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**From:** RulemakingComments Resource
**Sent:** Tuesday, December 24, 2013 8:15 AM
**To:** Rulemaking1CEm Resource
**Subject:** FW: Comments: Docket ID NRC-2012-0246
**Attachments:** CCBW_Comments_NRCWasteConfidenceDGEIS_20Dec2013.pdf



**From:** Karen Vale [mailto:karen@capecodbaywatch.org]
**Sent:** Friday, December 20, 2013 11:48 AM
**To:** RulemakingComments Resource
**Subject:** Comments: Docket ID NRC-2012-0246

Attached are comments in response to the Nuclear Regulatory Commission's request for comments on the Draft Waste Confidence Generic Environmental Impact Statement (Docket ID NRC–2012–0246).

We will also be sending our comments via mail.

Thank you,
Karen Vale

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**Hearing Identifier:** Secy_RuleMaking_comments_Public
**Email Number:** 630

**Mail Envelope Properties** (377CB97DD54F0F4FAAC7E9FD88BCA6D0014433C49F73)

**Subject:** FW: Comments: Docket ID NRC-2012-0246
**Sent Date:** 12/24/2013 8:14:55 AM
**Received Date:** 12/24/2013 8:14:55 AM
**From:** RulemakingComments Resource

**Created By:** RulemakingComments.Resource@nrc.gov

**Recipients:**
"Rulemaking1CEm Resource" <Rulemaking1CEm.Resource@nrc.gov>
Tracking Status: None

**Post Office:** HQCLSTR01.nrc.gov

| **Files** | **Size** | **Date & Time** | |
|---|---|---|---|
| MESSAGE | 882 | 12/24/2013 8:14:55 AM | |
| CCBW_Comments_NRCWasteConfidenceDGEIS_20Dec2013.pdf | | | 161120 |

**Options**
**Priority:** Standard
**Return Notification:** No
**Reply Requested:** No
**Sensitivity:** Normal
**Expiration Date:**
**Recipients Received:**

December 20, 2013

Annette Vietti-Cook, Secretary
U.S. Nuclear Regulatory Commission
Washington, DC 20555–0001
ATTN: Rulemakings and Adjudications Staff

Dear Ms. Vietti-Cook,

**RE: Nuclear Regulatory Commission's request for comments on the Draft Waste Confidence Generic Environmental Impact Statement (Docket ID NRC–2012–0246)**

On behalf of the undersigned groups and individuals, we submit the following comments in response to the above referenced request made by the Nuclear Regulatory Commission (NRC) regarding its Draft Waste Confidence Generic Environmental Impact Statement (DGEIS). We believe there are many issues not properly addressed by the DGEIS, specifically related to the storage of hazardous nuclear spent fuel at Entergy's Pilgrim Nuclear Power Station in Plymouth, Massachusetts (Pilgrim). These issues are outlined in our comments below.

It is unclear how the updated waste confidence rule affects plants that have recently been relicensed – for example, Pilgrim was relicensed in 2012, only two weeks before the D.C. Circuit Court of Appeals ruled that the Waste Confidence Rule was unsatisfactory. Pilgrim's pool currently holds nearly four times the number of fuel assemblies than it was originally licensed for, and its ISFSI is being built – with little oversight, no apparent assessment of its vulnerability to sea level rise and other climate change effects, and before the NRC finishes addressing environmental impacts of continued spent fuel. This is extremely concerning and must be addressed with an individual EIS immediately.

We support the "no action" alternative and at the very least believe that the NRC should perform site-specific reviews of the environmental impacts of continued storage at each facility in the nation. In particular, Pilgrim is located on the coast of Cape Cod Bay. The impacts of continued, long-term and/or indefinite spent nuclear waste storage and postulated accidents associated with an ISFSI or a spent fuel pool on such a unique and invaluable resource such as Cape Cod Bay – including its many diverse habitats and wildlife species upon which the region depends – needs to be properly assessed by the NRC. This has not been done with the subject generic EIS.

**Flawed Process**

The generic nature of the DGEIS results in a flawed assessment of environmental impacts associated with continued nuclear waste storage at individual plants. Our concern regarding the generic nature of the GEIS is discussed throughout this document. Plants have different equipment, differing ages of infrastructure, different environmental conditions and changes – it's much more complicated than could be covered by a

generic EIS. For example, the Fukushima Daiichi disaster occurred largely as a result of location and elevation relative to the sea. Nowhere in the DGEIS does the NRC consider specific locations of individual plants.

The DGEIS attempts to address globally significant superfund sites without consideration of site-specific challenges. To better understand the risks, the NRC should address questions such as: 1) Which reactors are within three miles of the east coast at an elevation below 100 MSL?, 2) Which facilities are on rivers with upstream dam/impoundments that could cause flooding if breached?, 3) Which facilities are on the west coast Pacific fault line?, 4) Which facilities could experience warming water temperatures, therefore cooling water failure?, and 5) Which facilities deal with corrosive salt water and air?

