

PROACTIVE STATE-LEVEL NUCLEAR POLICY: THE VERMONT YANKEE EXPERIMENT

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INTRODUCTION

Recent developments in commercial nuclear power have created market conditions in which state legislatures can be uniquely effective in regulating nuclear power. The U.S. Constitution bestows inherent authority upon state governments to regulate electrical generation,¹ and States have been exercising this authority with growing expertise since the turn of the twentieth century.

Nuclear regulation is generally conceived as a subject matter of federal jurisdiction.² However, the U.S. Supreme Court has interpreted federal laws so that the states retain authority in this field. While federal agencies regulate the most hazardous aspects of nuclear power, energy policymaking remains a matter of state expertise.³ State governments shape nuclear policy and ensure that nuclear operations suit the public health and welfare.⁴ Particularly, states are empowered to make nuclear policy by balancing the risks inherent to in-state nuclear generation against the costs and benefits of other power-supply choices, ultimately making a decision based on “the State's standards of public convenience and necessity.”⁵

By nature of our federalist system, state governments look to each other for innovative solutions to mutual problems. Vermont’s regulatory experience with the only in-state nuclear power plant, Vermont Yankee Nuclear Power Station (“Vermont Yankee”) exemplifies a number of such mutual problems. First, the plant is located on the Connecticut River, directly across from the banks of New Hampshire and walking distance from the Massachusetts border. Any issues in the reliability or safety of the electricity generated at Vermont Yankee will impact these states as well as Vermont. Furthermore, there are many states outside of New England hosting older nuclear facilities that are prone to the same types of age-related problems that Vermont Yankee has experienced in recent years.⁶ The success or failure of Vermont’s nuclear regulatory

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policies will provide information to other state regulators that could mitigate some of the potential risks to engaging in similarly assertive nuclear regulation.

Vermont's experience attempting to regulate the state's only in-state nuclear power plant, Vermont Yankee Nuclear Power Station ("Vermont Yankee"), despite the plant's concurrent regulation by the U.S. Nuclear Regulatory Commission ("NRC") is helpful to consider in shaping effective nationwide nuclear policy. No other state has taken such an active role in regulating in-state commercial nuclear power, and so Vermont's policies are relatively assertive in this manner.⁷ The Vermont legislature has developed a clearly-articulated energy policy based upon the best interests of the state's residents.⁸ Whether Vermont Yankee continues operating after the expiration of the plant's original NRC license is highly relevant to the economic and social welfare of the people of Vermont, and the state deserves deference in its policy-making decisions. However, whether federal agencies will support Vermont's assertive nuclear policies remains to be seen. There is an undeniable pro-nuclear sentiment within the current federal regime, and the NRC has already voted unanimously to award Vermont Yankee a license extension despite the Vermont legislature's continued deliberation on the issue.⁹

The ensuing analysis demonstrates the potential benefits of increased state-level nuclear regulation, as well as the potential drawbacks of such a policy without federal cooperation. The Vermont legislature has attempted to insulate the state from harm that could result from the continued operation of an aging nuclear facility. However, the state has struggled with a private nuclear operator's non-compliance with certain aspects of Vermont's regulatory scheme and a lack of enforcement mechanisms to ensure compliance. Without a change in federal policy, state nuclear regulators may have difficulties actively regulating the nuclear power plants within their borders. State regulation of nuclear power has grown substantially more sophisticated since 1954, and the time is ripe for the additional legislation contemplated by the Atomic Energy Act that would bolster state authority in this field.¹⁰

This article begins with a brief overview of the development of American nuclear policy, followed by a discussion of the jurisdictional divisions imposed upon the law of nuclear power by federalist doctrine. Next, this article describes the State of Vermont's experience in regulating the State's only in-state nuclear power plant, the privately-owned Vermont Yankee facility, in the dual-sovereign framework of American nuclear law, followed by a description of the

Vermont Yankee fact pattern. Finally, this article analyzes whether the current disposition of nuclear policy in America would allow Vermont to regulate the Vermont Yankee Nuclear Power Station according to the State's best interests, focusing in particular on the current litigation brought against the State by the power plant's private corporate owners.

I. AMERICA'S NUCLEAR EXPERIENCE

Although nuclear power potentially solves some of America's energy supply issues and environmental challenges, private capital markets have become almost completely unwilling to finance new nuclear projects. Although federal legislation restricts private liability for nuclear accidents, American nuclear projects have been shown to be characteristically risky and unpredictable in cost and construction time.¹¹ Historically, these market conditions contributed to a series of cancellations in nuclear projects across the country.¹² The last currently-operating nuclear power facility was licensed for construction in 1973,¹³ and as the existing nuclear power plants generating electricity continue to age, they eventually develop safety and reliability issues that force plants to close for cost-related reasons.¹⁴

In addition to the economic barriers to nuclear development, public opinion about nuclear power has become increasingly skeptical over time. America experienced its first and only serious nuclear accident in 1979 at the Three Mile Island facility in Pennsylvania.¹⁵ Since then, the proliferation of atomic materials has posed an increasing risk to national security,¹⁶ and furthermore, the federal government has been unable to find a permanent solution to nuclear waste disposal. Some experts argue that this fact alone makes nuclear power an undesirable source of electricity.¹⁷

While nuclear power will always have its critics, it also elicits a great deal of public endorsement. There are considerable environmental benefits to increasing America's dependence on energy generated from commercial nuclear power.¹⁸ Because nuclear power plants emit greenhouse gasses at levels far lower than comparable forms of electricity generation, America's nuclear power can be "scaled up" to achieve major air-quality goals.¹⁹ Even despite the incomplete nuclear waste cycle, electricity generated from nuclear power plants is quite clean. In fact, some experts declare nuclear energy to be even more environmentally-friendly than energy generated from renewable resources.²⁰ Regardless, global warming is a problem that only gets

worse with time, and eliminating greenhouse gas emissions requires immediate utilization of substantially all of society's clean energy technologies, nuclear included.²¹

Modern energy markets demonstrate that nuclear power can provide clean, inexpensive, reliable electricity to millions of customers safely and efficiently, as long as regulatory regimes facilitate safe, reliable, and secure nuclear operations. However, the benefits inherent to nuclear power are not absolute. High-level nuclear waste disposal is a significant problem for which there is no feasible permanent solution.²² Any sizeable expansion of commercial atomic energy certainly requires careful consideration of nuclear safety and waste disposal policies, as public confidence in these areas is low.²³ In particular, the Three Mile Island incident illuminated a need for more stringent regulation of the country's nuclear power plants.²⁴ The recent accident at Japan's Fukushima nuclear power plant—one of the many nuclear facilities across the globe set to turn 40 in the next few years—demonstrates the degree of necessary progress that remains to be made in nuclear regulatory practices.²⁵

II. JURISDICTIONAL ISSUES IN NUCLEAR REGULATION

Nuclear power has always been—and likely always will be—a subject of polarized political debate. States may seek to regulate nuclear power because of its potential effects on the public health and welfare. Historically, states have been limited in their authority to govern nuclear operations. However, federal law has evolved over time to become much more cooperative in its nuclear regulatory schemes, thus allowing states substantially more power to regulate in-state nuclear generators.

Initially, nuclear power was purely a military device.²⁶ For this reason, the first Atomic Energy Act (1946) precluded private ownership of nuclear technology altogether.²⁷ However, it wasn't long before federal policymakers began to see the benefits of commercial activity in developing peaceful nuclear technology. President Eisenhower's "Atoms for Peace" campaign, for example, called upon the international community to develop and implement peaceful uses for atomic power.²⁸ Immediately following the presidential campaign, Congress enacted the Atomic Energy Act of 1954 ("Atomic Energy Act") legalizing the private ownership and commercial production of nuclear technology, subject to federal licensing and oversight.²⁹

In addition to legalizing private nuclear power, the one of the primary legislative purposes of the Atomic Energy Act was the promotion of nuclear power.³⁰ The Atomic Energy Act enumerates Congress' official policy that "atomic energy shall be directed so as to promote world peace, improve the general welfare, increase the standard of living, and *strengthen free competition in private enterprise*."³¹ Particularly, Congress passed the Atomic Energy Act in order to bolster the private nuclear industry, which is considered to be "a major policy goal of the United States."³² The Price-Anderson amendments to the Atomic Energy Act, 42 U.S.C. § 2210, limit private liability from nuclear accidents partially in order to encourage private development of the nuclear industry.³³ Furthermore, under the leadership of President Obama, the Department of Energy ("DOE") is seeking to ignite a "nuclear renaissance" through its Nuclear Power 2010 program.³⁴

In order to help achieve policy goals, Congress has assigned distinct roles to the DOE, the Environmental Protection Agency ("EPA"), and the NRC.³⁵ While the EPA must establish "generally applicable standards for protecting the environment from releases of radioactive materials,"³⁶ the DOE must select, design, and ultimately operate a high-level nuclear waste storage repository, and the NRC must assume related licensing responsibilities.³⁷ Under this regime, the DOE and the EPA are involved in nuclear regulation, but the NRC bears the brunt of regulatory authority under the Atomic Energy Act. The NRC has exclusive power to regulate nuclear power plants for safety³⁸ as well as the safe construction and operation of nuclear facilities.³⁹ Although NRC licenses nuclear power plants for operation, the "safety" vocabulary establishing NRC jurisdiction is largely a term of art, especially given that major failures in non-safety related systems of a plant can result in destruction and devastation just as significant as failures in safety-related systems. Safety systems at nuclear power plants are those designed to "prevent an accident that would lead to a large amount of . . . radioactivity being released from the plant."⁴⁰ There are four major types of safety systems at nuclear power plants: (1) systems that shut down a reactor and quickly stop the fission chain reaction, (2) systems that control reactor pressure and continue cooling the reactor fuel in the case of shutdown, (3) electrical, control, and instrument systems that monitor the reactor and operate reactor safety systems and (4) the system of barriers intended to contain radioactivity if it should escape from the reactor core.⁴¹ All other nuclear power plant systems are 'non-safety systems' not directly inspected and controlled by the NRC.

Like the many successful environmental-control programs,⁴² federal nuclear regulation embodies the principles of cooperative federalism. The Atomic Energy Act includes a section titled “Cooperation with States,” which articulates the states’ interests in the peaceful uses of atomic energy, and clarifies the respective responsibilities of the states and the NRC with respect to specific areas of nuclear regulation.⁴³ The statute also recognizes the benefits of state-federal cooperation with respect to radiation control and the promotion of a regulatory scheme that is consistent with respect to nuclear development.⁴⁴ Most significantly, the Atomic Energy Act explicitly “recognize[s] that, as the States improve their capabilities to regulate effectively such materials, additional legislation may be desirable.”⁴⁵

Additionally, the U.S. Supreme Court has recognized specific state authority in nuclear regulation. In *Vermont Yankee v. Natural Resources Defense Council*, then Justice Rehnquist wrote:

“[t]here is little doubt that under the Atomic Energy Act of 1954, state public utility commissions or similar bodies are empowered to make the initial decision regarding the need for power. 42 U.S.C. § 2021 (k). The [NRC]’s prime area of concern in the licensing context, on the other hand, is national security, public health, and safety. §§ 2132, 2133, 2201.”⁴⁶

Thus, state regulators may govern nuclear power generation—a traditional subject of NRC control—as long as there are sufficient economic justifications for the action.⁴⁷

For example, the Supreme Court validated the California legislature’s decision to prohibit any new construction of nuclear facilities within the state, despite opponents’ claims that the policy was preempted by the Atomic Energy Act’s delegation of operational licensing authority to the NRC.⁴⁸ The Court decided that if California had based its nuclear moratorium on the basis of radiological health and safety concerns, the state’s law would have been preempted because radiological safety is squarely within NRC jurisdiction.⁴⁹ However, the state’s nuclear moratorium was not preempted. California argued that an unacceptable economic risk was created when the DOE failed to fulfill its waste-disposal mandate, which resulted in an incomplete nuclear fuel cycle for in-state nuclear facilities.⁵⁰ Even after identifying the clear conflict between California’s regulation and Congress’ intent to bolster private nuclear power

through the Atomic Energy Act, the Supreme Court deferred to the state's authority.⁵¹ Relying on prior Supreme Court case law that declared states to have constitutional authority to ensure an economical and reliable in-state electricity supply,⁵² the Court affirmed the states' power to determine whether a nuclear facility should operate in-state, on the condition that the state make its policy decisions based on considerations of economics and reliability rather than radiological safety or other subjects of NRC control.⁵³

Thus, the preemption issue in nuclear regulation is not entirely cut-and-dried; whether a given state regulation is preempted depends upon the content of the regulation, as well as the reasoning behind the law. Summarily, states have the power to regulate nuclear utilities on issues of cost, reliability, need, and other related concerns,⁵⁴ while the federal government retains absolute jurisdiction over the regulation of atomic safety and related licensing.⁵⁵ State legislatures have the power to decide whether nuclear power is welcome in-state before any NRC licenses are issued, but courts have not had the opportunity to analyze similar State action in the context of NRC license renewal. *Pacific Gas & Electric* held that state legislatures have the power to determine whether nuclear power should be part of the state's energy supply portfolio as long as a sufficient economic justification is offered, but Vermont Yankee is the first instance of a state attempting to exercise this authority against a nuclear power plant in the context of license renewal.

