

Testimony from Cape Downwinders, an organization of concerned citizens from the Cape and Islands working to close the Pilgrim Nuclear Power Station in the interest of the public health and safety of residents and visitors to Cape Cod and the Islands.

We support H. 2030, an Act relative to radiological air monitoring, and H. 2031, an Act increasing nuclear power plant protections to a fifty mile radius and urge their enactment at the earliest possible moment.

Thank you for the opportunity to present this testimony regarding the risks to the public health and safety from operation of Entergy Corporation's Pilgrim Nuclear Power Reactor in Plymouth, MA and the urgent need for state action in the event of a radiological accident. Whether one is for or against nuclear power, public health and safety should be a concern for all. The state is currently woefully unprepared for the destructive forces unleashed by a nuclear accident or hostile action at Pilgrim. We contend that although the public health and safety cannot be assured as long as the Pilgrim plant continues to operate, these two bills represent a significant step in the right direction.

Recognizing the unique geographical location of the Cape and Islands and our identification as an at-risk population within the current 50 mile Ingestion Pathway Emergency Planning Zone (IP EPZ), **H 2030 provides for funding for monitoring, and H 2031 extends the Plume Exposure Emergency Planning Zone (EPZ) mitigation plans, provides KI to the population, and establishes real-time radiological air monitoring for an area 50 miles around the Pilgrim reactor.**

Background

Following the 1979 nuclear accident at Three Mile Island, the Nuclear Regulatory Commission (NRC) recognized the need for emergency planning. Identified were two Emergency Planning Zones (EPZ). The first is the Plume Exposure Pathway (PEP) which is about 0-10 miles from Pilgrim. Primary emergency interventions for the population include evacuation and sheltering-in-place. This EPZ encompasses the 'Shadow Evacuation' effect from 10-15 miles, with traffic control plans in place to prevent congestion of the 10 mile EPZ evacuation routes. The second EPZ is the Ingestion Exposure Pathway (IEP) which is out to about 50 miles from Pilgrim and includes the Cape and Islands, Boston, and Providence. There are two planned interventions in this EPZ: stocking piling KI for the Cape and Islands only; and sheltering of animals and protection of foodstuffs as outlined in the Department of Public Health publication, "Radiological Emergency Information for Farmers and Food Processors."¹ This brochure accentuates the lack of planning for the public even though

¹ <http://www.mass.gov/eohhs/docs/dph/environmental/radiationcontrol/radiological-emergency-info-farmers.pdf>

both DPH and NRC identify the serious risk of internal contamination from exposure to a plume containing dangerous radionuclides from a severe accident at Pilgrim.

Lessons are to be learned. Fukushima blew away the myth that nuclear power is safe. Cape Downwinders is specifically concerned that Pilgrim is the same failed GE Mark 1 Boiling Water Reactor design which caused devastation in Japan after the loss of electricity for cooling. In 1986, Dr. Harold Denton, the NRC's chief safety officer, stated publicly that if a GE Mark 1 reactor had a severe nuclear accident, there was "something like a 90% chance" of containment failure.² At a 2013 NRC hearing in Plymouth, NRC official Tom Setzer confirmed that an accident like Fukushima could happen here. The GE Mark 1 is a known failed reactor design with a containment structure that won't contain in the event of a hydrogen explosion. Even the back up safety vents added to the containment in Japan failed. Fukushima was not an accident but a prediction come true. It could also happen here.

Since 1987, legislation for public safety to expand the PEP EPZ has been introduced many times in the Massachusetts legislature. A report of the Joint Special Committee on Pilgrim Nuclear Power Station, chaired by the Senator Thomas Northon and Representative Peter Foreman called for the establishment of a 50 mile plan for the population. Recognition of citizens at risk is not a recent concern as evidenced by H. 5754 introduced to be enacted as an 'emergency law for the immediate preservation of the public safety'. This bill had full support of then Governor Michael Dukakis in 1989. Currently, Senator Markey has introduced the "Dry Cask Act of 2015"³ calling on the NRC to expand the PEP EPZ to 50 miles if utilities do not comply with removing spent fuel to dry casks, understanding the current risks to the population from the overloaded spent fuel pools stored at reactor sites.