These regional issues are challenging and require unique understanding, preparation, and mitigation strategies. The DGEIS attempts to legitimize destruction to the environment by complying with the letter of the law, but not with the spirit or true intent of the law, which is to preserve the environment as we develop industry to suit our needs.

The NRC does not explain how the updated waste confidence rule would affect plants that have recently been relicensed – for example, Pilgrim was relicensed in 2012, only two weeks before the D.C. Circuit Court of Appeals ruled that the Waste Confidence Rule was unsatisfactory. Entergy has already started construction of its dry cask facility, without review of any external party, which raises many concerns. Knowing that Entergy's facility is being built with little oversight, and no apparent assessment of its vulnerability to sea level rise and other climate change effects, and before the NRC finishes addressing environmental impacts of continued spent fuel is very concerning and must be addressed with an individual EIS for Pilgrim right away. If the NRC's assessment of environmental impacts of continued storage of spent fuel does not apply to Pilgrim, then where is the EIS for Pilgrim's storage? If the NRC's DGEIS does apply to Pilgrim, then what specific aspects of the DGEIS would apply to its unique location?

**Ownership**

The NRC does not address ownership of the waste or responsibility post decommissioning in the DGEIS—other than the oft-repeated phrase that the federal government is expected to develop a deep geological permanent repository for radioactive waste 60 years after the end of the licensed life of each nuclear plant. The DGEIS presents no confidence that such storage will be available in any amount of time. In the case that such storage does not occur, the NRC should explain ownership of spent nuclear fuel post decommissioning in the DGEIS.

Chief among the issues to address environmental impacts of continued storage is the capacity of the owner to maintain safe and efficient operations around the clock. For pool storage, this includes maintaining electrical power at 100% reliability for the life of all facilities in the U.S. However, no owner accountability is discussed in the DGEIS.

The analysis assumptions in Section 1.8.3 discusses spent fuel and high-level radioactive waste stored under institutional controls at DOE sites. Are we to assume that DOE will maintain institutional controls—i.e., ownership of all national spent fuel repositories and thereby assure continued maintenance? When is a spent fuel pool or ISFSI considered a national "repository"?

**No Proven Safe Storage**

Storing spent fuel above-ground indefinitely, at reactor sites or away from reactor sites, is not an acceptable alternative for disposing of spent fuel. The Nuclear Waste Policy Act (NWPA) mandates that spent fuel be stored above ground only on an interim basis while a federal repository is developed. Assuming that spent fuel will be stored above ground indefinitely is inconsistent with the NWPA.

Instead of assuming that spent fuel can be stored safely forever at or away from reactor sites, the NRC should examine the likelihood that a federal repository will be successfully sited, and then assess the health and environmental consequences that may occur if a repository is not sited or if accidents occur related to the repository.

In addition, the DGEIS should discuss under what conditions on-site storage is not appropriate, and therefore when off-site storage is preferable to insure safer, long term/indefinite storage of this hazardous waste.

**Timeframes**

The DGEIS outlines impacts in three timeframes – short-term (60 years post reactor license), long term (100 years post short-term) and indefinite storage. However, it is incredibly difficult to accurately predict environmental conditions at every reactor site in the long-term timeframe and nearly impossible for the indefinite timeframe. An EIS – particularly one that is generic in nature – cannot accurately predict direct, indirect, and cumulative environmental impacts of continued spent fuel storage in these timeframes without knowing how the environment will change in particular locations or how certain ecosystems will respond to future stressors (e.g., climate change impacts, changes in community development, etc.).

**Socioeconomics/demography**

The impacts on tourism and commercial uses are not fully assessed in Sections 4.2 and 4.18 of the DGEIS. Tourism and commercial uses vary widely at reactor sites across the nation – a generic EIS cannot properly assess the impacts of long-term storage or of postulated accidents related to storage of spent nuclear fuel at all U.S. reactor sites.

For example, Entergy's dry cask storage project at the Pilgrim plant in Plymouth, MA is being built approximately 100 feet from the shore of Cape Cod Bay (CCB). Marine based tourism in Massachusetts is largely dependent on CCB; it is an important economic driver for the state and for Plymouth and

Barnstable counties in particular, which directly border the Bay.[1] Marine tourism includes recreational fishing, boating, diving, swimming, sight-seeing, and whale watching. Stellwagen Bank National Marine Sanctuary, located about 3 miles (4.8 km) north of CCB, is a major destination for recreational fishing, boating, and whale watching. Several whale watching companies operate throughout CCB – including vessels out of Barnstable, Plymouth and Provincetown harbors. In 1996, it was estimated that the whale watching industry made US$21 million in revenue for the state of Massachusetts.[2]

Approximately six million tourists visit Cape Cod each year and Massachusetts is the eighth most popular U.S. destination for international travelers.[3] Total annual output of the marine economy state-wide, based on 2004 data, was US$14.8 billion with tourism accounting for US$8.7 billion of that total.[4]

CCB is also important to commercial fishing operations (finfishing, lobster fishing, and fishing charters), since a variety of commercially valuable species are found in the bay. To a lesser extent, CCB is also used for commercial ferry services, aquaculture operations, and for transportation for vessels going to and from the Cape Cod Canal.[5]

Impacts of continued spent fuel storage on tourism and commercial uses like those discussed above should be assessed by the NRC.

