UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of Docket # 50-293-LR

Entergy Corporation

Pilgrim Nuclear Power Station

License Renewal Application November 18, 2011

PILGRIM WATCH REQUEST FOR HEARING ON A NEW CONTENTION REGARDING INADEQUACY OF ENVIRONMENTAL REPORT, POST FUKUSHIMA

In accordance with 10 C.F.R § 2.309 (c)(1) Pilgrim Watch files a new Request for Hearing. The contention reads:

> Based on new and significant information from Fukushima, the Environmental Report is inadequate post Fukushima Daiichi. Entergy's SAMA analysis ignores new and significant issues raised by Fukushima regarding the probability of both containment failure, and subsequent larger off-site consequences due, in part, to the need for flooding the reactor (vessel, containment, pool) with huge amounts of water in a severe accident, as at Fukushima. "An important limitation of the MACCS2 code is that it does not currently model and analyze aqueous transport and dispersion of radioactive materials through the subsurface water, sediment, soils, and groundwater. As demonstrated by the recent events in Japan, certain accident scenarios can result in large volumes of contaminated water being generated by emergency measures to cool the reactor cores and SFPs, with yet to be determined offsite radiological consequences. To determine the relative risk significance of these types of scenarios, (Pilgrim's) Level 3 PRA must (model and

> analyze) the aqueous transport and dispersion of radioactive materials."[1] Further, there is no provision within the Severe Accident Mitigation Guidelines (SAMGs) for processing the water post accident. This important technical gap in Entergy's SAMA needs to be addressed before closing this proceeding. As in Japan, enormous quantities of contaminated water are likely to enter Cape Cod Bay (adding to radioactive atmospheric fallout on the waters and contamination resulting from aqueous transport and dispersion of radioactive materials through subsurface water, sediments, soils and groundwater) and then flow to other water bodies and shores posing significant offsite consequences and costs, threatening the health of citizens and the ecosystem and damaging the economy.

This Board is well aware of Pilgrim Watch's position that a motion to reopen under 10 C.F.R 2.326 is <u>not</u> required in an on-going proceeding that is utterly unrelated to anything that has previously been litigated, and that the Board's decisions to reject PW's new contention of May and June 11 on the ground that a motion to reopen were wrong. Those decisions are now the subject of Petitions for Review to the Commission.[2]

However, to avoid unnecessary procedural wrangling, and without waiving its current and previous position, Pilgrim Watch moves, in the alternative, that this new contention should be accepted pursuant to any portions of 10 C.F.R 2.326 that may be deemed by the ASLB as pertinent here.

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[1] SECY-11,0089, Enclosure 1, pg., 29; http://www.nrc.gov/reading-rm/doc-collections/commission/secys/2011/2011-0089scy.pdf; and Commission Voting Record, Decision Item SECY-11-0089, September 21, 2011, http://www.nrc.gov/reading-rm/doc-collections/commission/cvr/2011/2011-0089vtr.pdf

[2] Pilgrim Watch understands that the Board has not considered Pilgrim Watch's position as presented in its Requests for Review. Accordingly, the portions of those Requests dealing with whether a motion to reopen is required are attached, Exhibit 3.

I. INTRODUCTION

In the license renewal process, the Applicant is required under 10 CFR §51(c)(ii)(L) to perform a severe mitigation analysis if they had not previously done so. The purpose of a SAMA review is to ensure that any plant changes that have a potential for significantly improving severe accident safety performance are identified and addressed.

Post Fukushima Daiichi, it plainly is necessary to redo Pilgrim's SAMA analysis to take into account new and significant information learned from Fukushima regarding the probability of containment failure in the event of an accident and the concomitant probability of a significantly larger volume of off-site consequences due to the need for flooding the reactor (vessel, containment, pool) with huge amounts of water in a severe accident, as at Fukushima. This source of contamination would add to that resulting from aqueous transport and dispersion of radioactive materials through subsurface water, sediments, soils and groundwater, plus atmospheric fallout on the waters - resulting in <u>three sources of contamination in the waters</u>.

The MACCS2, that Entergy <u>chose</u> to use for its SAMA, does not currently model and analyze aqueous transport and dispersion of radioactive materials; and there is no provision within the Severe Accident Mitigation Guidelines (SAMGs) for processing the water post accident, just as there was no discussion in NUREG/CR-5634. Lessons learned from Fukushima show that we are now placed at significant risk. As in Japan, if there should be a severe accident at Pilgrim, enormous quantities of contaminated water are likely to enter Cape Cod Bay and other waters (adding to the radioactive atmospheric fallout on the water and runoff) posing significant offsite consequences and costs, threatening the health of citizens and the ecosystem and damaging the economy. NEPA requires that these technical gaps be addressed <u>prior</u> to any licensing decision. Absent addressing these gaps, Entergy fails to satisfy the purpose of its

required SAMA review to ensure that any plant changes that have a potential for significantly improving severe accident safety performance are identified and addressed.

II. THE CONTENTION IS WITHIN THE SCOPE OF THESE PROCEEDINGS

This contention addresses a defect or dispute regarding the Applicant's Category 2 SAMA, The defect is fully recognized by the NRC Commission in SECY-11-0089. Therefore, the contention is plainly within the scope of this proceeding.

Further Pilgrim Watch's (hereinafter "PW") contention is within scope because it seeks compliance with a legal requirement for re-licensing Pilgrim Station, i.e., consideration of new and significant information that could have an effect on the outcome of the environmental analysis for Pilgrim. 10 C.F.R. § 51.92(a); *Marsh,* 490 U.S. at 371-72 As the Supreme Court recognized in *Marsh,* it would be incongruous with NEPA's "action-forcing" purpose to allow an agency to put on "blinders to adverse environmental effects," just because the EIS has been completed. *Id.* Accordingly, up until the point when the agency is ready to take the proposed action, it must supplement the EIS if there is new information showing that the remaining federal action will affect the quality of the human environment "in a significant manner or to a significant extent not already considered." 490 U.S. at 374

The NRC must consider new and significant information arising from the accident at Fukushima before relicensing Pilgrim NPS, whether or not that information ultimately leads to modification of licensing requirements. "Regardless of its eventual assessment of the significance of the information, the [agency] ha[s] a duty to take a hard look at the proferred evidence." *Marsh v Oregon Natural Resources Council*, 490 U.S. 360, 385 (1989) (emphasis added)

The fundamental purpose of the National Environmental Policy Act, NEPA, 42 USC § 4332, 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." 40 CFR § 1500.1(c) (Emphasis added)

In its application for license renewal of Pilgrim, Entergy was required under 10 CFR § 51 to provide an analysis of the impacts on the environment that could result if it is allowed to continue beyond its initial license; and the environmental impacts that must be considered in its EIS include those which are "reasonably foreseeable" and have "catastrophic consequences, even if their probability of occurrence is low." 40 CFR §1502.22(b)(1) The fact that the likelihood of an impact may not be easily quantifiable is not an excuse for failing to address it in an EIS. NRC regulations require that "to the extent that there are important qualitative considerations or factors that cannot be quantified, these considerations or factors will be discussed in qualitative terms." 10 CFR§51.71

The ASLB must consider issues raised by Fukushima prior to relicensing Pilgrim because, even if they are not yet all conclusively understood, the Fukushima events plainly show that the environmental impacts of NRC relicensing Pilgrim may "affect the quality of the human environment in a significant manner or to a significant extent not already considered." *Marsh* at 374; see also *Marsh* at 372-373

The ASLB properly cannot rely upon Entergy's 2006 SAMA analysis and ignore new and significant information. NEPA requires an agency to consider the environmental impacts *before* decisions are made 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, 490 U.S. 332,349 (1989) This new contention seeks

compliance with NEPA and is based on the Applicant's Environmental Report (ER). 10 CFR§2.309(f)(2)

III. THE ISSUE RAISED IN THE CONTENTION IS MATERIAL

Pursuant to 10 C.F.R. § 51.71(d), the NRC must evaluate the potential environmental impacts of re-licensing Pilgrim. Under § 51.71(d), it must also conduct a SAMA analysis which evaluates the cost-effectiveness of measures to mitigate or avoid the environmental impacts of re-licensing Pilgrim. PW's contention seeks a revision of the environmental impact analysis and the SAMA analysis for Pilgrim, to consider new and significant information which could change the outcome of Pilgrim's SAMA and result in some previously rejected or ignored SAMAs that may prove to be cost-effective in light of the experience of the Fukushima accident and addressing the technical gaps identified. Therefore the contention is material to the findings that NRC must make to re-license Pilgrim.

Further, the "issue raised in th[is new] contention is material to the findings the NRC must make to support the action that is involved in the proceeding." 10 CFR§2.309(f)(iv) In considering the license renewal for Millstone Nuclear Power Station, the ASLB stated that "[w]here a contention alleges a deficiency or error in the application, the deficiency or error must have some independent health and safety significance." *In the Matter of Dominion Nuclear Connecticut, Inc.* (Millstone Nuclear Power Station, Units 2 and 3) Docket Nos. 50-336-LR, 50-423-LR ASLBP No. 04-824-01-LR July 28, 2004, p. 7. See Private Fuel Storage, L.L.C. (Independent Spent Fuel Storage Installation), LBP- 98-7, 47 NRC 142, 179-80 (1998), aff'd in part, CLI-98-13, 48 NRC 26 (1998). The deficiency highlighted in this contention has obvious, and large, independent health and safety significance.

IV. THE CONTENTION IS SUPPORTED BY A CONCISE STATEMENT OF FACT OR EXPERT OPINION SUPPORTING THE CONTENTION, ALONG WITH APPROPRIATE CITATIONS TO SUPPORTING SCIENTIFIC OR FACTUAL MATERIALS.

Section 2.309(f)(v) requires "a concise statement of the alleged facts or expert opinion which support the "petitioner's position on the issue and on which the petitioner intends to rely at hearing, together with references to the specific sources and documents on which the petitioner intends to rely to support its position on the issue."

An intervenor is not required to prove its case at the contention filing stage: "the factual support necessary to show that a genuine dispute exists need not be in affidavit or formal evidentiary form and need not be of the quality as that is necessary to withstand a summary disposition motion." Statement of Policy on Conduct of Adjudicatory Proceedings, 48 N.R.C. 18, 22 n.1 (1998), *citing, Rules of Practice for Domestic Licensing Proceedings — Procedural Changes in the Hearing Process,* Final Rule, 54 F.R. 33168, 33171 (Aug. 11, 1989). Rather, petitioner must make "a minimal showing that the material facts are in dispute, thereby demonstrating that an inquiry in depth is appropriate." *In Gulf States Utilities* Co., 40 NRC 43, 51 (1994), *citing, Rules of Practice for Domestic Licensing Proceedings — Procedural Changes in the Hearing Process,* Final Rule, 54 F.R. 33168, 33171 (Aug. 11, 1989).

In support of this request and alternative motion, Pilgrim Watch relies here on the expert opinion of Arnold Gundersen (Exhibits 2 and 3) and others to be identified as the proceeding progresses; SECY-11-0089, July 7, 2011 and SECY-11-0089 Commission Voting Record, September 21, 2011; NUREG/CR-5634; NUREG-1437, Supplement 29; Reports from the Commonwealth of Massachusetts: *An Assessment of the Coastal and Marine Economics of Massachusetts* RFR #: ENV 06 CZM 09 Massachusetts Office of Coastal Zone Management (CZM), University of Massachusetts President's Office, Donahue Institute, Amherst, Massachusetts, June 29, 2006; Jiang and Zhou, The Massachusetts

and Cape Cod Bays Hydrodynamic Model 2005 Simulation[3]; Massachusetts Management Plan, Volume 2, *Baseline Assessment and Science Framework*, December 2009; *The Massachusetts Bay Hydrodynamic Model: 2005 Simulation,* Massachusetts Water Resources Authority Environmental Quality Department Report ENQUAD 2008-12; USGS OFR 2005-1250, *Processes influencing the transport and fate of contaminated sediments in coastal ocean-Boston Harbor and Massachusetts Bay, Section 4: Oceanographic Setting*, Bradford Butman, Richard P. Signell, John C. Warner, P. Soupy Alexander; Changsheng Chen, Ph.D., Massachusetts Bay Modeling using FVCOM-GOM/GB;[4] and numerous reports on Fukushima.

V. THERE IS A SUBSTANTIAL BASIS FOR THE CONTENTION

Assumptions made in Entergy's SAMA analysis now have to be questioned. This contention focuses on new and significant information regarding the increased probability of a severe accident and larger offsite consequences impacting the marine environment, that if analyzed would justify additional mitigation.

A. NEW AND SIGNIFICANT INFORMATION REGARDING THE PROBABILITY OF A SEVERE ACCIDENT

PW here incorporates by reference PW's May 11, 2011 and June 1, 2011 contentions. Both support the significant technical gap in Entergy's SAMA to which this contention is addressed - that Entergy failed to model contaminated acqueous releases "bled" into Cape Cod Bay from the large volumes of water needed to flood the reactor (vessel, containment, pool) in a severe accident extending over an extended period of time in the type of disaster we now know is

[3] http://www.mwra.state.ma.us/harbor/enquad/pdf/2008-12.pdf see, for example, Mass Bay, 2nd Generation Model Results
[4] http://fvcom.smast.umassd.edu/research_projects/MassBay/index.html

credible.[5] This source of contamination would add to that resulting from aqueous transport and dispersion of radioactive materials through subsurface water, sediments, soils and groundwater, plus atmospheric fallout on the waters - resulting in three sources of contamination in the water. Entergy's SAMA failed to analyze these offsite costs.

B. NEW AND SIGNIFICANT INFORMATION REGARDING SUBSTANTIAL OFFSITE CONSEQUENCES OF A SEVERE ACCIDENT

Fukushima Daiichi, water in

The above aerial photo taken by a small unmanned drone and released by AIR PHOTO SERVICE. It shows damaged Unit 4 of the crippled Fukushima Dai-ichi NPS and water pumping into the reactor via the red hose, on right.

Fukushima Daiichi, water out

April 20, 2011 Photo taken by Tepco leaking radioactive water into the sea near Unit 2[6]

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[5] PW's June 1, 2011 *Request for Hearing on a New Contention Regarding Inadequacy of Environmental Report, Post Fukushima* we showed that Entergy must factor into its SAMA analysis the probability of containment failure, hydrogen explosions, and subsequent larger off-site consequences due to failure of the direct torus vent (DTV) to operate. This establishes as credible both the need to flood the reactor and the probability that contaminated water would bleed out.
In PW's May 11, 2011 *Request for Hearing On Post Fukushima SAMA Contention* we showed that releases extending over a considerable duration (months) must be considered and modeled in Entergy's SAMA analysis. Accidents over an extended time period will require a greater volume of water for flooding the reactor and larger volume bleeding out significantly increacing the impact on the marine environment and economy.

[6] http://cryptome.org/eyeball/daiichi-npp2/daiichi-photos2.htm

1. Introduction

Entergy's SAMA analysis ignores new and significant issues raised by Fukushima regarding the probability of both containment failure, and subsequent larger off-site consequences due to the need for flooding the reactor (vessel, containment, pool) with huge amounts of water in a severe accident, as at Fukushima. This source of contamination and offsite costs adds to contamination resulting from aqueous transport and dispersion of radioactive materials through subsurface water, sediments, soils and groundwater, plus atmospheric fallout on the waters.

SECY-11-0089 (Enclosure 1, pg., 29) recognized that,

> An important limitation of the MACCS2 code is that it does not currently model and analyze aqueous transport and dispersion of radioactive materials through the subsurface water, sediment, soils, and groundwater. As demonstrated by the recent events in Japan, certain accident scenarios can result in large volumes of contaminated water being generated by emergency measures to cool the reactor cores and SFPs, with yet to be determined offsite radiological consequences. To determine the relative risk significance of these types of scenarios, (Pilgrim's) Level 3 PRA must (model and analyze) the aqueous transport and dispersion of radioactive materials." (Underlining added)

And, there is no provision within the Severe Accident Mitigation Guidelines (SAMGs) for processing the water post accident. The net effect is "bleeding" large amounts of contaminated water into Cape Cod Bay and currents transporting the contaminants to other water bodies and shores significantly increasing offsite consequences/costs. The process of adding volumes of water and the subsequent leaking of that water are referred to as "feed and bleed."

The aqueous contamination would add to what would be deposited in the water from the air. Entergy's own expert, Dr. Steven Hanna, testified that "most winds blow towards the north and

east quadrant[7]" – over Cape Cod and Massachusetts Bays. Last runoff into waters from radioactive contamination of soils, sediment and groundwater must be added in to determine the final impact and offsite costs[8].

It is clear that adding the impact of "bleeding" contaminated water into the bay and runoff is new and significant information; the GEIS and Pilgrim's SEIS simply referenced atmospheric releases fallout on open bodies of water, but not leaks of large quantities of water resulting from the necessity to dump tons of water on top of the reactor followed by tons of water leaking out into adjacent waters, adding to runoff. The failure to consider "feed and bleed" may explain, at least in part, why the GEIS mistakenly determined "societal and economic impacts of severe accidents are of small significance for all plants."

> The generic analysis (GEIS) applies to all plants… and that the probability- weighted consequences of atmospheric releases fallout onto open bodies of water, releases to ground water, and societal and economic impacts of severe accidents are of small significance for all plants." (NUREG-1437, Sup 29, emphasis added)

The technical gaps that must be addressed by Entergy in its SAMA include[9]:

a. The volume of water that would be required to flood the reactor (vessel, containment, pool) in a severe accident such as occurred in Pilgrim's sister-reactors in Fukushima, including rationale[10];

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[7] Testimony of Dr. Kevin R. O'Kula and Dr. Steven R. Hanna on Meteorological Matters Pertaining to Pilgrim Watch Contention 3, Pilgrim LR Proceeding 50-293-LR, 06-848-02-LR, Exhibit No. ENT000001, January 3,2001, A.69, pg., 68; A. 96, Figures 6 & 7

[8] *Most radioactive cesium piled up within 2 centimeters of soil surface* (Mainichi Japan) November 17, 2011, reported that "Most of the radioactive cesium emitted by the crippled Fukushima No. 1 Nuclear Power Plant has piled up within two centimeters of the soil surface, the government has announced." http://mdn.mainichi.jp/mdnnews/news/20111117p2a00m0na016000c.html

[9] **Averaging:** Because pollutant transport is affected by factors that are highly variable over time, it is important that Entergy models over at least a 5 year period and uses the 95% percentile, and not simply the mean. The rationale is the same as that expressed by Pilgrim Watch in the SAMA Remand, 2010-2011 filings on averaging.

[10] NUREG/CR-5634, pg., 4-19 states that flooding Peach Bottom (BWR) NPS' containment up to the reactor pressure vessel (RPV) bottom head takes 1,500,000 gallons. Flooding the containment up to the top of the reactor core would take more water. There is no mention of leakage nor is Pilgrim specifically referenced. Pilgrim's plant-

b. The volume of water that would be "bled" into Cape Cod Bay;

c. The radioactive content of the water, specifying isotopes and half-lives;

d. The radioactive atmospheric fallout on the waters, specifying isotopes and half-lives;[11]

e. The radioactive runoff into the waters from deposits on soil, sediment and groundwater;

f. Sum of b + d + e to determine total offsite impact;

g. The area of projected impact;

h. Analysis of projected offsite consequences/costs, including cleanup and waste disposal costs.

2. Methods to Decontaminate Water - Failed

Methods used to try to decontaminate water in Fukushima failed, providing new and significant information material to Pilgrim's SAMA. The French Areva method used to decontaminate the water was unsuccessful.[12] The Scientific American reported that "a trial run of the new filtration system was halted on June 18 in less than five hours when it captured as much radioactive cesium 137 in that span as was expected to be filtered in a month." The Japan Times reported November 11 that:

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specific calculations in response to the SAMG flooding step are not available on ADAMS and awaits discovery in this proceeding. Email from Ronald R. Bellamy, Chief Projects Branch 5, 11/15/11: "On November 3, you emailed Bill Dean with a request for a copy (or ADAMS reference) for Entergy's analysis to determine "trigger set-points" and additional information for Severe Accident Mitigation Guidelines… We have searched for any such documentation here in the region, in Headquarters, and in ADAMS. We also spoke to our technical experts. This document was not something that needed to be sent to the NRC and docketed, and we have been unable to find a copy in our system."

