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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of — Docket # 50-293-LR

Entergy Corporation

Pilgrim Nuclear Power Station

License Renewal Application — December 13, 2010

PILGRIM WATCH REQUEST FOR HEARING ON A NEW CONTENTION: INADEQUACY OF ENTERGY'S AGING MANAGEMENT OF NON-ENVIRONMENTALLY QUALIFIED (EQ) INACCESSIBLE CABLES (SPLICES) AT PILGRIM STATION

In accordance with 10 C.F.R § 2.309 (c)(1) Pilgrim Watch files a new technical/safety related contention supported by fact and expert testimony. The contention reads:

> **Entergy's Aging Management Plan for non-environmentally qualified (EQ) inaccessible cables and cable splices at Pilgrim Station is insufficient to provide reasonable assurance that these cables will be in compliance with NRC Regulations and public health and safety shall be protected during license renewal.**

I. INTRODUCTION

The license renewal application for Pilgrim Station fails to comply with the requirements of 10 C.F.R. §§ 54.21(a) and 54.29 because the applicant has not proposed an adequate or sufficently specific plan for aging management of non-environmentally

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qualified inaccessible electrical cables, and splices ("cables") for which such aging management is required. Without an adequate plan for aging management of non-environmentally qualified inaccessible electrical cables protection of public health and safety cannot be assured.

Entergy's Aging Management Program for non-environmentally qualified inaccessible cables (splices) at Pilgrm Station essentially is a carbon copy of Indian Point's and EVY's, all owned and operated by Entergy. New York's Attorney General has filed contentions to the relicensing of Indian Point on this submerged cable issue;[1] and theAtomic Safety and Licensing Board (ASLB) accepted the contention.

Pilgrim Watch did not learn about the submerged cable issue until after it filed its May 2006 petition to intervene. New information became available on December 2, 2010 when NRC issued Information Notice 20 10-26: Submerged Electrical Cables. Attachment A

II. THE CONTENTION IS WITHIN THE SCOPE OF THESE PROCEEDINGS

10 C.F.R. 54.4 sets forth the scope of review[2] concerning safety issues in a license renewal proceeding. The safety review "is confined to matters relevant to the extended period

[1] Docket No 50-247 LR and 50-286-LR, Contention 6 & 7, filed November 30, 2007

[2] This rule reads in relevant part:
§ 54.4 Scope.
(a) Plant systems, structures, and components within the scope of this part are --
(1) Safety-related systems, structures, and components which are those relied upon to remain functional during and following design-basis events (as defined in 10 CFR 50.49 (b)(1)) to ensure the following functions --
The integrity of the reactor coolant pressure boundary;
The capability to shut down the reactor and maintain it in a safe shutdown condition; or
The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to those referred to in § 50.34(a)(1), § 50.67(b)(2), or § 100.11 of this chapter, as applicable.
(2) All non-safety-related systems, structures, and components whose failure could prevent satisfactory accomplishrnent of any of the functions identified in paragraphs (a)(1)(i), (ii), or (iii) of this section.
(3) All systems, structures, and components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48),

of operations requested by the applicant," and focuses on the plant systems, structures, and components "that will require an aging management review for the period of extended operation," or "are subject to an evaluation of time-limited aging analyses." *Duke Energy Corp. (McGuire Nuclear Station, Units 1 and 2; Catawba Nuclear Station, Units 1, 2 and 3),* 56 N.R.C. 358, 363-64 (2002).

The NRC has emphasized that the level of inspection and testing related to age-management over the extended license term is one of the core issues addressed by the license renewal proceeding. Aging management of inaccessible cables is plainly within scope. Part 54 centers the license renewal reviews on the most significant overall safety concern posed by extended reactor operation — the detrimental effects of aging. By its very nature, the aging of materials 'becomes important principally during the period of extended operation beyond the initial 40-year license term, ... Adverse aging effects can result from material fatigue, oxidation, erosion, corrosion, . . . and shrinkage. Such age-related degradation can affect a number of reactor and auxiliary systems, . . . Indeed, a host of individual components and structures are at issue. See 10 C.F.R. 54.21(a)(1)(i).

Left unmitigated, the effects of aging can overstress equipment, unacceptably reduce safety margins, and lead to the loss of required plant functions, including the capability . . . to otherwise prevent or mitigate the consequences of accidents with a potential for offsite exposures.

Accordingly, Part 54 requires renewal applicants to demonstrate how their programs will be effective in managing the effects of aging during the proposed period of extended operation. Applicants must identify any additional actions, i.e. maintenance, replacement

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environmental qualification (10 CFR 50.49), pressurized thermal shock (10 CFR 50.61), anticipated transients without scram (10 CFR 50.62), and station blackout (10 CFR 50.63).

of parts, etc., that will need to be taken to manage adequately the detrimental effects of aging. Adverse aging effects generally are manifested gradually and thus can be detected by programs that ensure sufficient inspections and testing. *Turkey Point Nuclear Generating Plant, Units 3 and 4,* 54 N.R.C. 3, 7-8 (2001)(internal citations omitted).

The Pilgrim Nuclear Power Plant Application for License Renewal (Application) includes a list of systems that require aging management. Among them are Non-EQ Inaccessible cables (A.2.1.21 Non-EQ Inaccessible Medium-Voltage Cable Program; A.2.1.23 Non-EQ Insulated Cables and Connections Program; Section B.1.19 Non-EQ *Inaccessible* Medium-Voltage Cable). Deficiencies in the Aging Management Plan could endanger the safety and welfare of the public and are therefore within the scope of a relicensing hearing.

III. THE CONTENTION IS A MATERIAL ISSUE

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

deficiency highlighted in this contention has enormous independent health and safety significance.

IN 2010-26 says, for example (at 6) that, "Because these cables are not designed or qualified for submerged or moist environments, the possibility that more than one cable could fail has increased; this failure could disable safety-related accident mitigation systems."

The subsurface at Pilgrim Nuclear Power Station (PNPS) is moist. The reactor is located adjacent to Cape Cod Bay and in a meteorological weather climate subject to fog, rain and snow. In addition the Applicant has failed to extablish current groundwater flow throughout the entire site since the Dames & Moore 1967 hydrological geeological survey performed prior to construction.

IV. THE CONTENTION IS SUPPORTED BY FACTS OR EXPERT OPINION

Section 2.309(f)(v) requires "a concise statement of the alleged facts or expert opinion which support the " petitioner's position on the issue and on which the petitioner intends to rely at hearing, together with references to the specific sources and documents on which the petitioner intends to rely to support its position on the issue." An intervenor is not required to prove its case at the contention filing stage: "the factual support necessary to show that a genuine dispute exists need not be in affidavit or formal evidentiary form and need not be of the quality as that is necessary to withstand a summary disposition motion." Statement of Policy on Conduct of Adjudicatory Proceedings, 48 N.R.C. 18, 22 n.1 (1998), *citing, Rules of Practice for Domestic Licensing Proceedings — Procedural Changes in the Hearing Process,* Final Rule, 54 F.R. 33168, 33171 (Aug. 11, 1989). Rather, petitioner must

make "a minimal showing that the material facts are in dispute, thereby demonstrating that an inquiry in depth is appropriate." *In Gulf States Utilities* Co., 40 NRC 43, 51 (1994), *citing, Rules of Practice for Domestic Licensing Proceedings — Procedural Changes in the Hearing Process,* Final Rule, 54 F.R. 33168, 33171 (Aug. 11, 1989). Pilgrim Watch relies here on: the expert opinion of Paul Blanch, retired nuclear engineer specializing in electrical (Attachment B); Entergy's LRA; government documents (including the NRC's admissions and opinions stated in IN 2010-26); and that the insufficiency of Indian Point's aging management program of inaccessible cables (nearly identical to Pilgrim's program) is an accepted contention in IP's relicensing adjudication process.

V. THE CONTENTION RAISES A GENUINE DISPUTE OF MATERIAL LAW OR FACT

Section 2.309(f)(vi) requires that a petitioner provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of law or fact. As required, the information set forth in this contention includes references to specific portions of the application that the petitioner disputes and the supporting reasons for each dispute; and to the fact that the application fails to contain information on a relevant matter as required by law, and identifies each such failure and the supporting reasons for the petitioners belief.

PW references, for example: NRC Information Notice 2010-26, Submerged Electrical Cables; sections of the LRA including A.2.1.23 Non-EQ Insulated Cables and Connections Program, A.2.1.23 Non-EQ Insulated Cables and Connections Program, Section B.1.19 Non-EQ *Inaccessible* Medium-Voltage Cable, Section B.1.21; NUREG-1891; and pertinent government documents and regulations, including SAND 96-0344

and NUREG/CR 7000. Together, these are far more than the required "minimal showing that the material facts are in dispute, thereby demonstrating that an inquiry in depth is appropriate." *In Gulf States Utilities Co.,* 40 NRC 43, 51 (1994), *citing, Rules of Practice for Domestic Licensing Proceedings — Procedural Changes in the Hearing Process,* Final Rule, 54 F.R. 33168, 33171 (Aug. 11, 1989).

A Licensing Board should not address the merits of a contention when addressing admissibility. *Public Service Co. of New Hampshire* (Seabrook Station, Units 1 and 2), LBP-82-106, 16 NRC 1649, 1654 (1982).

VI. THERE IS A SUBSTANTIAL BASIS FOR THE CONTENTION

Introduction

1. Pilgrim Nuclear Power Station (PNPS), like all other nuclear plants, has thousands[3] of submerged electrical cables[4] throughout the plant. The cables play vital roles in the operation of a nuclear power plant. This is recognized in 10 CFR 54.4 and 54.21. In addition, in the underground circuits, Pilgrims' submerged cables may include splices[5] that are part of, and are exposed to the same environmental and operational stresses as the cables on which they are installed. For the purposes of this contention, the

[3] Estimated to be many miles of internal wiring and cables

[4] In this context, wires and cables are considered to be the same components

[5] NUREG/CR 7000 (at 2-4; Cable splices are exposed to the same environmental and operational stressors as the cables on which they are installed. Since cable splices are constructed of many of the same or similar materials as the electric cables on which they are installed, these stressors can also cause aging degradation of the polymer insulating materials used in the cable splice. In addition, the other subcomponents that make up an electric cable splice (insulating tape, fillers, sleeves, insulating compounds, and compression connectors) are also susceptible to aging degradation due to the various stressors to which they are exposed. NUREG/CR-6788, At 4-16

If the underground cable circuit includes a cable splice, long-term submergence of the splice can also result in unexpectedly early failure of the cable system if the splice is not specifically qualified for continuous submerged operation. If a splice is not installed correctly, failure could occur even more quickly in the presence of moisture or standing water.

inaccessible cables and slices are effectively one and the same, and are collectively referred to as "cables."