**Impacts on Climate Change**

Section 4.5 of the DGEIS evaluates the effect of continued storage on climate change. When considering greenhouse emissions (all timeframes), the NRC only considers the direct resulting CO2 footprint of continued storage. However, the DGEIS should consider the entire fuel life-cycle in its scope, including the effects of uranium mining, milling, and processing, the transport of fuel, reactor operation, decommissioning and final storage of radioactive waste. Without the entire fuel life-cycle being considered, the DGEIS is ineffective in properly examining potential environmental impacts occurring as a result of continued storage of spent fuel.

**Geology/Soils**

The NRC concludes in Section 4.6 of the DGEIS that the environmental impacts on geology and soils from continued storage of spent fuel would be “SMALL” (pool and ISFSI; all timeframes). However, this would depend on site-specific factors, including the soils present at each location (and general geomorphology

[1] Massachusetts Department of Business and Technology. 2003. Massachusetts toward a new prosperity: Building regional competitiveness across the commonwealth.; Haughton J, Giuffre D, and Barrett J. 2003. Blowing in the wind: Offshore wind and the Cape Cod economy. Beacon Hill Institute at Suffolk University. ISBN- 1-886320-19-5. 53 pp.

[2] Massachusetts Ocean Management Task Force Technical Report (MA OMTFTR). 2004. Estuarine and Marine Habitat. 101-127.

[3] Massachusetts Department of Business and Technology. 2003. Massachusetts toward a new prosperity: Building regional competitiveness across the commonwealth.

[4] Coastal Zone Management, Massachusetts Office of (CZM). 2006. Report I - An assessment of the coastal and marine economies of Massachusetts. RFR #: ENV 06 CZM 09.

[5] Executive Office of Energy and Environmental Affairs (EOEEA). 2009. Draft Massachusetts ocean management plan. Volume 1. 141 pp.

for coastally-sited plants), the sites' vulnerability to erosion, the amount of fuel stored in pools, and the type of storage facility being planned.

The construction of spent fuel storage sites, including earth clearing and foundation laying, could contribute to coastal erosion for plants located near the coast. According to a 2011 USGS study,[6] on average, the beaches in New England and the mid-Atlantic are eroding at about 1.6 ft/year. However, erosion was much worse in the southern Virginia area (60 ft/year). This shows that while the problem of coastal erosion is widespread in New England and the mid-Atlantic, erosion can vary widely depending on the location. A generic EIS cannot accurately assess the potential impacts of an ISFSI (and related construction) on erosion.

Furthermore, the NRC should not only consider the impact of storing spent fuel in ISFSI on the geology and soil, but also the impacts that varying soil types would have on the long term stability – and therefore the risk for a potential accident – of a plant's ISFSI. For example, "variable and erratic sandy soil" has been described at Entergy's Pilgrim plant in Plymouth, Massachusetts, with dense and compact material located below a depth of about 35 ft.[7] The impacts that sandy soil types might have on the stability of an ISFSI should be assessed by the NRC.

Section 4.6 of the DGEIS also states most soil contamination from spent fuel pool leaks would remain onsite and, therefore, offsite soil contamination is unlikely to occur. However, this depends on many factors, including soil type, groundwater flow, and the size of the leak. For example, at Entergy's Pilgrim plant in Plymouth, Massachusetts, it has been assessed that the groundwater flows toward Cape Cod Bay.[8] Additionally, Pilgrim is located on the Plymouth-Carver Sole Source Aquifer,[9] which is characterized by highly permeable soils.[10] Considering these factors, contaminants that enter the soil would likely migrate to the Aquifer and/or Cape Cod Bay. According to the 2007 Plymouth-Carver Sole Source Aquifer Action Plan Final Report, the "course-grained soil, the sand and gravel glacial outwash deposits that comprise the PCA are more susceptible to the infiltration and migration of contaminates than less permeable soils typical of non-potentially productive aquifers." [11] The report also states that contaminants entering into the soil and groundwater would not be impeded from migration into the Plymouth-Carver Aquifer without human intervention.

**Surface-Water Quality and Use**

[6] Hapke CJ, Himmelstoss EA, Kratzmann M, List JH, and Thieler ER. 2010. National assessment of shoreline change; historical shoreline change along the New England and Mid-Atlantic coasts. U.S. Geological Survey Open-File Report 2010-1118. 57 pp. <http://pubs.usgs.gov/of/2010/1118/>

[7] Department of Public Health, Environmental Toxicology Program. June 25, 2010. Memorandum: Status of Groundwater Monitoring Program at Pilgrim Nuclear Power Plant.

[8] Entergy Nuclear Generation Company. 2006. Appendix E. Pilgrim Nuclear Power Station, Applicant's Environmental Report, Operating License Renewal Stage. 261 pp.

