public and stakeholder input served to mitigate negative impacts on the local environment, the reuse of the Vermont Yankee property, regional planning and development, and aesthetics, which are the permissible review-criteria listed in the Vermont Public Service Board's Order of July 7, 2015, granting intervention to New England Coalition.

Mr. Shadis further testifies that there has been an inadequate exploration of alternatives to the siting and design of the proposed ISFSI; in particular, those that could serve to mitigate negative impacts on the local environment, the reuse of the Vermont Yankee property, regional planning and development, and aesthetics.

Finally, Mr. Shadis testifies that the proposed ISFSI will need to be in place until all of its stored spent fuel is removed, a date no one can accurately, credibly predict. The potential for the fuel to remain in the ISFSI long after decommissioning and Vermont Yankee License Termination; and perhaps well into the 22nd century is very real and should be factored in review of this petition.

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**PREFILED TESTIMONY OF RAYMOND SHADIS
ON BEHALF OF NEW ENGLAND COALITION**

Q-1. Please state your name, place of residence, and business address.

A-1. My Name is Raymond Shadis. I live in Edgecomb, Maine. My business address is 47 Shadis Road, Edgecomb, Maine 04556

Q-2. Please sum your education and experience.

A-2. A summation or resume' is attached. In addition, I will mention here that I participated in the Keystone Foundation "National Dialogue on Decommissioning" (2001), the U.S. Nuclear Regulatory Commission's Initial Implementation Evaluation Panel for the (new) Reactor Oversight Process (2000), an NRC follow-up workshop on " Risk Significance Determination" (2001), NRC Annual Regulatory Information Conferences (2000, 2001, 2003), the American Nuclear Society's International Conference on High Level Nuclear Waste (Las Vegas and Yucca Mtn. 2001), a TLG/Entergy Decommissioning Conference (Captiva Island, Fla. 2002) , ANS Conferences on Decommissioning in Uncasville, Ct. and Traverse City, Mi., Chernobyl- Plus 20, international conference on the effects of the Chernobyl accident, Kiev, Ukraine – 2006; more recently, regional meetings of the President's Blue Ribbon Commission on the Future of Nuclear

Power (2010, 2011, Wiscasset Me., Boston, Ma.), a Bi-Partisan Policy Center Regional Meeting, MIT, Cambridge, Ma.(2014), Union of Concerned Scientists Forum on Nuclear Safety, MIT, Cambridge, Ma (2012), International Roundtable on Decommissioning 2014 hosted by NGO Greenworld of Sosnovy Bor, Russia w/ funds from the U.S. State Department, Washington, DC (2014).

Q 3. Please identify your employer?

A 3. I am presently self-employed and since 2006 I have been serving as a technical consultant to New England Coalition. From 1997 through 2006, I was employed by New England Coalition as staff technical advisor. My duties included tracking and reading nuclear power plant documents, regulatory issuances, and power industry journals. It was my responsibility to then make any new information accessible to the NEC Board of Trustees and to initiate an advocacy response to any safety, environmental, citizen rights, or regulatory issues that were identified.

Q 4. Have you previously testified before the Vermont Public Service Board?

A 4. Yes, my testimony has been admitted in Dockets 6545, 7195, 7440, 7600, 7801, and 8762.

Q 5. What is the purpose of your testimony?

A 5. In recounting my experience as an active and contributing participant in the Maine Yankee decommissioning and Independent Spent Fuel Storage Installation (ISFSI) experience, I would like to put before the Vermont Public Service Board (Board) the possibility of a very different licensee approach to decommissioning and the establishment of an ISFSI. I realize that this proceeding, Docket 8300, is not about decommissioning, but establishing an ISFSI is an integral part of decommissioning and usually included in the license termination plan(LTP) and so licensee policies and initiatives that span both decommissioning and establishment must be discussed in order to have an intelligent conversation about installing an ISFSI.

The second, but not-the-less-important purpose of my testimony is to underscore the likelihood that high level nuclear waste will not be removed from Vermont Yankee or Vermont in our lifetime and thus to help ensure that, because of vast uncertainties as to how long the negative impacts of the proposed project will play out, the Board and the parties will give the proposal a most scrupulous and searching review. Unlike permission to operate a generating station, once permission, a Certificate of Public Good, is given to set up a host site for sealed canisters of high level nuclear waste, the permission cannot be withdrawn and its effects undone. Thus, Vermont has just one chance to 'get it right.' New England Coalition heartily supports a prompt move to dry cask, however the Coalition hopes that the Department of Public Service and the Public Service Board will join the Coalition in seeking ways to condition the Certificate of Public Good so as to protect Vermont from the long term negative effects of an open-ended agreement; potentially a contract for a used fuel storage site in perpetuity.

