

# **RUTGERS ENVIRONMENTAL LAW CLINIC**

123 Washington Street  
Newark, NJ 07102-3094  
Phone: (973) 353-5695

Rutgers, The State University of New Jersey  
School of Law - Newark  
Fax: (973) 353-5537

September 8, 2006

## **VIA EMAIL AND U.S. MAIL**

Chief, Rules Review and Directives Branch  
U.S. Nuclear Regulatory Commission  
Mail Stop T6-D59  
Washington, D.C. 20555-0001  
OysterCreekEIS@nrc.gov

**Re: NUREG-1437: Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Supplement 28, Regarding Oyster Creek Nuclear Generating Station Draft Report for Comment: Comments on Safety and Security Aspects**

Please accept these written comments submitted on behalf of Nuclear Information and Resource Service, Jersey Shore Nuclear Watch, Inc., Grandmothers, Mothers and More for Energy Safety, New Jersey Public Interest Research Group, New Jersey Sierra Club, and New Jersey Environmental Federation (collectively "Citizens") on the safety and security aspects of the above-referenced Draft Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants, Supplement 28, regarding Oyster Creek Nuclear Power Plant ("DSEIS"). Comments on other aspects of the DSEIS are being submitted under separate cover by Julia Huff of this office for Citizens and additional organizations. NRC should consider and respond to both sets of comments, as they are complementary and not duplicative.

### **I. Summary**

The DSEIS is inadequate because it fails to consider the environmental effects of a spent fuel pool fire that could be caused by accident or by an act of terrorism. This failure, among others, means

<b>Carter H. Strickland, Jr., Esq.+</b> Acting Director cstrickland@kinoy.rutgers.edu	<b>Julia L. Huff, Esq.*+</b> Staff Attorney jhuff@kinoy.rutgers.edu	<b>Kathleen J. Shrekast, Esq.#</b> Staff Attorney kshrekast@kinoy.rutgers.edu	<b>Richard Webster, Esq.+</b> Staff Attorney rwebster@kinoy.rutgers.edu
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\* Admitted in New Jersey Pursuant to 1:21-3(c)

+ Also admitted in New York

# Also admitted in Pennsylvania

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that the analysis of Severe Accident Mitigation Alternatives (“SAMA”) is woefully inadequate.

Calculations by experts show that a spent fuel pool fire could result from the packing of the spent fuel into the pool at high density, which was not originally intended. Such a fire could directly cause \$180 billion and \$1.8 trillion worth of damage, including over 24,000 lung cancers. This is around ten times the amount of damage caused by hurricane Katrina. At an estimated probability of around 1 in 10,000 per year, this imposes a risk to society that is valued at between \$200 million and \$3.6 billion.

AmerGen stands to make around \$2.6 billion during the proposed 20 year extended operating period, provided nothing serious goes wrong with the plant during that time. Thus, the costs to society of the risk imposed by Oyster Creek are probably more than AmerGen would make from the electricity generated at the plant, even it operated at full capacity throughout the proposed 20 year extended license period.

This means that even closure of the plant would be a cost effective SAMA. Further, according to experts, transferring the spent fuel that is over five years old to dry cask storage would significantly lower the chance of a spent fuel pool fire at a cost of less than \$100 million. Indeed, AmerGen has quoted the cost as around \$30 million, and, incredibly, has described this as an “unnecessary expense.” The failure of the DSEIS to consider the possibility of a spent fuel pool fire means that it currently violates the requirements of both the National Environmental Policy Act (“NEPA”), and the NRC regulations that implement NEPA. Thus, the SAMA analysis must be completely revised and presented as a new draft for additional public comment.

In addition, allowing Oyster Creek to continue to operate its spent fuel pool in such a reckless manner during any additional period of licensed operation would violate the Atomic Energy Act (“AEA”). Moreover, there are currently no acceptable means of containing the wastes that would be generated by further operation of the reactor. Therefore, the NRC should refuse to relicense the reactor,

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because to do so would be “inimical to the common defense and security or to the health and safety of the public.” 42 U.S.C. § 2133(d). Furthermore, because allowing AmerGen to continue to operate a high density fuel pool does not offer “adequate protection” to public health and safety, as required by the AEA, NRC should also take urgent action to mitigate the current risk caused by the spent fuel pool at Oyster Creek. Although Citizens do not think that the Oyster Creek site is an appropriate place for the long term disposal of high level nuclear waste, the extreme imminent risk posed by the existing spent fuel pool means that Citizens are forced to accept an expedient, imperfect, and temporary solution to lower the risk. Thus, NRC should order AmerGen to transfer all spent fuel that is over five years old to the dry cask storage facility and to maintain sufficient spacing in the pool to minimize the risk of a spent fuel pool fire. The DSEIS must assess the consequences this action. In particular, the DSEIS must assess the vulnerability of the dry cask storage systems to terrorist attack and the potential for environmental release of radioactive waste, and provide methods to mitigate these risks. Furthermore, if NRC wishes to proceed with relicensing, it must also complete the evaluation of the site specific consequences of adding yet more fuel to the dry cask store over the next twenty years.