[9] U.S. EPA. Plymouth-Carver Sole Source Aquifer Map. <http://www.epa.gov/region1/eco/drinkwater/plymcarv.html>

[10] Executive Office of Energy and Environmental Affairs. 2007. Plymouth Carver Sole Source Aquifer Action Plan Final Report. Prepared for the EOEEA by Fuss & O'Neill, Lakeville, MA. See Section 2.2.2 - Soil Types.

[11] Executive Office of Energy and Environmental Affairs. 2007. Plymouth Carver Sole Source Aquifer Action Plan Final Report. Prepared for the EOEEA by Fuss & O'Neill, Lakeville, MA. See Section 2.2.5 - Aquifer Susceptibility.

Section 3.6 claims that the provisions of the Clean Water Act (CWA) and issuance of "NPDES permit terms may not exceed 5 years" will regulate the discharge of pollutants into waters of the U.S. However, at Pilgrim, the NPDES permit is 17 years out-of date, and there are discharges that are not being regulated as set out in the CWA. The DGEIS does not even mention this failure or how the CWA regulations are applied throughout the country at other nuclear facilities.

In Section 4.7, the DGEIS states that, for pool storage, most environmental impacts to surface-water resources will cease due to the end of reactor operations, and that there will be a 99% reduction in cooling-water demand. However, some water use would still occur and there doesn't appear to be adequate information available to make a "SMALL" impact determination. For example, even currently, the NPDES permit for Entergy's Pilgrim plant in Plymouth, Massachusetts is based on limited field data and outdated science. As stated above, Entergy's NPDES permit for Pilgrim expired in 1996. The NRC cannot assume "SMALL" impacts based on less water use, if the impacts are not clearly known for current full-operation water use. Even based on Pilgrim's site-specific license renewal EIS, impacts to the marine environment were considered "MODERATE" for some species and "SMALL TO MODERATE" for others.

The DGEIS states that incidents of radioactive contamination of groundwater would have a "SMALL" impact on surface water; that the large volume of surface water available would dilute groundwater contaminants "well below limits considered safe." However, despite the ocean's capacity to dilute radiation, nuclear isotopes persist and move up the marine food chain – evident in the marine life near the Fukushima Daiichi accident; the full impacts on marine life – and human life – are still unclear.[12]

Further, it is inaccurate for the NRC to assume "SMALL" impacts when the factors involved vary at each facility/location in the U.S. For example, the amount of contamination is never the same in each location since soils and environmental factors differ, groundwater levels and flows are different at each site, the chemical properties of materials potentially released can differ, and most importantly, the fate of those contaminants on local resources will vary greatly. A site specific assessment would have to be done to determine the real potential impacts of groundwater contamination on surface water.

The DGEIS also states that it is unlikely that a spent fuel pool would leak continuously (24 hours per day, 365 days per year) undetected and unimpeded to local surface waters, and that the quantities of radioactive material discharged to nearby surface waters would be comparable to values associated with permitted, treated effluent discharges from operating nuclear power plants; therefore the NRC concludes that the impact of spent fuel pool leaks on surface water would be "SMALL".

However, there have been several cases where fuel pool leakage and other leaks of radioactive material have occurred continuously undetected and unimpeded. For instance, Pilgrim has been leaking tritium

[12] Grossman E. 2011. Radioactivity in the ocean: diluted, but far from harmless." Yale Environment 360. <https://agriculturedefensecoalition.org/~agricum4/sites/default/files/file/nuclear_japan/114P_28_2011_Radioactivity_in_the_Ocean_Diluted_But_Far_From_Harmless_Environment_360_April_7_2011.pdf>

into the ground at least since the 1990s, when the Massachusetts Department of Public Health first started testing the groundwater. The leaks have been ongoing, and are still of unknown source(s).[13] Another example is Yankee Rowe Nuclear Station, also in Massachusetts, which leaked about 2 million gallons of contaminated water from a pool between 1963 and 1965, some of which made it to the Deerfield River.[14] Also, Brookhaven National Labs located in Long Island, New York, leaked tritium into the drinking water aquifer from its fuel pool.[15] These cases certainly did not cause "SMALL" impacts. The NRC should accurately assess the impacts of pool leaks and other leaks of radioactive material being discharged into surrounding ground and surface waters.

Lastly, the impacts of postulated accidents on surface water quality and use should be fully assessed in Section 4.18 of the DGIS.

**Groundwater Quality and Use**

Section 4.8 of the DGEIS states that storage of spent fuel in spent fuel pools could result in radiological impacts on groundwater quality, but it is "very unlikely" that a leak from a spent fuel pool would go undetected and reach the offsite environment. However, undetected leakage from spent fuel pools and other reactor components has plagued reactor licensees and communities for decades.

