RAS J-258

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE U.S. NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
	)	
Entergy Nuclear Generation Co. and	)	
Entergy Nuclear Operations, Inc.	)	Docket No. 50-293-LR
	)	
	)	ASLBP No. 06-848-02-LR
(Pilgrim Nuclear Power Station)	)	

PILGRIM WATCH NOTICE TO COMMISSION REGARDING NEW AND SIGNIFICANT INFORMATION PERTAINING TO PILGRIM WATCH'S PETITION FOR REVIEW OF LBP- 06-848

Mary Lampert
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July 25, 2010

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PILGRIM WATCH'S NOTICE TO COMMISSION REGARDING NEW INFORMATION PERTAINING TO PILGRIM WATCH'S PETITION FOR REVIEW OF LBP- 06-848

Pilgrim Watch seeks leave to file notice to the Commission regarding new and significant information pertaining to Pilgrim Watch's appeal to the Commission of the Atomic Safety Licensing Board's decision regarding LBP-06-848. This information could not have been cited in Pilgrim Watch's petition, and supports Pilgrim Watch's argument under appeal.

I. BACKGROUND

On November 12, 2008, Pilgrim Watch filed with the Commission *Pilgrim Watch's Petition for Review of LBP- 06-848, LBP-07-13, LBP-06-23 and the Interlocutory Decisions in The Pilgrim Nuclear Power Station Proceeding.*

Pilgrim Watch's position stated that the Board's decision regarding the scope of issues before it in a license renewal proceeding was erroneous. In short, ASLB's interlocutory decisions held that that the only thing that matters about such buried pipes and tanks in a license renewal proceeding is whether the leaks are so great as to permit a design base failure. The ASLB refused to permit Pilgrim Watch to include within scope a number of the key ways in which the Aging Management Program (AMP) did not provide reasonable assurance that radioactive or other leakage from buried pipes and tanks would comply with the current licensing basis ("CLB") during license renewal.[1] As a result, the adjudicatory process failed to consider the standard set by the CLB, the standard against which the AMPs must be evaluated, and therefore the public has no

[1] **NRC's Liquid Radioactive Release Lessons Learned Task Force, Final Report**, September 1, 2006, Section 3.2.1.2, Existing Regulatory Framework
10 C.F.R. § 20.1302 Compliance with dose limits for individual members of the public: (a)(b)
10 C.F.R. § 50 Appendix A: ***Criterion 60–Control of releases of radioactive materials to the environment.*** The nuclear power unit design shall include means to control suitably the release of radioactive materials in gaseous and liquid effluents and to handle radioactive solid wastes produced during normal reactor operation, including anticipated operational occurrences. Sufficient holdup capacity shall be provided for retention of gaseous and liquid effluents containing radioactive materials, particularly where unfavorable site environmental conditions can be expected to impose unusual operational limitations upon the release of such effluents to the environment. ***Criterion 64–Monitoring radioactivity releases.*** Means shall be provided for monitoring the reactor containment atmosphere, spaces containing components for recirculation of loss-of coolant accident fluids, effluent discharge paths, and the plant environs for radioactivity that maybe released from normal operations, including anticipated operational occurrences, and from postulated accidents.

assurance, reasonable or otherwise, that the CLB will be maintained over the license renewal period. The initial decision concluded, incorrectly and absent relevant facts, that the proposed AMP provides reasonable assurance of ongoing conformity to the CLB.

On January 22, 2010, Pilgrim Watch filed *Pilgrim Watch's Notice To Commission Regarding New Information Pertaining To Pilgrim Watch's Petition For Review Of LBP- 06-848* drawing to the Commission's attention SECY-09-0174 (December 2, 2009) that was directly pertinent to Pilgrim Watch's petition, but it could not have been cited in Pilgrim Watch's petition, and supported Pilgrim Watch's argument under appeal.

In SECY-09-0174, at 3, the staff reviewed current regulations and reached a conclusion diametrically opposed to that of the ASLB. According to the Staff,

> With regard to buried piping, the goals of current regulations are to ensure that the piping is able to perform its intended safety function by supplying sufficient fluid flow and *to maintain inadvertent releases below licensee's technical specifications or other applicable limits.* (Italics added)

Further, on pages 6 and 7, the staff says:

> The license renewal rule requires applicants for license renewal to demonstrate that for each applicable structure, system, or component, the effects of aging will be adequately managed so that the intended functions *will be maintained consistent with the current licensing basis* for the period of extended operation. (pg. 6, italics added)

Last, the Staff concluded,

> With regard to buried piping, the goals of current regulations are to ensure that the piping is able to perform its intended safety function by supplying sufficient fluid flow *and to maintain inadvertent releases below licensee's technical specifications or other applicable limits which apply at the site boundary.* (pg 7, italics added)

Thus, SECY-09-0174 made clear that the ASLB was incorrect in concluding that the only thing that matters about buried pipes and tanks was whether leaks were so great as to permit a design base failure.

Since that time, there has been further new and significant information pertaining to Pilgrim Watch's Petition for Review of LBP-06-848. The new information affirms Pilgrim Watch's arguments presented in our appeal to the Commission and the NRC Staff's recommendations in SECY-09-0174. The new information is arranged in chronological order and culminates in an Event Report 46083 (07/20/10) describing a persistent and escalating level of tritium found in a well sample to 25, 552 pCi/L. The source has not been identified; therefore public safety is not assured.

II. NEW INFORMATION PERTAINING TO PILGRIM WATCH'S PETITION FOR REVIEW

A. GAO Investigation (Attachment 1): On January 14, 2010 Representative Markey and Representatives Hall (NY), Adler (NJ) and Welsh (VT) requested a GAO investigation in light of the increasing number of plants with tritium leaks and NRC's inadequate response to the Congressmen's concerns regarding this safety issue. They "question NRC's buried pipes inspection processes, NRC's current relevant regulations, and whether they are adequate and enforced in a manner that is sufficiently protective of reactor and public safety.[2]" They did not make an exception for license renewal. For example, their letter to GAO specifically cited that "just one week after the 40-year-old Oyster Creek (NJ) reactor's license was extended for another 20 years, plant workers discovered standing water in an on-site cable vault. This water, apparently leaking from two different buried pipes, was contaminated with the radioactive isotope tritium." (Ibid, pg. 1) Leaky pipes from other reactors were listed. They concluded that, "repeated pipe failures indicate a growing problem with an aging part of plant infrastructure that must be proactively managed to ensure continued safety." (Ibid, pg. 2) The Representatives questioned whether existing regulations "vary depending on the underground environment at

[2] Letter to Gene Dodaro, Acting Comptroller General of the US GAO, January 14, 2010, Congress of the United States, pg.2

individual reactor sites (e.g., the more moist saline seaside environment at Pilgrim that might accelerate corrosion.)" (Ibid, pg.2) These questions were not addressed by the ASLB during Pilgrim's licensing review process.

B. Governor Deval Patrick's Letter to NRC (Attachment 2): On February 9, 2010, The Honorable Deval Patrick, Governor of Massachusetts, wrote to the Commission in regard to Tritium leaks at Pilgrim Station and Vermont Yankee NPS requesting that the Commission:

- Require extensive testing for leaks of tritium and other radioactive substances at both Vermont Yankee and Pilgrim, including testing of potentially impacted drinking water supplies and of the Connecticut River in proximity to Vermont Yankee;
- Stay any further consideration of the relicensing of both plants until the leak issues are resolved.

In order to provide reasonable assurance to the Governor that "the leak issues are resolved" would require a demonstration that the Aging Management Program (AMP) provides reasonable assurance that radioactive or other leakage from buried pipes and tanks at Pilgrim complies with the current licensing basis ("CLB") during license renewal. The ASLB, incorrectly, refused to do so; the Commission has an opportunity to remand the issue back to the board.

C. MDPH Review Pilgrim's Groundwater Monitoring Program (Attachment 3): Following the Governor's letter, Massachusetts Department of Public Health (MDPH) began a review of Pilgrim's Groundwater Monitoring Program; and issued a *Memorandum Regarding the Status of Groundwater Monitoring Program at Pilgrim Nuclear Power Plant,* June 25, 2010 (Attachment C). The report reviewed inadequacies of Pilgrim's current groundwater monitoring program and documented the findings of tritium in nearly all sampling rounds since the program began in November 2007. The report made clear that the number of wells, their placement, and evidence of persistent tritium in sampling does not provide reasonable assurance that radioactive leakage from buried pipes and tanks at Pilgrim will comply with the current licensing basis ("CLB") during license renewal.