## **II. Requirements of NEPA**

The National Environmental Policy Act (“NEPA”) establishes a “national policy [to] encourage productive and enjoyable harmony between man and his environment,” and was intended to reduce or eliminate environmental damage and to promote “the understanding of the ecological systems and natural resources important to” the United States. *Dept. of Transp. v. Pub Citizen*, 541 U.S. 752, 756 (2004) (quoting 42 U.S.C. § 4321). The application of NEPA’s requirements, under the rule of reason relied on by the NRC, is to be considered in light of the two purposes of the statute: first, ensuring that the agency will have and will consider detailed information concerning significant environmental impacts; and second, ensuring that the public can both contribute to the body of information and can

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access the information that is made public. *San Luis Obispo Mothers For Peace v. NRC*, 449 F.3d 1016 (June 2, 2006).<sup>1</sup> The Supreme Court has identified NEPA's "twin aims" as "plac[ing] upon an agency the obligation to consider every significant action[, and] ensur[ing] that the agency will inform the public that it has indeed considered environmental concerns in its decisionmaking process." *Baltimore Gas & Elec. Co. v. Natural Res. Def. Counsel, Inc.*, 462 U.S. 87, 97 (1983)

NEPA is the "basic charter for protection of the environment." 40 C.F.R § 1500.1. Its fundamental purpose is to "help public officials make decisions that are based on understanding of environmental consequences, and take decisions that protect, restore and enhance the environment." *Id.* NEPA requires federal agencies to examine the environmental consequences of their actions before taking those actions, in order to ensure "that important effects will not be overlooked or underestimated only to be discovered after resources have been committed or the die otherwise cast." *Robertson v. Methow Valley Citizens Council (Robertson)*, 490 U.S. 332, 349 (1989).

NEPA goes beyond the Atomic Energy Act ("AEA") in mandating that the NRC consider alternatives to its licensing actions that may have detrimental effects on the environment. 10 C.F.R. § 51.71(d). The primary method by which NEPA ensures that its mandate is met is the "action-forcing" requirement for preparation of an EIS, which assesses the environmental impacts of the proposed action and weighs the costs and benefits of alternative actions. *Robertson*, 490 U.S. at 350-51. An EIS must be searching and rigorous, providing a "hard look" at the environmental consequences of the agency's proposed action. *Id.* at 349; *Marsh v. Oregon Natural Resources Council*, 490 U.S. 260, 374 (1989).

The environmental impacts that must be considered in an EIS include "reasonably foreseeable" impacts which have "catastrophic consequences, even if their probability of occurrence is low." 40 C.F.R. § 1502.22(b)(1). The Commission has held that probability is the "key" to determine whether an accident is "reasonably foreseeable" or whether it is "remote and speculative" and therefore need not be

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<sup>1</sup> A petition for certiorari is expected to be filed shortly

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considered in an EIS. *Vermont Yankee Nuclear Power Corp. (Vermont Yankee Nuclear Power Station)*, CLI-90-7, 32 NRC 129, 131 (1990). See also *Limerick Ecology Action v. NRC*, 869 F.2d 719, 745 (3rd Cir. 1989), citing *Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, Inc.*, 435 U.S. 519, 551 (1978). NRC has included consideration of the environmental impacts of design-basis accidents in its EISs since the beginning of NEPA implementation. *Limerick Ecology Action*, 869 F.2d 719 at 726, citing 36 Fed. Reg. 22,851 (1971).

In 1980, following the Three Mile Island accident, the Commission also began to consider the environmental impacts of severe or “beyond design-basis” accidents in its EISs. *Id.*, citing NRC, *Statement of Interim Policy, Nuclear Power Plant Accident Considerations Under the National Environmental Policy Act of 1969*, 45 Fed. Reg. 40,101 (1980). In addition, recently, the Ninth Circuit, concluded that it was unreasonable for the NRC to categorically dismiss the possibility of terrorist attack on a proposed spent fuel storage installation and on the entire reactor facility as too “remote and highly speculative” to warrant consideration under NEPA. *San Luis Obispo Mothers For Peace*, 449 F.3d at 1030. The court also found, as a matter of law, that NRC’s position was inconsistent with the government’s efforts and expenditures to combat this type of terrorist attack against nuclear facilities including establishment of the NRC’s own Office of Nuclear Security and Incident Response responsible for coordination with the Office of Homeland Security. *Id.* at 1030-31.

