



Testimony from Cape Downwinders, an organization of concerned citizens from the Cape and Islands working in the interest of public health and safety of residents and visitors on the Cape Cod and the Islands regarding the dangers to public safety from the operation of the Pilgrim Nuclear Power Station and high level radioactive waste storage in Plymouth.

Cape Downwinders supports H. 2167, an Act relative to emergency planning to direct the Massachusetts Emergency Management Agency to assess and report on the preparedness plans for a radiological accident at the Pilgrim Nuclear Power Station in Plymouth and the Seabrook Nuclear Power Station in Seabrook, NH and withdrawal of approval of emergency plans that are not adequate to protect the public.

This testimony represents our concerns regarding the risks to the public safety, specifically on the public emergency plans for Entergy Corporation's Pilgrim Nuclear Power Reactor in Plymouth and the urgent need for proper state action. Whether one is for or against nuclear power, public safety should be a concern for all. 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), the state is currently woefully unprepared to protect all Massachusetts citizens from a nuclear accident or hostile action at Pilgrim. We contend that although the public safety cannot be assured as long as the Pilgrim reactor continues to operate and the high level nuclear waste is located in the unprotected wet pool, this bill represents a significant step in the right direction to take a serious look at the current emergency plans and evaluate the need and appropriateness of additional plans to provide for public safety to residents in Barnstable and Essex Counties or call for revocation of the operating license if public safety cannot be assured.

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 the reactor. 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 the 50 mile Ingestion Pathway EPZ: stockpiling 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 both DPH and the NRC identify the serious risk of internal contamination from exposure to a plume containing dangerous radionuclides from a severe accident at Pilgrim outside of the 10 mile PEP EPZ. Currently, all Cape and Island residents have access to free KI (potassium iodide) pills to protect our thyroids from radioactive iodine present in a plume. However, this pill only protects the thyroid, not soft tissue from cesium 137 or bone from strontium 90. Also, the distribution of KI in our area identifies us as an acknowledged population at risk for exposure to damaging radionuclides.

Lessons are to be learned. Fukushima blew away the myth that nuclear power is safe. Cape Downwinders is concerned for public safety because Pilgrim is the same failed GE Mark 1 Boiling Water Reactor design. In 1986, Dr. Harold Denton, the NRC’s chief safety officer, stated publicly that if a Mark 1 reactor had a severe nuclear accident, there was “something like a 90% chance” of containment failure.² 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 backup safety vents added to the containment in Japan failed. Fukushima was not an accident but a prediction come true. It could 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 then 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 in 1989 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. Currently, Senator Markey has introduced the “Dry Cask Act of 2015”³ in Congress 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

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

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>

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, in November of 2014, voters in the Cape and Islands Senatorial district passed a public advisory ballot question in support of inclusion in a Plume Exposure Pathway EPZ. The measure won by 74% of the vote, more votes cast in support of the bill than for any candidate or other question on the ballot.⁴

On September 19, 2015, the State Democratic Convention unanimously voted in support of this bill. **The committee has strong public support for this bill.**

There is for additional state and local plans necessary to provide for public safety.



There is no escape from the Cape.

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

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 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 attached testimony by William Maurer on lack of radiation monitoring.

Cape and Islands citizens already have KI (potassium iodide) available for free thanks to legislation passed in 2003⁵ but that only protects our thyroids. 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

⁴ <http://www.capecodtimes.com/article/20141106/News/411050345>

⁵ <https://malegislature.gov/Laws/GeneralLaws/PartI/TitleXVI/Chapter111/Section5K>

available to all within the 50 miles but is available to only those within the 10 mile EPZ and the Cape and Islands. 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. Distribution came into effect from legislative action in 2002 sponsored by Rep. Matt Patrick because we are at risk.

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.”⁶ MEMA 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 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.”⁷

Giving 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.



⁶ <http://www.gpo.gov/fdsys/pkg/FR-2008-01-31/html/E8-1769.htm>

⁷ <http://www.mass.gov/eopss/agencies/mema/nuclear-preparedness-department.html>

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.”⁸ The State of California has expanded the EPZ in San Louis Obispo County to address such unique circumstances for their residents.⁹

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 concerns¹⁰ Chair Allison Macfarlane acknowledged that the Commonwealth has “a significant role in determining the adequacy of Pilgrim’s Emergency Preparedness Program.”¹¹ The NRC identified the jurisdiction for public health and off-site planning is state and local safety officials. This bill will provide public safety officials with potential mitigation strategies necessary for increased safety, not assured safety, due to new information learned as a result of the catastrophe in Japan, and development of recommendations to meet our unique needs.