1. Groundwater Monitoring Wells: MDPH reported that the total number of monitoring wells at PNPS, all put in place in response to NEI's Groundwater Initiative, is twelve (12). Four (4) of the twelve are control wells, and only eight (8) are indicator wells. Only six (6) of the twelve (12) are located between the plant and the shoreline. The number and placement are insufficient to monitor Pilgrim's facility. PNPS occupies about 140 acres and is located directly adjacent to the shores of Cape Cod Bay, with one (1) mile of continuous shoreline frontage.[3] In contrast, Indian Point has around forty (40) monitoring wells; and Seabrook currently has twenty-two (22) wells and plans to add five (5). Given the short distance from likely pipe locations to the shore, it is highly likely that a leak of radiological contaminants could migrate through the groundwater and pass between these widely-spaced wells or perhaps flow beneath them without detection.

Of special concern to the department was that, "[t]here are currently no groundwater monitoring wells located east/southeast between facility buildings and the shoreline" – meaning that the vast majority of the shoreline is not monitored. Populated shorefront communities of Priscilla and White Horse Beach are located east/southeast of the plant, within 2 miles of PNPS.[4]

Dr. David Ahlfeld, PhD, PE, expert witness for Pilgrim Watch, reviewed MDPH's report and recommended many more wells than recommended initially by MDPH and in addition noted that screen depth is important in order "to get both deep and shallow information from all monitoring locations."

The inadequate number of monitoring wells currently onsite makes us suspicious as to how much has leaked off-site in the past, is presently leaking, and will continue to leak undetected in the future.

2. Hydrogeologic Assessment: MDPH found that the wells were not placed according to accepted design practices, agreeing with Dr. Ahlfeld's testimony on behalf of Pilgrim Watch. The initial monitoring wells put in place in November 2007 and six (6) more wells added to the

[3] NUREG-1437, Supplement 29, July 2007, pg. 2-4
[4] Ibid, pg 2-1

program in April 2010; the location of all of these were based on a pre-operational 1967 Dames & Moore report. This is the only study to date that performed exploratory borings as part of its analysis. No subsurface investigations have been performed for over forty (4) year, as they clearly should have been. MDPH's report found this of special concern because,

> ...localized variations in groundwater flow beneath and around the footprint of the facility have not been well characterized. PNPS previous consultant noted that the additional data points would be needed to adequately assess horizontal and vertical gradients and flow direction across the site and in the vicinity of the structures (GZA 2009). Thus, further assessment of site specific hydrology would be required to rule out a possible cross – gradient groundwater pathway. In addition, much of the information on localized groundwater flow direction is based on information gathered prior to PNPP construction and subsurface conditions may have changed during construction and subsequent operations of the plant. Factors that could influence localized groundwater flow after construction of PNPP need to be further evaluated such as the impact of some facility structures reaching a depth below the water table and mounding of groundwater." (MDPH Report, pg. 9)

MDPH recommended, "...better characterization of site-specific groundwater flow gradients in and around PNPP subsurface structures and components." (MDPH Report, pg. 12) This is necessary because the suitability of these wells, and any subsequent wells, to actually intercept plausible leakage transport pathways is not known.

3. Groundwater Sampling Results: Table 1 in MDPH's June 25, 2010 report shows all results from November 29, 2007 to March 12, 2010. "With the exception of tritium results for one well early on, groundwater sampling at the PNPP since 2007 has generally shown tritium detections in the range of 450-1,500 pCi/L, and tritium has been detected in every monitoring well during all sampling rounds." (Underlining added)

The persistence of tritium in the samples reinforces concerns that the source of tritium in groundwater at the facility likely is not just atmospheric deposition or natural background, as PNPP officials believe."(MDPH Report, pg.9) The department reviewed Pilgrim's precipitation sampling effort and noted that, "based on the limited precipitation data available since fall 2009, concentrations of tritium detected in groundwater monitoring wells are roughly up to two times higher than concentrations of tritium that have been detected in adjacent precipitation samples." (MDPH report, pg. 8)

4. Precipitation Sampling Effort & Results (MDPH Report, pg. 8): The precipitation sampling effort discussed above consists of "four precipitation samplers located adjacent to MW-201, MW-202, MW- 203, MW-204 [and] an offsite precipitation sampler located approximately 4.5 miles to the S/SE of PNPP."

5. Surface Water Sampling (MDPH Report, pg. 8): Surface water is sampled onsite in the discharge canal and two locations off site (Bartlett Pond- 2.7 km and Powder Point Control – 13 km from the plant). This is inadequate. MDPH recommends that "surface/bay water samples from two locations in the bay between the facility shoreline and breakwater (i.e., directly down-gradient from monitoring wells MW-205 and MW-202/S/1 and to sample also sample surface water at the entrance to the breakwater) to ensure no detectable levels of tritium are present." (MDPH report, pg. 12)

D. July 2010 Increased Tritium Sampling Results:

1. NRC Event No. 46083 (07/09/2010) Offsite Notification Due to Elevated Levels of Tritium Found in Well Sample (Attachment 4) said that

> Entergy Pilgrim Station has received the results of its most recent weekly tritium sample taken on July 7, 2010 for groundwater monitoring well, MW-205. The sample results have shown an increase in the tritium concentration to 25,552 picocuries per liter (pCi/L) from the previous sample taken on June 30, 2010 which had a test result of 8,477 pCi/L.

According to Entergy,

> "[t]he latest results remain below any regulatory reporting requirements and the Environmental Protection Agency's (EPA) limits for tritium in non-drinking water

wells. This information has been communicated to federal, state and local stakeholders. There remains no threat to drinking water sources and no impact on the health and/or safety of the public.

Elsewhere in the report Entergy said that, "The... sample taken on June 21, 2010 returned a test result of 11,072 picocuries per liter of tritium."

Both the NRC and Entergy claim that the test results presented "no impact on the health and/or safety of the public." This is not supported by facts.

First, neither can say, with reasonable certainty, that the wells have detected the peak of the underground plume coming out from an as-yet undetected source. Neither knows the location of the leak, the radiological concentration of the contents in that source, or the geology. Without this knowledge, neither can properly conclude that the monitoring well sample of 25,000 picocuries per liter was the peak amount, or that there is "no threat."

Further, standards for tritium in drinking water range from 400 picocuries to 20,000 picocuries per liter in drinking water. EPA's standard for tritium in drinking water is 20,000 picocuries per liter. When MDPH, Pilgrim and NRC cannot correctly dismiss public concerns about leaks, saying that tritium levels of over 25,000 picoliters per liter measured by the plant operators are "safe" because were well below the EPA drinking water standard of 20,000 picocuries per liter.

The tritium levels measured at PNPS are ever farther above other safety standards. California's recommended public health goal is 400; DOE agreed to an action level of 500 for tritium in surface water in the clean up at Rocky Flats - corresponding to Colorado's standard; and Ontario Canada's Drinking Water Advisory Council recommended 540.

Indeed, all radiation protection regulations, and the most recent report of the National Academies BEIR VII report, have concluded that the hypothesis that best fits the facts is that every exposure to radiation produces a corresponding cancer risk – low exposures produce low risk, and that risk increases with exposure. There is no threshold below which there is zero risk.

2. <u>MDPH Summary of Tritium Detected in Groundwater Monitoring Wells</u> from November 29, 2007 → July 7, 2010. A copy is included in Attachment 5.

E. Congressman Markey's Letter To Commissioner Jaczko (July 15, 2010) Regarding Recent Elevated Tritium Levels Found In Samples At Pilgrim (Attachment 6): In his letter Congressman Markey that Pilgrim's report "is yet another disturbing reminder of the dangers lurking in the miles and miles of buried pipes within nuclear reactors that have never been inspected and will likely never be inspected. *** This is simply unacceptable and cannot possibly be sufficient to ensure the safety of both the public and the plant."

Congressman Markey also noted that

> [T]he possibility that there may be buried pipes leaking tritium at Pilgrim is not surprising. After all, the plant is almost 40 year old and located in a corrosive near shore environment.
>
> ***
>
> The current inspection regime for buried pipes …is incapable of ensuring the integrity of decades-old piping systems. While I realize that such inspection poses unique challenges due to accessibility and cost issues, those hurdles do not render these pipes immune from corrosion or damage, nor do they obviate the need for comprehensive inspections to ensure both operational and environmental integrity."

And he made a special point that, "This matter is even more critical in light of Entergy's application to extend Pilgrim's operating license past 2012 for another 20 years."

In the letter, Congressman Markey reminded the Commission that the same licensee, Entergy, admitted to misleading state regulators and lawmakers about their Vermont Yankee nuclear plant's buried pipes and subsequent tritium leak; and urged the NRC to pay additional attention to the issue of the inspection, maintenance and oversight of buried piping systems.

Last, Congressman Markey concluded that a buried component program "should work by identifying potential failures of components ***before*** they break and release unknown volumes of radioactive water into our environment. Other industries have figured out how to inspect their buried pipes in a proactive and comprehensive fashion." He asked, "How many more failures does the nuclear industry and the NRC need before they admit that the aging buried systems need additional attention?"