III. NUCLEAR REGULATION IN THE STATE OF VERMONT

In 1966, the state legislature hotly debated the issue of whether Vermont should allow a nuclear power plant to be constructed within its borders.⁵⁶ The legislature finally decided that Vermont Yankee should be licensed for construction because electricity generated from the facility would be more economical than other power supply options.⁵⁷

Initially, several New England-based public utilities owned the facility with Vermont's public utilities holding the majority share.⁵⁸ In 2001, the utilities started soliciting offers from other nuclear operators across the country for the sale of Vermont Yankee. When Vermont Yankee's original owners decided to sell the plant, they had to get approval from the Vermont Public Service Board ("Public Service Board" or "Board"). The state was interested in selling the

plant to a private entity because doing so shifted the financial risk of operating an aging nuclear power plant from ratepayer-financed utilities to a private company.⁵⁹

In its part negotiating the sale of the nuclear power plant, the Vermont Department of Public Service, the state agency charged with serving as the public representative in utility adjudications, arranged measures to ensure that the state was protected from the potential ill effects of ENVY's operation of Vermont Yankee.⁶⁰ In the sale negotiations, ENVY agreed to a number of terms giving Vermont regulators assurances that they would be able to enforce key state laws against ENVY despite any potential jurisdictional barriers.⁶¹ The State's licensing entity, the Public Service Board, was concerned that out-of-state management of the in-state nuclear facility would be economically detrimental to the State of Vermont.⁶² On this basis, the Board rejected various proposals to transfer ownership to purchasers located outside of New England.⁶³ However, the Public Service Board eventually approved transfer of Vermont Yankee's ownership to ENVY in 2002.⁶⁴

The Public Service Board's skepticism of out-of-state nuclear operators begs an obvious question: why approve ENVY's proposal rather than that of any other potential purchaser? The answer is that the Public Service Board approved the sale of Vermont Yankee to ENVY based on the special privileges that ENVY offered state regulators in exchange for the opportunity to operate Vermont Yankee.⁶⁵ For example, ENVY agreed to give Vermont special jurisdiction to issue a Certificate of Public Good ("State Certificate") which licensed an upgrade to Vermont Yankee's generation facilities to produce more electricity.⁶⁶ Although the NRC is the entity that typically licenses such upgrades, ENVY submitted to Vermont's jurisdiction and procured a State Certificate in addition to the NRC license.

Additionally, ENVY agreed that it would not operate Vermont Yankee beyond the original NRC-issued operating license, set to expire in March 2012, without another State Certificate from Vermont.⁶⁷ This covenant was accompanied by an express waiver of any preemption claims ENVY or its affiliated companies might bring.⁶⁸ The Public Service Board explicitly noted that licensing for nuclear operation is typically a matter of federal subject matter jurisdiction, but reaffirmed the state's authority to regulate nuclear activity on the basis of economics and reliability pursuant to the Supreme Court's holding in *Pacific Gas & Electric*.⁶⁹ The Public Service Board acknowledged its inherently limited jurisdiction, but declared:

To the extent that early closure [of Vermont Yankee] might be justified for non-financial reasons, such as nuclear waste and radiological safety, we have limited authority because Congress has placed nuclear waste and safety issues with the federal Nuclear Regulatory Commission, and not with this Board. . . . If we did not respect the choice of Congress in giving the NRC its power, we would have no right to expect Vermont Yankee's owners -- who ever they might be -- to respond to the authority that we have been given by law.⁷⁰

The Board was obviously concerned with Vermont's ability to ensure that ENVY operates Vermont Yankee in compliance with Vermont law,⁷¹ but ENVY allayed some of these concerns in the terms that the company agreed to in negotiating the sale. Of primary importance, ENVY conceded that the Public Service Board has the power to issue a State Certificate for continued operation of the plant after 2012 if the statutory requirements for relicensing are met.⁷² In fact, the company expressly acknowledged that the Public Service Board has jurisdiction for this purpose by waiving any preemption claims it might assert.⁷³ These special terms of sale are particularly important for two reasons—first, under Vermont law, electrical generators must operate for the *economic benefit* of the state; and second, Vermont wanted to secure enforcement authority through private contract, despite potential jurisdictional issues.

In Vermont, electricity providers must receive a State Certificate from the Public Service Board in order to operate an electric generation facility.⁷⁴ Vermont's legislature wrote the State's energy laws to ensure that the Public Service Board makes a number of mandatory findings before issuing a State Certificate allowing electricity to be generated from an in-state facility, including "that the purchase, investment or construction . . . is *required* to meet the need for present and future demand for service which *could not otherwise be provided in a more cost effective manner* . . . [and] will result in an *economic benefit* to the state and its residents."⁷⁵ Additionally, the State Certificate is awarded based on a finding that the facility "will *promote* the general good of the state," which commands the fulfillment of other requirements enumerated in the statute.⁷⁶ This vocabulary is purposeful and meaningful. In order to be qualified for a State Certificate, an electrical generator may not operate with a null or detrimental effect on the state, but rather the facility must actually *promote* the general good, meaning that it must create some public benefit.⁷⁷ Vermont's electrical licensing regime is specifically applied to

nuclear power operations through 30 V.S.A. § 248(e)(2), which adds an additional licensing requirement unique to nuclear power: in addition to the regular Public Service Board proceedings, Vermont’s elected legislature must vote to approve relicensing of nuclear power facilities in-state.

In this context, the state legislature is performing a public duty—namely, utility regulation—that is traditionally reserved to a public service board.⁷⁸ However, to be clear, the Vermont legislature decides *whether* to engage in a given electrical regulatory scheme, and the Public Service Board decides *how* this scheme should proceed.⁷⁹ The Vermont legislature is voting based on whether relicensing Vermont Yankee would be to the economic welfare of the state, and it has constitutional authority to do so. There is no separation of powers issue because the Public Service Board is, essentially, an agent of the state legislature.⁸⁰ Vermont’s legislature delegated a specific subset of authority to the Public Service Board within its general legislative powers, but certainly not the absolute authority to make all energy-related policy decisions for the state.⁸¹ Such a delegation of legislative power would be both anti-democratic and unconstitutional.⁸² Furthermore, it is generally not the role of the courts to second-guess legislative decisions “regarding the permissible degree of policy judgment that can be left to those executing or applying the law.”⁸³ Thus, the Vermont legislature is free to delegate some of its legislative authority to the Public Service Board so that there is sufficient technical expertise in the state’s energy policy. However, the democratically-elected legislature remains empowered to make the final decision regarding whether a given energy policy is best for the public health and welfare.

Despite having initially participated in Vermont’s energy regulatory scheme when purchasing Vermont Yankee, ENVY has refused to comply with its agreement to seek a renewed State Certificate to operate the plant after March 2012; instead, the company went directly to the NRC for a federal license.⁸⁴ Needless to say, this clear disregard for both Vermont’s regulatory laws and the particular terms of the sale agreement that the State expressly bargained for has caused public opinion about Vermont Yankee to sour. However, public outcry calling for the closure of the Vermont Yankee facility was largely caused by a number of major incidences at the plant that have occurred since ENVY took over operations, discussed further below.

IV. VERMONT YANKEE

Vermont Yankee is a nuclear power plant located in Vernon, Vermont.⁸⁵ The facility was originally licensed for construction in 1967 and commenced operation in 1972, subject to a 40 year license from the NRC and a State Certificate from the Vermont Public Service Board (“Public Service Board”).⁸⁶ Vermont Yankee supplies about one-third of Vermont’s electricity in addition to selling electricity on New England’s open wholesale markets.⁸⁷

Vermont Yankee has supplied reliable, economical electricity to the state of Vermont and other parts of New England for almost forty years. However, certain events following the sale of Vermont Yankee to a private company in 2002 have raised concerns within the Vermont legislature about the plant’s continued ability to operate in a reliable and economically beneficial manner. As discussed, despite agreements to seek a renewed State Certificate for operation beyond the current expiration date of March 2012, ENVY submitted an application for an extension of Vermont Yankee’s operating license to the NRC in January 2006 without consulting the state. Vermont Yankee was granted a renewed NRC operating license on March 21, 2011, certifying the facility’s safe operation for an additional 20 years.⁸⁸ Of course, state regulators were not notified of ENVY’s intentions until the information became public.

Responding to ENVY’s surreptitious NRC relicensing application, the Vermont legislature passed new laws to ensure that Vermont Yankee can operate economically and reliably in the future.⁸⁹ Specifically, the laws arose out of concern over ENVY’s maintenance of the “non-safety” systems of Vermont Yankee, parts of the plant that are not subject to inspection by the NRC.⁹⁰ Certain recent highly-visible events, such as a transformer fire and a cooling tower collapse, indicate that Vermont Yankee’s reliability performance may soon take a downturn.

Given that the NRC issues operating licenses based on the adequacy of the plant’s nuclear *safety*, there is a clear need for increased State authority to regulate non-safety related nuclear operations in order to ensure that nuclear power plants, especially Vermont Yankee and its aging contemporaries, can operate *reliably*. Like many other nuclear power plants across the country, Vermont Yankee is an aging facility in need of constant inspection and maintenance. If ENVY is capable of adequately managing the facility, accidents should be avoided and the

nuclear power plant should generate reliable electricity. However, ENVY's operation of Vermont Yankee exhibits a disturbing theme of maintenance problems within non-safety systems that raise substantial questions regarding the plant's future reliability. Particularly, there have been three major incidences at Vermont Yankee since privatization of the facility: a fire, a flood, and radioactive containment issues.

A. The Fire

A large fire broke out at the Vermont Yankee facility on June 18, 2004,⁹¹ causing substantial damage to one of the plant's transformer facilities and the surrounding area.⁹² The series of events that culminated in the ignition were largely related to Vermont Yankee's aging equipment and—at least indirectly—ENVY's failure to replace or properly maintain certain parts of the plant's non-safety systems.

The complex string of events resulting in the 2004 transformer fire started with a very old piece of metal foil lining a cooling duct. A short time before the incident, ENVY had installed a more powerful system of fans to move air through that particular segment of ducting.⁹³ Although there was some industry-wide data demonstrating that this type of ducting had failed previously at other plants,⁹⁴ the cooling ducts at Vermont Yankee had not been inspected after the airflow upgrade. ENVY identified that an inspection was necessary but never actually completed one, even despite an opportunity to do so during a 2004 maintenance outage.⁹⁵ Eventually, the 32-year-old bit of foil detached from the ducting, was blown some distance by the air current, and landed between the main generator and main transformer, causing a short in the electrical connection between them.⁹⁶

Although Vermont Yankee has systems in-place to prevent the transformer's ignition in such circumstances, the system failed because of improper maintenance.⁹⁷ Further, state investigators found that Vermont Yankee employees made several actions that contributed to the cause of the transformer fire.⁹⁸ However, ENVY did not document any human performance deficiencies or procedural weakness as causal factors of the fire.⁹⁹ Overall, the 2004 transformer fire was but one example of the effects of ENVY's unwillingness or inability to maintain some parts of Vermont Yankee's non-safety systems. If Vermont is allowed to be more hands-on in regulating the plant's non-safety systems, the aforementioned incident could have been avoided.