The public speaks out in support of expansion for safety. For four years ending in 1990, bills to expand the PEP EPZ were approved in the House and Senate, but not in the same legislative years. Thus, no expanded safety plans have been enacted. In 1992, 78% of the Cape and Islands voters approved a senatorial district ballot referendum requesting our state senator to establish a radiological emergency plan for our area. In 1994, the Barnstable County Assembly of Delegates passed a resolution in support of a bill for study of public buildings which could be used as radiological shelters. They also supported an expansion of the PEP EPZ. In the spring of 2013, 20 towns on the Cape and Islands approved a public advisory question calling on the Governor to request the NRC revoke the operating license of Pilgrim because public safety cannot be assured. Most recently, this past November, voters in the Cape and Islands Senatorial district passed a public advisory ballot question for inclusion in a Plume Exposure Pathway EPZ. The measure won by 74% of the vote, more votes cast in support than for any candidate or question on the ballot. **The Committee has strong public support for these bills.**

² http://www.nytimes.com/2011/03/16/world/asia/16contain.html?_r=0

³ <https://www.congress.gov/bill/114th-congress/senate-bill/945>

H. 2030

This bill calls for additional assessment to certain power plants to enhance radiological monitoring.

The corporations that profit from the production of nuclear power should carry the costs of monitoring, not the public that is put a risk and in need of such monitoring for their health and safety.

H. 2031

Section 1: Lack of radiological monitoring keeps the DPH and emergency management from effectively identifying mitigation plans or understanding the impact on public health.

Current monitoring mechanisms are insufficient to determine the path of a radioactive plume. Populations may thus be evacuated to heavily contaminated areas as they were four years ago in Japan. Releases during regular operation of the reactor also require monitoring to inform public health and safety officials of necessary protective actions for the public. Releases that may travel beyond the onsite monitoring during regular operation of the reactor should be monitored to inform public safety officials' protective actions. See also testimony by William Maurer for Cape Downwinders.

Section 2: The Cape and Islands citizens already have KI (potassium iodide) available for free thanks to legislation passed in 2003⁴. What about metro Boston and other areas also located within 50 miles?

KI is a medication with costs assessed to Entergy Corporation. It is about 85% effective in preventing the uptake of radioactive iodine by the thyroid from plume exposure. This medication should be made available to all within the 50 miles. Exposure is a matter of wind direction. Which way the radioactive plume will float determines exposure, not arbitrary lines created by emergency planners. People on the Cape who live more than 40 miles away from Plymouth have KI. Boston area citizens, only 36 air miles away, require the same protection.

In 2008, the Federal Office of Science and Technology (OST) acknowledged that KI is second in importance to evacuation for those within 20 miles of a nuclear power reactor. This Office concluded: “a more effective preventive measure does exist for the extended zone covered by the Act, namely **avoidance of exposure altogether through evacuation** of the potentially affected population and interdiction of contaminated food.”⁵ The MA Nuclear Preparedness Department also has identified KI as second in importance to evacuation and sheltering. “It is important to note that KI is effective only against exposure to radioactive iodine and only protects the thyroid. Numerous other

⁴ <https://malegislature.gov/Laws/GeneralLaws/PartI/TitleXVII/Chapter111/Section5K>

⁵ <http://www.gpo.gov/fdsys/pkg/FR-2008-01-31/html/E8-1769.htm>

radionuclides may be released in an accident situation and KI would not protect individuals from these other types of radioactivity. The primary method of protection is evacuation and sheltering-in-place, and KI should be viewed as an adjunct to these primary measures.”⁶

While Cape Cod and Island residents are acknowledged by the State to be at risk of exposure and provided with free KI, that policy leaves the population in the other direction at the same risk distance from Pilgrim, exposed and unprotected. This includes Boston. And given KI without a plan for evacuation is contradictory to both the state and federal policies that KI is only secondary to evacuation. We are a population at risk without plans for real protection.

Section 3: Expanding the Plume Exposure EPZ is clearly within the responsibility of the State.