2. The motion includes any cables not qualified for exposure to moisture (referred herein as "Non-EQ"). Non-EQ cables are significantly more likely to fail or experience undetected failures due to submergence and moisture accumulation, as discussed in Information Notice 2010-26, NUREG/CR 7000, and SAND96-0344.

3. Based on 10 C.F.R. 54.21(a)(1) and 10 C.F.R. 54.4 electrical cables are clearly within the scope of 10 C.F.R 54, irrespective of the design or the applied voltage, either AC or DC.

3. Pilgrim has a history of submerged and/or wetted cables, and there has been no verification of the long-term operability that provides reasonable assurance of continued operability of these cables. (Discussed at number 29)

Significance of Non-EQ Inaccessible Electric Cables

5. Almost every active safety and non safety system at Pilgrim Nuclear Power Station (PNPS) is dependent upon electrical power to perform its function to prevent major accidents. If an accident occurs, electrical power is required to prevent a reactor meltdown with major radioactive releases to the environment.

6. Nuclear plants are designed to cope for a short period, typically four hours, without alternating current[6] (AC) electrical power. During this short period, electrical power from batteries[7] can be used to control steam-driven valves and pumps that cool the reactor

[6] Similar to the power in homes and other facilities
[7] Direct Current (Similar to car batteries)

core; once the batteries are depleted, if workers have not restored AC electrical power from the onsite emergency diesel generators or the offsite electrical grid, the plant then proceeds towards a reactor meltdown.

7. Failure to properly manage aging of non-environmentally-qualified (Non-EQ) Inaccessible Cables may challenge: (a) the integrity of the reactor coolant pressure boundary; (b) the capability to shut down the reactor and maintain it in a safe shutdown condition; and/or (c) the capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposures comparable to those referred to in § 50.34(a)(1), § 50.67(b)(2), or § 100.11.

8. The failure to properly manage aging of the Non-EQ inaccessible electric cables (and any splices) could result in the loss of safety related cables and buses that supply emergency power to safety equipment including Station Blackout (SBO) loads, service water motors/pumps, safety injection pumps, and other electrical loads required to meet the requirements of 10 C.F.R. § 54.4.

9. Consequence of failures of Non-EQ inaccessible electric cables (and any splices) may result in accidents beyond the Design Basis Accidents resulting in exposures to the public exceeding 10 C.F.R. § 100 limits.

10. The Applicant has not "demonstrate(d) that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the period of extended operation," 10 C.F.R. § 54.21(a)(3) for those SSC's identified.

11. The Applicant has failed to identify the location and extent of Non-EQ Inaccessible Cables (and any splices) in use at Pilgrim.

12. The Applicant has failed to address specific recommendations from the referenced Sandia report (SAND96-0344), discussed below at number 32(d).

13. The Applicant has failed to address specific recommendations from the recently issued Brookhaven report funded by the NRC and titled "Essential Elements of an Electric Cable Condition Monitoring Program" NUREG/CR-7000, discussed below at number 34.

14. There is no technical basis provided to support extension of operations using the existing Non-EQ inaccessible cables (and any splices) without an adequate aging management plan.

15. There is no technical basis provided to justify differences between programs for aging management of accessible cables and inaccessible cables. 10 C.F.R. § 54.21(a)(3).

New Information

16. On December 2, 2010 the NRC issued Information Notice 2010-26: Submerged Electrical Cables (Attachment A and Adams Accession No. "ML1028004") to inform addresses of observations of protracted cable submergence in water. This document clearly shows that numerous cables have been exposed to submergence and moisture.

17. The new information included in the December 2, 2010 notice includes that

(a) Pilgrim Nuclear Power Station (PNPS) is specifically mentioned;

(b) the NRC has concluded that cable submergence in water is serious;

(c) despite its conclusion that the issue is serious, the NRC has not required PNPS to take any action ("The NRC expects recipients (of the IN) to *consider* taking

action...the suggestions that appear in this IN are *not NRC requirements*; therefore *no specific action...is requried*" (IN 2010-26, at 1, emphasis added); and (d) in view of the NRC's failure to require corrective action only relicensing provides a mechanism for ensuring that this significant aging management issue will be addressed at PNPS.

18. The NRC's December 2 announcement (IN 2010-26) that it will require no corrective action to address what it now admits is a significant safety issue, supports PW's new contention that Entergy's Aging Management Plan for non-environmentally qualified (EQ) inaccessible cables at Pilgrim Station is insufficient to provide reasonable assurance that public health and safety shall be protected during license renewal.

The NRC's Admissions

19. In IN 2010-26, the NRC and Brookhaven National Lab (BNL) admit that (a) cable failures have a variety of causes, (b) submerged cables present significant concerns, (c) the concerns are largely related to aging, and (d) that signifcant steps should be taken

a. Cable failures have a variety of causes, including manufacturing defects, damage caused by shipping and installation, and exposure to electrical transients or abnormal environmental conditions during operation. Latent shield or insulation damage could result from errors during cable installation, which could be caused by cable jamming, cable pull-bys, cable sidewall bearing pressure, pulling cables through conduits and flexible conduit, or computerized cable routing system software routing cables through the wrong raceway. (IN 2010-26, 5)

b. Cables not designed or qualified for, but exposed to, wet or submerged environments have the potential to degrade. Cable degradation increases the probability that more than one cable will fail on demand because of a cable fault, lightning surge, or a switching transient. Although a single failure is within the plant design basis, multiple failures of this kind would be challenging for plant operators. Also, an increased potential exists for a common-mode failure of accident mitigating system cables if they are subjected to the same environment and degradation mechanism for which they are not designed or qualified for. (IN 2010-26, at 7)

c. The likelihood of failure from any of these factors increases over time as the cable insulation degrades and/or is exposed to water. (IN 2010-26, at 5)

These failure data indicated an *increasing trend in underground cable failures, and the predominant contributing factor was submergence or moisture intrusion that degraded the insulation.* The staff noted that the *cables are failing within the plants' 40-year licensing periods.* (IN 2010-26 at 7)

d. The NRC expects [*but does not require*] licensees to identify conditions that are adverse to quality for cables, such as long-term submergence in water. Upon discovery of a submerged condition, the licensee should [*but is not* required to] take prompt corrective actions to restore the environment to within the cable's design specifications, immediately determine the operability of the cable(s) to perform its intended design function, and determine the impact of the adverse environment on the design life of the cable. These corrective actions typically involve the removal of water, the installation of a sump pump or the repair of the drainage conditions, and evaluation of the operability of the cable(s) including testing

where appropriate. The long-term [*no time frame is even* discussed] corrective actions could involve establishment of a condition monitoring program for all cables which are inaccessible and underground and under the maintenance rule, including testing of cables to verify the cables are not degraded and visual inspection of manholes for water accumulation to ensure continued operability. (IN 2010-26 at 6, Petitioners comments addded in italics)

20. The NRC also admits that steps taken by licensees to address the problem of aging submerged cables have been insufficient:

> Some licensees have attempted to periodically drain the accumulated water from the cable surroundings to avoid cable failures. In some cases, the water quickly refilled the cavity in areas in which the water table was above the base level of a cable trench or underground vault. In other cases, water accumulated seasonally (e.g., because of snowfall or rain), filling the conduit or raceways. In both cases, periodic draining could slow the rate of insulation degradation, but it may not prevent cable degradation. Licensees should ensure that cables that could become submerged are adequately monitored. (IN 2010-26, at 7)

21. Despite these admissions, the NRC has not ordered any corrective action. Particularly in view of the staff's recognition that *cables are failing within the plants' 40 year licensing period*," it could hardly be clearer that sufficiently managing aging of inaccessible cables should be a critical part of relicensing.

22. Although the NRC said that Licensees should ensure that cables that could be submerged are adequately monitored" (Id.), it utterly failed to say that failed or failing cables should be replaced or otherwise updated to bring the cables into compliance with NRC Regulations.

Site Specific Cable System Degradation Mechanisms

23. Moisture: At 7, IN 2010-26 said that "These failure data indicated an increasing trend in underground cable failures, and the predominant contributing factor was submergence or moisture intrusion that degraded the insulation."

24. Many of the wires and cables used at PNPS to supply power to vital and non-vital electrical equipment are contained within conduits. The conduits themselves that function to isolate the wires from the environment are made of materials that are subject to degradation, especially as they age and are exposed to Pilgrim's moist salt water environment. Corroded conduits and manholes allow moisture inside. The wires and cables, together with any connections and splices inside the conduits, are only designed to operate properly in a dry environment and were not designed or specified to operate in a moist or wet environment. While a cable may work if wet and/or submerged, there is no assurance they will not fail if wet or submerged or previously experienced exposure to moisture.

25. Most electrical cables at Pilgrim Nuclear Power Station have been exposed to significant moisture over the past 40 years since initial construction in the 1960's. This is because:

(a) Pilgrim is located on low land directly beside Cape Cod Bay.

(b) The FEIS describes the soil as sandy, silt and clay – soil types that retain moisture.

(c) Plymouth's climate[8] is characterized by frequent showers, thunderstorms, high humidity in the spring and summer. Summer winds typically are from the southwest or southeast and bring warm, moist air that can contribute to fog formation. Spring and summer southwesterly winds may drive hurricanes northward with the potential to flood shores where cables are buried; and the storms of autumn or winter, "nor'easters," also have particularly strong winds and may drive winter storms into northeastern-facing shores with storm/tidal surges. Snow storms generally occur in winter. Melting snow, rains, tidal surges etc result in moisture percolating downwards wetting and degrading conduits and wiring below.

(d) Water travels downward from leaks inside the reactor following along wires to collect below.

(e) Manhole covers may not be watertight; and the water table is high in seasonal cycles and the tidal surges accompanying storms.