B. The Flood

The second major incident at Vermont Yankee occurred in August 2007, when one of the wooden cooling towers at the facility collapsed and flooded most of the surrounding area.¹⁰⁰ The massive weight of the water on the already age-degraded wood supports caused the main pipe carrying cooling water to separate while water was being pumped through it.¹⁰¹ The resulting deluge collapsed support beams, resulting in complete destruction of a large portion of the east side of the cooling tower.¹⁰² ENVY replaced the failed wooden structures with fiberglass, but water-control difficulties continued through 2008.¹⁰³

Inspectors concluded that the cooling tower collapse was caused by failures in the support structure, and that these failures occurred at least partially as a result of inadequate inspection.¹⁰⁴ ENVY employees never physically inspected the cooling tower that collapsed; rather, ENVY hired outside inspectors to conduct “visual inspections” from remote locations.¹⁰⁵ These contractors were often allowed to work from memory, and were not required to use work orders or sketches.¹⁰⁶ Furthermore, ENVY engaged in little to no verification of these inspections and failed to observe industry-wide knowledge about similar cooling tower problems.¹⁰⁷

Following the collapse, the NRC inquired into the cause of the failure, but only to ensure that the collapse wasn't related to the emergency back-up cooling system.¹⁰⁸ As discussed, the NRC does not directly inspect and regulate non-safety nuclear systems such as the transformer and cooling tower facilities. In this regard, the State of Vermont is the regulatory entity of last resort; any assurances regarding the security of Vermont Yankee's cooling towers and other non-safety systems must come from state inspection. Both the fire and the flood at Vermont Yankee could have been avoided if the plant's facilities had been inadequately inspected, the plant's management had properly taken into account available industry-wide operating data, and the plant's non-safety systems were subject to a proper degree of maintenance and oversight.¹⁰⁹ According to one state expert: “[h]ad full inspections been performed, [the transformer fire and cooling tower collapse] could have been prevented. We feel Entergy needs to give more attention to operating experience and inspections in the nonsafety area.”¹¹⁰

C. Radioactive Containment Issues

When ENVY purchased Vermont Yankee in 2002, the site housed about 500 metric tons of spent nuclear fuel.¹¹¹ However, continued operation of the plant, along with the federal government's inability to find a long-term storage solution to high-level radioactive waste, have caused radioactive materials to accumulate at Vermont Yankee. Therefore, ENVY has been forced to make arrangements for the short-term storage of radioactive waste on-site.¹¹²

One minor radioactive containment issue occurred during a transfer of some of Vermont Yankee's nuclear fuel waste when a machinery operator dropped a cask of spent atomic fuel rods on the floor.¹¹³ Supplemental cooling procedures were performed and no major damage resulted, but spent fuel transfer was delayed for a few days.¹¹⁴

However, the most publicized radioactive containment failure that occurred under ENVY's management of Vermont Yankee was the radioactive tritiated water leak discovered in 2010. An underground piping system carrying water contaminated with tritium and other radioactive isotopes began leaking somewhere on the Vermont Yankee complex in 2008.¹¹⁵ A number of interrelated events caused the leak. In short, individual degradations in two separate steam traps caused two underground pipes to begin leaking irradiated water.¹¹⁶ The drain from the tunnel was clogged with debris, so radioactive fluid collected in an underground tunnel housing the pipes over a course of years.¹¹⁷ As the tunnel filled, the irradiated water began to leak into the soil.¹¹⁸ By July 2008, soil surrounding the leak began to exhibit non-uniform substance, and by January 2010 the radioactive water had migrated to a monitoring well several hundred feet away from the leak.¹¹⁹

As if the 2004 transformer fire and the 2007 cooling tower collapse were not already causing enough public relations problems, Vermont law specifically requires an inspection of any of Vermont Yankee's underground piping systems that carry radioactive materials¹²⁰ and ENVY officials told the state inspectors that there was no underground piping system that carried radioactive materials at Vermont Yankee.¹²¹ Based on these representations, state inspectors focused on the non-radioactive service water system only, and tritiated water continued to leak from the underground piping undetected for almost two years.¹²² Of course, discovery of the radioactive leak proved that the statements made by Vermont Yankee's management regarding the nonexistence of radioactive piping underground were false.¹²³

Misstatements from ENVY employees were the direct basis for the state inspectors' belief that no underground pipes were relaying radioactive fluids underneath Vermont Yankee.¹²⁴ Once this was proven untrue, Vermont's nuclear experts reconvened to investigate and report on the newly-discovered underground radioactive piping system and to assess the degree to which the original inspection report had been compromised by Entergy's material omission.¹²⁵ ENVY commenced an independent investigation into these misstatements and concluded that Vermont Yankee personnel failed to properly clarify certain 'implicit understandings,' thus allowing personnel to make statements that seemed inaccurate when considered in a different context.¹²⁶ In the company's own internal investigation, ENVY identified and disciplined 11 Vermont Yankee employees from various departments.¹²⁷ However, the fact that the employees were scattered throughout the organization evidences a wide-scale breakdown in management.¹²⁸ The Vermont Attorney General's office has undertaken criminal and civil investigations regarding the material misstatements made by Entergy officials with regard to the underground piping at Vermont Yankee.¹²⁹

D. Discussion of the Recent Events at Vermont Yankee and the Related Implications

The recent accidents at Vermont Yankee are related to a disturbing trend in ENVY's management regime, which seems to foster the development of non-safety-related operating issues.¹³⁰ Particularly, ENVY's corporate culture related to the aging plant's mechanical problems is a pervasive risk to Vermont Yankee's future reliable operation.¹³¹ For example, current operating procedures are inadequate for newly hired employees, which are quickly becoming the bulk of the facility's workforce.¹³² Furthermore, ENVY deliberately under-staffs Vermont Yankee as a money-saving management strategy,¹³³ even though adequate staffing is a factor that Vermont regulators specifically take into consideration when determining a plant's ability to produce reliable electricity in the future.¹³⁴

Perhaps the most distressing aspect of ENVY's management style is that corporate norms within the company allowed misstatements regarding the presence of radioactive underground piping to perpetuate for almost a year after they were first suspected untrue, delaying the discovery of a radioactive leak and eventually allowing false statements to migrate into sworn testimony and documents.¹³⁵ The NRC particularly values truth and accuracy in reports from private nuclear operators,¹³⁶ as untold damage could result from mere negligence in nuclear

operations. State regulators also embrace this policy, as “integrity of the information is the lifeblood of capable regulation and of public confidence in regulatory decisions.”¹³⁷ ENVY’s resource and staffing restrictions, combined with company’s lack of transparency that allowed for untrue statements to seep into official documents, are definitely problematic.¹³⁸ This is particularly disturbing when considering the fact that states have no power to remediate radiological safety issues because the NRC has complete jurisdiction in this regard.¹³⁹ Thus, ENVY could suffer no punitive action if radioactivity in the area of the leak failed to reach certain levels.

Both state and federal inspectors agree that ENVY has not applied enough resources to the non-safety-systems related to the 2008 radioactive leak to ensure reliable operation of these systems in the future.¹⁴⁰ Entergy, ENVY’s parent company, is known to operate nuclear plants on the basis of limited resource allocation to non-safety systems as an economical operations strategy.¹⁴¹ An independent team of experts writing about Entergy’s Indian Point nuclear plants in New York said that “[t]he physical condition of the plant in non-safety areas is visibly deficient. While station personnel pay close attention to the care, maintenance, and operation of plant safety systems, the care and maintenance of some other plant systems and structures do not meet the standards of high-performing plants.”¹⁴²

While these management policies have not yet caught up to ENVY as a significant impediment to reliability, they have substantially undermined public opinion of the plant and the facility's standing within the state. Although the power plant has operated reliably over the course of its 40 year lifetime, Vermont Yankee is currently in the bottom quartile of the U.S. nuclear fleet on the Equipment Reliability Index.¹⁴³ Inadequate human performance and resource restrictions under ENVY management present a real challenge to Vermont Yankee’s reliable, economical operation in the future.¹⁴⁴ Although Vermont Yankee could continue to operate to the benefit of the state beyond March 2012 if certain problem-areas are addressed, this is by no means a firm assurance.¹⁴⁵ The entire nuclear industry lacks operating experience for aging facilities,¹⁴⁶ and the mechanical issues due to age-decay at nuclear facilities are not well understood.¹⁴⁷

Unfortunately Entergy’s practice of restricting resources devoted to maintenance of non-safety-systems is not contrary to the industry standard. There is a problematic industry-wide

practice of poorly maintaining a nuclear facility's non-safety-related systems. Poor maintenance of non-safety systems has been a leading indicator within the industry of nuclear plants with serious reliability problems.¹⁴⁸ However, because the NRC only directly regulates nuclear safety systems, there is a clear need for state oversight of non-safety plant systems. The NRC suffers from resource restrictions of its own, and state-federal cooperation in nuclear power plant inspection is an elegant solution to this policy issue.

The Vermont government is concerned that, although ENVY gives substantial attention to aspects of Vermont Yankee's operation that fall within NRC jurisdiction, the company gives little attention to equally important non-safety-related systems in the plant not subject to direct federal inspection. Private nuclear operators like ENVY can profit by cutting back on the maintenance of non-safety-related systems within nuclear facilities, although poor maintenance of any nuclear power systems creates an obvious public risk with few economic repercussions to private nuclear operators.¹⁴⁹

Given these risks, determining the exact scope and nature of the benefits to Vermonters from renewing Vermont Yankee's State Certificate depends heavily on the economic return to the state. Particularly, Vermont seeks favorable price terms and the consumer protection conditions in the Power Agreement to be renewed along with Vermont Yankee's operating license.¹⁵⁰ If ENVY does not offer a rate for electricity from Vermont Yankee at price per-kilowatt-hour that Vermont identifies as beneficial for the state economy, the generator has likely failed to meet the *economic benefit* standard required by state law,¹⁵¹ and the state is not likely to issue a renewed State Certificate for the facility's operation beyond 2012. If ENVY agrees to provide electricity to Vermont at a favorable price, then it would likely win legislative approval and meet the Vermont's relicensing standard. However, the company has thus far refused to do so.¹⁵²

V. LEGAL ANALYSIS

Subjective critique aside, ENVY has perpetrated two violations of Vermont law: first, ENVY employees made false statements in sworn responses to the state's investigation into the 2008-2010 radioactive leak, and, second, the company neglected to seek a State Certificate

before applying for a renewed NRC operating license despite an explicit agreement to do so that was codified in state law.

With respect to the radioactive leak, state inspectors were particularly concerned with why Entergy allowed false statements to migrate into sworn testimony and its own data reposes to state inspections.¹⁵³ Although state inspectors gave the company the benefit of the doubt in concluding that the statements could have been accidental and erroneous, one Entergy independent report stated that the misstatements may have been intentional.¹⁵⁴ Particularly, it is possible that management made obviously inaccurate responses to inquiries made by one nuclear engineering expert working for Vermont Legislature because “[he] would seek to reopen issues from the Audit.” Of course, reopening the audit would be the proper thing to do if it was found to contain inaccurate information.¹⁵⁵

The reasoning behind Entergy’s decision to ignore its promise to seek a renewed State Certificate is unclear, particularly given the fact that ENVY has complied with similar agreements under analogous circumstances.¹⁵⁶ For example, ENVY allowed Vermont to exercise the special jurisdiction that it bargained for when ENVY sought an uprate order from the NRC, which would expand the generation capacity at Vermont Yankee.¹⁵⁷ This is directly analogous to ENVY’s agreement to give Vermont special privileges of dual sovereignty with respect to the State Certificate and the renewed NRC operating license, as both agreements grant the state special jurisdiction. The totality of circumstances surrounding Vermont Yankee’s operation under private management, including: poor maintenance of plant’s non-safety systems, officials’ misstatements before the Vermont General Assembly and Public Service Board, and ENVY’s application—and subsequent approval for—an NRC license extension without the state’s consent, indicate that the company may be attempting to evade the responsibilities imposed upon it state law. This wholesale noncompliance evidences a lack of respect for state authority in nuclear regulation, and calls for an affirmation of state power in this context.

VI. CURRENT LITIGATION CHALLENGING VERMONT’S NUCLEAR REGULATORY SCHEME

Pursuant to 30 V.S.A. § 248(e)(2), the Vermont Senate voted not to relicense the plant in February 2010 primarily based on sentiments regarding ENVY employees’ potential perjury with regard to the 2008-2010 radioactive leak, as well as the unfavorable price terms of ENVY’s

proposed purchase power agreement.¹⁵⁸ On April 18, 2011, ENVY and its corporate parent, Entergy, (collectively, “Complainants”) filed a claim in federal court against Vermont’s Governor Peter Shumlin and other key state officials seeking declaratory and injunctive relief prohibiting the enforcement of Vermont’s nuclear regulatory scheme.¹⁵⁹ Although Complainants are sure to continue this and related litigation far into the future, the claims alleged in the April 2011 complaint are likely to fail for a number of reasons.

Complainants first allege that a number of Vermont’s statutes are invalid because they are preempted by the Atomic Energy Act, which conveys exclusive jurisdiction to the NRC to license nuclear power plants for operation. The Complaint alleges that any state regulation requiring a state license for the operation of a nuclear power plant or otherwise directly affecting nuclear operations is automatically preempted.¹⁶⁰ Specifically, Complainants allege that Vermont is prohibited from requiring Vermont Yankee to seek a state-issued State Certificate before the plant is allowed to operate beyond March 2012.¹⁶¹ Additionally, Complainants allege that Vermont’s attempt to regulate Vermont Yankee is preempted on the basis that the underlying purpose of the state laws under siege is to address nuclear safety issues, a subject of exclusive NRC purview.¹⁶²

Even assuming, *arguendo*, that all of ENVY’s waivers and promises¹⁶³ in this context are invalid, there are only two types of preemption imposed by the Supremacy Clause.¹⁶⁴ Complete or ‘field preemption’ occurs when the federal government occupies an entire field of law, thus precluding State action in that legal field. Individual or ‘direct conflict’ preemption occurs when a particular state action is invalid because it directly conflicts with federal law. Federal statutes articulate legal minimums, and states are free to shape legislation that offers protections beyond those offered by federal law. When the federal government deems some practice to be permissible, but not mandatory, there is no reason why a state cannot deem the permissive act illegal according to its own reserved authority.