Q 6. Are you aware of the Vermont Public Service Board's admonition regarding issues that are federally preempted?

A6. Yes, the very last sentence of the Board's Order of July 7, 2015 read:

In addition, we remind NEC that this proceeding is not a forum for litigating issues that are within the jurisdiction of the Nuclear Regulatory Commission.

The Board is not first to remind this witness that state regulatory forums cannot entertain issues within the jurisdiction of NRC. In 2000, the Federal Court-District of Maine issued a similar warning on a case almost identical to what we have before us in Docket 8300 – siting an ISFSI. *Please see*, Maine Yankee Atomic Power Co. v. Bonsey, 107 F. Supp. 2d 47 - Dist. Court, D. Maine (2000).

In 1999, I persuaded the Maine Board of Environmental Protection (MBEP) that environmental

concerns and public interest were sufficiently strong to warrant moving a Maine Yankee ISFSI site permit application from Department of Environmental Protection "checklist" review to a full Board hearing process. MBEP then requested that Maine Yankee provide dry cask environmental data including radiological protection data. This was promptly followed by Maine Yankee's application for a federal district court injunction against MBEP where Maine Yankee prevailed. The Court ruled that field preemption applied and further that non-radiological issues could not be litigated if they led to a decision that in any way frustrated the federal scheme of regulating used nuclear fuel storage. That being the case, I would respectfully venture that there is practically nothing to litigate in this docket without treading an almost invisibly thin line; one that Entergy VY seems ready to move or expand and contract, accordion-like, at its whim. I will nonetheless try to confine my remarks to non-preempted topics and trust to the Board's discretion in rendering immaterial any remarks which the Board sees as a jurisdictional challenge.

Q 7. Please explain your Maine Yankee ISFSI experience especially as it relates to licensee attitudes and policy regarding public participation. Compare this to the quality of public participation at Vermont Yankee.

A 7. First, let me say why I think public participation, meaningful public participation, is important. It is important because public participation has the potential to lead to better outcomes. In nuclear regulation, public participation is encouraged by NRC and increasing public participation is one of the agency's policy goals. In matters affecting communities and the environment, the National Environmental Policy Act as interpreted by NRC, requires meaningful public consultation. Public participation serves to increase public confidence in the licensee and regulatory agencies. I believe that the Vermont Public Service Board makes an effective gesture to inclusiveness when it holds informal hearings and invites public comments that it promises to

consider when reviewing petitions that it has taken up.

In the case of Maine Yankee, I witnessed over a period of seven and a half years (1997-2005) the efficacy of meaningful public input.

Unlike Entergy VY, which deferred to the state in forming a decommissioning advisory panel, Maine Yankee proactively began to lay plans for a community advisory panel on decommissioning before the actual decision to decommission was even cast. The plans identified interested persons as potential participants from various sectors of the community including "anti-nuclear" safety and environmental advocates. The day that the announcement was made that Maine Yankee would go into decommissioning I received a call from the Chief Nuclear Officer (CNO) of Maine Yankee extending the invitation to participate in the upcoming community advisory panel.

At the inaugural meeting of Maine Yankee's Community Advisory Panel (CAP) on Decommissioning (September 1997) I introduced myself to the panel members and to Maine Yankee executives as a representative of Friends of the Coast-Opposing Nuclear Pollution , our local non-profit advocacy group. I then read a manifesto stating that I was not there as a passive participant, but as an advocate for safety and the environment I also declared that Friends of the Coast would only participate in an atmosphere of complete transparency and with access to all decommissioning information, not just in polished final form but in its rawest and unedited iterations as well. A few weeks later at the second CAP meeting, Maine Yankee executives said that they had carefully considered my request and, short of proprietary material, decided to open their files. As Maine Yankee identified stakeholders outside of the CAP , such as state agencies and federal regulators , such as EPA, the company began to hold a series of meetings aimed at agreement, first as to what the end state of the site should be and secondly how to get to that end

state. I was invited to participate in those meetings. Maine Yankee reported back to the CAP with summaries of the stakeholder meetings. Meanwhile Maine Yankee introduced the concept of dry cask nuclear fuel storage and sought CAP concurrence on a way forward. Various cask and ISFSI designs were displayed and discussed. Maine Yankee then flew all CAP members willing and able to go to Calvert Cliffs Nuclear Plant in Maryland and Palisades Nuclear Plant in Michigan to tour established ISFSI's. The two plants were similar in design to Maine Yankee, but the ISFSI's employed different cask designs in different storage configurations. CAP members had full access to available plant personnel. At Calvert Cliffs we toured a cask staging area where we were able to see the interior of a NuHolm cask, designed for horizontal storage. The Calvert Cliffs ISFSI site was set in a wooded area, tucked down into a kind of natural amphitheater. The nuclear fuel canisters were stored in low modular concrete bunkers. We learned that no vehicle carrying more than 50 gallons of fuel (diesel or gas) was allowed on the ISFSI site, and that for some period of time after ISFSI start-up, the site was connected by dedicated wire to state environmental protection offices direct readout of temperature and radiations levels for each storage module. The Palisades ISFSI hosted Sierra casks, a vertical unit somewhat resembling those currently deployed at Vermont Yankee except quite inferior in construction. We toured the ISFSI, were able to question plant personnel, walk between and touch the casks. Maine Yankee then flew the group to Las Vegas for a three day American Nuclear Society International Conference on High Level Waste. An opportunity to tour Yucca Mountain was also offered.