(f) Storms and higher tides are increasingly common and therefore the conduits may get refilled soon after purging.

(g) Condensation is an additional factor caused by changes in temperature in the climate.

The foregoing all increase the potential for conduit and insulation degradation.

25 Age: IN 2010-26 at 7, it said that, "The staff noted that the cables are failing within the plants' 40-year licensing periods." Pilgrim is one of the oldest operating commercial reactors in the county. Pilgrim Watch understands that the majority of the conduits and wires at PNPS were installed during initial construction in the 1960's and

[8] http://www.mass.gov/czm//oceanmanagement/waves_of_change/pdf/troceancc.pdf

possible some at subsequent plant updates. This data is not available, although it should be available to both the NRC and public.

26. Corrosion increases with age. The aging degradation of wires is commonly the result of deterioration of the wiring insulation. Aging causes insulation to become less and less pliable, making it easier for cracks and tears to form and grow larger. Residual defects in the insulation, leftover from blemishes during manufacturing and nicks and scrapes during installation, are pre-existing weaknesses exploited by aging. According to the recently issued EPRI reports, [9] wires degrade with age and the most susceptible to degradation are the oldest wires.

27. There are no existing methods to assure operability short of visual inspection and/or replacement with cables designed for operation in a wet or submerged environment. NRC agrees[10] and said, in NRC Inforamtion Notice 2010-26, at 7, the staff noted that the cables are failing within the plants' 40-year licensing periods. Some of the cable failures have resulted in plant transients and shutdowns, loss of safety redundancy, entries into limiting conditions for operation, and challenges to plant operators. The NRC staff published the summary report that captured the review of responses from all licensees on November 12, 2008 (ADAMS Accession No. ML082760385).

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[9] Plant Support Engineering: Aging Management Program Development Guidance for AC and DC Low-Voltage Power Cable Systems for Nuclear Power Plants, "*Regulatory and management concern regarding the reliability of low-voltage power cable systems at nuclear plants has been increasing for the past 5–10 years. The staff of the United States Nuclear Regulatory Commission are concerned that wetted (up to and including submergence) low-voltage power cable circuits may be degrading to the point at which multiple cable circuits may fail when called on to perform functions affecting safety. Utility managers are concerned that cables may fail, causing adverse safety consequences and/or plant shutdowns. This document provides guidance for developing and implementing a cable aging management program for low-voltage power cable circuits in nuclear power plants.*"

[10] NRC *Regulatory Issue Resolution Protocol-Inaccessible or Underground Cable Performance Issues at Nuclear Power Plants* (August 19, 2009) available NRC Electronic Library, Adams Accession No. ML092460425

28. Installation & Manufacturing Defects[11]: IN 2010-26 says (at 5) that "Cable failures have a variety of causes, including manufacturing defects, damage caused by shipping and installation. (and) The likelihood of failure...increaces over time as the cable insulation degrades and/or is exposed to water."

26. During installation these wires were likely damaged,[12] meaning scrapes and other damage likely occurred in the surface of the insulation and possibly deeper. Manufacturing defects cannot be ignored either. These coating defects permit moisture to infiltrate the wiring. Moisture/submergence increases the probability of failure should an accident occur. Failure of the wires assures failure of connected components (emergency diesel generators, emergency reactor cooling motors and pumps, valves, etc.) If these wires have any surface defects/degradation due to installation, other unknown defects or normal aging, there is no assurance that they are capable of performing their designated safety functions when required if they have experienced submergence and/or moisture exposure.

Pilgrim, Site Specific Experience, Examples

28. The IN 2010-26 Appendix A included examples of NRC Inspection Reports on Cable Submergence issues.

29. NRC Integrated Inspection Report *05000293/2010003*, 1RO6 Flood Protection Measures, July 29, 2010 (Attachment C), Pilgrim: The NRC inspectors observed partially

[11] Response to NRC Generic Letter 2007-0, Attachment 1 to Entergy Letter No. 2.07.034
Generic Letter **2007-01** Response (ML071300361): "Request 1-Provide a history of inaccessible or underground power cable failures for all cables that are within the scope of 10 CFR 50.65 (the Maintenance Rule) and for all voltage levels.Response 1:Pilgrim has experienced one cable failure within the scope of the GL. The requested information is provided below. Cable failed during service due installation damage."
[12] Some plants during construction, actually connected wires to cables and trucks to pull wires through the buried pipes

and fully submerged medium voltage cables" in the three cable vaults sampled. (Report, pg.7) The report made clear that flooding is a recurring issue; and demonstrates that both NRC oversight and Entergy's compliance are inadequate to provide "reasonable assurance" that these electric wires will function when required now or over the license renewal period, leaving protection of public safety to chance. The Report's main finding describes a sample taken on April 28, 2010, where the inspectors observed water in the three (3) manholes and vaults inspected:

> On April 28, 2010, the inspectors observed water in each of the manholes and vaults listed above. The inspectors noted that no dewatering or drainage systems existed in the manholes. Entergy procedure EN-DC-346, Revision 0, "Cable Reliability Program," was issued and effective on December 31, 2009. This procedure discusses manhole inspections and dewatering, and requires, in part, "If manual inspections and pumping are used to maintain a cable system dry, the intervals must be sufficient to keep the cables dry. Adjust intervals as necessary, based on inspection results." Discussions with Entergy personnel involved with these inspections indicated that *cables in Manhole 2A were periodically found submerged or partially submerged, and that cables in Manholes 4 and 5 were always found submerged.* The cables that were submerged included cables that were installed from the 4160V, non-safety related startup transformer and connected to the A2 and A4 non-safety related busses. The inspectors identified that *Entergy had previously identified submerged cables in August and September of 2009, however, corrective actions were not sufficient to preclude these cables from being submerged.* The inspectors also determined that The inspectors identified that *Entergy had previously identified submerged cables in August and September of 2009, however, corrective actions were not sufficient to preclude these cables from being submerged* (Pg., 8, emphasis added)

Prior to that, for example, wiring failures were reported at Pilgrim in NRC Information Notice 2002-12.

Pilgrim's LRA, Aging Management Program

30. A review of Pilgrim's LRA shows that its Aging Management Progam (AMP) is inadequate and does not properly respond to the issues outlined in IN 2010-26 thereby not providing reasonable assurance that public health and safety will be protected.

31. Pertinent Sections of Pilgrim's LRA include:

a. **A.2.1.21 Non-EQ Inaccessible Medium-Voltage Cable Program says:** In the Non-EQ Inaccessible Medium-Voltage Cable Program, in scope medium-voltage cables, not designed for, but exposed to significant moisture and voltage are tested at least once every ten years to provide an indication of the condition of the conductor insulation. The specific test performed is a proven test for detecting deterioration of the insulation system due to wetting, such as power factor, partial discharge, polarization index, or other testing that is state-of-the-art at the time the test is performed. Significant moisture is defined as periodic exposures that last more than a few days. Significant voltage exposure is defined as being subjected to system voltage for more than 25% of the time. Inspections for water collection in cable manholes and conduit occur at least once every two years.

b. **A.2.1.23 Non-EQ Insulated Cables and Connections Program** says: The Non-EQ Insulated Cables and Connections Program provide reasonable assurance that intended functions of insulated cables and connections exposed to adverse localized environments caused by heat, radiation and moisture can be maintained consistent with the current licensing basis through the period of extended operation. An adverse localized environment is significantly more severe than the specified service condition for the

insulated cable or connection. A representative sample of accessible insulated cables and connections in adverse localized environments is visually inspected at least once every 10 years for cable and connection jacket surface anomalies such as embrittlement, discoloration, cracking or surface contamination.

c. **Section B.1.19 Non-EQ *Inaccessible* Medium-Voltage Cable** says:, The Non-EQ Inaccessible Medium-Voltage Cable Program at PNPS will be comparable to the program described in NUREG-1801, Section XI.E3, Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements. In this program, periodic actions will be taken to prevent cables from being exposed to significant moisture, such as inspecting for water collection in cable manholes and conduit, and draining water, as needed. In scope medium-voltage cables exposed to significant moisture and voltage will be tested at least once every ten years to provide an indication of the condition of the conductor insulation. The specific type of test performed will be determined prior to the initial test. The program will be initiated prior to the period of extended operation. [Emphasis added]

d. **Section B.1.21** says:

Non-EQ Insulated Cables and Connections provides that a representative sample of accessible insulated cables and connections within the scope of license renewal will be inspected visually for embrittlement, discoloration, cracking, surface contamination, and other cable and connection jacket surface anomalies. The technical basis will be determined in accordance with EPRI TR-109619, "Guideline for the Management of Adverse Localized Equipment Environments. A representative sample of *accessible* insulated cables and connections within the scope of license renewal will be visually inspected for cable and connection jacket surface anomalies such as

embrittlement, discoloration, cracking or surface contamination. The technical basis for sampling will be determined using EPRI document TR-109619, "Guideline for the Management of Adverse Localized Equipment Environments. The program will be initiated prior to the period of extended operation. [Emphasis added]

e. **Conclusion** (Appendix B Aging Management Programs and Activities Page B-72)

The Non-EQ Insulated Cables and Connections Program will be effective for managing aging effects since it will incorporate proven monitoring techniques, acceptance criteria, corrective actions, and administrative controls. The Non-EQ Insulated Cables and Connections Program will provide reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

32 Entergy's Aging Management Plan for non-environmentally qualified (EQ) submerged cables at Pilgrim Station is insufficient to provide reasonable assurance that public health and safety shall be protected during license renewal.

For example:

a. One- time inspection in 10 years is too infrequent. 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 as if we inspected yesterday we don't need to inspect again for 10 years. First, corrosion/degradation is a rate process and the rate is *NOT* constant with time. Therefore, the probability would

have to be adjusted with age, or the risk becomes a function of age. As a consequence, the entire risk management in the AMP is totally misguided.

b. The programs lack specificity. "Periodic actions," "as needed," "representative sample" - such language is too vague to provide reasonable assurance.

c. A.2.1.21 Non-EQ Inaccessible Medium-Voltage Cable Program's "Inspections for water collection in cable manholes and conduit occur at least once every two years" does not provide for the fact that not all inaccessible cables are capable of inspection by manholes.

d. SAND96-0344, *Aging Management Guideline for Commercial Nuclear Power Plants – Electrical Cable and Terminations*, prepared by Sandia National Laboratories for the U.S. Department of Energy, September 1996, and sponsored by the Department of Energy and EPRI. The Sandia study contains numerous recommendations related to the management of aging of cables and terminations with specific emphasis on 10 C.F.R. Part 54 and meeting the requirements of the regulation.