Pilgrim Watch has appealed LBP- 06-848 so that the NRC will assure that the public gets "additional attention."

III. Significance of New Information

The new information is significant because it demonstrates that the aging management program (AMP) for buried components within scope of license renewal is insufficient (likewise the SER performed at Pilgrim) to provide reasonable assurance that pertinent NRC regulations regarding unmonitored radioactive materials will not go offsite unmonitored placing public health and safety in jeopardy.

Both the AMP and day-to-day maintenance procedures ignore that the probability of corrosion is not constant with time and therefore cannot be characterized with a number and entered as such into a "rule," such that, if the Applicant inspected yesterday they do not need to inspect again for 10 years. Corrosion is a rate process and the rate is *NOT* constant with time. Therefore, the <u>probability must be adjusted with age</u>, and the <u>risk is a function of age.</u> The entire risk management now practiced at Pilgrim and an integral part of the AMP is totally misguided.

Tritium discovered in Pilgrim's monitoring wells and tritium leaks at reactors around the country both during and after the license renewal process (examples include Oyster Creek, Indian Point, Vermont Yankee, Pilgrim) clearly indicate that as reactors age they are leaking and day-to day operations and the AMP are insufficient. The public deserves a hearing so that evidence can be presented and the facts see the light of day.

Thanking you for the opportunity to draw your attention to this new and significant information pertaining to Pilgrim Watch's appeal to the Commission of the Atomic Safety Licensing Board's decision regarding LBP-06-848.

Respectfully submitted,

Mary Lampert

Mary Lampert
Pilgrim Watch, pro se
148 Washington Street
Duxbury, MA 02332
July 25, 2010

ATTACHMENTS

- **Congressman Edward Markey, John Hall, John Adler's letter to Gene Dodaro, Acting Comptroller General of the United States, January 14, 2010**

- **Honorable Deval L. Patrick's Letter to Chairman Gregory B. Jaczko, Commissioner Dale E. Klein, Commissioner Kristine L. Svinicki, February 9, 2010**

- **Massachusetts Department of Public Health, Memorandum Status Monitoring Program at Pilgrim Nuclear Power Plant, June 25, 2010**

- **NRC Event Report, Number 46083, Offsite Notification Due to Elevated Levels of Tritium Found in Well Sample, 07/09/2010**

- **Massachusetts Department of Public Health, Summary of Tritium Detected in Groundwater Monitoring Wells, Pilgrim Nuclear Power Station, Plymouth MA -All results reported in picocuries per liter (pCi/L)**

- **Congressman Edward Markey letter to The Honorable Gregory Jaczko, July 15, 2010**

ATTACHMENT 1

Congress of the United States
Washington, DC 20515

January 14, 2010

Gene Dodaro
Acting Comptroller General of the United States
Government Accountability Office
441 G Street, NW
Washington, D.C. 20548

Dear Mr. Dodaro:

We are writing to request that the Government Accountability Office (GAO) commence a review of the policies and procedures of the Nuclear Regulatory Commission (NRC) regarding the integrity, safety, inspection and maintenance of buried piping at our nation's nuclear power plants. The recent discoveries of leaks of reactor cooling water, diesel fuel and radioactive water at several plants suggest that NRC processes must be improved to help licensees adequately manage the aging of this infrastructure to ensure the safety of the reactors and of the public.

For example, just one week after the 40-year-old Oyster Creek (NJ) reactor's license was extended for another 20 years, plant workers discovered standing water in an on-site cable vault. This water, apparently leaking from two different buried pipes, was contaminated with the radioactive isotope tritium.[1] A similar leak, this time in buried pipes that are part of the auxiliary feed water system, occurred last February at Indian Point (NY).[2] Indeed, these cases are not isolated incidents. Other known or suspected leaky pipes, tanks or pipe fittings at our nation's nuclear power plants were found at San Onofre (CA),[3] Byron (IL),[4] Perry (OH),[5] Dresden (IL)[6] and Braidwood (IL).[7]

These repeated failures, often identified only after thousands of gallons of fluid have escaped, suggest that even now there may be undetected, active leaks from buried piping at one or more of our nation's nuclear power plants. The integrity of buried piping has implications, not only for today's public safety, but for future costs incurred during plant decommissioning. Unforeseen

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[1] Exelon Report, "Tritium Identified in Emergency Service Water (ESW) Vault." June 5th, 2009.
[2] http://www.nytimes.com/2009/05/02/nyregion/02nuke.html
[3] http://articles.latimes.com/2006/aug/18/local/me-radioactive18
[4] http://www.wifr.com/news/headlines/10817731.html
[5] http://www.cleveland.com/business/index.ssf/2009/11/firstenergy_restarts_perry_nuc.html
[6] http://www.chicagobreakingnews.com/2009/06/exelon-radioactive-leak-contained-not-in-water-supply.html
[7] http://www.morrisdailyherald.com/articles/2009/12/04/94978024/index.xml

contamination cleanup due to leaky pipes would have a dramatic negative impact not only on the ability of licensees to fully and effectively complete the decommissioning process, but on local property values, community plans for the site, and actual or perceived threats to public health.

The NRC staff's assessment of these questions, laid out in a December 2, 2009 letter[8] from the NRC Director of the Office of Nuclear Reactor Regulation to the Commissioners, stated that current NRC regulations are adequate, that the NRC staff have no new proposals for changes to the buried piping regulations, and that the NRC staff will monitor licensee implementation of industry buried piping initiatives. Although this report recommends no changes to any NRC regulations or protocols, we feel that the repeated pipe failures indicate a growing problem with an aging part of plant infrastructure that must be proactively managed to ensure continued safety.

We have serious questions about the NRC's buried pipe inspection processes, NRC's current relevant regulations, and whether they are both adequate and enforced in a manner that is sufficiently protective of reactor and public safety. We ask that your examination of the NRC's policies and procedures relating to this subject include an assessment of the following questions:

Existing NRC Regulations

1) What does the NRC require of their licensees regarding the monitoring and inspection of underground piping systems?
2) For example, how often are inspections mandated and what percentage of total buried pipe length must be examined during the inspection interval?
3) What inspection techniques are permitted?
4) Do those inspections focus on those piping sections most likely to fail, such as elbows and welds?
5) Do NRC requirements vary depending on the underground environment at individual reactor sites (e.g., the more moist, saline seaside environment at Pilgrim that might accelerate pipe corrosion)?

Enforcement of NRC Regulations

1) How does the NRC ensure that these regulations are being met by its licensees?
2) What is the frequency with which NRC Inspectors conduct onsite examinations of buried piping conditions?
3) What are the potential enforcement consequences if a licensee fails to implement NRC regulations correctly, and does NRC regularly undertake enforcement actions regarding these matters?
4) Does the NRC monitor compliance with the licensee's own protocols for the management of aging reactor components and systems (if buried piping is included in their assessments)?

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[8] Leeds, Eric J. "Staff Progress in Evaluation of Buried Piping at Nuclear Reactor Facilities." 2 December 2009. SECY-09-0174.

Adequacy of NRC Regulations

1) Are the NRC regulations sufficient to ensure the safety and integrity of underground piping systems?
2) Are there different requirements that have been developed or contemplated for future nuclear power plants to better manage the risks of underground piping systems (e.g., placing pipes in trenches or above ground)?
3) Can industry initiatives[9] in this area be as effective and enforceable as NRC regulations? Why or why not?

Thank you for your prompt attention to this request. If you have any questions or concerns please contact us, or have your staff contact Dr. Katie Matthews of Rep. Markey's office at (202) 225-2836, Jim Bradley of Rep. Hall's office at (202) 225-5441, or Nancy Sopko of Rep. Adler's office at (202) 225-4765. We look forward to your response.

Sincerely,

Edward J. Markey

Edward Markey
Member of Congress

John Hall
Member of Congress

John Adler
Member of Congress

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[9] E.g., Nuclear Energy Institute's "Buried Piping Integrity Initiative" and Electric Power Research Institute's "Buried Pipe Integrity Group"

ATTACHMENT 2

OFFICE OF THE GOVERNOR
COMMONWEALTH OF MASSACHUSETTS
STATE HOUSE • BOSTON, MA 02133
(617) 725-4000

DEVAL L. PATRICK
GOVERNOR

TIMOTHY P. MURRAY
LIEUTENANT GOVERNOR

February 9, 2010

Chairman Gregory B. Jaczko
Commissioner Dale E. Klein
Commissioner Kristine L. Svinicki
The United States Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, Maryland 20852-2738

Re: Tritium leaks

Dear Chairman Jaczko and Commissioners Klein and Svinicki:

It has come to my attention that there is a serious problem at the Vermont Yankee plant in Vernon, Vermont, involving tritium leaks and possibly leaks of other radioactive substances. Test wells at the plant are apparently showing tritium readings more than 30 times higher than the federal standard, and a trench on the site shows readings hundreds of times higher than the standard.