When, Friends of the Coast petitioned NRC for leave to intervene in the Maine Yankee License Termination Plan approval process, NRC Staff filed objections, but Maine Yankee answered their filing stating that they were altogether too narrowly legalistic and that Friends of the Coast

deserved to be allowed to intervene. Shortly thereafter, at Maine Yankee's initiation the LTP proceedings were suspended pending the outcome of settlement discussions between Maine Yankee, the State, and Friends of the Coast. The settlement talks were detailed and intense, and went on for over a year. After some struggle Maine Yankee ceded to a Friends of the Coast call for a residual radiation standard 2 ½ times more stringent than the applicable federal standards. Maine Yankee also demonstrated that they were listening when they moved quickly to replace fans on a spent fuel pool cooler following complaints transmitted through the CAP.

ISFSI improvements such as an earthen berm that casts the storage units into low silhouette, cask spacing on modular pads that permits emergency vehicle or large equipment access and a prohibition on the use of corrosive de-icing salts, the planting of a visual screen of Eastern White Pine were all the result Maine Yankee tuning to reasoned citizen input.

These are just a few of many examples of how Maine Yankee extended itself to communicate through meaningful public participation. To date, I know of no comparable examples at Vermont Yankee either regarding decommissioning or the ISFSI.

Q 8. How will the presence of an ISFSI affect the reuse of the Vermont Yankee site?

A 8. I know of no instance in which the presence of an ISFSI has not precluded reuse of a nuclear power plant site. An exception, though not applicable to Vermont Yankee because of its relatively small size and shape, may be the Maine Yankee site, where it was determined that roughly 660 of its 700 acres were unaffected by nuclear operations, that is, plant derived radionuclides, if present, were in concentrations below detectable levels on 660 acres. One section of the 660 acres was set aside as an industrial development park, which currently has one tenant, a medical device manufacturer. That plant is located approximately 1000 yards from the ISFSI; more than twice the distance from the Vermont Yankee proposed ISFSI to the Vernon Elementary School. Maine

Yankee received numerous offers for reuse of its administration building, a designated unaffected building estimated at 200 yards from the ISFSI, but security personnel were concerned with the building's potential as a staging area for a malevolent assault on the ISFSI. The building was demolished. At one point a gas-fired generating station was proposed for the old nuclear plant site, but Maine Yankee was concerned about the advisability of running a large diameter gas pipeline in proximity of the ISFSI and so the project was scrubbed. The plant electrical switch yard remains in use, as it likely will at Vermont Yankee.

New England Coalition asked this very same question in the first round of information requests in this proceed and this is the answer they received from Entergy VY:

A.NEC:EN.1-21: OBJECTION. Entergy VY objects that the request is vague and ambiguous and calls for speculation.

Without waiving its objections, Entergy VY states that as shown in Entergy VY's DCE, Entergy VY currently expects that the U.S. Department of Energy will remove spent fuel from the site and that the ISFSIs will be decommissioned before the termination of the Vermont Yankee NRC operating license. Entergy VY therefore does not currently expect that the ISFSIs will affect eventual reuse of the Vermont Yankee site.

Person Responsible for Response: T. Michael Toomey

Title: Vice President, External Affairs, EWC; Vice President, ENOI

Date: June 17, 2015

Q 9. Do you find this answer provides adequate assurance that the ISFSI will be decommissioned before the current license is terminated.

A 9. No, I do not. As it stands, plant decommissioning must, by law, be complete before 2073. The ISFSI itself cannot be decommissioned until the last fuel assembly is removed from the site. An negative effects of the ISFSI on regional planning, aesthetics, site reuse, and/or the local environment will remain until the ISFSI is removed. Entergy's own documents foresee scenarios in which the last nuclear fuel assembly is not removed before the license termination deadline, as in the following example:

Six scenarios were identified for evaluation. As shown below, the six scenarios evaluate a combination of shutdown dates, decommissioning alternative (prompt or deferred), and expectations of the DOE's performance in transferring spent fuel from the site (Entergy VY vs. Vermont Department of Public Service).

