

# The Case for Necessity at Pilgrim

The Pilgrim nuclear plant received an operating license after an open licensing process in which the public had an opportunity to legally challenge nuclear safety matters. The original operating license and supporting documents assumed that fuel assemblies would be periodically discharged from the reactor core into the spent fuel pool. After a brief storage period (i.e., months to a few years), the spent fuel would be shipped offsite for reprocessing or disposal in a geological repository.

When the federal government stopped the reprocessing option, Pilgrim's owner sought to increase the maximum storage capacity of the spent fuel pool. Following an open licensing process in which the public again had the opportunity to legally intervene, the spent fuel pool storage capacity was increased.

After the federal government halted reprocessing, it enacted a law tasking the Department of Energy (DOE) with siting, constructing, and operating a repository for spent fuel. Pilgrim's owner signed a contract with DOE per this law. Pilgrim's owner paid into the Nuclear Waste Fund for DOE to use in developing the repository. In return, DOE would accept spent fuel beginning in January 1998.

As spent fuel pools neared capacity with neither reprocessing nor a repository available, owners sought permission to transfer fuel from spent fuel pools into dry casks stored onsite. Following an open licensing process in which the public had an opportunity to legally intervene, the first dry cask was loaded in 1986.

The Nuclear Regulatory Commission (NRC) changed the game in 1990. Owners could now opt to turn to dry cask storage via a closed process denying the public an opportunity to legally intervene. The closed, non-public process soon became more popular than the open, public one.

As nuclear power reactors began shutting down permanently, the NRC learned that its emergency planning regulations had been developed with operating reactors in mind and might not be applicable to permanently shut down reactors. In 1999, the NRC staff identified 34 separate sections of the emergency planning regulations that were likely inapplicable. But despite having revised its emergency planning regulations via open processes at least four times since that definition, the regulations were not changed for permanently shutdown reactors. Instead, the NRC enables owners to eliminate or lessen emergency planning requirements by exemptions, which the NRC grants without any possible public participation.

Similarly, the NRC identified portions of its security regulations that might not be applicable to permanently shutdown regulations. Rather than revising its regulations to better tailor security regulations to plant circumstances, the NRC instead revised its policy and practices by installing an "express lane" for owners to easily seek and swiftly obtain exemptions via the closed, non-public process.

The federal government has taken billions of dollars from plant owners for the stated purposes of operating a spent fuel repository. The federal government has taken zero ounces of spent fuel.

Plant owners have sued the federal government for breach of contract and been awarded billions of dollars to compensate for their undue burden.

The public also shoulders an undue burden from the federal government's failure to take away spent fuel. How has the public been compensate for its undue burden? The federal government took away the public's right to intervene in decisions affecting their safety and security.

Acts of civil disobedience might not be right, but they seem considerably less wrong than what the federal government has done to the community around Pilgrim and how it was done.

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## SPENT FUEL STORAGE AND DISPOSAL

The Atomic Energy Commission (AEC) issued a construction permit for the Pilgrim Nuclear Power Station on August 26, 1968. The AEC issued a reactor operating license for Pilgrim on June 8, 1972 (NRC, 2016). Both the construction permit and the operating license were outcomes of open licensing processes in which any person could contest issuance provided he or she met criteria such as standing and putting forth one or more technical contentions. For example, on April 19, 1971, the AEC mailed the plant's owner a copy of the notice to be published in the *Federal Register* about the proposed issuance of an operating license for Pilgrim that outlined the process for requesting a hearing to contest the issuance (AEC, 1971).

Consistent with the standard nuclear fuel cycle practice at the time, the AEC's evaluations supporting issuance of the operating license assumed that spent fuel would remain onsite for only a short time before being shipped offsite for reprocessing or disposal:

*Fuel elements removed from the reactor are expected to be irradiated to about 25,000 megawatt-days per ton on the average. Prior to shipment offsite, the spent fuel will be allowed to decay a minimum of 90 days, so that essentially all the noble gases except krypton-85 will decay away and iodine-131 will be reduced by a factor of 2000. (AEC, 1972, page 51)*

*A nuclear plant the size of Pilgrim operates on about 23 metric tons of fresh nuclear fuel per year; the same amount of spent fuel is transported offsite each year for reprocessing. (AEC, 1972, pages 67-68)*

Pilgrim was initially built and licensed to hold 580 fuel assemblies in its reactor core and 880 fuel assemblies in its spent fuel pool.<sup>1</sup> The spent fuel pool capacity enabled the entire reactor core to be offloaded in case it became necessary to inspect the reactor vessel or repair one of its internal components, plus storage capacity for fuel assemblies discharged from past refueling outages that had not yet been shipped offsite.

On April 7, 1977, President Jimmy Carter announced that the United States would indefinitely defer the reprocessing of spent fuel from civilian nuclear power plants. On October 18, 1977, the DOE announced a new spent fuel policy, approved by the President, in which the federal government would accept and take title to spent fuel from U.S. nuclear power plants in return for a one-time storage fee (DOE, 1977).

The suspension of the reprocessing option coupled with the lack of a repository option left spent fuel at nuclear plant sites with no place for it to go. Anticipating this situation, the nuclear industry initiated measures to expand onsite storage of spent fuel so their nuclear plants could continue to operate. Pilgrim's owner applied to the Nuclear Regulatory Commission (NRC, which had replaced the AEC under the Energy Reorganization Act of 1974) on December 17, 1975, for an amendment to the reactor operating license increasing the maximum capacity of the spent fuel pool. On April 22, 1976, the NRC's notice about this request was published in the *Federal Register*. The notice stated:

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<sup>1</sup> Initially, nuclear power reactors refueled annually. The interval between refueling outages was lengthened to 18 months and even to 24 months at some plants. Approximately one-quarter to one-third of the fuel assemblies are discharged from the reactor core into the spent fuel pool and replaced with new fuel assemblies. The spent fuel pool is about 45 feet deep and the approximate 12-foot long fuel assemblies are placed in metal storage racks sitting on the pool's bottom. The water is continuously circulated through a cooling system to remove the heat generated by radioactive decay of fission byproducts within the fuel assemblies. The water also serves as a shield to protect workers from excessive radiation exposure.