As mentioned above (see our "Surface-Water Quality and Use" comments), there have been several cases where fuel pool leakage and other leaks of radioactive material have occurred undetected for extended periods of time. For instance, Pilgrim has been leaking tritium into the ground at least since the 1990s, when the Massachusetts Department of Public Health first started using groundwater testing wells on the site. The tritium leaks at Pilgrim have been ongoing, and are still of unknown source(s).[16] Additionally, Yankee Rowe Nuclear Station in Massachusetts leaked about 2 million gallons of contaminated water from a spent fuel pool in the mid-1960s, which contaminated the Deerfield River.[17]

When considering groundwater quality and use, the DGEIS completely excludes the Plymouth-Carver Sole Source Aquifer (PCA) and the glacial moraine of Plymouth, Massachusetts (where Pilgrim is located). The Northeast region's PCA and glacial debris influences environmental characteristics, including water temperature, pH, salinity, soil type, and other important attributes of regional peculiarity that are likely to impact the storage of nuclear waste, as well as be vulnerable to contamination from that storage.

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[13] MA Department of Public Health. June 13, 2012. PNPS: Tritium in Groundwater Monitoring Wells. <http://www.mass.gov/eohhs/docs/dph/environmental/radiationcontrol/tritium/2012-updates/pnps-update-6-13-12.pdf>

[14] Yankee Atomic Electric Company. July 19, 2006. Groundwater Protection Data Collection Questionnaire < http://pbadupws.nrc.gov/docs/ML0620/ML062080156.pdf>

[15] U.S. General Accounting Office. 1997. Information on the Tritium Leak and Contractor Dismissal at the Brookhaven National Laboratory <http://pbadupws.nrc.gov/docs/ML1209/ML120960692.pdf>

[16] MA Department of Public Health. June 13, 2012. PNPS: Tritium in Groundwater Monitoring Wells. <http://www.mass.gov/eohhs/docs/dph/environmental/radiationcontrol/tritium/2012-updates/pnps-update-6-13-12.pdf>

[17] Yankee Atomic Electric Company. July 19, 2006. Groundwater Protection Data Collection Questionnaire <http://pbadupws.nrc.gov/docs/ML0620/ML062080156.pdf>

Furthermore, sea level rise and other climate change effects will likely cause changes to groundwater systems in coastal areas; sea level rise will affect groundwater level and flow, increase the fresh water table in many areas, and influence the chemical properties of groundwater. However, no site-specific investigations on how these issues will affect contamination leaks at coastal nuclear plants have been done. A generic EIS certainly cannot assess these issues.

For example, there is limited knowledge about the hydraulic gradient at Pilgrim's site. Existing contamination as a result of construction and other activities on the site over the past 40+ years, as well as future contamination, must be evaluated in relation to the influence of Cape Cod Bay and the PCA on the groundwater as well as the capacity of the groundwater to migrate to the Bay and throughout the PCA.

It's also inaccurate for the NRC to assume "SMALL" impacts when the factors involved vary at each groundwater contamination incident. For example, the amount of contamination is never the same in each incident, soils and environmental factors differ, groundwater flows differently at each site, the chemical properties of materials potentially released can differ, etc. Site specific assessment would have to be done to determine the real potential impacts of contamination of groundwater use and quality.

Section 4.8 also does not properly address impacts to drinking water quality. Many nuclear plants are located on drinking water aquifers, and many have negatively impacted drinking water sources. For instance, the fuel pool at Brookhaven National Labs (New York) had leaked tritium, undetected, into the drinking water aquifer for twelve years. [18] And Pilgrim's tritium leaks are occurring on the PCA, which supplies drinking water for individual residents and several southeastern Massachusetts towns.

In Appendix E of the DGEIS, the NRC describes the general method used to remediate tritium leaks as "monitored natural attenuation." However, at no point does the DGEIS address the conditions at Pilgrim where tritium is regularly entering the groundwater and being allowed to discharge into Cape Cod Bay for "natural attenuation" without environmental monitoring (in addition to above-normal concentrations of cobalt-60 and cesium-137 that have been found in soil samples by the Massachusetts Environmental Radiation Laboratory, which can spread easily in the environment due to high water solubility).[19] It is a failure of regulatory oversight that allows this unabated contamination of the environment at Pilgrim. Release and presence of tritium in the groundwater and soil must be addressed more robustly by the NRC. Given that there is a general lack of knowledge on the impacts of tritium on aquatic organisms, and there has been little effort to test or monitor the release at Pilgrim, we cannot evaluate the harm that is being done.

Lastly, the impacts of postulated accidents on groundwater quality and use should be fully assessed in Section 4.18 of the DGIS.

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[18] U.S. General Accounting Office. 1997. Information on the Tritium Leak and Contractor Dismissal at the Brookhaven National Laboratory <http://pbadupws.nrc.gov/docs/ML1209/ML120960692.pdf>

[19] Pilgrim Nuclear Power Station (PNPS): Tritium in Groundwater Monitoring Wells. MA Dept of Public Health. Oct 18, 2013. <http://www.capecodbaywatch.org/wp-content/uploads/2013/11/PNPSUpdate-10-18-2013.pdf>

**Terrestrial Resources**

Section 4.9 of the DGEIS states that impacts of continued spent fuel storage in fuel pools and ISFSIs (including construction, repacking, and replacement activities) on terrestrial resources would be "SMALL". Again, it seems impossible for a generic EIS to accurately assess the impacts on terrestrial resources at every site, given that the resources (imperiled species, habitat types, etc.) vary extensively at site locations.