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.

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.¹² 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”¹³. Those results reveal a self-evacuation response by 50% to 70% of the year round resident population (by the 2010 Census,

⁸ <http://www.nrc.gov/about-nrc/emerg-preparedness/about-emerg-preparedness/planning-zones.html>

⁹ <http://www.slocounty.ca.gov/OES/NPPInfo/DCPPEmergencyPlanning/PAZInfo/EPZ.htm>

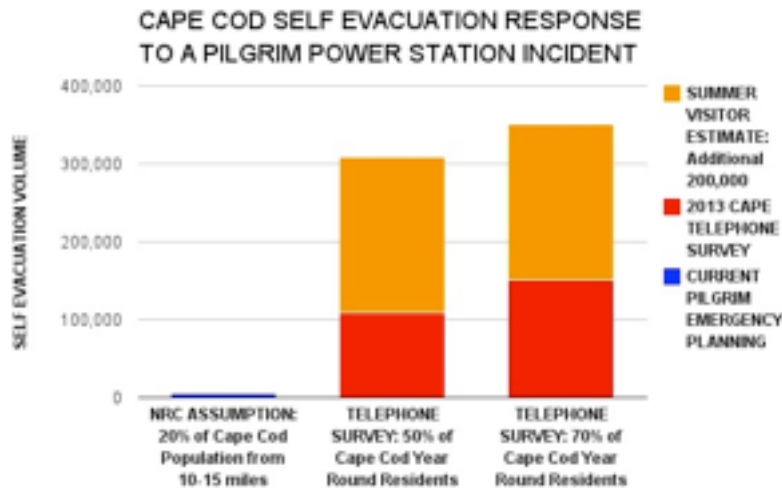
¹⁰ http://www.madownwinders.org/wp-content/uploads/Patrick_letter_to_NRC_2014March17.pdf

¹¹ http://www.madownwinders.org/wp-content/uploads/NRC_letter_to_Gov_2014June9.pdf

¹² <https://www.nirs.org/reactorwatch/emergency/gaoshadowevacreport413.pdf>

¹³ <http://www.madownwinders.org/news/cape-cod-telephone-survey-results/>

the Cape Cod Population = 218,000), approximately 109,000 to 153,000 individuals respectively. This 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.¹⁴ 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 Warren replied to Entergy, which develops the plans with MEMA, that the plan ignores the potential need for residents on the Cape to evacuate and agreed it is based on false assumptions¹⁵. No further work from the results of this plan and Congressional recommendations has been completed to effect our safety. This is an abdication of responsibility by both the federal government and MEMA to protect all citizens.

The Massachusetts Emergency Management Agency (MEMA) plans are inadequate to protect the public.

Currently, the MEMA plan for Cape Cod 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.¹⁶

MEMA Director Kurt Schwartz spoke at a public meeting for the Barnstable County Regional Emergency Planning Committee in October of 2012. He reported that residents would

¹⁴ <http://capedownwinders.org/cape-downwinders-letter-to-nrc/>

¹⁵ <http://www.pilgrimcoalition.org/getfile/20130816-WarrenMarkeyLetter-EntergyPilgrim.pdf>

¹⁶ http://www.bcrepc.org/wp-content/uploads/2014/09/BCREPC_Radiation-Emergency-Reference-Sheet-092214.pdf

have to ‘shelter-in-place’. A ‘relocation’ plan would be put into effect by the State to determine where the ‘hot spots’ were. Director Schwartz continued to describe the plan:

“Over the next number of days, we would have mapped this area and once we had identified this area we would then issue a relocation order and order anyone within this area to leave the area. And we would enforce that order. This is not an evacuation. An evacuation is an emergency quick get out of town order which says get in your car and get the hell out of town because there is an imminent danger. This is not an evacuation. This is a relocation. It is not urgent. We have the time to plan it and what we did in this drill and what we would do in real life is identify all the roads and major roads. We will work with local and state police and the department of transportation. We would seal off all the roads in and out. We would send people into these areas with protective clothing and help everybody relocate out. We would move animals and anything living we would move out. And the unfortunate reality which is what Fukushima faces today, is that this area may well be closed to anyone for years to come.”¹⁷

MEMA Director Kurt Schwartz also 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 MEMA radiological emergency document reveals “Generally, sheltering-in-place can provide significant protection for about 2 hours in small residential structures.”¹⁸ This may be a “protective action” but not protection from exposure to dangerous radionuclides in a release. The only way to be protected from the danger is to not to be exposed. It is unconscionable that a portion of the population is acceptable collateral damage.