[11] *Half of radioactive materials from Fukushima fell into sea: study*, Mainichi Shimbun, November 17, 2100, reported, **"**Between 70 and 80 percent of the radioactive cesium from the Fukushima Daiichi power plant in Fukushima Prefecture had fallen into the sea by April… according to the simulation done by the Meteorological Research Institute in Tsukuba, Ibaraki Prefecture, and other researchers."
http://mdn.mainichi.jp/mdnnews/news/20111117p2g00m0dm012000c.html

[12] http://www.scientificamerican.com/article.cfm?id=fukushima-meltdown-radioactive-flood&print=true Scientific American, Three months after its meltdown, the stricken nuclear power plant continues to struggle to cool its nuclear fuel--and cope with growing amounts of radioactive cooling water, David Biello | Friday, June 24, 2011

> The reactor basements contained 77,000 tons of radioactive water as of Nov.8. To keep the radioactive water from draining into the sea, Tepco started constructing an underground wall between the shore and the reactor buildings late last month. The wall, about 800 meters long and 22 to 23 meters deep, will take two years to complete. Experts say, however… 'The groundwater keeps flowing in the direction of the sea. Even if the wall blocks a certain amount of it, the water will accumulate behind it, eventually build up and flow around the wall into the ocean,' said Yoshikazu Suzuki, who heads Chiba-based Kimitsu System Co., which specializes in soil and water contamination.[13]

Therefore based on experience in Japan, it is not reasonable to assume, absent convincing evidence to the contrary, that there would be a solution to deal with the volumes of contaminated water bled into Cape Cod Bay in similar circumstances at Pilgrim Station.

3. Area Impacted - Currents & Tides

Pilgrim: Pilgrim sits on Cape Cod Bay. In a severe accident, atmospheric release fallout and aqueous releases would initially be deposited in Cape Cod Bay that is part of the Massachusetts Bay System.

[13] *Contaminated water still headache for Tepco*, Kazuaki Nagata, Japan Time, November 11, 2011. http://www.japantimes.co.jp/text/nn20111115f2.html

Cape Cod Bay, described in NUREG-1437,[14] is a large semi-enclosed embayment partially surrounded by approximately 300 miles of shoreline that is open to the north and enclosed by the mainland to the west and Cape Cod to the south and east. The Commonwealth "has designated Cape Cod Bay as an Ocean Sanctuary, a status intended to protect the ecology and appearance of this area[15]."

NUREG-1427, 2.2.5.1 says that:

> The movement of water within Cape Cod Bay is controlled mainly by ocean circulating patterns, tidal fluctuations and wind. These factors control the hydrodynamics of the bay to varying degrees and result in currents that jointly control the exchange of water between Cape Cod Bay and the much larger Massachusetts Bay. <u>The waters of Cape Cod Bay exchange with water from Massachusetts Bay through the processes of tidal exchange, the counterclockwise pattern of ocean circulation, and wind-induced motion.</u> Tidal fluctuations largely control this exchange. The intertidal volume represents approximately 9.3% of the mean volume of the bay. The tidal bay flushing rate is approximately 7.2% per day, which corresponds to a mean residence time in Cape Cod bay of 13.9 days (Stone and Webster 1975, in ENSR 2000).
>
> Ocean currents in the vicinity of PNPS are generally toward the south and are part of the large-scale, counterclockwise circulation pattern within Massachusetts Bay. In contrast, tidal currents tend to rotate clockwise, completing one revolution per tide cycle (EG&G 1995, in ENSR 2000). (Underlining added)

A US Coast Guard document[16] is more detailed. It says that "The flow pattern in Cape Cod Bay includes a clockwise circulation centered southeast of Plymouth Harbor and a smaller counterclockwise circulation south of Provincetown. At 25-m depth, which is below the seasonal

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[14] <u>NUREG-1437, Supplement 29, 2.2.5.1 Water Body Characteristics</u>

[15] See, for example Provincetown Center for Coastal Studies http://www.coastalstudies.org/what-we-do/cc-bay-watch/ccbay.htm

[16] <u>http://pubs.usgs.gov/circ/2007/1302/sections/CIRC1302_Section4.OceanSetting.pdf</u>

thermocline, the principal features of the residual flow are the southeastward Maine Coastal current, and a southerly flow along the western side of Massachusetts Bay. In contrast to the near-surface flow, this southerly flow feeds a counterclockwise flow in Cape Cod Bay that exits north of Race Point."

The following figures provided by the Massachusetts Water Resources Authority,[17] show circulation in Massachusetts and Cape Cod Bays.

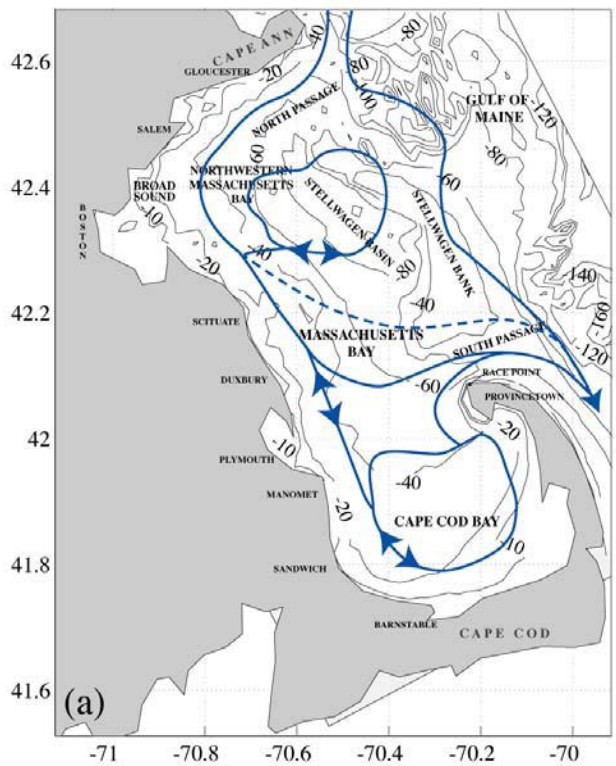
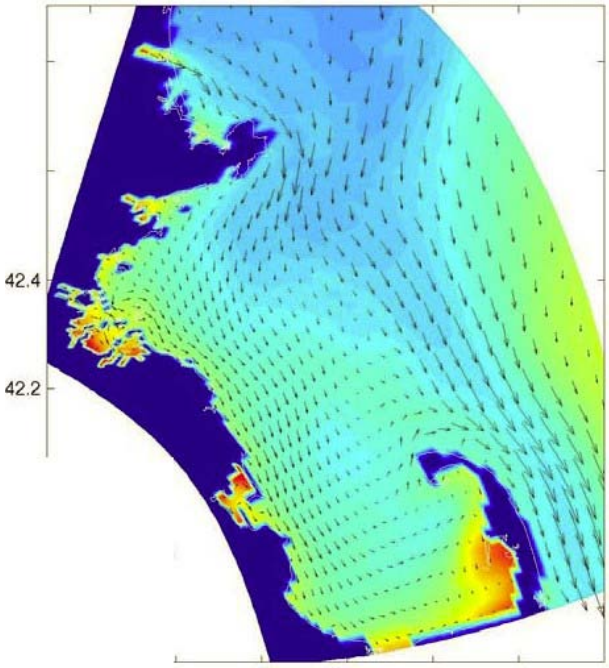


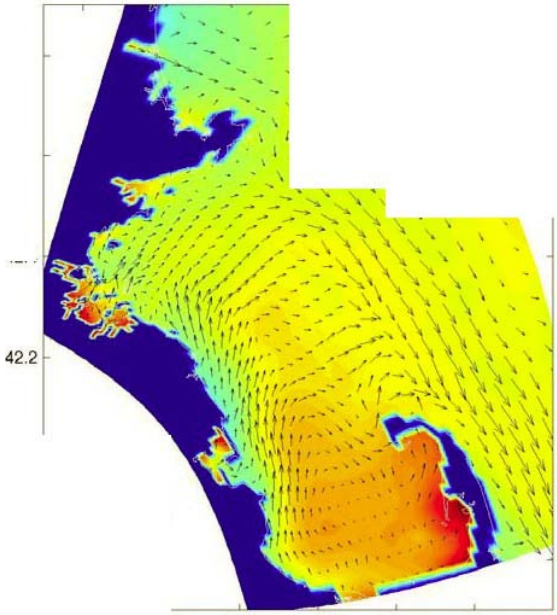
Figure 4-1 Summary of circulation within Massachusetts Bay (Lermusiaux et al. 2001.)

[17] Physical and Biological Oceanography of Massachusetts, Wendy Leo, Rocky Geyer, Mike Mickelson http://www.mwra.state.ma.us/harbor/enquad/pdf/ms-085_04.pdf

The dispersion of discharges also varies seasonally as shown in Figure 4-12 below.



Spring 1999

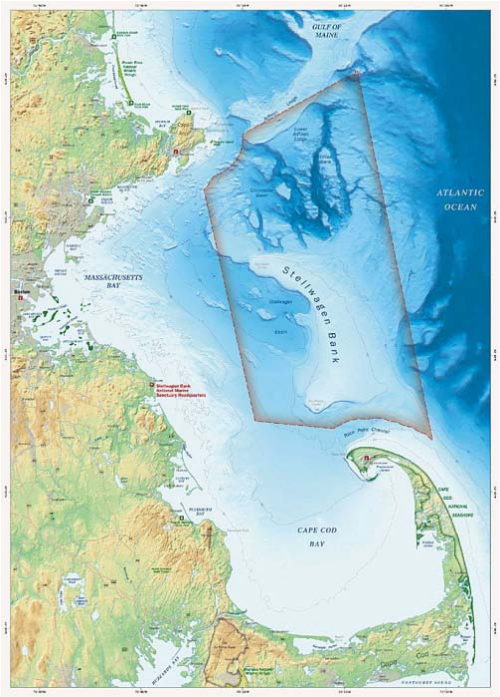


summer 1999

Figure 4-12 Modeled surface temperature and circulation patterns in spring 1999 (top panel) and summer 1999 (bottom panel) showing northward flow along the coast (figure courtesy Mingshun Jiang, UMass/Boston.) Color shows surface temperature (4-8 C in spring, 10-20 C in summer).

From information available, it is reasonable to predict that currents, winds and tides would spread contaminants around Cape Cod Bay, into Massachusetts Bay and eventually south down the outside arm of Cape Cod, impacting also rivers, streams, and other waterways that are connected to the larger bodies of water. The impact, actual or perceived, would significantly affect the marine ecology and economy. The NUREG describes a "counterclockwise circulation." Circulation implies that contaminants would not simply get a "one-way ticket" out.

The dispersion of contaminants entering Massachusetts Bay could affect or could be perceived to impact Stellwagen Bank. The bank is just 6 miles off the tip of Provincetown. It is a national marine sanctuary that extends some 24.85 miles in a northwest direction between Cape Cod and Cape Ann[18]. It is very important to the marine environment and economy.



[18] Sanctuary Management Plan http://stellwagen.noaa.gov/management/1993plan/toc.html

Tides: Massachusetts and Cape Cod Bays are tidal. NUREG-1427, 2.2.5.1 Contaminants leaking into the bay during an incoming tide will be drawn into Plymouth, Duxbury and Kingston Bays and up the rivers, such as the Jones, Eel, and Bluefish Rivers; in the outgoing tide they will flow into Cape Cod Bay and beyond.

Summary: The area likely to be impacted from aqueous transport and dispersion of radioactive materials, as in Fukushima, is considerable encompassing: Duxbury, Kingston and Plymouth Bays; Cape Cod Bay; Massachusetts Bay (that includes, for example, Boston Harbor and Stellwagen Bank a National Marine Sanctuary), the outside arm of Cape Cod and the multiple rivers and estuaries branching off these bodies of water. Economic impact will result, as shown in Japan, from actual/measured contamination above acceptable limits and the public's perceived or feared contamination irrespective of actual readings.

Entergy did not model this and must be required to show and justify precisely what areas in the marine environment would be contaminated, and for how long, from radionuclides in a severe accident as a result of aqueous discharges and fallout from releases into the air.

Models are readily available to analyze aqueous transport and dispersion of radioactive materials from Pilgrim in a severe accident. For example a team led by Dr. Chen (UMASSD) has developed an innovative integrated ocean model system (an unstructured-grid finite-volume coastal ocean model called FVCOM)[19] PW appreciates that in CLI-10-22, pg., 9, the Commission said that NEPA requirements are "tempered by a practical rule of reason" and an environmental impact statement is not intended to be a "research document." However, the

[19] To view the animation of the M2 tidal currents and elevation over tidal cycles. SMAST will upload the hourly field of the model hindcast currents, water temperature and salinity on this page soon. To get an updated information, please contact Dr. Chen at SMAST.
http://fvcom.smast.umassd.edu/research_projects/MassBay/index.html

necessary data and modeling methodology needed here is available, reliable, applicable, and adaptable for evaluating aqueous transport in Entergy's SAMA analysis cost-benefit conclusions.

4. Offsite Consequences/Costs

a. Offsite Consequences/Costs Fukushima Daiichi- Lesson Learned

There are numerous press reports that describe the impact on the Japanese environment and economy from the enormous quantities of contaminated water "bled" into the ocean after flooding the reactor (vessel, containment, pool) with huge amounts of water in Japan, adding to contamination resulting from aqueous transport and dispersion of radioactive materials through subsurface water, sediments, soils and groundwater, plus atmospheric fallout on the waters. Lessons learned provide new, significant and material information. Significant offsite economic consequences resulted from the actual contamination of the marine environment; and negatively impacted all the industries associated with fishing. As important, the public's perception that the fish and ecosystem were contaminated, whether or not there was any clear evidence, significantly damaged the marine economy.

There is no doubt that radiation discharged at Fukushima contaminated fish and marine life. No fishing zones were initially established 12-miles around the plant. The area expanded as more was learned about currents and testing showed contamination in fish caught 40 miles from the plant with unsafe levels of iodine-131 and cesium-137.[20] Bioaccumulation, food chain accumulation, is recognized as an issue as carnivorous fish ingests the radioactivity in bodies of the smaller prey or larger fish feed on plankton. The higher up on the food chain a fish is, the more these contaminated prey fish increase the radioactive material in its body.

[20] *Company Says Radioactive Water Leak at Japan Plant is Plugged*, NYT, Pollack, Andrew, et al., April 5, 2011

Early reports showed that TEPCO pumped approximately 3 million gallons of water, containing 100 times the legal limit of radiation, into the ocean,[21] adding to runoff.

Fishing Group Protests Radioactive Dumping as Tsukiji Market Sales Plummet, *Yasumasa Song and Stuart Biggs - Apr 5, 2011, Bloomberg*

> A fishing industry group in northern Japan protested Tokyo Electric Power Co.'s decision to dump radioactive water into the sea in Fukushima, saying it may damage their fishery forever.
>
> Tepco, as the utility is known, began releasing water yesterday off the coast near its Dai-Ichi plant. It plans to dump 11,500 tons (3 million gallons) containing about 100 times the regulatory limit of irradiated iodine in an area about 220 kilometers (135 miles) north of Tokyo. The government approved the measure so that Tepco can drain turbine buildings of water so radioactive it burned workers two weeks ago.
>
> Fish sales in Japan have slumped since the magnitude-9 earthquake on March 11 triggered a tsunami that knocked out power at the nuclear plant, leaving its cooling systems unable to prevent a partial meltdown. Radioactive material has leaked into the air and sea ever since, forcing the government to ban milk and fish shipments from Fukushima.
>
> Tepco will discharge 10,000 tons of water from its waste treatment facility and another 1,500 tons accumulated in pits outside reactors No. 5 and 6, Masateru Araki, a company spokesman, said yesterday. Filtering radiation from the water would take too long and its release will help protect equipment in the buildings housing the reactors, another spokesman said yesterday.
>
> **'No Choice'**
>
> Radioactive iodine and cesium were found in fish caught off the coast of Ibaraki, north of Tokyo,
>
> A study detected 4,080 becquerels of iodine-131 and 447 becquerels of cesium per kilogram of sand eels caught on April 1. The levels aren't harmful for limited

[21] *Japan Release Low-Level radioactive Water into the Ocean*," NYT, Tabuchi, Hiroko and Belxon, Ken, April 4, 2011.

consumption, the newspaper reported, citing Shinichi Suga, a former official at the Japan Atomic Energy Research Institute.

Tsukiji Fish Market

Concerns about radioactive fish have caused sales to drop, even after the government ordered a stop to fishing off the coast of Fukushima. At the Tsukiji fish market in central Tokyo, sales of fresh fish fell to an average 583 metric tons per day in the week ended March 17, 28 percent lower from a year earlier. Sales dropped by 44 percent in the week to March 24. Total trading volumes fell by 25 percent and 23 percent, according to official data.

"Restaurants are losing customers and the demand for fish is falling… Consumers are reluctant to buy fish after the earthquake due to harmful rumors about contamination, and damage to the distribution system has also disrupted supplies."

Sushi restaurants and hotels, including Shangri-La Asia's luxury chain, dropped Japanese seafood from their menus because of radiation fears. Global fishing companies such as Hong Kong's Pacific Andes International Holdings Ltd. could benefit from increased demand to replace Japanese produce. Japan exported 565,295 metric tons of fish and other marine products worth 195 billion yen ($2.3 billion) last year.

Japanese Food Imports:

Nations from Australia to the U.S. have limited Japanese food imports. Singapore banned seafood imports from Fukushima, Ibaraki, Tochigi and Gunma while allowing shipments from other Japanese prefectures. "Our exports will decrease as countries stop importing from Japan."

Over subsequent months the impact increased. For example: *Fukushima's radioactive sea contamination lingers*, Andy Coghlan, New Scientist, September 30, 2011.

Peak leaks: Official estimates from the Japanese government and TEPCO, the company that owns Fukushima-Daiichi, suggest that 3500 terabecquerels of caesium-137 from the plant entered the ocean between 11 March and late May. The pollution was exacerbated in April by problems locating a persistent leak of contaminated water and a decision by TEPCO to dump contaminated water at sea. A further 10,000 terabecquerels of caesium-137 is thought to have found its way into the ocean after escaping as steam from the facility. And TEPCO said last week that Fukushima-Daiichi may still be leaking as much as 500 tonnes of contaminated water into the sea every day. (Emphasis added)

Radioactive cesium may be brought back by Ocean in 20-30 years, Tokyo Times, 09.16.11

> Radioactive substances from the Fukushima nuclear facility which spilled into the ocean in the aftermath of the March quake and tsunami may reach the Japanese coasts again in 20-30 years, according to a new research.
>
> The Meteorological Research Institute and the Central Research Institute of Electric Power Industry compiled a study indicating that the leaked radioactive cesium may travel clockwise through the northern Pacific Ocean and return to the Japanese coast in two or three decades.

Radioactive plankton found near Fukushima plan, Mark Willacy, Reuters Kodo, October 15, 2011

> Research leader professor Takashi Ishimaru told Japan's NHK network sea currents had carried contaminated water south from the nuclear plant, heavily contaminating the plankton. A wide range of fish and other marine species feed on the plankton, leading to fears it could have a serious impact on the food chain. (Underlining added)

Fishermen's livelihoods still drowning in Fukushima, Ashi Shimbun, Satoshi Otani and Takemichi Nishibori, September 25, 2011 reported that:

> Coastal fishing is still suspended even more than six months later, as contamination of fish and other marine products by radioactive materials is continuing.
>
> …news of the radioactive contamination of beef from the prefecture spread. … "Seeing the beef situation, no one will buy fish (from Fukushima Prefecture) even if the contamination level is lower than the government's standards.

b. Offsite Consequences/Costs - Pilgrim

Lessons learned from Fukushima provide a preview of what would happen at Pilgrim, a sister-reactor to those in Fukushima. Entergy's SAMA failed to model offsite marine economic costs; it must be required to do so.

Economic impacts must include: direct impacts, indirect impacts, induced impacts (induced impacts are the multiplier effects of the direct and indirect impacts created by successive

rounds of spending by employees and proprietors) and total impacts (sum of direct, indirect and induced impacts). Also Entergy must consider dollars that are not spent locally, but on goods and services produced elsewhere - dollars "leaked" out of the local economy. These dollars do not have an opportunity to be locally re-spent and to create a "ripple" effect in the local economy.

PW also relies on two reports prepared for the Commonwealth. One is a recent analysis done in 2006 for Massachusetts Coastal Zone Management by the University of Massachusetts Donahue Institute, An assessment of the Coastal and Marine Economies of Massachusetts. [22] It provides a detailed analysis of the marine economy in Massachusetts – employment and economic output; and an analysis of the economic value of the coastal and marine economies as well as an overview of employment, wages, and business activities within important sectors of the Massachusetts marine economy that would be severely impacted in a severe accident at Pilgrim Station. Each marine sector is analyzed in the report: commercial seafood industries; marine transportation sector; coastal; tourism and recreation; marine science and technology sector; and marine related construction and infrastructure.

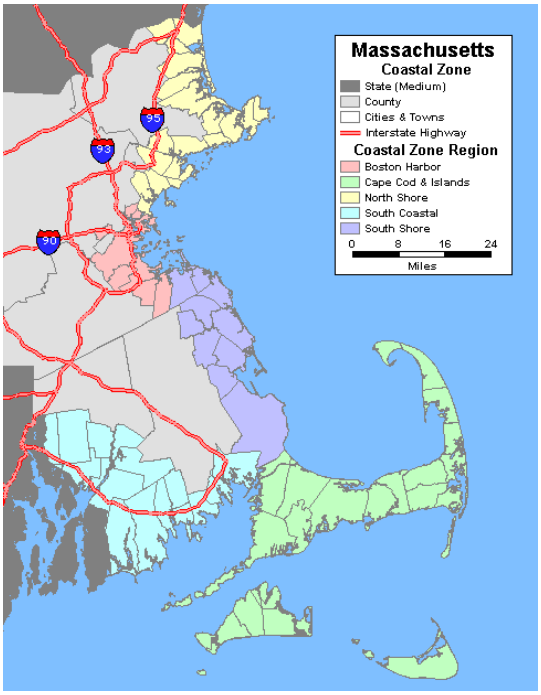
The second study is the Massachusetts Ocean Management Plan, Volume 2, Chapter 7-Economic Valuation[23]. It relies on the Donahue study. Figures given are for the entire marine economy and breakdowns per sector.