Section 6 of the Sandia report contains (18) pages of recommendations and conclusions that specifically relate to the aging management of cables and terminations. The LRA Appendices A and B fail to address or commit to any of the specific recommendations of SAND 96-0344. Further the Sandia study (at page 6.4) states: "No currently available technique was identified as being effective at monitoring the electrical aging of medium-voltage power cables. Some methods may be effective at detecting severe electrical degradation or

monitoring certain types of degradation (such as thermal aging); however, correlation of these measurements with the expended or remaining life of these cables has not been demonstrated."

e. The Non-EQ inaccessible & accessible cable programs at PNPS are *new programs* for which there is no operating experience (LRA B-68). Therefore there is no basis to assume their capability to provide reasonable assurance.

f. The main difference between the cables discussed in B. 1.19 and B.1.21 is accessibility, which in light of the comparable safety significance of both types of cables and the risk of aging damage and exposure to wetness to both types of cables is not technically defensible basis for treating the two types of Non-EQ Medium voltage Cables differently.

The NRC Staff has recognized the importance of an aging management program for cables, even if they are inaccessible: NRC Generic Letter 2007-01: Inaccessible or Underground Power Cable Failures That Disable Accident Mitigation Systems or Cause Plant Transients (February 7, 2007).

The Generic Letter suggests several procedures that could be implemented to address the degradation of inaccessible cables. For example, it says that some licensees have detected cable degradation prior to failures through techniques for measuring and trending the condition of cable insulation. Licensees can assess the condition of cable insulation with reasonable confidence using one or more of the following testing techniques: partial discharge testing, time domain reflectometry, dissipation factor testing, and very low frequency AC testing. Licensees can

replace faulty cables during scheduled refueling outages prior to cable failure that would challenge plant safety. (At 4)

None of these measures are included in the AMP for Non-EQ Inaccessible Medium-Voltage Cables

g. The NRC and PNPS did not require or include a program in its License Renewal Application (LRA) 10 CFR 54, to manage low voltage cables for the present period and/or the period of proposed extended operation. There is no evidence presented that "low voltage cables" are of "low" safety significance.

Pilgrim's Safety Evaluation Report (SER) NUREG-1891[13]

33. PNPS' SER Final Report (November 2007) does not provide reasonable assurance either, for at least the following reasons.

a. General Design Criterion 4 in Appendix A to 10 CFR Part 50 requires safety equipment to be designed for the environmental conditions it is subjected to during normal operation and postulated accidents. 10 CFR 50.49 requires electrical equipment to be qualified for the environmental conditions it experiences during normal operation and postulated accidents.

Rather than ensuing that cabling exposed to "significant moisture" is designed and qualified to operate under that condition (as required by NRC Regulations), PNPS' SER accepts under-designed and unqualified cabling as long as one

[13] SER, NUREG 1891
http://adamswebsearch2.nrc.gov/idmws/doccontent.dll?library=PU_ADAMS^PBNTAD01&ID=071800054

periodically checks from time to time that the cables still work (at that moment).

The most troubling aspect of the SER is on page 3-18:

> In this program, periodic inspections and drainage, as needed, for water collection in cable manholes and conduit prevent cable exposure to significant moisture. The condition of the conductor insulation for in-scope medium-voltage cables exposed to significant moisture will be tested at least every ten years; the specific test type to be determined before the initial test. The program will start prior to the period of extended operation.

"The specific test type to be determined before the initial test" means that no test type is now specified. It's an important test. When water accumulation is found, the test looks for damage to the in-scope medium-voltage cables exposed to that water. Because the test is not specified now, it's hard to conclude whether it is adequate or inadequate. The test might involve a mere visual examination of a dime-sized section of the cable insulation, assuming all other parts of the insulation are equally sound. Or it might be a more meaningful test. Absent a solid test, this whole exercise ends up little more than a water safari. We fail to see much assurance that a useful determination that exposure to "significant moisture" has not damaged the medium-voltage cables. That is, or should be, the whole point of it all.

A recent report by the NRC Office of Inspector General (OIG), *Office of Inspector General's Audit of NRC's License Renewal Program*[14] made clear that neither the NRC nor the public can rely on the SER's conclusion that aging will

[14] *Office of Inspector General's Audit of NRC's License Renewal Program*, OIG-07-A-15, September 6, 2007. NRC ADAMS ML072490486

be adequately managed so that the intended functions will be maintained consistent with the CLB over the extended period of operations. The OIG's audit revealed that, among other failures, the NRC Staff's license renewal review process is weak. In Section C of the report, the OIG concluded that:

> most audit team members do *not conduct independent verification* of operating experience, instead relying on license-supplied information. This is because program managers have not established requirements and controls to standardize the conduct and depth of such reviews. *In the absence of conducting independent verification of plant-specific operating experience*, license renewal auditors may not have adequate assurances that relevant operating experience was captured in the licensee's renewal application of NRC's consideration. [OIG-07-A-15, at 18] (Emphasis added)

There was no evidence that Pilgrim's SER does not fit this description - no manhole cover was lifted for inspection for water or other independent verification occurred. Instead the SER at Pilgrim as described at 3-18 says that, the staff reviewed the operating experience presented in the LRA and interviewed the applicant's technical personnel to confirm that the AMP complied with the GALL. In other words, the staff simply reviewed what was in the LRA, asked the licensee a couple of clarifying questions and went away satisfied. Examples:

b. 3.0.3.1.5 Non-Environmental Qualification Inaccessible Medium-Voltage Cable Program

The staff asked the applicant to explain how it had considered operating experience for manhole inspection frequency. Entergy responded that, "... the applicant revised the program evaluation report to include the following: The inspection will be based on actual plant experience with water accumulation in the manholes and the frequency of inspection will be adjusted based on the results of the evaluation, but the frequency will be at least once every 2 years. (3-19) NRC Staff was satisfied with this response; however, Entergy did not explain how often the inspections will occur or what procedure will be used. Will inspections be based on happenstance, convenience, or some random time period between 1-24 months?

The Staff also asked the applicant whether it inspects water in manholes under specific procedures for such inspections and, if so, for a copy of the procedures. The applicant responded that it has no formal procedure. The Staff was satisfied that Entergy in Commitment No. 15-committed to develop a formal procedure to prevent cable exposure to significant moisture. However commitments do not provide details – when will it be established and what will it do? The time frame and/or procedure could be unsatisfactory. At this point in time neither the NRC Staff nor the public knows.

The Staff asked the applicant to revise the AMP B.1.19 program evaluation report and define significant moisture for consistency with the GALL Report's scope or to explain how inaccessible medium-voltage cable exposed to significant moisture more than a few days and less than a few years is not susceptible to water treeing. In its response, the Applicant revised the program evaluation report and said that,

"Significant moisture is defined as periodic exposure to moisture that last more than a few days (e.g., cable in standing water). Periodic exposure to moisture that lasts less than a few days (i.e., normal rain and drain) is not significant." Based on its review, the staff finds the applicant's response acceptable because the scope of the program is consistent with that of the GALL Report. However, that definition does not provide reasonable assurance and NRC knows this to be true.

NRC Regulatory Issue Resolution Protocol Inaccessible or Underground Cable System Performance Issues at Nuclear Power Plants, January 21, 2010, Slide 4 (NRC Electronic Library, Adams Accession No ML100150850) Staff comments say in contrast that,

> Cable Aging Management Program Guides should address... All cables subjected to <u>any level of wetting or submergence</u>. [Emphasis added]

<u>c. 3.0.3.1.7 Non-Environmental Qualification Insulated Cables and Connections Program</u>

To The Staff's satisfaction, the applicant revised LRA Section B.1.19 program description to read,

> This program addresses cables and connections at plants whose configuration is such that most cables and connections installed in adverse localized environments are accessible. This program can be thought of as a sampling program. Selected cables and connections from accessible areas will be inspected and represent, with reasonable

assurance, all cables and connections in the adverse localized environments. If an unacceptable condition or situation is identified for a cable or connection in the inspecting sample, a determination will be made as to whether the same condition or situation is applicable to other accessible cables or connections. The sample size will be increased based on an evaluation per the corrective program.

PW fails to understand how this provides reasonable assurance and satisfied Staff. First, and most important, there is no reason to believe that accessible cables are representative of inaccessible cables. In fact it is likely that inaccessible cables have a greater probability of being degraded. Further, for the described accessible cable program, no information is provided on what basis the "determination will be made."

Routine Maintenance (Business as Usual) Does not Provide Reasonable Assurance

34. NUREG/CR 7000 (5.1 Conclusions) summarized by saying that 10 CFR Part 50 including Appendix A and B regulations require licensees to assess the condition of their components, to monitor the performance or condition of structures, systems, and components in a manner sufficient to provide reasonable assurance that they are capable of performing their intended functions, and to establish a test program to ensure that all testing required to demonstrate that components will perform satisfactorially in service is identified and performed.

Recent incidents around the country, and at Pilgrim, involving early failures (IN 2010, IN 2002-12, Generic Letter 2007-01, "Inaccessible or Underground Power cable failures That Disable Accident Mitigation Systems or Cause Plant Transients," suggest that licensees approaches to cable testing, such as in-service testing, surveillance testing, preventative maintenance, maintenance rule, etc., do not charaterize sufficiently the condition of cable insulation nor provide information on the extent of aging and degradation mechanisms that can lead to failure. The proof is in the pudding.