Furthermore, the court found that to eliminate a possible environmental consequence from analysis by labeling a risk as “unquantifiable” is not supported by any provision of NEPA or any other authority cited by the Commission. See also *Limerick Ecology Action*, 869 F.2d at 754 (J. Scirica, dissenting) (finding no “statutory provision, no NRC regulation or policy statement, and no case law that permits the NRC to ignore any risk found to be unquantifiable”)

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Although an NRC-sponsored study conducted as early as 1979 raised the potential for a severe accident in a high-density fuel storage pool if water is partially lost from the pool (NUREG/CR-0649, *Spent Fuel Heatup Following Loss of Water During Storage* (March 1979), the NRC has failed to take that risk into account in every EIS it has prepared including the 1979 GEIS on the environmental impacts of fuel storage and the 1996 License Renewal GEIS on which the Oyster Creek license renewal application relies. See NUREG-1437, *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* at 5-1 (1996).

The terrorist acts of September 11, 2001, the NRC's response to those attacks, and the finding of the Ninth Circuit in *San Luis Obispo*, show that the environmental impacts of intentional destructive acts against the Oyster Creek fuel pool are reasonably foreseeable. Taken together, the potential for severe pool accidents caused by intentional malicious acts and by equipment failures and natural disasters is not only reasonably foreseeable, but is likely enough to qualify as a "design-basis accident," i.e., an accident that must be designed against under NRC safety regulations. At minimum, such an event is a "severe accident." NRC's failure to take account of this new information when preparing the DSEIS is inconsistent with NEPA's major requirement that environmental decisions must take new information into account if the information shows that a proposed action will affect the quality of the human environment "in a significant manner or to a significant extent not already considered." *Marsh*, 490 U.S. at 374.

### **III. Requirements of the NRC Regulations**

#### **A. NRC Implementation of the AEA**

NRC regulations implement the AEA by setting detailed minimum standards for safe and secure operation of nuclear facilities. The AEA prohibits the NRC from issuing a license to operate a nuclear power plant if it would be "inimical to the common defense and security or to the health and safety of the public." 42 U.S.C. § 2133(d). Public safety is the first, last, and a permanent consideration in any

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decision on the issuance of a construction permit or a license to operate a nuclear facility. *Power Reactor Development Corp v. International Union of Electrical Radio and Machine Workers*, 367 U.S. 396, 402 (1961).

Before a nuclear power plant is constructed, the NRC requires the operator to include a preliminary safety analysis report in the construction permit application. A nuclear power plant must be designed against accidents that are “anticipated during the life of the facility.” *See* 10 C.F.R. § 50.34(a)(4), which provides that a construction permit application for a nuclear power plant must include:

[A] preliminary analysis and evaluation of the design and performance of structures, systems, and components of the facility with the objective of assessing the risk to public health and safety resulting from operation of the facility and including determination of the margins of safety during normal operations and transient conditions anticipated during the life of the facility, and the adequacy of structures, systems, and components provided for the prevention of accidents and the mitigation of the consequences of accidents.

These “anticipated” accidents, against which nuclear power plants must be designed, are called “design-basis accidents” and include some low frequency but credible events. License Renewal GEIS at 5-2.

The NRC designates accidents that are more complex and less likely than design-basis accidents as “severe accidents.” License Renewal GEIS at 5-1 (severe accidents are “those involving multiple failures of equipment or function and, therefore, whose likelihood is generally lower than design-basis accidents but whose consequences may be higher”). Although severe accidents are “beyond the substantial coverage of design-basis events,” they constitute “the major risk to the public associated with radioactive releases from nuclear power plant accidents.” NRC, *Policy Statement on Severe Accidents Regarding Future Designs and Existing Plants*, 50 Fed. Reg. 32, 138, 32, 139 (August 8, 1985) (“Severe Accident Policy Statement”).

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The Commission has made the generic determination that nuclear plants can be operated safely, despite the potential for severe accidents. Nevertheless, the Commission has an ongoing program to address severe accidents in the context of its regulatory program for protection of public health and safety under the AEA, and pledges to act upon any new information that calls the safety finding into question. Severe Accident Policy Statement at 139-40.

In the particular matter of stored spent nuclear fuel and high-level radioactive waste, NRC has promulgated requirements for its protection:

Each licensee subject to this section shall establish and maintain a physical protection system with the objective of providing high assurance that activities involving spent nuclear fuel and high-level radioactive waste do not constitute an unreasonable risk to public health and safety.

10 C.F.R 73.51(b)(1). To meet this objective, the physical protection system must be “designed to protect against loss of control of the facility that could be sufficient to cause a radiation exposure exceeding the total effective dose equivalent of 5 rem.” 10 C.F.R 73.51(b)(3). Furthermore, the system must be reviewed every 24 months. 10 C.F.R 73.51(d)(12).