Living Under A Cloud Of Unacceptable Risk:

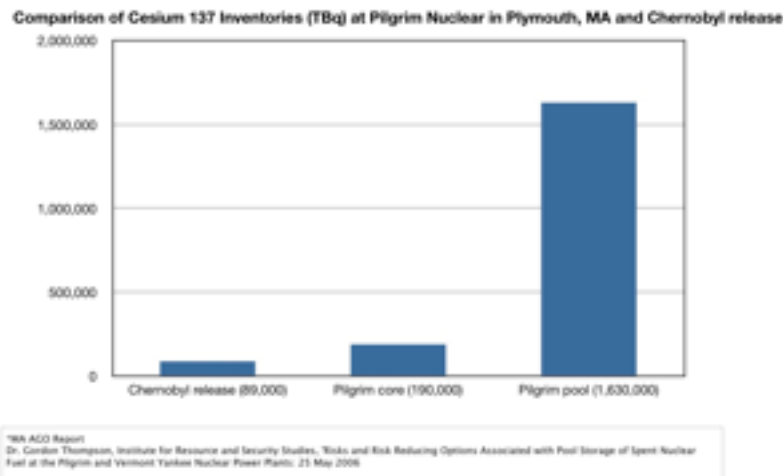
- Governor Patrick, Attorney General Coakley, Representative Keating, Senator Markey, State Senate President Murray, State Senator Wolf, and Representative Peake requested the NRC not re-license Pilgrim Nuclear until the "Lessons Learned" from Fukushima were implemented. The license was renewed over 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 over 3,200. Closer packing of fuel assemblies, over design limits, increases

¹⁷ <http://www.madownwinders.org/resources/packet-to-nrc-no-escape-from-the-cape/>

¹⁸ <http://www.mass.gov/eopss/docs/mema/nuclear/marerp2014.pdf> page 2-6

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.¹⁹

- 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 by the Chernobyl accident which spread throughout Europe and beyond.²⁰ 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.²¹ 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 radionuclides travel more than 10 miles but the plans for evacuation affect only those living within 10 miles. A call for

¹⁹ <http://www.madownwinders.org/wp-content/uploads/Beyea-Pilgrim-Vermont-Yankee-report-for-Mass-AG-may-25.pdf>

²⁰ <http://i0.wp.com/www.capecodbaywatch.org/wp-content/uploads/2015/02/chart.jpg>

²¹ http://www.madownwinders.org/wp-content/uploads/CDsPacketToNRC_NoEscapeFromCape.pdf

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 determined that there is no safe dose of radiation. Pregnant women, babies, children and females are at greater risk of damaging health effects.²² 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.”²³ The National Cancer Institute documents Plymouth County as having the highest rates of all cancers in the State.²⁴
- 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.²⁵
- 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”.²⁶
- Efforts have been made by citizens petitioning the NRC to expand the EPZ with no satisfaction.²⁷
- During the Fukushima accident, the NRC called for an evacuation of all American citizens within 50 miles.²⁸ Why aren't the same standards held for Americans at home?
- Pilgrim is profiled by the Department of Defense as a high value, symbolic terrorist target with nuclear waste above ground with a non hardened, commercial type roof and structure. A

²² http://dels.nas.edu/resources/static-assets/materials-based-on-reports/reports-in-brief/beir_vii_final.pdf

²³ <http://concernedneighborsofpilgrim.org/wp-content/uploads/2013/08/Ex-11-Clapp-Affidavit.pdf>

²⁴ <http://statecancerprofiles.cancer.gov/map/map.withimage.php?25&001&001&00&0&01&0&1&5&0#results>

²⁵ <http://www.mass.gov/eopss/docs/mema/nuclear/marerp2014.pdf> pg. 2-12

²⁶ <http://www.markey.senate.gov/news/press-releases/markey-nrcs-delay-of-fukushima-safety-measure-is-irresponsible>