Nuclear regulation is not a subject of complete federal preemption, as states retain authority in regulating the siting of nuclear power facilities, as well as the economic aspects of their operation.¹⁶⁵ Thus, Complainants cannot prevail on a claim that Vermont is completely prohibited from regulating Vermont Yankee, as states retain some degree of authority over nuclear operations. Furthermore, an NRC operating license permits, but does not mandate, the

operation of a nuclear facility. The NRC exclusively regulates nuclear safety; therefore, an NRC operating license is a statement of federal law declaring that a nuclear facility can operate safely as long as certain conditions are met. This is not a federal mandate that the plant operate, nor a declaration that the plant should operate, but merely an official finding that the facility meets the minimum safety requirements articulated by federal law.¹⁶⁶ The State of Vermont is not attempting to contradict this finding. Rather, the state is concerned about the economics and reliability of Vermont Yankee and, more specifically, the state's bargaining power to ensure just, reasonable, and economically beneficial rates for its citizens.¹⁶⁷ Vermont has not acted in conflict with federal law, and therefore the state's laws are not properly subject to a preemption challenge based on the Atomic Energy Act

Next, the complaint avers that the Federal Energy Regulatory Commission ("FERC") has exclusive jurisdiction to regulate wholesale power transaction pursuant to the Federal Power Act, and therefore state officials are preempted from regulating "whether power is sold from the Vermont Yankee Station, much less the rates, terms, or conditions of any such sales."¹⁶⁸ Complainants allege that Vermont is using state licensing requirements as a bargaining chip to "force" ENVY to sell Vermont Yankee's electricity to the state utilities at below-market rates.¹⁶⁹ The crux of the complaint is that conditioning continued operation of a generation facility on whether the state receives favorable rates impermissibly burdens out-of-state utilities in contravention of the Federal Power Act.¹⁷⁰

FERC has exclusive federal jurisdiction over interstate sales of electricity.¹⁷¹ However, this jurisdiction is expressly restricted to interstate electrical transmission—meaning the physical flow of electric energy across state lines—and FERC does not have jurisdiction over "any other sale of electric energy."¹⁷² The proposition averred in the Complaint—that, "[i]n light of FERC's exclusive jurisdiction . . . [no] state actor has the authority to dictate whether wholesale power is sold from the Vermont Yankee Station"¹⁷³—is inaccurate because it severs relevant language from the law: FERC has exclusive jurisdiction over wholesale power *in interstate commerce*. Wholesale Power Purchase Agreements between Vermont Yankee and in-state entities are subject to review by the Vermont Public Service Board,¹⁷⁴ as are the sale of generation facilities themselves as and any substantial physical improvements to generation or distribution facilities. In fact, states have substantial regulatory authority over generation facilities like Vermont

Yankee, as electrical generation is a subject of state jurisdiction pursuant to Section 201(b) of the Federal Power Act.¹⁷⁵ Because a Power Purchase Agreement between Vermont Yankee and the State of Vermont is not a transaction in interstate commerce, but rather a fully long-term contract for the sale of electricity generated and distributed in-state, the state is free to regulate the transaction according to the economic interests of its citizenship.

Finally, Complainants allege that Vermont is prohibited from implementing the state's nuclear regulations by the Commerce Clause of the U.S. Constitution based on the allegation that state officials are withholding the determination of whether Vermont Yankee should receive a renewed state license until ENVY agrees to enter into a contract that entitles Vermont to electricity from Vermont Yankee at below-market rates. Complainants allege that this places a direct and substantial burden on interstate wholesale electricity transactions.¹⁷⁶ However, Vermont is acting pursuant to its reserved Constitutional authority to protect the general health and welfare of its citizenship by ensuring that Vermont Yankee is only issued a new state license if the plant continues to operate for the economic benefit of the state.¹⁷⁷

In *New England Power Company v. New Hampshire*, the Supreme Court reviewed the constitutionality of a New Hampshire law that prohibited the interstate transmission of electricity generated at in-state hydroelectric facilities.¹⁷⁸ The Court found the New Hampshire's law to be unconstitutional, as a law prohibiting exportation of electricity based on in-state economic value is an intentional restriction of private interstate commerce. As an important point of distinction from *New England Power Company*, Vermont is not restricting the sale of any electricity. Rather, the Vermont statute challenged by the Complaint is merely a codification of a licensing condition required by a freely-negotiated contract, as embodied in certain final orders of the Public Service Board and various Memoranda of Understanding between Complainants and the Vermont Department of Public Service.¹⁷⁹

Vermont Yankee has already been issued two state licenses certifying the plant's public good and approving its operation: first, when the plant was initially licensed under its original owners, and, second, when the original owners sold the plant to Entergy. In fact, Vermont took great care in deciding whether Vermont Yankee should be issued a state license to operate under Entergy's management, and the final order resulted in an issuance of a state license that would expire on March 21, 2012 in order to ensure that Vermont Yankee had to seek state approval for

operation beyond that date,¹⁸⁰ as this provision was expressly bargained for in the sale negotiations. The Vermont legislature later enacted statutes codifying this agreement, and these statutes are under attack as impermissible barriers to interstate commerce.

The Commerce Clause does not restrain Vermont from refusing to reissue an operating license for an in-state business that exports some of its goods across state lines. Therefore, the third claim fails to point to an actual constitutional violation. In alleging that Vermont is barred from regulating Vermont Yankee on issues of economics and reliability, Complainants have failed to recognize the states' nuclear regulatory authority confirmed by the Supreme Court in *Pacific Gas & Electric*.¹⁸¹ States are free to form their own economic regulatory regimes. Declaring that a state is incapable of regulating a private electrical generation facility operating in-state and selling its electricity to in-state consumers would be an absurd construction of federal authority over interstate power.

In addition to crafting state utility laws with a unique emphasis on public benefit, Vermont stands alone as the only New England state that has not deregulated its energy markets. These facts verify the state's desire to maintain regulatory authority over in-state generation facilities in order to ensure that Vermonters are not exposed to economic abuse or environmental disaster. Complainants seek to strip the state of its inherent regulatory authority in order to pursue private economic gain. This private usurpation of the public interest is contrary to the interests of both federal and state nuclear policies, and therefore the Complaint must be dismissed.

CONCLUSION

Vermont has developed a very strict, yet effective, cooperative regulatory relationship with Vermont Yankee ever since the plant was initially licensed almost 40 years ago.¹⁸² However, America's nuclear industry has changed substantially since that time in a manner which calls for increased state authority in nuclear regulation. For example, states can no longer rely upon the federal government's promise to manage waste from in-state power plants, and thus state legislatures are left to find a solution.¹⁸³ More relevantly, America's nuclear power plants are aging, and many public utilities have sold their old, fully-paid-off, nuclear power

plants to private, limited-liability companies, just as the New England utilities chose to do with Vermont Yankee.

The fact that Vermont Yankee—and many other nuclear power plants across America—are now owned by private corporations rather than in-state utilities is significant. Public utilities are subject to direct regulation by state legislatures because they are licensed to provide a public service within the state.¹⁸⁴ In general, public utilities managing nuclear power plants are subject to popular scrutiny and political will in addition to particularized state regulation. Private companies, however, enjoy a position in society that does not explicitly demand that they operate for the public benefit. Rather, in accordance with its fiduciary duties, a corporation must operate for *private benefit*—particularly, the benefit of the corporation’s investors. Private companies have no duty to the public service of a single state; rather, private utilities have a duty to be profitable for their investors nationwide.

All utilities are operated pursuant to the public good,¹⁸⁵ but private utilities are operated pursuant to the profit motive as well. If a private electrical generating company perpetrates some harm against society, there is no repercussion unless it acts in contravention of some generally-applicable law. In contrast, if a public utility manages its facilities to the detriment of the public good, it may be prohibited from collecting revenue, and the utility is stuck with a stranded cost.¹⁸⁶ When a state licenses the transfer of an in-state electrical generation facility to a nationwide company headquartered somewhere outside the state, it risks losing regulatory authority and suffering the consequences of the externalities of profit-driven nuclear operations.¹⁸⁷

Assuredly, there is no moral issue inherent in the corporate profit motive; rather, the profit motive has demonstrated benefits well beyond regulatory regimes in many contexts. In fact, regulators often attempt to create regulatory schemes that mimic free-market-operations.¹⁸⁸ In free markets—where the profit motive drives market activity—the natural interaction of supply and demand sets an equilibrium price. This natural equilibrium serves a rationing function, which can be particularly valuable in electrical markets where conservative use has substantial social benefits, in addition to a capital-attraction function that incentives new investments that could improve the market over time¹⁸⁹ However, despite these ostensible benefits, the notion that that “There Ain’t No Such Thing as a Free Lunch,” fundamentally

underlies any activity in a free market economy.¹⁹⁰ Private companies engage in inherently risky capitalistic activities seeking to maximize the return that they could reap and redistribute to their shareholders. Public utilities generally do not manage electrical generation facilities based upon this risk-return tradeoff inherent to the profit motive. Rather, since public utilities collect revenue at the grace of the state legislature and public utility regulators, they have almost no incentive to manage electrical generation facilities in a risky or anti-social manner.

Overall, private ownership of nuclear power plants is an effective public policy, but it necessarily calls for a regulatory regime that imposes different management incentives, relative to public ownership, in order to ensure that private entities can operate nuclear power plants for the public good. Vermont is one of the first states to attempt to form a regulatory regime to address the new issues that have emerged in the American nuclear industry now that it is largely privatized—particularly, increased regulatory oversight of non-safety nuclear systems.

Nuclear power plants have an incredibly complex and individualized nature, and policymakers must be aware of how difficult and necessarily extensive nuclear regulation has become.¹⁹¹ Japan recently learned this lesson in the most tragic manner conceivable—by means of a catastrophic nuclear accident.¹⁹² From the perspective of western civilization—much of which is electrified by nuclear power—perhaps the most shocking aspect of the Fukushima disaster was that the extensive Japanese nuclear regulatory scheme failed to prevent it. Unlike Chernobyl, Fukushima was not governed under a secretive, volatile, Soviet-style regulatory regime.¹⁹³ Rather, Japanese regulators had previously identified and specifically addressed the natural hazards that eventually crippled Fukushima. The reactor automatically shut-down during the earthquake—which is necessary in order to stop the fission reaction heating the reactor core—and cooling systems were hooked up to back-up generating systems; furthermore, the Japanese government addressed the potential danger presented by the tsunami following the earthquake by constructing a 33 foot-high sea wall down almost 40% of Japan’s coastline.¹⁹⁴

As one American expert in nuclear reactor safety postulated that “it was not at all inevitable that [Fukushima] had to play out like this,” such a statement is reminiscent of the oft-quoted tort principle that “on a clear day, you can foresee forever.”¹⁹⁵ Despite best laid plans—in the case of Fukushima, automatic reactor shutoff, redundant safety systems to ensure cooling, and a seawall to protect from tsunamis—certain events are simply unforeseeable in foresight, though perhaps obvious in hindsight.¹⁹⁶ America has suffered a number of nuclear incidences

but, with the exception of Three Mile Island, each caused minimal damage and none released dangerous levels of radioactivity.

Truly, the NRC has a glowing record of preventing nuclear accidents—even despite industry-wide and political pressure to the contrary.¹⁹⁷ However, at the bare minimum, good nuclear policy requires constant oversight and analysis on behalf of government regulators. Though the profit motive may incentivize a firm to operate a nuclear power plant at high efficiency, it also incentivizes risky behavior in an industry where such risk is unacceptable. This is the case of ENVY’s management of Vermont Yankee,¹⁹⁸ and this is why Vermont and similarly-situated states must be able to exercise their authority over nuclear power plant reliability to the fullest extent possible. States should be able to assist the NRC to the fullest extent possible in protecting the American public from the potential ill-effects of private nuclear power,¹⁹⁹ especially given the cooperative federal regulatory regime embodied in the Atomic Energy Act.²⁰⁰

Former NRC Commissioner Peter Bradford summarizes the foregoing analysis more concisely: “[f]ederal preemption in this area is a concept that has outlived its usefulness.”²⁰¹ America’s market for nuclear power has changed substantially since the first Atomic Energy Act granted federal regulators complete control over nuclear power, foreclosing even the possibility of private ownership. Privatization of the nuclear industry creates new incentives for companies to neglect maintenance activities on non-safety nuclear systems in order to increase profitability. Ostensibly, ENVY has perpetrated an efficiency breach of its contract with Vermont not for malicious reasons, but for economic ones. This breach was incentivized further by the fact that the states have not traditionally regulated nuclear operations, so ENVY and other private nuclear operators simply may not respect State authority in this context.