*By May 24, 1976, the licensee may file a request for a hearing and any person whose interest may be affected by this proceeding may file a request for a hearing in the form of a petition for leave to intervene with respect to the approval of the modification to the subject facility spent fuel storage pool. ... A petition for leave to intervene must set forth the interest of the petitioner in the proceeding, how that interest may be affected by the results of the proceeding, and the petitioner's contentions with respect to the proposed action. (NRC, 1976)*

On August 17, 1978, the NRC issued an amendment to Pilgrim's operating license increasing the storage capacity of the spent fuel pool from 880 fuel assemblies to 2,300 fuel assemblies (NRC, 1978). Increased capacity was achieved by replacing the original storage racks with racks placing spent fuel assemblies closer together (i.e., a higher density storage configuration).

On January 7, 1983, the Nuclear Waste Policy Act (NWPA) of 1982 became law. President Ronald Reagan had lifted the deferment of spent fuel reprocessing, making this option legally open. But reprocessing remained costly<sup>2</sup> and impractical. The NWPA sought to establish a parallel path for shipping spent fuel to a repository should the reprocessing path remain untraveled. It provided that the DOE would begin taking spent fuel for disposal no later than January 31, 1998 (United States Court of Federal Claims, 2005).

The untraveled reprocessing path and the unbuilt repository path forced the NRC to address the accumulation of spent fuel at nuclear plants in larger quantities and for longer durations than originally expected. The NRC's Waste Confidence Decision was published in the *Federal Register* on August 31, 1984. The decision followed a public rulemaking process initiated by the agency:

*... on October 25, 1979 to assess generically the degree of assurance now available that radioactive waste can be safely disposed of, to determine when such disposal of off-site storage will be available, and to determine whether radioactive wastes can be safely stored on-site past the expiration of existing facility licenses until off-site disposal or storage is available. (NRC, 1984)*

In the Waste Confidence Decision, the NRC stated:

*The Commission finds reasonable assurance that one or more mined geologic repositories for commercial high-level radioactive waste and spent fuel will be available by the years 2007-09, and that sufficient repository capacity will be available within 30 years beyond expiration of any reactor operating license to dispose of existing commercial high level radioactive waste and spent fuel originating in such reactor and generated up to that time. (NRC, 1984)*

Boston Edison, then Pilgrim's owner, signed a contract with the DOE under the NWPA for disposal of spent fuel from the plant (United States Court of Federal Claims, 2005).

Re-racking spent fuel pools increased the storage capacity of the pools, but the enlarged limit would eventually be reached. In 1986, the Surry nuclear plant in Virginia became the first U.S. nuclear plant to store spent fuel onsite in dry storage casks.<sup>3</sup> In its environmental assessment for dry storage at Surry, the NRC stated:

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<sup>2</sup> Reprocessing extracts fissionable uranium and plutonium from spent fuel for fabrication into new nuclear fuel. The discovery of uranium ores made mining, milling, and fabrication a significantly less expensive source of new fuel.

<sup>3</sup> Casks feature a sealed metal canister placed within a reinforced concrete protective cover. The spent fuel assemblies loaded into the canister have been discharged from the reactor core long enough that the decay heat they

*Until about 1975, it was planned in general that spent fuel from nuclear powered reactors would be stored in the spent fuel pool at the reactor site where generated for an interim period. After the interim storage, it was anticipated that spent fuel would be transported to a reprocessing plant for recovery and recycling of the fuel. Reactor facilities, including Surry, which were designed and constructed prior to 1975 provided less capacity for spent fuel storage on site than required for life-of-plant. (NRC, 1985)*

As spent fuel pools neared capacity, owners transferred fuel assemblies from the spent fuel pool into dry storage casks to make room for the fuel being discharged during the next refueling outage. As in the case of expanded spent fuel pool storage at Pilgrim, the NRC's approvals for dry cask storage of spent fuel at Surry and other nuclear plants resulted from open licensing processes in which any person could attempt to legally contest the proposals. But the NRC essentially added a closed, non-public process for plant owners to implement dry cask storage in August 1990 when it revised the regulations:

*The U.S. Nuclear Regulatory Commission (NRC) is amending its regulations to provide for the storage of spent nuclear fuel under a general license on the site of any nuclear power reactor provided the reactor licensee notifies the NRC, only NRC-certified casks are used for storage, and the spent fuel is stored under conditions specified in the cask's certificate of compliance. This final rule also provides procedures and criteria for obtaining NRC approval of spent fuel storage cask designs. (NRC, 1990a)*

Less than one month after revising its spent fuel storage regulations, the NRC issued Certificates of Compliance for the NAC-C28 (NRC, 1990b), Castor V/21 (NRC, 1990c) and NAC S/T (NRC, 1990d) dry cask designs. More than a dozen dry cask Certificates of Compliance were subsequently issued.

The NRC approved Surry for dry cask storage of spent fuel via a site-specific license. The regulations were revised in August 1990 to add the general license option. As shown in Figure 1, loading dry casks under a general license became more popular than loading dry casks under a site-specific license.

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generate can be conducted through the metal wall's of the canister and carried away by convective air flow (i.e., the chimney effect) in the annular space between the concrete cover and the canister.