The Nuclear Regulatory Commission (NRC) has identified an EPZ as being a flexible area, taking into consideration locale variabilities. The NRC views “the exact size and shape of each EPZ is a result of detailed planning which includes consideration of the specific conditions at each site, unique geographical features of the area, and demographic information.”⁷ The State of California has expanded the EPZ in San Louis Obispo County to address such unique circumstances for their residents.⁸

In 2014, former Governor Patrick sent a letter to the NRC on behalf of the voters on Cape Cod and Martha’s Vineyard who overwhelmingly voted for the NRC to close Pilgrim because public safety cannot be assured. The Governor asked that the NRC consider decommissioning Pilgrim due to public safety concerns⁹ Chair Allison Macfarlane replied that Commonwealth of MA has ‘a significant role in determining the adequacy of Pilgrim’s Emergency Preparedness Program’.¹⁰ The NRC has given the jurisdiction for public health and safety for off-site planning to the state and local entities. These bills provide the public with mitigation strategies necessary for increased safety, not assured safety, due to new information learned as a result of the catastrophe in Japan.

The Nuclear Regulatory Commission, Federal Emergency Management Agency (FEMA), and the Massachusetts Emergency Management Agency (MEMA) significantly underestimate the consequences of a severe radiological accident at Pilgrim and its impact on the public.

⁶ <http://www.mass.gov/eopss/agencies/mema/nuclear-preparedness-department.html>

⁷ <http://www.nrc.gov/about-nrc/emerg-preparedness/about-emerg-preparedness/planning-zones.html>

⁸ <http://www.slocounty.ca.gov/OES/NPPInfo/DCPPEmergencyPlanning/PAZInfo/EPZ.htm>

⁹ http://www.madownwinders.org/wp-content/uploads/Patrick_letter_to_NRC_2014March17.pdf

¹⁰ http://www.madownwinders.org/wp-content/uploads/NRC_letter_to_Gov_2014June9.pdf

The US General Accountability Office has determined that the NRC needs to better understand the public response to an accident. Currently, the shadow evacuation plans, covering the area between 10 and 15 miles from the reactor, are based on false assumptions. The NRC accepts assumptions that only 20% of the population in the shadow evacuation area would attempt to evacuate and that there would be no significant impact on traffic movement from the 10 mile EPZ.¹¹ The Cape Cod Traffic Study proved that wrong. To date the only part of the study made available for public consumption has been a telephone survey reported in a July 25, 2013 Memo: “Cape Cod Telephone Survey Results”¹². Those results reveal a self-evacuation response by 50% to 70% of the year round resident population (by the 2010 Census, the Cape Cod Population = 218,000), approximately 109,000 to 153,000 individuals respectively. That is a Cape Cod shadow evacuation volume 24 to 28 times greater than the theoretical design assumptions used to predict and apply, in the formulation and calculations of current PNPS emergency planning.¹³ Including tourists and visitors, trapping 109,000 to 553,000 individuals in their vehicles with no protection, and hoping the wind doesn’t blow in their direction is a completely unreasonable and unacceptable risk mitigation strategy that speaks to an anticipated collateral damage casualty expectation as an acceptable outcome, by design.

Both Senator Markey and Senator Warren¹⁴ replied to Entergy, which develops the plans with MEMA, that the plan ignores the potential need for residents on the Cape to evacuate and is based on false assumptions. No further work from the results of this plan and Congressional recommendations has been completed to effect our safety.

The Massachusetts Emergency Management Agency (MEMA) plans are inadequate to protect the public. Currently, the MEMA plan within the IP EPZ is for the State to send emergency teams in hazmat suits to contaminated areas, move out anything living, and relocate people. There is no emergency evacuation plan.¹⁵ MEMA Director Kurt Schwartz recently stated that even ‘swaths of Boston’ may have to be relocated-destination unknown. The plans also call for ‘sheltering in place’ which appears to be a reasonable protective action until the document reveals that “Generally, sheltering-in-place can provide significant protection for about 2 hours in small residential structures.”¹⁶ This may be a ‘protective action’ but not protection from exposure to

¹¹ <https://www.nirs.org/reactorwatch/emergency/gaoshadowevacreport413.pdf>

¹² <http://www.madownwinders.org/news/cape-cod-telephone-survey-results/>

¹³ <http://capedownwinders.org/cape-downwinders-letter-to-nrc/>

¹⁴ <http://www.pilgrimcoalition.org/getfile/20130816-WarrenMarkeyLetter-EntergyPilgrim.pdf>

¹⁵ http://www.bcrepc.org/wp-content/uploads/2014/09/BCREPC_Radiation-Emergency-Reference-Sheet-092214.pdf

¹⁶ <http://www.mass.gov/eopss/docs/mema/nuclear/marerp2014.pdf> page 2-6

dangerous radionuclides in a release. The only way to be protected from the danger is to not to be exposed.