There are substantial potential policy benefits to bolstering state-wide regulation of nuclear power generation on the basis of economics and reliability; particularly given that it has become industry-wide practice to cut back on maintenance of non-safety nuclear systems not subject to NRC inspection. The Atomic Energy Act explicitly recognizes that additional federal legislation may be desirable as states improve in their regulatory capabilities.²⁰² The Supreme Court’s opinion in *Pacific Gas and Electric* was the last clear federal validation of State power in nuclear regulation, and state regulatory experience has developed substantially since the case

was decided in 1983. In totality, Vermont's experience with Vermont Yankee demonstrates the need for new federal legislation under the Atomic Energy Act bolstering state authority in nuclear regulation. This necessity is reinforced by the fact that America's nuclear power plants are the oldest in the world and that the states are in a unique position to regulate age-sensitive non-safety-related plant systems.

¹ U.S. CONST. amend X. The Supreme Court has declared that "[t]here is little doubt that under the Atomic Energy Act of 1954, state public utility commissions or similar bodies are empowered to make the initial decision regarding the need for power." *Vermont Yankee Nuclear Power Corp. v. Natural Res. Def. Council, Inc.*, 435 U.S. 519, 550 (1978).; *Pac. Gas & Electric Co. v. State Energy Res. Conservation & Dev. Comm'n*, 461 U.S. 190, 206 (1983) [hereinafter *Pacific Gas & Electric*]. Because in passing the Atomic Energy Act "Congress legislated here in a field which the States have traditionally occupied. . . . we start with the assumption that the historic police powers of the States were not to be superseded by the Federal Act unless that was the clear and manifest purpose of Congress." *Pacific Gas & Electric*, 461 U.S. at 206.

² See generally, Atomic Energy Act of 1954, 42 U.S.C. § 2011 (2011). See also discussion *infra* at § II.

³ "[T]he Federal Government maintains complete control of the safety and "nuclear" aspects of energy generation; the States exercise their traditional authority over the need for additional generating capacity, the type of generating facilities to be licensed, land use, ratemaking, and the like." *Id.* at 212. (articulating the jurisdictional divides established by the Atomic Energy act of 1954.)

⁴ The U.S. Supreme Court has declared that "Federal pre-emption of the States' authority to decide against nuclear power would create a regulatory vacuum. In making its traditional policy choices about what kinds of power are best suited to its needs, a State would be forced to ignore the undeniable fact that nuclear power entails certain risks." *Pacific Gas & Electric*, 461 U.S. at 225 (internal citations omitted).

⁵ *Pacific Gas & Electric*, 461 U.S. at 225.

⁶ If Vermont Yankee is relicensed it will be the 63rd nuclear reactor license renewed beyond its initial 40 year term. *Id.* A few other examples of aging facilities that have been awarded NRC license extensions include: the Monticello nuclear power plant in Minnesota, which began operating in 1970, MONTICELLO NUCLEAR GENERATING PLANT, UNIT 1, <http://www.nrc.gov/info-finder/reactor/mont.html> (last visited March 25, 2011); the Palisades facility in Michigan (also owned by Entergy, *supra* note 2) which began operating in 1971, PALISADES NUCLEAR PLANT, <http://www.nrc.gov/info-finder/reactor/pali.html> (last visited March 25, 2011); and the Calvert Cliffs facility in Maryland, which began operating in 1974, CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT 1, <http://www.nrc.gov/info-finder/reactor/calv1.html> (last visited March 25, 2011). The Oyster Creek nuclear power plant in New Jersey, the oldest in the country and a contemporary of Vermont Yankee, was awarded a license extension to operate until 2029. However, Oyster Creek's operator has decided to cease operation of the plant in 2019 for economic reasons associated with bolstered state environmental regulation. Rebecca Smith, *Exelon Reaches A Deal to Shut Nuclear Plant*, WALL ST. J. (Dec. 10, 2010), available at <http://online.wsj.com/article/SB10001424052748703766704576009572158054218.html>.

⁷ Maine and California are comparable to Vermont in this regard, but nuclear operations have been limited in these states; Maine's only in-state nuclear power plant was voluntarily closed for economic reasons, Donald N. Zillman, *The Role of State Government in Nuclear Power Regulation: Jurisdictional Conflicts in the U.S.*, 16 J. ENERGY &

NAT. RESOURCES L. 16, 29 (1998), and California imposed a moratorium on nuclear construction decades ago, *see generally, Pacific Gas & Electric*, 461 U.S. 190.

⁸ *See* 30 V.S.A. § 202 (2011).

⁹ U.S. Nuclear Regulatory Commission, *NRC Will Renew Vermont Yankee Operating License for an Additional 20 Years*, NRC NEWS NO. 11–041 (March 10, 2011).

¹⁰ Congress called for “additional legislation” allowing more state authority in nuclear law “as the States improve their capabilities to regulate effectively such materials.” 42 U.S.C. § 2021(a) (6) (2010).

¹¹ While a nuclear power plant ordered in 1969 was projected to be on-line in nine years at a cost of about \$226 per kilowatt-hour, by 1978 this estimate skyrocketed to \$1,648 per kilowatt hour over a 12 year construction period. Dorothy Nelkin, *Some Social and Political Dimensions of Nuclear Power: Examples from Three Mile Island*, 75 AM. POL. SCI. REV. 132, 132 (1981). Notably, the events that unfolded at Three Mile Island could have been much more serious if the reactor vessel had not been promptly cooled. U.S. NUCLEAR REGULATORY COMM., BACKGROUND ON THE THREE MILE ISLAND ACCIDENT (Aug. 11, 2009) available at <http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/3mile-isle.html>.

¹² *Id.*

¹³ NUCLEAR ENERGY INSTITUTE, MYTHS AND FACTS OF NUCLEAR ENERGY, 4 (Sept. 2010), www.nei.org/filefolder/Final_Myths_Facts_090110.pdf (last visited March 25, 2011). Some of the plants ordered during this time, such as the TVA Watts Bar 1 plant in Tennessee took over 20 years to complete; others, like the TVA Watts Bar 2 plant, are still under construction. *Id.*

¹⁴ *See e.g.* discussion of the Oyster Creek facility, *supra* note 6. Maine Yankee, another contemporary of Vermont Yankee, closed in 1997 due to maintenance-related costs. Zillman, *supra* note 7 at 28.

¹⁵ Nelkin, *supra* note 11.. The Three Mile Island accident did not result in a full core-meltdown, so although radiation was released the event did not directly cause any deaths or serious injuries. *Id.* Regulators estimated that there would be an additional 1–10 cancer cases in the 50 miles surrounding the Three Mile Island facility when it exploded. *Id.* at 134.

¹⁶ For a more complete discussion of nuclear proliferation, *see* Richard Rhodes, *Arsenals of Folly: The Making of the Nuclear Arms Race* (2007).

¹⁷ *See* Karl S. Coplan, *The Externalities of Nuclear Power: First, Assume We Have A Can Opener*, 35 ECOLOGY L. CURRENTS 17 (2008). This was also the main argument behind California’s nuclear moratorium, discussed *infra* at 6–7.

¹⁸ Some of the most vocal advocates of nuclear power claim that its environmental benefits exceed those presented by renewable energy. Jesse H. Ausubel, *Renewable and Nuclear Heresies*, 3 Int. J. Nuclear Gov. Econ. & Eco. 229, 232–234 (2007). For example, renewable energy resources are not as environmentally-friendly when produced at a scale comparable to nuclear power because of the substantial land-use impacts of hydro-electric, biomass, wind, and solar technologies. *Id.* Furthermore, new nuclear technologies such as the Pebble-Bed design can shift our energy sector to become hydrogen-based rather than carbon-based. *Id.*

¹⁹ S. Pacala & R. Socolow, *Stabilization Wedges: Solving the Climate Problem for the Next 50 Years with Current Technologies, Toward A Hydrogen Economy*, 305 SCI. 968, 969 (Aug. 13, 2004). For example, if global construction of nuclear power plants continues for 50 years at the pace established from 1975 to 1990, greenhouse gas emissions

from electricity generation would be reduced by 25 billion tons. *Id.* at 971. This is about one-seventh of the reduction required to solve the climate problem within the next 50 years. *Id.* at 968.

²⁰ Jesse Ausubel, Director of the Program for the Human Environment at Rockefeller University, claims that when produced at a scale comparable to nuclear power, energy from renewable resources can be environmentally detrimental because of substantial land-use impacts. Ausubel, *supra* note 18. Further, renewable energy resources can be less economical because they do not benefit from the economies of scale that forced coal and nuclear power into the superior market positions that they enjoy today. *Id.*

²¹ Bryan Hannegan, *Prism 2.0: Preliminary Insights from EPRI's Regional Model*, 16 (Aug. 2, 2010) available at http://mydocs.epri.com/docs/SummerSeminar10/Presentations/2_Hannegan-EPRIFINAL.pdf (advocating an optimal clean-energy policy that utilizes almost all renewable technology as well as clean coal and new nuclear power). See also S. Pacala & R. Socolow, *Stabilization Wedges: Solving the Climate Problem for the Next 50 Years with Current Technologies, Toward A Hydrogen Economy*, 305 SCI. 968 (Aug. 13, 2004).

²² *Supra* note 17 and accompanying text. See generally, Charles De Saillan, *Disposal of Spent Nuclear Fuel in the United States and Europe: A Persistent Environmental Problem*, 34 HARV. ENVTL. L. REV. 461 (2010). Even though construction of the Yucca Mountain Repository is on hiatus, it would barely have enough capacity to store the current amount of high-level waste being stored at nuclear facilities so the repository—even if constructed—would not be a long-term solution. Karl S. Coplan, *The Externalities of Nuclear Power: First, Assume We Have A Can Opener*, 35 ECOLOGY L. CURRENTS 17, 20 (2008).

²³ Letter from Bruce Lacy, Principal, Lacy Consulting Grp., to Catherine Benham, Assoc. Fiscal Officer, Vt. Legislature Joint Fiscal Office, *Questions Regarding Tritium, Spent Nuclear Fuel, and Security*, 4 (Feb. 22, 2010) available at <http://www.leg.state.vt.us/jfo/envy/2010-02-22%20LCG%20Memo%20re%20Tritium%20SNF%20and%20Security,%20Final.pdf>. California, for example, has suspended future construction of any thermal fission power plants until there is a feasible long-term solution to the disposal of high-level radioactive waste. Cal. Pub. Res. Code Ann. 25524.2 (West 2005).

²⁴ Nelkin, *supra* note 11, at 132

²⁵ In March 2010, an earthquake damaged Japan's Fukushima nuclear power station to such a degree that the reactor cooling system was unable to properly cool-down the nuclear reactor and sea water had to be dumped on the facility to avoid a meltdown. Mikka Pineda, *Fukushima vs. Three Mile Island vs. Chernobyl*, FORBES (March 17, 2010) available at <http://www.forbes.com/2011/03/16/japan-disaster-nuclear-opinions-roubini-economics.html>. Japan's recent nuclear accident is unfortunately reminiscent of the Three Mile Island disaster, except much worse in terms of radioactive containment. The average dose of radiation given to the 2 million people in the area of the Three Mile Island disaster was only about 1 millirem. U.S. NUCLEAR REGULATORY COMM., BACKGROUND ON THE THREE MILE ISLAND ACCIDENT (Aug. 11, 2009) available at <http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/3mile-isle.html>. However, the Fukushima accident initially released about 800 millirem (8,000 microsieverts) of radiation, and this figure is evolving. Pineda, *supra*.

²⁶ The Manhattan Project was the world's first application of nuclear energy, which culminated in the invention of the atomic weapons used on Japan in World War II. Zillman, *supra* note 7, at 16.

²⁷ The act declared that “[t]he significance of the atomic bomb for military purposes is evident,” but that “[t]he effect of the use of atomic energy for civilian purposes upon the social, economic, and political structures of today cannot now be determined.” Atomic Energy Act of 1946, Pub. L. No. 585–724, 60 Stat. 755 (1946).

²⁸ “Against the dark background of the atomic bomb, the United States does not wish merely to present strength, but also the desire and the hope for peace.” President Dwight D. Eisenhower, Address to the 470th Plenary Meeting of the United Nations General Assembly, (Dec. 8, 1953) (transcript available at http://www.iaea.org/About/history_speech.html).

²⁹ 42 U.S.C. § 2011 (2011)

³⁰ *Pacific Gas & Electric*, 461 U.S. at 221. (interpreting 42 U.S.C. § 2013(d), which states that the Atomic Energy Act creates a program “to encourage widespread participation in the development and utilization of atomic energy for peaceful purposes to the maximum extent consistent with the common defense and security and with the health and safety of the public.”).