Figure 1



(NRC, 2005, Slide 4)

The site-specific license provides an opportunity for a public hearing (i.e., legal intervention) while no such opportunity exists with a general license.

Figure 2

**Choices of Spent Fuel Storage Licenses**

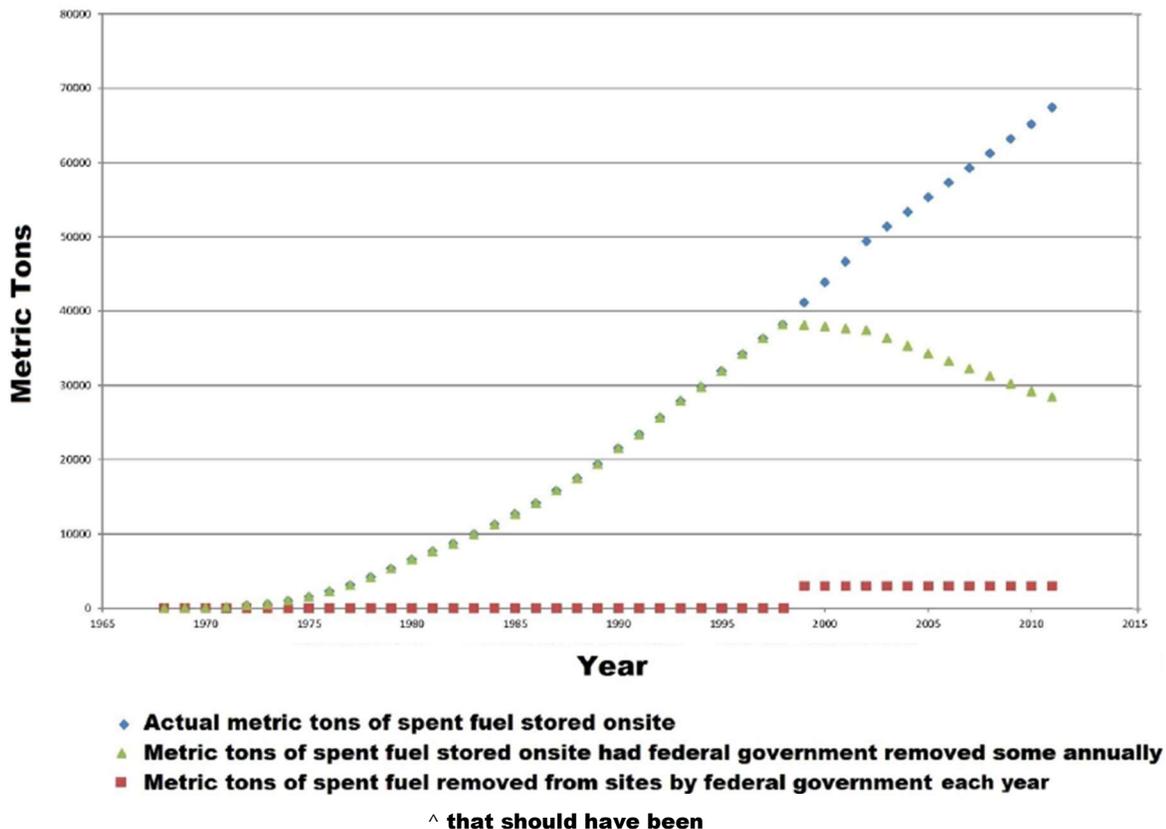
- **General License**
  - Available only to nuclear power reactor licensees (10 CFR Part 50)
  - Requires use of certified cask design
  - Requires site evaluation for compatibility with cask design
- **Site Specific License**
  - Available to reactor licensees and other applicants
  - Required for away-from-reactor sites
  - Opportunity for public hearing

(NRC, 2005, Slide 11)

On June 22, 1994, the NRC issued an amendment to Pilgrim’s operating license that increased the storage capacity of the spent fuel pool from 2,320 fuel assemblies to 3,859 fuel assemblies. The plant’s owner had applied to the NRC for the amendment on February 11, 1993 (NRC, 1994). On April 23, 1993, the NRC sent the plant’s owner a copy of the notice the agency submitted for publication in the *Federal Register* (NRC, 1993). Spent fuel pool storage requirements remained an issue handled by the NRC via an open licensing process.

DOE failed to meet the January 31, 1998, deadline in the NWPA for accepting spent fuel for placement in a repository. David Lochbaum testified before the U.S. Senate in July 2013 about proposed legislation to deal with spent fuel storage and disposal with the deadline still unmet. Lochbaum presented the following figure showing the consequences of the DOE’s failure to meet its statutory and contractual obligations:

Figure 3



(Lochbaum, 2013)

The Congressional Research Service reported in March 2010 about the DOE’s liability under the contracts signed per the Nuclear Waste Policy Act of 1982:

*Nuclear utilities have thus been successful in recovering all reasonable and foreseeable expenses incurred in mitigation of DOE’s breach. Generally, these damages consist of costs associated with developing, implementing, and maintaining on-site interim SNF storage. Damages are limited, however, to the costs incurred from the date at which the utility became aware of DOE’s potential breach, a realization often occurring well before the January 31, 1998, deadline, to the date of trial. Nuclear utilities are free, however, to re-file future claims as new mitigation damages are incurred. (Garvey, 2010)*

The CRS reported that DOE and the nuclear industry estimated the liability if DOE cannot begin taking spent fuel in 2020 at \$12.3 billion to \$50 billion. In addition, the U.S. Department of Justice spends an estimated \$5 million to \$7 million to defend the DOE in each lawsuit (Garvey, 2010).

Entergy had purchased Pilgrim from Boston Edison on July 13, 1999 (United States Court of Federal Claims, 2005). With the purchase came the breached contract with DOE for accepting spent fuel from Pilgrim.