I am also aware that there have been tritium leaks at a number of other nuclear plants in the country and that, in light of similarities in design, the Pilgrim plant in Plymouth, Massachusetts could have similar problems.

Because of the proximity of the Vermont Yankee plant to Massachusetts, the concern that tritium may leak into the groundwater, and the possibility that there may also be leaks of radioactive substances at Pilgrim, I ask that you undertake the following immediately:

- require extensive testing for leaks of tritium and other radioactive substances at both Vermont Yankee and Pilgrim, including testing of potentially impacted drinking water supplies and of the Connecticut River in proximity to Vermont Yankee;
- stay any further consideration of the approval of the spin-off of the Vermont Yankee and Pilgrim plants from Entergy to Enexus until the leak issues are resolved; and
- stay any further consideration of the relicensing of both plants until the leak issues are resolved.

Thank you for your consideration of my concerns. I look forward to your response and to your prompt action to address this matter.

Sincerely,

ATTACHMENT 3

The Commonwealth of Massachusetts

Executive Office of Health and Human Services
Department of Public Health
Bureau of Environmental Health
Environmental Toxicology Program
250 Washington Street, Boston, MA 02108-4619
Phone: 617-624-5757 Fax: 617-624-5777
TTY: 617-624-5286

MEMORANDUM

To: Suzanne K. Condon, Associate Commissioner
Director, Bureau of Environmental Health (BEH)

From: Meg Blanchet, Assistant Director MB
BEH Environmental Toxicology Program (ETP)

Cc: Martha J. Steele, Deputy Director, BEH
Bob Gallaghar, Acting Director, BEH Radiation Control Program
Margaret Round, Senior Environmental Analyst, BEH/ETP

Re: Status of Groundwater Monitoring Program at Pilgrim Nuclear Power Plant

Date: June 25, 2010

The purpose of this memorandum is to provide a summary of the past and current status of groundwater monitoring activities conducted at Pilgrim Nuclear Power Plant (PNPP) in Plymouth, MA and identify data gaps that should be addressed. Information contained in this memorandum is based on information currently available to the MDPH Bureau of Environmental Health (BEH) through review of public records and via site visits to PNPP that included review of technical reports and discussions with Entergy staff and their hydrogeological consultants. The PNPP is currently owned by Entergy and has been operating since 1972.

Background

Information evaluating subsurface conditions at the PNPP site prior to the plant's construction and completion in 1972 was available in a 1967 Dames & Moore report. The 1967 report describes the existence of an upper layer of variable and erratic sandy soil conditions, and more dense and compact material below a depth of approximately 35 feet. Based on 35 exploratory borings installed in 1967 to explore land conditions prior to construction of PNPP, subsurface conditions in the area of the plant (down to approximately 35 feet) were variable and typical of a glacial outwash deposit. Specifically, borings encountered discontinuous layers of silty fine sand, fine sand, clayey silts, and clayey sands. Beneath the upper 35 feet of variable strata, poorly graded to well-graded sands with varying amounts of gravel and cobbles were found. The sands underlying the 35 feet of variable strata were found to be generally dense and relatively 'incompressible'. Bedrock was encountered at a depth of approximately 80 feet. Boulders ranging in size from one to three feet were encountered throughout the overburden soils from the ground surface down to bedrock and significantly larger boulders were also expected to be present.

Based on the investigations of subsurface conditions, the 1967 Dames & Moore report concluded that the proposed plant structures could be adequately supported on foundations placed after the upper variable strata of sand were removed and/or replaced with compact backfill. During a recent site visit, PNPP staff confirmed that much of the soil immediately beneath the power station consists of construction fill that was brought in at the time the plant was built.

Hydrogeologic information contained in most reports MDPH reviewed (e.g. Dames and Moore, 1967; Final Safety Analysis Report [FSAR], 1985; and Site Hydrogeologic Assessment Reports, 2007, 2009) indicates that groundwater flow at PNPP is believed to be to the north and east toward Cape Cod Bay based on an assumption that flow patterns at the site mimic the regional topographical trends. In the absence of site-specific data, this assumption seems reasonable in a general sense based on local topography, that is, the facility is located at a lower elevation than land directly to the west/northwest. In general terms, groundwater will follow surface topography and flow from higher to lower elevations, in this case towards Cape Cod Bay.

Better characterization of site-specific groundwater flow direction and gradients at PNPP however seems warranted as localized variations on groundwater flow under and around the footprint of the facility has not been well characterized. Water levels measured in borings prior to PNPP construction indicated a variable groundwater table at the site likely attributed to local zones of perched water. A higher groundwater table, estimated at approximately 15 feet below ground surface, was attributed to a localized condition of poorly draining soils. It was also noted that groundwater levels would be expected to fluctuate with the tides and vary approximately 1.5 feet.

It is also unknown how sub-surface conditions may have changed since the plant was constructed. PNPP staff reported that all underground pipes are buried within 10 feet below ground surface (bgs), and the reactor building reaches 28 feet below grade. According the 2007 Hydrogeologic Assessment, the PNPP station reportedly extends to a depth of approximately 40 feet bgs and cuts through many of the discontinuous silt and clay layers. The potential effect of a vertical connection between these layers is unknown.

Finally, based on a review of historical documents related to a transformer release at PNPP, GZA (2009) noted that groundwater contours generated using 1997 groundwater elevation data indicated a shallow groundwater flow gradient towards the southeast may also be present in some areas, rather than easterly toward Cape Cod Bay as would be expected based on regional topography and drainage conditions. The 2009 GZA report noted that additional data points would be needed to adequately assess horizontal and vertical gradients across the site and in the vicinity of the PNPP structures.

Groundwater Monitoring Wells

PNPP signed onto the Nuclear Energy Institute (NEI) Groundwater Protection Initiative in Spring 2006. This program is a voluntary initiative that falls outside of current NRC requirements and provided nuclear power plants across the U.S. with specific guidance for the development and implementation for a formalized site-specific groundwater protection program. The NEI Groundwater Protection Initiative identified specific actions nuclear power plants should take to be prepared to manage and respond to inadvertent releases of radioactive substances that may result in low but detectible levels of plant-related materials in groundwater. Specific actions identified by the NEI Initiative included: 1) characterization of geology, hydrology, and groundwater flow characteristics and gradients based on current site conditions, 2) evaluation of systems, structures, and components (SSCs) and work practices that involve or contain radioactive materials that could potentially reach groundwater, 3) establishment of an on-site groundwater monitoring program to ensure timely detection of inadvertent releases of radioactive materials to groundwater, 4) development of a remediation protocol to prevent migration of radioactive materials off-site, and 5) establishment of proper record-keeping of any leaks, spills, or remediation efforts. In addition, subsequent to the NEI initiative, the Electric Power Research Institute (EPRI) also developed technical guidelines for implementation of groundwater protection programs at nuclear power plants. These national guidelines also include a recommendation that analysis be conducted to understand the contribution of atmospheric deposition of tritium to local groundwater including a site-specific review of processes involving tritium releases, dispersion, deposition, runoff, infiltration, and recharge to aquifer. These recommendations also provide methods for empirical evaluation of groundwater and rainwater monitoring data to determine whether detected levels of tritium in groundwater are attributable solely to rainwater infiltration (considering background sources) or may also be attributable to leakage from systems, structures, and components (SSCs).

In 2007, PNPP conducted a Site Hydrogeologic Assessment and identified areas where groundwater monitoring wells should be located based on a risk ranking of operational plant systems and available site geology and hydrology information. It is important to note that this assessment relied primarily on a review of existing historical and regional geological and hydrological information summarized in the previous section and did not involve new subsurface investigations or sampling to better characterize local hydrogeological conditions at the facility. Also, the 2007 document did not contain specific details on how previous monitoring well locations were selected. PNPP initiated routine monitoring of six groundwater wells in 2007.

The original six groundwater monitoring wells have been sampled quarterly at PNPP since 2007 for the presence of tritium and other gamma radionuclides. Five of the original wells are located in the immediate vicinity of the plant operations and one is located up-gradient of the plant near Rocky Hill Road near Entergy's Waste Water Treatment Plant. Four of the six monitoring wells were installed in 2007; two of the 6 monitoring wells existed previously.

In April 2010, Entergy installed six additional wells at PNPP. Three of the new wells (MW-202I, MW-205, and MW-206) were added to the narrow stretch of land between the facility buildings and the shoreline near the discharge canal. These three new wells, in combination with MW-201, MW-202S, and MW-204 already in place since 2007, enhanced the previous groundwater monitoring system in terms of detecting potential leaks with a narrow groundwater pathway. Another new well, MW-207, was also installed joining the existing well MW-203 in the vicinity of the Augmented Off-gas System (AOG) pipe. However, it is important to note that there are currently no groundwater monitoring wells located east/southeast of MWs 201 and 206 between the facility buildings and this area of the shoreline. Finally, a shallow and deep well couplet, MW-208S and MW-208I, were installed south of the reactor building at the perimeter of the protected area and behind an outdoor storage area. The approximate locations of all groundwater monitoring wells at PNPP are shown in Figure 1.