## **B. NRC Treatment of Terrorist Attack**

NRC had a longstanding policy that NEPA does not require consideration of the environmental impact of a terrorist attack. This was based on four 2002 decisions (Private Fuel Storage, Duke Cogema Stone & Webster, Dominion Nuclear Connecticut and Duke Energy) and the reasoning was as follows:

1. The possibility of terrorist attack is too far removed from the natural or expected consequences of agency action to require study under NEPA
2. Because the risk of terrorist attack cannot be determined, the analysis is likely to be meaningless.
3. NEPA does not require a “worst-case” analysis
4. NEPA’s public process is not an appropriate forum for sensitive security issues.

This was set out in a memorandum and order, CLI-03-1, 57 NRC 1, where the NRC accepted the Atomic Safety and Licensing Board’s referral of its decision to reject the environmental contentions related to terrorism. *San Luis Obispo Mothers For Peace*, 449 F.3d 1016. As discussed above, the

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Ninth Circuit has now ruled that the four reasons given by the NRC as grounds for this did not support the NRC's categorical refusal to consider the effects of a terrorist attack. *Id.* at 6084. Furthermore, the Ninth Circuit reiterated NEPA's direction on uncertain consequences 40 C.F.R. §§ 1502.22(b)(3), (4), which requires an agency to deal with uncertainties by including in the EIS "a summary of existing credible scientific evidence which is relevant to evaluating the reasonable foreseeable significant adverse impacts on the human environment, and... the agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community." The court construed the regulation to apply to those events with potentially catastrophic consequences "even if their probability of occurrence is low, provided that the analysis of impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason." 40 C.F.R. § 1502.22 (b)(4).

In addition, the NRC has now recognized that, if it is not overturned by the U.S. Supreme Court, the *San Luis Obispo* decision will require an analysis of spent fuel pool sabotage scenarios for Oyster Creek. Earlier this week, the NRC decided to postpone its review of the dismissal of a contention by the State of New Jersey that this analysis was essential, but missing. *In the Matter of AmerGen Energy Co. (License Renewal for Oyster Creek Nuclear Generating Station), LLC*, CLI-06-24 (September 6, 2006).

The License Renewal GEIS purports to address both design-basis accidents and severe accidents. With respect to design-basis accidents, the GEIS provides a brief statement that the impacts of design-basis accidents were considered in the original EIS for each nuclear power plant, and that the design was found adequate to "accommodate" those accidents. License Renewal GEIS at 5-11. Moreover, the GEIS asserts that the consequences of design-basis accidents are not expected to change significantly as a result of aging of the plant. *Id.* Therefore, the GEIS does not provide a further discussion of design-basis accidents. *Id.* These impacts are also classified as "Category 1 in Table B-1 of Appendix B to

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Subpart A of 10 C.F.R. Part 51. However, this approach fails to recognize that the build up of spent fuel at reactors is effectively an effect of aging, and that a new design-basis accident could arise from the storage of the spent fuel.

With respect to severe or beyond design-basis accidents, the License Renewal GEIS discusses the potential consequences of an array of severe accidents identified in various studies, primarily the NRC's most recent and comprehensive probabilistic analysis of nuclear power plant accidents, NUREG-1150, *Severe Accident Risks for Five U.S. Nuclear Power Plants* (1990). While recognizing the possibility that the likelihood of some severe accidents may be so low as to be "remote and speculative" and therefore not necessary to discuss in an EIS, the License Renewal GEIS does not exclude any severe accidents on the ground of their estimated probability. Severe accidents are classified as "Category 2" impacts in Table B-1 of Appendix B to Subpart A of 10 C.F.R. Part 51.

However, the License Renewal GEIS does not include any discussion of how deliberate and malicious attacks on nuclear power plants may increase the likelihood or consequences of severe accidents. In addition, the DSEIS it failed to make any assessment of the risks of sabotage. This is consistent with the NRC's long-established, but now obsolete, policy of refusing to examine such issues under NEPA. The rest of these comments show that the DSEIS is grossly deficient in this regard and is also deficient on many points of detail. The rest of the comments also provide a brief, very preliminary, assessment of the issues involved, based directly on work submitted by others to the NRC in pending license renewal proceedings.

#### **IV. Analysis of Risk At Similar Plants From Spent Fuel Pool Fires**

A recent filing by the Massachusetts Attorney General in license renewal proceedings for Pilgrim and Vermont Yankee Nuclear Power Plants, which are both G.E. Boiling Water Mark 1 plants, similar to Oyster Creek, provided a quantitative analysis of the risk of spent fuel pool fires. The filing

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contains two expert reports, one on the probability of a spent fuel pool fire and the options to reduce that probability, and another on the consequences of a spent fuel pool fire. The report on probability finds that where high density racks of fuel assemblies are held in spent fuel pools, a loss of cooling or rupture of the pool would probably cause a spent fuel pool fire. Gordon R. Thompson, *Risks and Risk-Reducing Options Associated with Pool Storage of Spent Nuclear Fuel at the Pilgrim and Vermont Yankee Nuclear Power Plants*, 9-12 (May 25, 2006) (“Risk Report”), Ex. SC 1.