For example, at the Pilgrim plant, there is both priority and estimated habitat for the spotted turtle (*Clemmys guttata*), which is a Massachusetts state species of special concern, and other sensitive species (although the MA Natural Heritage and Endangered Species Program will not reveal the sensitive species found or potentially found in the area). There is also an area designated as critical habitat for the northern red-bellied cooter (*Pseudemys rubriventris)* on the site.

The NRC should use site-specific assessments to determine the impacts of long term storage (pools and ISFSIs) on terrestrial resources. The NRC should also fully assess the impacts of postulated accidents on site-specific terrestrial resources.

**Aquatic Resources**

The DGEIS (Section 4.10) states that the impacts on aquatic ecology associated with the operation of spent fuel pools would be "SMALL" due to lower withdrawal rates, lower discharge rates, and smaller thermal plumes. However, the impacts from water use of operating plants (Pilgrim for example) have not even been properly assessed, so there is no proper baseline to base this assumption on. To touch upon this point, even currently, the NPDES permit for Entergy's Pilgrim plant is based on limited field data and outdated science, and Entergy's NPDES permit expired in 1996. The NRC cannot assume "SMALL" impacts based on less water usage, if the impacts are not clearly known for current full-operation water use.

To better understand the impacts of continued spent fuel storage (specifically in pools) on aquatic resources, the NRC should carry out site-specific assessments since aquatic resources differ greatly between reactor sites. The Pilgrim plant is located on Cape Cod Bay, which is an ecologically rich ecosystem composed of a diversity of habitats, provides a variety of estuarine and marine species and communities, including fish, shellfish, turtles, marine mammals, plants, and birds.[20] Along the coast, Cape Cod Bay is lined with estuarine habitats, primarily salt marsh and tidal flats. Estuaries are among the most productive ecosystems in the world and are vital to the economy and the environment. They provide nesting and feeding areas for aquatic species of plants and animals, including fish and shellfish – many of which are commercially important species. The importance of estuaries as "nurseries" for

[20] Executive Office of Energy and Environmental Affairs (EOEEA). 2008. Ocean planning - draft report of the habitat work group. 75 pp.; Massachusetts Water Resources Authority (MWRA). How healthy is the marine ecosystem of the bays? Factsheet. <http://www.mwra.state.ma.us/harbor/pdf/fqa4.pdf> Accessed 10/10/2012.

juvenile fish and shellfish has long been recognized. Estuaries are also important filters for pollutants and sediments flowing from rivers and streams in to the sea.[21]

Cape Cod Bay has long been recognized as a valuable and unique resource for the state of Massachusetts. In the early 1970s, the Massachusetts Oceans Sanctuaries Act recognized it as a state ocean sanctuary.[22] Furthermore, in 1985, an eastern portion of the bay was designated by the Massachusetts's Secretary of Environmental Affairs as an Area of Critical Environmental Concern because of the extraordinary natural resources found in the area. A generic EIS cannot accurately determine the impacts of continued spent fuel storage on this unique and important resource.

In Section 6.4.10 the DGEIS states, "*LARGE impacts are not as likely but could occur under exceptional circumstances such as if other Federal or non-Federal actions, such as intense fishing pressure or changes in aquatic habitats from climate change, had overlapping impacts with the continued storage of waste that destabilized aquatic resources."* As we have stated often in our comments, we are concerned that the NRC has a poor grip on the likely influence of climate change in all its forms on the Pilgrim facility. Warming waters, sea level rise, inundation from storms and increases in groundwater, leaking contamination into groundwater and Cape Cod Bay, unregulated discharges due to an expired NPDES permit, lack of regulatory oversight concerning wastewater and storm water discharges, ongoing impingement and entrainment of marine species, changes to ocean pH – coupled with changes in species composition over time and failure of proper consultation with NMFS and FWS – means that the impacts from long-term storage of spent fuel will have an UNACCEPTABLY LARGE impact upon the fragile aquatic resources of Cape Cod Bay. Pilgrim should be required to file a site-specific environmental impact statement for public review immediately.

Lastly, the NRC should also fully assess the impacts of postulated accidents on site-specific aquatic resources.

**Special Status Species and Habitat**

The DGEIS (Section 4.11) states that the NRC would be required to reinitiate consultation with the U.S. Fish and Wildlife Service (FWS) or the National Marine Fisheries Service (NMFS) if the cooling system parameters change, or if a "take" occurs for a species not included in an incidental take permit, or if a new species is listed under the ESA. However, to assume compliance with this requirement is flawed.