Living Under A Cloud Of Unacceptable Risk:

- Governor Patrick, Attorney General Coakley, Representative Keating, Senator Markey, State Senate President Murray, State Senator Wolf, and Representative Peake requested the NRC not re-license Pilgrim Nuclear until the "Lessons Learned" from Fukushima were implemented. The license was renewed over these objections; safety concerns remain. NRC Chair Gregory Jaczko was the lone vote against relicensing.
- The waste fuel pool in the attic of the reactor building was designed for 880 assemblies and now holds well over 3,200. Closer packing of fuel assemblies, over design limits, increases criticality and speeds up evaporation of coolant which, in turn, results in less time to respond to pump failure and core meltdown. In 2006, Attorney General Coakley published a report by Dr. Jan Beyea that determined an accident at the fuel pool could cause as much as \$488 billion in damages, 24,000 latent cancers, and damage areas hundreds of miles downwind.¹⁷
- Plymouth is a de facto nuclear waste dump with the ongoing danger of a spent fuel pool fire with severe consequences. The amount of radioactive cesium in the waste pool is 18 times the amount released at the Chernobyl accident that spread throughout Europe and beyond.¹⁸ There is no relief in sight from unsafe compression of the over crowded waste pool as each new refueling adds to the greater than 1,000,000 pounds of nuclear waste stored in Plymouth, with nowhere to go.
- There is no escape from the Cape.¹⁹ MEMA and Entergy Corporation developed the current emergency plans as part of the Nuclear Regulatory Commission regulations. Due to evacuation of the Plymouth area south and west on Route 3 to Route 495, the Sagamore Bridge will be closed and exits 1 and 2 on Route 6 will be blocked. Cape westbound traffic will be detoured off the highway. The Bourne Bridge will also be closed if the westbound traffic has an impact on the escaping people from the PEP EPZ which will most certainly happen. This plan does not assure public safety for those living in the Shadow Evacuation area and Cape Cod and Islands because, as we know, dangerous radiation travels more than 10 miles but the plans for evacuation affect only

¹⁷ <http://www.madownwinders.org/wp-content/uploads/Beyea-Pilgrim-Vermont-Yankee-report-for-Mass-AG-may-25.pdf>

¹⁸ <http://i0.wp.com/www.capecodbaywatch.org/wp-content/uploads/2015/02/chart.jpg>

¹⁹ http://www.madownwinders.org/wp-content/uploads/CDsPacketToNRC_NoEscapeFromCape.pdf

those living within 10 miles. A call for evacuation in the 10 mile PEP EPZ will undoubtedly cause massive panic and confusion on the Cape and beyond.

- The National Academy of Sciences has stated that there is no safe dose of radiation, and that pregnant women, babies, children and females are at greater risk of damaging health effects.²⁰ Dr. Richard Clapp, director of the MA Cancer Registry from 1980-89, completed a Health Study that found “adults living or working within ten miles of Pilgrim had a fourfold increased risk of contracting leukemia.”²¹ The National Cancer Institute documents Plymouth County as having the highest rates of all cancers in the State.²²
- The State and the Nuclear Regulatory Commission have already determined that an accident at Pilgrim could have a serious impact on our population's health and safety. MEMA Director Kurt Schwartz told Cape residents last October that populations within the 50 mile IEP EPZ are ‘in harm’s way’ and would be ‘relocated’ after a severe accident with a plume spreading long-lived toxins over an exposed population and our treasured landscape.
- According to MEMA , the directive to shelter-in-place protects 0% if in the open or in a car, 10% if in your wooden home. A concrete building with no windows would provide the most protection but how many such buildings are there on the Cape? Cape Cod has never had an assessment for radiological shelters.²³
- The NRC staff recommendation for filters on the safety vents on GE Mark 1 boiling water reactors and the conclusion that the status quo does not reasonably assure the public health, safety, and security met with a 4-1 vote AGAINST the filters by the NRC commissioners, with Chair Allison MacFarlane the lone vote in favor; she had witnessed first hand the devastation in Japan. Senator Markey stated that the “NRC has abdicated its responsibility to ensure public health and safety in New England and across the country”.²⁴