³¹ 42 U.S.C. § 2011(b) (2011) (emphasis added).

³² H. R. Rep. No. 89–883, at 4 (1965) (explaining that “the substantial entry of private industry into the atomic energy program would speed the further development of the peaceful uses of atomic energy, a major policy goal of the United States.”).

³³ 42 U.S.C. § 2012(i) (2011). *See also* *Duke Power Co. v. Carolina Env'tl. Study Grp., Inc.*, 438 U.S. 59, 63–67 (1978).

³⁴ U.S. DEPARTMENT OF ENERGY, NUCLEAR POWER 2010: OVERVIEW, <http://www.ne.doe.gov/np2010/overview.html> (last visited March 25, 2011).

³⁵ *Nuclear Energy Inst., Inc. v. U.S. Env'tl. Prot. Agency*, 373 F.3d 1251, 1259 (D.C. Cir. 2004) (discussing the Nuclear Waste Policy Act, 42 U.S.C. §§ 10132–10134 (2000)).

³⁶ *Id.*

³⁷ *Id.*

³⁸ The NRC requires nuclear plant operators to maintain radiation exposure to plant employees and the public is “As Low As Reasonably Achievable” (“ALARA”), meaning that the plant operator must demonstrate that they both met the 3 millirem/year standard and that they took all reasonable measures to ensure that the radiation exposure was as low as reasonably possible. 10 C.F.R. pt. 50, appx. I (2011).

³⁹ The NRC has a Two-Step Licensing Process pursuant to 10 C.F.R. pt. 50 (2011), under which an applicant first receives a construction permit, which requires a safety review, an environmental review, and an antitrust review for new projects and then a subsequent operating permit, which is required for new and existing generation projects.

⁴⁰ U.S. NUCLEAR REGULATORY COMM., NRC: REGULATOR OF NUCLEAR SAFETY, 12–13 (Feb. 2008) available at <http://www.nrc.gov/reading-rm/doc-collections/nuregs/brochures/br0164/r4/br0164r4.pdf>

⁴¹ *Id.*

⁴² For example, the Clean Water Act created a cooperative program that requires state and federal agencies work together to set water quality standards for estuaries of national concern. 33 U.S.C. § 1330(c)–(j) (2011). The Clean Air Act requires states to develop state implementation plans, subject to EPA approval, specifying the measures that the state will use to assure that air quality meets national uniform ambient air quality standards. 42 U.S.C. § 7410 (2011). The federal Resource Conservation and Recovery Act (“RCRA”) regulates the generation, treatment, storage, and disposal of hazardous waste, but delegates planning duties to state regulators and calls for federal-state cooperation in enforcing the law. 42 U.S.C. § 6902(a) (2011). Similarly, the federal Comprehensive Environmental

Response, Compensation, and Liability Act (“CERCLA”) calls for state plans controlling existing polluted land sites and provides federal funds as assistance. 42 U.S.C.A. § 9628 (2011).

⁴³ 42 U.S.C. § 2021(a)(1) (2011).

⁴⁴ 42 U.S.C. § 2021(a)(2–3) (2011).

⁴⁵ 42 U.S.C. § 2021(a)(6) (2011).

⁴⁶ *Vermont Yankee Nuclear Power Corp. v. Natural Res. Def. Council, Inc.*, 435 U.S. 519, 550 (1978)

⁴⁷ *Id.*

⁴⁸ *Pacific Gas & Electric*, 461 U.S. 190 (1983).

⁴⁹ *Id.* at 213.

⁵⁰ *Id.* at 199.

⁵¹ *Id.* at 194.

⁵² *Vermont Yankee Nuclear Power Corp. v. Natural Res. Def. Council, Inc.*, 435 U.S. 519 (1978).

⁵³ *Pacific Gas & Electric*, 461 U.S. at 223.

⁵⁴ *Id.* at 205. (citing *Vermont Yankee v. Natural Resources Defense Council*, 435 U.S. 519 (1978)).

⁵⁵ *Id.*

⁵⁶ Video: Introductory Comments by Speaker of the House Gaye Symington, Vermont Joint Fiscal Committee Presentation at Vermont State House (Nov. 19, 2008)(*available at* http://www.leg.state.vt.us/JFO/vt_yankee_video.aspx).

⁵⁷ *Id.*

⁵⁸ Michael Dworkin, *Vermont Yankee: History and Context* (November 19, 2008), http://www.leg.state.vt.us/JFO/envy/Vermont_Yankee%20-%20Dworkin%20-1108.pdf.

⁵⁹ *Id.*

⁶⁰ Proposed Sale of Vermont Yankee Nuclear Power Station to Entergy Nuclear Vermont Yankee, Docket No. 6545 (Vt. P.S.B. June 13, 2002) [hereinafter Docket No. 6545], <http://www.state.vt.us/psb/6545.htm>.

⁶¹ *Id.* In particular, the Vermont Department of Public Service negotiated a Power Agreement with ENVY that set the price of Vermont Yankee’s electricity at a favorable rate up until 2012, and ENVY expressly agreed to pursue a State Certificate, pursuant to 30 V.S.A. § 248, if the company decided to relicense the plant.

⁶² The Public Service Board rejected a proposal by another company seeking to purchase Vermont Yankee because “the proposed purchase price [did] not reflect the fair market value” and stressed “that fair market value, like the general good of the state, is a matter of more than mere cash payment.” Proposed Sale of Vermont Yankee Nuclear Power Station, 207 P.U.R.4th 292, 2 (Vt. P.S.B. Feb. 14, 2001) [hereinafter Docket No. 6300] (dismissing AmerGen Energy Company’s petition to purchase Vermont Yankee for failing to demonstrate that the transaction would be economically beneficial to the state). The fact that the company already owned a nuclear fleet at the time of the VY

purchase was taken to indicate a greater breadth of knowledge in the operation of nuclear power plants. Public Oversight Panel Report, *supra* note 54 at 2.

⁶³ Public Oversight Panel Report, *supra* note 54 at 2.

⁶⁴ Docket No. 6545, *supra* note 59.

⁶⁵ Although the ensuing analysis focuses on ENVY's jurisdictional waivers, ENVY also provided a number of economic incentives to the state in exchange for the privilege of operating Vermont Yankee. Other key terms in the sale included a covenant that ENVY assume all of the liability associated with Vermont Yankee's decommissioning and impose plans for back-up funding. *Id.* Entergy promised to provide financial assurances as needed to accomplish decommissioning, *Id.* at 5, and that the company would put forth its best efforts to ensure that spent fuel waste is removed from the Vermont Yankee facility as quickly as commercially possible. *Id.* at 136. If decommissioning is delayed beyond March 21, 2022, excess funds remaining in the decommissioning fund will be shared by Entergy and Vermont's ratepayers. *Id.* at 143. Finally, in a later case, ENVY agreed to dispatch its best commercial efforts to ensure that the highly radioactive spent nuclear fuel stored at the Vermont Yankee plant would be removed from Vermont as quickly as possible. State Certificate to Construct a Dry Fuel Storage Facility at the Vermont Yankee Nuclear Power Station, 249 P.U.R.4th 1 (Vt. P.S.B. April 26, 2006).

⁶⁶ Docket No. 6545, *supra* note 59 at 14–16. ENVY provides Vermont with revenues equal to 20% of the uprate power sold in each hour, an amount that must equal 50% of the weighted average price per megawatt-hour for uprate power generated by Entergy in a year above the strike price. State Certificate to Modify the Vermont Yankee Nuclear Power Station to Increase the Station's Generation Output, 232 P.U.R.4th 219, 56–57 (Vt. P.S.B. March 15, 2004).

⁶⁷“ENVY also agrees . . . that the Board has complete jurisdiction to decide whether to renew ENVY and ENO's Certificates of Public Good ("Certificate") if ENVY seeks to extend its operating license past the expiration of its present term. This clarification of authority and the contractual commitment with the Department (on which our approval relies) provide assurances to Vermont that ENVY and ENO cannot thwart state review if ENVY plans to operate Vermont Yankee beyond 2012.” Docket No. 6545, *supra* note 59 at 15.

⁶⁸ Docket No. 6545, *supra* note 59 at 138. Recall that the NRC has jurisdiction over licensing nuclear operations.

⁶⁹ *Id.* at 305.

⁷⁰ *Id.* at 305.

⁷¹ Dworkin, *supra* note 58.

⁷² One of these statutory requirements is that the operation of the facility would be in the best interests of the state; a finding that the operation of the facility would not present an economic benefit to the state is dispositive on the issue. 30 V.S.A. § 248(b) (2010).

⁷³ Docket No 6545, *supra* note 66.

⁷⁴ 30 V.S.A. § 248(a).

⁷⁵ 30 V.S.A. § 248(b)(2)–(4)

⁷⁶30 V.S.A. § 248(a)(2)(B). The "general good of the state" standard contemplated by § 248(a)(2)(B), "is a broader concern than the call for some, albeit possibly limited, positive impact amounting to 'an economic benefit' . . ." In re Amended Petition of UPC Vt. Wind, LLC, 2009 VT 19, P7 (Vt. 2009).

⁷⁷ This is required by 30 V.S.A. § 248(b), and subject to enforcement under 30 V.S.A. § 102(c) (“For good cause, after an opportunity for hearing, the board may amend or revoke any certificate awarded under the provisions of this section.”). According to the Vermont Supreme Court, good cause to revoke ENVY’s State Certificate may exist if the company “materially alters the circumstances they presented to the [Public Service Board] as grounds for it to find that the sale and associated power purchase agreement promote the general good of Vermont.” *In re Proposed Sale of Vermont Yankee Nuclear Power Station*, 829 A.2d 1284, 1288 (Vt. 2003) ENVY was not required to seek a State Certificate when it purchased Vermont Yankee. *Id.* However, the company has voluntarily agreed to seek one. *Supra* notes 61–70 and accompanying text.

⁷⁸ Video: Introductory Comments by Speaker of the House Gaye Symington, Vermont Joint Fiscal Committee Presentation at Vermont State House (Nov. 19, 2008)(*available at* http://www.leg.state.vt.us/JFO/vt_yankee_video.aspx).

⁷⁹ *MCI Telecommunications Corp. v. American Telephone & Telegraph Co.*, 512 U.S. 218, 231 (1994) (finding it “highly unlikely that [the legislature] would leave the determination of whether an industry should be entirely, or even substantially, rate-regulated to agency discretion. . .”).

⁸⁰ In Vermont, “the Public Service [Board] is an administrative body clothed in some respects with functions of a judicial nature, quasi-judicial functions they may be called, authorized in the exercise of the police power to make rules and regulations required by the public safety and convenience, and to determine facts upon which existing laws shall operate. In a sense it has auxiliary, or subordinate, legislative powers; for while the supreme legislative power cannot be delegated there are many powers so far legislative that they may properly be exercised by the Legislature, which may, nevertheless, be delegated.” *Sabre v. Rutland R.R.*, 85 A. 693, 699 (Vt. 1913). This is typically how states construct utility regulatory regimes. *See Duquesne Light Co. v. Barasch*, 488 U.S. 299 (1989) (affirming deference to state legislatures in how they choose to regulate utilities for the public health and welfare).

⁸¹ Of course, doing so would be an unconstitutional delegation of legislative authority under U.S. CONST. ART. I § 1,8. *See also A.L.A. Schechter Poultry Corp. v. U.S.*, 295 U.S. 495 (1935). Vermont included a nondelegation clause in the state’s constitution as well: “the people of this State by their legal representatives, have the sole inherent and exclusive right of governing and regulating the internal police of the same.” VT. CONST. ART. 5 § 1. The Vermont Supreme Court interpreted this provision to mean “beyond the power of a state to divest itself of its right and duty in respect of the full exercise of this power, and the Federal Government cannot interfere with a state in the exercise of that right and duty except by virtue of some authority derived from the Constitution of the United States.” *Sabre v. Rutland R.R.*, 85 A. 693, 700 (Vt. 1913).

⁸² *Id.*

⁸³ *Mistretta v. United States*, 488 U.S. 361, 416 (1989).

⁸⁴ Both the State of Massachusetts and the State of Vermont have sought to present evidence of inadequacies in Vermont Yankee’s relicensing proceedings before the Atomic Safety Licensing Board, the States’ evidence was held to be inadmissible under NRC rules. *New York v. United States NRC*, 589 F.3d 551, 552 (2d Cir. 2009). This decision was upheld on administrative appeal by the NRC, and again on appeal; the Circuit Court held that the states’ only relief was a petition for rulemaking with the NRC. The states returned to the NRC and filed a petition for rulemaking, which was denied. *Id.* at 555.