The Risk Report concluded that the probability of a spent fuel pool fire is dominated by the possibility of a malicious attack. *Id.* at 57. Thompson estimated the total probability of a spent fuel pool fire at  $1.2 \times 10^{-4}$  per year for both plants, comprised of a  $1 \times 10^{-4}$  per year chance of a successful terrorist attack and  $2.1 \times 10^{-5}$  per year chance of an accidental fuel pool fire. The accidental risk is around double the core damage frequency (“CDF”) assumed by AmerGen. DSEIS at G-2.

The other report submitted by the Massachusetts Attorney General in the same proceeding provides an analysis of the consequences of spent fuel pool fire at the Pilgrim and Vermont Yankee plants. It shows that the consequences of a spent fuel pool fire are comparable or worse than core damage accidents. Jan Beyea, *Report To The Massachusetts Attorney General On The Potential Consequences Of A Spent-Fuel-Pool Fire At The Pilgrim and Vermont Yankee Nuclear Plants* (May 25, 2006) (“Consequence Report”), Ex. SC 2. The results are truly sobering. Bayea shows that, even excluding the cost of cleanup from a spent fuel pool fire, the consequences of such a fire at these plants would range from \$87 billion to \$878 billion and the number of induced lung cancers would range from more than 2,700 to more than 24,000. *Id.* at 9, 11, 18-19.

Combining the estimates of event probability with the predicted consequences, the Risk Report shows that a consequence of \$100 billion at a probability of  $1 \times 10^{-4}$  per year over twenty years would have a present value of \$110 million to \$200 million, depending on the discount rate. Risk Report at 58.

Thus, the consequence estimates of \$87 billion to \$878 billion combined with the probability estimate of  $1 \times 10^{-4}$  per year yield a range of around \$100 million to \$1.8 billion for the present value of the consequences. Therefore an investment in this range would be justified to avoid the consequences of a spent fuel pool fire. This is orders of magnitude greater than the screening value of \$4.46 million used by the NRC in the SAMA analysis. DSEIS at G-12.

## **V. Risk Of A Spent Fuel Pool Fire At Oyster Creek**

The magnitude of the risk that would be imposed upon Citizens by extending the license for an additional 20 years has been grossly underestimated in the DSEIS because the analysis fails to take account of the potential for a fire in the spent fuel pool at Oyster Creek due to accident or deliberate attack. At a qualitative level the state of New Jersey has stated that the consequences of a spent fuel pool fire could be worse than the consequences of the accident at Chernobyl and that Oyster Creek is particularly vulnerable to an attack because the spent fuel pool at the plant is elevated and densely packed. Letter from Lipoti to Miller, dated July 30, 2004, Ex. SC 3.

More specifically, New Jersey noted that it had reviewed a scientific paper which generically estimated the consequences of a terrorist attack on the spent fuel pool:

The Alvarez Paper was available to New Jersey as was the NRC staff's review and comments. This paper focused on the potential generic vulnerabilities of spent fuel pools to terrorist attack. The paper also details the possible public safety and environmental consequences should such attacks successfully occur. Included in this paper were conservative estimates of the radiological release should a spent fuel zircaloy cladding fire occur due to a significant breach of a spent fuel pool. The paper states, "The long-term land-contamination consequences of such an event could be significantly worse than those from Chernobyl". The paper further states (in reference to Chernobyl), "The total area of this radiation-control zone is huge: 10,000 km<sup>2</sup>, equal to half the area of the State of New Jersey. During the following decade, the population of this area declined by almost half because of migration to areas of lower contamination".

Id. The letter then went on to highlight the plant specific vulnerability of Oyster Creek because its spent fuel pool is elevated, it has a relatively weak superstructure over the spent fuel pool, which could collapse, and it is on the coast providing an unimpeded flight path for an attacking aircraft. Id. The

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letter concluded by requesting NRC to provide New Jersey with site specific estimates of the consequences of an attack on the spent fuel pool. *Id.* As far as Citizens are aware, no such estimate has been provided. More recently New Jersey attempted to intervene in the license renewal proceeding to contend, among other things, that AmerGen's SAMA analysis was inadequate because it failed to consider the vulnerability of the spent fuel pool or mitigation measures to address this vulnerability.