NUREG/CR 7000 (5.1 Conclusions) goes on to say that,

> In-service testing of safety-related systems and components can demonstrate the integrity and function of associated electric cables under test conditions. However, in-service tests do not provide assurance that cables will continue to perform successfully when they are called upon to operate fully loaded for extended periods as they would under normal service operating conditions or under design basis conditions. In-service testing of systems and components does not provide specific information on the status of cable aging degradation processes and the physical integrity and dielectric strength of its insulation and jacket materials. (Emphasis added)

Recommendations

35. NUREG/CR 7000 put forward some rcommendations; and we expect our expert to comment on these and come forward with other suggestons during the proceeding. For example, at 4-18 and 4-19, NUREG/CR 7000 says,

> Clearly, underground cable environments needed to be monitored for the presence of moisture or standing water. However, due to the inaccessibility of these cable circuits, indirect methods for inspection and measurement must be considered. Visual inspection for moisture or standing water, or the signs

of flooding, such as accumulations of sand, mud, and silt or flooding high water marks, could be performed at accessible manhole vaults or cable pull boxes along the length of an underground duct bank. Site survey data on the elevations of the manhole vaults along the underground cable duct bank can then be used to determine whether manhole flooding has affected connected cable ducts. If available, site hydrological data on water table depth and how the water table is affected by site precipitation or the water surface level in nearby bodies of water can also be used to determine where underground cable flooding may be occurring. Illuminated borescopes, such as those used for internal inspection of pipelines, can be routed down into underground duct banks or conduits to visually inspect for standing water or the signs of flooding, such as accumulations of sand, mud, and silt. Cable conduits that are above flood level elevation, but are susceptible to moisture intrusion, such as described in Information Notice 89-63 [Ref. 36[15]], can be checked for water accumulation using ultrasonic inspection at low points.

Some of the condition monitoring tests for cables performed for implementation of element 7 of the cable CM program, described in subsection 4.7, can be used to detect and locate the presence of water along the length of an electric cable. Time domain reflectometry (TDR), the ECAD inspection system, and the newer line resonance analysis (LIRA) technique, which are described in Section 3 of this report, may be able to accomplish this.

The results of electrical property measurement CM tests from program element 7 that can detect water treeing or the degradation of insulation dielectric strength resulting from water treeing could be reviewed as another indirect method for determining whether it is or has been operating in a submerged condition. CM measurement techniques such as insulation resistance/polarization index testing, dc high potential testing, and VLF

[15] US NRC Information Notice 89-63, "Possible Submergence of Electrical Circuits Located Above the Flood Level Because of Water Intrusion and Lack of Drainage," U.S. Nuclear Regulatory Commission, September 5, 1989.

withstand testing, can be used to check the condition of cables that may be exposed to water. Test results indicating weakened dielectric strength, or trends of unusually rapid deterioration of dielectric strength between successive testing periods, could be an indication of power cables operating in a submerged condition over extended periods of time.

The output results of the CM program element 3 monitoring of cable operating environment activities will be periodic environmental measurements, data, and inspection results for global and local cable operating environments for those cables selected for monitoring in the CM program. The periodic environmental monitoring information for each cable circuit is documented in the CM program database. These data, together with the baseline environmental characterization information, and will be available for review by the cable engineer under CM program element 9, in order to make decisions on managing cable operating environments.

And at 5.2 Recommendations, NUREG /CR 7000 concludes,

Special consideration should be given the problem of monitoring the operating environment for cable circuits routed through inaccessible underground cable ducts and conduits, covered cable distribution trenches, and manhole vaults because they can frequently become flooded resulting in power and control cables operating in wetted and completely submerged conditions for extended periods of time. Unless the installed cables have been procured specifically for continuous submerged or submarine operation, the licensees should ensure that cables installed in duct banks, manholes, bunkers and direct burial applications, are provided with proper drains, sumps, alarms and other protective measures and inspection activities to ensure that they are monitored and maintained in a dry environment.

These reccomendations go far beyond what Entergy provided in their Aging Management Program. There is no excuse for providing less protection of the

public especially in consideration of the following. Pilgrim has submerged Non-EQ inaccessible cables. Pilgrim is not located on a dessert; instead it is located adjacent to Cape Cod Bay and in a climate subject to snow, rain and fog. Pilgrim has failed to perform a thorough up-dated hydro-geological anlaysis over the entire site since 1967 (pre-construction) so they do not have a clue concerning subsurface groundwater flow. License renewal adds an additional 20 years of operation, and GL 2007-01 " showed a trend toward early failure, the majority occuring in the range of 11-20 years of service."

Conclusion

36. Entergy's Aging Management Plan for non-environmentally qualified (EQ) inaccessible cables (splices) at Pilgrim Station is insufficient. The Aging Management Plan should include a program that assures all inaccessible cables are in compliance with existing NRC Regulations [16]discussed in Regulatory Issue Resolution Protocol Inaccessible or Underground Cable Performance Issues at Nuclear Power Plants, August 19, 2009. (NRC Electonic Library, Adams Accession No. "ML092460425") Failure to

[16] 10 CFR Part 50, Appendix A, General Design Criterion (GDC) 2, "Design Bases for Protection Against Natural Phenomena."
10 CFR Part 50, Appendix A, General Design Criterion (GDC) 4, "Environmental and Dynamic Effects Design Bases."
10 CFR Part 50, Appendix A, GDC 17, "Electric Power Systems."
10 CFR Part 50, Appendix A, GDC 18, "Inspection and Testing of Electric Power Systems."
10 CFR 50.65(a)(1), "Maintenance Rule."
10 CFR 50.49, "Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants."
10 CFR 50.49, "Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants,
10 CFR Part 50, Appendix B, Criterion III, "Design Control."
10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings."
10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings."

address this issue before license renewal is granted could result in significant harm to the health and safety of the public.

VII. THE CONTENTION IS TIMELY

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

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

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

The information upon which this contention is based did not become available to the public (including Pilgrim Watch) until December 2. 2010, when NRC Information Notice 2010-26 was released.

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

(Donald C. Cook Nuclear Plant, Units 1 and 2), CLI-72-75, 5 AEC 13, 14 (1972); Cincinnati Gas and Electric Co. (William H. Zimmer Nuclear Station), LBP-80-14, 11 NRC 570, 574 (1980), appeal dismissed,ALAB-595, 11 NRC 860 (1980)."

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

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

Pilgrim Watch is already a party, and thus clearly has the right under the Act to be, a party to this proceeding.

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

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

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

Petitioners believe that if Pilgrim is allowed to operate for an additional twenty years without taking the mitigation steps required by virtue of this contention that there will be an unacceptable risk to the environment jeopardizing the health, safety, property and finances of Petitioners' members who live, recreate, conduct business and own property within the vicinity of the Pilgrim Nuclear Power Station.

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

None of the factors suggesting "other means" referred to in Sec. 2,10.3.3.3E Factor #5 of the NRC Digest are present here. There is no state judicial forum or other NRC licensing procedure to which Pilgrim Watch can take its concerns regarding the fact that Entergy's Aging Management Plan for non-environmentally qualified (EQ) submerged cables, splices and connectors at Pilgrim Station is insufficient to provide the necessary reasonable assurance that public health and safety shall be protected during license renewal. (See, Private Fuel Storage, L.L.C. (Independent Spent Fuel Storage Installation), LBP-00-23, 52 NRC 114, 121-122 (2000)). "The suggestion that an organization could adequately protect its interest by submitting a limited appearance statement gives insufficient regard to the value of participational rights enjoyed by parties - including the entitlement to present evidence. Similarly, assertions that the organization might adequately protect its interest by making witnesses available to a successful petitioner or by transmitting information in its possession to appropriate State and local officials are without merit." Duke Power Co. (Amendment to Materials License SNM-1773 -- Transportation of Spent Fuel from Oconee Nuclear Station for Storage at

McGuire Nuclear Station), ALAB-528, 9 NRC 146, 150 n.7 (1979)." NRC Digest, Prehearing Matters, 38. And a "petition under 10 C.F.R. § 2.206 for a show cause proceeding is not an adequate alternative means of protecting a late petitioner's interests.... Washington Public Power Supply System (WPPSS Nuclear Project No. 3), ALAB-747, 18 NRC 1167, 1175-1176 (1983). See Florida Power and Light Co. (Turkey Point Nuclear Generating Plant, Units 3 and 4), LBP-90-5, 31 NRC 73, 81 (1990), aff'd, ALAB-950, 33 NRC 492, 495-96 (1991). After all, despite the long history of §2.206, the number of successful petitions brought under that section is extremely small. Dominion Nuclear Connecticut, Inc. (Millstone Nuclear Power Station, Units 2 and 3), LBP-05-16, 62 NRC 56, 67 (2005). (Id.)

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

The other parties to this proceeding are Entergy and the NRC Staff. Throughout this proceeding both NRC Staff and Entergy (in concert with each other) have consistently opposed Pilgrim Watch's interests. There is no reasonable basis to expect that leopard will change its spots. The NRC has accurately recognized that,

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

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

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

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

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

The issue presented by this contention - Entergy's Aging Management Plan for non-environmentally qualified (EQ) inaccessible cables and splices at Pilgrim Station is insufficient to provide the necessary reasonable assurance that public health and safety shall be protected during license renewal is new. The ASLB has not looked at this before.

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

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

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

Pilgrim Watch intends to cover the inadequacies of Entergy's Aging Management Program for Non-Environmentally Qualified Inaccessible Cables (Splices) at Pilgrim Station. Pilgrim Watch has provided in this new contention ample evidence to support its dispute. Pilgrim Watch intends principally to rely upon government documents and testimony from Paul Blanch, nuclear engineer specializing in electrical. The Petitioner satisifies 10 C.F.R 2.309(d), Standing: The Petitioner already is a party to this hearing and has satisfied the requirements.

VI. CONCLUSION

With respect to adequate assurance of public health and safety the AMP for Pilgrim must be revised so that either Pilgrim is required to replace all cables (and splices) that may be exposed to submergence with cables "procured as submarine cables (IN 2010-26 at 6) or develop a comprehensive aging management program, incorporating recommendations suggested in the foregoing, to assure compliance with existing NRC regulations cited above.[17]

Respectfully submitted,

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[17] Honorable Gregory B. Jaczko Chairman speech to INPO on November 9, 2010 said, "[Y]ou must remember that compliance with NRC regulations is the foundation for the safety excellence that you strive for. Safety excellence includes more than just compliance, but it starts with compliance."

ATTACHMENTS

- **Attachment A: NRC Information Notice 2010-26: Submerged Electrical Cables, December 2, 2010 (Adams Accession No. ML102800456)**

- **Attachment B: Declaration of Paul M. Blanch, December 13, 2010**

- **Attachment C: NRC Integrated Inspection Report *05000293/2010003*, 1RO6 Flood Protection Measures, July 29, 2010 (Adams Accession No. ML 102100150)**

ATTACHMENT A

UNITED STATES NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
OFFICE OF NEW REACTORS
WASHINGTON, DC 20555-0001
December 2, 2010

NRC INFORMATION NOTICE 2010-26: SUBMERGED ELECTRICAL CABLES

ADDRESSEES

All holders of an operating license or construction permit for a nuclear power reactor issued under Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel.