On May 6, 2010, Judge Charles F. Lettow ruled that Entergy was entitled to \$4,224,696 for expenses incurred because the DOE breached its contractual obligations under the Nuclear Waste Policy Act to accept spent fuel from Pilgrim (United States Court of Federal Claims, 2010).

On June 18, 2018, Judge Charles F. Lettow granted Entergy's motion for partial summary judgment on liability and awarded the company \$42,019,191 for expenses incurred because the DOE breached its contractual obligations under the Nuclear Waste Policy Act to accept spent fuel from Pilgrim (United States Court of Federal Claims, 2018).

Article IX of the contract signed by DOE and Boston Edison under the NWPA was an "unavoidable delay" clause that stated:

*Neither the Government nor the purchaser shall be liable under this contract for damages caused by failure to perform its obligations hereunder, if such failure arises out of the causes beyond the control and without the fault or negligence of the party failing to perform. (Garvey, 2010)*

The Department of Justice defended DOE in the breach of contract lawsuits and argued that the breaches were an "unavoidable delay," thus protecting DOE from any liability for costs associated with prolonged and expanded onsite spent fuel storage. The courts decided against this position and held DOE liable. In other words, the breaches were within DOE's control and the failure constituted some fault and/or negligence on the part of DOE. Or, the DOE has no excuse for not taking spent fuel beginning in 1998.

While DOE has not taken any spent fuel from Pilgrim and other nuclear power plants, it has taken money from the plants under the NWPA for the Nuclear Waste Fund.<sup>4</sup> As of September 2019, the owners of the two nuclear power plants in Massachusetts had contributed \$188.4 into the Nuclear Waste Fund as shown in Figure 4. Yankee Rowe permanently shut down in 1991, nearly three decades ago. Its money is long gone; its spent fuel remains behind.

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<sup>4</sup> The contracts between DOE and nuclear plant owners under the NWPA require owners to make payments into the Nuclear Waste Fund based on the electricity generated by their plants (which correlates to the amount of spent fuel being created.) The Nuclear Waste Fund is to be used to fund DOE's siting, construction, and operation of a spent fuel repository. Consequently, the Nuclear Waste Fund cannot be tapped by owners to cover their costs in storing spent fuel onsite that, per contracts, should have been taken years ago by DOE.

Figure 4

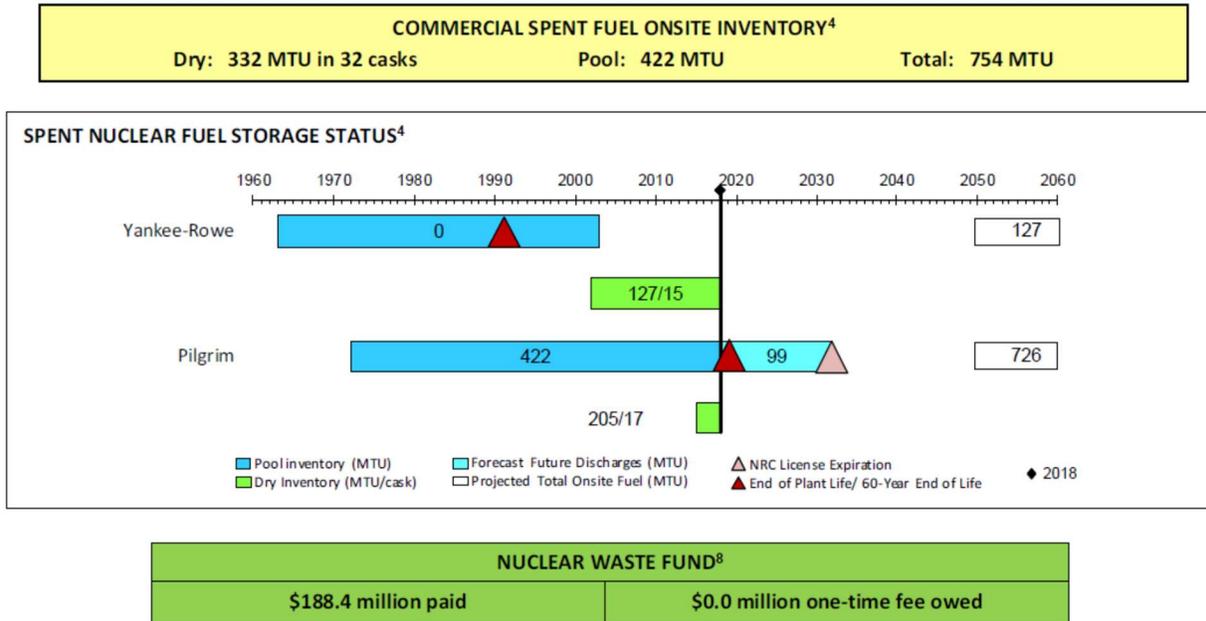


Figure 3 illustrates the widening gap between the amount of spent fuel stored onsite because DOE breached its contracts and the amount stored onsite had DOE fulfilled its legal obligation. The breaches of contract burdened plant owners with costs they would not have incurred had DOE fulfilled its obligations. The lawsuits and their court-ordered rewards compensate owners for the undue burden.

