STATE OF VERMONT
PUBLIC UTILITY COMMISSION

Docket No. 8880

Joint Petition of NorthStar Decommissioning Holdings, LLC	**)**
NorthStar Nuclear Decommissioning Company, LLC, NorthStar	**)**
Group Serviced, Inc., LVI Parent Corporation, NorthStar Group	**)**
Holdings, LLC, Entergy Nuclear Vermont Investment Company	**)**
LLC and Entergy Nuclear Operation, Inc., and any other	**)**
necessary affiliated entities to transfer ownership of Entergy	**)**
Nuclear Vermont Yankee, LLC, and for certain ancillary	**)**
approvals, pursuant to 30 V.S.A. secs. 107, 231, and 232	**)**

AFFIDAVIT OF RAYMOND SHADIS IN OPPOSITION TO MOTION TO EXCLUDE

I, Raymond Shadis, upon being duly sworn, do depose and say:

1. I submit this affidavit in opposition to the motion to exclude my testimony.
2. As stated in my resume and my prefiled testimony, my experience includes: 38 years of study of nuclear operations, nuclear safety and nuclear decommissioning, including attendance at American Nuclear Society technical conferences on decommissioning; participation in an Oak Ridge Associated Universities Manager's Training Course in the Multi-Agency Radiation and Site Survey Investigation Manual (MARSSIM); testimony on nuclear operation, safety and decommissioning in proceedings of the Maine Public Utilities Commission, the Maine Board of Environmental Protection, the Connecticut Department of Public Utility Control, the Nuclear Regulatory Commission, the Federal Energy Regulatory Commission and this Commission; participation by invitation of the State Department, the Nuclear Regulatory Commission, and various public utilities in national and international proceedings (including invitation by the NRC to participate in the

development of an NRC staff report (NUREG-1738) on spent fuel pool accident risk, NRC reactor oversight proceedings, and NRC proceedings on reactor safety and spent fuel pool accident risk); and receipt of paid invitations and foundation awards to present at international conferences on the effects of the Chernobyl nuclear accident in Kiev, and, most recently, at the International Conference on Decommissioning 2017, in St. Petersburg.

3. I have been employed as Technical Advisor to the New England Coalition for 19 years; 1979 to 2006 as Staff Technical Advisor, and 2006 to the present as Consulting Technical Advisor. As stated in my prefiled testimony, my duties have included tracking and reading nuclear power plant operational and compliance 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. While in performance of these duties, nuclear safety issues which I isolated and identified were granted relief in two 10C.F.R.2.206 Enforcement Requests. In all, more than six of my Enforcement Requests were accepted by NRC Staff as having sufficient technical basis for review. I conducted extensive review of both the Seabrook and Vermont Yankee Environmental Impact Statements, as issued for license renewal. As part of my job, I also performed in-depth review of the Maine Yankee, Yankee Rowe, and Connecticut Yankee License Termination Plans, as well as the Yucca Mountain Environmental Impact Statement.

4. Given that Joint Petitioners challenge my competence to address radiological safety, the NRC's recognition of my competence in this area is noteworthy:

●In 2000 and 2001, I was invited at NRC's expense to present in breakout sessions at NRC's Annual [three day] Regulatory Information Conference(s) in Washington, D.C. and Rockville, MD. My assigned topics were Reliance on Corrective Action Programs, Industry Voluntary Initiatives Program, and Public Participation in Decommissioning. Approximately 1800 industry executives, managers, technicians and engineers together with representatives of foreign nuclear regulators and industry official were in attendance for the general session. This event is NRC's world showcase. In general session, I engaged in public dialogue on regulatory issues with NRC Chairmen, Commissioners, and Executive Directors of Operation.

●I served on the Initial Implementation Evaluation Panel of the Reactor Oversight Process. This was a FACA (Federal Advisory Committees Act) invitation. I was invited, at NRC expense, to present my perspectives on the findings of the Initial Implementation Evaluation Panel of the Reactor Oversight Process to a meeting of the full NRC. I was also invited in 2002, again at NRC expense, to return to the NRC headquarters to participate in technical Reactor Oversight Panel evaluation task group investigating the (Risk) Significance Determination Process.