For example, NOAA Fisheries (NMFS) concluded informal consultation with the NRC regarding the relicensing of Pilgrim with a "not likely to adversely affect" finding for all species under NMFS jurisdiction, including north Atlantic right whales (*Eubalaena glacialis*). But at that time, the federal agencies only considered Pilgrim's effects on individual, adult whales. However, in January 2012, new information emerged – a right whale mother-calf pair was seen swimming very close to Pilgrim (within

[21] Beck et al. 2003. The Role of Nearshore Ecosystems as Fish and Shellfish Nurseries. Issues in Ecology No. 11, Ecological Society of America. 12 pp.
[22] MA G.L. c. 132A, §§12A-16E&18 - Massachusetts Ocean Sanctuaries Act

the 500 yard exclusion zone). This was the first mother and calf right whale sighting in Cape Cod Bay in January in 27 years, and the only mother-calf pair ever documented occurring near Pilgrim. This new information should have required the NRC and NMFS to reinitiate ESA Section 7 consultation to reassess whether Pilgrim's operations could have negative impacts on a nursing mother and newborn calf. The reinitiation never happened.

There are more than 80 state- and federally-listed species occurring in Plymouth County, where Pilgrim is located.[23] Four endangered whale species (sei, right, finback, and humpback) and five endangered sea turtle species (loggerhead, leatherback, hawksbill, green, and Kemp's ridley) have the potential of occurring near Pilgrim in Cape Cod Bay. There is also critical habitat and priority habitat areas (for the north Atlantic right whale, northern red-bellied cooter, and spotted turtle) occurring near Pilgrim. The potential site-specific impacts of continued spent fuel storage should be fully assessed for these protected species and their habitats.

The impact of postulated accidents on all site-specific special status species and habitats should be assessed by the NRC (those mentioned above as well as others found in the area, such as the bald eagle, piping plover, roseate tern, Atlantic sturgeon, and all non-listed marine mammals that are protected under the Marine Mammal Protection Act).

**Environmental Impacts of Postulated Accidents (Pools and ISFSIs; Including Climate Change)**

Section 4.18 discusses the environmental impacts of postulated accidents involving the continued storage of spent fuel. However, the NRC primarily discusses the impacts that natural phenomena and external events would have on the safety systems associated with pools and ISFSIs. Instead, the DGEIS should fully assess the impacts that postulated accidents would have on the affected environment (e.g., aquatic resources, special status species, terrestrial resources, etc.).

Section 4.18 of the DGEIS also concludes that the environmental impacts of postulated accidents involving continued storage of spent fuel in pools and ISFSIs would be "SMALL" because all important safety structures, systems, and components involved with the spent fuel storage are designed to withstand these design basis accidents without compromising the safety functions. However, the NRC should assess environmental impacts associated with postulated accidents where safety structures and systems do not work properly – as has happened in real world situations.

The DGEIS estimates that sea level will rise less than 1 meter by 2100 (75 FR 81037), and this will not endanger any U.S. nuclear plant. However, sea level rise will vary greatly by region. It is inaccurate to assume a blanket 1-meter rise for all plant locations and then conclude that all plants will not be in danger. The 1 meter figure is a global average; sea level rise has been projected to be much less in some areas, but also projected to be much greater in others (like much of the eastern seaboard, where many nuclear plants are sited). Areas projected to experience the most significant sea level rise should be

[23] Entergy Nuclear Generation Company. 2006. Appendix E. Pilgrim Nuclear Power Station, Applicant's Environmental Report, Operating License Renewal Stage. 261 pp.

addressed in the DGEIS. Using a global average to assume all plants are safe is a flawed approach. For example, projections for sea level rise for Cape Cod Bay (where Entergy's Pilgrim plant is located) range between 4-6 feet by 2100. It's also projected that this rise will come with increasing severity of storms, surge and wave action on top of the higher water levels.

The DGEIS does not consider the impacts of rising temperatures on the water sources intended to cool spent fuel pools. As an increasingly warming climate is heating the water temperature of our oceans, lakes, and rivers, water is becoming too warm for plants' cooling systems. Cooling systems are only approved for certain incoming water temperatures, and their ability to operate properly and safely has not been proven under higher temperatures. Warming water is becoming an increasing problem. For example, just this past summer, Entergy's Pilgrim plant was forced to power down several times to comply with its license when the water in Cape Cod Bay exceeded 75$^{o}$. Generally, it appears that Cape Cod Bay is warming, and in recent years its average summer temperature has been several degrees warmer than its mean for the last century. Only site-specific reviews can inform the NRC whether mitigation strategies – such as chillers – would be required to sustain the temperature of wet pools during extended heat waves.

The DGEIS also does not consider the issue of marine debris. More debris comes ashore during and after periods of inclement weather (e.g., storms and heavy seas).[24] Therefore, when storms occur and their intensity increases due to climate change, the coast could increasingly be subject to problems associated with marine debris. The NRC should assess impacts of marine debris clogging intake structures needed to provide cooling water for spent fuel pools as well as clogging ISFSI cooling vents. There are regional differences in quantity, composition and trends of marine debris, therefore the NRC should carry out site-specific assessments of this potential problem.