Turning to a more quantitative approach, the situation at Oyster Creek is very similar to that at Pilgrim and Vermont Yankee. All three plants are G.E. Boiling Water Reactors with a Mark 1 containment system. In addition, all three plants store their spent fuel assemblies in high density racks that enclose the fuel with a neutron absorbing material to allow fuel assemblies to be placed close to each other and fit more fuel into the spent fuel pool than originally intended. NRC, Information Notice No. 87-43 (September 8, 1987); Risk Report at 9-14. In 2002, Pilgrim and Vermont Yankee stored 2,274 and 2,671 fuel assemblies, respectively. Risk Report at 41. In 1995, Oyster Creek's operator obtained permission to store 2,645 fuel assemblies in its spent fuel pool. 60 Fed. Reg. 19,309 (April 17, 1995). In 2000, AmerGen obtained permission to increase the number of fuel assemblies in the spent fuel pool by 390 to 3,035 fuel assemblies. 65 Fed. Reg. 55,061-55,064 (September 12, 2000). This action was needed to allow for continued operation of the plant. *Id.*

Citizens are aware that Oyster Creek now has a dry cask storage facility that can store spent fuel that is over five years old. However, press reports indicate that AmerGen only transfers spent fuel to dry cask storage when it runs out of room in the spent fuel pool. Robert Manor, *US: New life for old nuclear plants*, Chicago Tribune, September 18, 2004, Ex. SC 4. Thus, it appears that the amount of spent fuel currently in the elevated pool at Oyster Creek could be larger than at Pilgrim or Vermont Yankee. For simplicity, this analysis assumes that the spent fuel pool has an inventory similar to Pilgrim and Vermont Yankee.

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At root, risk is comprised of two basic elements, the probability of the event and the consequences. Regarding event probability, the State of New Jersey has suggested that Oyster Creek might be a more attractive target than other similarly designed nuclear power stations because it is closer to major population centers and, because it is on the coast, there is an unimpeded flight path.

Thompson's estimate for the probability of a terrorist attack assumed that all plants are equally attractive targets. Thus, the likelihood of a spent fuel pool fire at Oyster Creek may be greater than at Pilgrim or Vermont Yankee. Although, Thompson's assumption is conservative for Oyster Creek, it is not unreasonable at the current level of uncertainty. Therefore, for simplicity, this analysis uses Thompson's estimate of  $1.2 \times 10^{-4}$  per year as the available best estimate of the chance of a spent fuel fire. The Commission has established a threshold of  $1 \times 10^{-7}$  per year as the threshold probability for design basis events at nuclear power plants. *In The Matter Of Private Fuel Storage, L.L.C. (Independent Spent Fuel Storage Installation)*, CLI-01-22, 54 NRC 255 (November 14, 2001). Thus, Thompson's probability estimate is three orders of magnitude greater than the threshold probability for consideration in this nuclear power plant relicensing.

Turning to the consequences, Beyea's estimates of \$87 billion to \$878 billion in consequences for Pilgrim and Vermont Yankee are probably low because the population around Oyster Creek is larger, property values in the areas are higher than in Vermont or Massachusetts, contamination from a fire at Oyster Creek could contaminate major cities on the eastern seaboard, including New York City, Philadelphia, and Trenton, and the estimate excluded consideration of clean up or reconstruction of downtown areas. Thus, it is not unreasonable to estimate that the economic consequences could be at least double those estimated for Pilgrim and Vermont Yankee, ranging from around \$180 billion to \$1.8 trillion. At a frequency of  $1.2 \times 10^{-4}$  per year this is equivalent to a present value of between \$200 million to \$3.6 billion.

Even more importantly, the number of induced lung cancers would probably be even greater than the 2,700 to 24,000 estimated for Pilgrim and Vermont Yankee because the population density in the potentially affected area is considerably higher on average.

## **VI. Significance Of The Risk Estimates For Oyster Creek**

The potential consequences of a spent fuel pool fire are startlingly large. As Beyea points out the US government borrows around \$350 billion per year. Because the government would be forced to foot nearly all of the bill for recovery after such a huge disaster<sup>2</sup> it would have a massive financial impact on the nation. Furthermore, and perhaps even more importantly, such a disaster could lead to major loss of life, loss of confidence, and long-term contamination of large areas. Taken together, these effects could have a devastating long term impact on major cities, such as New York City, Philadelphia, and Trenton. To put the consequence estimates into context they are around ten times the damage estimates for hurricane Katrina.

To look at it from a different perspective, AmerGen currently claims to be making around \$25 per Mwhr produced. Exelon Press Release, dated July 31, 2006 at 6, Ex. SC 5. Thus, assuming plant capacity of 619 Mw and a capacity factor of 95%, the total value of the electricity that could be produced by AmerGen at Oyster Creek during the proposed 20-year license extension is at most \$2.6 billion or \$129 million per year, even if nothing serious went wrong with the plant for 20 years. Thus, the externalized risk to society from the operation of the plant could actually be greater than the value to its owner of its output. In such circumstances, if no other mitigation options are available, plant closure and decommissioning would be a feasible SAMA alternative.

Plant closure and decommissioning must therefore be evaluated as a SAMA alternative in the DSEIS and Citizens believe that this is the only approach that would provide acceptable levels of risk

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<sup>2</sup> Note that the Price-Anderson Act could limit AmerGen's liability for this huge loss to \$400 million and force the federal government to meet all costs over \$10 billion.