It is Entergy's job, not Pilgrim Watch's, to re-do the SAMA. These figures simply provide a yardstick.

[22] Available on line at http://www.massbenchmarks.org/publications/studies/pdf/czmreport1.pdf
[23] Available on line at http://www.env.state.ma.us/eea/mop/final-v2/v2-text.pdf

Summary Key Findings CZM Report & Massachusetts Ocean Management Plan

The Massachusetts Ocean Management Plan, Volume 2 Baseline Assessment and Science Framework, December 2009 and Assessment of the Coastal and Marine Economies of Massachusetts, Massachusetts Office of Coastal Management prepared by University of Massachusetts Donahue Institute, 2006 determined economic valuation of the marine environment on the services it provides.



The five regions are defined as follows:

- North Shore: Amesbury, Beverly, Danvers, Essex, Gloucester, Ipswich, Lynn, Manchester, Marblehead, Nahant, Newbury, Newburyport, Peabody, Revere, Rockport, Rowley, Salem, Salisbury, Saugus, and Swampscott.
- Boston Harbor: Boston, Braintree, Chelsea, Everett, Milton, Quincy, Weymouth, and Winthrop.
- South Shore: Cohasset, Duxbury, Hanover, Hingham, Hull, Kingston, Marshfield, Norwell, Pembroke**, Plymouth**, and Scituate.
- Cape Cod and Islands: Aquinnah, Barnstable, Bourne, Brewster, Chatham, Chilmark,

Dennis, Eastham, Edgartown, Falmouth, Gosnold, Harwich, Mashpee, Nantucket, Oak Bluffs, Orleans, Provincetown, Sandwich, Tisbury, Truro, Wellfleet, West Tisbury, and Yarmouth.

- South Coastal: Acushnet, Berkley, Dartmouth, Dighton, Fairhaven, Fall River, Freetown, Marion, Mattapoisett, New Bedford, Rehoboth, Seekonk, Somerset, Swansea, Wareham, and Westport.

Economic Impact

The maritime economy in Massachusetts generated $14.8 billion dollars in 2004, including $6.1 billion in secondary output impacts (jobs created in the rest of the state through the functioning of the maritime economy) (CZM Report 2006). The maritime sectors include: commercial seafood, transportation, coastal tourism and recreation, marine science and technology, and marine related construction and infrastructure. The linkages among the sectors affect the amount of revenue within the local economy. It is Entergy's job to show what portions would not be affected by a severe accident at Pilgrim.

Coastal tourism and recreation is the largest marine-related business consisting of 70% of the marine business and employing 79% of the people in marine-related businesses. Like in Japan, tourism disappears in radioactive contaminated areas. Marine economy employment has a moderate impact on job creation with a multiplier effect of 1.47 (one job creates 0.47 jobs). Marine transportation and marine science and technology have the highest multiplier effects – 2.83 and 2.27.

Employment

About 37% (1,161,326 persons) of the work force in Massachusetts is employed in maritime sectors (2004). (Donahue, 2006) Over 78% of employees in marine-related industries are employed in coastal tourism and recreation sector, followed by marine-related construction and infrastructure (10%) and commercial seafood (7%).

Donahue, Figure 5—Massachusetts Coastal Zones: Establishments, Employment and Wages, 2004

Coastal Regions	Establishments	Employment	Wages
Boston Harbor	28,383	659,611	$41,722,286,361
Cape & Islands	11,441	106,770	$3,730,218,817
North Shore	13,877	181,068	$7,249,900,683
South Coastal	10,723	139,617	$4,641,570,648
South Shore	6,736	74,208	$2,854,816,077
Coast Total	71,160	1,161,274	$60,198,792,586

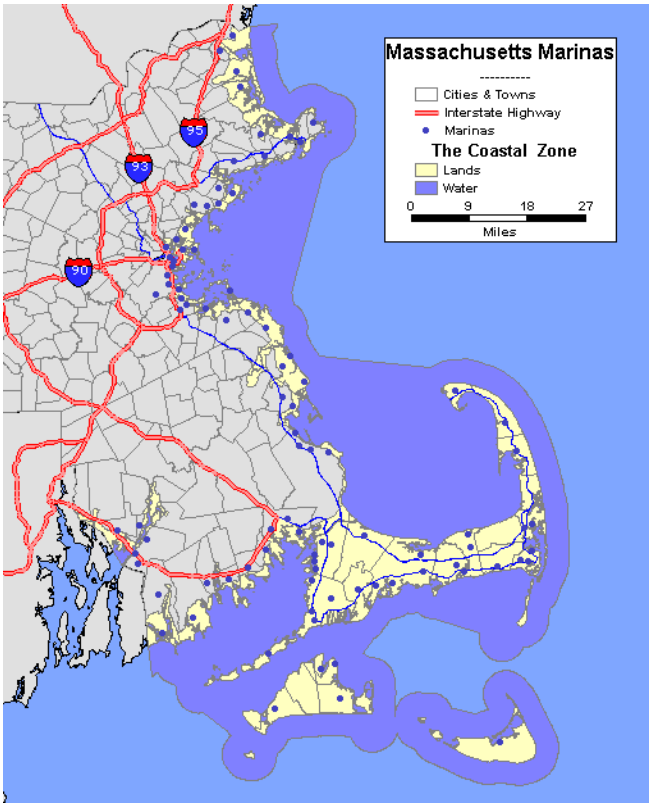
Marine Transportation

Transportation of foreign and domestic freight, passengers, towing and tugboat services is important contributor to the marine economy. It has the highest multiplier (2.83) within the marine industry. (Donahue 2006) There are seven major custom ports in Massachusetts: Boston, Gloucester, Salem, New Bedford, Fall River, Plymouth and Provincetown.

Coastal Tourism and Recreation

Tourism and recreation sector employed 125,800 individuals in 2006. The sector comprises subsectors- food, entertainment and recreation and accommodations. Altogether $14.2 billion were generated in this sector in 2006. Activities associated with this sector include recreational boating, saltwater angling, wildlife watching, and beach visits. At least 20% of the visitors to Massachusetts visit Cape Cod and the Islands, drawn to its beaches and bays. Whale watching is another draw. In 2007, 145,496 motor boats were registered in Massachusetts in 2007. During the summer, as many as 195,000 residents go boating during the week-ends in Massachusetts. Boat owners in the state spent $192,917,000 per year on new boats, engines,

trailers, accessories (MMTA 2008). The Donahue Institute study projected that recreational boat ownership has an employment multiplier of 1.37 and a spending multiplier of 1.33. The net effect of local communities from peripheral spending was $1,338,750,000 in 2007 (Massachusetts Marine Trades Association, MMTA 2008[24]). An important aspect of recreational boating is the number of businesses and trades associated with it - boat yards, marinas, boat manufacturing, sales and transportation, canvas makers, charters and excursions, dock management, harbormasters, marine surveyors and yacht brokers. There are 64 marinas and about 25,000 permitted public slips and moorings used for recreational boating along the Massachusetts coastline. In addition there are 10,000 privately maintained slips, moorings and docks. (MMTA 2008).



Source D & B Marketplace

[24] Massachusetts Marine Trades Association (MMTA) 2008. http://www.boatma.com/boating_in_ma.html.

Marine Science and Technology

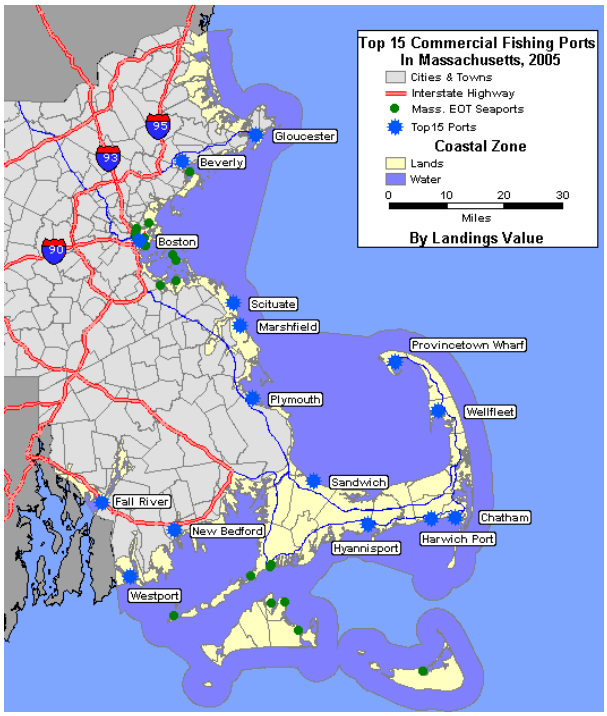
The industry includes the construction of marine instruments, research, and environmental services and employs about 5,000. Users include industries such as commercial fishing, maritime shipping and transportation, environmental services, education and research. In 2004 the annual production output of this sector in Massachusetts was $1.2 billion (Donahue 2006).

Marine Related Construction and Infrastructure

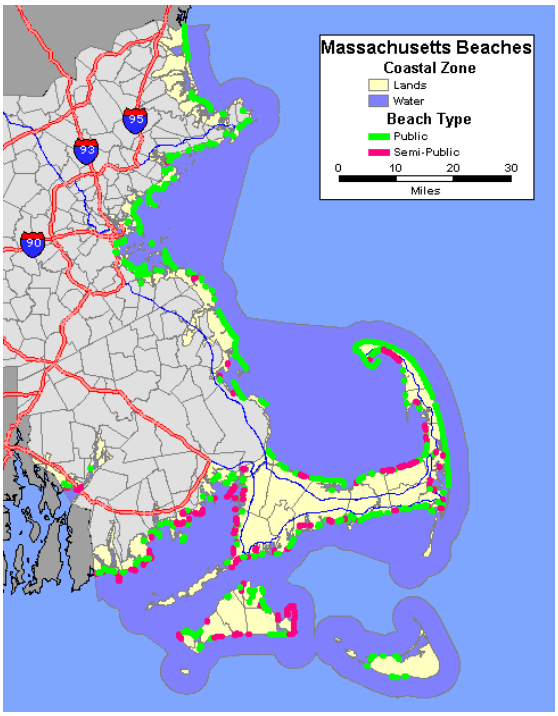
This sector is the second largest marine industry component in Massachusetts and includes heavy construction such as coastal and offshore infrastructure, administration of management programs and real estate development. This sector generates 10% of employment but wages are twice the marine industry average. 77% of the 15,000 employed in this sector are involved in housing construction and 23% in marine-related development. Almost 12,000 jobs were created from secondary impacts in 2004. The employment multiplier is 1.82, and 1.56 for output. In total $2.8 billion was generated from this sector in 2004.

Commercial and Recreational Seafood

Massachusetts is a leading state in the fisheries sector. The commercial sector- fishing, processing, and wholesale industries- employs 11,270 people in the state with landing values at $296 million in 2004 (out of a gross state product of $1.6 billion) (Donahue 2006). The commercial fishing industry in Massachusetts is one of the most valued in the United States. Scallops, lobsters, and ground fish species are responsible for the highest value. Commercial and recreational fishing in Massachusetts contribute $2 billion to the economy.



Source: Massachusetts Division of Marine Fisheries.



Source: MassGIS

Aquaculture

Aquaculture is the smallest sector in the seafood industry, employing 267 in 2004 and generated $3.6 million in 2002. 80% of the aquaculture takes place on Cape Cod, with the South and North Shores experiencing the greatest increase since 2000. Duxbury Bay, for example, is heavily investing in the industry. Island Creek Oysters are served in fine restaurants around the country, including White House dinners, and is a multi-million dollar operation.

NUREG-1437, Sup 29, 2.2.5.3, Biological Communities describes the biological communities in the waters of Cape Cod Bay surrounding PNPS. Although the NUREG is focused on the impact of once-through cooling, it provides information useful here. It listed fish, pelagic invertebrates, plankton, benthic invertebrates, marine aquatic plants, marine mammals, and federally listed marine species (including some marine mammals and sea turtles). The "species listed include commercially or recreationally valuable species that are critical to the

potentially affected ecosystem, and species for which essential fish habitat (EFH) has been designated in the vicinity of PNPS." Forty-two are listed; the listing does not include Massachusetts Bay.

The NUREG highlights certain species for their commercial importance. For example: It says that: “The second largest U.S. lobster fishery is the Massachusetts lobster fishery, accounting for about 28% of the U.S. landings. The most economically valuable fishery in Massachusetts territorial waters is the commercial lobster fishery in the PNPS area;” (2-78) and “[t]he Atlantic sea scallop supports one of the most valued shellfisheries in the U.S.” (2-79)

Lessons learned from Japan showed that whether or not the fish or seafood is in fact contaminated was not necessarily important. The public believed that they were contaminated, or might be contaminated; did not believe the government or industry reports; and refused to buy the merchandise or eat at restaurants serving it. The same public responses must be calculated in Pilgrim’s SAMA.

Offsite consequences are not limited to fish, pelagic invertebrates and plankton but also to marine aquatic plants. For example, Irish Moss is an important commercial species that has been harvested along the shores of Cape Cod Bay since the 1800’s. The seaweed is harvested as a source of carrageenan, a hydrocolloid unique for its jellying, suspension and viscosity properties. It is widely used as a suspending and thickening agent in the brewing, baking, pharmaceutical and dairy industries. (NUREG 2-82) consequences and costs need to be calculated not only for those who harvest Irish Moss but also the industries that use it. Plankton and marine plants provide food for marine life. Not to be forgotten in calculating impacts is that radionuclides bio-accumulate as they work their way up the food chain.

Marine Mammals (2.2.5.3.6.): A variety of marine mammals live within Cape Cod Bay for at least a part of their life cycle, according to the NUREG. All are protected under the Marine Mammal Protection Act (MMPA) of 1972, as amended. Several species are federally listed whales, which are additionally protected under the Endangered Species Act of 1976, as amended (ESA). Entergy will have to justify how they calculate the economic costs of these. The two major groups of marine mammals that may occur within Cape Cod Bay include cetaceans (whales, dolphins and porpoises) and pinnipeds (seals, sea lions and walruses). Also there are non-Federally listed species in these groups.

Federally listed Anadromous and Marine Species (2.2.5.3.7): Federally listed species in the NUREG include: Four listed sea turtles may occur in Cape Cod Bay, the loggerhead turtle is listed as threatened; five species of whales; and two fish, Shortnose sturgeon and Atlantic sturgeon. Again Entergy must justify how they calculate the offsite consequences and costs of contaminating, and the potential killing from radiation linked diseases, threatened and endangered species. What is the value of life of a threatened or endangered species?

Rare Terrestrial and Freshwater Aquatic Species (2.2.6.3): Protected and non-protected birds that forage in the marine environment must be considered in offsite consequences/costs from ingestion of contaminants bled into the waters. Federally listed species identified by FWS as" the piling plover, roseate tern, bald eagle, and northern red-belied cooter. Ducks and other birds hunted for human consumption also must be calculated.

Current and tidal action described by the NUREG-1437, Sup 29, 2.2.5.3 and discussed above likely will result in radioactive contamination (and as important, the fear of

contamination) spreading from Cape Cod Bay to Massachusetts Bay and their associated coastlines and estuaries, and out to Stellwagen Bank and Georges Bank.

Stellwagen Bank National Marine Sanctuary 6 miles north of P-Town is commercially very important. Any contamination found, or suspected, in the banks would have serious economic impact.

Over 130 species from numerous Classes of the animal kingdom call the bank home at least temporally. Some such fish are the Atlantic cod, Silver hake, yellow tail flounder, blue fin and yellow fin tuna, striped bass, blue fish and numerous species of shark including the Great White Shark [1]. Shellfish such as the American lobster, sea scallops squid and the ocean quahogs are also prevalent. Many marine birds call the bank home including gannets shearwaters storm petrels, fulmars, puffins and razorbills. Reptiles are even present, primarily being represented by the Leatherback sea turtle. Possibly the most famous animals on Stellwagen bank are the mammals. Fives species of seals; the Harp, Gray, Harbor, Hooded, and Ringed seal, and numerous whales species swim in the waters of Stellwagon[2]. Whale watchers can frequently see Humpback Whales, Minke Whales, Fin Whales and, one of the most critically endangered whale species, North Atlantic Right Whales.Several other whale species can also be seen here including, the sperm whale, Beluga, Orca, Pilot whale, white beaked dolphin, Atlantic white-sided dolphin, Common dolphin, Bottlenose dolphin, Risso's dolphin, Harbor porpoise, Blue whale, and Sei whale[3].
http://en.wikipedia.org/wiki/Stellwagen_Bank_National_Marine_Sanctuary;
http://www.nesportsman.com/articles/article80.shtml

The impact on beaches and shorefront properties also must be considered in calculating offsite consequences because they too would be contaminated, and others would be thought to be contaminated. In addition radionuclides washed up on the shores would become re- dispersed when the sands/rocks dried out and winds blew them aloft.

Summary of Key Findings (Donahue Report, pgs., 5-9)

Findings related to the coastal economy:

Entergy needs to be required to do redo their SAMA and determine the impact/costs on the marine economy in the various sectors, including the multipliers or "ripple" effect- income and employment.

- 71,160 coastal economy establishments directly employ 1,161,326 persons (ES-202 basis, 2004) in Massachusetts, representing close to 37 percent of employment in the state.
- Seventeen percent of coastal employment is in the Health Care and Social Assistance sector, the largest sector of coastal employment. This sector is followed by the Trade—Wholesale and Retail—with 14 percent of employment, followed by Arts, Entertainment, Accommodation and Food Services with 11 percent of employment and Finance, Insurance and Real Estate with 10 percent of employment.
- Payroll within the coastal economy totals over $60 billion with an average annual wage in the region of close to $52,000.
- Annual Gross State Product (GSP), 2004, of the coastal economy is approximately $117 billion or 37 percent of Massachusetts GSP in 2004.
- Secondary employment impacts – jobs created in the rest of the state through the functioning of the coastal economy—total almost 147,000 additional jobs created within Massachusetts.

Findings related to the marine economy:

- The marine economy is comprised of five major sectors: Commercial Seafood, Marine Transportation, Coastal Tourism and Recreation, Marine Science and Technology, Marine-related Construction and Infrastructure.
- The marine economy directly employs 152,440 persons (ES-202 basis) in Massachusetts with an annual average wage of $28,263.
- More than 78 percent of the cluster's[25] total employment in Massachusetts is in the Coastal Tourism and Recreation sector, followed by Marine-related Construction and Infrastructure employment with 14,956 jobs or 10 percent of marine employment, Commercial Seafood sector employment of 11,270 or 7 percent, Marine Science and Technology employment of 5,055 or 3 percent, and Marine Transportation employment of 2,099 or one percent of employment.
- Total payroll within the marine economy totals more than $4.3 billion.
- Secondary employment impacts of the coastal economy total 30,072 indirect and 41,324 induced jobs for a total of 223,836 additional jobs created within the region, an employment multiplier of 1.47.
- Total annual output (2004) of the marine economy was $14.8 billion. This includes $6.1 billion in secondary output impacts ($2.9b indirect and $3.2b induced).

Findings related to major sectors of the marine economy

Commercial Seafood

- The Commercial Seafood sector directly employs 11,270 persons. This includes 7,661 covered employees and 3,609 individual proprietors.
- Commercial fishing activities and seafood processing and wholesaling employment comprise the majority of jobs.
- Payroll within the sector totals $509 million annually, with average annual wages of $45,229 per employee.
- Secondary employment impacts of the sector create over 11,000 additional jobs

[25] The marine economy is a horizontally-integrated industry cluster: an industry which includes sectors which might share a common market for the end products, use a common technology or labor force skills, or require similar natural resources. See http://www.planning.unc.edu/courses/261/leveen/.

within the region, an employment multiplier of 1.99.

- Annual production output (2004) totals about $1.6 billion including about $638 million in secondary impacts.

Marine Transportation

- The Marine Transportation sector directly employs 2,099 persons.
- Deep sea and coastal transportation, as well as support activities for water transportation, comprise the majority of jobs.
- Payroll within the sector totals $93 million annually, with average annual wages of $44,228 per employee.
- Secondary employment impacts of the sector create over 3,833 additional jobs within the region, an employment multiplier of 2.83.
- Annual production output (2004) totals about $529 million including about $239 million in secondary impacts.