Currently, no off-site groundwater monitoring wells are included in the PNPP groundwater monitoring program nor are they required as part of the NEI Initiative program. One monitoring well, MW3, is located up-gradient at the property boundary near Rocky Hill Road and serves largely as a background or comparison well. Based on a review of available information on areas of Plymouth that are served by both private and public water supply wells, it appears that no public or private drinking water wells are located within a 2-mile radius of PNPP. The closest drinking water well is approximately 2.5 miles southeast of PNPP.

Groundwater is analyzed for tritium and for gamma radionuclides using gamma spectroscopy. Tritium is a good indicator contaminant for groundwater monitoring and gamma spectroscopy results can also be used to help identify a potential source if a groundwater well indicates a possible leak. Based on its chemical properties, tritium is highly soluble in water; thus it flows with groundwater. Gamma radionuclides, on the other hand, adsorb strongly to soils and do not move as quickly from their release point. Thus, tritium will be detected in groundwater earlier than other tested contaminants.

When compared to the number of groundwater monitoring wells routinely monitored at other nuclear power plants located in the northeast, PNPP has fewer groundwater monitoring wells. While we understand (based on information we have gathered) that many nuclear power plants across the country have increased their numbers of monitoring wells in response to detection of subsurface tritium leaks we believe it would be optimal to increase the number of wells prior to such an occurrence at PNPP.

Seabrook Nuclear Power Plant in New Hampshire (owned and operated by Florida Power & Light) has 22 on-site groundwater monitoring wells that are sampled and analyzed on a quarterly basis and they reportedly have plans to install an additional five wells. Prior to the detection of tritium in groundwater at Vermont Yankee (also owned and operated by Entergy), the groundwater monitoring program consisted of three on-site groundwater monitoring wells. Installation of up to 21 additional monitoring wells was required in order to identify the source of tritium. At Indian Point in New York, cracks in the spent fuel pools prompted the installation of a series of monitoring wells across the site to determine the extent of radioactive contamination in the groundwater. Now, approximately 40 monitoring wells are in place to better assess radioactive contamination in groundwater. In New Jersey, tritium leaks are currently being monitored at three of the state's four nuclear power plants; numerous wells have been installed at these plants to investigate the various leak sources.

Sampling Frequency at PNPP

Since November 2007, samples have been collected quarterly by Entergy and analyzed for tritium and gamma radionuclides by an Entergy contract lab. Split groundwater samples were also sent to the MDPH/RCP Massachusetts Environmental Radiation Laboratory (MERL) for analysis until state funding for the lab was substantially reduced in May 2009. MDPH/BEH/RCP redirected existing resources from the Radioactive Materials Program to resume some efforts of the MERL in May 2010 and began accepting split samples from PNPP again at that time. MDPH/RCP also received a split sample for MW201 from Entergy on 3/12/2010 and the sample was analyzed by a MDPH contract laboratory for tritium and gamma spectroscopy analysis.

Groundwater Sampling Results

Table 1 shows all results of tritium in the original six monitoring wells since groundwater sampling began in 2007. Tritium has been detected at various concentrations in all of the monitoring wells (including the up-gradient well MW-3) sampled since 2007. The maximum concentration of tritium detected in groundwater at PNPP prior to May 2010 was 3300 picocuries per liter (pCi/L) from MW201 in November 2007. Tritium results from this particular well appear to have generally decreased since the initial sampling was conducted and after Entergy repaired a hole in the pavement above this well. PNPP staff reported to MDPH that based upon their observations and remedial efforts followed by declining levels of tritium in groundwater, they concluded that the higher level of tritium in MW-201 was likely the result of atmospheric deposition. Although the PNPP monitoring wells are not used for drinking water, the tritium concentrations are all well below the U.S. Environmental Protection Agency (EPA) Maximum Contaminant Level (MCL) for drinking water (20,000 pCi/L). The NRC has established a tritium screening level of 3000 pCi/L for groundwater monitoring results, which is one tenth of the NRC tritium standard for non drinking water (i.e. surface water) sources (30,000 pCi/L).

In addition to tritium, MERL also analyzes split samples using gamma spectroscopy against a suite of more than 30 isotopes which serve as sentinel indicators for the presence of other radionuclides including beta and alpha emitters. Gamma spectroscopy provides a rapid and effective screening determination for radionuclides. In the event that gamma emitters above background levels are present, the MDPH/RCP protocol calls for additional testing for beta emitters such as strontium-90, and alpha emitters such as transuranic elements. Based on analyses conducted between November 2007 and May 2009, no fission product radionuclides have been detected above background levels in split samples. Results from the contract laboratory analysis of the March 2010 split sample from MW201 were also consistent with background. During the site visits, PNPP staff reported that no plant-related gamma radionuclides have been detected in PNPP groundwater samples, but they have consistently detected natural gamma activity which has provided them with reassurance regarding the sensitivity of their methods.

In May 2010, the MERL was re-opened and Entergy began once again sending split samples to MDPH. The most recent groundwater monitoring results from samples taken on May 17, 2010, indicated a tritium concentration of 5800 pCi/L at MW-205, one of the new wells. The MERL split sample for this well showed a consistent result (5259.96 pCi/L). MERL results for monitoring wells MW-204 and MW-202S located on either side of MW-205 showed tritium detections of 852.44 and 622.39 pCi/L, respectively. Entergy re-sampled MW-205 and adjacent wells 202S and 202I on June 11, 2010 to confirm the results and provided split samples to MERL. The second sample from MW-205 detected tritium at 8800 pCi/L, the highest level of tritium detected in PNPP groundwater to date (Entergy's results for 202S and 202I were not provided). Confirmatory results from MERL on the second round of samples are still pending, but preliminary results for MW-205 appear to be consistent with Entergy's reported 8800 pCi/L.

Precipitation Sampling Effort

At the May 18, 2010 site visit, Entergy staff reported that they started a precipitation sampling program in August 2009 to further investigate their contention that tritium detected in groundwater monitoring wells is due primarily to air deposition. Currently, there are four precipitation samplers located adjacent to MW201, MW202, MW203, and MW204. There is also an offsite precipitation sampler located approximately 4.5 miles to the S/SE of PNPP. The monitors collect all the precipitation over a one-month period and then are sampled for tritium. Tritium results for the precipitation monitors are shown in Table x.

To date, no tritium has been detected in precipitation samplers located adjacent to MW201 or at the control location 4.5 miles S/SE. Low levels of tritium have been detected on a few occasions in samplers located adjacent to MW202, MW203, and MW204 at concentrations slightly greater than the detection limit (note: the lower limits of detection varies ranging from <400 pCi/L to <414 pCi/L). The maximum concentration of tritium detected in a precipitation sample to date is 669 pCi/L collected from the sampler located near MW203 on March 11, 2010. Based on the limited precipitation data available since fall 2009, concentrations of tritium detected in groundwater monitoring wells are roughly up to two times higher than concentrations of tritium that have been detected in adjacent precipitation samples.

Surface Water Sampling

PNPP collects surface water samples from three locations on a routine basis and reports results to the NRC. Surface water is sampled monthly at one location on-site in the discharge canal and two locations off-site (Bartlett Pond - 2.7 km and Powder Point Control - 13 km from the plant). According to the Annual Reports from 2005-2008, no tritium was detected in any of the surface water samples.

Summary

With the exception of tritium results for MW-201 early on, groundwater sampling at the PNPP since 2007 has generally shown tritium detections in the range of 450-1,500 pCi/L, and tritium has been detected in every monitoring well during almost all sampling rounds. The most recent groundwater monitoring results in which a new well, MW-205, showed the highest groundwater detection to date (8,800 pCi/L) reinforces concerns that the source of tritium in groundwater at the facility may not be just atmospheric deposition or natural background, as PNPP officials believe. It is also important to note that prior to the now well known "leaks" at Vermont Yankee, the majority of all groundwater monitoring results at that plant were non-detect (ND). Although none of the tritium concentrations detected at PNPP to date pose health concerns, they do indicate that additional data (e.g., via installation of additional monitoring wells or surface water sample locations) and investigation is needed to further identify the source(s) of the concentrations detected and potential extent of tritium detections.