The public also shoulders a burden from spent fuel in their communities that should be in DOE’s repository. In July 2003, the General Accounting Office (GAO) reported to Congress on its evaluation of security protection of spent fuel. The GAO’s report included information it obtained from the NRC about potential health effects from a spent fuel pool accident:

Table 1: Potential Health Effects of Fire in a Spent Fuel Pool

| Time after shutdown of reactor | Lower level of radioactivity <sup>a</sup> |                                    | Higher level of radioactivity <sup>a</sup> |                                    |
|--------------------------------|---|------------------------------------|--|------------------------------------|
|                                | Number of early fatalities                | Number of latent cancer fatalities | Number of early fatalities                 | Number of latent cancer fatalities |
| 30 days                        | 2   | 3,500                              | 200  | 15,000                             |
| 1 year                         | 1   | <sup>b</sup>                       | 80   | <sup>b</sup>                       |
| 5 years                        | 0   | <sup>b</sup>                       | 1  | <sup>b</sup>                       |
| 10 years                       | 0   | <sup>b</sup>                       | 0  | 7,500                              |

Source: NRC.

<sup>a</sup>NRC assumed a low level and a high level of ruthenium in the dispersed spent fuel. Ruthenium, found in higher levels in recently discharged fuel, is a particularly lethal isotope when dispersed in small particles.

<sup>b</sup>Information not available.

(GAO, 2003)

While the number of individuals harmed by radioactivity released from a spent fuel accident or sabotage depends on many factors (e.g., surrounding population, weather conditions, success of evacuation and

sheltering measures, etc.), the NRC's estimates reported by GAO constitute *prima facie* evidence that the public has a burden from DOE's breach of contract.

The public undue burden is supported by common sense. When in the core of an operating reactor, irradiated fuel is so hazardous that federal liability protection under the Price-Anderson Act is needed to protect plant owners and reactor vendors. When in the depths of a geological repository, irradiated fuel is so hazardous that it must be isolated from humans and the environment for at least 10,000 years into the future. With such hazardous endpoints, it makes no sense that irradiated fuel would be harmless in spent fuel pools and dry casks at permanently shutdown plants. But even if reductions were warranted and justifiable, the proper and legal way to enact them is through an open licensing process where the public has an opportunity to intervene.

Rather than taking away spent fuel and its inherent risk from Pilgrim and other nuclear plants, the federal government took away the public's legal right to challenge the undue burden placed on them. Via the general license provision, owners can load dry casks with spent fuel without any chance for a public hearing. The public can merely watch as spent fuel accumulates in their communities rather than in the repository the NWPA called for.

The federal government is double gouging the public for spent fuel storage. First, the federal government requires plant owners to pay into the Nuclear Waste Fund to pay for a repository. Second, because the federal government failed to provide a repository, plant owners receive monetary awards to reimburse them for the costs of onsite spent fuel storage. Thus, ratepayers are funding the construction and operation of a repository and taxpayers (i.e., the same folks with a different label) are funding the non-construction and non-operation of that repository. Two wrongs certainly don't make it right.

## **SPENT FUEL STORAGE AND EMERGENCY PLANNING**

Following the partial meltdown of the Unit 2 reactor at the Three Mile Island nuclear plant in Pennsylvania in March 1979, the NRC issued regulations requiring emergency planning measures for nuclear power plants on August 19, 1980. According to the NRC:

*The Nuclear Regulatory Commission is upgrading its emergency planning regulations in order to assure that adequate protective measures can and will be taken in the event of a radiological emergency. Nuclear power plants and certain other licensed facilities are required to submit their emergency plans, together with the emergency response plans of States and local governments, to the Commission. (NRC, 1980)*

The NRC issued regulations for onsite dry storage of spent fuel in August 1988. In its final rule as published in the *Federal Register*, the NRC described the open licensing process leading to these regulations:

*On May 27, 1986, following Commission approval, the proposed revision to 10 CFR Part 72 relating to MRS [monitored retrievable storage] licensing was published in the Federal Register (51 FR 19106) for comment. The comment period expired on August 25, 1986.*

*The NRC received 195 comment letters from utilities, engineering companies, State offices, environmental groups, private citizens, and a member of the U.S. House of Representatives. The comment letters from private citizens numbered about 145. (NRC, 1988)*

Paragraph (c) of 10 CFR 72.32 in the NRC's revised regulations for spent fuel storage addressed emergency planning as follows:

*For an ISFSI [independent spent fuel storage installation] that is located on the site of a nuclear power reactor licensed for operation by the Commission, the emergency plan required by 10 CFR 50.47 shall be deemed to satisfy the requirements of this section. (NRC, 1988)*

On April 20, 1999, the NRC staff delineated the thirty-four (34) exemptions from emergency planning regulatory requirements requested when nuclear power reactors permanently shut down:

- 10 CFR 50.47(b)
- 10 CFR 50.47(b)(1)
- 10 CFR 50.47(b)(3)
- 10 CFR 50.47(b)(4)
- 10 CFR 50.47(b)(5)
- 10 CFR 50.47(b)(6)
- 10 CFR 50.47(b)(7)
- 10 CFR 50.47(b)(9)
- 10 CFR 50.47(b)(10)
- 10 CFR 50.47(c)(2)
- 10 CFR 50.47(g)
- 10 CFR 50 Appendix E IV
- 10 CFR 50 Appendix E IV A.1
- 10 CFR 50 Appendix E IV A.3
- 10 CFR 50 Appendix E IV A.4
- 10 CFR 50 Appendix E IV A.5
- 10 CFR 50 Appendix E IV A.8
- 10 CFR 50 Appendix E IV B
- 10 CFR 50 Appendix E IV C
- 10 CFR 50 Appendix E IV D.1
- 10 CFR 50 Appendix E IV D.1
- 10 CFR 50 Appendix E IV D.2
- 10 CFR 50 Appendix E IV D.3
- 10 CFR 50 Appendix E IV E.8
- 10 CFR 50 Appendix E IV E.9.a
- 10 CFR 50 Appendix E IV E.9.c
- 10 CFR 50 Appendix E IV E.9.d
- 10 CFR 50 Appendix E IV F.1.viii
- 10 CFR 50 Appendix E IV F.2
- 10 CFR 50 Appendix E IV F.2.b
- 10 CFR 50 Appendix E IV F.2.c
- 10 CFR 50 Appendix E IV F.2.d
- 10 CFR 50 Appendix E IV F.2.e
- 10 CFR 50 Appendix E IV F.2.f (Barss, 1999)