²⁰ http://dels.nas.edu/resources/static-assets/materials-based-on-reports/reports-in-brief/beir_vii_final.pdf

²¹ <http://concernedneighborsofpilgrim.org/wp-content/uploads/2013/08/Ex-11-Clapp-Affidavit.pdf>

²² <http://statecancerprofiles.cancer.gov/map/map.withimage.php?25&001&001&00&0&01&0&1&5&0#results>

²³ <http://www.mass.gov/eopss/docs/mema/nuclear/marerp2014.pdf> pg. 2-12

²⁴ <http://www.markey.senate.gov/news/press-releases/markey-nrcs-delay-of-fukushima-safety-measure-is-irresponsible>

- Efforts have been made by citizens petitioning the NRC to expand the EPZ with no satisfaction.²⁵
- In Fukushima, the NRC called for an evacuation of all American citizens within 50 miles.²⁶
- Pilgrim is profiled by the Department of Defense as a high value, symbolic terrorist target with nuclear waste above ground in a non hardened, commercial type roof and structure. A 2013 DOD report identified Pilgrim as one of eight most vulnerable nuclear reactor to terrorist attack in the US.²⁷
- In January of this year, the NRC determined that Entergy failed their recent inspection and is still one of the worst operating reactors in the US. Pilgrim is assessed as ‘Degrading’.²⁸ The troubled reactor remains on the NRC safety watch list due to multiple emergency shutdowns (scrams) with complications due to equipment failures and worker errors.²⁹ The scram during winter storm Juno was identified by the Union of Concerned Scientists as a ‘near miss’.³⁰
- Pilgrim has experienced operational failures and shutdowns due to increased storm intensity. The electric switchyard at Pilgrim has repeatedly collapsed when confronted with major storms and remains a looming threat. The loss of offsite power to the nuclear reactor causes the plant to use back up emergency systems and power which have experienced multiple failures. The reactor is old and deteriorating with multiple and new problems threatening public health and safety.

The first duty of our elected officials is to protect the public health and safety.

These initiatives enhance our disaster response capabilities. Predictably, Entergy will represent that there are no issues to be concerned with-‘trust us with your lives and uninsurable property as your favorite Fortune 500 Company!’. The real storm clouds of risk are gathering. By operating Pilgrim, Entergy Corporation is pushing the risk envelope with age, obsolescence, unsafe waste disposal, climate change, a deplorable safety record, and the advent of terrorism. In 1967 when Governor Volpe broke ground at

²⁵ <https://www.nirs.org/reactorwatch/emergency/petitionforrulemaking22012.pdf>

²⁶ <http://www.nrc.gov/reading-rm/doc-collections/news/2011/11-050.pdf>

²⁷ <http://sites.utexas.edu/nppp/2013/07/24/nppp-u-s-nuclear-facilities-vulnerable-to-terrorist-attack/>

²⁸ <http://pbadupws.nrc.gov/docs/ML1506/ML15065A348.pdf>

²⁹ <http://www.capecodbaywatch.org/wp-content/uploads/2015/01/2014-008-PG-95002-final-6.pdf>

³⁰ <http://allthingsnuclear.org/nuclear-near-miss-at-pilgrim/>

the reactor site, none of these issues existed. They do today and will not go away. Passage of these bills reflect recognition of new realities and a sensible response to mitigate risk that confronts the Commonwealth.

We request the Joint Committee on Public Health to:

1. Amend H. 2031 to include the following:

If at any time following the development, review, or approval of state and local emergency plans, the governor determines that said plans are no longer adequate to protect the public health and safety, he/she shall notify the Federal Emergency Management Agency to secure withdrawal of the plans and call on the Nuclear Regulatory Commission to revoke the operating license and begin the decommissioning process

2. Report out these bills favorably for a vote by the full House and Senate

Year after year, similar legislation has been introduced on behalf of public safety for Barnstable County and beyond, however, it has not moved forward for a vote since the early 1990's. This time we urgently appeal to the Committee to not fail us. An expansion of the Plume Exposure EPZ will place us in the necessary real-life emergency risk zone so our legitimate concerns will be seriously considered.