⁸⁵ Public Oversight Panel, *Comprehensive Reliability Assessment of the Vermont Yankee Nuclear Power Plant*, 1 (March 17, 2009) [hereinafter Public Oversight Panel Report], *available at* <http://www.leg.state.vt.us/JFO/envy/Public%20Oversight%20Panel%20Report%2003-17-2009.pdf>.

⁸⁶*Id.* at 1. Since 2002, ENVY has initiated three major NRC licensing proceedings: an "uprate" substantially increasing the plant's physical generating capacity, a permit allowing dry cask storage of spent nuclear fuel on-site, and a request for a renewal of Vermont Yankee's original operating license. *Id.* A renewed NRC operating license would allow Vermont Yankee to continue generating electricity for another 20 years beyond the expiration of the facility's current operating license in 2012. *Id.* at 2. ENVY's license renewal request, filed with the NRC in January 2006, was originally scheduled for final determination in 2009; however, the NRC initially balked at giving a final order because of the problems that ENVY has been having with the State of Vermont. Letter from U. S. Nuclear Regulatory Comm. to Mr. John Herron, President CEO and CNO of Entergy Nuclear Operations, Demand for Information (March 1, 2010) available at <http://www.nrc.gov/info-finder/reactor/vy/information-demand.pdf>. The NRC was particularly concerned with certain false statements made by Entergy management to state inspectors, which caused an underground radiation leak to go undiscovered for quite some time. *Id.*

⁸⁷ Vermont is part of the New England Power Pool known as ISO-NE, which purchases power from multiple sources in New York, New England, and Canada; Vermont Yankee only provides about 2% of New England's electricity. Public Oversight Panel Report, *supra* note 85, at 1. There are several hundred power plants in New England, so there are supply options available on the wholesale power market to replace the power that would have been supplied by Vermont Yankee if the plant were to fail or close for decommissioning in 2012. Dworkin, *supra* note 58.

⁸⁸ U.S. NUCLEAR REGULATORY COMM., VERMONT YANKEE NUCLEAR POWER STATION LICENSE RENEWAL APPLICATION, <http://www.nrc.gov/reactors/operating/licensing/renewal/applications/vermont-yankee.html#schedule> (last visited March 25, 2011).

⁸⁹ Testimony of Public Oversight Panel Member Arnold Gunderson before the House Natural Resources and Energy and Senate Finance Committees, (March 19, 2009) (transcript available at <http://www.leg.state.vt.us/JFO/envy/Gunderson%20Testimony%202003-19-2009.pdf>). The Vermont Legislature passed Act No. 160, amending 30 V.S.A. §248(e) to impose a special requirement on nuclear power plants operating within the state: "[n]o nuclear energy generating plant . . . may be operated beyond the date permitted in any State Certificate . . . unless the *general assembly* approves and determines that the operation will promote the general welfare. . . ." 30 V.S.A. §248(e)(b) (2010). The act also stated that the Public Service Board could begin proceedings on Vermont Yankee's renewed State Certificate if the legislature failed to make a final determination by July 1, 2008. *Id.* Because the General Assembly did not act by this deadline, ENVY applied to the Public Service Board for an extension of its State Certificate. The Public Service Board is currently reviewing ENVY's application. Petition for Authority to Continue After March 21, 2012, Operation of the Vermont Yankee Nuclear Power Station, Docket No. 7440, 2010 Vt. P.U.C. 166, 167 (LEXIS June 4, 2010) [*hereinafter* Docket No. 7440]. Also in 2008, the Vermont legislature passed a law making it clear that *all dimensions and implications of reliability* must be taken into consideration when deciding whether the facility should be allowed to operate beyond its initial licensing phase. 30 V.S.A. § 1571 (2010). This law established a state-mandated Comprehensive Reliability Audit ("CRA") and created the Public Oversight Panel to oversee the audit. *Id.* The Public Oversight Panel was charged with ensuring that this analysis was carried out in accordance with the legislative intent. *Id.*

⁹⁰ Recall that the NRC nuclear operating licenses require a safety review and an environmental review for new and existing generation projects. 10 C.F.R. pt. 50. *Supra* note 39. To be clear, the NRC only inspects plants to collect data on their "safety systems and procedures." U.S. NUCLEAR REGULATORY COMM., NRC: REGULATOR OF NUCLEAR SAFETY, 7 (Feb. 2008) available at <http://www.nrc.gov/reading-rm/doc-collections/nuregs/brochures/br0164/r4/br0164r4.pdf>.

⁹¹ A severe electrical fault caused a generator to trip, triggering automatic plant shutdown and resulting in a fire on the main transformer. Testimony of Public Oversight Panel Member Bill Sherman before the House Natural

Resources and Energy and Senate Finance Committees, 1–2 (March 19, 2009) (transcript available at <http://www.leg.state.vt.us/JFO/envy/Sherman%20Testimony%2003-19-2009.pdf>).

⁹² There was no damage to the reactor systems, the auxiliary transformer, or the main transformer itself. *Id.*

⁹³ *Id.*

⁹⁴ *Id.*

⁹⁵ *Id.*

⁹⁶ The connection between the main transformer and the main generator is known as the isophase bus, which carries all of the electricity generated by the nuclear plant. Proper operation of the isophase bus is integral in the reliability of Vermont Yankee. Testimony of Public Oversight Panel Member Bill Sherman, *supra* note 91.

⁹⁷ Particularly, the surge arrestors intended to protect against electrical faults of these kinds were non-functional. *Id.* The causal connection between the fire and ENVY’s questionable maintenance of some of Vermont Yankee’s facilities, rather, is based on the foreseeability of the incident following upgrades to the air flow system.

⁹⁸ *Id.*

⁹⁹ *Id.*

¹⁰⁰ Notably, wood is no longer the conventional construction material for cooling towers in the nuclear industry. Newer plants are generally built with fiberglass or concrete cooling towers because “[w]ooden cooling towers are often the most vulnerable to degradation.” Electric Power Research Institute, *Nuclear Executive Update: Cooling Tower Inspection and Maintenance Guidance Targets Improved Reliability*, NUCLEAR EXECUTIVE UPDATE (Sept. 2010), available at <http://mydocs.epri.com/docs/CorporateDocuments/Newsletters/NUC/2010-09/09a.html>.

¹⁰¹ Public Oversight Panel Report, *supra* note 85, at 25.

¹⁰² *Id.*

¹⁰³ This is partially because the new columns were improperly constructed, and partly because there were unforeseen construction issues in replacing wooden structures with fiberglass, which has different physical properties. *Id.* See also ENTERGY VERMONT YANKEE, A SUMMARY OF ISSUES SURROUNDING ENTERGY VERMONT YANKEE, 83–90 (March 6, 2009) available at <http://www.safecleanreliable.com/pdf/issuesdoc.pdf>.

¹⁰⁴ Public Oversight Panel Report, *supra* note 85, at 25.

¹⁰⁵ These visual inspections could take place as far away from the facility as from across the Connecticut River. *Id.*

¹⁰⁶ *Id.*

¹⁰⁷ *Id.*

¹⁰⁸ John Dillon, Vermont Yankee says cooling towers safety shouldn’t be reviewed for relicensing, VPR News (Oct. 2, 2007) (available at: http://www.vpr.net/news_detail/77587).

¹⁰⁹ Public Oversight Panel Report, *supra* note 85 at 26. Overall, the general causes of both the cooling tower collapse and the transformer fire were: ENVY’s failure to address industry-wide problems, inadequate inspection, and resource restrictions. *Id.* at 3.

¹¹⁰ Testimony of Public Oversight Panel Member Bill Sherman *supra* note 91.

¹¹¹ VERMONT DEPARTMENT OF PUBLIC SERVICE, Nuclear Waste Management Report, 10 (last visited March 23, 2011), <http://www.leg.state.vt.us/jfo/envy/7440%20Waste%20Management%20Report.pdf>.

¹¹² ENVY sought and was awarded a license from the NRC and the PSB to operate dry-cask storage facilities at the plant. State Certificate to Construct a Dry Fuel Storage Facility at the Vermont Yankee Nuclear Power Station, 249 P.U.R.4th 1 (Vt. P.S.B. April 26, 2006).

¹¹³ Specifically, a crane operator attempted to stop a spent fuel transfer cask that was being lowered to the floor of the refueling facilities, but the operator was unable to do so and the cask was set down on the refueling floor. VERMONT DEPARTMENT OF PUBLIC SERVICE, Nuclear Waste Management Report, 12 (last visited March 23, 2011),

¹¹⁴ *Id.*

¹¹⁵ *Id.*

¹¹⁶ *Id.*

¹¹⁷ *Id.*

¹¹⁸ An animated video of Entergy's summary of the irradiated water leak is available at: <http://safecleanreliable.com/tritium/>.

¹¹⁹ Public Oversight Panel, *Supplemental Report Regarding the Reliability Assessment of the Vermont Yankee Nuclear Power Plant*, 7 (July 20, 2010) [hereinafter Supplemental Public Oversight Panel Report] available at <http://www.leg.state.vt.us/JFO/envy/POP%20VY%20Supplemental%20Report%2007-2010.pdf>.

¹²⁰ 30 V.S.A. § 1571(b) (2010).

¹²¹ Supplemental Public Oversight Panel Report, *supra* note 119 at 5. Nuclear Safety Associates (NSA) also performed the reliability assessment under contract to the Vermont Department of Public Service, which was made public on Dec. 22, 2008.

¹²² *Id.*

¹²³ *Id.*

¹²⁴ Though untrue statements were sworn to under oath, the Public Oversight Panel concluded that the inaccurate statements made by Entergy were most likely not a result of any deliberate effort to deceive. For example, there is some industry jargon that could have created some confusion about the degree to which "buried piping" is synonymous with "underground piping." *Id.* at 13–14.

¹²⁵ *Id.*

¹²⁶ *Id.* at 15.

¹²⁷ Supplemental Public Oversight Panel Report, *supra* note 119, at 15.

¹²⁸ *Id.*

¹²⁹ *Id.* at 12.

¹³⁰ *Id.* at 7.

¹³¹ Testimony of Public Oversight Panel Member Arnold Gunderson before the House Natural Resources and Energy and Senate Finance Committees, (March 19, 2009) (transcript available at <http://www.leg.state.vt.us/JFO/envy/Gunderson%20Testimony%2003-19-2009.pdf>).

¹³² Testimony of Public Oversight Member Peter Bradford before the Vermont Yankee Reliability Assessment House Committee on Natural Resources and the Senate Finance Committee of the Vermont Legislature, 7 (March 19, 2009) (transcript available at <http://www.leg.state.vt.us/JFO/envy/Bradford%20Testimony%2003-19-2009.pdf>).

¹³³ State inspectors urged ENVY management to become more effective in this regard, particularly with respect to employee-related expenses. Vermont Yankee is currently experiencing a high rate of staff turnovers and vacancies; this presents a challenge to assuring procedure quality and enforcement by management. *Id.*

¹³⁴ Docket No. 6300, *supra* note 62.

¹³⁵ Public Oversight Panel Report, *supra* note 58, at 16.

¹³⁶ Letter from U. S. Nuclear Regulatory Comm. to Mr. John Herron, President CEO and CNO of Entergy Nuclear Operations, *supra* note 86.

¹³⁷ Supplemental Public Oversight Panel Report, *supra* note 119 at 16.

¹³⁸ *Id.*

¹³⁹ To be within the ALARA standard commercial nuclear power plants such as Vermont Yankee may expose the public to 25 millirem/year of radiation. 10 C.F.R. § 20.1301(d) (2011). All other nuclear facilities, such as research reactors and medical facilities, can generate up to 100 millirem/year of radiation. 10 C.F.R. § 20.1301(a) (1) (2011). Despite the 2008–2010 radioactive leak, Vermont Yankee has been found to meet the ALARA standard. U.S. Nuclear Regulatory Commission, *Director's Decision Under 10 CFR 2.206 Vermont Yankee*, 7 (March 11, 2011) available at <http://pbadupws.nrc.gov/docs/ML1100/ML110060072.pdf>. See also Director's decision Under 10 CFR 2.206 Vermont Yankee, 71 Fed. Reg. 144 (U.S. Nuclear Regulatory Comm. Jan. 3, 2006).

¹⁴⁰ Supplemental Public Oversight Panel Report, *supra* note 119 at 9.

¹⁴¹ Public Oversight Panel Report, *supra* note 58, at 7 (citing U.S. Office of Technology Assessment (1993)).

¹⁴² Indian Point Independent Safety Evaluation Panel, *Indian Point Independent Safety Evaluation Report*, 11 (July 31, 2008), available at http://www.safesecurevital.com/pdf/ISE_Full_Report.pdf.

¹⁴³ Testimony of Arnold Gundersen, *supra* note 123, at 3. “The Equipment Reliability Index (ERI) is a measure used to gauge the health of equipment at a single nuclear power plant—or at a fleet of plants—by defining the key plant programs and processes that must perform effectively to ensure safe and reliable operations.” The Nuclear News Interview Ron Davis: On the Industry’s Equipment Reliability Index, NUCLEAR NEWS, 28 (October 2005), available at <http://www.ans.org/pubs/magazines/nn/docs/2005-10-2.pdf>.