In 2000, the NRC staff reviewed the history of emergency planning for 13 reactors that had permanently shut down. One reactor [Humboldt Bay (shutdown 1976)] had shut down before the NRC adopted emergency planning regulations. Two reactors [San Onofre Unit 1 (1992) and Millstone Unit 1 (1995)] retained full emergency planning measures due to other reactors still operating on the site. Ten reactors [La Crosse (1987), Fort St. Vrain (1989), Yankee Rowe (1991), Trojan (1992), Haddam Neck (1996),

Maine Yankee (1996), Zion Units 1 and 2 (1997) and Big Rock Point (1997)] were granted exemptions from the emergency planning regulatory requirements (Hubbard, 2000).

The NRC's Office of the Inspector General (OIG) reported in August 2000 on its review of the agency's oversight of spent fuel storage at permanently shutdown nuclear plants. OIG reported:

*NRC regulations pertaining to nuclear power reactors are primarily directed toward the safety of facilities that are licensed to operate. As reactors are permanently shutdown and enter decommissioning, licensees have had to rely on seeking regulatory relief, in the form of exemptions and amendments to their licenses. As a result, after years of ad hoc decisions on reactor decommissioning, NRC staff are developing regulations that take into account the different risks posed by decommissioning plants, including updated risk insights with regard to spent fuel pools (NRC, 2000).*

As of December 31, 2019, the NRC staff had not issued regulations that take into account the different risks, despite having explicitly defined the 34 parts of its emergency planning regulations that apply to operating reactors and not so much to permanently shut down reactors. Instead, the NRC continues to lessen the emergency planning requirements by granting exemptions. Similar to the closed, non-public process through which NRC enables owners to load dry casks with spent fuel, the exemption process is essentially a closed, non-public process that denies the public any chance to contest exemption(s) they consider inappropriate and/or unsafe. And the NRC concedes that chronic reliance on exemptions is inappropriate.

In her speech at the NRC's annual conference in 1996, NRC Chairman Shirley Jackson addressed recurring exemptions from regulatory requirements:

*Early in my tenure as Chairman, I became concerned that the NRC was repeatedly being asked for exemptions from the same relatively few regulations. This raised an obvious question: were the regulations so unduly onerous that exemptions were necessary — in which case a rule change would be appropriate — or were licensees not meeting their responsibility to comply with reasonable regulatory requirements? The answer was not self-evident, so I asked the staff to examine our exemption history, identify those regulations for which multiple exemptions had been granted, and evaluate whether we need to change the regulations.*

*The statistics indicate that approximately three quarters of the exemptions were associated with six rules (fire protection, containment testing, property insurance, emergency planning, general design criteria, and physical protection). We have already amended the regulation pertaining to containment leakage testing and plan to consider amending the other regulations as well.*

*I would like to take this opportunity, therefore, to clarify that I am not opposed to exemptions per se. They have their place in the NRC regulatory process -- there is no doubt about that. But if the problem is with the regulation itself, then it is far better policy to amend the regulation rather than routinely grant exemptions from it. (Jackson, 1996, page 9)*

In his speech before an April 2001 forum on nuclear plant decommissioning sponsored by the Nuclear Energy Institute and the Electric Power Research Institute, NRC Commissioner Nils Diaz stated that

while the NRC could grant exemptions from regulatory requirements when properly justified, “NRC’s policy is to avoid the use of exemptions for recurring licensing actions”<sup>5</sup> (Diaz, 2001).

After the NRC explicitly defined in 1999 the 34 parts of its emergency planning regulations that may not be applicable to permanently shutdown plants and reviewed in 2000 the exemptions requested from emergency planning regulations by owners of permanently shutdown plants, the NRC has revised its emergency planning regulations on at least four different occasions:

- In January 2001, the NRC revised its emergency planning regulations to address the consideration of potassium iodide (KI) (NRC, 2001).
- The NRC revised its regulations in August 2007 to cover early site permitting for new nuclear reactors. The revised and new regulations affected emergency planning requirements (10 CFR 50.47), but only in the context of new reactors (NRC, 2007).
- On November 23, 2011, the NRC revised its emergency planning regulations (10 CFR 50.47) to add provisions for new nuclear reactors and security-based events (NRC, 2011).
- In June 2013, the NRC revised regulations to correct some things and clarify others. Among the clarifications was a revision to emergency planning regulations (10 CFR 50.47) (NRC, 2013).

None of these four revisions addressed any of the 34 known issues with emergency planning regulations for permanently shutdown plants. Instead, the NRC continues to grant exemptions from emergency planning regulations for owners of permanently shutdown plants.

It’s a sleazy bait and switch tactic. The emergency planning regulations were developed and subsequently revised via open licensing processes. Because the regulations did not discern between hazards at operating reactors vice hazards at permanently shutdown reactors, the public believed that they would be protected by the mandated emergency planning measures as long as the hazards remained in their communities, regardless of the reactor’s operating status. But the NRC permits the protective measures to be lessened at permanently shutdown reactors via a closed, non-public process.

The open licensing process that the NRC used to issue the emergency planning regulations in August 1980 and to revise them on at least four occasions since 2000 afforded the public the opportunity to contest the proposed regulatory requirements. But that open licensing process also afforded plant owners this same opportunity. If plant owners felt that the proposed requirements were too onerous for nuclear plants that became permanently shutdown, they could have — and should have — used any one of these multiple opportunities to legally seek a change. Having failed to avail themselves of multiple opportunities to rectify requirements considered overly burdensome, the owners instead benefit from the closed, non-public exemption process.