Coastal Tourism and Recreation

- The Coastal Tourism and Recreation sector in the coastal zone directly employs 119,420 persons.
- Within the sector, 73 percent of employment (87,499 jobs) is related to food services, 15 percent (18,296 jobs) is related to accommodations, and 11 percent (13,625 jobs) is related to entertainment and recreation.
- Payroll within the sector totals $2.3 billion annually, with average annual wages of $19,580 per employee.
- Secondary employment impacts of the sector create over 38,011 additional jobs within the region, an employment multiplier of 1.32.
- Annual production output (2004) totals about $8.7 billion including about $3.6 billion in secondary impacts.

Marine Science and Technology

- The Marine Science and Technology sector directly employs 5,055 people.
- Within this total, 59 percent of employment (2,985 jobs) is related to marine engineering and technical services, 29 percent (1,441 jobs) is related to production of instrumentation and equipment, and about 10 percent (490 jobs) is related to ship and

boat building and repair.

- Supplemental research determined that an additional 1,530 people work in academic programs and research institutions dedicated to marine science.
- Payroll to employees within the sector totals $419 million annually, with average annual wages of $82,829 per employee.
- Secondary employment impacts of the sector create over 6,426 additional jobs within the region, an employment multiplier of 2.27.
- Annual production output (2004) totals about $1.2 billion including about $568 million in secondary impacts. The output multiplier for this sector—1.96— is the highest output multiplier of all sectors in the marine economy.

Marine-Related Construction and Infrastructure

- The Marine-Related Construction and Infrastructure sector in directly employs 14,596 persons.
- Within the sector, 77 percent of employment (11,181 jobs) is related to coastal real estate development and an additional 23 percent (3,415 jobs) is related to marine construction.
- Payroll within the sector totals $949 million annually, with average annual wages of $65,014 per employee.
- Secondary employment impacts of the sector create over 11,940 additional jobs within the region, an employment multiplier of 1.82.
- Annual production output (2004) totals $2.8 billion including about $1 billion in secondary impacts, an output multiplier of 1.56.

Findings from survey of marine economy businesses:

- Business conditions in the marine economy are stable and generally positive. Approximately one-quarter of businesses increased employment during the past 12 months (24.5 percent) and over one-quarter of businesses expect to increase employment during the next 12 months (26.6 percent).
- In general, businesses reported stable or positive sales/revenue growth conditions, with 37.5 percent of those interviewed reporting stable sales or revenue during the past 12 months. Two-thirds of businesses expect revenues or sales to increase during the next

12 months.

- The vast majority of marine and coastal businesses purchase supplies primarily from businesses located in Massachusetts (80.3 percent).
- Marine and coastal businesses draw a significant percentage of their customers from outside of their region and out-of-state. Close to 47 percent of businesses attract customers primarily from within a 25 mile radius of the business. However, close to 54 percent of businesses draw customers primarily from outside their region and out-of-state.
- The marine economy businesses interviewed for the survey overwhelmingly recruit workers from within their community (70 percent) and the region (17.2 percent).
- A minimum of 30 percent of businesses across sectors report problems recruiting sufficiently-skilled employees, including sectors that do not demand a high- number of skilled workers. In fact, 10.5 percent of all businesses surveyed reported that it is a "big problem" finding skilled workers.
- The cost of real estate is by far the most significant issue facing marine and coastal tourism businesses. A related issue, the availability of suitable land for expansion, was the next most significant problem.
- Nearly one-half of the businesses surveyed (47.9 percent) reported some problem with government regulations and permitting. In general, firms did not report significant problems gaining access to capital and broadband services or customers and suppliers

VI. SUFFICIENT INFORMATION TO SHOW THE EXISTENCE OF A GENUINE DISPUTE WITH THE APPLICANT AND THE NRC

The attached documented evidence shows that the environmental impacts of re-licensing Pilgrim are significantly greater than those estimated by Entergy in its 2006 SAMA. Lessons learned from Fukushima, in Pilgrim's sister-reactors, showed that the probability of both containment failure and subsequent larger off-site consequences is much higher than previously considered by Entergy, due to the need for flooding the reactor (vessel, containment, pool) with

huge amounts of water in a severe accident, and the subsequent bleeding of radioactive contaminated waters into the ocean are credible events in a severe accident and required modeling. This source of contamination and offsite costs added to contamination resulting from aqueous transport and dispersion of radioactive materials through subsurface water, sediments, soils and groundwater, plus atmospheric radioactive fallout on the waters- make three sources of contamination in the waters not analyzed in Pilgrim's SAMA.

The NRC Commission recognized this in SECY-11-0089. It said that the MACCS2, that Entergy chose to use for its SAMA, does not currently model and analyze aqueous transport and dispersion of radioactive materials; and there is no provision within the Severe Accident Mitigation Guidelines (SAMGs) for processing the water post accident. Aqueous discharges added to those deposited in the waters from the air and runoff will increase offsite consequences/costs. Mitigations will be justified serving to increase safety going forward.

Therefore the environmental impact analysis for the Pilgrim should be re-evaluated and the SAMA analysis should be revised to consider mitigative measures that previously may have been ignored or rejected.

VII. PILGRIM WATCH MEETS THE REQUIREMENTS OF 2.309 AND 2.326

This Request for Hearing is presented under 10 C.F.R 2.309. The record of this proceeding has not closed, as discussed previously in filings before the ASLB and below. However, in the alternative, Pilgrim Watch seeks re-opening of the record to the extent necessary to admit this Request, in the event the ASLB again we believe incorrectly determines that a motion to reopen is required. The motion covers all issues that must be addressed in order to raise a contention at a late stage of license renewal adjudication. *Entergy Nuclear Vermont Yankee,*

L.L.C., and Entergy Nuclear Operations, Inc. (Vermont Yankee Nuclear Power Station, LBP-10-19, __ NRC __ (October 28, 2010).

A. PILGRIM WATCH MEETS THE REQUIREMENTS OF 2.309

THE CONTENTION IS TIMELY

Under 10 C.F.R 2.309(c), the determination whether the filing of a contention is "non-timely" is "based on a balancing of eight factors, the most important of which is "good cause, if any, for the failure to file on time." Crow Butte Resources, Inc. (North Trend Expansion Project), LBP-08-6, 67 NRC 241 (2008)

The factors, and how each points to the conclusion that this contention should be accepted, are set forth below.

1. Good cause, if any, for failure to file on time.

The information upon which this contention is based (Fukushima, SECY-11-0089 and the Commissioner's vote on SECY-11-0089 September 11, 2011) did not become available to the public (including Pilgrim Watch) until sufficient reports became available after the Fukushima disaster and after it became clear what actions that the NRC would or would not take in response to lessons learned. The information is clearly new.

Also if the fact that the MACCS2 does not model aqueous transport and dispersion of radioactive materials were old news, the GEIS, Pilgrim's SEIS and Entergy's SAMA would have modeled the consequences/costs resulting from "feed and bleed." Instead the GEIS, like Pilgrim's SEIS, modeled simply <u>atmospheric releases fallout on open bodies of water</u> but apparently not leaks of large quantities of water from the necessity to dump tons of water in the reactor(vessel, containment, pool) followed by tons of water leaking out into adjacent waters.

The generic analysis (GEIS) applies to all plants… and that the probability- weighted consequences of atmospheric releases fallout onto open bodies of water, releases to ground water, and societal and economic impacts of severe accidents are of small significance for all plants." (NUREG-1437, Sup 29, emphasis added)

"Good cause" has been consistently interpreted to mean that a proposed new contention be based on information that was not previously available, and was timely submitted in light of that new information. Dominion Nuclear Connecticut, Inc. (Millstone Nuclear Power Station, Unit 3), CLI-09-5, 69 N.R.C. 115, 125-26 (2009) citing Pacific Gas & Electric Co. (Diablo Canyon Power Plant Independent Spent Fuel Storage Installation), CLI-08-1, 67 N.R.C. 1, 6 (2008). See also, NRC Digest, Prehearing Matters, 29: "Newly arising information has long been recognized as providing "good cause" for acceptance of a late contention. Consumers Power Co. (Midland Plant, Units 1 and 2), LBP-82-63, 16 NRC 571, 577 (1982), citing Indiana and Michigan Electric Co. (Donald C. Cook Nuclear Plant, Units 1 and 2), CLI-72-75, 5 AEC 13, 14 (1972); Cincinnati Gas and Electric Co. (William H. Zimmer Nuclear Station), LBP-80-14, 11 NRC 570, 574 (1980), appeal dismissed,ALAB-595, 11 NRC 860 (1980)."

Here is it clear that (1) the information is new and could not have been presented earlier, and (2) Pilgrim Watch acted promptly after learning of the new information. Texas Utilities Electric Co. (Comanche Peak Steam Electric Station, Units 1 and 2), CLI-92-12, 36 N.R.C. 62, 69-73 (1992)

2. The nature of the requestor's/petitioner's right under the Act to be made a party to the proceeding.

Pilgrim Watch is already a party, and thus clearly has the right under the Act to be a party to this proceeding - a proceeding that is not closed, even before the ASLB, and in which Entergy's license application has not been granted.

3. The nature and extent of the requestor's/petitioner's property, financial or other interest in the proceeding.

As said in Pilgrim Watch's originally filed petition (Request For Hearing And Petition To Intervene by Pilgrim Watch –May 25, 2006. Pg.1), and as remains the case, "Pilgrim Watch is a non-profit citizens' organization located at 148 Washington Street, Duxbury, Massachusetts, 02332. It is represented pro se by Mary Lampert who makes her residence and place of occupation and recreation within ten (10) miles of Pilgrim Nuclear Power Station. Under 10 CFR § 2.309 Petitioners have standing to intervene in the license renewal proceedings of Pilgrim because they live within 10 miles of the facility. For reactor construction and licensing proceedings, the NRC has recognized a presumption that people who live within close proximity of the facility (50 miles) have standing to intervene in the proceedings." Mary Lampert also has two residential properties on Beacon Hill in Boston that are within 50 miles of Pilgrim Station.

4. The possible effect of any order that may be entered in the proceeding on the requestor's/petitioner's interest.

Petitioners believe that if Pilgrim should not be allowed to operate for an additional twenty years without redoing its SAMA. A proper SAMA would justify the cost of taking the mitigation steps that would be required by analyzing the impact on the marine environment from the probability of both containment failure, and subsequent larger off-site consequences/costs due to the need for flooding the reactor (vessel, containment, pool) with huge amounts of water in a severe accident, as at Fukushima, and the subsequent discharge (bleeding) of large volumes of contaminated water into Cape Cod Bay and adjacent waters. This source of contamination and offsite costs added to contamination resulting from aqueous transport and dispersion of radioactive materials through subsurface water, sediments, soils and groundwater, plus

atmospheric fallout on the waters. Such an impact will result in unacceptable damage to the marine environment jeopardizing the health, safety, property and finances of Petitioners' members who live, recreate, conduct business and own property within the vicinity of the Pilgrim Nuclear Power Station and the wider economy of the region and Commonwealth. The motion thereby addresses a new and significant public safety and environmental issue.

5. The availability of other means for protecting the petitioner's interests.

None of the factors suggesting "other means" referred to in Sec. 2, 10.3.3.3E Factor #5 of the NRC Digest are present here. There is no state judicial forum or other NRC licensing procedure to which Pilgrim Watch can take its concerns regarding to provide the necessary reasonable assurance that public health and safety shall be protected during license renewal. (See, Private Fuel Storage, L.L.C. (Independent Spent Fuel Storage Installation), LBP-00-23, 52 NRC 114, 121-122 (2000)). "The suggestion that an organization could adequately protect its interest by submitting a limited appearance statement gives insufficient regard to the value of participational rights enjoyed by parties - including the entitlement to present evidence. Similarly, assertions that the organization might adequately protect its interest by making witnesses available to a successful petitioner or by transmitting information in its possession to appropriate State and local officials are without merit." Duke Power Co. (Amendment to Materials License SNM-1773 -- Transportation of Spent Fuel from Oconee Nuclear Station for Storage at McGuire Nuclear Station), ALAB-528, 9 NRC 146, 150 n.7 (1979)." NRC Digest, Prehearing Matters, 38. And a "petition under 10 C.F.R. § 2.206 for a show cause proceeding is not an adequate alternative means of protecting a late petitioner's interests.... Washington Public Power Supply System (WPPSS Nuclear Project No. 3) ALAB-747, 18 NRC 1167, 1175-1176 (1983). See Florida Power and Light Co. (Turkey Point Nuclear Generating Plant, Units 3 and

4), LBP-90-5, 31 NRC 73, 81 (1990), aff'd, ALAB-950, 33 NRC 492, 495-96 (1991). After all, despite the long history of §2.206, the number of successful petitions brought under that section is extremely small. Dominion Nuclear Connecticut, Inc. (Millstone Nuclear Power Station, Units 2 and 3), LBP-05-16, 62 NRC 56, 67 (2005) (Id.)

6. The extent to which the petitioner's interest will be represented by existing parties.

The other parties to this proceeding are Entergy and the NRC Staff. The Massachusetts Attorney General is not yet admitted. Throughout this proceeding both NRC Staff and Entergy (in concert with each other) have consistently opposed Pilgrim Watch's interests. There is no reasonable basis to expect that leopard will change its spots. The NRC has accurately recognized that,

> In weighing the [sixth] factor, a board will not assume that the interests of a late petitioner will be adequately represented by the NRC Staff. The general public interest, as interpreted by the Staff, may often conflict with a late petitioner's private interests or perceptions of the public interest. Washington Public Power Supply System (WPPSS Nuclear Project No. 3), ALAB-747, 18 NRC 1167, 1174-1175 n.22 (1983).

NRC Digest, Prehearing Matters, 35; see also NRC Practice Digest, Prehearing Matters 33: "Participation of the NRC Staff in a licensing proceeding is not equivalent to participation by a private intervenor.

The Board accurately summarized the realities in Turkey Point (NRC Practice Digest, Prehearing Matters, 34-35):

> To what extent will Petitioners' interest be represented by existing parties?" must be answered, "None."

7. The extent to which petitioner's participation will broaden the issues or delay the proceeding.

The issue presented by this contention is new and significant information that the increased probability of a severe accident and significant damage to the marine environment would justify additional mitigation to provide the necessary reasonable assurance that public health and safety shall be protected during license renewal. The ASLB has not looked at this before.

Moreover, this "factor includes only that delay which can be attributed directly to the tardiness of the petition. Jamesport, supra, ALAB-292, 2 NRC at 631; South Carolina Electric and Gas Co. (Virgil C. Summer Nuclear Station, Unit 1), LBP-81-11, 13 NRC 420, 425 (1981). Here, there is nothing "tardy" about Pilgrim Watch's petition to add this new petition. It is based on information that became public only a short time ago.

8. The extent to which petitioner's participation might reasonably assist in developing a sound record.

Absent Pilgrim Watch's participation, it is apparent that neither any other party nor the Board will develop any record whatever regarding the subject of this contention.

Pilgrim Watch intends principally to rely upon government and licensee documents of record, and testimony from Arnold Gundersen, nuclear engineer, and others. Mr. Gundersen's Declaration is attached. The Petitioner satisfies 10 C.F.R 2.309(d), Standing: The Petitioner already is a party to this hearing and has satisfied the requirements.

9. Pilgrim Watch's motion shows that a materially different result would be likely had this new and significant information been available to consider initially[26]. The offsite consequences/costs would be substantially greater if considered by Entergy in its SAMA

[26] This satisfies re-opening the record, in an abundance of caution, although we argue that is not required.

analysis; or in the alternative Entergy failed to show that it would not be materially different because they never considered it.

B. PW Not Required To Reopen the Record

Pilgrim Watch expects again that there will be a dispute regarding whether reopening is required or not. The NRC's rules themselves set one standard for reopening a closed contention to take new evidence about an issue that has already been heard (see "10 C.F.R § 2.326 Motions to Reopen), and a quite different standard for a request to add a new contention that raises a new material issue (see "10 C.F.R § 2.309 Hearing requests, petitions to intervene, requirements for standing, and contentions").

Section 2.326 is directed to motions to reopen decisions in which the record has been closed and a "result" has been reached. 10 CFR 2.326 says "reopen a closed record." Properly understood, 2.326(d) may require a motion to reopen if the entire record is closed because the entire proceeding before the Board has been concluded (that is not the case here), or if (as in *Vermont Yankee*) the new contention restates a contention that the Board has already decided (that also is not the case here).

Section 2.236 does not say "a petitioner must file a motion to reopen if any aspect of the record has been closed, regardless of whether the record in the proceeding has been closed or what the petitioner seeks to do have anything to do with any record that has been closed." There is an important distinction between a closed evidentiary record relating to one contention, and a closed proceeding record. The "record" of a proceeding includes all timely raised issues and

PW's timely raised contentions, unrelated to anything that had been decided or "closed," that remain before the Board and Commission.[27]

Rule 2.326 does not apply, and indeed makes no sense, when a new request raises new matters not heretofore raised in this proceeding and does not seek to "reopen" any portion of any record or to change any "result."

None of this is changed by 10 C.F.R 2.326(d). That sub-section may apply to a new contention that seeks to reopen a previously closed portion of a record directed to a contention that has already been decided (as in *Vermont Yankee)*, or to one presented after the record in the entire proceeding has been closed (as in *New Jersey Environmental).* But neither it, nor any other aspect of 2.326 applies when the new contention does not seek to reopen anything that has been closed.

Further, the standard for reopening may not be properly applied to the new material contentions that deal with un-litigated issues. *Union of Concerned Scientists v. NRC*, 735 F.2d 1437, 1443-44 & n. 11 (D.C. Cir. 1984. The opportunity to request reopening is not an adequate substitute for the opportunity to request a hearing and the stringency of the reopening standards properly cannot be applied to new material contentions that deal with un-litigated issues). See also *Commonwealth of Mass. v. NRC*, 924 F.2d 311, 334 (D.C. Cir. 1991: "under section 189(a), the NRC may not unjustifiably require that a material contention satisfy the heightened evidentiary standards for reopening a closed record"); *Union of Concerned Scientists v. NRC.* 920 F.2d 50, (DC Cir. 1990: if the NRC were to construe its rules to prevent parties from ever raising a material issue, the aggrieved party could bring an as-applied challenge to the validity of the rules); and *Deukmajian v. NRC*, 751 F.2d 1287, 1316-17 (D.C. Cir. 1984), *vacated in part*,

[27] PW recognizes, as Entergy has pointed out (Entergy's September 12 Reply, pg., 9) that "Administrative consideration of evidence always creates a gap between the time the record is closed and the administrative decision is promulgated." But that only emphasizes that the record is this proceeding is not closed.

760 F.2d 1320 (D.C. Cir. 1985) (en banc), *and aff'd* 789 F.2d 26 (D.C. Cir. 1985) (en banc), *cert. denied,* 479 U.S. 923 (1986).

To argue that a motion to reopen is required would ignore: (i) the title of 10 C.F.R § 2.326 ("Motions to reopen'), (ii) the basic provision of clause (a) ("A motion to reopen a closed record') and (iii) the import of clause (a)(3) ("a materially different result would be or would have been likely had the newly proffered evidence been considered initially"),[28] all of which show that § 2.326 simply does not apply to PW's new contention.

In short, Rule 2.326 is clear. It applies to "A motion to reopen a closed record…." But it does not apply here, for a simple reason – no record even remotely related to the issues raised by this new contention has been closed. The record in this proceeding is and will remain open until and unless the Board and the Commission close it with respect to <u>everything</u> involved in this proceeding. Pilgrim Watch does not seek to introduce any new evidence as to any contention that has previously been considered by the ASLB; rather it seeks to add a new, entirely different in scope, contention to the proceeding.

Not one of the cases relied on by the Board in its previous decisions supports its conclusion that a motion to reopen is required here In every case cited by the Board, the new contention was directed to a matter as to which the record in fact had been closed. In at least two, whether a motion to reopen was required was not even an issue; the petitioner had filed a motion to reopen.

Sec. 2.326 is not applicable. <u>However in an abundance of caution, we have alternatively moved under, and have met the requirements of, 2.326.</u>

[28] 10 C.F.R § 2.326(a)(3) is directed to whether the new evidence sought to be presented after reopening would have likely changed the result in a decision that had already been reached, and reinforces that § 2.326 deals only with motions to reopen the record in some part of a proceeding that has been decided and closed.

PW Has Met Requirements of 2.326

Although not required to do so, PW met the requirements of 2.326, as indicated in the foregoing. The motion was timely satisfying 2.326 (a)(1). The motion addressed a significant safety or environmental issue, (2.326 (a)(2). The motion showed a materially different result would have been likely had the newly proferred evidence been considered initially, 2.326 (a)(3). The motion is accompanied by an affidavit that addresses each of the rule's criteria, 2.326 (b). The motion satisfies in full the requirements for nontimely contentions in 2.309(c).