It is our understanding that current well locations were selected based on the general assumption that groundwater flows towards Cape Cod Bay. However, as discussed previously in this memo, localized variations in groundwater flow beneath and around the footprint of the facility have not been well characterized. PNPP's previous consultant noted that additional data points would be needed to adequately assess horizontal and vertical gradients and flow directions across the site and in the vicinity of the structures (GZA, 2009). Thus, further assessment of site-specific hydrogeology would be required to rule out a possible cross-gradient groundwater pathway. In addition, much of the information on localized groundwater flow direction is based on information gathered prior to PNPP construction and subsurface conditions may have changed during construction and subsequent operation of the plant. Factors that could influence localized groundwater flow after construction of PNPP need to be further evaluated such as the impact of some facility structures reaching a depth below the water table and mounding of groundwater.

As mentioned, Entergy officials attribute tritium detection in groundwater monitoring wells to atmospheric deposition and subsequent transport via rainwater. However, based on the limited precipitation data available, concentrations of tritium detected in groundwater monitoring wells are roughly up to two times higher than concentrations of tritium that were sometimes detected in adjacent precipitation samples. According to the 2007 EPRI guidance document, if tritium in groundwater is much higher than tritium in rainwater, this would indicate that further assessment is warranted to determine if the higher tritium levels detected in the groundwater are associated with leakage from the systems, structures and/or components (SSC) of the plant (e.g., leak from underground pipes) or whether it is associated solely with atmospheric deposition and infiltration of tritiated water vapors.

In addition to the installation of more groundwater monitoring wells east/southeast of the facility buildings Entergy must also address uncertainties and provide documented evidence of their contention that tritium detected in groundwater is attributed to natural sources and deposition of licensed atmospheric releases. There are analytical methods available to provide such evidence. For example, to understand the contribution of atmospheric deposition pathway(s) of tritium to groundwater, a site-specific assessment of physical, meteorological and hydrogeological processes, including licensed air discharges from stacks and vents, dispersion, deposition, runoff, infiltration, and recharge of aquifer is needed. With this information, modeling can be performed using site-specific empirical calculations from monitoring and hydrogeological studies to predict atmospheric dispersion and deposition of radionuclides using available software. Current practice within the industry has found that since atmospheric dispersion modeling is already conducted as part of the Radiological Environmental Monitoring Program (REMP) for the calculation of offsite radiation doses attributed to gaseous radioactive releases from the plant, the refinement of the model using monitoring data, deposition velocity and scavenging coefficients can then be used to estimate both dry and wet deposition of tritium.

Although Entergy staff has previously reported that they suspect tritium detections in groundwater can be attributed natural sources and to air transport and deposition of licensed air emissions, it remains unclear why conditions at PNPP would be different from other nuclear plants. MDPH has observed a notable difference in monitoring for tritium in groundwater at other nuclear power plants in the northeast – that is that PNPP seems to consistently have detections of tritium, albeit low levels. MDPH has been unable to identify other nuclear power plants of similar vintage to PNPP that have consistently comparable levels or frequency of tritium detections in routine monitoring wells. Further, an evaluation of the sensitivity of detection limits at other plants does not seem to explain the greater frequency of tritium detections at Pilgrim. At the May 18, 2010 site visit, MDPH asked Entergy staff to provide additional explanation as to why tritium is being detected in their groundwater monitoring wells at current levels. PNPP staff indicated they would gather additional information on tritium measured in groundwater and analytical detection limits from other plants in the Entergy fleet to further investigate this question; however MDPH has not received additional data from Entergy to date.

Although the additional groundwater monitoring wells installed in April 2010 are an enhancement to PNPP's previous groundwater monitoring efforts, given the recent sampling results and that many nuclear power plants across the country are dealing with aging underground pipes and tritium leaks in groundwater, it would be prudent for PNPP to consider installation of a few additional wells. In particular, MDPH recommends that the area along the shore east/southeast of the facility be better addressed as part of the plant's routine monitoring program. PNPP staff have reported that their consultant, ERM, Inc., is currently preparing a report that will include additional information on hydrology and potential tidal influence at PNPP. In addition, Entergy plans to hire a consultant to conduct an enhanced risk ranking of subsurface structures and underground piping at PNPP. Both of these reports are expected to be informative in helping MDPH to determine specific locations for additional groundwater monitoring wells, such as in the area east/southeast of MW-201, MW-206 and the facility buildings along the shoreline.

At this time, there are no surface water sample locations in the bay between the facility shoreline and the breakwater. Given the recent detections of tritium in groundwater monitoring well MW-205 and based on the assumption that groundwater discharges to Cape Cod Bay MPDH believes that samples of surface/bay water should be collected on a routine basis from the area inside the breakwater. Specifically, it would be prudent to sample surface water in the off-shore area directly down-gradient from monitoring wells MW-205, and MW-202S/I and to also sample surface water at the entrance of the breakwater.

Recommendations

While much has been learned through review of site-related documents and site visits to PNPP, MDPH has identified several data gaps that Entergy should address in order to improve their groundwater monitoring program such that a more complete picture is available and importantly to prevent potential off-site implications. Specifically, MDPH recommends that Entergy: 1) install at least two additional groundwater monitoring wells in the area directly east/southeast of the facility buildings to better characterize an area that currently has no monitoring wells and that may be impacted by facility operations or leaks, 2) collect surface/bay water samples from two locations in the bay between the facility shoreline and breakwater (i.e., directly down-gradient from monitoring wells MW-205, and MW-202S/I and to also sample surface water at the entrance of the breakwater) to ensure no detectable levels of tritium are present, 3) provide better characterization of site-specific groundwater flow gradients in and around PNPP subsurface structures and components (this is consistent with the NEI initiative guidelines and is reportedly being addressed with a detailed hydrogeological study being conducted by ERM), and 4) provide better characterization of possible groundwater sources of tritium (also recommended by NEI guidance and reportedly being addressed by Entergy) and documentation on the potential contribution of the licensed tritium releases including mass balance analysis and dispersion modeling.

Table 1

Summary of Tritium Detected in Groundwater Monitoring Wells
Plymouth Nuclear Power Plant, Plymouth, MA
All Results Reported in picocuries per liter
(pCi/L)

Sample Collection Date	Reported By	Tritium Concentration (pCi/L)					
		MW-201	MW-202	MW-203	MW-204	MW-3	MW4
November 29, 2007	Entergy	3192 ± 162	451 ± 135	NDA<447	1366 ± 144	N.S.	N.S.
	Entergy	3300 ± 164	525 ± 138	N.A.	1586 ± 150	N.S.	N.S.
	Entergy		733 ± 142			N.S.	N.S.
	MDPH/MERL	3014 ± 98	522 ± 66	371 ± 63	1277 ± 77	N.S.	N.S.
January 22, 2008	Entergy	2409 ± 158	572 ± 141	NDA<455	564 ± 141	635 ± 142	N.S.
	Entergy	2304 ± 155	426 ± 138	444 ± 138	796 ± 142	471 ± 139	N.S.
	Entergy					578 ± 140	N.S.
	MDPH/MERL	2112 ± 105	553 ± 84	397 ± 81	844 ± 88	496 ± 83	N.S.
	Entergy	2200 ± 97	519 ± 92	740 ± 93	339 ± 90	421 ± 91	N.A.
	Entergy	2130 ± 100	336 ± 93	NDA < 243	676 ± 95	355 ± 94	N.A.
February 21, 2008	Entergy	N.S.	N.S.	N.S.	N.S.	642 ± 141	N.S.
	MDPH/MERL	N.S.	N.S.	N.S.	N.S.	445 ± 95	N.S.
	MDPH/MERL	N.S.	N.S.	N.S.	N.S.	401 ± 95	N.S.
April 24, 2008	Entergy	1332 ± 144	976 ± 145	525 ± 137	899 ± 141	758 ± 139	917 ± 141
	MDPH/MERL	1256 ± 107	468 ± 94	333 ± 91	591 ± 96	506 ± 94	614 ± 96
July 17, 2008	Entergy	1875 ± 154	622 ± 141	461 ± 141	808 ± 143	NDA<452	979 ± 145
	MDPH/MERL	1588 ± 113	495 ± 95	325 ± 91	566 ± 96	473 ± 94	670 ± 98
October 8, 2008	Entergy	1784 ± 140	574 ± 129	455 ± 128	850 ± 132	NDA<412	547 ± 129
	MDPH/MERL	1595 ± 112	567 ± 95	306 ± 90	761± 98	420 ± 92	541 ± 94
	MDPH/MERL		623 ± 96				

Table 1 (continued)

Summary of Tritium Detected in Groundwater Monitoring Wells
Plymouth Nuclear Power Plant, Plymouth, MA
All Results Reported in picocuries per liter (pCi/L)

Sample Collection Date	Reported By	Tritium Concentration (pCi/L)					
		MW-201	**MW-202**	**MW-203**	**MW-204**	**MW-3**	**MW4**
March 18, 2009	Entergy	1292 ± 137	688 ± 131	681 ± 131	774 ± 132	498 ± 129	627 ± 130
	MDPH/MERL	1346 ± 88	622 ± 79	485 ± 77	829 ± 82	327 ± 74	427 ± 76
	MDPH/MERL	1189 ± 86					
May 27, 2009	Entergy	1205 ± 137	615 ± 131	419 ± 129	959 ± 134	NDA<417	734 ± 132
	MDPH/MERL	1184 ± 86	608 ± 78	471 ± 76	995 ± 84	327 ± 74	815 ± 81
	MDPH/MERL					394 ± 75	
September 23, 2009	Entergy	1726 ± 140	757 ± 131	663 ± 130	1004 ± 133	NDA<411	818 ± 131
December 15, 2009	Entergy	987 ± 134	919 ± 133	632 ± 130	875 ± 133	NDA<415	623 ± 130
March 12, 2010	Entergy	1180 ± 110	1040 ± 110	900 ± 110	930 ± 110	360 ± 100	590 ± 100
	MDPH Contractor	944 ± 180	N.A.	N.A.	N.A.	N.A.	N.A.