The proper course of action, as explicitly expressed by Chairman Jackson and Commissioner Diaz, would be for the NRC to revise its emergency planning regulations to better tailor them to the hazards present at permanently shutdown reactors. The improper course of inaction would be to continue to deny the public its due day in court when lessening emergency planning measures here, there, and everywhere.

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<sup>5</sup> Perhaps the NRC sustained its multiple-decade practice of granting exemptions from emergency planning regulations rather than revising the regulations through an open licensing process by granting itself an exemption from this policy.

## SPENT FUEL STORAGE AND SECURITY

Before the tragic events of September 11, 2001, the NRC issued security regulations intended to manage the risk of sabotage releasing radioactivity that harms workers and/or the public. The regulations ranged from requirements limiting access to vital areas to only authorized individuals, detecting unauthorized entries, and interceding with armed security personnel. The NRC evaluated compliance with its security regulations with periodic inspections. A key inspection involved force-on-force exercises pitting a group of mock intruders against a plant's security personnel. Each exercise determined whether security was sufficient to prevent the mock intruders from simulating damage to equipment that could result in release of radioactivity. The force-on-force exercises proved to be good indicators of whether the elements of security measures fit together seamlessly to thwart sabotage attempts. The exercises also served to find and fix any deficiencies before real bad guys could try to exploit them.

Prior to 9/11, the force-on-force exercises were conducted at each nuclear plant once every eight years. After 9/11, the NRC increased the frequency of force-on-force exercises to once every three years. The rising threat profile warranted a commensurate increase in means to assure adequate protection.

In July 2018, the NRC reported to Congress results from its inspections of security measures at operating nuclear power plants. Force-on-force exercises were conducted at 19 nuclear plants in 2017, with the mock attackers being successful in one exercise as shown in Table 1 of the NRC's report to Congress:

**Table 1 Calendar Year 2017 Force-on-Force Inspection Program Summary**

|    |  |
|----|--|
| 19 | Total number of inspections conducted (two exercises per inspection) |
| 34 | Total number of effective exercises                                  |
| 0  | Total number of indeterminate exercises                              |
| 3  | Total number of marginal exercises                                   |
| 1  | Total number of ineffective exercises                                |
| 0  | Total number of canceled exercises                                   |

(NRC, 2018b)

While most force-on-force exercises conducted in 2017 and earlier had the reactor core as the target of the mock intruders, spent fuel in storage was sometimes the target of an exercise.

None of the exercises conducted in 2017 was conducted at a permanently shutdown plant. As with the emergency planning regulatory requirements, the NRC allows owners to eliminate and lessen security measures including the force-on-force exercises — not by revising its regulations via an open licensing process, but by granting exemptions via a closed, non-public process:

*Recent examples of exemption requests and changes to the security plan using the § 50.54(p) process include elimination of licensee-conducted force-on-force (FoF) exercises and reduction of staffing levels. (NRC, 2015)*

In a 2018 presentation on security requirements for permanently shutdown nuclear plants, the NRC explained that rather than revising its security regulations on force-on-force testing for permanently shutdown reactors, it revised its policy to make its closed, non-public exemption process more efficient:

## Policy Formalized

- Relief from NRC triennial evaluated Force-on-Force Inspection
  - *Upon docketing of the certifications of permanent cessation of operations and permanent removal of fuel from the reactor vessel pursuant to § 50.82 or § 52.110, the NRC will notify licensees by letter of their relief from this inspection program*

(NRC, 2018a, Slide 26)

With full security measures in effect, the mock intruders successfully simulated damage of equipment with the potential to release harmful amounts of radioactivity about once each year, as happened in 2017. By eliminating and relaxing security measures, it seems doubtful that real intruders would always be unsuccessful in sabotage attempts. Therefore, spent fuel stored at permanently shutdown nuclear plants is adequately protected against sabotage — unless sabotage is attempted.

The NRC's improper, closed, non-public process of reducing security protection at permanently shutdown reactors must end. If certain security requirements truly are inappropriate or unnecessary after a reactor permanently shuts down, conduct an open rulemaking process to revise the regulations. Give the public its due day in court.

The public deserves both adequate protection and adequate participation. It takes the latter to ensure the former.

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## Sources:

Atomic Energy Commission (AEC). 1972. "Draft Detailed Statement by the Division of Radiological and Environmental Protection U.S. Atomic Energy Commission on the Environmental Considerations Related to the Proposed Issuance of an Operating Licensing to the Boston Edison Company for the Pilgrim Nuclear Power Station." Washington, DC. February.

Atomic Energy Commission (AEC). 1971. Letter to James M. Carroll, Vice President and General Counsel, Boston Edison Company. Washington, DC. April 19. Online at <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML011920405>

Barss, Daniel. Nuclear Regulatory Commission. 1999. Email "Typical EP Exemptions for Permanently Shutdown Reactor" to Diane Jackson, Nuclear Regulatory Commission. Washington, DC. April 20.

Department of Energy (DOE). 2019. "Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report." Washington, DC. September.

Department of Energy (DOE). 1977. Letter to Owners of Nuclear Power Plants. Washington, DC. December 20.

Diaz, Nils J., Commissioner, Nuclear Regulatory Commission. 2001. Speech "Decommissioning the Uncertainty" at the NEI/EPRI Decommissioning, Planning and Technology Forum. New Orleans, LA. April 30. Online at <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML011430352>

Garvey, Todd, Legislative Attorney, Congressional Research Service. 2010. "The Yucca Mountain Litigation: Liability Under the Nuclear Waste Policy Act (NWPA) of 1982." Washington, DC. March 8.