We thank Representative Sarah Peake and Representative Ann-Margaret Ferrante and all the co-sponsors of this bill for their diligent efforts to protect the health and safety of the citizens of the Commonwealth.

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Attachments:

Three ring binder with:

Notation Vote From NRC Chairman Gregory Jaczko 5.21.12

NRC NEWS: 3.16.11

Senator Markey: NRC Delays of Fukushima Safety Measure is Irresponsible 3.19.13

Letter to NRC Chair Allison Macfarlane from Rep. William Keating 4.25.14

NUREG 50.47

GAO Emergency Preparedness: NRC Needs to Better Understand Likely Public Response to Radiological Incidents at Nuclear Power Plants 3.13

Pilgrim Watch 2.206 petition to the NRC 8.11.14

Pilgrim Watch letter to NRC 1.21.15

News article: Duxbury officials consider Pilgrim evacuation time estimates unlikely
Cesium Comparison Chart

Report to the Massachusetts Attorney General On The Potention Consequences Of A Spent-Fuel-Pool Fire At The Pilgrim Or Vermont Nuclear Plant, Jan Beyea, Ph.D 5.25.06

Booklet: Pilgrim Nuclear Accident=No Escape From The Cape/Cape Downwinders

Paper copies of linked documents in testimony

Testimony in Favor of H2030 - An act relative to radiological monitoring

**Coverage Analysis of Pilgrim Nuclear Power Station (PNPS)
Current Radiological Monitoring Stations relative to Cape Cod**

Introduction

The current locations of PNPS monitoring stations create a blind spot on the Cape Cod Bay side of the plant because existing monitoring stations are located only on land. Current station locations are shaped more or less like a horseshoe with the open end directed towards Cape Cod Bay.

Figures, Maps and Diagrams (attached)

Figure 1 maps the current radiological monitoring station locations.

Figure 2 identifies the coverage zones based on the location and capability of the existing monitoring stations. The horseshoe analogy and the "blind spot" should be obvious and is of significant proportions but appears to be located predominantly over open water.

Figure 3 expands the geographical view revealing the blind spot to be more than of little consequence. For simplicity assume the wind blows in a straight direct, there's an area from Gloucester to Dennis, MA that lies within the arc of a blind spot of the current radiological monitoring stations sampling ability. Figure 3 includes a wind rose diagram showing the directional frequency that the wind blows at PNPS and within the arc of this blind spot which is 58% of the time on a yearly basis.

Figure 4 depicts the PNPS Radiological Monitoring Coverage Zones relative to Cape Cod and the yearly and seasonal breakdown showing the amount of time the wind blows towards Cape within two

different Coverage Zones. In terms of vulnerability the worst case scenario exists from January to March when the wind blows 39% of the time towards the blind spot that arcs from Dennis to Provincetown.

Figure 5 overlays the Fukushima plume and uninhabitable areas over the PNPS landscape. It seems pretty clear that Cape Cod residents and visitors are at risk of exposure during a serious radioactive release at PNPS.

Conclusions

A blind spot and a deficiency of significant proportions exists in the current radiological monitoring aspect of PNPS emergency preparedness planning. A precedent was set with the installation of Duxbury's combined "real-time" meteorological and radiological monitoring station using this same blind spot analysis.

The Cape Cod towns from Provincetown to Dennis are in this blind spot. The wind blows towards these and other Cape Towns often enough to merit continuous real-time monitoring (Figure 4). To date it is unknown when and how much radiation has already blown into the arc of the blind spot, over Cape towns and into Cape Cod Bay during routine releases by PNPS. Combined meteorological and radiological monitoring stations should be positioned appropriately throughout Cape Cod and the Islands to assist local Emergency Management in making informed decisions (i.e. evacuation or sheltering in place then relocation) during a PNPS emergency as well as monitor the consequences of routine releases. It's important and in the service of transparency that Cape Emergency Management Professionals have unencumbered 24/7/365 access to this real-time data as it is generated.

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Attachments:
Figures 1-5