C. National Environmental Policy Act

In addition to (and independent of) everything that has been said above, the Board cannot forget that the National Environmental Policy Act, NEPA, 42 USC § 4332, requires that the ASLB look at new and significant information in order to "help public officials make decisions that are based on understanding of environmental consequences, and take decisions that protect, restore and enhance the environment." 40 CFR § 1500.1(c) (Emphasis added)

VII. CONCLUSION

As required by NEPA, the ASLB should consider the new and significant information arising from the Fukushima accident brought forward by Pilgrim Watch before deciding whether to approve Pilgrim's Application to continue operations until 2032.

Respectfully submitted,

(Electronically signed)

Mary Lampert
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November 18, 2011

November 18, 2011

On November 16, 2011, Pilgrim Watch notified all parties of record via email of its intent to make this filing. David Lewis, representing Entergy, indicated that Entergy objects. Susan Uttal, NRC, objects. Matthew Brock, Assistant Attorney General, Commonwealth of Massachusetts does not object.

EXHIBITS

Exhibit 1: Declaration of Arnold Gundersen Supporting A Request by Pilgrim Watch For A New Contention Hearing Regarding The Inadequacy of Pilgrim Station's Environmental Report, Post Fukushima

Exhibit 2: Arnold Gundersen CV

Exhibit 3: Pilgrim Watch Requests for Review, portions pertaining to reopening

Docket No. 50-293-LR
PILGRIM WATCH
EXHIBIT ONE

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the matter of		
Entergy Corporation	)	November 17, 2011
Pilgrim Nuclear Power Station	)	Docket No. 50-293-LR
License Renewal Application	)	

DECLARATION OF ARNOLD GUNDERSEN SUPPORTING A REQUEST BY PILGRIM WATCH FOR A NEW CONTENTION HEARING REGARDING THE INADEQUACY OF PILGRIM STATION'S ENVIRONMENTAL REPORT, POST FUKUSHIMA

I, Arnold Gundersen, declare as follows:

1. My name is Arnold Gundersen. I am sui juris. I am over the age of 18-years-old.

2. I have been retained by Pilgrim Watch to provide expert services in connection with the above captioned matter regarding an application to add 20-years to the operating license of Pilgrim Station.

3. I earned my Bachelor's Degree in Nuclear Engineering from Rensselaer Polytechnic Institute (RPI) cum laude. I earned my Master's Degree in Nuclear Engineering from RPI via an Atomic Energy Commission Fellowship. Cooling tower operation and cooling tower plume theory were my area of study for my Master's Degree.

4. I began my career as a reactor operator and instructor in 1971 and progressed to the position of Senior Vice President for a nuclear licensee prior to becoming a nuclear engineering consultant and expert witness. My Curriculum Vitae is attached as Exhibit 2.

5. I have testified before the Nuclear Regulatory Commission (NRC) Atomic Safety and Licensing Board (ASLB) and Advisory Committee on Reactor Safeguards (ACRS), the State of Vermont Public Service Board, the State of Vermont Environmental Court, the Florida Public Service Commission, the State of New York Department of Environmental Conservation, and in Federal Court.

6. I am an author of the first edition of the Department of Energy (DOE) Decommissioning Handbook.

7. As an appointee of Vermont State Legislature for two years, I was charged with serving in an oversight role of Entergy Nuclear Vermont Yankee and an advisory role on nuclear reliability issues to the Vermont State Legislature.

8. I have more than 39-years of professional nuclear experience *including and not limited to*: Cooling Tower Operation, Cooling Tower Plumes, Consumptive Water Loss, Nuclear Plant Operation, Nuclear Management, Nuclear Safety Assessments, Reliability Engineering, In-service Inspection, Criticality Analysis, Licensing, Engineering Management, Thermohydraulics, Radioactive Waste Processes, Decommissioning, Waste Disposal, Structural Engineering Assessments, Nuclear Fuel Rack Design and Manufacturing, Nuclear Equipment Design and Manufacturing, Prudency Defense, Employee Awareness Programs, Public Relations, Contract Administration, Technical Patents, Archival Storage and Document Control, Source Term Reconstruction, Dose Assessment, Whistleblower Protection, and NRC Regulations and Enforcement.

9. I have personal knowledge of the facts contained in this Declaration; and I am qualified to testify in support of this Request for Hearing. Most importantly, since the accident at Fukushima Daiichi began, I have been conducting extensive research on the accidents with Japanese colleagues. As the chief engineer at Fairewinds Associates, I prepare regular Fukushima Updates, text and video presentations that are also translated into Japanese. Fairewinds' videos are widely viewed throughout the world and expand my contacts with experts reviewing the disaster. I am in contact with many Japanese and nuclear engineering experts, just two of whom are Dr. Genn Saji, Ex-Secretariat of Nuclear Safety Commission, Japan and Dr. Ko-ichi Nakamura from the National Institute of Advanced Industrial Science

and Technology (AIST). Dr. Nakamura's asked me to be one of the peer reviewers for a paper he has written concerning liquid releases from Fukushima after the accident and I am acknowledged as such in that paper.

10. Since the accidents occurred, I have discussed Fukushima related issues with the Advisory Committee on Reactor Safeguards and the NRC's 2.206 Petition Review Board.

11. Based upon my research and my contacts with other nuclear power experts in the US, Japan, and throughout the world coupled with my 39-years of experience analyzing key engineering, reliability, and safety issues at Mark 1 BWRs, I have an essential understanding of the Fukushima disaster and subsequent accidents. My unique insights and comprehensive understanding of the accident scenario at Mark 1 BWR nuclear plants enables me to assess similar accident scenarios at Pilgrim Station and the impact and costs of such an accident upon the surrounding marine environment.

OVERVIEW AND SCOPE OF THE PROCEEDING

12. My declaration is intended to support Pilgrim Watch's Request for Hearing and is specific to issues regarding the inadequacy of Pilgrim's SAMA analysis.

13. Currently, the SAMA does not consider new and significant issues raised at Fukushima regarding the probability of containment failure in the event of an accident and the concomitant probability of a significantly larger volume of off-site consequences due to the need to flood the reactor (vessel, containment, refueling pool) with huge amounts of water in a severe accident, as at Fukushima.

14. In SECY-11-0089 the NRC acknowledges that the MACCS2 code, used by Entergy in its SAMA analysis, does not model and analyze aqueous transport and dispersion of radioactive materials through surface water, sediments, soils and groundwater. Aqueous radioactive releases would be in addition to atmospheric release fallout onto open bodies of water and would increase the significance and economic consequences of the aqueous radionuclides.

15. Furthermore, there is no provision within the Severe Accident Mitigation Guidelines (SAMGs) that prepare for processing post accident radioactive water, perhaps because Entergy assumed that the volume of water required would be minimal and contained within the containment itself. The lessons learned from Fukushima show otherwise.

16. If there were a serious accident at Pilgrim, with the almost identical reactor to those at Fukushima Daiichi where the accidents occurred, it would be likely that enormous quantities of contaminated water would enter Cape Cod Bay and other nearby waters and marshlands. In light of Fukushima, such an accident at Pilgrim Station could have significant offsite consequences and unanticipated costs that would threaten the health of citizens, the ecosystem and economy.

17. Such releases might add significantly to the atmospheric release fallout onto open bodies of water. In addition, since the prevailing winds are over Cape Cod Bay, in my professional experience the resulting cleanup and waste disposal costs could be substantial due to the amount of radioactive waste created and the challenges surrounding waste clean up, mitigation, and remediation.

18. I believe that enormous quantities of contaminated water could likely enter Cape Cod Bay and other nearby waters and marshlands thereby posing significant offsite consequences and unanticipated costs that could threaten the health of citizens, the ecosystem and economy. Moreover, such releases would most likely add to the atmospheric release fallout onto open bodies of water because the prevailing winds are over Cape Cod Bay. Therefore, in my professional experience the resulting cleanup and waste disposal costs could be substantial due to the amount of radioactive waste created and the challenges surrounding waste clean up, mitigation, and remediation.

REVIEW OF THE MATERIAL AND SUPPORT OF ITS CONTENT

19. I have reviewed the Request for Hearing and support its content. In my professional judgment, the impact on the marine economy set forth in this Request for a New Contention Hearing is supported by, among other things, two reports from the Commonwealth of Massachusetts: *An*

Assessment of the Coastal and Marine Economics of Massachusetts[29] and the *Massachusetts Management Plan*[30]. In my professional judgment, NUREG-1437, Supplement 29, documents prepared for the Commonwealth and independent analysis cited support my opinion regarding the behavior of water flow and the description of biological communities in the waters surrounding Pilgrim Station.

20. In my professional opinion the hydrodynamic models referenced demonstrate that there are ample models developed and available for Entergy to use. The numerous reports referenced on Fukushima accurately reflect my research and discussions with independent Japanese scientists and engineers that is part of my reporting (text and video) for Fairewinds Associates, available on line in both English and Japanese. Numerous reports from varied, credible sources indicate that approximately 80 percent of the radiation released from the Fukushima accidents is now in aqueous form in the Pacific Ocean. Fishing has been and will continue to be restricted as a result and contamination of the aquatic food supply will increase, not decrease, as bio-accumulation occurs and the contamination increases and moves up the food chain.

THE TIMELINESS OF THIS INFORMATION IN RELATION TO THE NEW CONTENTION AND REQUEST FOR HEARING BY PILGRIM WATCH

21. In my professional opinion, this request for hearing has been brought in a timely manner because it relies upon wholly new information gleaned from the four nuclear power plant accidents at the Fukushima site and subsequent environmental disaster presenting itself in the Fukushima Prefecture. Clear information to support this contention has now only recently become available following months and months of cover-ups by the Tokyo Electric Power Company regarding the severity of these accidents, including a five-week denial that the unfolding accident was at least a Level 7. Every day I monitor information that continues to be made public regarding attempts to contain the large volumes of contaminated water cleanup including the industry-wide unanticipated challenges and burgeoning unprecedented costs.

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[29] *An Assessment of the Coastal and Marine Economics of Massachusetts*[29] RFR #: ENV 06 CZM 09 Massachusetts Office of Coastal Zone Management (CZM), University of Massachusetts President's Office, Donahue Institute, Amherst, Massachusetts, June 29, 2006

[30] *Massachusetts Management Plan*[30]*, Volume 2, Baseline Assessment and Science Framework,* December 2009

22. More specifically, according to SECY-11-0089 the MACCS2 computer code used by Entergy does not model aqueous transport. Support for this contention's timeliness is evidenced by the fact that the NRC Commissioners did not vote on and accept SECY-11-0089 *until* late September 2011.

WHAT IS THE SIGNIFICANCE OF THE NEW CONTENTION RAISED BY PILGRIM WATCH?

23. In my professional opinion, this new contention raised by Pilgrim Watch clearly addresses a significant safety and environmental issue by showing the effect of copious amounts of radioactive releases upon the marine environment, the area likely to be contaminated (or, as important, that will be believed by the public to be contaminated) and its resulting economic impact. Witnessing the events in Japan and its effect on the marine environment and economy, one cannot think otherwise.

WOULD THE SAMA BE SIGNIFICANTLY DIFFERENT IF ENTERGY MODELED AND ANALYZED AQUEOUS TRANSPORT AND DISPERSION OF RADIOACTIVE MATERIALS?

24. Yes, I believe that Entergy's Pilgrim Station SAMA would be entirely different if Entergy had modeled and analyzed aqueous transport and dispersion of radioactive materials. The new contention submitted by Pilgrim Watch clearly shows that a materially different result would be, or would have been likely, had the newly proffered evidence from the Fukushima accidents have been analyzed in the original application. Fairewinds Associates looks forward to reviewing Entergy's SAMA analysis once Entergy has modeled the impact of the release of copious amounts of radioactive water upon the aquatic, marine, and marshland environment of Cape Cod Bay and connected waters. Entergy's modeling and analysis should include mitigation and remediation of a Fukushima-like accident in Plymouth, Massachusetts and the surrounding interconnected pristine natural environments.

PLEASE DESCRIBE THE NRC REQUIREMENTS AND SEVERE ACCIDENT MITIGATION GUIDELINES REGARDING FLOODING OF THE REACTOR (VESSEL, CONTAINMENT, POOL) WITH WATER DURING A SEVERE ACCIDENT

25. According to NUREG/CR-5634, September 1991 the NRC gave some consideration to the need for flooding the reactor in a severe accident. It says the following:
    a) "Containment flooding is part of the RPV [reactor pressure vessel] control guidelines in the BWR EPGs" [Emergency Procedure Guidelines]. Page 4-19.
    b) In the second full paragraph on Page 4-19 the NRC states that flooding the Peach Bottom containment up to the RPV bottom head takes 1,500,000 gallons. Flooding the containment up to the top of the reactor core would take more water.
    c) "The primary containment is also designed to permit containment flooding (with water) to a level above the reactor core." Page 3-2 section 3.1.1.
    d) Figure 4.15 on page 4-62 lists "Containment Flooding" as a accident mitigation option
    e) Section 5.2.8 beginning on page 5-13 discusses the methods and reasons for containment flooding as an accident mitigation measure.
26. However, these SAMG guidelines have been proven to be woefully inadequate to address the actual accidents that have occurred at Fukushima 1, 2, 3, and 4. Therefore the details reviewed show that the SAMG do not address a "severe" accident at all, nor do they provide adequate assurance that a severe accident has received an adequate analysis. According to the evidence examined, the SAMG addressed only the amount of water required to fill the containment of a Boiling Water Reactor and did not consider the continued pumping into the reactor of huge volumes of water as were necessary at Fukushima due to the leak(s) at the bottom of the reactor pressure vessel.

27. Furthermore, the entire concept of "defense in depth" has failed at Fukushima where:
    - The top of the reactor fuel cannot be covered at Fukushima because the recirculation pump seals have failed.
    - Fukushima's containment has also leaked, creating a direct pathway for highly contaminated water to enter the environment.

Rather, the evidence reviewed shows that Entergy's modeling and assumptions for a "severe" accident do not adequately assess what has already occurred at four almost identical Boiling Water Reactors.

28. Severe Accident Mitigation Guidelines: Moreover, the NRC's consideration for flooding the reactor is extremely narrow. The NRC considered only weight of the water required to partially flood the reactor, along with how much space it would occupy. The isolated pertinent provision of the Severe Accident Management Guidelines deals with using water from a lake, river, or ocean to fill the containment until the level is above the top of the active fuel in the reactor core. While this option seeks to cool the reactor core, by immersion in water because it assumes all other means failed, it neglects to consider other critical criteria.

    - The plant-specific calculations performed to support this SAMG step consider how high the containment must be flooded to achieve this condition.
    - The SAMGs direct the operators to position motor-operated valves and such to their desired positions before submerging them in water and disabling them.
    - The SAMGs also look at how much water much be added to achieve the desired level and the weight (water weighs about 8 pounds per gallon) this level has on the structural integrity of the containment.

    However, there is no post-accident provision within the SAMGs for processing this water and for leakage of that water into the environment. More importantly, the accidents at Fukushima show that millions of gallons of water may have to be pumped into a reactor, most of which bleeds into the environment. And, because the industry and the NRC never anticipated or hypothesized such an accident, no method has been developed to prevent such radioactive water from bleeding and contaminating the environment during and after an accident like that at Pilgrim's sister-reactors in Fukushima.

29. SECY-11-0089 admits:

    > An important limitation of the MACCS2 code is that it does not currently model and analyze aqueous transport and dispersion of radioactive materials through the subsurface water, sediment, soils, and groundwater. As demonstrated by the recent events in Japan, certain accident scenarios can result in large volumes of contaminated water being generated by emergency measures to cool the reactor

> cores and SFPs, with yet to be determined offsite radiological consequences. To determine the relative risk significance of these types of scenarios, (Pilgrim's) Level 3 PRA must (model and analyze) the aqueous transport and dispersion of radioactive materials. SECY-11-0089, July 7, 2011, Enclosure 1, pg., 29.

On September 21, 2011, the Commissioners voted on the SECY. To the best of my knowledge, Pilgrim has not conducted the required Level 3 PRA.

HOW MUCH WATER COULD WE ASSUME WOULD BLEED INTO CAPE COD BAY FROM PILGRIM STATION IN AN ACCIDENT SCENARIO LIKE THE ONE OCCURRING IN JAPAN?

30. Since we know that millions of gallons of contaminated water bled into the ocean at Fukushima, it is reasonable to assume that the same would hold true at Pilgrim. However, there is no Pilgrim-specific factual information publicly available.

31. While NUREG/CR- 5634, September 1991 did not specifically reference Pilgrim, it said on page 4-19 that flooding the Peach Bottom (Boiling Water Reactor) containment up to the RPV bottom head takes 1,500,000 gallons.
    - This postulation assumes that the containment retains its integrity, and that did not happen at Fukushima.
    - It is important to note that flooding the containment up to the top of the reactor core would take more water. This postulation also assumes that the reactor pressure vessel would retain its integrity, and that did not happen at Fukushima.

    Using Fukushima as a reference, continuing to fill a leaking reactor to maintain a water level up to the top of the core could mean that millions of gallons of radioactive water would bleed into the environment in an accident like that at Pilgrim's sister-reactors in Fukushima.

32. The Boiling Water Reactor Owners Groups (BWORG) developed templates for the Severe Accident management Guidelines, but has not produced its results for public review. Each owner of a Boiling Water Reactor (presumably including Entergy) was asked to perform site-specific calculations to determine the trigger set points and volumes/gallons associated with the SAMG steps. It is my understanding that Pilgrim's responses to the BWORG

request are not being made available to the public for review. In response to an inquiry by Pilgrim Watch, Ronald R. Bellamy, NRC Chief Projects Branch 5 said, "We have searched for any such documentation here in the region, in Headquarters, and in ADAMS. We also spoke to our technical experts. This document was not something that needed to be sent to the NRC and docketed, and we have been unable to find a copy in our system." As an independent expert witness for Pilgrim Watch, I look forward to receiving, and reviewing, Entergy's response for Pilgrim Station.

HOW LARGE AN AREA WOULD LIKELY BE IMPACTED?

33. Here again, we know that the area impacted by the disaster at Fukushima is enormous and according to other experts over time the entire Pacific Ocean will become contaminated. Therefore, there is every reason to expect that a similarly large area would be affected by a similar accident at Pilgrim Station. It is certainly reasonable to assume that the entire Cape Cod Bay would be unusable by the public for its intended function after a severe accident at Pilgrim Station. However, and once again, no Pilgrim-specific information has been made available for valid independent scientific review. Based upon experiences at Fukushima, it is my professional judgment that the area affected, and, more importantly, believed to be contaminated, would be as large as that at Fukushima Daiichi in a similar severe accident scenario at Pilgrim Station located as it is in relation to the Cape Cod and Massachusetts Bays and feeding into the Atlantic Ocean.

34. There are sophisticated and readily available models that Entergy could use to track the likely path and dilution of discharges into Cape Cod Bay. For example, The Marine Ecosystem Dynamics Modeling Laboratory (MEDML) at the School for Marine Science and Technology, University of Massachusetts–Dartmouth has a research team focusing on coastal and estuary circulation, frontal dynamics, bio-physical interaction, suspended sediment processes, and ecosystem modeling. This ecological scientific team has developed a model, described as an unstructured grid, Finite-Volume, primitive equation Community Ocean Model (FVCOM) that is specifically designed to simulate the circulation and ecosystem dynamics particularly for regions near Pilgrim that are characterized by irregular complex coastlines, islands, inlets, creeks, and inter-tidal zones. Furthermore, in

collaboration with scientists at the Woods Hole Oceanographic Institution (WHOI), these scientists are building an integrated high-resolution model system that is capable of hindcasts, nowcasts, and forecasts of circulation and key ecosystem processes in coastal oceans and estuaries that would be valuable for Pilgrim's SAMA analysis. As described, the major components of this system include:

34.1. a meso-scale meteorological model,

34.2. FVCOM,

34.3. a sediment model based on the Community Sediment Transport Model,

34.4. a generalized lower trophic level food web model,

34.5. multi-stage zooplankton models, and

34.6. the EPA-standard water quality model.

Moreover, a GUI has been developed for system operation and post-processing. In collaboration with scientists at Massachusetts Institute of Technology (MIT), they have implemented both ensemble and reduced Kalman filters into FVCOM to build a model-based observing and prediction coastal ocean system.

35. MEDML, conveniently located close to Plymouth, has a computational center for ocean modeling equipped with a super performance Linux cluster. And additionally, considerable research on pollutant transport in Massachusetts and Cape Cod Bays has been done in response to the construction of a large sewage treatment outflow in Boston Harbor.

36. In my opinion, these are critical resources that Entergy must apply to perform a real life accident scenario analysis given the significant contamination due to the bleeding of radioactive water into the environment from Pilgrim Station's sister plants at Fukushima.

OVER WHAT TIME PERIOD SHOULD MODELING THE DILUTION AND TRANSPORT OF RADIOACTIVE LIQUID DISCHARGES EXTEND AND WILL AVERAGING BE IMPORTANT TO ENTERGY'S ANALYSIS?