Scenario	Shutdown	Option	1st Spent Fuel Assembly Pickup	Last Spent Fuel Assembly Pickup
1	2012	SAFSTOR	2021	2045
2	2012	SAFSTOR	2058	2082
3	2032	DECON	2021	2060
4	2032	DECON	2042	2082
5	2032	SAFSTOR	2021	2060
6	2032	SAFSTOR	2042	2082

The more conservative scenario in the above table (1) Allows 24 years for three or more rounds of DOE fuel pick up, which I think considering the 2004 Acceptance Priority Ranking and Acceptance Schedule (DOE/RW – 0567) is about right. The first fuel pickup date of 2021 in the first scenario is utterly unrealistic considering it is but 6 years away and the fuel must have an up and operating host site to which to be transported. Even at that the 2004 DOE Report was written before the Yucca Mountain National High Level Repository was effectively canceled. That site took more than 20 years to develop at the cost of several billion dollars. If it were only a matter of politics that brought down the Yucca Mountain repository, I might agree with the President's Blue Ribbon Commission on America's Nuclear Future that a political fix might put Yucca back on the fast track, but I do not. Rather, I agree with the 323 interveners, who, having been accepted in the first licensing proceeding, lay waiting in the wings with contentions that focus on Yucca Mountain's many technical failings. In my opinion the Yucca Mountain project was a technical "balls-up" gone soft with feather-bedding and incompetence. When I took an engineering tour of the site in 2000, just five years short of the proposed opening, I found that

contractors had no idea of how fuel would be handled once it arrived at the foot of the mountain; the design temperatures had not been refined to discriminate below or above the boiling point of water, that no tests with live fuel assemblies had been conducted, nor were they contemplated, that no whole characterization of affect biota for the proposed period of geologic characterization had been done, and that climate change effects evaluation had been relegated to projecting from collecting ancient records, as in, once a desert, always a desert.

I would add to this, three things:

(1) We do not have at our disposal the infrastructure (roads and rails) to support the movement of multiple heavy loads comparable to fully packed canisters and transportation casks. Further, we have only a few prototype transportation casks, heavy transport vehicles, and specially-design rail cars, available. Many hundreds more must be designed licensed and built. So far, no tie has been laid, no gravel and concrete poured, nor ordered, no machine tooling designed. Worse yet, no consensus has been built and no funding mechanism put in place, and no enabling legislation brought to lawmakers. At a recent high level waste task force meeting, state representatives reasonably wanted to know if federal funding would be available for the necessary highway improvements to move waste. I think that the answer may have been, "We'll get back to you on that."

(2) The President's Blue Ribbon Commission (BRC) Report and hence the President's agenda has a strong focus on community involvement and agreement to consolidated or interim waste storage siting. Having attend the BRC and Bi Partisan Council meetings on the disposition of nuclear waste it is my strong impression that New England is not fertile or even tillable ground for location of an interim waste storage site; especially if the citizenry are to be consulted.

(3) There seems to be a silent or soft-spoken consensus among the federal courts and agencies

and the national laboratories that used nuclear fuel will not be leaving plant sites in quantity until at least the 22nd century. NRC's Long Term Storage Rule, written under remand from the Federal Courts, responsive to the court's order contemplates what will happen if no final repository is built. At least the federal court finds this a plausible scenario. NRC says that in the event of canister failure it will require the licensee to build transfer facilities and change out the fuel to new canisters. NRC says it can do this every one hundred years or so as long as the fuel remains in place.

On November 4th 2009, the Government Accountability Office issued GAO 10-48 Report, entitled "NUCLEAR WASTE MANAGEMENT "GAO estimated the cost of on-site storage (in 2009 dollars) of 153,000 metric tons at the end of 100 years to range from \$13 billion to \$34 billion but increasing to between \$20 billion to \$97 billion (with disposal in a permanent repository after 100 years)." Options 'b' and 'c' cover a period of 232 years. The GAO Report also assessed on-site storage costs for 500 years with repackaging every 100 years for safety purposes from \$34 billion up to \$225 billion. The GAO Report acknowledged large uncertainties in their cost projections

In sum, Entergy's assumption that it will complete decommissioning of the ISFSI before license termination is according to its own reports overly-optimistic and, considering externalities, just plain wrong. If mitigating actions are put in place and Entergy is right then the mitigation will have effect only so long as the fuel remains in place; the same is true if Entergy is wrong and the fuel remains in place after Entergy's tenure at VY, as a decommissioning plant, is over.

Q 10.

Does that complete your testimony?

A. Yes. It is as much as time permits. I would invite the Board to a discussion of potential mitigation at the time of live testimony.