5. The NRC Corrective Action Program that the NRC invited me to provide my opinions about is "the system by which a utility finds and fixes problems at a nuclear power plant." As set forth on the NRC website, a Corrective Action Plan "includes a process for evaluating the safety significance of the problems, setting priorities in correcting the problems, and tracking them until they have been corrected."

   https://www.nrc.gov/reading-rm/basic-ref/glossary/corrective-action-program.html. In other words, the NRC invited me to address issues that included how to evaluate the significance of radiological contamination at nuclear power plants and how to respond to that radiological contamination.

6. The Reactor Oversight Process which the NRC asked me to discuss is the NRC's "program to inspect, measure and assess the safety and security performance of operating commercial nuclear reactors, and to respond to any decline in their performance. https://www.nrc.gov/reactors/operating/oversight.html. The Significance Determination

Process is the process used by NRC staff to "evaluate inspection findings to determine their safety significance. This involves assessing how the inspection findings affect the risk of a nuclear plant accident, either as a cause of the accident or the ability of plant safety systems or personnel to respond to the accident." https://www.nrc.gov/reading-rm/basic-ref/glossary/significance-determination-process.html. That is, the NRC invited me to address issues that included the causes of and responses to radiological accidents at nuclear power plants.

7. While these NRC-sponsored roles involved radiological safety and contamination during plant operation and during decommissioning, I have gained widely recognized experience and expertise pertaining to nuclear plant decommissioning more generally (as described in my resume and prefiled testimony). I served on the Maine Yankee Community Advisory Panel on Decommissioning from 1997 through 2005; I am intimately knowledgeable of the details of the decommissioning of the Maine Yankee plant, from start to finish. During the Maine Yankee decommissioning, I participated in more than forty Maine Yankee technical working group meetings that helped design, execute, and oversee the dismantlement and decontamination of the Maine Yankee facility. I have been invited by the NRC and by utilities to speak at conferences on decommissioning. I have attended American Nuclear Society technical conferences on high-level radioactive waste and decommissioning, as well as a TLG/Entergy conference on decommissioning. In 2014, I was an invited presenter at the State Department-funded International Roundtable on Decommissioning. Also in 2014, the Legislature of Leningrad Oblast, Russia presented me an award for my global contributions to nuclear decommissioning. Most recently, in September of 2017, I and my long-term colleague Michael Meisner, the former CEO and

Chief Nuclear Officer of Maine Yankee Atomic Power Company, were invited speakers at the second international conference on decommissioning held in St. Petersburg earlier this month.

8. **Questions 7-10 and Shadis Exhibit 2 – lessons from the Maine Yankee decommissioning process, and Mr. Holschuh's statements.** Questions 7-10 and **Shadis Exhibit 2**, are based upon my experience as a participant in the Maine Yankee decommissioning regulatory process. The regulatory process in Maine resulted in a successful, on-time, on-budget, community and stakeholder-supported decommissioning of a nuclear plant of comparable size and age to Vermont Yankee. I point out that, to date, "… mostly because of ISFSI security considerations, no decommissioned commercial nuclear power plant site has thus far been repurposed for industrial or commercial use while both the Maine Yankee and Connecticut Yankee sites boast nature preserves and open land." (p.12) In Maine, Maine Yankee agreed to set aside 200 of its acres for a nature preserve and center. A nature preserve set-aside was also obtained in Connecticut. All of these facts are well within my personal knowledge and experience, and my testimony applies this experience to Vermont.
9. In discussing what the end state should be at the Vermont Yankee site, I mention and attach **Shadis Exhibit 2**, the Electric Power Research Institute (EPRI) report on Maine Yankee decommissioning. This exhibit fleshes out in more detail the same subject matter as my testimony. I could have eliminated the EPRI report and added many pages to my testimony instead. I possess first-hand information about all of the information in Exhibit 2. It is accurate.

10. I also am familiar with EPRI generally. In my experience, while I may not personally agree with every EPRI report, within the nuclear power industry EPRI reports are regarded as reliable sources of information.