37. Because pollutant transport is affected by factors that are highly variable over time, it is important that Entergy model over at least a 5-year time period, and use the 95% percentile, and not simply the mean. For example, winds affect the direction and strength of currents. Strong winds, seen more frequently in winter and during years with more frequent storms,

serve to mix the water column affecting the dilution of contaminants. River discharges also affect current direction and that varies from year to year depending upon the extent of snow and fresh water melt into the Gulf of Maine and Massachusetts Bay. Therefore, in my opinion, a single year's worth of data cannot provide a sufficiently conservative data set for the purposes of Pilgrim's SAMA analysis. Additionally, it is important that a 95th percentile analysis, not one simply based on a mean, be used to provide a reasonable estimate of potential risk and costs. The data affecting contaminant dispersion and dilution would have to be averaged in order to be input into a model, but a mean-based analysis would totally obscure the real risk. The SAMA analysis would be functionally dependent on the choice of statistical input parameter or average.

WHAT WOULD BE THE LIKELY ECONOMIC IMPACTS?

38. We know that the impact of Fukushima on Japan, and on its marine-dependent industry has been staggering. Converting Japanese Yen to US dollars in order to assess the economic impact of such an accident at Pilgrim Station shows that Price Anderson insurance limits will be exceeded to pay compensation for damages, much of which is due to marine dependent industry losses.

CONCLUSION

39. In conclusion, the accidents at Fukushima Daiichi occurred at nuclear power plants almost identical to Pilgrim Station. If such an accident were to occur at the similarly aged and almost identical Pilgrim Station BWR Mark 1, it is my opinion that the economic impacts would be significant in a similar accident scenario at Pilgrim. However additional factual information, that is not currently publicly available, is required from Entergy in order to correctly ascertain the significant damage that would be caused to the environment if such an accident were to occur at Pilgrim Station. To conduct a thorough scientific analysis, Entergy should provide information regarding: the likely volume of water fed into the reactor in an accident similar to Fukushima; the volume and radioactive composition of water bleeding into Cape Cod Bay, added on top of the radioactive fallout onto the water from the air; and the area likely to be impacted, and equally as important, the area believed may be impacted. For example, there are comprehensive studies on the marine economy

performed for the Commonwealth of Massachusetts by the University of Massachusetts Donahue Institute that could be applied and used as a baseline once Entergy and the NRC make this required information available.

-End-

I declare that under penalty of perjury that the foregoing is true and correct to the best of my knowledge. The facts presented in this declaration are true and correct to the best of my knowledge, and the opinions expressed are based on my best professional judgment.
Executed in Accord with 10 CFR 2.304 (d) and 2.326 (b),

(Electronically signed)

_____

Arnold Gundersen, MSNE, RO
Fairewinds Associates, Inc
Burlington, Vermont 05408
Tel: (802) 865 9955
Email: arnie@fairewinds.com
Date: November 17, 2011

EXHIBIT 2

CURRICULUM VITAE
Arnold Gundersen

Chief Engineer, Fairewinds Associates, Inc
November 2011

Education and Training

ME NE	Master of Engineering Nuclear Engineering Rensselaer Polytechnic Institute, 1972 U.S. Atomic Energy Commission Fellowship Thesis: Cooling Tower Plume Rise
BS NE	Bachelor of Science Nuclear Engineering Rensselaer Polytechnic Institute, Cum Laude, 1971 James J. Kerrigan Scholar
RO	Licensed Reactor Operator, U.S. Atomic Energy Commission License # OP-3014

Qualifications – including and not limited to:

- Chief Engineer, Fairewinds Associates, Inc
- Nuclear Engineering, Safety, and Reliability Expert
- Federal and Congressional hearing testimony and Expert Witness testimony
- Former Senior Vice President Nuclear Licensee
- Former Licensed Reactor Operator
- 39-years of nuclear industry experience and oversight
    - Nuclear engineering management assessment and prudency assessment
    - Nuclear power plant licensing and permitting – assessment and review
    - Nuclear safety assessments, source term reconstructions, dose assessments, criticality analysis, and thermohydraulics
    - Contract administration, assessment and review
    - Systems engineering and structural engineering assessments
    - Cooling tower operation, cooling tower plumes, thermal discharge assessment, and consumptive water use
    - Nuclear fuel rack design and manufacturing, nuclear equipment design and manufacturing, and technical patents
    - Radioactive waste processes, storage issue assessment, waste disposal and decommissioning experience
    - Reliability engineering and aging plant management assessments, in-service inspection
    - Employee awareness programs, whistleblower protection, and public communications
    - Quality Assurance (QA) & records

Publications

Co-author — *Fairewinds Associates 2009-2010 Summary to JFC,* July 26, 2010 State of Vermont, Joint Fiscal Office, (http://www.leg.state.vt.us/jfo/envy.aspx).

Co-author — *Supplemental Report of the Public Oversight Panel Regarding the Comprehensive Reliability Assessment of the Vermont Yankee Nuclear Power Plant July 20, 2010,* to the Vermont State Legislature by the Vermont Yankee Public Oversight Panel.

Co-author — The Second Quarterly Report by Fairewinds Associates, Inc to the Joint Legislative Committee regarding buried pipe and tank issues at Entergy Nuclear Vermont Yankee and Entergy proposed Enexus spinoff. See two reports: *Fairewinds Associates 2nd Quarterly Report to JFC* and *Enexus Review by Fairewinds Associates.*

Author — Fairewinds Associates, Inc *First Quarterly Report to the Joint Legislative Committee*, October 19, 2009.

Co-author — *Report of the Public Oversight Panel Regarding the Comprehensive Reliability Assessment of the Vermont Yankee Nuclear Power Plant*, March 17, 2009, to the Vermont State Legislature by the Vermont Yankee Public Oversight Panel.

Co-author — *Vermont Yankee Comprehensive Vertical Audit – VYCVA – Recommended Methodology to Thoroughly Assess Reliability and Safety Issues at Entergy Nuclear Vermont Yankee, January 30, 2008 Testimony to Finance Committee Vermont Senate.*

Co-author — *Decommissioning Vermont Yankee – Stage 2 Analysis of the Vermont Yankee Decommissioning Fund – The Decommissioning Fund Gap*, December 2007, Fairewinds Associates, Inc. Presented to Vermont State Senators and Legislators.

Co-author — *Decommissioning the Vermont Yankee Nuclear Power Plant: An Analysis of Vermont Yankee's Decommissioning Fund and Its Projected Decommissioning Costs*, November 2007, Fairewinds Associates, Inc.

Co-author — *DOE Decommissioning Handbook, First Edition*, 1981-1982, invited author.

Presentations & Media

Fairewinds Energy Education Corp 501c3 presentations at the University of Vermont (2), Boston Library (6/16/11), Duxbury Emergency Management (6/15/11), Vermont State Nuclear Advisory Panel (VSNAP), Elder Education Enrichment, New Jersey Environmental Federation (5/14/11), Quaker Meeting House, Press Conference for Physicians for Social Responsibility (5/19/11), St. Johnsbury Academy – Nuclear Power 101.

Educational videos on nuclear safety, reliability and engineering particularly Fukushima issues. Videos may be viewed @ fairewinds.com 24 videos (July 21, 2011).

Expert commentary: CNN (6), The John King Show (14), BBC, CBC, Russia Today, VPR, WPTZ, WCAX, WBAI, NECN, Pacifica, Democracy Now, *Washington Post*, *New York Times*, *The Guardian*, *Bloomberg* (print & TV), *Reuters*, *Associated Press*, *The Global Post*, *Miami Herald*, *Al Jazeera, The Tennessean*, The Chris Martinson Show, *Mainichi News*, *Gendai Magazine*, NHK television, *Scientific American*. *Huffington Post* (Paris) named Fairewinds.com the best go to site for Fukushima information (5/9/11).

Patents

Energy Absorbing Turbine Missile Shield – U.S. Patent # 4,397,608 – 8/9/1983

Committee Memberships

Vermont Yankee Public Oversight Panel, appointed 2008 by President Pro-Tem Vermont Senate
National Nuclear Safety Network – Founding Board Member
Three Rivers Community College – Nuclear Academic Advisory Board
Connecticut Low Level Radioactive Waste Advisory Committee – 10 years, founding member
Radiation Safety Committee, NRC Licensee – founding member
ANSI N-198, Solid Radioactive Waste Processing Systems

Honors

U.S. Atomic Energy Commission Fellowship, 1972
B.S. Degree, Cum Laude, RPI, 1971, 1st in nuclear engineering class
Tau Beta Pi (Engineering Honor Society), RPI, 1969 – 1 of 5 in sophomore class of 700
James J. Kerrigan Scholar 1967–1971
Teacher of the Year – 2000, Marvelwood School
Publicly commended to U.S. Senate by NRC Chairman, Ivan Selin, in May 1993 – "It is true...everything Mr. Gundersen said was absolutely right; he performed quite a service."

Expert Witness Testimony and Nuclear Engineering Analysis and Consulting

Nuclear Regulatory Commission – November 10, 2011
Expert witness report entitled: *Fukushima and the Westinghouse-Toshiba AP1000, A Report for the AP1000 Oversight Group by Fairewinds Associates, Inc,* and Video. Submitted to NRC by the AP1000 Oversight Group.

Nuclear Regulatory Commission – October 7, 2011
Testimony to the NRC Petition Review Board Re: Mark 1 Boiling Water Reactors, Petition for NRC to shut down all BWR Mark 1 nuclear power plants due to problems in containment integrity in the Mark 1 design.

New York State Department Of Environmental Conservation, October 4, 2011
Prefiled Rebuttal Testimony Of Arnold Gundersen On Behalf Of Petitioners Riverkeeper, Inc., Scenic Hudson, Inc., And Natural Resources Defense Council, Inc. To The Direct Testimony Of Matthew J. Barvenik (Senior Principal Gza Geoenvironmental, Inc.) Regarding Radiological Materials

Southern Alliance for Clean Energy (SACE) submission to TVA Board of Directors – August 3, 2011
Expert witness report entitled: *The Risks of Reviving TVA's Bellefonte Project,* and Video prepared for the Southern Alliance for Clean Energy (SACE).

New York State Department Of Environmental Conservation, July 22, 2011

Nuclear Regulatory Commission – May 10, 2011
Comment to the proposed rule on the AP1000 Design Certification Amendment Docket ID NRC-2010-0131 As noticed in the Federal Register on February 24, 2011 Retained by Friends of the Earth as Expert Witness.

Nuclear Regulatory Commission – May 10, 2011
Comment to the proposed rule on the AP1000 Design Certification Amendment Docket ID NRC-2010-0131 As noticed in the Federal Register on February 24, 2011 Retained by Friends of the Earth as Expert Witness.

NRC Advisory Committee on Reactor Safeguards (ACRS) – May 26, 2011
Lessons learned from Fukushima and Containment Integrity on the AP1000.

Vermont Energy Cooperative (VEC) – April 26, 2011
Vermont Yankee – Is It Reliable for 20 more years?

Vermont State Nuclear Advisory Panel (VSNAP) – February 22, 2011
Testimony and presentation entitled the *Vermont Yankee Public Oversight Panel Supplemental Report* regarding management issues at the Vermont Yankee Nuclear Power Plant to the reconvened Vermont State Nuclear Advisory Panel.

Vermont State Legislature Senate Committee On Natural Resources And Energy
February 8, 2011. Testimony: *Vermont Yankee Leaks and Implications*.
(http://www.leg.state.vt.us/jfo/envy.aspx)

Vermont State Legislature – January 26, 2011
House Committee On Natural Resources And Energy, and
Senate Committee On Natural Resources And Energy
Testimony regarding Fairewinds Associates, Inc's report: *Decommissioning the Vermont Yankee Nuclear Power Plant and Storing Its Radioactive Waste*
(http://www.leg.state.vt.us/jfo/envy.aspx). Additional testimony was also given regarding the newest radioactive isotopic leak at the Vermont Yankee nuclear power plant.

Vermont State Legislature Joint Fiscal Committee Legislative Consultant Regarding Entergy Nuclear Vermont Yankee *Decommissioning the Vermont Yankee Nuclear Power Plant and Storing Its Radioactive Waste* January 2011. (http://www.leg.state.vt.us/jfo/envy.aspx).

U.S. Nuclear Regulatory Commission Advisory Committee on Reactor Safeguards (NRC-ACRS) AP1000 Sub-Committee
Nuclear Containment Failures: Ramifications for the AP1000 Containment Design,
Supplemental Report submitted December 21, 2010. (http://fairewinds.com/reports)

Vermont State Legislature Joint Fiscal Committee Legislative Consultant Regarding Entergy Nuclear Vermont Yankee *Reliability Oversight Entergy Nuclear Vermont Yankee, December 6, 2010.* Discussion regarding the leaks at Vermont Yankee and the ongoing monitoring of those leaks and ENVY's progress addressing the 90-items identified in Act 189 that require remediation. (http://www.leg.state.vt.us/jfo/envy.aspx).

U.S. Nuclear Regulatory Commission Atomic Safety and Licensing Board (NRC-ASLB) *Declaration Of Arnold Gundersen Supporting Blue Ridge Environmental Defense League's Contention Regarding Consumptive Water Use At Dominion Power's Newly Proposed North Anna Unit 3 Pressurized Water Reactor* in the matter of Dominion Virginia Power North Anna Power Station Unit 3 Docket No. 52-017 Combined License Application ASLBP#08-863-01-COL, October 2, 2010.

U.S. Nuclear Regulatory Commission Atomic Safety and Licensing Board (NRC-ASLB) *Declaration Of Arnold Gundersen Supporting Blue Ridge Environmental Defense League's New Contention Regarding AP1000 Containment Integrity On The Vogtle Nuclear Power Plant Units 3 And 4* in the matter of the Southern Nuclear Operating Company Vogtle Electric Generating Plant, Units 3&4 Combined License Application, Docket Nos. 52-025-COL and 52-026-COL and ASLB No. 09-873-01-COL-BD01, August 13, 2010.

Vermont State Legislature Joint Fiscal Committee Legislative Consultant Regarding Entergy Nuclear Vermont Yankee – July 26, 2010
Summation for 2009 to 2010 Legislative Year For the Joint Fiscal Committee Reliability Oversight Entergy Nuclear Vermont Yankee (ENVY) Fairewinds Associates 2009-2010. This summary includes an assessment of ENVY's progress (as of July 1, 2010) toward meeting the milestones outlined by the Act 189 Vermont Yankee Public Oversight Panel in its March 2009 report to the Legislature, the new milestones that have been added since the incident with the tritium leak and buried underground pipes, and the new reliability challenges facing ENVY, Entergy, and the State of Vermont. (http://www.leg.state.vt.us/jfo/envy.aspx)

U.S. Nuclear Regulatory Commission Atomic Safety and Licensing Board (NRC-ASLB) *Declaration Of Arnold Gundersen Supporting Blue Ridge Environmental Defense League's Contentions* in the matter of Dominion Virginia Power North Anna Station Unit 3 Combined License Application, Docket No. 52-017, ASLBP#08-863-01-COL, July 23, 2010.

Florida Public Service Commission (FPSC)
Licensing and construction delays due to problems with the newly designed Westinghouse AP1000 reactors in *Direct Testimony In Re: Nuclear Plant Cost Recovery Clause By The Southern Alliance For Clean Energy (SACE)*, FPSC Docket No. 100009-EI, July 8, 2010.

U.S. Nuclear Regulatory Commission Advisory Committee on Reactor Safeguards (NRC-ACRS) AP1000 Sub-Committee
Presentation to ACRS regarding design flaw in AP1000 Containment – June 25, 2010
Power Point Presentation: http://fairewinds.com/content/ap1000-nuclear-design-flaw-addressed-to-nrc-acrs.

U.S. Nuclear Regulatory Commission Atomic Safety and Licensing Board (NRC-ASLB)
Second Declaration Of Arnold Gundersen Supporting Supplemental Petition Of Intervenors Contention 15: DTE COLA Lacks Statutorily Required Cohesive QA Program – June 8, 2010.

NRC Chairman Gregory Jaczko, ACRS, Secretary of Energy Chu, and the White House Office of Management and Budget
AP1000 Containment Leakage Report Fairewinds Associates - Gundersen, Hausler, 4-21-2010.
This report, commissioned by the AP1000 Oversight Group, analyzes a potential flaw in the containment of the AP1000 reactor design.

Vermont State Legislature House Committee On Natural Resources And Energy – April 5, 2010
Testified to the House Committee On Natural Resources And Energy regarding discrepancies in Entergy's TLG Services decommissioning analysis. See *Fairewinds Cost Comparison TLG Decommissioning* (http://www.leg.state.vt.us/jfo/envy.aspx).

Vermont State Legislature Joint Fiscal Committee Legislative Consultant Regarding Entergy Nuclear Vermont Yankee – February 22, 2010
The Second Quarterly Report by Fairewinds Associates, Inc to the Joint Legislative Committee regarding buried pipe and tank issues at Entergy Nuclear Vermont Yankee and Entergy proposed Enexus spinoff. See two reports: *Fairewinds Associates 2nd Quarterly Report to JFC* and *Enexus Review by Fairewinds Associates*. (http://www.leg.state.vt.us/jfo/envy.aspx).

Vermont State Legislature Senate Natural Resources – February 16, 2010
Testified to Senate Natural Resources Committee regarding causes and severity of tritium leak in unreported buried underground pipes, status of Enexus spinoff proposal, and health effects of tritium.

Vermont State Legislature Senate Natural Resources – February 10, 2010
Testified to Senate Natural Resources Committee regarding causes and severity of tritium leak in unreported buried underground pipes. http://www.youtube.com/watch?v=36HJiBrJSxE

Vermont State Legislature Senate Finance – February 10, 2010
Testified to Senate Finance Committee regarding *A Chronicle of Issues Regarding Buried Tanks and Underground Piping at VT Yankee.* (http://www.leg.state.vt.us/jfo/envy.aspx).

Vermont State Legislature House Committee On Natural Resources And Energy – January 27, 2010 *A Chronicle of Issues Regarding Buried Tanks and Underground Piping at VT Yankee*. (http://www.leg.state.vt.us/jfo/envy.aspx).

Submittal to Susquehanna River Basin Commission, by Eric Epstein – January 5, 2010
Expert Witness Report Of Arnold Gundersen Regarding Consumptive Water Use Of The Susquehanna River By The Proposed PPL Bell Bend Nuclear Power Plant In the Matter of RE: Bell Bend Nuclear Power Plant Application for Groundwater Withdrawal Application for Consumptive Use BNP-2009-073.

U.S. Nuclear Regulatory Commission Atomic Safety and Licensing Board (NRC-ASLB)
Declaration of Arnold Gundersen Supporting Supplemental Petition of Intervenors Contention 15: Detroit Edison COLA Lacks Statutorily Required Cohesive QA Program, December 8, 2009.

U.S. NRC Region III Allegation Filed by Missouri Coalition for the Environment
Expert Witness Report entitled: *Comments on the Callaway Special Inspection by NRC Regarding the May 25, 2009 Failure of its Auxiliary Feedwater System,* November 9, 2009.

Vermont State Legislature Joint Fiscal Committee Legislative Consultant Regarding Entergy Nuclear Vermont Yankee
Oral testimony given to the Vermont State Legislature Joint Fiscal Committee October 28, 2009. See report: *Quarterly Status Report - ENVY Reliability Oversight for JFO* (http://www.leg.state.vt.us/jfo/envy.aspx).

Vermont State Legislature Joint Fiscal Committee Legislative Consultant Regarding Entergy Nuclear Vermont Yankee
The First Quarterly Report by Fairewinds Associates, Inc to the Joint Legislative Committee regarding reliability issues at Entergy Nuclear Vermont Yankee, issued October 19, 2009. See report: *Quarterly Status Report - ENVY Reliability Oversight for JFO* (http://www.leg.state.vt.us/jfo/envy.aspx).

Florida Public Service Commission (FPSC)
Gave direct oral testimony to the FPSC in hearings in Tallahassee, FL, September 8 and 10, 2009 in support of Southern Alliance for Clean Energy (SACE) contention of anticipated licensing and construction delays in newly designed Westinghouse AP 1000 reactors proposed by Progress Energy Florida and Florida Power and Light (FPL).

Florida Public Service Commission (FPSC)
NRC announced delays confirming my original testimony to FPSC detailed below. My supplemental testimony alerted FPSC to NRC confirmation of my original testimony regarding licensing and construction delays due to problems with the newly designed Westinghouse AP 1000 reactors in *Supplemental Testimony In Re: Nuclear Plant Cost Recovery Clause By The Southern Alliance For Clean Energy*, FPSC Docket No. 090009-EI, August 12, 2009.

Florida Public Service Commission (FPSC)
Licensing and construction delays due to problems with the newly designed Westinghouse AP 1000 reactors in *Direct Testimony In Re: Nuclear Plant Cost Recovery Clause By The Southern Alliance For Clean Energy (SACE)*, FPSC Docket No. 090009-EI, July 15, 2009.