Notes:

Entergy results presented as value ± 1-sigma uncertainty. MDPH reported ± 2-sigma values divided by two for comparison.

NDA< = Not detected at less than activity value listed.

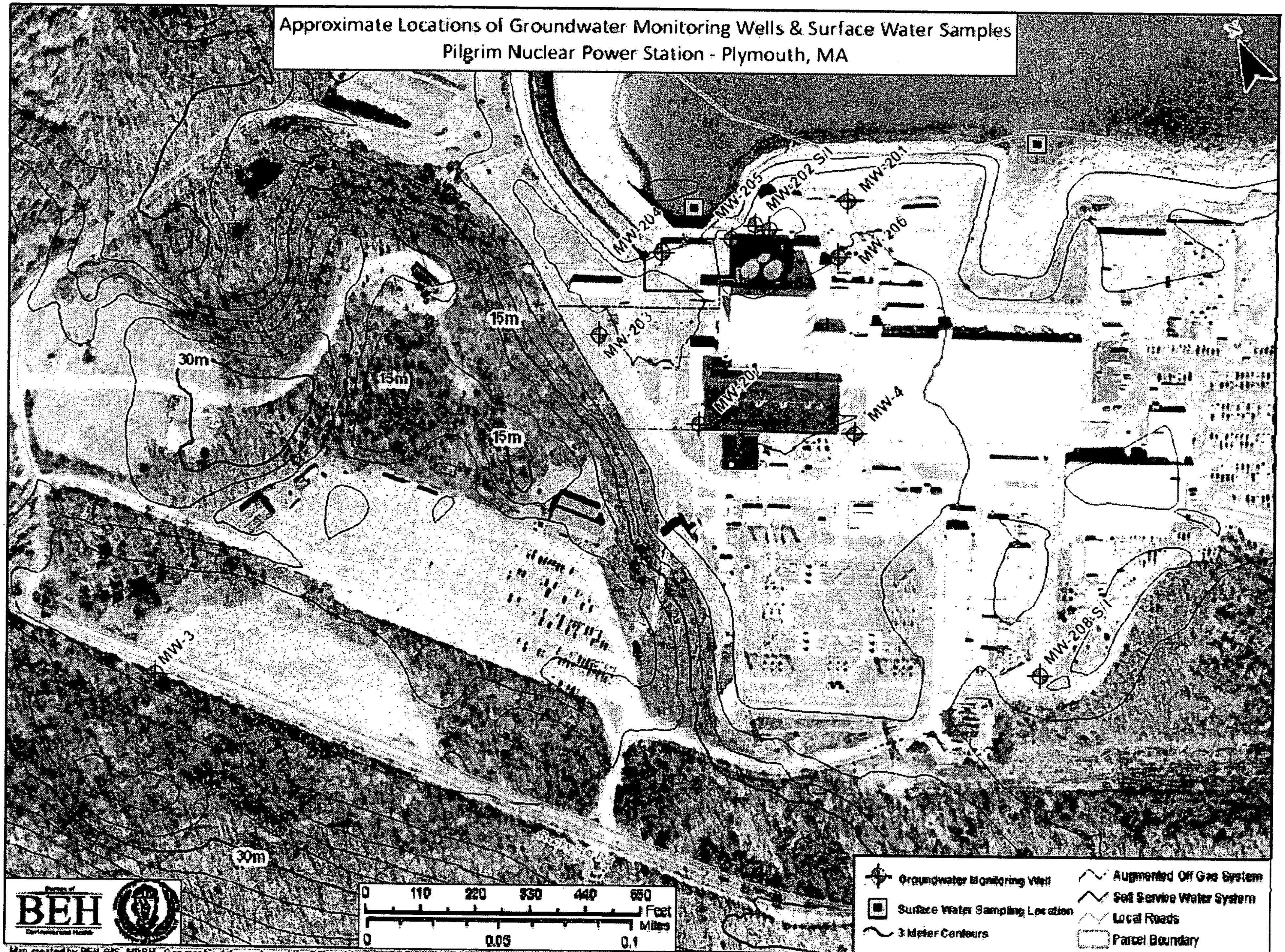
N.A. = Not analyzed

N.S. = Not sampled

Table 2
Summary of Precipitaion Monitoring Results
Plymouth Nuclear Power Plant, Plymouth, MA
All Results Reported in picocuries per liter (pCi/L)

Date	**Tritium Concentration (pCi/L)**				
	Near MW-201	**Near MW-202**	**Near MW-203**	**Near MW-204**	**Control**
August 29, 2009	< 407	< 407	< 407	***528***	-
September 30, 2009	< 405	< 405	< 405	< 405	-
October 31, 2009	< 405	< 405	< 405	***435***	< 405
November 30, 2009	< 405	< 405	< 405	< 405	< 405
December 31, 2009	<414	<414	***388***	<413	<413
February 18, 2010	<411	<411	<411	***632***	<411
March 11, 2010	<404	<404	***669***	<404	<404
April 1, 2010	< 405	< 405	< 405	< 405	< 405
May 5, 2010	<400	***424***	***557***	<400	<400

Notes:
Results provided to MDPH by Entergy on 6/2/10
Detectable tritium results are shown with bold and gray background
Control sampler is located ~4.5 miles SSE of PNPP



Map created by BEH-GIS, MDPH. Geographic data courtesy of the Office of Geographic Information (MassGIS), Commonwealth of Massachusetts Executive Office of Environmental Affairs

ATTACHMENT 4

Power Reactor	Event Number: 46083
Facility: PILGRIM Region: 1 State: MA Unit: [1] [ ] [ ] RX Type: [1] GE-3 NRC Notified By: JOHN WHALLEY HQ OPS Officer: DONG HWA PARK	Notification Date: 07/09/2010 Notification Time: 15:55 [ET] Event Date: 07/09/2010 Event Time: [EDT] Last Update Date: 07/20/2010
Emergency Class: NON EMERGENCY 10 CFR Section: 50.72(b)(2)(xi) - OFFSITE NOTIFICATION	Person (Organization): ANTHONY DIMITRIADIS (R1DO)

Unit	SCRAM Code	RX CRIT	Initial PWR	Initial RX Mode	Current PWR	Current RX Mode
1	N	Y	100	Power Operation	100	Power Operation

Event Text

OFFSITE NOTIFICATION DUE TO ELEVATED LEVELS OF TRITIUM FOUND IN A WELL SAMPLE

"Entergy Pilgrim Station has twelve groundwater monitoring wells used to sample for tritium and other radioactive nuclides in accordance with the Nuclear Energy Institute's (NEI) voluntary Groundwater Protection Initiative (GPI). One of the wells, MW-205, located in the vicinity of the Condensate Storage Tanks (CST) indicated an elevated level of tritium, however well below the limits established by the NEI Groundwater Protection Initiative, the Nuclear Regulatory Commission's (NRC) limits for liquid effluent release and the Environmental Protection Agency's (EPA) limits for tritium in drinking or non-drinking water wells. The latest sample taken on June 21, 2010, returned a test result of 11,072 picocuries per liter of tritium. To date, tritium is the only isotope detected in the samples collected at the site. This information has been communicated to federal, state and local stakeholders and a press advisory is expected to be issued by the Massachusetts Department of Public Health (MDPH). On that basis and the anticipated interest to the general public this notification is being made.

"This event has no impact on the health and/or safety of the public.

"The NRC Resident Inspector is on-site and has been notified."

* * * UPDATE FROM MERT PROBASCO TO HOWIE CROUCH @ 1808 EDT ON 7/20/10 * * *

"Entergy Pilgrim Station has received the results of its most recent weekly tritium sample taken on July 7, 2010 for groundwater monitoring well, MW-205. The sample results have shown an increase in the tritium concentration to 25,552 picocuries per liter (pCi/L) from the previous sample taken on June 30, 2010 which had a test result of 8,477 pCi/L. The latest results remain below any regulatory reporting requirements and the Environmental Protection Agency's (EPA) limits for tritium in non-drinking water wells. This information has been communicated to federal, state and local stakeholders. There remains no threat to drinking water sources and no impact on the health and/or safety of the public.