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over the long term. However, because the risk is large and imminent there is a need to mitigate this risk in the short term, rather than waiting for decommissioning. Therefore, as an initial temporary option, the dry cask storage facility offers an imperfect, but nonetheless useful option to mitigate the present risk. According to Thompson, the spent fuel at Pilgrim and Vermont Yankee that is more than 5 years old could be stored in dry casks at the site at a cost of \$43 million to \$87 million. Risk Report at 56. AmerGen has placed the cost of dry cask storage at Oyster Creek even lower at \$30 million. Robert Manor, *US: New life for old nuclear plants*, Chicago Tribune, September 18, 2004, Ex. SC 4. This cost would be incurred anyway at decommissioning, so that the net effect is to change the time at which the expenditure occurs. Risk Report at 32. Thus, the cost to AmerGen of this measure could be offset by reductions in decommissioning cost. Depending on discount rate and the life of the plant, the net cost could be between \$15 million and \$40 million.

In this way, the spent fuel pool could be converted back to its original function to turn a massive and unacceptable risk into a lower, but still unacceptable long-term risk, at relatively low cost. *Id.* at 32. Indeed, although the situation is highly uncertain, the lowest estimate of the present value of risk exceeds the highest estimate of the cost to mitigate that risk. It is therefore unclear why the NRC has not already required the risk of spent fuel pool fires to be mitigated at Oyster Creek and other reactors with elevated fuel pools. At minimum, the next draft of the DSEIS must contain a full site-specific analysis of the likelihood and consequences of a spent fuel pool fire and assess how to carry out effective mitigation.

However, merely carrying out an assessment is not enough. Even this brief assessment has shown that the densely packed elevated fuel pool at Oyster Creek currently presents terrorists with a chance of killing 20,000 to 50,000 people and causing economic disruption on a scale that dwarfs even major natural disasters like hurricane Katrina. The risk posed by the plant is totally unacceptable and

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has a present value of over \$200 million and \$3.6 billion. The net cost of transferring the fuel to a less dangerous means of storage is between \$15 million and \$40 million. Therefore, there is no question that this action meets SAMA requirements. To provide “adequate protection” for the public, NRC should take urgent action to lower the risk by ordering that the spent fuel that is beyond 5 years old to be moved to dry cask storage for temporary storage.

Unfortunately, dry cask storage not a risk free activity. Highly active nuclear waste was never intended to be stored at wet coastal sites in densely populated areas. The difficulty that the Department of Energy has had in showing whether the Yucca Mountain long -term disposal facility for this material could be acceptable, shows that storage of this material at the Oyster Creek site in the long term could not present an environmentally sound approach. In addition, concerns have been raised about the vulnerability of dry cask stores to terrorism. At minimum, the next draft of the DSEIS must consider the security and environmental risks of dry cask storage at this site for the current fuel inventory.

This assessment shows that at present the failure to find a responsible approach to managing nuclear waste is causing a huge risk to the people of New Jersey and other states. This risk can be reduced, but cannot be totally eliminated, by moving the spent fuel to dry cask storage as quickly as possible. Because there is currently no acceptable method of disposing of spent fuel, it is simply irresponsible to allow AmerGen to continue to generate waste. Thus, Citizens firmly believe that the NRC should not allow AmerGen to operate Oyster Creek beyond its currently licensed operating period. At minimum, the DSEIS must assess how increasing the amount of spent fuel stored at Oyster Creek by 50% would change the current risks presented by the spent fuel on the site to the public and the environment.

Although the NRC has been on notice of the potential for spent fuel pool fires since at least 1994, the risk of such a fire being caused by terrorist attack has not been assessed generically. Thus, the

reliance in the DSEIS on a generic determination of environmental significance of spent fuel pool storage during decommissioning is misplaced. DSEIS at xvi-xvii. By failing to analyze the risk of spent fuel pool fire from a terrorist attack or an accident during operation, the DSEIS is grossly deficient and would violate NEPA requirements unless this deficiency is remedied.

## **VII. Other Inadequacies of the DSEIS**

Thompson estimated the probability of an accidental fuel pool fire as  $2.1 \times 10^{-5}$  per year. This is around double the core damage frequency (“CDF”) of  $1.1 \times 10^{-5}$  per year assumed by AmerGen. DSEIS at G-2. Although NRC may have looked at the chance of a spent fuel pool fire during decommissioning, many of the initiating events contributing to accidental spent fuel pool fires are not present during decommissioning. Thus, the risk of an accidental spent fuel pool fire during operation is significant and has not been assessed generically. Therefore this risk must be considered in the revised SAMA analysis, in addition to the risk of terrorist attack. At present, it is completely omitted.