Vermont State Legislature Joint Fiscal Committee Expert Witness Oversight Role for Entergy

Nuclear Vermont Yankee (ENVY)

Contracted by the Joint Fiscal Committee of the Vermont State Legislature as an expert witness to oversee the compliance of ENVY to reliability issues uncovered during the 2009 legislative session by the Vermont Yankee Public Oversight Panel of which I was appointed a member along with former NRC Commissioner Peter Bradford for one year from July 2008 to 2009.

Entergy Nuclear Vermont Yankee (ENVY) is currently under review by Vermont State Legislature to determine if it should receive a Certificate for Public Good (CPG) to extend its operational license for another 20-years. Vermont is the only state in the country that has legislatively created the CPG authorization for a nuclear power plant. Act 160 was passed to ascertain ENVY's ability to run reliably for an additional 20 years. Appointment from July 2009 to May 2010.

U.S. Nuclear Regulatory Commission
Expert Witness Declaration regarding Combined Operating License Application (COLA) at North Anna Unit 3 *Declaration of Arnold Gundersen Supporting Blue Ridge Environmental Defense League's Contentions* (June 26, 2009).

U.S. Nuclear Regulatory Commission

Expert Witness Declaration regarding Through-wall Penetration of Containment Liner and Inspection Techniques of the Containment Liner at Beaver Valley Unit 1 Nuclear Power Plant *Declaration of Arnold Gundersen Supporting Citizen Power's Petition* (May 25, 2009).

U.S. Nuclear Regulatory Commission

Expert Witness Declaration regarding Quality Assurance and Configuration Management at Bellefonte Nuclear Plant *Declaration of Arnold Gundersen Supporting Blue Ridge Environmental Defense League's Contentions in their Petition for Intervention and Request for Hearing*, May 6, 2009.

Pennsylvania Statehouse
Expert Witness Analysis presented in formal presentation at the Pennsylvania Statehouse, March 26, 2009 regarding actual releases from Three Mile Island Nuclear Accident. Presentation may be found at: http://www.tmia.com/march26

Vermont Legislative Testimony and Formal Report for 2009 Legislative Session
As a member of the Vermont Yankee Public Oversight Panel, I spent almost eight months examining the Vermont Yankee Nuclear Power Plant and the legislatively ordered Comprehensive Vertical Audit. Panel submitted Act 189 Public Oversight Panel Report March 17, 2009 and oral testimony to a joint hearing of the Senate Finance and House Committee On Natural Resources And Energy March 19, 2009. (See: http://www.leg.state.vt.us/JFO/Vermont%20Yankee.htm)

Finestone v FPL (11/2003 to 12/2008) Federal Court

Plaintiffs' Expert Witness for Federal Court Case with Attorney Nancy LaVista, from the firm Lytal, Reiter, Fountain, Clark, Williams, West Palm Beach, FL. This case involved two plaintiffs in cancer cluster of 40 families alleging that illegal radiation releases from nearby nuclear power plant caused children's cancers. Production request, discovery review, preparation of deposition questions and attendance at Defendant's experts for deposition, preparation of expert witness testimony, preparation for Daubert Hearings, ongoing technical oversight, source term reconstruction and appeal to Circuit Court.

U.S. Nuclear Regulatory Commission Advisory Committee Reactor Safeguards (NRC-ACRS)
Expert Witness providing oral testimony regarding Millstone Point Unit 3 (MP3) Containment issues in hearings regarding the Application to Uprate Power at MP3 by Dominion Nuclear, Washington, and DC. (July 8-9, 2008).

Appointed by President Pro-Tem of Vermont Senate to Legislatively Authorized Nuclear Reliability Public Oversight Panel
To oversee Comprehensive Vertical Audit of Entergy Nuclear Vermont Yankee (Act 189) and testify to State Legislature during 2009 session regarding operational reliability of ENVY in relation to its 20-year license extension application. (July 2, 2008 to present).

U.S. Nuclear Regulatory Commission Atomic Safety and Licensing Board (NRC-ASLB)
Expert Witness providing testimony regarding *Pilgrim Watch's Petition for Contention 1 Underground Pipes* (April 10, 2008).

U.S. Nuclear Regulatory Commission Atomic Safety and Licensing Board (NRC-ASLB)
Expert Witness supporting *Connecticut Coalition Against Millstone In Its Petition For Leave To Intervene, Request For Hearing, And Contentions Against Dominion Nuclear Connecticut Inc.'s Millstone Power Station Unit 3 License Amendment Request For Stretch Power Uprate* (March 15, 2008).

U.S. Nuclear Regulatory Commission Atomic Safety and Licensing Board (NRC-ASLB)
Expert Witness supporting *Pilgrim Watch's Petition For Contention 1*: *specific to issues regarding the integrity of Pilgrim Nuclear Power Station's underground pipes and the ability of Pilgrim's Aging Management Program to determine their integrity*. (January 26, 2008).

Vermont State House – 2008 Legislative Session

- House Committee on Natural Resources and Energy – Comprehensive Vertical Audit: *Why NRC Recommends a Vertical Audit for Aging Plants Like Entergy Nuclear Vermont Yankee (ENVY)*
- House Committee on Commerce – Decommissioning Testimony

Vermont State Senate – 2008 Legislative Session

- Senate Finance – testimony regarding Entergy Nuclear Vermont Yankee Decommissioning Fund
- Senate Finance – testimony on the necessity for a Comprehensive Vertical Audit (CVA) of Entergy Nuclear Vermont Yankee
- House Committee on Natural Resources and Energy – testimony regarding the placement of high-level nuclear fuel on the banks of the Connecticut River in Vernon, VT

U.S. Nuclear Regulatory Commission Atomic Safety and Licensing Board (NRC-ASLB)

MOX Limited Appearance Statement to Judges Michael C. Farrar (Chairman), Lawrence G. McDade, and Nicholas G. Trikouros for the "Petitioners": Nuclear Watch South, the Blue Ridge Environmental Defense League, and Nuclear Information & Resource Service in support of *Contention 2: Accidental Release of Radionuclides, requesting a hearing concerning faulty accident consequence assessments made for the MOX plutonium fuel factory proposed for the Savannah River Site*. (September 14, 2007).

Appeal to the Vermont Supreme Court (March 2006 to 2007)

Expert Witness Testimony in support of *New England Coalition's Appeal to the Vermont Supreme Court Concerning: Degraded Reliability at Entergy Nuclear Vermont Yankee as a Result of the Power Uprate*. New England Coalition represented by Attorney Ron Shems of Burlington, VT.

State of Vermont Environmental Court (Docket 89-4-06-vtec 2007)

Expert witness retained by New England Coalition to review Entergy and Vermont Yankee's analysis of alternative methods to reduce the heat discharged by Vermont Yankee into the Connecticut River. Provided Vermont's Environmental Court with analysis of alternative methods systematically applied throughout the nuclear industry to reduce the heat discharged by

nuclear power plants into nearby bodies of water and avoid consumptive water use. This report included a review of the condenser and cooling tower modifications.

U.S. Senator Bernie Sanders and Congressman Peter Welch (2007)
Briefed Senator Sanders, Congressman Welch and their staff members regarding technical and engineering issues, reliability and aging management concerns, regulatory compliance, waste storage, and nuclear power reactor safety issues confronting the U.S. nuclear energy industry.

State of Vermont Legislative Testimony to Senate Finance Committee (2006)
Testimony to the Senate Finance Committee regarding Vermont Yankee decommissioning costs, reliability issues, design life of the plant, and emergency planning issues.

U.S. Nuclear Regulatory Commission Atomic Safety and Licensing Board (NRC-ASLB)
Expert witness retained by New England Coalition to provide Atomic Safety and Licensing Board with an independent analysis of the integrity of the Vermont Yankee Nuclear Power Plant condenser (2006).

U.S. Senators Jeffords and Leahy (2003 to 2005)
Provided the Senators and their staffs with periodic overview regarding technical, reliability, compliance, and safety issues at Entergy Nuclear Vermont Yankee (ENVY).

10CFR 2.206 filed with the Nuclear Regulatory Commission (July 2004)
Filed 10CFR 2.206 petition with NRC requesting confirmation of Vermont Yankee's compliance with General Design Criteria.

State of Vermont Public Service Board (April 2003 to May 2004)
Expert witness retained by New England Coalition to testify to the Public Service Board on the reliability, safety, technical, and financial ramifications of a proposed increase in power (called an uprate) to 120% at Entergy's 31-year-old Vermont Yankee Nuclear Power Plant.

International Nuclear Safety Testimony
Worked for ten days with the President of the Czech Republic (Vaclav Havel) and the Czech Parliament on their energy policy for the 21st century.

Nuclear Regulatory Commission (NRC) Inspector General (IG)
Assisted the NRC Inspector General in investigating illegal gratuities paid to NRC Officials by Nuclear Energy Services (NES) Corporate Officers. In a second investigation, assisted the Inspector General in showing that material false statements (lies) by NES corporate president caused the NRC to overlook important violations by this licensee.

State of Connecticut Legislature
Assisted in the creation of State of Connecticut Whistleblower Protection legal statutes.

Federal Congressional Testimony
Publicly recognized by NRC Chairman, Ivan Selin, in May 1993 in his comments to U.S. Senate, "It is true...everything Mr. Gundersen said was absolutely right; he performed quite a service." Commended by U.S. Senator John Glenn for public testimony to Senator Glenn's NRC Oversight Committee.

PennCentral Litigation
Evaluated NRC license violations and material false statements made by management of this nuclear engineering and materials licensee.

Three Mile Island Litigation
Evaluated unmonitored releases to the environment after accident, including containment breach, letdown system and blowout. Proved releases were 15 times higher than government estimate and subsequent government report.

Western Atlas Litigation
Evaluated neutron exposure to employees and license violations at this nuclear materials licensee.

Commonwealth Edison
In depth review and analysis for Commonwealth Edison to analyze the efficiency and effectiveness of all Commonwealth Edison engineering organizations, which support the operation of all of its nuclear power plants.

Peach Bottom Reactor Litigation
Evaluated extended 28-month outage caused by management breakdown and deteriorating condition of plant.

***Special Remediation Expertise*:**

Director of Engineering, Vice President of Site Engineering, and the Senior Vice President of Engineering at Nuclear Energy Services (NES) Division of Penn Central Corporation (PCC)

- NES was a nuclear licensee that specialized in dismantlement and remediation of nuclear facilities and nuclear sites. Member of the radiation safety committee for this licensee.
- Department of Energy chose NES to write *DOE Decommissioning Handbook* because NES had a unique breadth and depth of nuclear engineers and nuclear physicists on staff.
- Personally wrote the "Small Bore Piping" chapter of the DOE's first edition Decommissioning Handbook, personnel on my staff authored other sections, and I reviewed the entire Decommissioning Handbook.
- Served on the Connecticut Low Level Radioactive Waste Advisory Committee for 10 years from its inception.

- Managed groups performing analyses on dozens of dismantlement sites to thoroughly remove radioactive material from nuclear plants and their surrounding environment.
- Managed groups assisting in decommissioning the Shippingport nuclear power reactor. Shippingport was the first large nuclear power plant ever decommissioned. The decommissioning of Shippingport included remediation of the site after decommissioning.
- Managed groups conducting site characterizations (preliminary radiation surveys prior to commencement of removal of radiation) at the radioactively contaminated West Valley site in upstate New York.
- Personnel reporting to me assessed dismantlement of the Princeton Avenue Plutonium Lab in New Brunswick, NJ. The lab's dismantlement assessment was stopped when we uncovered extremely toxic and carcinogenic underground radioactive contamination.
- Personnel reporting to me worked on decontaminating radioactive thorium at the Cleveland Avenue nuclear licensee in Ohio. The thorium had been used as an alloy in turbine blades. During that project, previously undetected extremely toxic and carcinogenic radioactive contamination was discovered below ground after an aboveground gamma survey had purported that no residual radiation remained on site.

Additional Education

Basic Mediation Certificate Champlain College, Woodbury Institute
28-hour Basic Mediation Training September 2010

Teaching and Academic Administration Experience

Rensselaer Polytechnic Institute (RPI) – Advanced Nuclear Reactor Physics Lab
Community College of Vermont – Mathematics Professor – 2007 to present
Burlington High School
Mathematics Teacher – 2001 to June 2008
Physics Teacher – 2004 to 2006
The Marvelwood School – 1996 to 2000
Awarded Teacher of the Year – June 2000
Chairperson: Physics and Math Department
Mathematics and Physics Teacher, Faculty Council Member
Director of Marvelwood Residential Summer School
Director of Residential Life
The Forman School & St. Margaret's School – 1993 to 1995
Physics and Mathematics Teacher, Tennis Coach, Residential Living Faculty Member

Nuclear Engineering Work Experience 1970 to Present

Expert witness testimony in nuclear litigation and administrative hearings in federal, international, and state court and to Nuclear Regulatory Commission, including but not limited to: Three Mile Island, US Federal Court, US NRC, NRC ASLB & ACRS, Vermont State Legislature, Vermont State Public Service Board, Florida Public Service Board, Czech Senate, Connecticut State Legislature, Western Atlas Nuclear Litigation, U.S. Senate Nuclear Safety Hearings, Peach Bottom Nuclear Power Plant Litigation, and Office of the Inspector General NRC.

Nuclear Engineering, Safety, and Reliability Expert Witness 1990 to Present

- Fairewinds Associates, Inc – Chief Engineer, 2005 to Present
- Arnold Gundersen, Nuclear Safety Consultant and Energy Advisor, 1995 to 2005
- GMA – 1990 to 1995, including expert witness testimony regarding the accident at Three Mile Island.

Nuclear Energy Services, Division of PCC (Fortune 500 company) 1979 to 1990

Corporate Officer and Senior Vice President - Technical Services
Responsible for overall performance of the company's Inservice Inspection (ASME XI), Quality Assurance (SNTC 1A), and Staff Augmentation Business Units – up to 300 employees at various nuclear sites.

Senior Vice President of Engineering
Responsible for the overall performance of the company's Site Engineering, Boston Design Engineering and Engineered Products Business Units. Integrated the Danbury based, Boston based and site engineering functions to provide products such as fuel racks, nozzle dams, and transfer mechanisms and services such as materials management and procedure development.

Vice President of Engineering Services
Responsible for the overall performance of the company's field engineering, operations engineering, and engineered products services. Integrated the Danbury-based and field-based engineering functions to provide numerous products and services required by nuclear utilities, including patents for engineered products.

General Manager of Field Engineering
Managed and directed NES' multi-disciplined field engineering staff on location at various nuclear plant sites. Site activities included structural analysis, procedure development, technical specifications and training. Have personally applied for and received one patent.

Director of General Engineering
Managed and directed the Danbury based engineering staff. Staff disciplines included structural, nuclear, mechanical and systems engineering. Responsible for assignment of personnel as well as scheduling, cost performance, and technical assessment by staff on

assigned projects. This staff provided major engineering support to the company's nuclear waste management, spent fuel storage racks, and engineering consulting programs.

New York State Electric and Gas Corporation (NYSE&G) — 1976 to 1979

Reliability Engineering Supervisor

Organized and supervised reliability engineers to upgrade performance levels on seven operating coal units and one that was under construction. Applied analytical techniques and good engineering judgments to improve capacity factors by reducing mean time to repair and by increasing mean time between failures.

Lead Power Systems Engineer

Supervised the preparation of proposals, bid evaluation, negotiation and administration of contracts for two 1300 MW NSSS Units including nuclear fuel, and solid-state control rooms. Represented corporation at numerous public forums including TV and radio on sensitive utility issues. Responsible for all nuclear and BOP portions of a PSAR, Environmental Report, and Early Site Review.

Northeast Utilities Service Corporation (NU) — 1972 to 1976

Engineer

Nuclear Engineer assigned to Millstone Unit 2 during start-up phase. Lead the high velocity flush and chemical cleaning of condensate and feedwater systems and obtained discharge permit for chemicals. Developed Quality Assurance Category 1 Material, Equipment and Parts List. Modified fuel pool cooling system at Connecticut Yankee, steam generator blowdown system and diesel generator lube oil system for Millstone. Evaluated Technical Specification Change Requests.

Associate Engineer

Nuclear Engineer assigned to Montague Units 1 & 2. Interface Engineer with NSSS vendor, performed containment leak rate analysis, assisted in preparation of PSAR and performed radiological health analysis of plant. Performed environmental radiation survey of Connecticut Yankee. Performed chloride intrusion transient analysis for Millstone Unit 1 feedwater system. Prepared Millstone Unit 1 off-gas modification licensing document and Environmental Report Amendments 1 & 2.

Rensselaer Polytechnic Institute (RPI) — 1971 to 1972

Critical Facility Reactor Operator, Instructor

Licensed AEC Reactor Operator instructing students and utility reactor operator trainees in start-up through full power operation of a reactor.

Public Service Electric and Gas (PSE&G) — 1970

Assistant Engineer

Performed shielding design of radwaste and auxiliary buildings for Newbold Island Units 1 & 2, including development of computer codes.

Public Service, Cultural, and Community Activities

2005 to Present – Public presentations and panel discussions on nuclear safety and reliability at University of Vermont, Vermont Law School, NRC hearings, Town and City Select Boards, Legal Panels, Local Schools, Television, and Radio.

2007-2008 – Created Concept of Solar Panels on Burlington High School; worked with Burlington Electric Department and Burlington Board of Education Technology Committee on Grant for installation of solar collectors for Burlington Electric peak summer use

Vermont State Legislature – Public Testimony to Legislative Committees

Certified Foster Parent State of Vermont – 2004 to 2007

Mentoring former students – 2000 to present – college application and employment application questions and encouragement

Tutoring Refugee Students – 2002 to 2006 – Lost Boys of the Sudan and others from educationally disadvantaged immigrant groups

Designed and Taught Special High School Math Course for ESOL Students – 2007 to 2008

Featured Nuclear Safety and Reliability Expert (1990 to present) for Television, Newspaper, Radio, & Internet – Including, and not limited to: CNN (Earth Matters), NECN, WPTZ VT, WTNH, VPTV, WCAX, Cable Channel 17, The Crusaders, Front Page, Mark Johnson Show, Steve West Show, Anthony Polina Show, WKVT, WDEV, WVPR, WZBG CT, Seven Days, AP News Service, Houston Chronicle, Christian Science Monitor, New York Times, Brattleboro Reformer, Rutland Herald, Times-Argus, Burlington Free Press, Litchfield County Times, The News Times, The New Milford Times, Hartford Current, New London Day, evacuationplans.org, Vermont Daily Briefing, Green Mountain Daily, and numerous other national and international blogs

NNSN – National Nuclear Safety Network, Founding Advisory Board Member, meetings with and testimony to the Nuclear Regulatory Commission Inspector General (NRC IG)

Berkshire School Parents Association, Co-Founder

Berkshire School Annual Appeal, Co-Chair

Sunday School Teacher, Christ Church, Roxbury, CT

Washington Montessori School Parents Association Member

Marriage Encounter National Presenting Team with wife Margaret
Provided weekend communication and dialogue workshops weekend retreats/seminars
Connecticut Marriage Encounter Administrative Team – 5 years

Northeast Utilities Representative Conducting Public Lectures on Nuclear Safety Issues

End

EXHIBIT 3

Reopening- Excerpts from Pertinent Filings before the Commission

Pilgrim Watch's Petition For Review Of Memorandum And Order (Denying Pilgrim Watch's Requests For Hearing On Certain New Contentions) ASLB No. 06-848-02-Lr, August 11, 2011, August 26, 2011, Pg., 3

1. Pilgrim Watch's New Contention Is Not Required to Satisfy the Standards for Reopening the Record.

The Board holding that PW is required to file a Motion to Reopen was wrong. It is neither consistent with nor required by 10 C.F.R. 2.326, and it is not supported by the decisions upon which the majority relied.

The pertinent portions of 10 CFR 2.326 are set forth below with underlining added. Sec. 2.236 applies only when a party seeks to reopen a closed record.

§ 2.326 Motions to reopen.

(a) A motion to reopen a closed record to consider additional evidence will not be granted unless the following criteria are satisfied:

(3) The motion must demonstrate that a materially different result would be or would have been likely had the newly proffered evidence been considered initially.

(d) A motion to reopen which relates to a contention not previously in controversy among the parties must also satisfy the requirements for nontimely contentions in § 2.309(c).

Three important facts are relevant here.

1. At the time PW filed its new contention, the only evidentiary record that had been closed was that directed to Contention 1 (Buried Pipes and Tanks); the remand hearing on Contention 3 had not even been heard, and the Board did not decide it until July 19, 2011.

2. PW's new contention did not seek to reopen, or to reach some "materially different result," with respect to either Contention 1 or Contention 3.

3. The Board majority admits that PW's new contention "raise[] new matters not heretofore raised in this proceeding" (Decision, p. 14, emphasis added).

a. Even Today, the Record in this ASLB Proceeding has Not Been Closed

The ASLB has jurisdiction over a proceeding from the time a presiding officer is designated until the time "when the period within which the Commission may direct that the record be certified to it for final decision expires, when the Commission renders a final decision, or when the presiding officer withdraws from the case..., which ever is earliest." 10 C.F.R. §2.318. None of these eventualities has occurred.