11. **Questions 11, 12, 13 and 15 – radiologic risk, rubblization and Shadis Exhibit 5.** I discuss in Answer 11 the half-lives of the radionuclides found at the Maine Yankee site and likely to be found at the Vermont Yankee site, and the scientific consensus that expiration of ten half-lives is a reasonable safety standard. Understanding and application of this information was central to my work at Maine Yankee and my participation in NRC proceedings. In Answer 12 I discuss the mrem/yr standards imposed by other states. I discuss in Answer 13 the meaning and effect of the 10, 15 and 25 mrem/yr residual radiation levels, and in Answer 15 how nuclear power plants are "scabbled" and the radiological risks of rubblization. Each of these opinions is based upon my in-depth experience and education, throughout and after the Maine Yankee decommissioning process, including participation in the Oak Ridge training and American Nuclear Society and TLG/Entergy technical conferences, presenting to the NRC and to two international conferences on the radiological risks of decommissioning, and participation in more than forty Maine Yankee technical working group meetings through which I participated in design and oversight of the Maine Yankee decommissioning..

12. Joint Petitioners also object to quotation from a letter submitted by the then-EPA Administrator Carol Browner to the NRC, and to a report from the National Academies of Science on the Biological Effects of Ionizing Radiation. I verify that the EPA letter is posted on NRC's official "ADAMS" library of documents and that the National Academies are the preeminent scientific panels in the United States; they exist to report to the

Congress. My experience is that experts in nuclear plant operation and decommissioning matters consult EPA documents posted on the ADAMS website and this National Academies report as reliable sources of information. I myself do so.

13. Joint Petitioners object as well to an email from the New Jersey Department of Environmental Protection Bureau of Radiation. The email refers to New Jersey's statutory limit of 15 mrem/yr for soil. That limit is publicly available in New Jersey's statutes. The reason I cite the email is that it illustrates my point that in New Jersey, the same as in Maine, the state takes the position that its radiological standard goes into effect *when decommissioning has been completed, after the NRC license has been terminated.* I recognize now that the prefiled testimony does not make this sufficiently clear, so we are moving to amend that page. I am not offering the email to prove what the New Jersey standard is.
14. The email is the type of information that experts in the decommissioning process, such as myself, rely on in determining the nature and scope of state review of decommissioning.
15. **Questions 14 – unexpected costs, Dr. Irwin's Affidavit, the NRC Staff Report and Shadis Exhibits 3 and 4.** In Answer 14, I set forth my concern that NorthStar lacks adequate information to predict the potential costs of decommissioning and has not demonstrated the financial strength to respond to large cost increases. I do so in reliance upon my experience working on the decommissioning of Maine Yankee, including the information I gained about decommissioning Connecticut Yankee while working on the decommissioning of Maine Yankee. My testimony is that, based on his experience at Maine Yankee, I concur with the testimony of witnesses Noyes, Schwer, Brewer and Maret, and I add that, unlike the decommissioning of Maine Yankee, ratepayers will not be available

to pay the unexpected cost increases that may arise during the decommissioning of Vermont Yankee.

16. I also quote from a NRC Staff report on the risks that limited liability companies may lack the resources, as stand-alone entities, to fulfill decommissioning obligations (p.24). The NRC Staff report is a publicly available document issued by the NRC. NRC staff reports such as this are documents which I and other experts on nuclear operation and decommissioning often rely upon as reliable sources of information.

I Raymond Shadis of Edgecomb, Maine hereby declare under penalty of perjury that the foregoing statements to my best knowledge are true and correct.

Witness my hand and seal this 19th day of October, 2017.

Raymond G. Shadis

STATE OF MAINE
COUNTY OF LINCOLN

Then personally appeared before me this 19th day of October, 2017 the above named Raymond G. Shadis and acknowledged the foregoing statements to be his free act and deed.

Wilma Jeanne Tatlock
Notary Public / ~~Attorney at Law~~
Wilma Jeanne Tatlock
Printed Name
My commission expires: 10/24/2021