²⁷ <https://www.nirs.org/reactorwatch/emergency/petitionforrulemaking22012.pdf>

²⁸ <http://www.nrc.gov/reading-rm/doc-collections/news/2011/11-050.pdf>

2013 DOD report identified Pilgrim as one of eight most vulnerable nuclear reactor to terrorist attack in the US.²⁹

- 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”.³⁰ 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.³¹ The scram during winter storm Juno was identified by the Union of Concerned Scientists as a “near miss”.³² In the following months, additional investigations by the NRC have continued to downgrade Pilgrim which is now just one step from federally mandated shutdown.³³
- Pilgrim has experienced operational failures and shutdowns due to increased storm intensity which puts the population at risk. The electric switchyard 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 many new and repeating problems threatening public safety.
- When nuclear reactor owners begin decommissioning, they generally file for a license amendment with the NRC to be released from emergency planning requirements. Vermont Yankee shut down in December of 2014 and Entergy, which owns both VY and Pilgrim, applied to the NRC to become exempt from emergency planning off-site. The NRC granted approval. The state of Vermont is appealing this decision.³⁴
- The Barnstable County Regional Emergency Planning Committee has published a Radiation Emergency Reference Sheet for residents and visitors to Cape Cod. It clearly states we can be impacted by a radiological accident at Pilgrim, however, there are no plans for evacuation of the Cape population.³⁵

²⁹ <http://sites.utexas.edu/nppp/2013/07/24/nppp-u-s-nuclear-facilities-vulnerable-to-terrorist-attack/>

³⁰ <http://pbadupws.nrc.gov/docs/ML1506/ML15065A348.pdf>

³¹ <http://www.capecodbaywatch.org/wp-content/uploads/2015/01/2014-008-PG-95002-final-6.pdf>

³² <http://allthingsnuclear.org/nuclear-near-miss-at-pilgrim/>

³³ <http://www.capecodtimes.com/article/20150902/NEWS11/150909865>

³⁴ <http://vtdigger.org/2015/09/28/state-slams-emergency-plan-changes-at-vermont-yankee/>

³⁵ http://www.bcrepc.org/wp-content/uploads/2014/09/BCREPC_Radiation-Emergency-Reference-Sheet-092214.pdf



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

This initiative enhances disaster response capabilities by taking a close look at current plans to evaluate effectiveness and need for expansion. Predictably, Entergy will represent that there are no issues to be concerned with even though the NRC has determined Pilgrim is one of the worst operating reactors in the country.³⁶ The real storm clouds of risk are gathering. By operating Pilgrim, Entergy Corporation is pushing the risk envelope with age, obsolescence, unsafe waste disposal, impact of climate change, a deplorable safety record, and the advent of terrorism. In 1967 when Governor Volpe broke ground at the reactor site, none of these issues existed. They do today and will not go away. Passage of this bill will reflect recognition of new realities and a sensible response to mitigate risk that confronts the Commonwealth.

We request the Joint Committee on Public Safety and Homeland Security report out this public safety bill favorably for a vote by the full House and Senate as an emergency measure.

Year after year, similar legislation has been introduced on behalf of public safety for Barnstable County and beyond; however, expansion has not moved forward for a vote since the early 1990's. We have appealed for support from MEMA and the current administration without results. This time we urgently appeal to the Committee to not fail us. An expansion of the Plume Exposure EPZ to include both Barnstable and Essex Counties will place us in the necessary real-life emergency risk zone so our legitimate concerns will be seriously considered.

Section 3 elevates public safety off-site to the primary responsibility of the state as NRC Chair Allison Macfarlane acknowledged to then Governor Patrick. The State needs to carefully

³⁶ <http://www.boston.com/news/local/massachusetts/2015/09/03/pilgrim-officially-one-the-worst-ranked-nuclear-plants-the-country/co1sgdBC4qBdNdQCrh0U0N/story.html>

review and not accept emergency plans that are no longer adequate to protect the public. Currently, the plans do not protect us. The Governor will be instructed to withdraw plans that are ineffective and call for the revocation of the operating license and begin safe decommissioning.

A request for public hearings to be held on the emergency plans is also submitted. Towns within the 10 mile EPZ, like Duxbury, do not approve the current plans.

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 safety of the citizens of the Commonwealth. We look to your committee to forward this serious public safety effort and favorably report this bill out as soon as possible.

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Attachments:

Booklet-No Escape From The Cape by Cape Downwinders

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 MA AGO on Consequences of A Spent Fuel Pool Fire at Pilgrim, Jan Beyea, Ph.D