All current and potential applicants for a combined license or standard design certification for a nuclear power plant under the provisions of 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants." All current and potential applicants for a construction permit under the provisions of 10 CFR Part 50.

PURPOSE

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice (IN) to inform addressees of observations of protracted cable submergence in water, recent NRC inspection findings, and the results of licensees' responses to Generic Letter (GL) 2007-01, "Inaccessible or Underground Power Cable Failures That Disable Accident Mitigation Systems or Cause Plant Transients," dated February 7, 2007 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML070360665). Furthermore, this IN provides additional clarification to IN 2002-12, "Submerged Safety-Related Electrical Cables," dated March 21, 2002 (ADAMS Accession No. ML020790238), through the NRC's observations of the submergence in water of electrical cables that feed safety-related equipment at certain facilities. The NRC expects recipients to review the information for applicability to their facilities and consider taking action, as appropriate, to avoid similar problems. The suggestions that appear in this IN are not NRC requirements; therefore, no specific action or written response is required.

DESCRIPTION OF CIRCUMSTANCES

Monticello Nuclear Generating Plant

On September 11, 2008, a double phase-to-ground fault occurred on the underground feeder cables (offsite power) routed from the 2RS (345-kilovolt (kV)/34.5-kV) transformer to the 2R (34.5-kV/4.16-kV) transformer at the Monticello Nuclear Generating Plant. On December 16, 2008, the NRC issued Inspection Report 05000263/2008-009 (ADAMS Accession No. ML083510254), which documented the results of a special inspection that it performed at the plant. The special inspection evaluated the facts and circumstances surrounding the loss of normal offsite power and resultant reactor trip and other complications that occurred on September 11, 2008. The inspectors identified a violation for the licensee's failure to establish an effective monitoring and corrective action plan that included the 34.5-kV underground feeder cables in the scope of a monitoring program that met the requirements of

10 CFR 50.65(a)(1). This cable was found submerged, as the manhole was full of water above the level of the conduits. The licensee's evaluation of the cable failure determined that the faults did not occur in the section of cable that was found submerged.

The inspectors determined that the licensee's preventive maintenance and testing methodology for the 34.5-kV cables was not sufficient to establish the condition of the cables, and, therefore, the exemption of 10 CFR 50.65(a)(2) was not applicable. Additionally, the preventive maintenance and testing methodology implemented by the licensee for the 34.5-kV cables did not provide the information necessary to ensure that the 2R transformer was capable of fulfilling its intended function. Therefore, the licensee had not effectively assessed the performance goal before the failure. Thus, the exemption of 10 CFR 50.65(a)(2) was not applicable. Following the cable failure, the licensee performed tan-delta and partial discharge (PD) cable performance monitoring tests to identify the extent of the cable degradation. The tan-delta testing indicated that the A2 phase conductor (which failed on September 11, 2008) had a severe fault at a second splice location, and, therefore, the licensee needed to replace the splice. The PD testing identified termination problems in the B2 and C2 cable conductor splices and at the stress cones. To address these deficiencies, the licensee repaired or replaced the faulted cable. The licensee is implementing a cable monitoring and testing program to monitor the performance of the cables.

Fermi Power Plant, Unit 2

On September 11, 2007, the NRC issued Inspection Report 05000341/2007-003 (DRS) (ADAMS Accession No. ML072540412), which documented the results of a component design bases inspection that it performed at the Fermi Power Plant, Unit 2. The emergency diesel generator cables installed between the residual heat removal complex and the reactor building, which were located below the maximum ground water level, were not designed for continuous underwater service. The inspectors identified a violation of Criterion III, "Design Control," of Appendix B to 10 CFR Part 50, for the licensee's failure to implement licensing and design-basis requirements when the licensee specified and purchased safety-related and nonsafety-related cables. The inspectors noted that the licensee failed to ensure that the cables were designed for continuous underwater service, which is contrary to statements made in the licensee's updated final safety analysis report. The licensee entered the finding into its corrective action program to investigate the design of the cables and to institute a cable management program.

Point Beach Nuclear Plant

On April 21, 2008, the NRC issued Inspection Reports 05000266/2008-007 and 05000301/2008-007 (ADAMS Accession No. ML081130194), which documented the results of the agency's special inspection. The purpose of the special inspection was to review the circumstances surrounding the loss of the Point Beach Nuclear Plant, Unit 1, 1X-04 transformer that resulted in the loss of safety bus 1B-04 at the plant. One of three violations identified during the inspection dealt with the licensee's failure to establish a test program that would adequately demonstrate that medium-voltage cables subjected to submergence in water would perform satisfactorily in service. Specifically, the online, energized PD testing methodology that the licensee had adopted in approximately 2001 to periodically assess the condition of submerged power cables failed to provide any indication of declining cable performance or an indication of an imminent failure of the transformer cables before the actual failure on January 15, 2008.

On May 11, 2010, the NRC issued Inspection Reports 05000266/2010-002 and 05000301/2010-002 (ADAMS Accession No. ML101310428), which documented a violation of the requirements in Criterion XVI, "Corrective Action," of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50 because of the licensee's failure to implement timely corrective actions to address the longstanding issue of submerged, medium-voltage underground cables at the Point Beach Nuclear Plant. Specifically, the NRC first identified this issue in 1997, with numerous condition reports written by the licensee since that time. The licensee entered this issue into its corrective action program. The licensee's corrective actions included the increased monitoring and pumping of manholes, and its proposed actions include design changes to support the automatic monitoring and removal of water from the manholes.
The medium-voltage cable condition monitoring program at the Point Beach Nuclear Plant was subsequently inspected during the Post-Approval Phase 2 License Renewal inspection. The inspection was documented in NRC Inspection Report 05000266/2010-011 (ADAMS Accession No. ML102850469). Inspections of commitments associated with the cable condition monitoring program were concluded to be acceptable.

Beaver Valley Power Station, Units 1 and 2

On August 4, 2009, the NRC issued Inspection Reports 05000334/2009-003 and 5000412/2009-003 (ADAMS Accession No. ML092160021), which documented the results of an inspection at the Beaver Valley Power Station, Units 1 and 2. The inspectors identified a violation of Criterion III, "Design Control," of Appendix B to 10 CFR Part 50, whereby First Energy Nuclear Operating Company (FENOC), the licensee for the Beaver Valley Power Station, Units 1 and 2, failed to maintain safety-related cables in an environment for which these cables were designed. Since the NRC issued IN 2002-12, FENOC has had several opportunities to trend as-found data, implement effective maintenance programs, and identify and thoroughly evaluate long-term adverse conditions for underground safety-related cables exposed to continuous submerged environments. The cables affected include those for Unit 1 river water and Unit 2 service water. FENOC entered the issue into its corrective action program to initiate a review of the current manhole and cable monitoring programs, as well as long-term corrective actions.

Wolf Creek Generating Station

On November 7, 2008, the NRC issued Inspection Report 05000482/2008-004 (ADAMS Accession No. ML083120336), which documented the results of an inspection at the Wolf Creek Generating Station. The inspectors identified a violation of Criterion III, "Design Control," of Appendix B to 10 CFR Part 50 because the licensee failed to adequately demonstrate that submerged 4,160-volt cables are designed or qualified for such service and that they would continue to remain operable. These cables include those of residual heat removal, containment spray, and essential service water. The licensee has subsequently written a condition report and work orders to inspect cables and dewater cable vaults and has conducted tests to monitor the performance of the cables.

Callaway Plant

On October 21, 2009, the NRC issued Inspection Report 05000483/2009-004 (ADAMS Accession No. ML092940774), which documented the results of an inspection at the Callaway Plant. The inspectors identified a violation of Criterion XVI, "Corrective Action," of Appendix B to
10 CFR Part 50 because the licensee failed to take prompt corrective actions to prevent continuous submergence of essential service water pump power cables. The licensee initially identified this submergence issue in its corrective action program (action request) in 2002, but it did not complete the corrective actions. The continuously submerged environment for these cables existed because the two vaults containing these cables (MH-01N and MH-01S) had inadequate seals that are needed to protect the vaults from incoming surface water. These cables were not designed to be continuously submerged and could fail over time based on the operating experience examples in GL 2007-01 and IN 2002-12. The licensee failed to correct an inadequate and degraded seal design for underground cable vaults MH-01N and MH-01S and failed to adequately demonstrate operability for the 4.16-kV essential service water pump cables through adequate testing and analysis for a continuously submerged condition. This violation was determined to be of very low safety significance because the degraded seals were a design or qualification deficiency confirmed not to result in loss of operability. The licensee has subsequently taken measures to improve the seals and has created a Callaway corrective action document to further evaluate and correct this issue.

Peach Bottom Atomic Power Station, Units 2 and 3

On February 8, 2010, the NRC issued Inspection Reports 05000277/2009-005 and 05000278/2009-005 (ADAMS Accession No. ML100390108), which documented the results of a routine inspection at the Peach Bottom Atomic Power Station (PBAPS), Units 2 and 3. The inspectors identified a violation of Criterion III, "Design Control," of Appendix B to
10 CFR Part 50 because the licensee failed to maintain safety-related power cables (including low-voltage cables) in an environment for which they were designed and tested. Specifically, the licensee did not adequately select and review a 480-volt alternating current power cable for suitability of application of materials. The cable feeds a safety-related motor control center that has been in a submerged environment in a manhole for an extended period of time (at least since 2002). Additionally, PBAPS personnel did not take actions to properly evaluate and mitigate the effects of long-term submergence of these safety-related electrical power cables. To address this issue, the licensee entered it into its corrective action program.