General Accounting Office (GAO). 2003. "Spent Nuclear Fuel: Options Exist to Further Enhance Security." Washington, DC. July.

Hubbard, George. Nuclear Regulatory Commission. 2000. Email "EP History" to NRC Staffers. Washington, DC. August 8.

Jackson, Shirley A., Chairman, Nuclear Regulatory Commission. 1996. Speech "Challengers for the Nuclear Power Industry and Its Regulators: The NRC Perspective" at the NRC's Regulatory Information [Vol. <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML003708992>

Lochbaum, David. 2013. "Statement of David Lochbaum, Director, Nuclear Safety Project Before the Senate Committee on Energy and Natural Resources." Washington, DC. July 30.

Nuclear Regulatory Commission (NRC). 2018a. "Physical Security for Decommissioning Plants." Washington, DC. Online at <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML18295A223>

Nuclear Regulatory Commission (NRC). 2018b. "Report to Congress on the Security Inspection Program for Commercial, Power Reactors and Category I Fuel Cycle Facilities: Results and Status Update Annual Report for Calendar Year 2017." Washington DC. July. Online at <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML19029A036>

Nuclear Regulatory Commission (NRC). 2016. "Information Digest 2016-2017." NURE-1350 Vol. 26. Washington, DC. Online at <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML16243A018>

Nuclear Regulatory Commission (NRC). 2015. "Review of Security Exemptions/License Amendment Requests for Decommissioning Nuclear Power Plants." Washington, DC. September 28. Online at <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML15106A737>

Nuclear Regulatory Commission (NRC). 2013. "Miscellaneous Corrections." *Federal Register*. [Vol 78, No. 110]. Washington, DC. June 7.

Nuclear Regulatory Commission (NRC). 2011. "Enhancements to Emergency Preparedness Regulations." *Federal Register* [Vol. 76, No. 226]. Washington, DC. November 23.

Nuclear Regulatory Commission (NRC). 2007. "Licenses, Certifications, and Approvals for Nuclear Power Plants." *Federal Register* [Vol. 72, No. 166]. Washington, DC. August 28.

Nuclear Regulatory Commission (NRC). 2005. "Independent Spent Fuel Storage" Presentation in Beijing, China. Beijing, China. June 22. Online at <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML051520511>

Nuclear Regulatory Commission (NRC). 2001. "Consideration of Potassium Iodide in Emergency Plans." *Federal Register*. [Vol. 66, No. 13]. Washington, DC. January 19.

Nuclear Regulatory Commission (NRC). 2000. "Review of NRC's Spent Fuel Pool Inspection Program at Decommissioning Nuclear Power Plants." Washington, DC. August 16. Online at <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML003748120>

Nuclear Regulatory Commission (NRC). 1994. "Amendment No. 155 to the Operating License No. DPR-35 for the Pilgrim Nuclear Power Station." Washington, DC. June 22. Online at <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML011940178>

Nuclear Regulatory Commission (NRC). 1993. "Notice of Consideration of Issuance of Amendment to Facility Operating License, Proposed No Significant Hazards Consideration Determination, and Opportunity for a Hearing – Pilgrim Nuclear Power Station." Washington DC. April 23. Online at <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML011920659>

Nuclear Regulatory Commission (NRC). 1990d. "Certificate of Compliance for Dry Spent Fuel Storage Casks Certificate Number 1002 Cask Model No. NAC S/T." August 17. Online at <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML033020120>

Nuclear Regulatory Commission (NRC). 1990c. "Certificate of Compliance for Dry Spent Fuel Storage Casks Certificate Number 1000 Cask Model No. Castor V/21." August 17. Online at <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML033020117>

Nuclear Regulatory Commission (NRC). 1990b. "Certificate of Compliance for Dry Spent Fuel Storage Casks Certificate Number 1003 Cask Model No. NAC-C28." August 17. Online at <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML033020125>

Nuclear Regulatory Commission (NRC). 1990a. "Storage of Spent Fuel in NRC-Approved Storage Casks at Power Reactor Sites." *Federal Register* [Vol. 55, No. 138]. Washington, DC. July 18.

Nuclear Regulatory Commission (NRC). 1988. "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste." *Federal Register* [Vol.53, No. 161]. Washington, DC. August 19.

Nuclear Regulatory Commission (NRC). 1985. "Environmental Assessment Related to the Construction and Operation of the Surry Dry Cask Independent Spent Fuel Storage Installation." Washington, DC. March. Online at <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML13165A154>

Nuclear Regulatory Commission (NRC). 1984. "Waste Confidence Decision." *Federal Register* [Vol 49, No. 171]. Washington, DC. August 31.

Nuclear Regulatory Commission (NRC). 1980. "Emergency Planning." *Federal Register* [Vol. 45, No. 162]. Washington, DC. August 19.

Nuclear Regulatory Commission (NRC). 1978. "Amendment No. 33 to the Operating License No. DPR-35 for the Pilgrim Nuclear Power Station." Washington, DC. August 17. Online at <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML011910005>

Nuclear Regulatory Commission (NRC). 1976. Letter to J. E. Larson, Nuclear Licensing Administrator - Operations, Boston Edison Company. Washington, DC. April 27. Online at <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML011870027>

United States Court of Federal Claims. 2018. "Entergy Nuclear Generation Company v. United States, No. 14-1248C." Washington, DC. June 19.

United States Court of Federal Claims. 2010. "Boston Edison Company and Entergy Nuclear Generation Company v. United States, Nos. 99-447C and 03-2626-C." Washington, DC. May 6.

United States Court of Federal Claims. 2005. "Entergy Nuclear Generation Company v. United States, No. 03-2626-C." Washington, DC. March 3.