¹⁴⁴ Besides staffing issues, ENVY has a higher-than-expected maintenance backlog, which can be corrected by the implementation of a preventative maintenance process. Further, because the uncertainty of pending state and federal license extensions, ENVY has balked on committing to refurbish or replace the plant's condenser. Thus, there is an increased probability of reliability problems from the condenser in the early part of VY's extended operation, if allowed. Testimony of Peter Bradford, *supra* note 132, at 7. Recurring problems in areas such as: procedure use and

compliance, OSHA reportable events, and foreign material exclusion, place ENVY's human performance far below initial expectations. *Id.* at 27 (citing NSA Report).

¹⁴⁵ Public Oversight Panel Report, *supra* note 58, at 37.

¹⁴⁶ The oldest plants still operating in the U.S. turned 40 in 2009. Public Oversight Panel Report *supra* note 58.

¹⁴⁷ *Id.*

¹⁴⁸ To be specific, the preventative action facilities, such as the surge arrestors related to the transformer fire, and related corrective-action programs. Public Oversight Panel Report, *supra* note 58, at 3. Half of the reactors in the U.S. have been shut down for at least one year, most of them unaware that a long shutdown would occur even the day before the event; one common factor among all of these plants was weak corrective action programs. *Id.*

¹⁴⁹ The Price-Anderson Act limited liability of private operators for nuclear accidents to the maximum amount of insurance commercially available. 42 U.S.C. § 2210(b) (2010).

¹⁵⁰ Public Oversight Panel Report, *supra* note 58, at 37.

¹⁵¹ *Supra* notes 72-77 and accompanying text.

¹⁵² Economic & Policy Resources, Inc., & Kavet, Rockler, & Assoc., LLC, *Executive Summary Consensus Economic and Fiscal Impact Analysis Associated with the Future of the Vermont Yankee Power Plant*, 11 (March 2010) (finding ENVY can operate Vermont Yankee economically if it offers a price term in the relicensed Power Agreement that is tied to the wholesale market price, which is has thus-far refused to agree to).

¹⁵³ Supplemental Public Oversight Panel Report, *supra* note 119, at 15.

¹⁵⁴ *Id.*

¹⁵⁵ *Id.*

¹⁵⁶ See *supra* note 65 and accompanying text.

¹⁵⁷ *Supra* notes 66-67 and accompanying text.

¹⁵⁸ John Dillon, *Vermont Senate Votes Down Vermont Yankee*, New Hampshire Public Radio, Feb. 25, 2010 (available at <http://www.nhpr.org/node/30189>)

¹⁵⁹ Complaint for Declaratory and Injunctive Relief, Entergy Nuclear Vermont Yankee, LLC and Entergy Nuclear Operations, Inc. v. Peter Shumlin et al., No. 1:11-cv-00099 (D. Vt. April 18, 2011) [*hereinafter* Complaint].

¹⁶⁰ Complaint at ¶89.

¹⁶¹ *Id.* at ¶90.

¹⁶² *Id.* at ¶91.

¹⁶³ *Supra* notes 60-70 and accompanying text.

¹⁶⁴ U.S. CONST. ART. VI § 2

¹⁶⁵ See discussion *supra* at § III.

¹⁶⁶ Notably, the NRC takes no position on the Vermont Yankee litigation, as it identifies the case as an issue of state concern.

¹⁶⁷ See discussion *supra* at § III.

¹⁶⁸ Complaint at ¶101.

¹⁶⁹ Complaint at ¶102.

¹⁷⁰ Complaint at ¶107.

¹⁷¹ See *Public Utilities Comm.'n v. Attleboro Steam & Electric Co.*, 273 U.S. 83 (1927).

¹⁷² *Federal Power Commission v. Florida Power & Light Co.*, 404 U.S. 453 (1972) (citing Section 201(b) of the Federal Power Act).

¹⁷³ Complaint at ¶101.

¹⁷⁴ 30 V.S. A. § 248

¹⁷⁵ 16 U.S.C. § 824(b).

¹⁷⁶ Complaint ¶111.

¹⁷⁷ See 30 V.S.A. § 248(e).

¹⁷⁸ 455 U.S. 331 (1982).

¹⁷⁹ See Docket No. 6545, *supra* note 59; Docket No. 7440, *supra* note 89; Docket No. 6300, *supra* note 62.

¹⁸⁰ Entergy was aware throughout the Vermont Yankee transaction that it would “be forced to seek another [state license] beyond that date.” Complaint at ¶54.

¹⁸¹ *Pacific Gas & Electric*, 461 U.S. 190.

¹⁸² Arthur W. Murphy & Bruce D. La Pierre, *Nuclear Moratorium Legislation in the States and the Supremacy Clause: A Case of Express Preemption*, 76 Colum. L. Rev. 392, 419–20 (1976) (describing the unique success of Vermont’s negotiation-based nuclear regulatory regime relative to other states).

¹⁸³ High-level radioactive waste—like the spent atomic fuel rods removed from a power plant during refueling—is a subject of exclusive federal regulation. However, Vermont has addressed the long-term storage of low-level nuclear waste—such as the soil contaminated by the 2008–2010 radioactive leak at the Vermont Yankee facility—by means of The Texas Low-Level Radioactive Waste Disposal Compact (“Waste Compact”). The Waste Compact provides that Texas, Maine, and Vermont will “cooperate in the protection of the health, safety, and welfare of their citizens and the environment and to provide for and encourage the economical management and disposal of low-level radioactive waste.” Pub. Law No. 105–236, 112 Stat. 1544, §101 (1998). For a more thorough discussion of the policy implications of the Waste Compact, see generally Michael Branson, Comment: Should Maine Ship Its Low-Level Radioactive Waste To Texas? A Critical Look At The Texas Low-Level Radioactive Waste Disposal Compact, 49 Me. L. Rev. 515, 550–572 (1997).

¹⁸⁴ *Duquesne Light Co. v. Barasch*, 488 U.S. 299, 313 (1989).

¹⁸⁵ *Smyth v. Ames*, 169 U.S. 466, 545–46 (1898).

¹⁸⁶ Utilities serve the public good, and as such the original constitutional standard for just compensation was considerably high. The Constitution, as originally interpreted, required: “*fair value* of the property being used . . . for the convenience of the public. *Federal Power Comm. v. Florida Power & Light Co.*, 404 U.S. 453, 546 (1972).

¹⁸⁷ This loss of authority is partly due to the fact that this has made the in-state electrical generation facility an instrument of interstate commerce. The federal government has been liberal in its use of commerce-clause jurisdiction to gain regulatory authority over in-state utilities. *See Federal Power Comm.*, *supra*.

¹⁸⁸ For example, cost-of-service ratemaking allows a public utility to recover revenues that are adequate, but not excessive, while simultaneously motivating consumers to ration their demand for a scarce resource. James C. Bonbright, *Principles of Public Utility Rates*, 80 (1961).

¹⁸⁹ *Id.* at 69–70.

¹⁹⁰ David Colander, Distinguished Professor of Economics at Middlebury College, has famously abbreviated this principle into “TANSTAAFL,” and has written exhaustively on the topic. *See* David Colander, Economics for the 21st Century Presentation, http://community.middlebury.edu/~colander/links_century.html.

¹⁹¹ Prof. Benjamin K. Sovacool, a public policy professor at the world-renowned National University of Singapore, summarizes this point eloquently. “Nuclear plants are more like one-of-a-kind cathedrals than off-the-shelf cellular phones. Key components like computer systems and reactor technologies may be modular but they still have to go in a facility uniquely—and expensively—designed for its site. A nuclear plant requires special cooling systems, emergency backup generators, spent fuel ponds, radiation shields, and firewalls that must all work in tandem to ensure safety and reliability.” Benjamin K. Sovacool, *The Business Case Against Nuclear Power*, WALL ST. J. (March 24, 2011), available at http://online.wsj.com/article_email/SB10001424052748704050204576218012573866874-1MyQjAxMTAxMDIwNTEyNDUyWj.html

¹⁹² On March 11, 2011, an earthquake reaching readings of up to 9.0 on the Richter scale shook Japan with such force that the entire island nation shifted a few feet to the east. Nancy Gibbs, Japan’s Tragedy: What Happens when Disaster Strikes Even the Most Prepared Nations, 177 *TIME* 24 (March 28, 2011). Although the Fukushima Daiichi nuclear complex had functional safety systems that shut down the reactor core during the earthquake, a three-storey tall tsunami that followed the earthquake inundated the diesel-powered backup generators that were being used to power the reactor’s cooling systems. Jeffrey Kluger, *Fear Goes Nuclear*, 177 *TIME* 34, 34 (March 28, 2011). At this moment, a total meltdown of the reactor core became a real possibility; if the reactor couldn’t be cooled down from its temperature—over 5,000°F when the generators at Fukushima failed—the highly-radioactive nuclear fuel rods would burn through the entire plant and as far into the earth as they could go before, presumably, the entire facility explodes into a radioactive nightmare reminiscent of the Chernobyl disaster. This horrific scenario likely would have been the story of Fukushima, but for the heroic efforts of the plant’s employees who exposed themselves to uncalculated doses of radiation in pumping sea water through the reactor vessel until it was adequately cooled. *Id.*

¹⁹³ Historically, the Soviet Union was very secretive about reactor safety, which often had disastrous results. Richard Rhodes, *Arsenals of Folly: The Making of the Nuclear Arms Race*, 7 (2007). Unknown to citizens of the Soviet Union and the international community, there had been at least 13 serious nuclear-reactor accidents in the Soviet Union preceding the Chernobyl disaster. *Id.* Each one of these accidents was covered up by regulators as “state secrets,” and so engineers were never able to correct the design flaws that caused the accidents. *Id.* Nuclear accidents are ostensibly foreseeable in this type of regime.

¹⁹⁴ Jeffrey Kluger, *supra* note 192.

¹⁹⁵ Wing H. Liang, *Honeywell: The Straw That May Just Break The Inventor's Back*, 26 CARDOZO L. REV. 2655, 2697 n170 (2005) (attributing the quote originally to Bernard Wilkin, Esq.).

¹⁹⁶ Although the U.S. Congress reacted to the Fukushima event by beginning a new investigation into nuclear safety, other governments have taken a more pessimistic approach. For example, the Swiss government has put a freeze on all new nuclear plants, and Germany has shut down all of the facilities in the country that were built before 1980. Nancy Gibbs, *supra* note 192.

¹⁹⁷ For example, in February 1979 the private company that operated the Maine Yankee plant and four other nuclear power plants across the country discovered an error in the safety-related seismic protection mechanisms used in the plants. Interview with Peter Bradford, former Commissioner, U.S. Nuclear Regulatory Commission, by email (Mar. 30, 2011) (on file with author). The NRC was unsure whether this would diminish the plants' ability to withstand an earthquake, so it ordered the five plants to close until the seismic protection mechanisms were fixed. *Id.* This created obvious backlash from the industry and nuclear proponents. *Id.* According to one nuclear expert who served as an NRC commissioner during this time: "Maine Yankee was particularly displeased at having to shutdown in midwinter during the oil crisis that was then going on. The Congressman from their territory made statements about the impossibility of earthquakes in Maine. A Congressional committee held a hearing during which the NRC was scathingly denounced." *Id.* However, a small earthquake struck Maine that year, quickly silencing critique of the agency. *Id.*

¹⁹⁸ In the words of state nuclear expert Arnold Gunderson: "it may be possible for Entergy Nuclear Vermont Yankee to operation for an additional 20 years. However, [state law] did not require, nor does the Audit itself contain, an assessment of just how difficult that process may be. . . . As a former nuclear engineering Senior VP with more than 35 years of nuclear engineering experience, I believe it will be extraordinarily difficult for ENVY to continue to operate reliability due to corporate control problems uncovered by both the Oversight Panel and the NSA Audit." Testimony of Public Oversight Panel Member Arnold Gunderson before the House Natural Resources and Energy and Senate Finance Committees, (March 19, 2009) (transcript available at <http://www.leg.state.vt.us/JFO/envy/Gunderson%20Testimony%2003-19-2009.pdf>).

¹⁹⁹ Nuclear accidents inherently damage the economy. Japan lost billions off of the Nikkei stock exchange following Fukushima. Jeffrey Kluger, *supra* note 192.

²⁰⁰ 42 U.S.C. §2021(a) (1) (2011).

²⁰¹ Interview with Peter Bradford, former Commissioner, U.S. Nuclear Regulatory Commission, by email (Oct. 8, 2010) (on file with author).

²⁰² 42 U.S.C. § 2021(a) (6) (2011).