Three Mile Island Nuclear Station

On July 31, 2009, the NRC issued Inspection Report 5000289/2009-003 (ADAMS Accession No. ML092120364), which documented the results of a routine inspection at the Three Mile Island (TMI) Nuclear Station, Unit 1. The inspectors identified a violation of Criterion V, "Instructions, Procedures, and Drawings," of Appendix B to 10 CFR Part 50 because the licensee failed to establish and accomplish appropriate work instructions and procedures to inspect underground electrical cables, vaults, and supports for degradation or adverse effects caused by long-term repetitive submergence in water. TMI personnel had not entered the cable vaults, and TMI procedures did not require the actual visual inspection of the cables, supports, or vaults sufficient to determine operability. Furthermore, the licensee did not take action to identify or remediate the cause of the repetitive flooding and to restore the function of the designed cable vault drain systems. The inspectors observed corroded cable tray supports, damaged galvanized armor protective sleeves on cables, and indications of repetitive long-term cable submergence in water. The licensee entered, inspected, and dewatered all affected

vaults. The licensee initiated work orders to correct all identified discrepancies. Some of the

licensee's proposed corrective actions included the implementation of a cable vault improvement initiative such as preventing rainwater intrusion, lid repair, installing lid gaskets, applying sealant to the lids, concrete repair, cable support repair, improving the grading/surrounding environment to prevent water runoff into the vaults, and restoring and maintaining French drains and other drains between vaults.

Vermont Yankee Nuclear Power Station

On May 10, 2010, the NRC issued Inspection Report 05000271/2010-002 (ADAMS Accession No. ML101300363), which documented the results of an inspection at the Vermont Yankee Nuclear Power Station. The inspectors identified a violation of Criterion III, "Design Control," of Appendix B to 10 CFR Part 50 because Entergy (the licensee for the Vermont Yankee Nuclear Power Station) did not select and review safety-related cables suitable for application in the environment in which they were found. Specifically, Entergy allowed the continuous submergence of safety-related cables that were not designed or qualified for continuous submergence and failed to demonstrate that the cables would remain operable. Entergy initiated condition reports to address the issues, commenced the dewatering of the affected manholes, and initiated a preventive maintenance plan to ensure proper design conditions. The finding was determined to be of very low safety significance because it was a design or qualification deficiency which was confirmed to have not resulted in a loss of operability or functionality. Specifically, the continuously submerged cables were not designed or qualified for that environment but were still fully capable of performing their design functions.

BACKGROUND

Cable failures have a variety of causes, including manufacturing defects, damage caused by shipping and installation, and exposure to electrical transients or abnormal environmental conditions during operation. Latent shield or insulation damage could result from errors during cable installation, which could be caused by cable jamming, cable pull-bys, cable sidewall bearing pressure, pulling cables through conduits and flexible conduit, or computerized cable routing system software routing cables through the wrong raceway. The likelihood of failure from any of these factors increases over time as the cable insulation degrades and/or is exposed to water.

During the license renewal and routine baseline inspections, NRC inspectors identified numerous inspection findings that indicate that some licensees are not maintaining cables important to safety in an environment for which they were designed.

On March 21, 2002, the NRC staff issued IN 2002-12, which described medium-voltage cable failures at the Oyster Creek Nuclear Generating Station and the Davis-Besse Nuclear Power Station. The cable failures resulted from submerged safety-related cables in manholes and duct banks that were subjected to long-term flooding problems. Based on the operating experience described in IN 2002-12, several licensees began manhole restoration projects, replaced faulty dewatering equipment and cable supports, and made other modifications.

During a meeting on the license renewal application for the St. Lucie Plant in April 2003, members of the Advisory Committee on Reactor Safeguards questioned whether cable issues were also applicable in accordance with 10 CFR Part 50. The NRC staff responded that the staff of the Office of Nuclear Reactor Regulation (NRR) would evaluate the Committee's concerns. The NRR staff reviewed the available operating experience of cable failures and

observed that some cables at nuclear power plants, which were qualified for 40 years through licensees' equipment qualification programs, were failing before the end of the qualified life of the cables. The staff identified 23 licensee event reports and two morning reports from 1988 to 2004 that described failures of buried medium-voltage alternating current and low-voltage direct current power cables that resulted from insulation failure. In most of the reported cases, the failed cables had been in service for 10 years or more. The NRR staff confirmed that the subject issue was applicable in accordance with 10 CFR Part 50 for operating reactors.
In 2006, the NRC began a detailed review of underground electrical power cables after moisture-induced cable failures were identified at some plants. The cables were exposed to submergence in water, condensation, wetting, and other environmental stresses. Because these cables are not designed or qualified for submerged or moist environments, the possibility that more than one cable could fail has increased; this failure could disable safety-related accident mitigation systems. On February 7, 2007, the NRC issued GL 2007-01 to gather information on inaccessible or underground power cable failures for all cables that are within the scope of the Maintenance Rule (10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants").

DISCUSSION

Based on the above, the NRC expects licensees to identify conditions that are adverse to quality for cables, such as long-term submergence in water. Upon discovery of a submerged condition, the licensee should take prompt corrective actions to restore the environment to within the cable's design specifications, immediately determine the operability of the cable(s) to perform its intended design function, and determine the impact of the adverse environment on the design life of the cable. These corrective actions typically involve the removal of water, the installation of a sump pump or the repair of the drainage conditions, and evaluation of the operability of the cable(s) including testing where appropriate. The long-term corrective actions could involve establishment of a condition monitoring program for all cables which are inaccessible and underground and under the maintenance rule, including testing of cables to verify the cables are not degraded and visual inspection of manholes for water accumulation to ensure continued operability.

Cables are not typically designed or qualified for submergence unless they are procured as submarine cables. Demonstration that a cable is designed or qualified for long-term submergence (i.e., submerged in water continuously or for extended periods of time) requires a qualification test report or certification from the cable vendor. The industry's previously conducted post-loss-of-coolant accident cable submergence tests do not demonstrate qualification for long-term cable submergence, and the use of the Arrhenius methodology by some licensees to demonstrate qualification for long-term cable submergence is invalid. For areas in which cables could be submerged, the licensee should identify and demonstrate that these cables are designed or qualified by documented testing for the required duration.
While the initial NRC inspection findings discussed in IN 2002-12 at Beaver Valley Power Station, Oyster Creek Nuclear Power Plant, Pilgrim Nuclear Power Station, Brunswick Steam Electric Plant, Davis-Besse Nuclear Power Station, and Millstone Power Station, Unit 2, did not identify any specific violations of NRC requirements, the NRC staff will evaluate future cable submergence issues to determine whether NRC regulations are being met.

The NRC issued GL 2007-01 to gather information on inaccessible or underground power cable

failures for all cables within the scope of the Maintenance Rule. The NRC staff identified 269 cable failures based on its review of responses from all licensees (65 sites and 104 reactor units). These failure data indicated an increasing trend in underground cable failures, and the predominant contributing factor was submergence or moisture intrusion that degraded the insulation. The staff noted that the cables are failing within the plants' 40-year licensing periods. Some of the cable failures have resulted in plant transients and shutdowns, loss of safety redundancy, entries into limiting conditions for operation, and challenges to plant operators. The NRC staff published the summary report that captured the review of responses from all licensees on November 12, 2008 (ADAMS Accession No. ML082760385).

The NRC regulations require licensees to assess the condition of their components; monitor the performance or condition of structures, systems, and components in a manner sufficient to provide reasonable assurance that they are capable of fulfilling their intended functions; and establish a suitable test program to ensure that all testing necessary to demonstrate that components will perform satisfactorily in service is identified and performed. To date, NRC inspectors have identified various violations of NRC requirements at several facilities. Appendix A to this IN lists NRC inspection reports from 2008–2010 that identified inspection findings related to cable submergence.

Cables not designed or qualified for, but exposed to, wet or submerged environments have the potential to degrade. Cable degradation increases the probability that more than one cable will fail on demand because of a cable fault, lightning surge, or a switching transient. Although a single failure is within the plant design basis, multiple failures of this kind would be challenging for plant operators. Also, an increased potential exists for a common-mode failure of accident mitigating system cables if they are subjected to the same environment and degradation mechanism for which they are not designed or qualified for. Some licensees have attempted to periodically drain the accumulated water from the cable surroundings to avoid cable failures. In some cases, the water quickly refilled the cavity in areas in which the water table was above the base level of a cable trench or underground vault. In other cases, water accumulated seasonally (e.g., because of snowfall or rain), filling the conduit or raceways. In both cases, periodic draining could slow the rate of insulation degradation, but it may not prevent cable degradation. Licensees should ensure that cables that could become submerged are adequately monitored.

CONTACT

This IN requires no specific action or written response. Please direct any questions about this matter to the technical contacts listed below or to the appropriate NRR project manager.

/RA by TBlount for/ /RA by JTappert for/
Timothy McGinty, Director Glenn Tracy, Director
Division of Policy and Rulemaking Division of Construction Inspection and
Office of Nuclear Reactor Regulation Operational Programs
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301-415-1597 301-415-2760
E-mail: Matthew.McConnell@nrc.gov Amar.Pal@nrc.gov
Note: NRC generic communications may be found on the NRC public Web site, http://www.nrc.gov, under Electronic Reading Room/Document Collection

ATTACHMENT B

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

In the Matter of	Docket # 50-293-
LR	
Entergy Corporation	
Pilgrim Nuclear Power Station	
License Renewal Application	December 13, 2010

Declaration of Paul M. Blanch

I, Paul Blanch hereby declare under penalty of perjury that the following is true and correct.

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

Experience

Beginning in 1964, I served in the U.S. Navy as both a nuclear reactor operator and electric plant operator on *Polaris* class submarines for seven years. These submarines typically were at sea for extended tours of duty. During my Navy service, I and my fellow crew members were routinely in close proximity to the submarines' nuclear reactors that powered the vessels whether they were under the sea or on the surface.
As a qualified Reactor and Electric Plant Operator, I was responsible for the operation of the reactor and supporting safety systems including, piping, valves, radiation monitoring systems, chemical monitoring systems, reactor protection and control systems, cable and cable termination systems, turbines, generators, power supplies, inverters, breakers, switchgear, battery chargers, motor and steam-powered electric generators (AC and DC), and transformers and other components and systems required to support the safe operation of the submarine's nuclear power plant.