The DGEIS also does not consider the issue of ocean acidification. This issue raises concerns about dry casks being built in close proximity to the ocean (for example, Pilgrim's dry casks will be about 100 feet from the shore of Cape Cod Bay). Dry casks are made of concrete and steel – materials already susceptible to deterioration by salt air and water. Adding even more acidic conditions raises serious concerns about carbonation-induced deterioration of the dry casks that are intended to protect the public and environment from the highly radioactive waste stored inside. If dry casks are to store nuclear waste in the long-term or indefinite time-frames, the NRC needs to consider the impact of ocean acidification, and not just salt. Again, a site-specific assessment would be needed since some regional characteristics can cause acidification to be a bigger problem in certain areas. One of these characteristics is eutrophication (when excess nitrates and phosphates enter coastal areas from lawn runoff, fertilizers, storm-water runoff, wastewater disposal, etc.). In areas experiencing eutrophication problems, such as along the Cape Cod Bay coastline, there is often die-off of algae and sea grass that produces even more CO2.

[24] Ribic CA, Sheavly SB, Rugg DJ, and Erdmann ES. 2010. Trends and drivers of marine debris on the Atlantic coast of the United States 1997–2007. Marine Pollution Bulletin. 60: 1231–1242.

An EIS that is generic in nature cannot address how individual plants would be affected by climate change and other issues (sea level rise, flooding and storm surges, warming water temperature, increasing storm intensity, ocean acidification, etc.). Plants have different equipment, differing ages of infrastructure, different environmental conditions and changes: even coastal plants are located with differing vulnerabilities—some are behind barrier beaches, some nestled in salt marsh estuaries, but Pilgrim is on Cape Cod Bay facing northeast toward the ocean – these issues are much more complicated than could be covered by a generic EIS.

In general, the NRC assumes that flooding can be mitigated with pumps. In some areas this is true; however, there are some sites where flood events can occur where they were not anticipated. Over the next 60 to 150 years, this will be increasingly true at Pilgrim where sea levels will rise and storms will become more intense. As of February 28, 2013,[25] Entergy claims that Pilgrim is a "dry site," because it is a few feet above the previously predicted storm surge level. However, Entergy never addresses below ground installations (such as pumps and equipment that maintain proper reactor and pool cooling) that may be subject to flooding—or how flooding would be controlled during an extended storm event where the tide does not abate for several days. Entergy has not addressed the potential influences of the Atlantic Ocean on the Pilgrim site; therefore they are not likely to be prepared for a flooding event – leading to a potential disaster for the region. It is the responsibility of the DGEIS to evaluate all U.S. sites' vulnerability to a changing climate and its effects. Mitigation efforts (building barrier walls, elevation considerations, etc.) at specific locations should also be discussed in the DGEIS.

We disagree with the statement on page 1-5, where the NRC states, "*Changes in the environment around spent fuel storage facilities are sufficiently gradual and predictable to be addressed using a generic approach."* While climate change is predicted, its impacts are not considered to be exact and orderly, nor are these changes expected to be "gradual." Storms such as "Superstorm Sandy" in October 2012 and the recent cyclone in the Philippines are but two examples of unexpected, unpredicted, and rapid changes with extraordinary significance. The environmental consequences of super storms, storm surges, and excessive wave action on dry casks are not acknowledged nor are they addressed in the DGEIS (the issues are only briefly mentioned as they relate to pool storage).

The GEIS states that there is a low probability of spent fuel pool fires, and therefore a low risk of causing harm. However, as we draft these comments, we are concurrently witnessing the incapacity of TEPCO in Fukushima to effectively handle damaged fuel pools and core reactor melt downs—let alone to properly assess the impacts of escaped radiation on workers, local communities, the Pacific ocean, and natural resources.

The NRC claims to have already *"established criteria that provide reasonable assurance of public health and safety and due consideration of environmental impacts in the construction and operation of nuclear power plants, including facilities for continuing storage of spent fuel."* However, given that the DGEIS fails to address sea level rise, proximity of installations to the coastal environment, or assess vulnerability to storm forces beyond a tornado—it does not meet the required "assurance of public

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health and safety" or "due consideration of environmental impacts, including facilities for continuing storage of spent fuel."

**Summary**

There are many technical shortcomings in the DGEIS; many issues that are not addressed properly in the report. Based on our comments above, we support the "no action" alternative, or at the very least request a supplemental EIS be done to address site specific concerns at Pilgrim and other facilities across the nation. We strongly believe that the NRC should perform site-specific reviews of the environmental impacts of continued storage. Given the fact that Pilgrim's spent fuel storage is located on the coast of Cape Cod Bay, the impacts on this irreplaceable resource – including its many diverse habitats and wildlife species upon which the region depends – needs to be properly assessed by the NRC. Furthermore, the NRC needs to clarify how the updated waste confidence rule would affect plants recently relicensed, such as Pilgrim.

Thank you,

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