"The NRC Resident Inspector is on-site and has been notified of this update.

"This is an update to the 4-hour non-emergency notification made in accordance with 50.72(b)(2)(xi) on July 9, 2010 at 1555 hours."

Notified R1DO (Doerflein).

ATTACHMENT 5

Summary of Tritium Detected in Groundwater Monitoring Wells, Pilgrim Nuclear Power Station, Plymouth, MA - All Results Reported in picocuries per liter (pCi/L)

Sample Collection Date	Reported By	Tritium Concentration (pCi/L)											
		MW-201	MW-202	MW-202I**	MW-203	MW-204	MW-205**	MW-206**	MW-207**	MW-208S**	MW-208I**	MW-3	MW4
November 29, 2007	Entergy	3192	451		NDA<447	1366						N.S.	N.S.
	Entergy	3300	525		N.A.	1586						N.S.	N.S.
	Entergy		733									N.S.	N.S.
	MDPH/MER	3014	522		371	1277						N.S.	N.S.
January 22, 2008	Entergy	2409	572		NDA<455	564						635	N.S.
	Entergy	2304	426		444	796						471	N.S.
	Entergy											578	N.S.
	MDPH/MER	2112	553		397	844						496	N.S.
	Entergy	2200	519		740	339						421	N.A.
	Entergy	2130	336		NDA < 24[illegible]	676						355	N.A.
February 21, 2008	Entergy	N.S.	N.S.		N.S.	N.S.						642	N.S.
	MDPH/MER	N.S.	N.S.		N.S.	N.S.						445	N.S.
	MDPH/MER	N.S.	N.S.		N.S.	N.S.						401	N.S.
April 24, 2008	Entergy	1332	976		525	899						758	917
	MDPH/MER	1256	468		333	591						506	614
July 17, 2008	Entergy	1875	622		461	808						NDA<452	979
	MDPH/MER	1588	495		325	566						473	670
October 8, 2008	Entergy	1784	574		455	850						NDA<412	547
	MDPH/MER	1595	567		306	761						420	541
	MDPH/MERL		623										
March 18, 2009	Entergy	1292	688		681	774						498	627
	MDPH/MER	1346	622		485	829						327	427
	MDPH/MER	1189											
May 27, 2009	Entergy	1205	615		419	959						NDA<417	734
	MDPH/MER	1184	608		471	995						327	815
	MDPH/MERL											394	
September 23, 2009	Entergy	1726	757		663	1004						NDA<411	818
December 15, 2009	Entergy	987	919		632	875						NDA<415	623
March 12, 2010	Entergy	1180	1040		900	930						360	590
	MDPH Contra[illegible]	944	N.A.		N.A.	N.A.						N.A.	N.A.
May 17, 2010	Entergy	910	900	930	1060	1230	5810	1470	1090	630	380	500	830
	Entergy						5280						
	MDPH/MER	819	622	494	585	852	5260	577	508	288	358		601
June 11, 2010	Entergy		589	NDA<404			8632						
	MDPH/MERL		454	313			8438						
June 21, 2010	Entergy		660				11,072						
	MDPH/MERL						10,492						
June 30, 2010	Entergy		499	520			8477						
	MDPH/MERL		542	399			8561						
July 7, 2010	Entergy	718	553	471	447	759	25,552	3352	488	NDA<402	NDA<402	NDA<402	568
	MDPH/MER	805	591	501	482	836	24,531	2542	585	348	540	397	622

Notes: * Entergy samples collected and analyzed by Entergy contract laboratory; MDPH split samples received from Entergy and analyzed by MDPH/RCP Massachusetts Environmental Radiation Laboratory (MERL)

**Groundwater Monitoring Wells MW-202I, MW-205, MW-206, MW-207, MW-208S, and MW-208I were installed in Spring 2010

N.A. = Not analyzed

N.S. = Not sampled

ATTACHMENT 6

HENRY A. WAXMAN, CALIFORNIA
CHAIRMAN

JOE BARTON, TEXAS
RANKING MEMBER

ONE HUNDRED ELEVENTH CONGRESS

Congress of the United States

House of Representatives

COMMITTEE ON ENERGY AND COMMERCE

2125 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515–6115

Majority (202) 225–2927
Minority (202) 225–3641

July 15, 2010

The Honorable Gregory Jaczko
Chairman
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Chairman Jaczko:

I write in regard to the recent discovery of radioactive tritium contamination near the Pilgrim Nuclear Station in Plymouth, Massachusetts that was reported yesterday in the Boston Globe.[1] Sadly this appears to be just another in a long line of failures of buried piping systems at our nation's nuclear plants.

This lack of a serious and comprehensive Nuclear Regulatory Commission (NRC) inspection regime for buried piping systems has long been a concern of mine, and this is not the first time I have written the Commission about this issue.[2] In January – in light of the increasing number (≥32) of plants with tritium leaks,[3] and the NRC's inadequate response to my concerns[4] – I requested an investigation of the situation by the Government Accountability Office (GAO).[5] I was joined in that request by Reps. Hall (NY), Adler (NJ) and Welch (VT), all of whom have leaking plants in their districts. This investigation is currently underway and I look forward to learning its results this fall.

In the meantime, however, plants continue to operate, to age, and to experience further corrosion. The possibility that there are buried pipes leaking tritium at Pilgrim is not surprising. After all, the plant is almost 40 years old and located in a corrosive near shore environment. The current inspection regime for buried pipes – physical inspections conducted only in those rare instances when pipes are dug out for other purposes – is incapable of ensuring the integrity of decades-old

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[1] "Tritium detected at Pilgrim N-plant" by Carolyn Y. Johnson in *The Boston Globe*, 14 July 2010.
[2] Letter from Reps. Markey and Hall to the NRC, 30 April 2009. Text here: http://markey.house.gov/index.php?option=com_content&task=view&id=3715&Itemid=141
[3] http://www.nrc.gov/reactors/operating/ops-experience/tritium/sites-grndwtr-contam.html
[4] Rep. Markey press release on NRC response to Markey-Hall letter, 2 July 2009. Text here: http://markey.house.gov/index.php?option=com_content&task=view&id=3752&Itemid=141
[5] Press release of 13 January 2010 GAO investigation request by Reps. Markey, Hall, Adler [Welch added at a later date] can be found at: http://markey.house.gov/index.php?option=com_content&task=view&id=3829&Itemid=141

piping systems. While I realize that such inspection poses unique challenges due to accessibility and cost issues, those hurdles do not render these pipes immune from corrosion or damage, nor do they obviate the need for comprehensive inspections to ensure both operational and environmental integrity.

This matter is even more critical in light of Entergy's application to extend Pilgrim's operating license past 2012 for another 20 years. I would like to remind you that this same licensee admitted to misleading state regulators and lawmakers about their Vermont Yankee nuclear plant's buried pipes and subsequent tritium leak. Earlier this year when Massachusetts Governor Deval Patrick noted design similarities between Pilgrim and Vermont Yankee and suggested the possibility that Pilgrim could also suffer from tritium leaks, Pilgrim spokesman called that argument "kind of a leap." Gov. Patrick's words now appear prescient.

Ralph Andersen, speaking for the trade association Nuclear Energy Institute, claimed that the detection of tritium in Pilgrim's monitoring wells was evidence the system was working. I disagree. "The system" should work by identifying potential failures of components ***before*** they break and release unknown volumes of radioactive water into our environment. Other industries have figured out how to inspect their buried pipes in a proactive and comprehensive fashion. How many more failures does the nuclear industry and the NRC need before they admit that aging buried systems need additional attention?

Thank you for your consideration of this matter. Should you have any questions, please contact Dr. Katie Matthews or Dr. Michal Freedhoff of my staff at 202-225-2836.

Sincerely,

Edward J. Markey

Edward J. Markey
Chairman
Subcommittee on Energy and
The Environment

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

BEFORE THE U.S. NUCLEAR REGULATORY COMMISSION

In the Matter of — Docket # 50-293-LR

Entergy Corporation

Pilgrim Nuclear Power Station

License Renewal Application — July 25, 2010

CERTIFICATE OF SERVICE

I hereby certify that the following was served, *Pilgrim Watch's Notice To Commission Regarding New Information Pertaining To Pilgrim Watch's Petition For Review Of LBP- 06-848* electronically on this date, followed by deposit of paper copies in the U.S. mail, first class

Secretary of the Commission
Attn: Rulemakings and Adjudications Staff
Mail Stop 0-16 C1
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Commission [2 copies]

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July25, 2010