This licensing proceeding before the Board has not been closed, even today.[31] It clearly was not closed by the Board's 2008 decision on Contention 1. It also was not closed during the pendency of the remand ("the proceeding will remain open during the pendency of the remand. *Vermont Yankee*, CLI 10-17, p 1, fn 37),[32] and it was not closed by the Board's most recent Partial Initial Decision on contention 3 ("A partial initial decision is a decision rendered after an evidentiary hearing on one or more contentions, but that does not dispose of the entire matter." NRC Practice Digest, Appeals 48, Pilgrim Nuclear Power Station, CLI-08-2, emphasis added. As Judge Young correctly said (LBP-11-18, Separate Statement, p. 3): "The Board Majority's Initial Decision does not terminate this proceeding or constitute a final licensing decision."

[31] "The Board will address Pilgrim Watch's fourth and fifth contentions, which both concern information derived from the events at the Fukushima reactors, in a separate ruling (and) In addition, that separate ruling will address filings by the Commonwealth of Massachusetts that also concern information from the Fukushima events" (Decision at 2-3)

[32] In the Decision, the Board spends considerable apples and oranges effort trying to equate the scope of the remand hearing with whether the record in this proceeding has been closed. PW does not say that that the Commission Order (although incorrectly), narrowed the scope of the remand hearing on Contention 3; but that has nothing to do with PW's new contentions that do not seek to reopen any closed record.

Section 2.236 is directed to motions to reopen decisions in which the record has been closed and a "result" has been reached. Properly understood, 2.236(d) may require a motion to reopen if the entire record is closed because the entire proceeding before the Board has been concluded (that is not the case here), or if (as in *Vermont Yankee,* discussed below) the new contention restates a contention that the Board has already decided (that also is not the case here). The rule does not apply, and indeed makes no sense, when the new request "raises new matters not heretofore raised in this proceeding" (Decision, p. 14, emphasis added), and does not seek to "reopen" any portion of any record or to change any "result."

The Board's reliance on subsection (d) of Rule 2.326 is misplaced. PW agrees with Judge Young that " the rule is not intended to be limited to motions seeking only to submit additional evidence relating to a previously-admitted contention" (Separate Statement, p. 2); the test is whether the new contention seeks <u>to reopen a closed record</u>. The majority admits that PW's new contentions raise new issues (Decision, 14) that do not "relat[e] to a previously admitted contention."

The Board apparently reads the rule to say that once <u>any part</u> of the record has been closed, <u>any motion</u> to add <u>any new contention</u> requires a motion to reopen, and that this is so even if the new contention has nothing to do with the closed portion of the record, and in fact presents new questions that were not, and could not have been, earlier litigated.

That is not what 10.C.F.R. §2.236 says, and the decisions on which the Board majority rely do not support the Board's conclusion.

b. <u>The Decisions on which the Board Relies do Not Support its Conclusion.</u>

Not one of the cases relied on by the Board (See Decision, pp 15-17) supports its conclusion. Properly understood, they support PW's position that no motion to reopen was needed here.

In every case cited by the Board, the new contention was directed to a matter as to which the record was closed. In at least two, whether a motion to reopen was required was not an issue; the petitioner had filed a motion to reopen.

(1) *Oyster Creek*: Unlike here, The Board had closed the record and issued its initial decision (CLI-08-12, 2), and Citizen's had filed a "motion to reopen the record." (CLI-08-28, pp 2, 3)

(2) *Private Fuel Storage,* Unlike here, Utah sought to reopen a closed record. (CLI-05-12, pp 1, 6, 7).

(3) *Vermont Yankee* - Unlike here, the "new contention" was essentially the same as other contentions previously decided and as to which the record was closed. "We agree with the Board that NEC has simply rehashed old arguments in Contention 2C". (CLI-10-17, 67).

(4) *Carolina Power & Light Co.,* ALAB-526 (1979). Unlike here, the entire record before the board had been closed, the board had authorized issuance of permits, and jurisdiction over the entire proceeding had moved to the Commission.

(5) *Long Island Lighting,* LBP-83-30 (1983), also decided long before the present rules were adopted. Unlike here, the petitioner sought to "supplement the record on a contention on which the evidentiary hearing has been completed" (pg 4). All issues as to which the Board had jurisdiction had been litigated. (pp 4-5).

The 1986 Federal Register extract (generally contemporaneous with *Carolina Power* and *Long Island Lighting)* that the Board quotes (Id., p 15, fn 75, underlining added: "A motion to

reopen must be filed whenever a proponent seeks to add new information to a closed record, whether the information concerns a new contention or one which has already has been heard") supports Pilgrim Watch's position. PW's new contentions do not seek to reopen or "to add new information to a closed record." The Commission should find that no motion to reopen is required here, reverse the Board majority Decision, and remand with instructions to determine whether PW's new contentions meet the requirements of 10 C.F.R 2.309.

Pilgrim Watch Reply To NRC Staff's Answer To Pilgrim Watch's Request For Review. September 12, 2011, pg., 1

1. No Motion To Reopen Is Required For Either The Cables or Cleanup New Contentions: The Staff supports its argument that a motion to reopen was required by saying that "on June 4, 2008, the Board formally closed the evidentiary record." There are at least two fundamental flaws in the Staff's assertion. First, and completely ignored by the Staff, is that the June 4, 2008 Board order could not have more clearly said that the only closed record was that with regard to Contention 1, AMP for Buried Pipes and Tanks (Order, pp; 2-3, 3-4):

> We note in taking this approach that we have not prior to this date formally closed the record with regard to Contention 1
> [W]e consider that the record with regard to Contention 1 is effectively closed, and to the extent necessary we here and now formally so close it.

The implication that the Staff seeks to create, that the entire record was then "formally closed," is simply not so.

Second, 10 CFR 2.236 says "record." It does not say "evidentiary record," and there is an important distinction (that the Staff again overlooks) between the two. A hearing before the Board on a contention creates an "evidentiary" record of that contention; the hearing on Contention 1 created an evidentiary record of that hearing. But the "record" of a proceeding is,

as even Entergy seems to admit (see Entergy Reply at 4) a record that includes all timely raised issues. PW timely raised subsequent contentions that remain before the Board and Commission.

As for the Staff's statement that "PW conflates the termination of the proceeding with the closing of the evidentiary record" (Staff at 7), to the extent that PW confused the Staff and might better have said "closing the record of the proceeding," we apologize. PW recognizes, as Entergy points out in its reply, that "Administrative consideration of evidence always creates a gap between the time the record is closed and the administrative decision is promulgated. (Entergy at 9, emphasis Entergy's) PW's point, that the Staff obfuscates, is that the record of this proceeding was not closed when PW filed its new contentions, and it still has not been.

Regarding *Vermont Yankee*,[33] the Staff's quotation of Judge Young conveniently ignores the important facts in *Vermont Yankee*: See PW Petition for Review, p.6

> (3) *Vermont Yankee* – Unlike here, the "new contention" was essentially the same as other contentions previously decided and as to which the record was closed. "We agree with the Board that NEC has simply rehashed old arguments in Contention 2C." CLI-10-7, 67 (Emphasis in original)

On the facts actually present in *Vermont Yankee,* what Judge Young said in the Staff's extracted quotation is correct – the *Vermont Yankee* "*proceeding* would remain open", and "*genuinely new issues* related to [matters that had already been decided in] the license renewal application" would require a motion to reopen. " (emphasis the Staff's)

In its Petition for Review, PW said (p., 5**)** it "agrees with Judge Young that "rule [2.236(d)] is not intended to be limited to motions seeking only to submit additional evidence relating to a previously admitted contention" (Separate Statement, p. 2). As PW also said, "the

[33] The Staff's reliance on *New Jersey Environmental* (Staff at 10) is also misplaced. *New Jersey Environmental* has nothing to do with the issue here – whether PW was required to file a motion to reopen. In *New Jersey Environmental*, Citizens filed a motion to reopen after the administrative record had been closed, the Board's Initial Decision had been issued, Citizens had a petition for review with the Commission. *New Jersey Environmental*, Slip opinion, pp. 13, 27 Here, none of these circumstances are the case.

test is whether the new contention seeks to reopen a closed record." (Id.) PW's new contentions do not. Both the Staff's and Entergy's replies completely ignore the Board majority's specific finding that "Each of Pilgrim Watch's new contentions raises new matters not heretofore raised in this proceeding" (Memorandum and Order, August 11, 2011, p.14, emphasis added) PW's new contentions are unrelated to either the closed Contention 1 evidentiary record, or to the then-still-open Contention 3 record, and have nothing to do with any matter that has already been decided or taken under advisement.

Here, the proceeding and its record are indisputably open. The record in this proceeding was not closed when PW's requests for hearing were filed, and is not closed even today.

Pilgrim Watch Reply To Entergy's Answer Opposing Pilgrim Watch's Petition For Review, September 12, 2011, pg., 1

The primary issue before the Commission is whether PW was required to file a motion to reopen any record to present new contentions that (i) meet the requirements of 10.C.F.R 2.309 and (ii) have absolutely nothing to do with anything that the Board has decided. The answer is that PW was not. Entergy spends pages discussing "a Grave nor a Significant Safety Issue" and "a Materially Different Result," but since no record is being reopened, they are irrelevant.[34]

1. **PW Was Not Required to File a Motion to Reopen.** The basic question here is whether PW is seeking to reopen any "closed record." Energy, both here and in its recently filed Motion asking the Commission immediately to issue a renewal license, seems contend that, no matter how many issues may remain outstanding, the entire record of a Board licensing proceeding is closed if the record with respect to any contention has been closed, and that it is entitled to its renewal license once any partial initial decision has been issued. PW does not

[34] In the 5 pages allowed here, PW does not have room to deal all of the inaccuracies in Entergy's response, both in its "Statement of the Case" and its characterizations of PW's positions. We trust the Commission's legal staff will do the necessary review.

believe that the Commission, or a reviewing court, could rationally read the Commission rules this way.

PW believes that the only sensible, or proper, reading of 10 C.F.R 2.236 is that the term "record" refers to the record regarding a matter that has been decided (or, to deal with the gap between the end of a hearing or proceeding and when the Board issues a decision, a matter that the Board has taken under advisement;[35] and that a "record" is "closed" only if and to the extent that the Board says so.

A Board often closes the record with regard to a particular contention when all the evidence as to that contention has been heard; and the Board here did so with respect to record regarding Contention 1. See Board Order of June 4, 2008. If PW had sought to reopen with respect to Contention 1, PW agrees that a motion to reopen the closed record of that contention would be required.[36]

But the Board has not closed the record in this proceeding, or with respect to any of the issues raised by PW's new contentions. Entergy seems to recognize the Board may not properly do so until "all timely raised issues have been resolved" (Entergy at 8), and to admit that there are pending requests before the Board and Commission.[37] (Entergy Motion for Issuance, pp 1, 7)

The Administrative Safety Licensing Board knows the difference between closing the record as to a particular contention and closing the record of a proceeding. After the hearing on

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[35] PW agrees that there is necessarily "gap between the time the record is closed and the time the administrative decision is promulgated" (Entergy at 9), and that a new contention filed in that "gap," i.e., "after the record is closed but before an Initial Decision is issued" (Entergy at 9), would require a motion to reopen.

[36] PW does not seek to reopen anything with respect to either Contention 1 or Contention; the contentions PW raises are entirely new, as the Board has recognized. (August 11, 2011 Majority Decision, p.14)

[37] Under the applicable rules, a Board cannot close the record of a proceeding until it has completed this informal hearing (10 C.F.R 2.1210), and has received and heard everything necessary to permit it to issue the initial decision required by 10 C.F.F. 2.340 that addresses "all matters put into controversy by the parties." (10 C.F.R. 2.340(a))

Contention 1 had been completed, the Board here issued its June 4, 2008 Order closing" the record with regard to Contention 1." But the Board has never issued an order like those in for example, *Southern Nuclear Operating Co*., LBP 10-21 ("Once the record of a proceeding is closed" and *Areva Enrichment Services, LLC*, Feb. 18, 2011 ("The Board hereby closes the record of this proceeding…"). Judge Young's statement that the open issues here "warrant further inquiry and exploration in this proceeding prior to issuing a renewed license" (Separate Statement, August 11, 2011, p. 32) could hardly make clearer that the record in this proceeding as to those issues is not closed.

The requirement in 2.236(a)(3) that a motion to reopen "must demonstrate that a materially different result would be or would have been likely" emphasizes that "closed record" in 2.236(a) must mean a record directed to a matter that has actually been decided and as to which there is some "result." [38] It makes no sense to apply 2.326(a) to a "record" that may not even exist, and that certainly has not been closed. Until the Board has decided a matter, there is no "materially different result [that] would be or might or might have been likely had the newly proffered evidence been considered initially."

Pilgrim Watch's Petition For Review Of Memorandum And Order (Denying Pilgrim Watch's Requests For Hearing On New Contentions Relating To Fukushima Accident) Sept. 8, 2011, September 23, 2011, pg., 7

2. Pilgrim Watch's New Contentions Are Not Required to Satisfy the Standards for Reopening the Record: Board Misapplied the Rule: Once again, a primary issue before the Commission is whether Pilgrim Watch must file a Motion to Reopen under 10 C.F.R. 2.236

[38] Since administrative necessity requires dealing with the "gap" between the time a record is closed and a decision is promulgated, PW agrees with Entergy that a motion to reopen would be required with respect to a matter under advisement.

to present new contentions that have absolutely nothing to do with anything that has previously been heard or decided in this still-open proceeding. The answer is "No;" just as PW argued August 26, 2011 in Pilgrim Watch's Petition for Review of Memorandum and Order (Denying Pilgrim Watch's Requests for hearing on Certain New Contentions August 11, 2011.

The Decision holds otherwise, saying that "[w]e hereby deny admission to the two new proposed contentions (Decision pg., 3) and that "[f]or either of the proposed new contentions to be admitted, Pilgrim Watch must satisfy the Commission's demanding regulatory requirements for reopening the record." (Decision pgs., 5, 7 referencing Entergy's and the Staff's position) The Decision states no other reason, and cites no authority, to support it's apparent conclusion that a motion to reopen was required.

PW's request for review of the August 11 decision, and its replies to Entergy and the Staff,[39] made crystal clear that the record in this proceeding is not closed, and that PW does not seek to reopen any part of the record relating to its Contentions 1 and 3. In the Decision, the Board says that the critical question is whether PW seeks to "reopen[] the record" (Decision pg., 5). It continues to ignore that PW does <u>not</u> seek to do so, or is PW required to do so.

Consistent with the Board's approach, PW will not here repeat everything that it said in its August 26 Petition for Review of the Board's August 11 decision, or in its replies to Entergy and the Staff in connection with that Petition. PW assumes that, in reviewing this Petition, the Commission will have considered the earlier Petition, or that it will consider them together.

Here, PW simply incorporates by reference what is now already before the Board, and briefly points out the most critical facts:

[39] As required, copies of all of these were served on each member of the Board. None are referred to in the present Decision.

- At the time PW filed its post-Fukushima contentions, the only record that had been closed was the evidentiary record of Contention 1. The Board's statement that it "terminated these proceedings in 2008" is not so, as LBP-08-22 cited by the majority clearly shows.

- The record in this proceeding indisputably has not been closed yet, and certainly had not been when PW filed its new contentions.

- PW's new contentions do not seek to reopen, or to reach some "materially different result," with respect to either Contention 1 or Contention 3.
- PW's new contentions are directed to issues that have not previously been heard or decided in this proceeding.

- On its face, 2.326 is directed to new information or evidence that a party wishes to include in a previously closed record. On its face, 2.236 is simply inapplicable when nothing is being reopened.

- 2.236(d) cannot sensibly be read to require reopening of an issue as to which there is no record, simply because some part of the record has been closed.

No decision cited by the Board, Entergy or the Staff support the Board's position.

Pilgrim Watch Reply To Entergy's Answer To Pilgrim Watch's Petition For Review, October 11, 2011, pg., 1

1. No Motion to Reopen is Required: PW's position that no motion to reopen is required to present its new contentions are not "meritless." (Entergy, 1) Section 2.326 may apply to a new contention that seeks to reopen a previously closed portion of a record directed to a contention that has already been decided (as in *Vermont Yankee)*, or to one presented after the record in the entire administrative proceeding has been closed (as in *New Jersey Environmental).* (See Entergy, 10, fn. 33*)* Contrary to what Entergy says (Entergy, 8), *New Jersey Environmental* did not hold that it would "render Section 2.326(d) meaningless" to requiring reopening when the petitioner seeks to add entirely new contentions in an administrative proceeding in which the record is still open.

The Board and Entergy try to read § 2.326 as if it said "a petitioner must file a motion to reopen if any aspect of the record has been closed, regardless of whether the record in the proceeding has been closed or what the petitioner seeks to do has anything to do with the closed aspect of the record." Section 2.326 does not say that. The Board's holding that it effectively does was simply wrong

The only rule that applies to PW's new contentions is 2.309, and PW has met all of its requirements. Rule 2.326 cannot be misapplied, as the Board did, and Entergy and the Staff would like, to prevent PW from raising material licensing issues that could not be previously raised. *UCS II,* 735 F.2d 1437 (D.C. Cir. 1984)

Pilgrim Watch Reply To NRC Staff's Answer To Pilgrim Watch's Petition For Review, October 12, 2011, pg., 1

1. No Motion to Reopen is Required for Either Contention: The NRC Staff (along with Entergy) continues to misunderstand §2.326, to mischaracterize the record, and to rely on authorities that do not support its position. About the only correct statement made by the Staff is its initial, apparently inadvertent, recognition that §2.326 applies "Once the record is closed." (Staff, 6, Emphasis added). But it then goes on to say, flatly contrary to the record, that "The Board closed the record in the proceeding years ago." (Staff, 8, underlining added) The Board did not do so, and LBP-11-23 on which the Staff relies could not be clearer that all the Board "closed" was the record "with regard to Contention 1." AMP for Buried Pipes and Tanks (Order, pp; 2-3, 3-4). What the Board actually said, not surprisingly anywhere quoted by the Staff, was:

> [W]e consider that the record with regard to Contention 1 is effectively closed, and to the extent necessary we here and now formally so close it.

Nothing else was closed, then or at any time before PW filed its contentions. The record of pending Contention 3 was not closed; and the record in the proceeding most certainly was not.

10 CFR 2.326 says "reopen a closed record." It does not say, as the Staff and Entergy wish it did, "a petitioner must file a motion to reopen if any aspect of the record has been closed, regardless of whether the record in the proceeding has been closed or what the petitioner seeks to do have anything to do with any record that has been closed." There is an important distinction (that the Staff and Entergy refuse to recognize) between a closed evidentiary record relating to one contention, and a closed proceeding record. The "record" of a proceeding includes all timely raised issues and PW's timely raised contentions, unrelated to anything that had been decided or "closed," that remain before the Board and Commission.[40] What the Staff (again together with Entergy) obfuscates is that the record of this proceeding was not closed when PW filed its new post-Fukushima contentions that have nothing to do with Contentions 1 or 3

The Staff's conclusion (pg., 8) that the Board's application of the reopening standard was "consistent with prior Commission case law and federal appellate court precedent" is wrong. In *Vermont Yankee*, unlike here, the "new contention" was essentially the same as other contentions previously decided and as to which the record was closed. "We agree with the Board that NEC has simply rehashed old arguments in Contention 2C." CLI-10-7, 67 PW's new contentions are new; they do not "rehash" any old arguments. As for *New Jersey Environmental*, Citizens did not file its motion to reopen until after the administrative record had been closed up tight and the Board's Initial Decision had been issued. The administrative record in this proceeding indisputably has not been closed, and certainly had not been when the post-Fukushima contentions, or for that matter the preceding cleanup and cable contentions, were filed.

[40] PW recognizes, as Entergy pointed out (Entergy's September 12 Reply, pg., 9) that "Administrative consideration of evidence always creates a gap between the time the record is closed and the administrative decision is promulgated." But that only; emphasizes that the record is this proceeding is not closed.

This illustrates how the Staff continues to misinterpret 10 C.F.R 2.326(d). (Staff, pg., 8) That section may apply to a new contention that seeks to reopen a previously closed portion of a record directed to a contention that has already been decided (as in *Vermont Yankee)*, or to one presented after the record in the entire proceeding has been closed (as in *New Jersey Environmental).* But neither it, nor any other aspect of 2.326 applies when the new contention does not seek to reopen anything that has been closed. Neither 2.326 nor any decision or law cited by the Staff (or by Entergy) supports the Board's decision.

The only rule that properly applies to PW's new contentions is 2.309, and PW has met all of its requirements, including timeliness, significance, and materiality. Rule 2.236 cannot be misapplied to prevent PW from raising material licensing issues that could not be previously raised. *Union of Concerned Scientists v. NRC*, 735 F.2d 1437, 1443-44 (D.C. Cir.1984) (commission discretion to deny a hearing under the reopen the record standard may be inconsistent with the AEA hearing right on a material licensing issue).