I graduated from the U.S. Navy Electronics Technician School in 1964; the U.S. Navy Nuclear Power School, in 1966; and the U.S. Navy Submarine School, in 1968.
As part of my Navy duties, I was certified as an operator/instructor at the Navy prototype reactor (S1C) in Windsor Locks, Connecticut. I instructed Navy officers and enlisted personnel on reactor operations and maintenance including the subjects of reactor systems and electrical theory related to nuclear systems, power generation, emergency core

cooling systems, emergency power systems, diesel generators, water supplies and all other systems required for the operation of the nuclear reactor.

I received an honorable discharge from the Navy in 1971. In 1972, I received a Bachelor of Science in Electrical Engineering from the University of Hartford. This curriculum included numerous courses in thermal and mechanical engineering.

I have more than 40 years of engineering, design, operations, maintenance, engineering management, and project coordination experience for the construction maintenance and operation of nuclear power plants. This includes positions at Northeast Utilities that involved in the design, construction, operation, and maintenance of Millstone Units 1, 2, and 3 and Connecticut Yankee (Haddam Neck). During this period, I was under the direction of the Nuclear Engineering Department within Northeast Utilities.

I have also been employed by Consolidated Edison and Entergy at Indian Point Unit 2 as an advisor to the Chief Nuclear Officer (CNO) at that facility. I served in a similar position at Maine Yankee reporting to the CNO of Maine Yankee Atomic Power Company.

My duties at Northeast Utilities included piping system designs and also all Instrument and control systems. I also served as Nuclear Operations Engineer providing liaison services between the NU headquarter and Millstone Unit 2 responsible for coordination of all system design, operation and backfits of operating systems.

I am a registered professional engineer in the State of California. Certificate Number 2235 (currently inactive)

I have actively participated in industry standards writing activities with the American Nuclear Society (ANS), Instrumentation Society of America (ISA), and the Institute of Electrical and Electronics Engineers, Inc. (IEEE) for use by the nuclear industry.

I have been employed as a contractor for the Electric Power Research Institute (EPRI) for the development of computerized monitoring systems for nuclear power plants including monitoring the performance of safety systems and devices including pressure and levelmonitoring systems.

I have been engaged as a contractor to Nuclear Energy Institute (NEI, previously NUMARC) to educate Chief Nuclear Officers on the attributes of a Safety Conscious Work Environment(SCWE).

In 1993, I was named "Engineer of the Year" by Westinghouse Electric and Control magazine for my efforts in identifying the subtle failures of active electrical devices such as pressure, level, and flow transmitters and indicators. These failures included generic design deficiencies of piping and mechanical systems in reactor level monitoring systems.

I am an expert witness for the State of New York for Inaccessible Cables however my

comments contained herein do not/may not reflect those of the State of New York.

I have read and reviewed the enclosed proposed contention from Pilgrim Watch and fully support all technical and regulatory aspects of this contention on Inaccessible cables.

Executed in Accord with 10 CFR 2.304 (d),

(Original Signed)

Paul M. Blanch
December 12, 2010
West Hartford, Connecticut
860-236-0326
pmblanch@comcast.net

ATTACHMENT C

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
July 29, 2010

SUBJECT: PILGRIM NUCLEAR POWER STATION - NRC INTEGRATED INSPECTION REPORT *05000293/2010003*

1 R06 Flood Protection Measures (71111.06)
Underground Cable Inspection

a. Inspection Scope (1 sample)

The inspectors reviewed a sample of flood protection measures affecting cables located in underground manholes. The inspectors selected an inspection of cable pits 2A, 4, and 5 that contain underground non-safety related power cables (from the start-up transformer to electrical buses A2 and A4) near the main transformer and the south side of the switchyard near the start-up transformer. The inspectors monitored Entergy's maintenance inspection and dewatering activities associated with each manhole to evaluate the as-found condition and corrective actions. The inspectors assessed the condition of power cables, splices, and supports. The inspectors also reviewed Entergy's Cable Reliability Program and corrective actions taken for this issue and the Cable Reliability Program in general. The documents reviewed during this inspection are listed in the Attachment.

b. Findings

Introduction: The inspectors identified a finding (FIN) of very low safety significance (Green) for improper maintenance of underground non-safety related medium voltage electric cables. The inspectors observed partially and fully submerged medium voltage cables during the regularly scheduled monthly dewatering and inspection of three cable vaults.

Enclosure
8
Description: The electric power distribution system provides electric power to safety and non-safety related distribution buses in the plant. Off-site power is provided to the system by two independent circuits through non-safety related, medium voltage (typically those rated from 2 kilovolts to 35 kilovolts), Kerite cables that are routed through underground vaults and ducts. These cables are not rated for continuous submergence in water.

On April 28, 2010, the inspectors observed water in each of the manholes and vaults listed above. The inspectors noted that no dewatering or drainage systems existed in the manholes. Entergy procedure EN-DC-346, Revision 0, "Cable Reliability Program," was issued and effective on December 31,2009. This procedure discusses manhole inspections and dewatering, and requires, in part, "If manual inspections and pumping are used to maintain a cable system dry, the intervals must be sufficient to keep the cables dry. Adjust intervals as necessary, based on inspection results." Discussions with Entergy personnel involved with these inspections indicated that cables in Manhole 2A were periodically found submerged or partially submerged, and that cables in Manholes 4 and 5 were always found submerged. The cables that were submerged included cables that were installed from the 4160V, non-safety related startup

transformer and connected to the A2 and A4 non-safety related busses. The inspectors identified that Entergy had previously identified submerged cables in August and September of 2009, however, corrective actions were not sufficient to preclude these cables from being submerged. The inspectors also determined that Entergy had not implemented the Cable Reliability Program guidance in a timely manner to ensure that the degrading effects of this environmental condition were minimized (Le., pumping intervals were not sufficient to maintain the cables dry).

Entergy generated Condition Report (CR) CR-PNP-201 0-1529, and specified actions to identify all underground medium voltage cables included in the Cable Reliability Program, and to identify which manholes should have dewatering capability. Entergy also created a corrective action to increase the frequency of the dewatering activities for these areas. In addition, the Electric Power Research Institute has generated a cable testing database that will be used to compare the test results of cables that have been removed from service to evaluate the potential for degradation of in-service cables.

Analysis: The inspectors determined that allowing medium voltage cables to remain submerged for extended periods of time was a performance deficiency. The cause of the issue was within Entergy's ability to foresee and correct, and should have been prevented. Traditional Enforcement did not apply, as the issue did not have actual or potential safety consequence, had no willful aspects, nor did it impact the NRC's ability to perform its regulatory function.

A review of NRC Inspection Manual Chapter (IMC) 0612, Appendix E, "Minor Examples," revealed that no minor examples were applicable to this finding. The finding was more than minor because it was associated with the design control attribute of the Initiating Events cornerstone, and affected the cornerstone objective of limiting the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, continued submergence of the nonsafety related power cables (from the start-up transformer to electrical buses A2 and A4)

could lead to cable failure and cause an event that would affect plant stability. The inspectors performed a Phase 1 Significance Determination Process screening of the finding in accordance with NRC Inspection Manual Chapter 0609, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," and determined that the finding was of very low safety significance because the condition did not contribute to both the likelihood of a reactor trip and the unavailability of mitigating systems equipment.
The inspectors determined that this finding had a cross-cutting aspect in the Problem Identification and Resolution cross-cutting area, Corrective Action Program component, because Entergy personnel did not thoroughly evaluate the problem when submerged cabling was initially identified [P.1(c)].

Enforcement: This finding does not involve enforcement action because no regulatory requirement violation was identified. Because this finding does not involve a violation and has very low safety significance, it is identified as **FIN *05000293/2010003-01,* Submerged Medium Voltage Cables.**

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of — Docket # 50-293-LR

Entergy Corporation

Pilgrim Nuclear Power Station

License Renewal Application — December 13, 2010

CERTIFICATE OF SERVICE

I hereby certify that *Pilgrim Watch Request For Hearing On A New Contention: Inadequacy Of Entergy's Aging Management Of Non-Environmentally Qualified (EQ) Inaccessible Cables (Splices) At Pilgrim Station* was served December 13, 2010 in the above captioned proceeding to the following persons by electronic mail this date, followed by deposit of paper copies in the U.S. mail, first class.

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Attn: Rulemakings and Adjudications Staff
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Administrative Judge
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Administrative Judge
Ann Marshall Young, Chair
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_____
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December 13, 2010

J-319

Hearing Docket

From:	Mary Lampert [mary.lampert@comcast.net]
Sent:	Monday, December 13, 2010 11:10 AM
To:	Jones, Andrea; Young, Ann; Newell, Brian; David Lewis; Harris, Brian; Docket, Hearing; 'Jason Parker'; Tucker, Katie; Kevin Nord; Regner, Lisa; Mark Stankiewicz (Plymouth); Matthew Brock; OCAAMAIL Resource; Abramson, Paul; paul.gaukler@Pillsburylaw.com; Cole, Richard; Richard MacDonald; Sheila Hollis(PlyAttorney); Uttal, Susan; 'Terence Burke'
Cc:	Paul Blanch
Subject:	PILGRIM WATCH REQUEST FOR HEARING ON A NEW CONTENTION: INADEQUACY OF ENTERGY'S AGING MANAGEMENT OF NON-
Attachments:	PW REQUEST FOR HEARING RE INACCESSIBLE ELECTRICAL CABLES 12.13.pdf; PW Request for Hearing New Contention Non EQ Inaccessible Cables (Splices) 12.13.10.doc

Good Morning:

Attached please find PILGRIM WATCH REQUEST FOR HEARING ON A NEW CONTENTION: INADEQUACY OF ENTERGY'S AGING MANAGEMENT OF NON-ENVIRONMENTALLY QUALIFIED (EQ) INACCESSIBLE CABLES (SPLICES) AT PILGRIM STATION and the Certificate of Service.

If you have any difficulty in opening these documents, please call Mary Lampert at 781-934-0389.

Thank-you and have a good day.

Mary

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From: Mary Lampert <mary.lampert@comcast.net>
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Subject: =?US-
ASCII?Q?PILGRIM_WATCH_REQUEST_FOR_HEARING_ON_A_NEW_CONTENTION:_INA
DE?=
=?US-ASCII?Q?QUACY_OF_ENTERGY'S_AGING_MANAGEMENT_OF_NON-?=
Date: Mon, 13 Dec 2010 11:10:02 -0500
Message-ID: <002f01cb9ae0$35de1610$a19a4230$@lampert@comcast.net>
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