The DSEIS states that the value of eliminating all internal and external severe event risk is \$4.46 million, DSEIS at G-12, but fails to provide any elaboration about how this estimate was derived. Working backwards, a consequence of \$100 billion at a probability of  $1 \times 10^{-5}$  per year has a present value of around \$15 million. Risk Report at 9-2. Because the CDF in the analysis is close to this level of probability and the screening value is around a third of the present value estimated, the consequences assumed in the analysis to derive the screening value must be of the order of \$33 billion.<sup>3</sup> This amount is confirmed by the assumption in the appendix that the total cost of cleanup and decontamination after a severe accident would be \$110 billion. DSEIS at G-28. This is surprising because the NRC has previously found that destruction of a private spent fuel storage facility would have lower consequences than a severe nuclear accident. NRC, CLI-01-22 Memorandum and Order, 54 NRC 255 (November 14, 2001). Beyea also points to another reason why the consequence estimate is far too low in the DSEIS.

<sup>3</sup> This is a simplistic calculation made for illustrative purposes only.

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The standard value of \$2,000 per person-rem used in the report, DSEIS at G-28, leads to a valuation of an avoided cancer death of \$200,000, which is far too low. Consequence Report at 14. This means the SAMA analysis at Oyster Creek must be recalculated placing a much higher value on the lives of the public who live close to the plant.

In addition, an assumption of \$33 billion in consequences would contrast starkly with the estimate of consequences from a spent fuel pool fire of \$180 billion to \$3.6 trillion and is at variance with the NRC's previous position that a spent fuel facility accident would be of less consequence than an accident involving core damage. The Risk and Consequence Reports taken together suggest that the DSEIS has failed to assess the dominant source of risk at the Oyster Creek site. It is important to remember that when the plant was initially licensed the risk from the spent fuel pool was zero, because the pool was empty. In addition, the NRC did not intend to allow spent fuel to be packed in pools in the way it is now. Although NRC may have looked at the chance of a spent fuel pool fire during decommissioning, no generic assessment of the risk from spent fuel fires during operation has been carried out. Because the risk of a spent fuel pool fire now appears to dominate the risk presented by the plant, it is quite extraordinary that the DSEIS fails to address the issue in detail. Producing an evaluation that grossly underestimates the risk of an action is actually worse than producing no assessment, because it may well lead to a decision based on a completely false assurance about risk levels. This is exactly what Congress intended to prevent when it enacted NEPA.

The DSEIS suggests that there is no new significant information that leads to questions about the validity of the GEIS. DSEIS at 5-3. This is totally incorrect. The information presented by Thompson and Bayea is itself significant new information about the risks posed by the operation of BWR Mark 1 reactors. In addition to the analysis of spent fuel pool fire risks, Bayea also shows that new studies indicate that low-level radiation does could cause more cancers than thought when the GEIS was written

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in 1996. Consequence Report at 12-15. Both the Risk Report and the Consequence Report were submitted to the NRC on May 25, 2006, before the DSEIS was finalized in June 2006. In addition, as the Court of Appeals for the Ninth Circuit has found, the events of September 11, 2001 mean that the NRC must now take account of terrorist risks in SEIS Reports about licensing decisions. *San Luis Obispo Mothers for Peace v. Nuclear Regulatory Commission*, No. 03-74628, 2006 WL 1511889 (9th Cir. June 2, 2006). Furthermore, that assessment must be complete before the NRC can take any action to extend the license. Thus, the DSEIS must be revised to take account of much significant new information.

NRC provides a completely inadequate justification for the use of a factor of 2 times the benefit of SAMAs designed to mitigation internal events to take account for external events, including sabotage. DSEIS at 8-9. This seems totally arbitrary because it is not necessarily true that mitigation measures to prevent sabotage and earthquakes would also mitigate risks from internal events.

As discussed above, the screening level of \$4.46 million, DSEIS at G-12, is unjustifiably low and must be revised substantially to take account of new cancer risk studies, higher values of life, and the substantial risks presented by the accidental triggering of a spent fuel pool fire during operation, as well as the risk of terrorism.

It is notable that Amergen's process failed to focus on the risk of terrorism or of a spent fuel pool fire. DSEIS at G-13. Thus, NRC's conclusion that the process was systematic and comprehensive is totally wrong. DSEIS at 14. In addition, the Risk and Consequence reports show that NRC's conclusion that there are no impacts related to design basis accidents beyond those discussed in the generic EIS is false. DESIS at 5-3.

## **VIII. Conclusion**

For the reasons articulated in this comment letter, NRC should not and cannot make any conclusions about either the risks of accident or terrorism associated with the proposed relicensing of the

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Facility or the license renewal application. Therefore, NRC cannot finalize the EIS and must prepare a new draft that addresses the inadequacies raised in this letter and submit it for public comment. Until a proper EIS is prepared and reviewed, NRC should not make any decisions with respect to the relicensing of Oyster Creek. To do otherwise would constitute an impermissible, irrevocable commitment of resources in violation of NEPA

We thank you for the opportunity to submit these written comments.

Sincerely,

By:



Richard Webster, Esq.  
Rutgers Environmental Law Clinic, Citizens' Counsel